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THE PHILIPPINE JOURNAL OF OTOLARYNGOLOGY HEAD AND NECK SURGERY

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DEDICATION

This issue of the journal is dedicated in honor of the man who can be considered the father of the Philippine Journal of Otorhinolaryngology-Head & Neck Surgery, Dr. Angel Enriquez. He was the person who saw the need for a written and published transcript of the proceedings of the society and served as its first editor. It was really a labor of love then. It was basically a one man operation and yet, despite this handicap, he was able to nurture it during its infancy. He would literally beg for articles, cajole members to write and even rewrite whole articles just to be able to come up with an issue. His obligations and commitment to the journal did not stop there. He even had to find and recruit sponsors willing to defray the cost of publication. All of these he was able to achieve despite his involvement in other activities.

Dr. Angel Enriquez is a former president of the society. He also used to occupy the same position with the Philippine Board of Otolaryngology-Head & Neck Society. Aside from these, he was also a former chairman of the Ear, Nose and Throat departments of the Manila Central University Hospital and the Ospital ng Maynila. He is a man dedicated to the specialty and, in a way, it can be said that ENT has been his life-long mistress.

Writing has been his second love, as manifested by the numerous articles he has authored and influenced. He has also been instrumental in the completion of the first Philippine book on the specialty, Basic Otolaryngology, wherein he was not only the editor but also its guiding spirit. He is a joy to work with knowing fully well that his commitment to the project has been unwavering. Though not a slave driver, one can not help but admire his work ethic finishing his share of the task much ahead of his younger counterparts.

His contributions to the specialty have been far-ranging and deeply rooted. A very stimulating lecturer, his style in making a very basic topic quite entertaining has never been equaled. He has taught at least two generations of physicians at the ORL Departments of the University of the Philippines, Manila Central University and Pamantasan ng Lunsod ng Maynila the basics of otolaryngology and has influenced the training of residents in these three institutions for decades. What is more admirable is that he did all these things at his alma mater, the UP College of Medicine, without receiving any compensation at all. That is, gratis et amore.

Even the society did not escape the imprint of his zeal and energy. He was one of the so-called heroic seven who established the society as a separate specialty organization despite all odds. The ophthalmologists were far more numerous than they were but this did not deter them from proceeding with their plans. Can you imagine this undaunted group not only was able to nurse the society to what it is now but also hosted an international congress here in Manila just to highlight the birth of their new organization?

Truly, Dr. Enriquez is possessed with the guts that would have cowed an ordinary human being. His intrepid character has benefited all of us who love the specialty. The younger practitioners can not deny the fact that he was one mentor with whom they can discuss things with, even personal ones. He was always there when you needed him most. And yet, despite his amiable nature, he had shown an innate strength of character when he resigned his position in a leading university over a matter of principle. Delicadeza is another of his strong suits and consistency is one of his trademarks.

It is but proper that, in this year of the centennial of our independence, we pay tribute to a man who has exerted a great influence to most of the present crop of ENT specialists. An influence he has made in his capacity as a lecturer and professor, as a writer and author, as president of the society and the certifying board, and, most of all, as a role model whose shoes we can only try to fill.

Dr. Angel Enriquez, may your tribe increase!! We sure are lucky to have you around and benefit from your presence.

MORALITY and MEDICINE

JOSELITO C. JAMIR, MD
Editor-in-chief

Morality pertains to the distinction between right and wrong and to the rules of right conduct. It refers to the character of being in accord with the principles or standards of right conduct. Morality is a concept whose existence most people come to accept but very few can put into concrete terms or can understand the meaning of. It is something that people tend to accept unconsciously as being present and has been trying hard to define and dissect in an analytical and logical manner.

Philosophers even from the ancient times have been grappling with the concept of morality and a lively discussion has ensued without having reached a consensus on the matter. The Greeks began it all as an attempt to find a regulation for the conduct of life which should have a rational basis and purpose instead of being derived from custom. There must be a single and final source of law not in conformity with law-giving powers but must be sought in ends that are good like self-realization, happiness, and holiness. That is, the greatest possible aggregate of pleasures.

Joseph Butler commented that morality is not primarily theological in nature but is rather based on careful and critical observations of the actual belief and practices of mankind. Man is motivated to action by a variety of different principles. David Hume claimed that reason alone can not be a motive to any action of the will, reason being not capable of opposing passion in the direction of the will. Pritchard, on the other hand, stated that no reason can or need be given to justify our beliefs about what we ought to do. To know whether an act is right or wrong, all that we need to do is contemplate the situation in which we find ourselves and it will become immediately evident to us whether we ought to or ought not to do the act in the situation. Thus, in effect, morality is self-evident and this fact we recognize by direct intuition.

Medicine is a profession or career that is deeply rooted in scientific principles and observation, statistical analysis and repeatability of result brought about by the time tested method of trial and error. Medicine for most is a vocation, a means to earn a livelihood. In recent years, this is the evolution that has transpired in our profession. Slowly vanishing is the nobility of purpose, the humanitarian goal to render services being the end in itself. Nowadays, medicine is just a part of the service industry, just another commodity subject to trade and commerce in the marketplace. Gone were the days when medicine was purely an avocation.

This transformation in the nature of the profession was brought about by the changing environment that surrounds the profession and maybe the direct result of the high cost of medical education, the increase in the cost of living and the expensive acquisition cost of instruments required in the practice of modern-day medicine. As such, physicians of today can not survive in practice on the basis of the nobility of the profession alone. A return on investment is and will always be a prime consideration.

In the daily practice of medicine, almost all physicians are confronted with questions of morality. How much to charge the patient is one such question. Overcharging and undercharging, in the strictest sense, are but two faces of the same coin. The question of charges can easily be remedied if each and every physician will just conform to a definite set of standards promulgated by a collegial body like a specialty society. However, such standards should take into consideration other factors like physician factors, patient factors, hospital factors and disease factors. Formulating such a standard is not only a complex task but a tedious one also.

The matter of palliative surgery is another issue. Is it morally acceptable to perform a palliative surgery knowing fully well that it is not sufficient to achieve a cure? Would the quality of life be better served by palliation? If so, is it enough to justify the

Continued on p. 20

ETHOS, ETHICS AND ETIQUETTE

Coupled with this day and age of technological advancements and sustained economic growth has been the increasing desire for material goods and comfort the pursuit of which has been the gradual erosion of moral values. It seems that there has been quite a shift in the definition of morality.

The medical profession has been considered since time immemorial as a noble and humanitarian one. But what are we seeing in our profession nowadays. Do physicians still treat their patients out of duty to cure the sick and promote the maintenance of good health, the maxim through which our profession is supposed to exist? Can we still see the same commitment and devotion to duty that our predecessors as the profession exhibited? Do we still consider these predecessors with the respect and recognition due them or as anachronism whose ideas and teachings are already passe and no longer applicable to the present?

As Immanuel Kant has aptly stated it, there are three propositions of morality. First, an action, to have moral worth, must be done from duty. Second, an action done form duty does not have its moral worth in the purpose which is to be achieved through it but through the maxim by which it is determined. Third, duty is the necessity of an action done from respect of the law.

It seems that the present day practitioners of the healing art has misinterpreted Kant gravely. It is true that an action is rendered right or wrong not by the results to which it leads but by the motive from which it has been performed. In this case, they have substituted the noble motive with the profit motive. With the need to recoup the high expenses engendered by the acquisition of a good medical education, the blame does not rest entirely with the practitioner. But is there really enough justification for the pendulum to swing to the materialistic extreme? Gone were the days when the physician spends the night with his patient who is in critical condition. Now he spends at most one hour a day with his patient and the patient is lucky enough if his physician does so. Most physician rarely find the time to explain matters fully to the patient and seldom do they answer queries posed eagerly nor find the time to allay the fears and anxieties that the patient feels. Although medical science is a very dynamic thing, especially with the technology intensive fields, the basics of medicine has gone virtually unchanged for the past twenty years. Our practitioners can never match the clinical eye and judgment of our former professors. More so if we consider medicine as the art of healing. Older physicians can "cure" their patient by simply touching them, by talking with patients and showing the empathy that is a must in healing. For this alone, our predecessors deserve the respect and recognition that we can render to them.

The ethics of decency has been upstaged by the ethics of greed, the need to acquire more. More and more we see doctors trying to outdo each other in the acquisition of wealth, in who has a better car, a plushier house, the bigger land, and other trimmings of wealth which are but icings to a barren core. Gone were the days when a patient saved is enough satisfaction in itself. Wealth and more wealth is the overriding motive. It has derailed the meaning and purpose of medical care and physicians have grown apathetic to the plight of the sick. Gone are the values that taught us to be happy for having done our good deed for the day and grateful for the little pleasures in life that this good deed brings.

Great societies are the products of people and no amount of material goods or comforts can replace the collective will and idealism of a society. People, not material things, are our greatest resource and an education that stresses values, not just information and technology, is our quality control for the future. Towards this end the inclusion of values on the specialty board exams, as a must-pass subject; is a concrete step towards this direction. Kant or can't we not?

JOSELITO C. JAMIR, M.D.
Editor-in-chief

*This is the editorial for the 1996 issue which was inadvertently omitted.

CRANIOFACIAL RESECTION FOR TUMORS OF THE NASAL CAVITY AND PARANASAL SINUSES – A 17 YEAR EXPERIENCE

Article by Lund VJ Howard DJ
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Institute of Laryngology and Otology
London United Kingdom
Head Neck 20(2) 97 105 1998 Mar

ABSTRACT

BACKGROUND

The rarity of sinonasal tumors has precluded long term follow up of large series of craniofacial resections until now METHODS A series of 209 patients suffering from a wide range of histologies who had undergone craniofacial resection for sinonasal neoplasia with up to 17 years follow up were analyzed RESULTS An overall actuarial survival of 51% at 5 years and 41% at 10 years was found for the cohort as a whole For malignant tumors the 5 year actuarial survival was 44% falling to 32% at 10 years For benign pathology the actuarial survival was 75% at both 5 and 10 years Statistical analysis identified three factors which significantly affect outcome and survival malignant histology brain involvement and orbital involvement Few complications are associated with the surgery with the mean post operative stay being 16 days

CONCLUSIONS

The improved survival and minimal morbidity and mortality associated with craniofacial resection make it the optimum approach to sinonasal tumors

COMMENT

This paper reports the authors series of craniofacial resections for tumors of the nasal cavity and paranasal sinuses over a 17 year period In all 209 patients were described with ages ranging 7 to 77 years Malignancy compromise 68% with adenocarcinoma as the most common The most common site was the ethmoid sinuses comprising 43% of tumor sites Survival rates were of course worst for malignant conditions at 44% (5 years) 32% (10 years) and 75% for benign lesions The treatment algorithm for the management of orbital extension is given eg periosteal transgression dictates removal of orbital contents In addition brain involvement also affected survival outcome

LASER ASSISTED UVULOPALATOPLASTY SIX AND EIGHTEEN MONTH RESULTS

Article by Wareing MJ Callanan VP
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J Laryngol Otol 112(7) 639-41 1998 Jul

ABSTRACT

The ongoing evaluation of the results of laser assisted uvulopalatoplasty (LAUP) for snoring is presented Follow up between 18 and 24 months post treatment completion of patients with a presumably successful result at six months reveals that 22 percent of these patients suffer failure of snoring control between these two evaluation points This equates to an overall success rate at this time of 55 percent LAUP like other surgical remedies for snoring has a continued relapse rate This must be considered when counselling patients

COMMENT

Kamami in 1990 popularized LAUP as an office procedure for the treatment of snoring Using a questionnaire the authors re evaluated the results at six months post op then 18 24 months later There was a reduction of the initial 78% success rate to 55% The limitation of this study was the lack of an objective assessment Nonetheless the need for making the prospective patients aware of the possibility of redevelopment of snoring is a valid point

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LARGE VESTIBULAR AQUEDUCT SYNDROME IN A FILIPINO PATIENT: THE FIRST REPORTED CASE*

JOSE CARLOS Z. JUGO, MD**
CHARLOTTE M. CHIONG, MD***

INTRODUCTION

The evaluation of sensorineural deafness and vertigo are perhaps two of the most frustrating clinical complaints that the clinician, moreso the otolaryngologist, is called upon to investigate often during the course of one's practice. First described by Valvassori in 1978[1], the LVAS, as an isolated temporal bone anomaly, is one such entity which is present in only 0.64% of the population as described by Levenson and Parisier in 1989 [2]. No case of the Large Vestibular Aqueduct Syndrome has, at the time of this writing, been reported locally. The co-existence of an atypical form of positional vertigo in the patient compounded the diagnosis even more. The high index of suspicion regarding this rare temporal bone anomaly among otolaryngologist-head and neck surgeons cannot be over-emphasized, and the differential diagnoses of patients with early onset progressive sensorineural hearing loss with or without vestibular symptomatology should include the Large Vestibular Aqueduct Syndrome among others.

CASE REPORT

I. F. is a 20 year-old female from Cabanatuan, Nueva Ecija who consulted in this institution with the chief complaint of hearing loss and dizziness. The condition started approximately 17 years ago when the patient was noticed to be 'hard of hearing' and delayed in speech. The mother described the child's hearing as more profound in the right since, as a child, the patient was said to have actually been able to hear faintly when one would 'shout' in her left ear. At this time there were no other associated signs and symptoms. Consult was done at a municipal clinic and the child's mother was simply advised that the child was deaf and mute. No hearing aids were recommended and no medications were given.

Ten years ago, the patient began complaining of episodes of severe dizziness upon waking in the morning, associated with non-projectile vomiting and nausea. The dizziness was described as a 'whirling' sensation and associated with sudden movements of the head and with sitting up from a supine position. The patient's sister and mother noticed 'sideward rolling of the eyes' during these attacks that would last for hours to days with normal intervals in between. Consult with several ENT specialists in Nueva Ecija resulted in partial relief of dizziness but with frequent recurrences in between.

Patient had been confined several times for the supportive management of acute exacerbations of dizziness. However, no ancillary procedures were done to further evaluate the condition. Since the age of fifteen, patient has had bouts of 'sore throat' that resolved spontaneously with only supportive home remedies. Pertinent past medical illnesses include only varicella at the age of ten and rubella at the age of five. No sequelae were noted. The immunization status as a child are unrecalled. There is no history of head trauma.

Fourteen months PTA, patient consulted in Malolos, Bulacan because of one week duration of severe spinning vertigo. Neuro-otologic examination was normal except for postural vertigo and profound sensorineural hearing loss and was then referred this institution's Hearing

*1st Place, PSOHNS Clinical Case Report Contest, May 17, 1997, Cebu Plaza Hotel, Cebu City
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and Vestibular Sciences Laboratory for a detailed work up.

There are no pertinent heredofamilial diseases in the patient's family except for essential hypertension in the father, who is deceased, and acid peptic disease among all the siblings but which was attributed to 'stressful' lives.

The older brother, however, also suffers from early onset and profound bilateral sensorineural deafness but without the dizziness spells described by the patient.

The patient is the third in a family of five children, a nonsmoker and nonalcoholic drinker. Physical examination findings with emphasis on the head and neck revealed a well-nourished and oriented young female. ENT examination was essentially normal except for profound sensorineural hearing loss, bilaterally. Dix-Hallpike test showed rotatory positional nystagmus without latency especially on head hanging right. No spontaneous or gaze nystagmus were noted. Cerebellar function was intact. Systemic examination was likewise normal.

Pure tone audiometry revealed bilateral profound sensorineural hearing loss. SRT could not be tested in either ear. (Figure 1).

However, Auditory Brainstem Evoked Response (ABR) showed poor wave morphology in all frequencies bilaterally, consistent with profound sensorineural hearing loss. (Figure 2).

Electronystagmography (ENG) revealed normal saccades and smooth pursuit, with symmetric optokinetic nystagmus. However, positional nystagmus, right beating in all head positions and without any delay in onset, was noted (Figures 3A-C). There was no response to bithermal caloric testing but a residual caloric response to ice water stimulus was elicited in the left ear (Fig. 4A and B). ENG findings were interpreted as 'atypical positional nystagmus', with bilateral marked caloric response reduction with residual response to ice water stimulation in the left ear. A mixed central nervous system and peripheral vestibular neuron localization could not be ruled out. Imaging studies by way of HCRT was recommended.

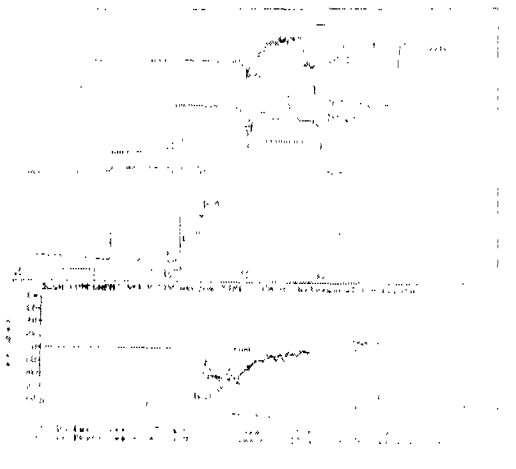

Figure 3A. *Electronystagmography of the patient revealed an 'atypical positional nystagmus': right beating in head hanging center, head hanging left and head hanging right. Above, Figure 5A: Head hanging right.*

Figure 3B. *Electronystagmography results (cont'd) head hanging left.*

Figure 3C. *Electronystagmography results (cont'd), head hanging center*

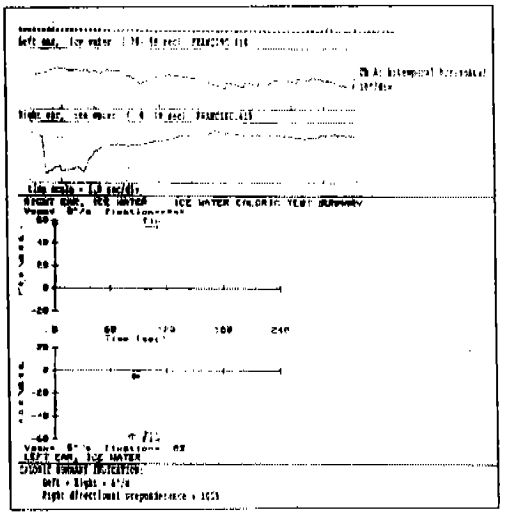

Figure 4A. *Summary of Bithermal Caloric Testing: No response bilaterally.*

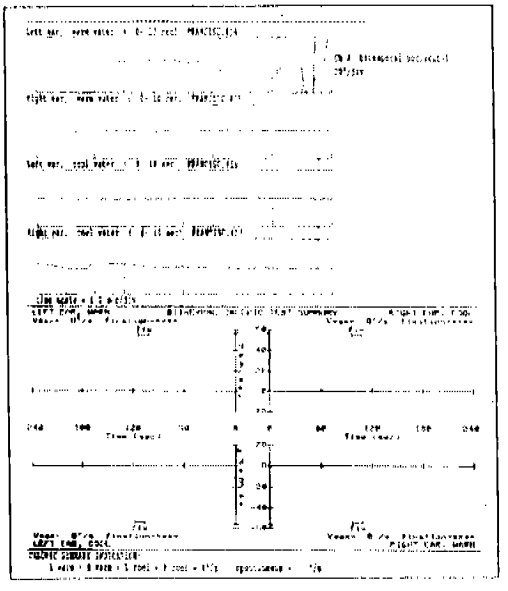

Figure 4B. *Summary of Ice Caloric Testing: No response to ice calorics in the right ear; residual response in the left ear.*

DISCUSSION

The clinical presentation of the patient together with the results of the pure tone audiometry and auditory brain evoked response testing prompted the authors to search for an etiology to the patient's condition. Differential diagnoses included bilateral acoustic neuroma, delayed endolymphatic hydrops, and a congenital inner ear malformation. The approach to the differentials and approach to the diagnosis are further discussed below.

The bilateral acoustic neuroma of neurofibromatosis type II deserves special mention as a differential diagnosis in any patient presenting with progressive bilateral sensorineural hearing loss. Bilateral acoustic neuromas are present in nearly 95% of cases of NF II[3]. However, the absence of a strong familial tendency to the tumor as well as café-au-lait spots and cerebellar signs in the patient made this differential unlikely. The normal diameter and symmetric appearance of the internal auditory canals on HRCT ruled out this condition.

In delayed endolymphatic hydrops, there almost always is a clear antecedent insult to the inner ear, usually a viral infection such as mumps or influenza [4], although bacterial infections as in meningitis may also occur. The viral or bacterial insult is highly suspected in such cases because of its temporal relationship to the hearing loss in the patient and may be bilateral, ipsilateral or contralateral, depending on the specific type of damage. Delayed endolymphatic hydrops is thought to be caused by injury to the resorptive mechanism of the inner ear, eventually leading to inconsistencies between the production and secretion of endolymph. However, since the existence of a viral or bacterial labyrinthitis 'preceding' the patient's deafness and vertigo was not clearly established, delayed endolymphatic hydrops was considered unlikely.

Isolated inner ear malformations were also considered[5]. Among them were Michel's Aplasia (complete aplasia of the inner ear), Scheibe's Aplasia (cochleo-saccular aplasia), Mondini's Aplasia (incomplete development of the bony and membranous labyrinth wherein the cochlea may be represented by as little as a single curve tube), and finally, the LVAS. To confirm the suspicion, a CT scan of the petrous portion of the temporal bone was requested.

High resolution CT scan of petrous bone using coronal and axial sections at 1 mm intervals showed dilatation of the vestibular aqueducts on both sides; 3.5 in the left and 2.5 mm in the right. The cochleas, semicircular canals and tympanic

cavities were unremarkable. (Figure 5) The diagnosis of Large Vestibular Aqueduct Syndrome was made at this point.

Figure 5. High resolution Computerized Tomograhpy (CT) Scanning of the petrous bone using 1 mm axial cuts revealed bilateral dilatation of the vestibular Aqueducts. The cochleas, semicircular canals and tympanic cavities together with the rest of the temporal bone were normal.

A brief review of the embryology, anatomy and physiology of the vestibular aqueduct will be made here in order to fully appreciate the peculiarity of the LVAS:

The membranous labyrinth is encased within the otic capsule. The endolymphatic duct system develops in the embryo as an ectodermal layer invagination but soon becomes a closed cavity and isolates itself from the original ectoderm. By the seventh week, the endolymphatic duct system is lodged in mesenchymal tissue, and, by the fourteenth week, it attains the size close to what it would be in the adult [5,6]

Successive invagination results in three main areas formed: The endolymphatic duct and sac which provides a channel for the exchange of chemicals and balance of pressure between the subarachnoid space and endolymph; the utricle and semicircular canals which contain the receptors for linear and angular motion; and the saculle and cochlea for transduction of sound energy. These three components constitute the membranous labyrinth in the adult.

The most likely sites for the production of endolymph are the secretory cells in the stria vascularis of the cochlea and the dark cells in the vestibular labyrinth. Resorption of endolymph, on the other hand, is generally believed to take place in the endolymphatic sac.

The large vestibular aqueduct syndrome, as an isolated temporal bone anomaly, is a relatively newly discovered clinical entity [6] and has been identified as a finding in children with progressive types of deafness. The syndrome describes an abnormally large endolymphatic duct and sac with associated sensorineural hearing loss. Subsequent reports have been much facilitated by computerized tomographic scanning and the isolated LVA anomaly has since been determined to have an overall incidence of 64%.[5] No case of the LVAS has ever been reported in the Philippines.

Although some authors attribute the LVAS to early derangements in the embryogenesis of the endolymphatic duct, in effect a sub-type of the Mondini's Dysplasia[8], more recent clinical observations have indicated that hearing loss in children with isolated enlargement of the vestibular aqueduct is acquired during childhood.[7]

Normally, the vestibular aqueduct arises from the medial wall of the vestibule. It extends posteriorly for approximately one centimeter and opens into the posterior surface of the pyramid within the posterior cranial fossa. The endolymphatic duct courses within the vestibular aqueduct and connects the endolymphatic sac with the vestibular labyrinth, and via the ductus reuniens, with the cochlear duct [5].

The remainder of the inner ear is developed at birth. However, the vestibular aqueduct and endolymphatic sac are not. The latter rapidly increase in size with the normal expansion of the posterior cranial fossa postnatally reaching full maturity only at four years of age. Hence, the vestibular aqueduct past the age of four has been classified into three anatomic/developmental categories with regards to 'area': Hypoplastic, lesser than 8 mm; Normoplastic, 8 to 18 mm; and Hyperplastic, greater than 18 mm[6]. Likewise, a vestibular aqueduct greater than 1.5 mm in antero-posterior diameter by high resolution CT scanning is considered abnormally enlarged [8]. Eelkema and Curtin (1989) noted that the caliber of normal vestibular aqueduct must be equal to or smaller than that of the posterior semicircular canal. Any larger measurement indicates dilatation, which is a

malformation most often observed in axial images.[9]

From the clinical observations of Levenson and Parisier, children born with an isolated LVAS may initially have normal hearing. In the LVS syndrome, however, where the vestibular aqueducts are abnormally dilated, the homeostasis of the endolymphatic circulation is compromised by reflux of hyperosmolar endolymphatic sac contents through the widely patent endolymphatic duct. (Figure 6)

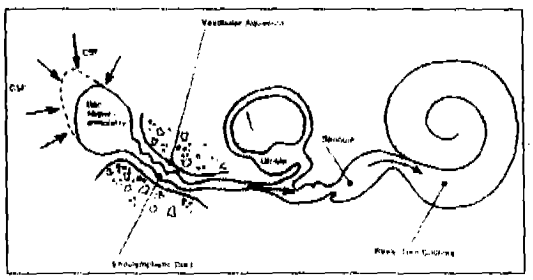

Figure 6. *Schematic diagram of endolymphatic circulation and proposed route of retrograde reflux of sac contents (Arrow). CSF indicates Cerebrospinal fluid.*

In addition, sudden fluctuations in the CSF pressure may compress the dural envelope surrounding the sac and backwash this hyperosmolar fluid into the basal turn of the cochlear duct via the ductus reuniens. Inevitably, if this current hypothesis holds true, maximum damage would be to the neuroepithelium of the cochlea's basal turn, producing high frequency SNHL initially. Persistence of this exposure of the cochlea to the hyperosmolar endolymphatic fluid will, over the years, result in a step-wise, progressive hearing loss in the child, as what may be true with this patient. Another theory to the sensorineural hearing loss include hydraulic forces transmitted from the endolymphatic sac into the cochlea secondary to reduced resistance from the enlarged vestibular aqueduct diameter [10].

Bilateral enlargement of the vestibular aqueduct is seen in 59 to 94% of cases with 60 to 66% being female. Hearing loss is usually identified in childhood and progresses in 60 to 65% of cases [10]. Sixty percent of the cases by Levenson and Parisier had associated abnormalities; a co-existing enlargement of the lateral semicircular canal being most frequent [1]. Remarkably, however, the rest of the patient's inner ear and temporal bone are intact. In eighty-seven percent of their case series of twenty-six cases, SNHL was moderate to profound, with a typical sloping high frequency component [2].

The patient also presented with paroxysmal episodes of severe vertigo related to head movement, lasting for hours to days at a time, which is quite unusual in LVAS patients. In the latter, vestibular symptoms are uncommon, and if ever present, minimal [2]. Since the positional nystagmus and vertigo could not be explained at the outset, the ENG was employed to evaluate residual vestibular function and to determine a co-existing central lesion.

The literature regarding vertigo as part of the large vestibular aqueduct syndrome is not as extensive as that regarding the sensorineural hearing loss that accompanies this rare isolated temporal bone anomaly. However, the atypical positional vertigo in this patient was attributed to the residual vestibular function in the left ear, in turn resulting in inequity of vestibular input to the brainstem. In Benign Positional Paroxysmal Vertigo (BPPV), the nystagmus is usually geotropic, or gravity dependent[11]. ENG recording of eye movements of paroxysmal positional nystagmus (PPN) may assist in differentiating between typical PPN in classical BPPV and 'atypical' forms usually associated with central nervous system lesions. In BPPV, the assumption of the critical dependent position will give rise to nystagmus where the direction of the horizontal beat (as determined by bitemporal horizontal leads) is 'away' from the undermost ear. This direction of the beat would be considered 'typical' while horizontal nystagmus beating toward the undermost ear would be atypical.[12] In this patient, there was right-beating nystagmus in all head positions, especially noted with the head hanging right. Thus, by criteria, the behavior of this patient's positional nystagmus upon ENG testing could not be interpreted as a simple case of benign paroxysmal positional nystagmus.

The results of the ENG was an interesting turning point in the search for the cause of the vertigo. Save for the ENG, the

patient's vertigo may well have been interpreted as a case of benign paroxysmal positional vertigo.

A timely diagnosis may have a significant impact on the stabilization of residual hearing in patients with LVA anomalies.

Wilson, Richardson, Hodgson and Talbot in 1997 reported that in their case series of six children, ranging from 4 to 17 years of age, endolymphatic sac obliteration was successful in the stabilization of progressive SNHL in children with LVAS. Four of the seven ears have maintained a pure tone average of within seven decibels or less within a follow up period of a mean of 3.2 years. Two ears actually showed improved hearing after surgery, and one ear continued to show progressive hearing loss. [13] A larger case study will, of course, be needed to verify the promising results presented here.

Endolymphatic sac surgery is at present a controversial management option in the LVAS, and there are many unanswered questions about the syndrome itself as well as the role of surgery in the stabilization of hearing. However, the selection of patients, such as age and degree of hearing loss, are critical issues in prognosis. Hence, early detection of LVAS is the first bold step in the management of its management, particularly in children.

CONCLUSION

The Large Vestibular Aqueduct Syndrome is a rare temporal bone anomaly; the incidence being a mere .64% of the population. Of course, many of these cases probably spend their entire lives branded as plainly 'deaf and mute' here in the Philippines as in other parts of the world. An otherwise healthy patient presenting with a bilateral progressive hearing loss requires a thorough neuro-otological work-up. The clinician, most especially the otolaryngologist must be aware and alert of common and not-so-common, syndromic and non-syndromic, hereditary and non-hereditary causes of hearing impairment in otherwise healthy young patients. LVAS should be considered among the differential diagnoses of congenital or early onset and progressive sensorineural hearing loss.

In light of the fact that the vestibular aqueduct matures at approximately the age of four, otherwise healthy children presenting with early onset progressive sensorineural deafness may benefit from high resolution CT scanning of the temporal bone.

Electronystagmography, on the other hand, is important in documenting any residual vestibular function that may explain the pathophysiology of vertigo in such patients. This report highlights the diagnostic features of LVAS, a rare temporal bone anomaly, and the first reported case in the country.

The authors also wish to illustrate clearly three important matters: the high index of suspicion needed by the clinician in the evaluation of deafness and vertigo in an otherwise healthy young patient, particularly the child; the good working communication required between the otolaryngologist and the radiologist. Finally, the potential role of thin slice HRCT scan in the diagnostic work-up of progressive and early onset sensorineural deafness in children four years old and above. The contention of the authors that this imaging procedure be included in the evaluation of SNHL in children with or without vestibular symptoms above the age of four should be seriously considered.

ENG studies should be useful in the detection of residual vestibular function in patients who may otherwise be signed-off as having a 'dead ear', and dizziness attributed to pathologies other than the vestibular pathways. Having confirmed, therefore, the vestibular origin of the patient's nystagmus, and residual vestibular function in the left ear, the giving of vestibular suppresants was justified. In addition, reassurance of the patient regarding the absence of central nervous system lesion, is, to say the least, empowering.

It is, therefore, the recommendation of the authors that in the evaluation of progressive sensorineural hearing loss in children: (1) Behavioural audiometry be performed to localize the pathology as early

as possible and to determine the severity of the hearing loss in the child, in order to institute the proper rehabilitative measures at the soonest possible time. (2) Auditory Brain Evoked response testing should be included in the audiologic work up in the uncooperative child to measure auditory thresholds and, where hearing loss is assymetric, rule out retrocochlear pathology. (3) Electronystagmography should be done for children with sensorineural hearing loss who also have symptoms that may point to vestibular pathology, and (4) Thin slice high resolution CT scanning of the temporal bone, middle and inner ears should be done if the above studies are inconclusive to rule out isolated temporal bone anomalies, such as the LVAS and other inner ear anomalies.

Lastly, research in molecular analysis and genetics may yet prove that a hereditary type of LVAS exists, and if so, genetic counseling may be an intelligent option in the comprehensive management of these patients.

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Figure 1. *Pure tone audiometry revealed profound SNHL, bilateral. Speech reception threshold could not be tested.*

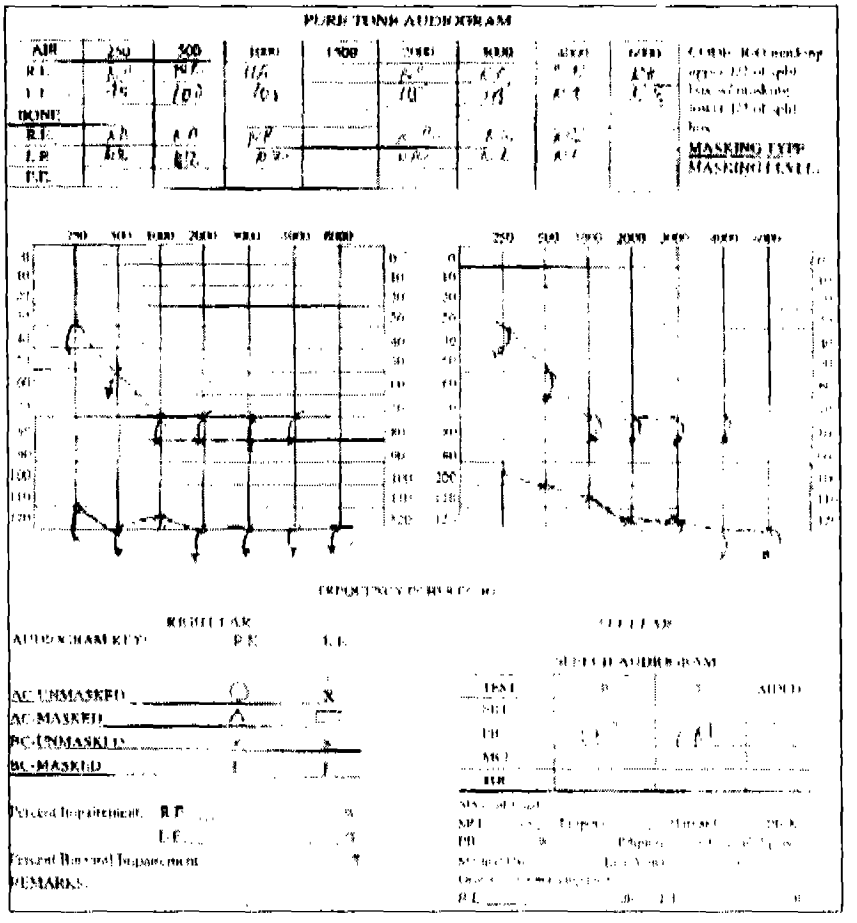
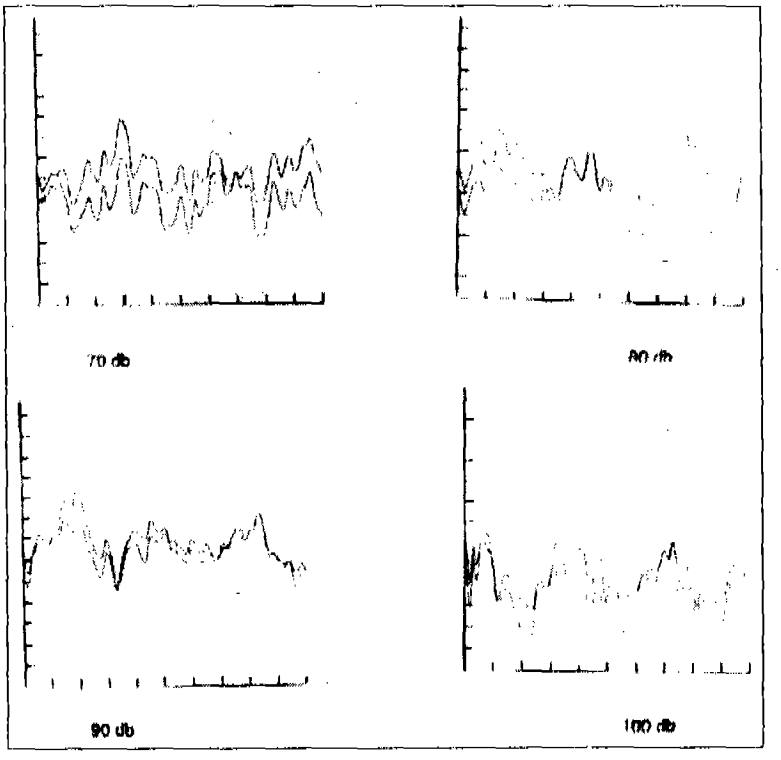


Figure 2. *Auditory Brain Evoked Response of the patient showed poor wave morphology in all stimulus intensities, consistent with profound hearing loss.*



PULSATILE PROPTOSIS SECONDARY TO TRAUMATIC VERTEBRAL ARTERIOVENOUS FISTULA*

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INTRODUCTION

Management of penetrating injury to the neck, specifically gunshot wounds, requires a keen sense of anticipation and imagination. Injury to the vascular structures is not infrequent and the potential for serious and unexpected sequelae is a distinct possibility.

In most cases, delayed sequelae are caused by traumatic aneurysms or arteriovenous fistulae. Aside from injury to the great vessels, the vertebral artery may also be affected. In a review of 49 cases of traumatic arteriovenous fistulae by Vinchon (1994)[1], most patients were symptom free and cervical bruit was the only manifestation. Thirty nine percent of patients had tinnitus alone. There were unusual symptoms noted like cervical neuralgia secondary to compression, spinal cord dysfunction, effort dyspnea secondary to high-flow heart failure caused by the shunt and vertebrobasilar insufficiency. None presented with proptosis. A further review of 224 cases from 1953 to 1993, also showed no account of proptosis as a presenting sign.

Proptosis, although an opthalmologic feature, is frequently encountered by the otorhinolaryngologist. It usually results from a mass, an inflammatory process or a vascular abnormality in the orbit. Its occurrence after a history of penetrating neck injury is thought provoking.

This report aims to inform the reader that proptosis can be caused by a lesion from as far below as the neck. The unsuspecting clinician may miss the diagnosis and waste valuable time and resources searching in the wrong direction for answers.

Specifically the objectives are:

1. To present a rare case of vascular abnormality secondary to trauma presenting as proptosis.
2. To discuss its possible pathogenesis.
3. To review current diagnostic modalities and therapeutic options.

CASE REPORT

A 26 year old Filipino, male, barber, single, right-handed, from Bicol, was admitted in this institution for the first time on March 5, 1995 because of a gunshot wound to the left paramedian suboccipital area.

One day PTA the patient while asleep was shot at the left paramedian suboccipital area by an unknown assailant with a 0.38 caliber revolver at close range. No point of exit was noted. At the time of admission, the patient was alert and oriented, with no neurological deficits. There was trismus with an interincisor distance of 2 cm. and a gradually enlarging neck circumference probably secondary to an expanding hematoma. Skull X-rays revealed a metallic slug at the skull base region just slightly posterior and medial to the left mandibular condylar neck. Patient was immediately transfused 1 unit of fresh whole blood.

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*2nd Place, PSOHN Clinical Case Report Contest, May 17, 1997, Cebu Plaza Hotel, Cebu City
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Emergency wound exploration and foreign body removal under general anesthesia were done. Intraoperatively, a metallic slug measuring approximately 2 x 1 x 1 cm was extracted just slightly posteromedial to the ascending ramus of the left hemimandible via an extended submandibular approach. There was minimal bleeding noted upon extraction. No fracture of adjacent bony structures was noted. For surgical exposure, ligation was done to the left external jugular and marginal mandibular veins. Patient had an unremarkable post-operative course and was discharged improved after 6 days.

About 3 months post-injury, the patient complained of gradual hearing loss, a continuous low-pitched tinnitus on the left and occasional vertiginous attacks. There was no consultation. No medications were taken.

About 4 months post-injury, there was progression of the hearing loss, progressive bulging of the left eye with blurring of vision, dizziness, and a continuous low-pitched tinnitus on the left. There was occasional nausea and a pulsating, non-radiating temporal headache. After 5 months, patient finally consulted at the ENT-OPD where pertinent physical examination revealed incision scars over the lateral neck and suboccipital area, pulsatile proptosis with bruit, lateral gaze palsy, and pain over the neck, all on the left side (Figure 1). Cranial CT Scan revealed an enhancing tortuous, tubular structure occupying the left retroorbital compartment (Figure 2). The radiologic assessment was dural cavernous fistula. The patient was referred to Ophthalmology. Opthalmologic examination revealed a visual acuity of 20/100 on the left eye with some improvement on pinhole examination, and limitation of left lateral gaze. Fundoscopy revealed normal findings. On exophthalmometry, a difference of 13 mm was noted. Applanation tonometry was normal. The patient was assessed to have a post-traumatic carotido-cavernous fistula and exposure keratitis OS which was initially managed medically with artificial tears.

Figure 1. 5 months post-injury.

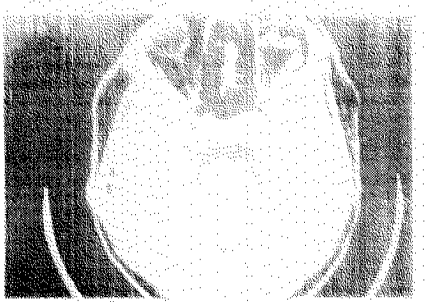
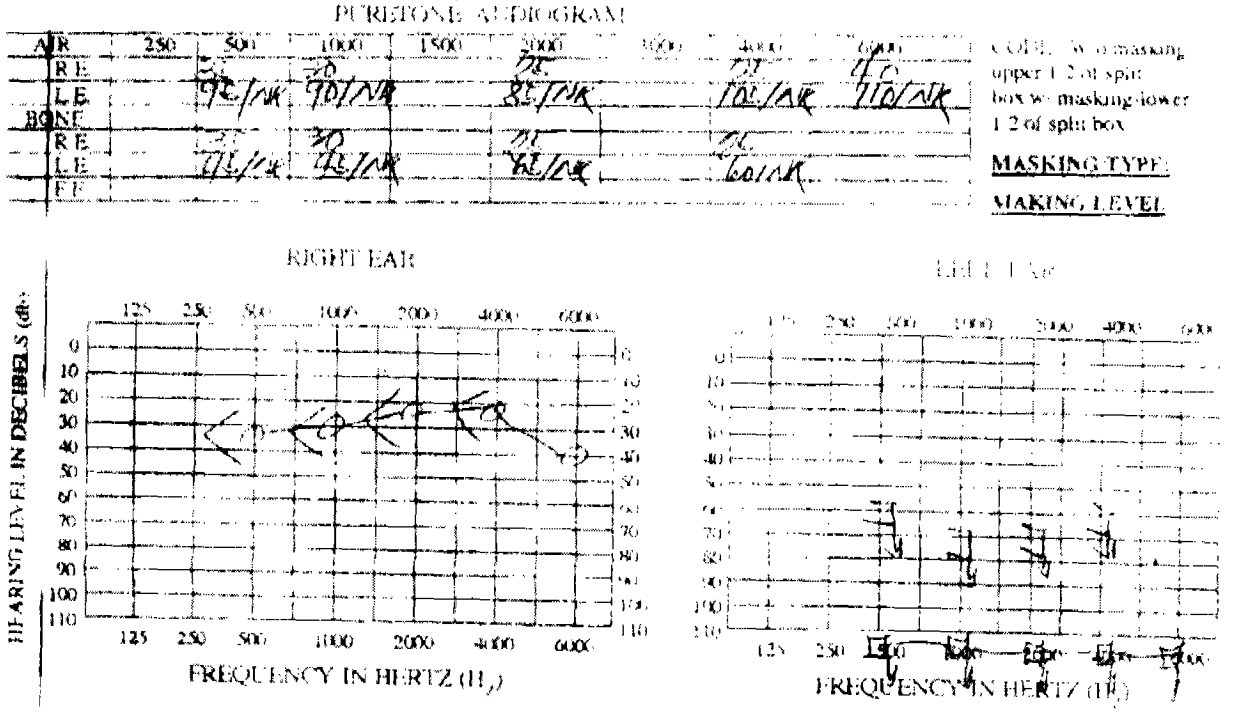


Figure 2. Cranial CT scan 5 months post-injury showed enhancing tortous, tubular structures at the left retroorbital area.

Audiometry demonstrated no recordable response to maximum intensity on the left ear (Figure 3). Tympanometry on both ears is within normal limits. Patient was referred to neurosurgery wherein angiography was requested.

About 9 months post-injury, digital subtraction carotid angiography revealed a left vertebral arteriovenous fistula probably traumatic in nature. Follow-up digital subtraction angiography one year after injury revealed the arteriovenous fistula with left proximal extraforaminal vertebral arterial feeders, and drainage through the ipsilateral left peri-and lateral medullary and upper superficial cervical veins with retrograde flow to the left superior ophthalmic veins (Figure 4, 5 & 6).

Figure 3. *Pure Tone Audiometry with tympanometry*



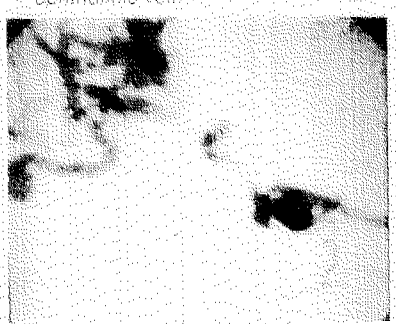
Remarks:

Right Ear:Mild Sensori-neural Hearing Loss.
Left Ear: Norrecordable response up to the maximum intensity limit of the audiometer.
Speech Reception Threshold conformed with pure tone findings.
Speech Discrimination Score: RE=96%.
TYMPANOGRAM: Bilateral Type A.

Figure 4. Angiography 1 year post injury showed immediate opacification of the left vertebral artery, peri- and lateral medullary veins

Figure 5. Initial blushing of cavernous sinus

Figure 6. Subsequent opacification left superior ophthalmic vein



Endovascular balloon tamponade will be done as soon as materials are available.

DISCUSSION

Fistulae between the vertebral artery and veins are uncommon. A few congenital fistulae[2] and even spontaneous fistulazation[3] have been described, but the great majority are reported as a consequence of trauma either from an angiography needle [4,5], or from bullet [6,12] or knife wounds [12-16].

Anatomically, the vertebral artery lies beneath the osseous encasement of the vertebral canal. The course is divided into 3 parts [17,18,19] (Figure 7). The first portion is about 3 cm long. It arises from the subclavian artery and ascends to the transverse process of the 6th cervical vertebra. Accompanying the artery in its short first portion is a single discrete vertebral vein. The second portion of the artery courses cephalad through an osteofibrous tunnel in the transverse process of the cervical vertebra. At the level of the first cervical vertebra, the third portion of the artery passes across the suboccipital space and through the foramen magnum. The paired vertebral artery fuse to form the basilar artery. This protected location is responsible for the rare occurrence of traumatic aneurysm or fistula of the vertebral artery[20]. Additionally, the high mortality rate secondary to injuries to these areas explains why eventual fistulae formation are infrequently encountered.

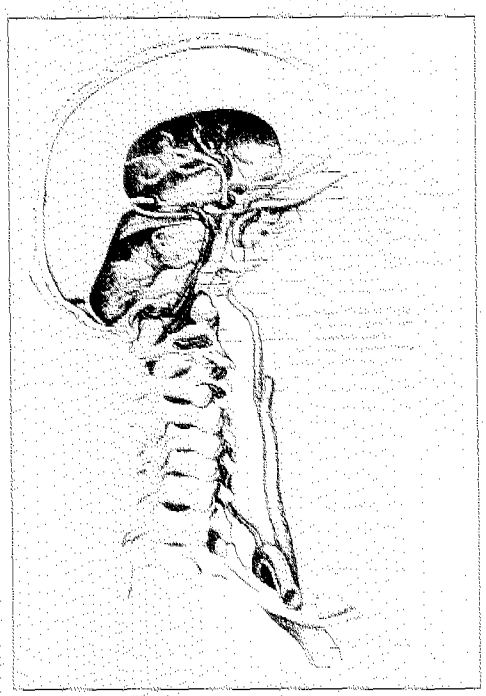


Figure 7. Anatomy of the vertebral artery

In many reported cases of traumatic vertebral arteriovenous fistulae, the locations are usually low in the neck particularly at the C_4 or C_5 level[21]. This

could be due to a number or reasons. First, the vertebral artery is enclosed in the vertebral canal. Secondly, sites above C_4 are relatively less accessible to trauma. In contrast, congenital and spontaneous fistulae are located higher and deeper in the neck at the C_1 or C_2 level[21]. In this patient, the fistula is found at the upper portion of the vertebral artery at C_2 level.

Several mechanisms have been implicated in the development of traumatic vertebral arteriovenous fistula[22]. Tearing of the vertebral artery and the surrounding venous plexus from penetrating trauma, from severe hyperextension injuries of the cervical spine and from osteophytes in cervical spondylosis may be implicated. Blunt trauma to the head and neck may also result from injuries to the artery and adjacent veins by either direct compression or contusion. Recently, an increasing incidence of vertebral arteriovenous fistulae caused by angiography has been reported and this was due to inadvertently puncturing the vessel during the procedure.

In this patient, shot at the left paramedian suboccipital area with a 0.38 caliber revolver at close range, the risk of tearing of the vertebral artery is high. A 0.38 caliber revolver is a low velocity handgun with the projectile travelling at 870 feet/sec[23]. At close range, the energy released from this handgun can inflict tissue damage not only along the track of the projectile but also extend a few centimeters radially beyond its track. The shock wave generated could cause distal injury to the blood vessels. It could also damage nerve and bone a distance away from the actual site of the track.

Vertebral arteriovenous fistulae, like most other arteriovenous fistulae anywhere in the body, represent an abnormal high flow connection between artery and vein. Symptoms are caused by arterial deprivation in the territory distal to the fistula or venous hyperpressure or congestion in the draining veins[24]. The time interval from the injury to the development of symptoms is quite variable and appears to be related to rate of growth of the lesion. In most cervical arteriovenous fistulae, it usually increases in size and flow rate, thus becoming symptomatic. In this patient, signs and symptoms remained undetected until months after the injury. Eventually, the classic symptoms of tinnitus and bruit were present.

A continuous bruit with systolic accentuation in the neck makes the diagnosis of a cervical arteriovenous fistulae more obvious. The site can usually be localized to the vertebral artery if compression of the carotid vessels fails to abolish, the bruit, thus eliciting the Branham's sign[19]. In this case, the bruit was felt over the left eye with no obvious signs and symptoms down the neck area.

Pulsatile tinnitus alone has been reported as the presenting sign[1]. The patient complained of a continuous low-pitched hum which was probably due to the turbulent blood flow. The progressive hearing loss over the left ear was probably secondary to diversion of blood flow causing ischemia to the inner ear.

What was most interesting was the clinical presentation of proptosis and its related eye symptoms. In the patient, the proptosis was probably due to venous hyper-pressure and congestion in the draining veins. It was assumed that the left vertebral artery was injured creating a fistulous tract to its adjacent structures, specially to the left perimedullary vein which drains to the superior petrosal sinus, to the left cavernous sinus then to the left superior ophthalmic vein. This explanation was supported by angiographic studies.

Other vascular abnormalities presenting with pulsatile proptosis include carotido-cavernous fistula and dural cavernous fistula[25]. These fistulae are usually spontaneous and result from degenerative process in patients with systemic hypertension and atherosclerosis. Inspite of the CT scan impression of a cavernous sinus fistula the team strongly believed that the precipitating factor was secondary to the cervical injury based on the following: (a) History of penetrating trauma (gunshot wound), (b) The location of the fistula on the same side of the injury and (c) The absence of complaints prior to the injury.

Rarely, orbital aneurysms, angiomas, meningoceles may also present with pulsating proptosis[26]. To unequivocably clinch the diagnosis, angiography is the diagnostic modality of choice. Avellanosa[22] in 1977 emphasized the value of angiography in the assessment of head and neck injuries, leading to an increasing recognition of associated injuries to blood vessels.

Current literature recommends mandatory angiography for Zone I and Zone 3 neck injuries (Fig. 8)[27]. Vascular injuries are likely to occur in this area. Contraindications include expanding hematoma, profound shock and uncontrolled bleeding[28]. This patient was not submitted to angiography on initial admission because of a possible expanding hematoma. Angiographic studies were only done after this patient presented with signs and symptoms of arteriovenous fistula.

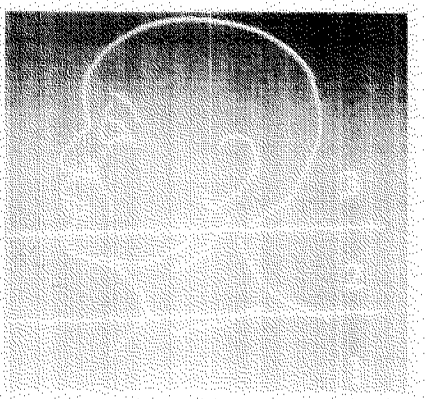


Figure 8. Zones of the neck

Selective angiography not only confirmed the diagnosis but may also serve as an option in the mode of therapy: selective arterial embolization, alone or used with surgery. The choice will vary according to the characteristic and location of the fistula. Surgical procedures should be reserved for unusual cases[1]. These include the now rare complication of embolization; anatomical variations preventing catheterization, either congenital or secondary to prior treatment; vertebrojugular high-flow fistulae, which, especially in children, carry a risk of balloon distal migration; and fistulae with a large false aneurysm, which cannot be treated with endovascular means.

The advancement in the use of intraluminal balloon occlusion for arteriovenous fistulae [29,32] may prove to be fortuitous. In this patient wherein the fistula is located higher and deeper in the neck making direct surgical approach risky and possible, this procedure may be a safer option. Vinchon[1] in his study in 1994, revealed an occlusion rate of 93% and a patency preservation of 78% with the use of endovascular occlusion. The success rate varies and depends on the vessels involved and the size of the fistula. Symptom relief will depend on the degree of closure and the longevity and severity of clinical manifestation. Generally, most arteriovenous fistulae can be totally or partially cured with a combination of modern endovascular and surgical techniques.

CONCLUSION

A case of vertebral arteriovenous fistula secondary to penetrating trauma presenting with proptosis has been presented. Pathogenesis of the proptosis as a unique clinical manifestation of traumatic arteriovenous fistula was discussed.

Angiography provides a quick, and accurate picture of the condition. Although surgical approach has been the standard therapeutic regimen for arteriovenous fistulae, endovascular occlusion holds great promise in the treatment of such cases, particularly for inaccessible areas where surgical manipulation can be potentially fatal.

RECOMMENDATION

A regular follow up is of great importance in the management of penetrating trauma, particularly in the head and neck area. For Zone III injuries, routine angiography is advocated to preempt possible sequelae such as arteriovenolus fistulae. The concept of waiting for a traumatic arteriovenous fistula to mature is unwise; the best results are obtained by treating a fistula soon after injury.

most of which can be controlled without the need for an ENT specialist. Only 5 to 10% of patients with less common causes of epistaxis would require an otolaryngologist to control the bleeding. These patients may require hospitalization, blood transfusion, and rarely, surgical interventions of the nasal blood supply. Other factors predisposing to epistaxis include infection, trauma, allergy, hypertension and arteriosclerosis, hereditary hemorrhagic telangiectasia, blood dyscrasia, atrophic rhinitis, tumor, and congenital or acquired nasal defects.[2] The other causes of epistaxis could be ruled out in this patient. There were no signs of infection, no history of trauma, blood examinations ruled out blood dyscrasia, nasal endoscopy revealed no tumors and no nasal defects. A hypertensive cause or an underlying vascular pathology is the two most likely etiology of epistaxis in this case.

Literature rarely mentioned an internal carotid artery aneurysm as the etiology of epistaxis.[4,5]

Severe epistaxis due to ruptured aneurysm is a clinical challenge. This condition is extremely rare and comes last in the etiologic list of epistaxis in most otolaryngological literature.[6] In 70% of cases, epistaxis due to an aneurysm have occurred after severe head trauma. As in this case, non-traumatic aneurysm due to anteriosclerosis accounted for 25%, while the remaining 5% are mainly due to congenital malformations.[6,7]

The final episode of severe epistaxis experienced by this patient may be due to a ruptured internal carotid artery aneurysm, which eroded through the sphenoid sinus. This has been documented from previous literature as the most frequent route, the eustachian tube and the cribriform plate being the other two. This is due to the close proximity of the intracavermous portion pf the internal carotid artery and the sphenoid sinus.[6] (Figure2) Renn and Rhoton in a study, noted that the internal carotid artery was bulging into the sphenoid sinus in 70% of samples and that the internal carotid artery is covered by a thin layer of bone, 66% of which is less than 1mm thick covers. There was even no bony layer seen but only dour and sinus mucosa in 4%.[9,10]

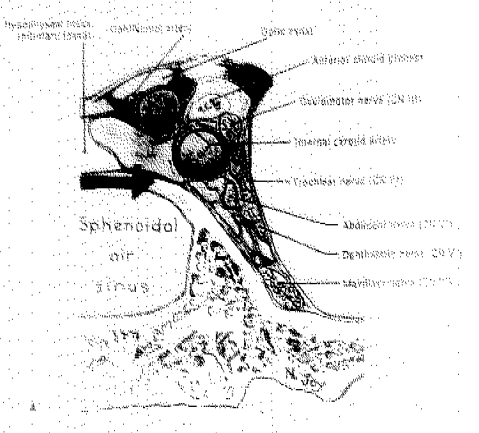


Figure 2. Arrow indicates the proximity of the intracavernous portion of the internal carotid artery and the sphenoid sinus

Bleeding from the eustachian tube can be demonstrated by the proximity of the internal carotid artery with the petrous canal as it enters the skull. (Figure 3) Erosion through the eustachian tube would usually present with an anterior epistaxis, bloody otorrhea and other otologic symptoms which were not evident in this case.[1,9,10]

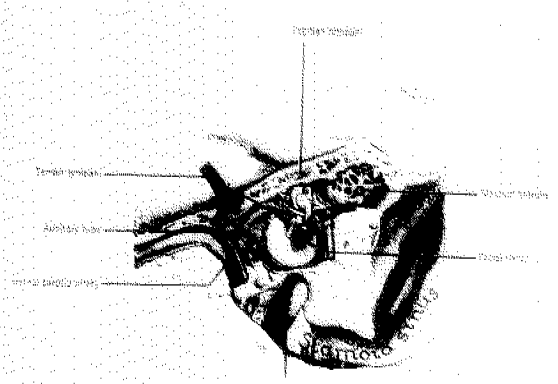


Figure 3. Arrow indicates the proximity of the eustachia tube with the internal carotid artery

Cribriform plate bleeding is least likely to occur and has never been reported yet in non-traumatic rupture of internal carotid artery aneurysm.[9]

Aneurysm is a rare cause of epistaxis, but if present, it can exsanguinate the patient. Bleeding from an intracavernous internal carotid artery is one of the causes of this potentially lethal vascular anomaly. It is, therefore, important to rule out the possibility of an aneurysm especially in-patients presenting with massive, recurrent, and intractable epistaxis after having precluded a systemic cause or

LARYNGEAL EMBRYONAL RHABDOMYOSARCOMA IN A FIVE –YEARS- OLD FEMALE: A CASE REPORT*

RODOLFO RIVERA, M.D.**
FREDERICK HAWSON, M.D.***

INTRODUCTION

Malignant neoplasms of the pediatric larynx are rare. Although isolated case reports have appeared in the literature, an extensive experience with pediatric laryngeal malignancies does not exist. Because these tumors are uncommon, treatment decisions may be difficult.

Within the past fifteen years, rhabdomyosarcoma has received the most clinical interest because of its highly aggressive nature and its propensity to affect children and young adults, giving it an emotional impact. Furthermore, rhabdomyosarcoma has responded best to improved methods in chemotherapy and radiation therapy to the extent that its previous poor prognosis has been replaced by the hope of possible cure.

The objective of this paper is to present a rare case of embryonal rhabdomyosarcoma of the larynx in a five-year-old female. This paper also aims to review the differential diagnosis of hoarseness in a young child. Lastly, it also discusses the different approaches in the management of laryngeal rhabdomyosarcoma in children.

CASE REPORT

This is a case of a five-year-old female who consulted the Department of Otolaryngology-Head and Neck Surgery Out-Patient Clinic because of a four-month history of progressively worsening hoarseness and noisy breathing. Patient was born to an 18-year-old mother, who smoked cigarettes and marijuana and engaged in "shabu" sessions up to her first trimester of pregnancy with the patient. The father is also cigarette smoker. On physical examination, the patient was fairly nourished and fairly developed. There was no palpable lymph node in the neck. Inspiratory stridor and wheezing on both lung fields was noted. Fiberoptic endoscopy of the larynx revealed a whitish papillomatous mass over the subglottic area. An MRI of the neck was done to assess the extent of the lesion. This revealed a suspicious rounded soft tissue structure, 5x5 mm, within the lumen of the airway, 5 mm below the ventricles. Both the true and the false cords appeared normal. On direct laryngoscopy the whitish papillomatous mass was seen to originate from the anterior aspect of the subglottis occupying about 50% of the glottic chink. Punch biopsy revealed chronic inflammation with squamous metaplasia. A laryngeal papilloma was being considered at this time. With the histopathologic finding of a benign lesion, excision of the mass via suspension laryngoscopy was performed. This revealed a whitish, circumscribed, pedunculated mass about 1.0x0.5 cm in size with the inferior portion of the pedicle attached to the anterior aspect of the subglottic area which was easily and completely excised. The patient was then put on postoperative antibiotics and steroids. The histologic diagnosis was suggestive of embryonal rhabdomyosarcoma. Immunohistochemical staining procedure was requested to confirm the histopathologic diagnosis. The result was positive sarcomeric actin in the spindle shaped and ovoid cells in the stroma.

A Pediatric Oncology referral was sought and extensive metastatic work-up for proper staging was recommended. Bone scan and liver ultrasonography was negative

*3rd Place. PSOHNS Clinical Case Report Contest, May 17, 1997, Cebu Plaza Hotel, Cebu City
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for metastasis. However, a bone marrow aspiration showed metastatic rhabdomyosarcoma cells.

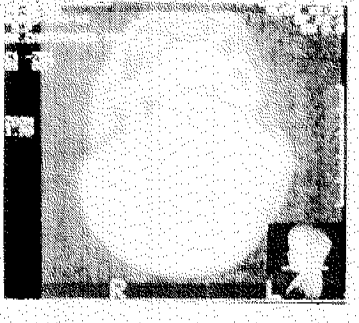
After careful assessment of the situation and deliberation together with the Pediatric Oncology service, it was decided to put the patient on chemotherapy. The regimen included the following agents: Vincristine 1.5 mg/ body surface area (BSA); Doxurubicin 15 mg/ BSA; Actinomycin D 500 mcg/ BSA; Cyclophosphamide 500 mg/ BSA. The agents were regularly given on a 21-28 day cycle.

At the end of the fourth cycle, a direct laryngoscopy was performed to assess the response to medications. Aside from slight edema, laryngeal findings were essentially normal. Heartened by this development and recognizing the toxicity of the initial chemotherapeutic agents, it was decided to shift to a less toxic drug combination composed of: Etoposide 100mg/ BSA and Ifosfamide 1.4 mg/ BSA. This second regimen was given alternating with the first chemotherapeutic regimen for five more cycles, also on a regular 21-28 day interval.

A repeat direct laryngoscopy was performed after five chemotherapeutic cycles. Again, there were no remarkable laryngeal findings. A repeat bone marrow aspiration also done at this time was negative for malignant cells.

After this final examination, the future plans will be to put the patient under watchful waiting. A repeat re-examination will be performed only when indicated by symptoms (i.e. change in present character of voice).

Figure 1A. MRI at the level of the glottis showing the true cord free of the tumor.



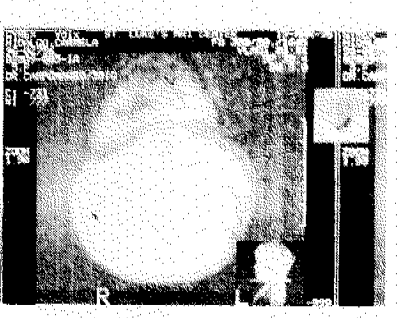


Figure 1B. *MRI at the level of subglottis showing a suspicious rounded soft tissue structure, 5x5 mm, within the lumen of the airway, 5mm below the ventricles. Both the true and the false cords appeared normal.*

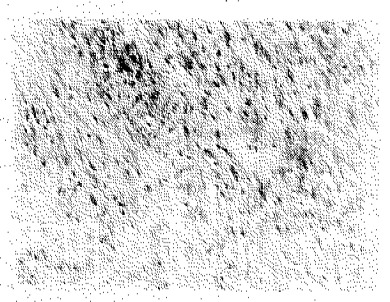
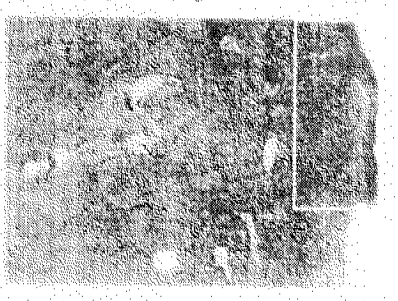


Figure 2. *Laryngeal mass, initial punch biopsy showing dense fibrovascular tissue with numerous mononuclear inflammatory cell infiltration. (in square)*

Figure 3. *Final biopsy of laryngeal mass*



A. Section of laryngeal mass showing fragments of polypoid structures partly lined by stratified squamous epithelium. In the supporting stroma, there are loosely arranged spindle-shaped cells or elongated cells with hyperchromatic nuclei and pink cytoplasm. There are also lymphoplasmacytic infiltrates in the stroma. (in rectangle)

B. Positive immunohistochemistry stain for sarcomeric actin. (in square)

CASE DISCUSSION

This is the case of a 5-year-old girl with a four-month history of progressive hoarseness, accompanied by harsh breathing and stridor. The chief complaint of hoarseness pointed to a possible laryngeal problem.

Unfortunately, whenever a child presents with changes in voice, the definitive diagnosis is commonly delayed. The first consideration is an inflammatory condition, most probably laryngitis (infectious or otherwise). These are often associated with fever and infection elsewhere in the upper respiratory tract. This is usually self-limiting, relieved by regimen of antibiotics, anti-inflammatory drugs, and voice rest. Chronic laryngitis, however, is a legitimate entity and consideration in the case presented.

In children a laryngeal foreign body should be a consideration. But this entity is not very likely in this case because the patient is not in significant respiratory distress nor was there any history of choking. This must not be totally disregarded, though.

Congenital laryngeal conditions should be kept in mind. At age five, without any previous manifestation, several of the more common congenital conditions would be ruled out. Perhaps an internal laryngocele or hemangioma could still be valid considerations.

Finally, laryngeal neoplasms should also considered. Most of these are benign, the most common being laryngeal papillomas. Papillomas were found to account for 84% of the benign laryngeal tumors (Jones et al, 1984) and occur in response to mucosal infections by a papovavirus.

Although uncommon, malignant lesions can also occur in the pediatric larynx. These are usually classified under the sarcoma group.

Therefore, with all these other differentials to consider, any case of hoarseness that remains persistent with conventional medical treatment should undergo further investigation. Definitive diagnosis is based on findings obtained during endoscopy. Initial examination is commonly done by flexible rhinopharyngoscopy, as was in this case. However, it is quite dependent on the patient's cooperation (difficult in children) and obtaining an adequate biopsy specimen is nearly impossible.

In this patient, the cause of the hoarseness indeed turned out to be a mass. The history of the case and the characteristics of the patient's laryngeal mass seem to indicate a benign tumor, most probably a papilloma, being the most common in incidence.

Direct laryngoscopy was then necessary to delineate the origin and extent of the lesion, as well as to obtain a biopsy specimen. In the management of this case, as set forth by Ohlms, et al (1994) a biopsy specimen should be obtained prior to (complete) excision of presumed papillomas in order to rule out co-existing malignancy was followed. The biopsy should establish the histology which will then be the basis for subsequent treatment decisions (2).

The preliminary biopsy procedure gave a histopathology of "Chronic inflammation with squamous metaplasia" thus supporting the preoperative impression of a laryngeal papilloma. Simple complete excision via microlaryngeal technique was subsequently the automatic next step in management.

However, this apparently straightforward case turned out to be anything but simple. The histopathologic report of the excised mass showed fragments of polypoid structures partly lined by stratified squamous epithelium with a loosely arranged spindle shaped cells or elongated cells in the supporting stroma suggestive of embryonal rhabdomyosarcoma. Confirmatory immunohistostaining techniques turned out positive for sarcomeric actin in the spindle and ovoid stromal cells. There was now no more doubt of the diagnosis, a truly rare

entity an embryonal rhabdomyosarcoma localized in the larynx.

Rhabdomyosarcoma is a malignancy that arises from the same embryonal messenchyme that is destined to give rise to striated skeletal muscle (5). This is the most common soft tissue sarcoma in the pediatric age group, with peak incidence at five years of age (3). Epidemiologically, there appears to be a higher incidence in individuals from families of low socio-economic status, who are exposed to chemical pollution and whose parents are cigarette smokers. These risk factors are all present in this patient.

Rhabdomyosarcoma occurs most commonly in the head and neck area (38%). The orbit is affected in about 31% of cases. Also commonly affected are the oral cavity & pharynx (29%) and the face & neck regions (24%). More rarely, it may involve the ear and sinuses (9%) and salivary glands (7%). For laryngeal rhabdomyosarcoma, Batsakis & Fox (1970) accepted only five cases (1). Canalis et al (1976) found 24 cases on review, half of which occurred in children. Diehen et al (1984) found 15 documented cases and reports one more case. Healy et al (1991) reported one more case but did not review literature for its incidence. There has been no documented case yet in local scientific literature. The paucity of reports confirms the rarity of isolated laryngeal rhabdomyosarcoma. These lesions usually present as painless, progressively enlarging mass, with a tendency to remain localized. This was also the case with this patient.

The next step in management was examination for metastatic disease. Metastasis via the venous and lymphatic systems is common. Metastasis will become manifest within six months of diagnosis, in 74% and within one year in 83% frequently involving regional lymph nodes, lungs, liver, bone marrow, and brain (2). While chest, liver and bone of this patient were all negative, the bone marrow was positive for metastasis. This puts the patient into Stage IV of the Intergroup Rhabdomyosarcoma Study (IRS) Staging System with a very poor 35% 2-year survival rate. On the other hand, this fact also mandates an aggressive management to improve these odds.

The principle of management in these cases is to presume that microscopic disease still exists even when gross disease has been excised. Current treatment protocols include chemotherapy and high dose radiotherapy, with surgery usually reserved for diagnostic biopsy only.

Healy et al (1991) reported a case where they did a total laryngectomy on their three-year-old patient, after much "thought and discussion". (4) The question remains, are surgeons really prepared to aim for improved survival in the face of considerable catastrophic functional deficit? Although it can result in complete cure, this option will never be popular with the majority of peers and populace.

Irradiation therapy might provide excellent control of residual tumor. Again, this presents the possibility of causing a fibrotic and infantile larynx-making the patient a very young laryngeal cripple. The additional risk of a second radiation induced tumor must also be considered (2).

Chemotherapy, therefore, seems to be the "safest" option. The introduction of new chemotherapeutic agents in the 1960s dramatically improved survival rates. At present, the accepted regimen for head and neck rhabdomyosarcoma with metastasis is a combination of Vincristine, Actinomycin D, Doxurubicin, and Cyclophosphamide (6). After undergoing this regimen for several cycles, the patient appeared to respond favorably to the chemotherapeutic agents. There also appears to be no recurrence of the laryngeal mass more than one year after the excision. Continual close follow-up will still figure very much in the future plan of management.

CONCLUSION

The case of a five-year-old girl with a four-month history of progressive hoarseness was presented. Endoscopy revealed the presence of a laryngeal neoplasm. Final biopsy report revealed this mass to be an embryonal rhabdomyosarcoma of the larynx. There was also metastasis to bone marrow, making this a Stage IV case. Management

consisted of local excision and aggressive chemotherapy.

This case possesses the following points of interest.

1. The inherent rarity of this case makes it significant, especially in the local setting where a similar case has yet to be documented and reported.
2. Clinicians should be aware that the potential for error exists in the process of diagnosis of laryngeal neoplasm, even when published procedures are followed closely Index of suspicion should be maintained.
3. The presence of a malignancy in the larynx of child presents to physicians very special difficulties in the process of treatment decision. Should survival take precedence over quality of life?

Fortunately, it appears that the correct decisions have been made so far. The satisfactory present condition should not lead to complacency. Vigilance should be the hallmark.

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Cont. of Editorial... Morality and Medicine

expense and the trauma attendant to such a surgery? On a more mundane approach, how much must a physician charge for palliative surgery?

In dealing with cancer patients, most physicians engage in white lies. This again brings forth another moral issue. When does a falsehood become a white lie? When is its use warranted, if ever? Is the intention enough justification to engage in lies? In the need to inform, how much information is enough?

The greatest moral problem of all, of course, is euthanasia? Does a physician have the right to play God for his terminally-ill patients? Would a physician be more humane if he would withhold life support systems for such patients or would one be more upright if he would just let things take their natural course of events?

Ethics and morals have been used interchangeably because both require conformity to a set of standards, the supreme law by which every act is measured by. Defining the source of the supreme law would be tantamount to encroaching already on one's faith. What is important is the universality of its application.

It must be gleamed from the above that being a good physician requires not only the possession of knowledge and skills in the art of healing but a good amount of morals too in the conduct of one's clinical practice.

HEMANGIOMA OF THE MANDIBLE: AN EXSANGUINATING LESION*

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ALFREDO Q.Y. PONTEJOS, JR., MD***

ABSTRACT

This paper reports a case of a nearly fatal exsanguinating hemorrhage arising from tooth extraction. The importance of a prompt diagnosis and aggressive intervention in preventing such a hemangioma of the mandible after extraction is well illustrated in this report case from a tertiary hospital. A segmental hemimandibulectomy of the right mandible was performed after the feeder vessels were identified by angiography and properly embolized. Gross and microscopic pathology were consistent with the final diagnosis of hemangioma of the mandible, mixed type with soft tissue extension.

Early diagnosis, aggressive treatment and provisions for rapid blood transfusion are mandated for the penalties to a casual approach is life threatening and the experience to both the patient and the physician is terrifying.

INTRODUCTION

Rare is an event when a young patient is bathed in blood spurting from within the mouth after a procedure as simple as dental extraction. An unsuspecting clinician would be amazed how a benign lesion would present itself as potentially fatal.

This paper aims to report an extremely rare case of an exsanguinating lesion that nearly claimed the life of a young man.

CASE REPORT

This is the case of G. G., 20 years old, male, from La Union referred to the UP-PGH Medical Center last August 25, 1995 for profuse bleeding from a tooth extraction site.

Condition started three months PTA as a slight swelling of the right mandibular area associated with toothache. Eight weeks PTA, patient underwent extraction of the right premolar tooth, which resulted in profuse bleeding uncontrolled by cotton packing and was rushed to a regional hospital where bleeding was temporarily controlled with gauze pack. Mandible – APO ordered was read only as impacted molar tooth. Computer tomography showed focal lytic changes with considerations of preapical granuloma or infection of site with overlying cellulitis.

One week later, the right external carotid artery was ligated, followed Collastyp (collagen) insertion into the tooth cavity and suturing of the alveolus. Three units of blood was transfused. Biopsy of the two submandibular nodes revealed reactive hyperplasia. Punch biopsy of the gum along the extraction site showed granulation tissues.

Three weeks PTA, bleeding amounting to 100-200 cc was noted, prompting readmission to the same regional hospital for exploration of site. At the operating table, massive bleeding occurred leading to a difficult intubation. Patient was subsequently referred to the Philippine

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General Hospital with the impression of hemangioma of the mandible for radiotherapy and further management.

On admission, patient was conscious, coherent, and had skin pallor and bulging of the right cheek caused by gauze pack kept in place by tight biting. Vital signs were normal. Other ENT findings were unremarkable. Examination of the oral cavity was deferred due to fear of inducing bleeding at the ER Past medical history revealed no bleeding tendencies, no history of easy bruisability. Family history was unremarkable. Review of the CT- scan and mandible APO showed osteolytic destruction. Initial diagnoses were Bleeding, Tooth Extraction Site, R/O Hemangioma of the Mandible, R/O Pyogenic Granuloma, and R/O Chronic Osteomyelitis.

Course in the Wards

Initial laboratory work-ups revealed a hemoglobin of 97 mg/dl and normal blood clotting parameters. Patient was brought to the OR for possible control of bleeders and exploration of site under local anaesthesia. However, upon removal of oral pack, massive spurting of blood developed. Blood pressure went down to 20 palpatory and patient lost consciousness. Bleeding was controlled with huge amount of oral gauze pack placed on the right side of the oral cavity. Estimated blood loss was 1.2 liters in a matter of seconds. Patient received plasma expanders initially followed by transfusion of 3 units of fresh whole blood, type AB Rh + which corrected the hemoglobin from 72 to 103 g/l. A nasogastric tube was inserted into the left nostril for osteorized feeding purposes.

Two days later, patient was again brought to the operating room for possible ligation of bleeders and tooth extraction under general anaesthesia. But upon removal of packing, profuse bleeding of approximately half liter occurred prompting deferment of the plan.

It was decided that an angiogram will be done to identify the feeder vessels and to control bleeding with embolization. Bilateral carotid angiogram revealed neovascularities and inhomogenous tumour blushing at the right mandibular area perfused by the bilateral lingual and left facial arteries. These findings were compatible with the clinical impression of submandibular hemangioma. The right carotid angiogram showed pronounced constriction of the external carotid segment just distal to the superior thyroid and ascending pharyngeal arterial origin from previous surgical ligation. The lingual artery was supplying the mandibular lesion. Collateral vessel formation from the right internal carotid circulation was seen with opacification of the right internal maxillary artery and collateral arteries toward the mandibular area. The left carotid angiogram showed hypertrophied left facial and left lingual arteries extending to the right mandibular area, forming secondary and collateral blood supplies. Embolization with gel foam was done on right lingual and bilateral facial arteries.

Patient was brought to the operating room the next day for ligation of bleeders and possible ligation of left external carotid artery. A submandibular incision on the right extending to the midline lower lip area was done. The lingual branch of the right external carotid artery could not be identified due to fibrosis. After ligation of the branch of the left external carotid artery, there was still profuse bleeding on removal of pack. Hence, segmental mandibulectomy was decided. Osteolytic and necrotic bone were removed. Exposed bleeders in the bone were covered with bone wax. Estimated blood loss was 3.2 liters, for which 5 units of fresh whole blood was transfused to the patient. On gross pathology, the resected part had a cavernous concavity lined by a capsule containing blood clot material. Histopath revealed vessels lined by benign endothelial cells with stroma being hyalinized to fibrotic and vascular areas infiltrated by lamellar bone. Final diagnosis was hemangioma of the mandible, mixed type, with soft tissue extension, based on the clinical appearance, angiographic interpretation and histopathologic report.

Despite drainage tubes, patient's right wound became infected with Klebsiella ozannae and Pseudomonas aeruginosa. This was resolved by intake of

Chloramphenicol and Sparfloxacin. Patient was discharged improved after the segmental hemimandibulectomy with scheduled mandibular reconstruction 6 months post-op.

DISCUSSION

Hemangioma of the bone accounts for 0.7% of osseous neoplasms and about 10% of primary benign neoplasms which occur in the skull. Hartley stated that less than 49 cases involving the maxillary and mandible have been reported in the world literature. Bunel (1993) cited the work of Lamberg, et al, who reviewed the literature and noted 10 fatalities. Of these, nine patients died of exsanguination from a puncture biopsy wound and the remaining patient in the series died from spontaneous hemorrhage. Luhn and Dahlin noted that females are more affected than males in a ratio of 2:1. It occurs mostly among the age group of 10-19 years old, with over two thirds of the cases occurring in the mandible.

Hemangioma of the bone is a benign neoplasm of vascular origin resulting from proliferation of mesodermal cells that undergo endothelial differentiation and canalization. It is classified into capillary, cavernous, or mixed. The capillary type consists of small vessels with pronounced cellularity and stroma whereas the cavernous type is composed of larger vessels lined by a thin layer of endothelial cells. The mixed type demonstrates characteristics of both capillary and cavernous types. Batsakis mentioned that the three stages of development are the following: (1) a richly vascular state which bleeds freely at operation; (2) cystic transformation of the lesion accompanied by organizing blood clot; and (3) a sclerotic phase in which the ossification occurs.

A patient will usually present with a firm, non-painful bony swelling, brisk bleeding around a tooth, bluish discoloration of gingiva, mobile teeth, derangement of the arch form, accelerated exfoliation and agenesis of the teeth.

Radiologic findings are non-pathognomonic. In general, osteolytic pattern or multicystic areas of bone resorption producing soap bubble or honeycomb appearance are noted.

Differential diagnoses may include dental granuloma, vascular fibrous dysplasia, chronic gingivitis, aneurysmal bone cyst, hemangioma of the soft tissue, osteogenic sarcoma, central giant cell tumor.

The actual choice of treatment modality depends on the size and location of lesion, age of the patient, and anticipated complications. Suggested modalities include irradiation, injection of sclerosing agents, carotid artery ligation, embolization, and surgery.

Irradiation is the main mode of treatment where surgery is undesirable and risky. This may provide regression of lesion. However, it is not curative, and recurrence has been reported. The presence of intraosseous hemangioma reduces the actual exposure of the lesion to radiation. Complications include disturbance to growth centers, development of teeth and the possibility of inducing neoplastic formation.

The sclerosing agents work by inducing inflammatory reaction within the endothelium that ultimately results in fibrous obliteration of the vessels. Agents used are sodium morrhuate, sodium psylliate, gel, and absolute ethanol.

Cryotherapy has been used in small soft tissue lesions. However, it damages the surrounding tissue such as adjacent nerves, cells of pigmentation or viable bone.

Embolization of vessels feeding the lesion reduces intra-operative bleeding. Agents include gelatin sponge, silicon pellets, muscle, lead pellets or isobutyl cyanoacryllate. These will shrink the lesion temporarily until collateral vessels develop. Complications include embolization of pulmonary or cerebral vessels.

Surgery is the most widely accepted treatment. Techniques include currettage and resection. The resection lines should

be placed at the uninvolved areas to reduce the risk of further hemorrhage. Ligation of feeder vessels should be done before removal of the lesion.

This case is of medical interest as hemangioma of the mandible is a rare but treacherous lesion. A young male patient (a rare occurrence by itself) presented with a life threatening hemorrhage after a minor procedure of dental extraction. Given its rarity, silent growth and non-pathognomonic presentation, it was a difficult case to diagnose. A review of the plain radiograph and computer tomography scan (done outside) showed a soft tissue mass with osseous extension and destruction, and not the typical honeycomb appearance of hemangioma of bone. Dental granuloma, vascular fibrous dysplasia and gingivitis, aneurysmal bone cyst (ABC) may bleed but the severity will not be the same as hemangioma of the bone. ABC, osteogenic sarcoma and osseous hemangioma may more or less share the same radiographic features- that of bony destruction.

Angiography was ordered for its use in identifying the feeder vessels as a guide in preoperative technique, and in the embolization as well as to further strengthen and confirm the diagnosis of hemangioma of the mandible. However, because of its cost, it took time for the relatives to raise the amount. Pending proper identification of its perfusing vessels, several attempts to explore the involved site resulted in bloody conditions. One attempt made at the referring hospital where the right external carotid artery was ligated resulted in blood loss requiring three units of blood for transfusion. Two attempts in this institution to explore and control bleeders resulted in blood loss of approximately 1.2 liters and a half liter, respectively, in a matter of seconds. The angiogram also showed that all the branches of the right external carotid artery were ligated in the previous hospital except the right lingual artery, which was the one supplying mainly the lesion, and collateral vessels from the left external carotid artery, particularly the left lingual branch and facial arteries were formed to supply it as well.

The initial plan was to control the bleeding by currettage and bone wax application after ligation of the feeder vessels. However, on removal of pack, profuse bleeding was still noted, albeit forty percent (40%) less than the observed original blood flow. Control of bleeders with bone wax application could not be done. Hence, the surgeon had to resort to cutting a segment of the mandible close to the angle to look for the blood vessels so these could be applied with bone wax. The bleeding was probably coming from a branch of the internal carotid artery as a result of collateralization of vessels.

Patient's and doctor's discomfort with this experience was unimaginable. The patient had to contend with biting the oral pack tightly for several days to control bleeding thereby removing comfortable means of nutrition and oral hygiene.

The doctor's experience was equally difficult since a patient with this case could just easily die from exsanguinating hemorrhage if not acted on promptly and effectively.

SUMMARY

In summary, it can be recommended that surgery is the most definitive treatment of hemangioma of the mandible. Embolization and ligation of external carotid artery can serve as adjuncts to surgery. With regard to diagnostics, angiography can confirm the presence of a vascular lesion and provide information to pre-operative planning. During the operation, the surgeon should be prepared for massive bleeding and provisions for rapid blood administration should be done. Huge amount of packing material should be prepared before any examination or surgical intervention is contemplated.

Fortunately, hemangioma of the mandible is rare and the unpleasant experience of excising a part of the mandible of a young person is encountered infrequently. However, when presented with a case like this, aggressive treatment is mandated for the penalties to a casual approach is life threatening.

APPENDIX

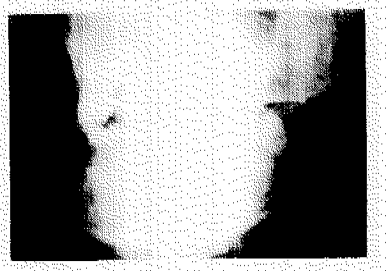

Figure 1. Skull APL showing a radiolucency with osteolytic changes at the right mandible.

Figure 2. CT scan showing a soft tissue density with focal lytic changes and osseus extension.

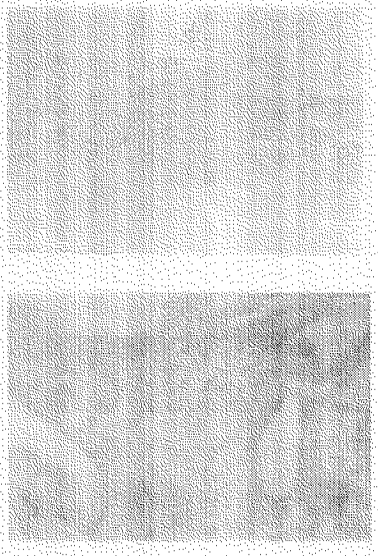

Figure 3. Histopathologgy showed vessels lined by benign enndothelial cells with hyalinized stroma and vasculaarized area infiltrated by lamellar bone.

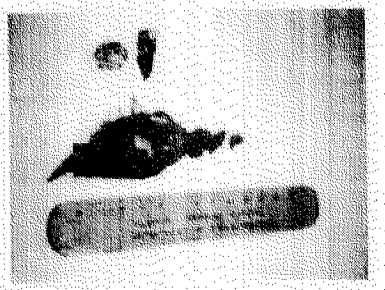

Figure 4. Gross pathologgy of the lesion showed a concavity lined by a capsule containing blood clots.

Figure 5. Preoperative picture of the patient.

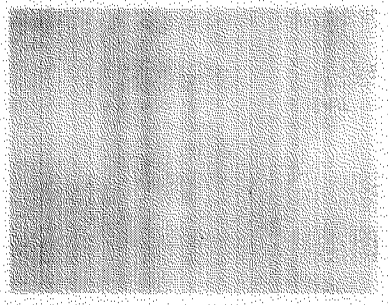

Figure 6. Post-operative picture of the patient, with the incision scar ending at the midline of mentum. Slight right mandibular deformity is noted.

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AN UNUSUAL MANDIBULAR MASS: FOLLICULAR CARCINOMA*

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INTRODUCTION

The surgical conditions of the mandible encompass the spectrum of pathology because both systemic and unique diseases occur in this location. Diseases occurring in the mandible range from a simple bone cyst to malignant tumors. Entities previously removed from the consideration of clinicians and pathologists are being encountered with increasing frequency. Meningioma, pigmented neuroectodermal tumor of infancy (melanotic progonoma, retinal anlage tumor), Hodgkin's disease, and plasma cell myeloma have been mentioned in literature to involve the mandible[1]. Thus, a disease entity, when presenting itself in a unique fashion, can make a clinician overlook the correct diagnosis of a particular disease which in turn can greatly alter the plan of management and survival of the patient.

Follicular carcinoma of the thyroid occurs with considerably less frequency than papillary carcinoma but, because of its greater tendency to metastasize hematogenously, many surgeons believe that a more aggressive therapeutic approach is indicated with this type of tumor[2].

A case of a metastatic follicular carcinoma which manifested as a mandibular mass is presented. Its unusual presentation and behavior as well as its radiologic appearance contributed to its misdiagnosis.

CASE REPORT

A 47 year old female presents with a left gingival and mandibular mass. The history started 8 months PTA when the patient experienced a painful, pinpoint ulceration with swelling on the left lower gingiva accompanied by numbness over the left mandibular area. No medications were taken at that time. A dentist was consulted who claimed that the gingival swelling was secondary to irritation form the 3rd upper molar and subsequently performed tooth extraction of the offending tooth providing relief of the symptoms.

However, 5 months PTA there was recurrence of the gingival pain and swelling. A 0.5 x 0.5cm mass also noted over the left mandibular area. The same dentist was consulted where Amoxycillin and Mefenamic acid were given with no relief of the symptoms. After a week, tooth extraction of the 2nd upper molar was done providing relief of the gingival pain but not of the gingival swelling.

Four months PTA, there was gradual increase in the size of the mandibular mass. A grayish, soft to doughy, non-tender mass was also noted over the site of the gingival swelling. This prompted consultation at a government hospital where panoramic radiograph of the mandible showed a cystic, lytic lesion at the body of the left mandible (Fig. 1). A biopsy of the gingival mass was also done. However, biopsy result revealed the presence of 'thyroid tissue'. A repeat biopsy was suggested but the patient refused.

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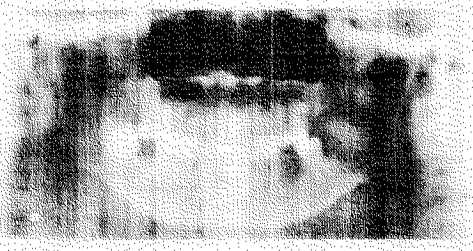

Figure 1. Panoramic Radiograph of the Mandible showing cystic lytic lesion on the left hemimandible.

Three months PTA, there was enlargement of the mandibular mass accompanied by increase in the size of the intraoral lesion with episodes of bleeding. Section biopsy of the gingival mass done at another government hospital was read as "Hemangiopericytoma".

One and a half months PTA, progressive increase in the size of the gingival mass followed by profuse bleeding prompted admission.

The personal history was unremarkable.

Mother and maternal aunt had a history of uterine tumor.

In 1990, the patient underwent "thyroid operation" secondary to an anterior neck mass at a medical mission in Valenzuela. However, the type of thyroidectomy procedure and histopathologic result was not known.

On admission, the patient was conscious, coherent, not in distress. Otoscopy, anterior, and posterior rhinoscopy and indirect laryngoscopy were essentially normal. On examination of the oral cavity, a 3x3x2 cm fleshly, friable, non-tender mass with areas of necrosis was noted over the left lower gingiva, displacing the first molar antero-medially (Fig. 2). There was no extension to the buccal area, tonsillar pillar, and floor of the mouth. An 8x5x2 cm doughy, non-tender, non-mobile mass was noted over the left mandibular area (Fig. 3). Examination of the neck showed a previous thyroidectomy scar. No palpable anterior neck mass nor lymph nodes were noted.

Figure 2. Left Lower Gingival Mass as seen on Oral Examination.

Figure 3. Left Mandibular Mass

CT scan of the mandible was requested pre-operatively but was not done due to financial constraints.

The patient was scheduled for hemimandibulectomy with iliac bone graft. Intraoperative findings revealed a soft to doughy, tan brown to reddish brown mass adherent to the left hemimandible. Profuse bleeding from the mass and areas of erosion of the left hemimandible were noted. Further dissection of the mandibular mass revealed extensive involvement necessitating left tonsillectomy and condylectomy. At the infratemporal fossa, a 2x2 cm pinkish, smooth-surfaced, friable mass was noted (Fig. 4). Profuse bleeding made further dissection difficult and risky. Hence, partial resection was performed. Cautery and packing with gelfoam was done which stopped the bleeding. Reconstruction with iliac bone graft was then performed (Fig. 5).

Figure 4. Site of the Cranial Base Mass seen Intraoperatively.

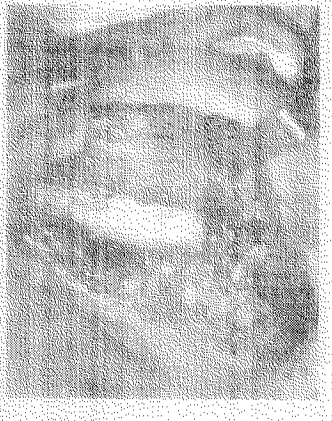

Figure 5. Reconstruction with Iliac Bone Graft.

Post-operatively, CT scan of the cranial base was requested. Excision of the cranial base mass was contemplated. However, patient refused to undergo further operation and so was then scheduled for cobalt therapy of the cranial base.

Histopathologic result released three weeks post-operatively revealed "microfollicular architecture composed of uniform, orderly, cuboidal cells with a relatively large nucleus surrounding occasionally colloid –filled follicles with scattered mitotic figures along with invasion of tumor cells to adjacent osseous tissue" (Fig. 6). Final diagnosis was metastatic follicular carcinoma. Patient was then scheduled for total body scan and radioactive iodine treatment.

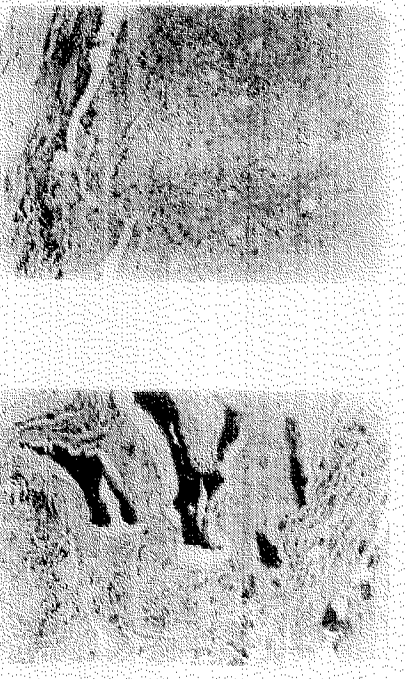

Figure 6. Histopathologic Slides of the Mandibular Mass.

DISCUSSION

The case is interesting from several viewpoints. Although Cummings mentioned the bone as the second most frequent site of metastasis in follicular carcinoma[3], it is unusual for a follicular carcinoma to metastasize to the jaw and manifest as a mandibular mass. Rockwood mentioned the spine, ribs, femur and humerus as the most

common sites of bony metastasis in cases of carcinoma[4]. Buchelt and Saillant, Ozakio and Casals reported cases of thyroid carcinoma metastasizing to the spine, sternum, and clivus of the base of the skull, respectively[567]. However, there have been no reported case of a follicular carcinoma metastasizing to the mandible.

De Groot mentioned the aggressive nature of this malignant tumor[2]. However, in this case, this tumor's behavior mimicking a benign entity in the mandible made it confusing for the authors and led them to think of the more commonly encountered benign lesions of the mandible such as an ameloblastoma.

Initially, the findings of a cystic, lytic lesion in the mandible led the authors to consider ameloblastoma. However, there is always some degree of difficulty differentiating this benign tumor from a malignant one radiographically, especially in cases of metastatic tumors because both can present with lytic changes. Likewise, difficulty was also encountered with regards to the histopathologic diagnosis. The initial biopsy findings of "thyroid tissue" was not convincing to the pathologists such that a repeat biopsy was requested. The second biopsy result which was read as Hemangiopericytoma outweighed the initial radiologic impression of an ameloblastoma in this case. However, the final histopath result of a metastatic follicular carcinoma was unforeseen and evoked some degree of amazement. The histopath results, from a Hemangiopericytoma to a metastatic follicular carcinoma, only demonstrated the difficulty encountered by the pathologists in establishing the histologic diagnosis of this tumor.

The intraoperative findings of a mass at the infratemporal fossa was not anticipated. The presence of this malignant tumor in the base of the skull poses a challenge to the ENT- Head and Neck surgeon. A resection of any malignant tumor is important to increase the survival and improve the patient's quality of life. Here, the knowledge and skill of the head and neck surgeon in handling cases of malignant extension into the cranial base is essential.

This case also poses a challenge to the ENT-Head and Neck Reconstructive surgeon. Proper reconstruction of a mandibular defect is critical because of physiologic reasons and because the mandible is one of the most difficult areas to reconstruct in terms of form, shape, and function.

Follicular carcinoma is derived from the thyroid hormone-producing follicular cells and is the second most common thyroid malignancy next to papillary carcinoma accounting for 10-25% of cases. This tumor has a female preponderance with reported ratios ranging from 2:1 to 4:1.2[8] with a peak frequency in women on their 5th and 6th decades.

Most follicular carcinoma are solitary, solid, non-cystic tumors with no necrosis (Fig. #7 demonstrates the algorithm for diagnosis and management of thyroid nodules). It is usually encapsulated and consists of highly cellular follicles and microfollicles with compact, dark-staining nuclei with fairly uniform size, shape, and location. Diagnosis is made when invasion of the capsule, adjacent gland, lymphatic invasion, and angioinvasion is seen. Prognosis is directly related to angioinvasion. Those with marked angioinvasion have the highest mortality and the highest incidence of metastasis.

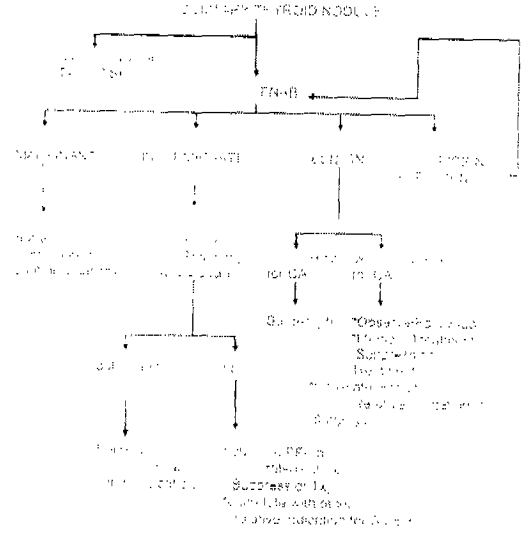

Figure 7. *Algorithm for Diagnosis and Management of Solitary Thyroid Nodule*

Distant metastasis from follicular carcinoma have been reported from 3-33% of patients at initial presentation[9] to up to 65% of patients[10], and may occur even with a very small primary tumor[3]. The most common sites of metastasis, in descending order frequency are the lung, bone, brain, and soft tissue (liver, bladder, skin) [3].

Most institutions employ the acronym AMES to represent age, distant metastases, extent of disease, and size of lesion in classifying low risk and high risk thyroid carcinoma (see table #1) [8]. At the Lahey Clinic, Cady and colleagues studied retrospectively 821 patients; the 689 patients considered as low risk experienced a 7.7% recurrence rate with a mortality rate of 1.8% and 132 high risk patients experienced a 59% recurrence rate with a 44% mortality rate[8]. Similarly, the Mayo Clinic improvised a grading system which proved valuable for prognostication.

Table #1. *Lahey Clinic Definitions of Risk Groups in Well-differentiated Thyroid Cancer*

Low Risk
- All Younger patients (males under 41, females under 51) without distant metastases
- Older patients with
  - Papillary Carcinoma if intrathyroidal or follicular carcinoma with minimal capsular involvement
  - Primary carcinoma less than 5 cm diameter, and
  - No distant metastases

High Risk
- All patients with distant metastases
- Older patients with
  - Extrathyroidal papillary carcinoma or major capsular involvement with follicular carcinoma, or Primary carcinoma 5 cm or larger, regardless of extent of disease

The extent of surgery required for thyroid carcinoma has been a controversial topic. A more aggressive surgery appears to be appropriate for high risk patients. Most authors believe that surgical extirpation of the thyroid tissue improves the ability to treat distant metastasis with radioactive iodine, increase the possibility of removing all multi-centered lesion, reduce the incidence of local recurrence in thyroid remnants, and prevent the possibility of anaplastic transformation. Other experienced surgeons fell that unilateral lobectomy may be all that is required for patients in the most favorable prognosis category.

According to Goldmann, et. al, patients with thyroid carcinoma exhibiting distant metastasis are placed on T_3 or T_4 replacement therapy after thyroidectomy with the primary objective of increasing TSH level to > 50mU/L to promote hypothyroid state in preparation for Iodide 131 scanning and possible treatment (see figure #8)[8].

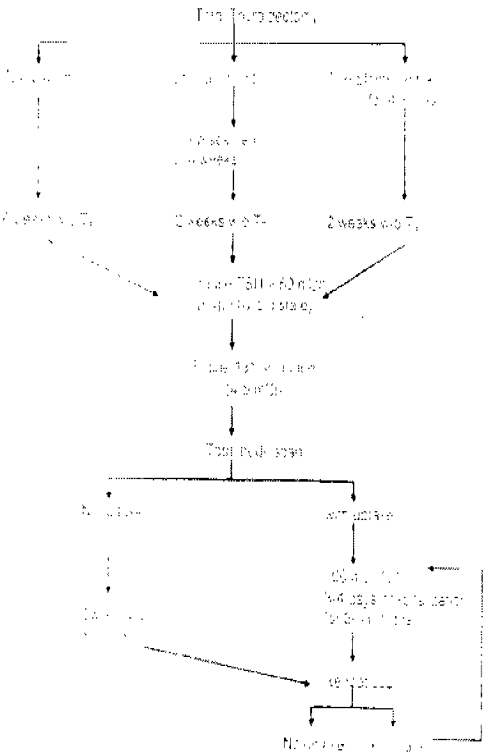

Figure 8. *Algorithm for Management of Thyroid Carcinoma with distant metastases*

The 5-year survival rate in follicular carcinoma is approximately 70%, decreasing to 40% at 10 years[10]. If distant metastases are present at initial diagnosis, the 5-year survival rate is approximately 20%[10]. Up to 75% of patients who die of this tumor succumb from distant metastasis[11].

A five (5) year review of histopathologic report on thyroid specimens from 5 institutions (see table #2) showed 505 (18.4% cases of thyroid carcinoma out of 2,747 specimens (see figure #9). Among the cases of thyroid carcinomas, majority were of the papillary type comprising 74.85% (378 cases). The follicular type constitutes 20% (101) of all thyroid carcinomas followed by anaplastic 4.75% (24) and the medullary type at 0.4% (2) (see Figure #10).

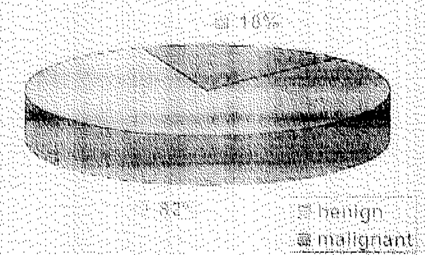

Figure #9. Incidence of benign and malignant tumors of the thyroid based on a 5 year review (1992-1996) of histopathologic reports from 5 institutions

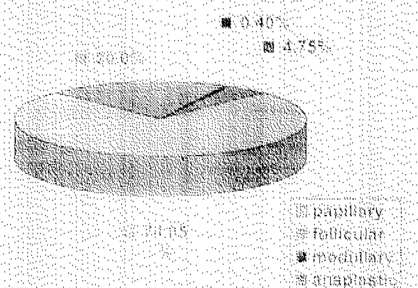

Figure #10. Incidence of the different histologic types of thyroid malignancy based on a 5 year review (1992-1996) of histopathologic reports from 5 institutions

Of the follicular type of thyroid cancer, 11.88% (12) had evidence of metastases mostly to the cervical lymph nodes comprising 8.9% (9). Metastatic follicular carcinoma was noted to occur in the spine (1 case), scalp-occipital area (1 case) and scapula (1 case). Based on the data collected, none were found to metastasize to the mandible.

Table 1. Review of Histopathology Reports on Follicular CA from 1992-1996

	EAMC	JRRMMC	STUH	FEU-NRMF	UERMMC	TOTAL
No. of Thyroidectomy specimens submitted with or without neck dissection	[illegible]	[illegible]	[illegible]	292	147	2,747
No. of Benign Lesions	604	404	[illegible]	255	109	2,242
No. of Thyroid CA a. papillary	110	80	[illegible]	30	25	378
b. follicular	45	10	28	7	11	101
c. medullary	1	1	0	0	0	2
d. anaplastic / undifferentiated	1	5	[illegible]	0	2	24
					Total	505
No. of Follicular CA with Metastases	1	0	7	0	1	9
a. Cervical Lymph node	0	0	[illegible]	0	1	1
b. Spine	0	0	0	1	0	1
c. Scalp - Occipital area	0	0	0	1	0	1
d. Scapula						
No. of Follicular CA Metastatic to the Mandible proven by biopsy and resected specimens	0	0	0	0	0	0

Note: [illegible]
Source: Tumor Registry, Dept. of Pathology

CONCLUSION

Since follicular carcinoma of the mandible is rare, this case can be considered an exception rather than the rule when dealing with mandibular masses. However, the physician should be cognizant of this type of tumor when occurring in the mandible because of its malignant nature, guarded prognosis, and management.

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SUBGLOTTIC GRANULOMA CAUSING DIFFICULT DECANNULATION: THE BALL-VALVE EFFECT*

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EDUARDO C. YAP, MD***

INTRODUCTION

Successful decannulation is most often simple and uneventful. In evaluating a patient for possible decannulation, the first and most important step is to make sure that the original problem that required the tracheostomy in the first place has resolved.

Arytenoidectomy is a procedure used in widening the glottis to allow eventual decannulation in bilateral vocal cord paralysis. External arytenoidectomy through a laryngofissure approach has been frequently used because it offers a wide surgical field for the surgeon. However, surgery of the upper air passage is not without complications. Problems in decannulation may occur later on as a result of the actual surgery[1]. This condition presents different modes of management depending on the surgeons expertise. Working on a small surgical field like the upper airway poses a special challenge to the surgeon since an inadequate opening can hide treacherous conditions that would spell the difference between life and death.

Here, an unusual case of a 47y/o female status post arytenoidectomy for bilateral midline paralysis of the vocal cord is presented in an effort to project the awareness that every case of difficult decannulation requires extensive evaluation and work-up in search for the etiology and to assess and further contribute in the present knowledge and experience regarding a new surgical tool which has helped lessen our operative and postoperative complications.

CASE REPORT

This is a case of a 47y/o housewife, from Tondo, Manila who was referred to us for Cordectomy of the right vocal cord using the CO_2 laser with an impression of status post arytenoidectomy, right, for bilateral midline paralysis of the vocal cords.

The condition started 7 months PTA as progressive stridor after thyroidectomy (left total and right subtotal) for adenomatous colloid goiter. A private physician attempted bronchoscopy but failed due to pending respiratory failure. Instead tracheostomy was immediately done. Computed Tomography scan revealed normal results. An ENT surgeon performed a fiberoptic laryngoscopy procedure which revealed bilateral abductor paralysis of the vocal cords. An external arytenoidectomy, right via laryngofissure approach was done. Weaning form the tracheostomy tube was started 2 weeks post-op. Although patient can tolerate a totally occluded tube, there were episodes of stridor in the supine position and during exertion. Repeat endoscopy revealed only a slight opening of the vocal glottis (approximately 3mm). Patient was subsequently referred to this institution.

On admission, the patient was conscious, coherent, afebrile, not in cardiorespiratory distress with tracheostomy tube, with the following vital signs:

Blood pressure: 130/80 mmHg
Cardiac rate: 80/min.
Respiratory rate: 20/min. (supine)

*Presented, PSOHNS Clinical Case Report Contest, May 17, 1997, Cebu Plaza Hotel, Cebu City
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A preoperative indirect and fiberoptic laryngoscopy procedure revealed bilateral abductor paralysis of the vocal cords with glottic chink measuring approximately 3mm. The rest of the P.E. findings were unremarkable. Laboratory findings likewise revealed normal results.

Thinking that the arytenoidectomy procedure previously done was insufficient to open up the glottis, cordectomy using the CO_2 laser was contemplated (Fig. 1). Intraoperatively, before cordectomy of the right vocal cord, a light brown mass was seen occluding the subglottic region with its pedicle attached anteriorly (Fig. 2). Using the CO_2 laser, an incision starting 4mm from the anterior commissure down to the arytenoid area was done (Fig. 3 and 4). The mass was subsequently removed via vaporization of the pedicle and carefully extruded out from the subglottic area.

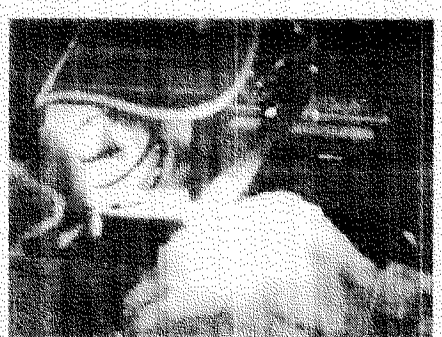

Fig. 1: Shows Direct Laryngoscopy procedure under General Anesthesia.

Fig. 2: Subglottic mass seen behind the true vocal cords. Note Arytenoidectomy done on right vocal cords.

Fig. 3: Carbon dioxide laser excision of right vocal cord exposing a greater portion of the subglottic mass.

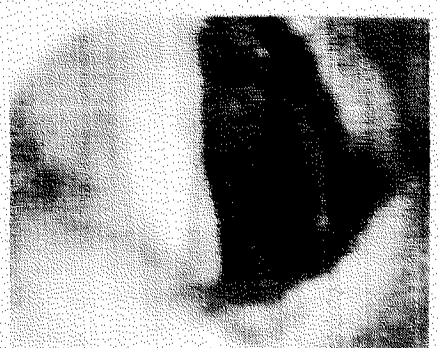

Fig. 4: Cordectomy of the right vocal cord, left vocal cord intact.

Grossly, the mass is oval shaped with a definite stalk and measured 0.8 x 0.5 x 0.5 cm. Histologic section revealed fibrous tissues proliferating capillaries and inflammatory cell infiltrates composed predominantly of neutrophils, lymphocytes, plasma cells and some macrophages. Final diagnosis is that of granulation tissue. (Fig. 5). The patient was discharged the following day improved.

Fig. 5: Subglottic mass extruded out. Measuring 0.8 x 0.5 x 0.5cm. Histopathologic diagnosis: Granulation tissue.

Tracheostomy tube was successfully weaned off after 2 weeks without any complication (Fig. 6). Up to the present time, though still with hoarseness follow up exam revealed the presence of a neocord on the right with an adequate glottic opening but with no recurrence of the subglottic mass (Fig. 7).

Fig. 6: Postoperatively, patient is shown with a totally occluded tube. Note tape on tube entrance.

Fig. 7: Postoperatively, fiberoptic laryngoscopy shows presence of a neocord, an adequate opening and no recurrence of the subglottic mass.

DISCUSSION

Bilateral midline paralysis of the vocal cords is a life-threatening condition that may eventually lead to respiratory failure and commonly caused by thyroid surgery[5,6]. Patients will manifest normal or near normal phonation with progressive inspiratory stridor. The initial step in the management is to overcome potentially life-threatening airway obstruction.

This can be accomplished quickly and directly by a tracheotomy. Once the airway is stabilized, the decision as to which procedure may be undertaken to provide a permanent airway is determined by the patients individual needs and preference. There are patients who may want to maintain a permanent tracheotomy and a normal voice. There are others who prefer decannulation after a lateralization procedure at the expense of the voice. Still a third group might like to maintain both adequate voice and airway[2]. In the past and for some patients today, a tracheostomy was all that was necessary. The voice remains fairly good because the vocal cords are in the paramedian position. The obstruction is safely bypassed through the tracheostomy. In an attempt to relieve the patient of an inadequate glottic opening so as to enable decannulation, various operative procedures have been developed with the common aim of permanently lateralizing at least one vocal cord. Although the normal glottic opening in an adult female on full abduction is 1.2 cm^3, the aim of surgical repair is to provide an adequate airway for average everyday physical activity and still retain a usable voice. A glottic opening of 5mm wide is adequate but the voice tends to be poor[3].

Arytenoidectomy involves removal of the arytenoid cartilage causing lateralization of the vocal cord thereby increasing the diameter of the airway. This was first performed by Kelley[2] in 1941 through a window in the thyroid cartilage. The results, while successful in early attempts, were not consistent. In 1946, Woodman[2,3,4], using a lateral laryngeal approach, removed the body of the arytenoid and fixed the vocal process of the arytenoid laterally to the thyroid cartilage. This produced a satisfactory airway when the glottic opening was between 4mm and 6mm, but when it was greater, a poor voice resulted. The Woodman arytenoidectomy remains one of the most popular procedure for managing bilateral vocal cord paralysis. Thornell[2,3,4] described translaryngeal arytenoidectomy by a submucous resection of the arytenoid cartilage. The deep tissues were cauterized with the intention of causing retraction of the vocal cord laterally. This procedure has been regarded as technically difficult. In 1968, Downey and Keenan[2,3] suggested laryngofissure as a direct approach through which arytenoidectomy can be performed. Laryngofissure is a midline anterior incision made on the thyroid cartilage for better access and visualization of the vocal cords. Montgomery[2,3,4] modified

this procedure to allow an arytenoidopexy in which the lateralized cartilage could be fixed with a pin to the cricoid. An overall success rate of 70% is expected from these procedures[10]. The external approach via laryngofissure is done to provide adequate exposure during surgery.

In doing arytenoidectomy, care must be taken to prevent injury to the mucosa of the interarytenoid cleft in order to prevent development of a posterior glottic web, which can further compromise the airway. Another complication is that healing causes additional scar contracture. The degree to which this occurs varies and it may produce a breathy voice[9].

Cordectomy is performed if arytenoidectomy fails. This involves resection of the whole or a portion of the vocal cord. Cordectomy can be performed either translaryngeally or via external approach.

After an uneventful arytenoidectomy procedure, attempts at decannulation can be started. On the 2nd postoperative week weaning was started in the patient although this resulted in episodes of stridor in the supine position and during exertion. A repeat endoscopy was done using the 70^0 rigid and flexible fiberoptic scopes, no pathology was seen other that a small glottic opening. Though resigned to the fact that a 3mm glottic opening was still inadequate to allow decannulation, the stridor present at certain positions even without exertion was quites puzzling. Relying on the available historical data and initial work up, the only plausible explanation was a failed arytenoidectomy and the only recourse was to do a cordectomy.

Conditions that could have surely compromised the airway must be considered also. But unlike what was previously described, the following differential diagnosis can cause consistent obstruction or could have been diagnosed by the series of fiberoptic exams that was done. According to Krespi, laryngeal edema is seen in almost all patients with prior surgery. This may take a few weeks to subside without any need for surgical intervention[1]. However, there are more concerning causes of delayed decannulation which may be irreversible.

Subglottic stenosis cause glottic insufficiency. This results from excessive scar formation. Factors causing excessive scarification leading to stenosis are: impaired healing, foreign body in tissue, inadequate reconstruction, wound infection and excessive tissue removal. Once stenosis sets in, its progress may be retarded by repeated injections into the immature scar while a more severe stenosis may require scar excision through the external approach[1,6].

Webs and synechiae impair laryngeal function, leads to aspiration thereby delaying decannulation. The factors responsible for these are similar to those mentioned for stenosis. Once developed, excision microsurgically through an endoscope may be performed[1,6].

Subglottic granuloma results from inadequate reconstruction with incomplete coverage of the defect, foreign bodies such as silk, and tissue infection. Another cause is intubation trauma. However, inspection of the larynx during the laryngofissure approach previously done reported no evidence from this source. Although intubation as a cause cannot be totally ruled out, the more extensive procedure of doing a laryngofissure wherein mucosa of the larynx may have been inadvertently left unsutured was the more probable source.

Glottic granulomas with scar formation were seen by Guerrier and Jazouli in 4.9% after unilateral cordectomy, in 3% after bilateral cordectomy and 5% after frontolateral resection[1]. Even though this incidence shows that granulomas commonly occur as a result of laryngeal surgery, it creates a complicated situation if encountered unexpectedly in an inadequate surgical field like bilateral vocal cord paralysis.

In this patient, indeed there was a granuloma in the subglottic area hiding from indirect visualization and it was significant in size in relation to the glottic opening, proving that extraction would not be at all that simple. A granuloma may fall down the respiratory tract causing further pulmonary

complications. Because of its long pedicle which is attached anteriorly the mass must have acted like a ball valve in the supine position, but deceivingly symptomless while upright. The Ball-valve effect lies on the principle that since the granuloma is situated below the vocal cords it falls down on the already reduced glottic opening in the supine position allowing air to enter on inspiration but is significantly reduced on expiration while a return to the upright position would permit adequate air exchange.

In effect, an explanation was also found why indirect and flexible laryngoscopy which was done in the upright position failed to reveal an accompanying pathology.

Coupled to an operating microscope, the laser was used to do a cordectomy and excise the granuloma followed by vaporization of remaining granulation tissue. A study done by Lannigan on patients who underwent laser cordectomy and arytenoidectomy for bilateral cord paralysis showed that all were provided an adequate airway and satisfactory voice quality[7].

The surgical superiority of the laser has been attributed to the following characteristics of laser energy-soft tissue interaction: 1) an inherent hemostatic; 2) minimal production of edema in tissues postoperatively; 3) rapid healing due to minimal peripheral tissue damage; and 4) minimal resultant scarring due to reduced manipulation[8]. These surgical advantages benefit patients by affording them decreased surgical pain, infection and hospitalization.

The most widely used is the Carbon Dioxide laser which is known for its precision. Its wavelength of 10.6um is at the peak of absorption of water.

This characteristics is important because absorption of this wavelength into soft tissue (90% water) will concentrate the energy permitting little heat to dissipate to adjacent tissues. The rapid thermal drop of laser energy in the tissue surrounding the incision results in shallow and predictable tissue penetration with minimal edema. The hemostatic capability of the CO_2 laser is limited however, to blood vessels not larger than capillaries (0.5mm). The laser beam can be focused to create a precise cut and defocused to produce coagulation of small vessels (approximately 1mm)[12]. This is why this machine was deemed appropriate for the procedure since any bleeding would surely obscure the view of the larynx. A disadvantage of the CO_2 laser is that it cannot be transmitted through flexible fibers but can only delivered through a somewhat articulated mirror system[12].

This experience with the CO_2 laser should open minds to the potentials of this new tool for future endeavors.

Intraoperatively, discovery of the subglottic mass led to the conclusion that this was the menace behind the decannulation problem despite arytenoidectomy

SUMMARY

Surgery of the upper respiratory tract poses a special challenge to the Otolaryngologist. Every case has a different approach to management. This was an unusual case of status post arytenoidectomy coupled with a hiding subglottic mass causing difficulty in decannulation. Physicians should be aware that every case of difficult decannulation would require extensive work up like plain films or tomograms coupled with thorough endoscopic inspection. The diagnosis is difficult and so is the management.

A machine which somehow lessened the operative complications in doing both a cordectomy and excision of granuloma was used.

This is the first reported case of cordectomy coupled with granuloma excision using the CO_2 laser in the Philippines. Further local studies are recommended to draw definite conclusions and to determine if treatment is curative. However, the dramatic improvement in the condition of the patient firmly supports the use of the CO_2 laser as a new and viable option in the management of laryngeal conditions

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A CASE REPORT OF AN AUDIOLOGIC DILEMMA IN A PATIENT WITH CRANIO-FACIAL ANOMALY*

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INTRODUCTION

The management of cranio-facial anomaly remains a dilemma among otorhinolaryngologists. Patients afflicted with this problem should be approached through the triad of physical, emotional, and psychological management to be mainstreamed, and be functional in a pre-judge society. The incidence of hearing loss in patients with cranio-facial anomalies is high. It is for this reason that neonates born with this disorder are included in a high risk registry proposed by the American Joint Committee on Infant Screening.

The objective of this case report is to remind and inform physicians that any form of an outright anomaly warrants immediate investigation and management. Such is the case of this patient where, for several years, it was erroneously thought that the normal looking ear was functional. Through further investigation, however, it was noted that the malformed pinna masquerades the only hearing ear. The problem in this situation lies in early identification of hearing loss. An even more interesting note, with regards to this case report, is the fact that the aplastic ear presented with a better hearing level and the normal looking ear presented with hearing loss. It is a known fact that one anomaly warrants the search for another anomaly and to treat this at such an early age would convert a debilitated child to a functional child.

CASE REPORT

Bryan, a 9 year old male, born pre term (34 to 35 weeks) to a G4P2 (1122) mother. Pregnancy, as well as labor and delivery, were reportedly uneventful. Patient had a birth weight of 5.5 lbs. and was noted to have multiple congenital anomalies.

Physical examination findings revealed an aplastic pinna on the left, cleft lip and palate, and a left hemi-facial microsomia. Patient underwent cheiloplasty at age 8 months and uranoplasty at 1 ½ years old. Anti-Koch's medication was given for six months at 1 ½ years old.

At 2 years old, the parents noted a delay in the language development but the rest of developmental milestones were unremarkable. At 2 ½ years old, a peculiar observation was noted in the patient that would answer the telephone, using the malformed left ear. Parents insisted on the child to use the normal looking ear but failed in this endeavor. Hence, a consult was done with an otologist for a battery of audiologic test. The otologist was then surprised with the ABR results which was suggestive of a conductive hearing loss on the atretic left ear, while a severe to profound hearing loss on the seemingly normal right ear. (Figure 1) A bone conductive hearing aid was then suggested by the otologist but due to financial reasons, the parents forego with the management.

Figure 1. *ABR*

AUDITORY BRAINSTEM EVOKED RESPONSES (mSecs.)

	I	II	III	IV	V	VI	VII
R.	NR.	NR	NR.	NR	NR	NR	NR.
L.	2.8	NR	4.7	NR	6.6	NR.	NR

Interaural Differences: 0.0 mSec. Time Window 10.2 mSecs.

*Presented, PSOHNS Clinical Case Report Contest, May 17, 1997, Cebu Plaaza Hotel, Cebu City
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No. of Averages: 1500-2000 NR = no response.

IPL: I-III	III-V	I-V
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1.9	1.9	3.8

Stimulus: R + C clicks
Intensity: 80 dBHL
Frequency: 4 KHz
Voltage Range: 1/32V

RESULTS:
Waveform morphology reveals a series of 3 vertex-positive. Responses of small Amplitude, referenced to ipsilateral Mastoid. Absolute latencies are prolonged, however, Interpeak Latencies were within normal limits left. *The right tracing did not reveal any* responses even at high stimulus intensities.

IMPRESSION
Suggests Conductive hearing loss, left. Severe-Profound Sensory loss, right

(Certified thru copy, June 7, 1991)

At age 4, patient was finally fitted with a bone conductive hearing aid on the aplastic ear but showed discomfort and complained of being ridiculed by peers prompting removal. The otologist suggested a referral to a developmental child psychologist. Patient was then enrolled in a special school (1992-1994) at age 5 years and was mainstreamed at age 7 years.

Presently at age 9, patient is now at grade 1 at a regular elementary school and, according to the mother, can basically handle the academic standards but was noted to become much more conscious about the condition. Further work ups were then done like pure tone audiometry which revealed a moderate conductive hearing loss, AS and a severe to profound hearing loss, AD (Figure 2). CT scan of the head with temporal cuts was done also revealing an impression of congenital abnormality in the nature of atretic left, external acoustic canal and abnormalities in the middle ear. (Figure 3).

Figure 2. *PTA*

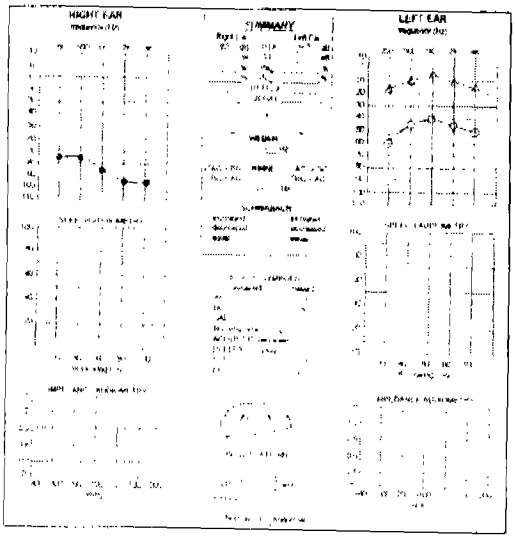


Figure 3. *CT-Scan*

CT SCAN OF THE TEMPORAL BONE
History: hypoplastic, left ear.
Method: Axial and coronal 1.5 mm slices done in the temporal bone region
Findings.
1. The left external acoustic canal is atretic
   The left middle ear cavity is small
2. The left mastoid is not aerated.
3. The left stapes could not be identified and is probably absent.
4. The left malleus and incus also *appeared fuse.*
5. The semicircular canals are normal
6. *The turn of the cochlea are complete.*
7. Negative for otosclerosis.
8. The right ear is unremarkable

IMPRESSION:
CONGENITAL ABNORMALITY IN THE NATURE OF ATRETIC LEFT EXTERNAL ACOUSTIC CANAL AND ABNORMALITIES IN THE MIDDLE EAR, AS DESCRIBED.

Parents were then advised to have the patient undergo surgery in order to improve the hearing. Presently, the parents are now deciding as to whether or not surgery be done in the only hearing ear.

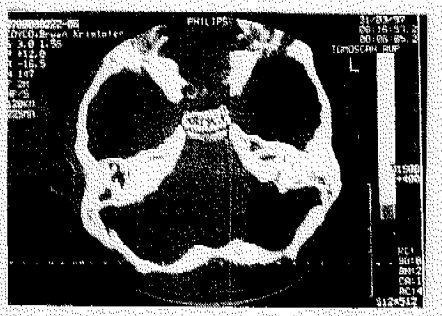
DISCUSSION

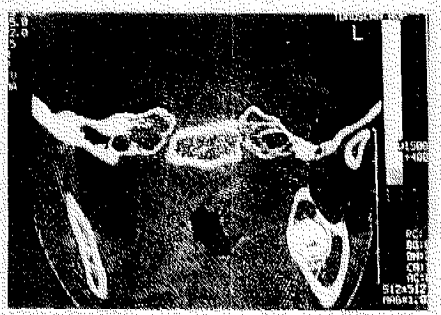
Management of cranio-facial anomaly is a major issue that all otolaryngologist has to face in one's practice. Patient underwent cheiloplasty and uranoplasty thereby correcting part of the defect. But presently the main concern of this case report is that of the audiologic dilemma. In order to discuss the case, it is important to be familiar with the embryologic development of the ear. The external ear is derived from the first and second branchial arches (pinna) and from the first branchial groove or cleft (external auditory canal). The middle ear structure are derived from the first and second branchial arches (ossicles) and from the first branchial pouch (air cells). The inner ear is derived from the otic placode (membranous labyrinth) and from rarefaction and ossification of the surrounding mesoderm (otic capsule) [1]. Looking at it in another perspective, at 6th week intrauterine, the auricles develops from 6 hillocks around the primitive meatus. At 8 weeks gestation the core epithelium migrates inward from the rudimentary pinna towards the first branchial pouch (precursor of the external auditory canal), the first branchial pouch then migrates outward from the middle ear cleft. The eardrum is then formed upon the fusion of the middle ear cleft and branchial pouch. At this time, the malleus and incus coming from the Meckel's cartilage from the first branchial arch takes shape. The stapes develop from the Reichert's cartilage and all ossicles takes shape at the end of the 16 week. At 24

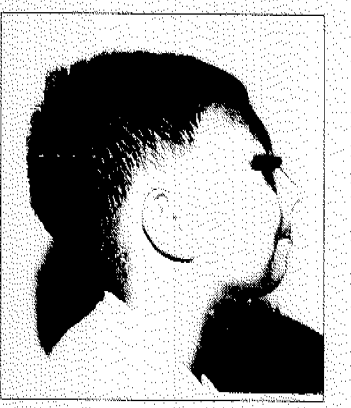
weeks age of gestation, the external auditory canal takes shape and this starts to canalize at 28th weeks. From the 28th week to the 32nd week, the middle ear cleft surrounds the ossicles and cover them with mucous membranes. Recanalization then starts after the 32nd week, age of gestation.

With the physical findings, (Figures 4 & 5) it can be deduced that aplasia of the external auditory canal occurred early, accompanied by the failure of development of the first branchial groove. The arrest in the growth and development happened possibly during the first trimester of pregnancy. It was also mentioned earlier that an intention of this report was to make all physicians cognizant of the association of certain anomalies with others. Where one congenital anomaly is faced, others must be sought.[2] Factors like genetic, pregnancy, birth and medical histories provide the data which triggers a red flag for the problems in hearing, vision, intelligence, perception, language and motor function. Early identification of hearing impairment in infants relates to the impact of hearing impairment on speech and language acquisition, academic achievements, and social/emotional development. It is in the first three years of life which is the most important for speech and language acquisition.[3] The use of the high risk registry for deafness is helpful in this regard.

Figure#4. *Subject Photo Identification*







It is basically a list of high pre-and perinatal conditions associated with hearing impairment and is divided into seven categories as follows:

1. Family history of childhood hearing impairment.
2. Congenital or perinatal infection (TORCH'S)
3. Anatomic malformations involving the head and neck
4. Birth weight of < 1500gm.
5. Hyperbilirubinemia at a level exceeding indications for exchange transfusion.
6. Bacterial meningitis specially Haemophilus influenzae
7. Severe asphyxia which may include infants with APGAR scores of 0 to 3 or who fail to institute spontaneous respiration by 10 min. and those with hypotonia persisting to 2 hour of age.[4]

Early intervention and proper management should be given to the patient since the parents failed to recognize the problem earlier or played a deaf ear. It was also unfortunate that his diagnosis for hearing loss was discovered late since it was assumed that a congenitally deformed ear was deaf and that the normal looking ear was functional. Such assumptions in these cases must be avoided since it generally alters the outcome. With the advent of new technologies like the Auditory Brainstem Response or Otoacoustic Emissions, it is now possible to test for hearing regardless of the age. In this case where an ABR (Index: Figure 3) revealed an impression of conductive hearing loss, left and a severe-profound sensory loss, right, this should now warrant immediate management which basically took one year. Also another problem encountered can be explained readily by a phenomenon known as the "head shadow effect". Studies have shown that there is a 6.4dB reduction of speech intensity as the signal progresses from one ear to the other (Tillman et al. 1963). That is, the head serves to attenuate or reduce the intensity of sounds arising to the ear farthest from the sound course.[5] Interventional management done for this patient, through the use of a bone conductive hearing aid, was then placed in order to improve monoaural amplification. The basic premise for this action is that, during the critical language acquisition period, the child is in need of as much auditory stimulation as possible in order to facilitate language learning.[6]

Surgical correction by reconstructing an auditory canal may be considered in order to improve the conductive hearing loss. But the problem is complicated by the fact that the normal looking ear is deaf. It was also unfortunate that no work ups was done on the normal looking ear. If the problem have been identified early, there might have been a slim chance of improving the hearing.

It is also noteworthy to discuss this patient's normal looking ear turned out to be deaf. In the United States, more than 16 million Americans are classified as having a significant hearing loss. These patients can be classified into two basic categories, one being congenital and the second being acquired etiologies. According to Boles, Textbook of Fundamentals of Otolaryngology, it was estimated that there are 2000 to 4000 infants born deaf every year. One half of these are of genetic etiology and about 1/3 of the cases have no cause to be found.[7] It must be remembered that the patient has a paternal uncle who was diagnosed to have mental retardation but was unfortunately not investigated. Genetic counseling and chromosomal studies were suggested but this was not done due to financial reasons.

Congenital deafness of genetic origin may be considered for the normal looking right ear. The problem in this ear

lies in the inner ear which may be cochlear or retrocochlear to central in location. If this is so, the genetic condition must also be identified and categorized in reference to the normal looking ear. The following classification can be used:

TYPE OF CONGENITAL DEAFNESS ON INNER EAR ANOMALIES
Michel's Deafness This entity, described by Michel in 1863, is characterized by total lack of development of the inner ear. Michel's deafness is thought to be autosomal dominant in transmission
Mondini's Deafness There is partial aplasia of the bony as well as membranous labyrinth. This malformation results in a flattened cochlea with development only of the basal turn so that instead of 2 ½ turns there are only 1 ½ turns, while the middle ear and apical turns occupy a common space. The osseous vestibular labyrinth may also be malformed. Dysgenesis of the organ of corti causes the hearing loss. This condition is transmitted as an autosomal dominant trait
Scheibe's Deafness Scheibe, in 1892, described this type of Aplasia, in which the bony labyrinth is fully developed but the pars inferior (saccule and cochlear duct) is represented by mounds of undifferentiated cells. Scheibe's aplasia is the most common of all inherited congenital deafness disorders and is usually transmitted as an autosomal recessive trait. The organ of corti and adjacent ganglion cells of the basal coil of the cochlea are most severely affected, resulting in a high frequency hearing loss. Bony and membranous labyrinth otherwise appears to be normal.
Alexander's Aplasia Organ of corti and adjacent ganglio cells of the basal coil of the cochlea are most affected, resulting on a high frequency hearing loss. The patients with Alexander aplasia should be able to use amplification to an advantage since hearing remains in the low frequencies

It is notable that the CT-Scan results for the right ear revealed a finding which was unremarkable (Figure # 3) and that Scheibe's deafness fits the patient since there were no detectable abnormalities on the right ear. Congenital deafness of nongenetic origin specifically infectious (TORCH'S) causes of hearing loss can also be considered but it must be remembered that pre-natal, perinatal and post natal history was unremarkable. Also it was stated by the mother that no pills, exposure to radiation X-ray and trauma occurred before, during and after the pregnancy.

An added major bio-ethical issue that can be raised here is the fact that the operative ear is the only hearing ear. Persons with monoaural amplification and with multiple congenital anomalies must be assessed properly by an experienced otologic surgeon since knowledge of the associated occurrence of structural anomalies is imperative. A practical system that is currently used by many authors is Colman's modification (1971) of Altman's classification (1955), which is based on the external auditory canal patency, middle ear pneumatization, and degree of difficulty of surgical procedures.[8] These abnormalities were subdivided into three groups:

Group I: Mild Aplasia, A meatus and drum exist but are often abnormally small. The ossicles are usually fixed, and the stapes are abnormal. Surgery is usually simple.

Group II: Moderate Aplasia, The pinna is severely deformed, the external auditory canal is absent, and numerous middle ear anomalies exist.

Group III: Severe Aplasia, The external canal is usually absent, pneumatization is poor, and cochlear anomalies often exist.

It is imperative to pinpoint the possible diagnosis to this case and, as such, First Branchial Arch Syndrome is one of the considerations entertained. Since the patient presents with an oral, aural and mandibular symptoms a strong consideration must, therefore, be entertained. Another consideration is Treacher-Collin Syndrome (Tranceschetti-Zwahlen-Klein Syndrome). This is an autosomal dominant disorder with an upper facial findings of a high arch palate, hypoplasia of the zygomas and other orbital and upper facial findings, decrease in the height of the mandibular ramus and the gonial angle which is more obtuse than normal. Cleft Palate may be found in approximately 35% of these patients.

If Treacher Collins Syndrome or a First Branchial Arch Syndrome or a combination of both is being considered, the management would depend on the age, degree of severity, and the pros and cons of each and every treatment modality. Conductive hearing loss is thought to be present in 50% of patients with Treacher-Collins Syndrome, and is caused by ossicular chain malformations, often in combination with meatal atresia.

The early detection of a possible hearing loss in Treacher-Collins is of great importance in order to be able to rehabilitate the hearing. As proposed by Altmann, Cremers et. al., Cremers and Teunissen,

Classification of Major Ear Anomalies, Minor Ear anomalies and Pinna Anomalies found in Annals of Otology, Rhinology and Laryngology, Volume 104 (1) – January 1995, P.32

ANOMALIES	TYPES	DESCRIPTIONS
Major ear Anomalies	I	Meatus is small and frequently only present in its medial portion
	II A	Total bony atresia over only part of length of meatus, or canal is partially aplastic
	II B	Total bony atresia over the full length of meatus. Tympanic cavity may be smaller than normal.
	III	Absent external meatus and small or missing tympanic cavity
Minor ear Anomalies	I	Isolated stapes ankylosis
	II	Stapes ankylosis with associated anomaly of incus and/or malleus
	III	Mobile stapes footplate, but anomalous or fixed incus and/or malleus
	IV	Aplasia or dysplasia of oval and/or round window
Pinna Anomalies	I	Pinna is smaller, rudimentary, and often located in abnormal position. Different parts of pinna are still discernible
	II	Pinna, besides being smaller and often in abnormal position, is represented by vertical curving ridge, resembling primitive helix
	III	Rudiment of Pinna has no resemblance to any portion of normal pinna

classifying an ear with aural atresia has proved to be worthwhile so that it can be estimated whether reconstructive ear surgery will be sufficiently successful. With the table above, the patient can then be classified as having a Major ear anomaly of type III; and Pinnal anomaly of type III.

Rehabilitation with a cBHA or a BAHA generally takes precedence over reconstructive ear surgery. If a patient has a minor ear anomaly, the hearing loss will be so severe that rehabilitation should be started at the earliest possible opportunity with an air conductive hearing aid. The patients hearing can be improved surgically but it is best to delay the operation until the age of 10 years.[9]

Reconstruction of the pinna can also be suggested but, at present, prosthesis is still advocated since reconstruction takes too much time and the majority of results are still unfavorable.

In summary, reconstruction of congenital atresia is both difficult and intriguing for the surgeon. Restoring a child's hearing or, at least, improving it is one of the most gratifying of all experiences in otologic surgery.

CONCLUSION

Physicians should be reminded of the fact that aesthetic physical beauty is only skin deep and that subjective opinions must be reserved. Objectivity should also be the main key in early diagnosis and management of these patients for what one may see is not what one may get. Such as in this case were beauty supersedes functions. To think that monoaural hearing was at the normal looking ear was purely judgmental and it should be remembered that these have some drawbacks. For it was said that;
"32% of children with unilateral hearing loss failed a grade in school whereas none of the children in the matched normal hearing group failed" and "35% of children with unilateral hearing loss had repeated a grade in contrast to a normal failure rate of about 3.5%".

With the advent of new technologies like the Otoacoustic Emission Test or the Auditory Brainstem Response, it is now possible to test for a child's hearing as early as day 2 of life. Early identification of hearing loss would mean early amplification and early rehabilitation which may convert a debilitated child to a functional child.

It is, therefore, the recommendation of the authors to screen all infants belonging to the High Risk Registry for hearing loss as early aspossible and that all investigative work-ups be exhausted whenever it is permitted.

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SNORING AND SLEEP APNEA SURGERY: SNORING-MELODY OR MALADY?*

VICTOR S. EJERCITO, MD, FACS**

"Laugh and the whole world laughs with you. Snore and you sleep alone!" anonymous.

INTRODUCTION

Snoring is a very common condition that affects 40 million Americans. It is estimated then that as high as 20% of the general population snores. In a study by Lugaresi in 1982, they reported that at the age of 40 and younger, 25% of males and 5% of females snore. However after the age of 40, the figure dramatically increases to 60% of males and 40% of females.[1]

THE MEDICAL EFFECTS OF SNORING

For many years, snoring has been thought of as a benign condition, more of a nuisance than a medical concern.. With its high association with **Obstructive Sleep Apnea** (OSA), and the increasing interest and research on it, snoring has also been found to be associated with other medical conditions. See Table 1.[2]

Table 1. Medical conditions that are associated with snoring.

1.	Hypertension
2.	Myocardial ischemia
3.	Increased risk for brain infarction
4.	Cor pulmonale
5.	Gastroesophageal reflux
6.	Nocturnal angina
7.	Cardiac arrhythmia
8.	Sudden death during sleep
9.	Upper airway resistance syndrome
10.	Obstructive sleep apnea

SNORING AND OBSTRUCTIVE SLEEP APNEA

Many snorers have daytime tiredness and sleepiness. These two conditions are also common findings in patients with OSA and should alert the physician for the need of a more in depth evaluation.

Snoring is present in approximately 94% of patients diagnosed as having OSA. Table II outlines some of the symptoms associated with OSA.[3]

Table II. Symptoms associated with Obstructive Sleep Apnea (OSA)

1.	Excessive daytime sleepiness (EDS)
2.	Habitual, loud snoring
3.	Obesity
4.	Morning headaches
5.	Reduced Alertness and fatigue
6.	Irritability and mood changes
7.	Reduced memory and cognitive function
8.	Loss of libido
9.	Depression
10.	Frequent nocturnal awakenings
11.	Choking during sleep
12.	Nocturia (adults) and enuresis (children)
13.	Nocturnal sweating
14.	Retrograde amnesia and hypnagogic hallucinations
15.	Hearing loss (noise induced?)

Certain pharyngeal findings have been noted in patients with snoring and OSA. The presence of these physical findings as outlined in Table III should alert the examiner for the possibility of snoring and OSA.[2]

Table III. Pharyngeal findings in patients with OSA and snoring.

1.	Low hanging soft palate
2.	Long, edematous uvula
3.	Prominent vertical pharyngeal folds
4.	"Webbing" of the posterior tonsillar pillar at the junction with the uvula.
5.	Prominent tongue (relative or actual macroglossia)
6.	Retrognathia
7.	Micrognathia
8.	Large tonsils

THE SOCIAL EFFECT OF SNORING

Snoring has been described as being gentle as a kitten's purr or earthshaking as a locomotive's roar. We all probably heard funny stories of how loud one's grandfather, spouse, or hunting buddy

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snored. Too often, the severity of the impact on interpersonal relationships that snoring can cause has been neglected. Snoring patients consulting us in our practice generally are sleeping in separate beds, if not in separate rooms from their spouses. They often suffer from a significant degree of marital strain with the loss of this intimate part of their relationship. Some have ended in divorce. In one instance a newspaper reported on an incident where the wife shot the husband to end his infernal snoring. One national TV news program featured a snorer who was fined for breaking the local community's anti-noise ordinance. How embarrassing it must have been for this person to have her snoring problem revealed on national television. Table IV outlines some of the common complaints snoring patients present with.[2]

Table IV. *Reasons for consultation for snoring*

1.	Wife insisted I have something done with my snoring.
2.	Family cannot sleep.
3.	Wife loses sleep and wakes up crabby in the morning.
4.	I am being evicted from my apartment.
5.	My neighbors are complaining.
6.	My snoring wakes me up.
7.	I wake up choking.
8.	I wake up tired and sleepy in the morning.
9.	I wake up with a bad headache.
10.	My throat is so sore from my snoring.
11.	I am falling off to sleep at work.
12	My co-workers are making fun of me during business trips.
13.	I am afraid of losing my fiancee because of my snoring.
14	I want my spouse back in the same bed with me.

THE SNORING EVENT-HOW AND WHY DO WE SNORE?

Snoring is caused by the passage of air in the upper airway causing a cycle of opening and closing of the soft tissues anywhere from the velopharynx down to the hypopharynx. This cycle of opening and closing causes the soft tissues to vibrate at 200-1000 Hz.[5] The loudest snore recorded in the Guinness Book of World Records was measured at 87 db.[4] This is at the same intensity level as a loud lawnmower.

Among patients with pharyngeal airways that are unstable or have a tendency to collapse, these vibratory activity can lead to increased resistance to the airflow leading to morbidities that have been associated with snoring. In some cases this increased resistance can lead to outright obstruction of the airway, and eventual OSA.

Some conditions that may cause snoring are outlined in Table V.[5]

Table V. *Factors that may cause snoring.*

1.	Obesity
2.	Tonsilloadenoidal hypertrophy
3.	Nasal obstruction
4.	Unfavorable tongue to mandible relationship such as in micrognathia, macroglossia, dental malocclusion
5.	Pharyngeal hypotonia-drug induced (ex. alcohol, sedatives), hormonal (ex. Hypothyroidism), neurological (palatal paralysis from strokes, etc.)
6.	Pharyngeal space occupying tumors.

WORK UP OF A SNORING PATIENT

The history of the snoring patient needs to address the social and health issues. It is important to encourage the spouse or bed partner to come with the patient during this evaluation as they often provide information that are often ignored or denied by the snorer. The social effects of snoring are usually the chief complaint and often is most distressing to the patient and bed partner. There should be a high index of suspicion for the presence of other associated medical conditions as outlined in Table 1. Symptoms that are suggestive of OSA also should be asked.

Reviewing the social history is an important part of the evaluation. The risk of velopharyngeal insufficiency might prove unacceptable to singers, voice professionals, or musicians performing with wind instruments. The ability to achieve velopharyngeal closure is important in these activities.

The physical exam starts with the vital signs. The patients height and weight are measured and the BMI or Body Mass Index calculated in kg/m^2. Patients with a BMI of 27 kg/m^2 fall under the obese category and have a higher risk of OSA. Table III outlined some of the findings in the pharynx that are commonly seen among snorers. Conditions favorable to snoring are outlined in Table V and should be investigated.

Some of the special procedures used in the evaluation of the upper airway include lateral cephalometric studies and fiberoptic endoscopy. Lateral cephalometrics are used to evaluate the relationship of the facial skeleton and also of

the soft tissues. A hypoplastic mandible can lead to a posterior displacement of the tongue leading to a narrowing of the airspace in the hypopharynx. Fiberoptic endoscopy is an important part of the evaluation in identifying sites of obstruction. This is done with a fiberoptic nasopharyngolarynoscope positioned just above the velopharynx. The patient is made to perform a Muellers manuever by taking deep inspiratory effort with the mouth closed and the nose pinched off.

The collapsibility of the airway is then evaluated by judging the amount of closure or colapse of the pharyngeal lumen during this manuever[6]. It is also often helpful if the patient is asked to simulate their snoring to try to determine if the nasopharynx is the primary cause of the snoring or if there is involvement of the other areas of the upper airway. This also helpful in determining how much of the soft tissue or the uvula needs to be resected should a surgical approach be decided on.

It is important to rule out OSA due to a high probability of this occurring among habitual snorers. As of now, the "gold standard" in evaluating patients for OSA is a full night Nocturnal Polysomnogram (NPSG).[7] This study involves the monitoring the sleep stages by EEG and EOG, chin EMG. Cardiorespiratory functions are monitored also by EKG, O_2 saturation chest wall and abdominal respiratory movement, nasal and oral airflow. Limb movements are also monitored to determine the presence of nocturnal myoclonus that is often observed in patients with sleep disorders such as OSA. Esophageal pressure and ph monitoring are also done as indicated. The Multiple Sleep Latency Test (MSLT) is also done to measure daytime sleepiness which has been identified as one of the components of OSA. The use of ambulatory or unattended studies is quite popular in Europe but has been a topic of debate here in the United States. At this time, the American Sleep Disorders Association recommends a full night polysomnogram and an MSLT to evaluate sleep disorders such as OSA and that ambulatory monitoring be used only in specific circumstances, such as the lack of a nearby sleep lab or timely schedule and the documentation is needed to initiate treatment, and also in known, documented cases of OSA and the study is to monitor treatment response.[5]

Other diagnostic tests that might be necessary include thyroid function studies and pulmonary function studies. Oral surgery consultation is also indicated especially in cases where orthognathic surgery is considered. A neurological consultation is also necessary when a sleep disorder such as OSA is diagnosed. Consultation with the pulmonologist or cardiologist is not uncommon due to the significant finding of pulmonary and cardiac disorders among snorers.

TREATMENT OF THE SNORING PATIENT

The treatment of the health issues can be categorized into non-surgical and surgical treatment. Table VI and VII outlines the treatment options available to the snoring patient.[28]

Table VI. *Non-surgical treatment options for snoring*

1.	Exercise
2.	Weight loss
3.	Elevation of the head of the bed
4.	Avoidance of alcohol and other sedating drugs
5.	Ear plugs for the bed partner.
6.	Non-sedating nasal decongestants
7	Dental appliances to reposition the tongue and/or mandible
8	CPAP
9	Nasopharyngeal tubes or catheters
10	"Anti-snore" pillow
11.	Tennis ball sewn into the back of the nightwear
12	Negative reinforcers such as electric shocks, vibrating devices, lights, tape recording feedback of the snoring sounds

Table VII. *Surgical treatment options for snoring*

1.	Nasal surgery, such as septal surgery, polypectomy, turbinectomies or functional rhinoplasties to improve the airway passages
2.	Tonsillectomy and/or adenoidectomy
3.	Orthognathic surgery
4.	UvuloPalatoPharyngoPlasty (UPPP)
5.	Laser Assisted Uvulo Plasty (LAUP)

NON-SURGICAL TREATMENT OF SNORING

At present there are at least 300 devices in the U.S. Patent Office claiming to cure or eliminate snoring. It has been estimated that the success rate of these devices is rather low. Some of these

devices include the anti-snore pillow. The basis for this pillow is that by allowing the head to extend back the tongue is prevented from falling back and thus eliminating snoring. In our experience, the success of this device has been very limited.

Vibrotactile devices worn on the wrist to alert the snorer of the snoring sound works by arousing the patient to a lighter stage of sleep and thus regain the muscle tone and support of the pharyngeal airway. Similar devices such as those that generate electric shocks, buzzing sounds, activate lights or the "classic elbow on the side" work on the same principle of arousing the snorer from their sleep. The snoring, however, recurs again when the patient shifts into the deeper stages of sleep and such frequent arousals from sleep can lead to a significant fragmentation of sleep leading to sleep deprivation and excessive daytime sleepiness.

Dental appliances have been employed in the treatment of snoring and OSA. There are at least 17 different appliances described in the literature. The basic principle for most of these dental appliances is to increase the pharyngeal airspace by moving the mandible and tongue forward. Several studies have documented the effectiveness of this treatment. It is also important to note that for most of these reports, patients have been able to wear this appliance up to 4 hours a night leaving them with the rest of the night without any corrective measures. Some of these devices can also cause a derangement of the temporo-mandibular joint.

CPAP has been shown to be an effective tool in the management of OSA. The device is designed to deliver air under positive pressure ranging from 5 to 20 cm. of H_2O pressure to a snug fitting nasal mask or pillows. This column of air acts as a pneumatic splint preventing the collapse and closure of the pharyngeal airway. This also prevents the vibration of the pharyngeal soft tissues and eliminates snoring. Despite the high success rate, patient compliance in the proper use of the machine has been low due to the inconvenience and discomfort of wearing the device. Especially for younger patients, the thought of having to wear this device for a lifetime is unappealing and also unromantic for the bed partner.

SURGICAL TREATMENT OF SNORING

The surgical treatment of snoring is directed towards improving the pharyngeal airway and removal of tissues responsible for the vibratory activity that produces the snoring sound. Surgical procedures in the nasal airway such as nasal septal reconstruction, turbinectomies, removal of nasal polyps improve the nasal airway allowing the snorer to breathe through his nose and sleep with his mouth closed. In some cases, a functional rhinoplasty might be indicated as in cases of external nasal deformities with compromise of the nasal passages. When done together with other pharyngeal procedures, it may enhance the reduction, and possibly the elimination, of snoring. By itself, nasal procedures seldom eliminate snoring completely.

Tonsillectomy and/or adenoidectomy improves the pharyngeal airway especially in those cases where these tissues are hypertrophied to the point of causing significant obstruction. Although commonly seen in children, tonsillo adenoidal hypertrophy is also seen in adult patients. Tonsillo adenoidal hypertrophy is a significant cause of snoring and OSA in children.

Uvulopalatopharyngoplasty was first described by Ikematsu in 1962 as a treatment for snoring and subsequently reported by Fujita in 1980 as a surgical option for the treatment of OSA. The procedure involves the partial excision of the soft palate and uvula. The resection of the soft tissues is extended to the tonsils or the tonsillar bed together with the anterior tonsillar pillar. The posterior tonsillar pillar is preserved and mucosal closure is done with absorbable sutures. Recovery period is 7-10 days. Surgical risks include bleeding, velopharyngeal insufficiency, and nasal regurgitation. Deaths from intra-operative or post operative bleeding have been reported but otherwise is a rare occurrence. Snoring is significantly reduced if not eliminated in 90% of these patients. Recurrence of snoring has been observed but usually to a more tolerable level.

In 1990, Kamami reported the use of the CO_2 laser in performing a modified uvulopalatoplasty.[9] The procedure significantly decreased the amount of soft tissue resected and also the postoperative morbidity associated with UPPP. The significantly reduced operating time and intra-operative pain allowed the performance of this procedure under local anesthesia and as an out-patient procedure. AUP is performed by using the CO_2 laser and the soft palate and uvula are reshaped. The whole procedure generally takes about 10 minutes and 1-5 sessions are performed at 3-4 week intervals. The end point is the inability of the patient to snort or to simulate a snoring sound. Most patients are generally comfortable enough to go back to work the same day. The postoperative pain usually becomes more noticeable during the 2^{nd} to 3^{rd} post-operative day with the pain approximating that of a tonsillectomy. Some of the contraindications to this procedure include a hyperactive gag reflex, redundant pharyngeal folds and obstructive sleep apnea. The success rate in the treatment of snoring has been reported to be as high as 85%. There has been no conclusive evidence to show that LAUP is effective in the treatment of Obstructive Sleep Apnea. The efficacy of this procedure in the treatment of mild OSA and upper airway resistance syndrome is still currently under investigation. Significant concern has been expressed both by the American Academy of Otolaryngology and American Sleep Disorders Association in the use of this treatment among sleep apnea patients. The elimination of snoring might erroneously mislead patients into believing that their problem with OSA has been resolved and subsequent treatment abandoned.[7]

It is important to note that these options are primarily for the non-sleep apneic patient. Patients with snoring and sleep apnea will often require a more extensive treatment and will be addressed in another article in the future.

SUMMARY

1. Snoring is a common condition that can have significant social and health consequences. Both these issues need to be addressed in dealing with the snoring patient.
2. The significant association of snoring with other medical conditions such as hypertension, cardiac disease, sudden death during sleep, strokes and various other neurological impairments and Obstructive Sleep Apnea demonstrate the need for treating snorers.
3. Full night polysomnography and MSLT is the "gold standard" for the diagnosis of sleep disorders and Obstructive Sleep Apnea in particular. The use of ambulatory unattended studies may be helpful but is not yet an accepted standard evaluation in this country.
4. Non-surgical options may be considered for the treatment of problematic snoring. Exercise, weight loss, dental appliances, positional changes may be helpful. Devices that causes arousal from sleep such as electric shocks, buzzers, and vibrotactile stimulus may cause arousal from sleep and sleep fragmentation leading to excessive daytime sleepiness.
5. Surgical procedures may help in the treatment of snoring in a significant number of patients. UPPP has been shown to be effective treatment for snoring and in some patients with OSA. LAUP is an effective treatment for non-apneic snoring and has not been adequately shown to be effective for OSA. Elimination of snoring alone is not effective for the management of OSA. This may in fact mask the disease by eliminating the most obvious sign for possible OSA.

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PRIMARY VOICE RECONSTRUCTION IN TOTAL LARYNGECTOMY USING THE FUNNEL TECHNIQUE*

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ABSTRACT

An alternative, funnel technique for tracheo-esophageal fistula primary voice reconstruction in a series of 10 patients (9M: 1F) undergoing total laryngectomy with or without neck dissection in a tertiary Philippine hospital from January 1995- January 1997 is described in detail.

Nine out of 10 patients acquired speech within 2-6 weeks (average 4 weeks), with 4 having intelligible voice used daily with unselected speeches: 2 patients with intelligible voice used occasionally and 3 with poor voice not used habitually.

There were no cases of significant aspiration. Observation of the neoglottic fistula while eating and drinking showed 2 patients with no secretions, 7 with occasional bubbles, and one with secretions resulting in occasional cough.

The advantages of this procedure are discussed and the reasons for its success are proposed.

Keywords: Funnel techniques, total laryngectomy, primary voice reconstruction

INTRODUCTION

Cancer of the larynx accounts for 1.2 % of all new cancer diagnoses and 1/5 of all head and neck cancers. It usually affects males with a 5:1 preponderance compared to women with peak incidence occurring between the 5th and 7th decade and a 5-year survival rate of 67% with adequate treatment.[1] It is a dreadful disease because it threatens one's life and it destroys one's ability to communicate.

Speech distinguishes man from animals. Man expresses his needs, emotions and thoughts through speech as a primary medium. Thus, in the management of laryngeal malignancies, the main focus of treatment is to control and contain the spread of the disease with post-operative voice rehabilitation as one of its main concerns.

There are various methods of voice rehabilitation after total laryngectomy. Among these are: (1) esophageal speech; (2) the use of electronic voice resonators; (3) the use of surgically-implanted electrically-generated sound source or resonators; (4) the use of one-way tracheo-esophageal prostheses; and (5) the creation of a neoglottis using a tracheo-esophageal fistula which includes the Funnel technique.

Esophageal speech has been the preferred method of a laryngeal communication but even the highly motivated patients are unable to effectively acquire it. Esophageal voice training is often time-consuming, tedious, frustrating, and, frequently, does not meet the social needs of the patient.[1] It requires a special trainor to teach patients to acquire it. These

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are the reasons why the acquisition rate of esophageal voice by laryngectomees is low.

The voice restoration method of tracheoesophageal puncture (TEP) with the use of a one-way, low pressure valve prosthesis was developed as an alternative to esophageal voice. However, there were problems observed regarding the use of TEP with a one-way valve prostheses. These include: pressure necrosis on the TEP site, fungal colonization of prosthesis, infection, leakage, and aspiration of prosthesis. Moreover, the prosthesis is expensive and its lifetime average of only 2 months requiring frequent replacement.

The use of electronic voice resonators is also a popular method of voice rehabilitation among laryngectomees. However, these are expensive, the quality of voice is monotonous and mechanical in character.

Implantation of an electrically-generated sound source represents a promising approach in voice rehabilitation. These artificial larynges are implanted in the neck or retropharynx. However, the sound produced by these prostheses are similar to the electronic voice resonators, the cost is exhorbitant, and is unavailable in our setting.

The use of tracheo-esophageal fistula (TEF) as a primary voice reconstruction procedure was described by several authors like Briani (Italy, 1940), Conley (USA, 1958), Asai (Japan, 1956), and Amatsu (Japan, 1980). While the primary voice reconstruction methods have been successful in producing speech among laryngectomees, the problem of aspiration has been consistently reported by some of the authors. The experience in this setting regarding such procedures also revealed aspiration as a common problem prompting surgeons to close these TEF's.

Due to the problem of aspiration, an alternative technique was developed in this institution, the Funnel Technique, as an original surgical primary voice reconstruction in total laryngectomy. The objectives of this study are: (1) to present the Funnel technique as a primary voice reconstruction procedure in patients undergoing total laryngectomy; (2) to determine the number of patients who are able to acquire speech after undergoing primary voice reconstruction using the Funnel technique; (3) to determine the number of patients who have aspiration after undergoing the primary voice reconstruction using the Funnel technique.

METHODOLOGY

This is a descriptive study. It involves 10 patients who have undergone total laryngectomy with the Funnel technique as the voice reconstruction procedure in this institution from January, 1995 to January, 1997. The operative technique is as follows:

The Funnel Technique

I. Standard total laryngectomy with or without radical neck dissection (Figure 1).

Figure 1. Standard Total Laryngectomy

II. Primary Voice Reconstruction Procedure

1. Creation of Tracheal Flap (Figure 2)

The tracheal stump is cut diagonally. The infero-anterior border of the triangular flap will be the lower margin of the tracheostome. The length of the tracheal flap is approximately 20-30 mm. The cartilaginous tracheal rings which are included in the flap are excised except for the most inferior one. This is preserved to serve as a stent in a tunnel to be formed later on.

Figure 2. Creation of tracheal Flap

2. *Releasing, Stabilizing the Tracheal Stump and Recruiting Additional Tracheal Tissue (Figure 3)*

The remaining tracheal stump is freed from its surrounding antero-lateral attachments by blunt dissection. It is pulled upwards, and the submucosa of the remaining trachea is sutured and anchored to the surrounding soft tissues at the suprasternal area and to the remaining SCM muscle.

Figure 3. Releasing, Stabilizing the tracheal stump and recruiting additional tracheal Tissue.

3. *Creation of Tracheo-Esophageal Fistula (Figure 4)*

A vertical incision measuring about 10mm. is done at about 2 mm. from the superior end of the tracheal flap mucosa (fig.4a). The incision is done layer-by-layer from the tracheal mucosa up to the submucosa of the esophagus. The mucosa of the esophagus is exposed and a 3-5 mm. incision is done (fig.4b). The esophageal mucosa is everted out into the tracheal mucosa and sutured around the tracheal mucosa using 4-0 chromic sutures (fig.4c). About 4-8 sutures are done to keep the fistula patent.

Figure 4. Creation of Tracheo-Esophageal Fistula

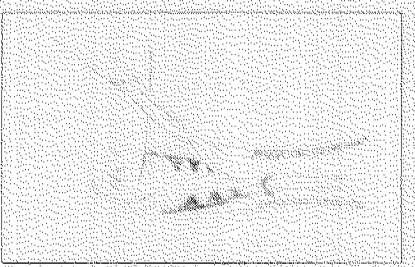

Figure 4a. A vertical incision measuring about 10mm. is done at about 2mm. from the superior end of the tracheal flap mucosa

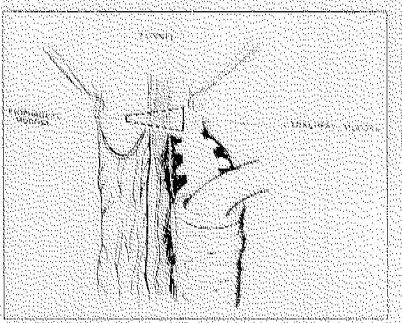

Figure 4b. The incision is done layer-by-layer from the tracheal mucosa up to the submucosa of the esophagus. The mucosa of the esophagus is exposed and a 3-5 mm. incision is done

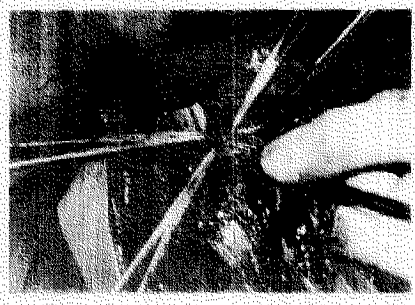

Figure 4c. The esophageal mucosa is everted out into the tracheal mucosa and sutured around the tracheal mucosa using 4-0 chromic suture.

4. *Formation of a Blind Pouch or Tunnel (Figure 5)*

The tracheal flap is sutured side-to-side over the T-E Fistula using a chromic 4-0 catgut sutures. The most inferior tracheal ring of the tracheal flap that was preserved in step 1 will serve as a stent at the entrance of the tunnel/pouch.

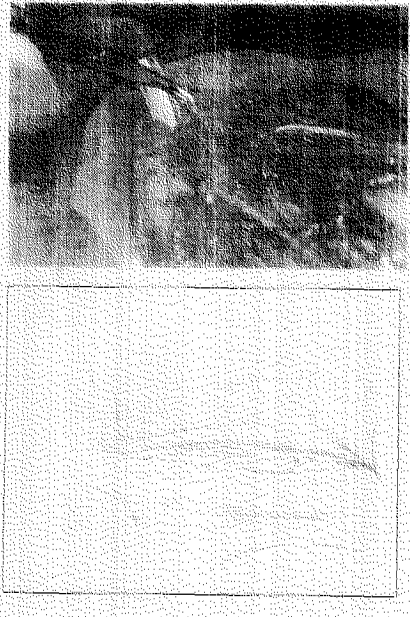

Figure 5. Formation of a blind pouch or tunnel.

III. Repair of the Hypopharynx (part of standard laryngectomy)

IV. Suturing of the tracheostome to its surrounding skin flap using silk 2-0 sutures (part of standard laryngectomy).

V. Layered suturing of the skin after suction drains have been positioned (part of standard laryngectomy).

All patients with laryngeal carcinoma underwent total laryngectomy with primary voice reconstruction using the Funnel Technique are included in the study regardless of sex, age, and radiation therapy status.

The patients will undergo a test wherein their speech will be evaluated. Scoring will be as follows, based on a study by St. Guily (1992)[3]:

S0 - failure, no voice
S1 - poor voice or no use in habitual conditions
S2 - intelligible voice, occasional use
S3 - intelligible voice, daily use with unselected speakers

Complications with aspiration will be graded according to the modified Leipzig Classification (1980)[4]:

G0 - No secretions from neoglottic fistula
G1 - Bubble on the neoglottic fistula
G2 - Occasional cough, no significant problem
G3 - Constant cough, worse with eating or drinking
G4 - Pneumonia

A frequency count shall then be made for the classifications on speech intelligibility and aspiration complications.

RESULTS

A series of ten patients underwent total laryngectomy with or without radical neck dissection, with primary voice reconstruction using the Funnel technique from January, 1995 to January, 1997.

Table 1 shows the 10 patients included in the study with their corresponding sex and age. There are 9 males and 1 female, with age ranging from 50 to 70 years, with an average age of 67.1.

Table 1. Age, Sex Distribution

Patient	Age	Sex
B.A.	69	F
C.S.	73	M
L.M.	69	M
R.S.	50	M
F.R.	70	M
J.C.	72	M
L.R.	60	M
B.C.	69	M
J.J.	73	M
M.L.	70	M

Table 2 shows the stage of the disease and the management done on the 10 patients included in the study. Management includes total laryngectomy with or without radical neck dissection in 10 patients. Of the three patients who underwent radical neck dissection, one was done along with the laryngectomy while two were done eight and twelve weeks after the laryngectomy. The latter radical neck dissections were performed due to contra-lateral neck metastasis. Post operative radiation were done in 8 out of 10 patients. All patients had primary voice reconstruction using the Funnel technique.

Table 2. Staging and Management

Patient	Stage of Disease	Management
B.A.	T3N0Mx Stage III	Total laryngectomy w/ F.T & R.T.
C.S	T3N0Mx Stage III	Total laryngectomy w/ F.T. & R.T
L.M	T3N0Mx Stage III	Total laryngectomy w/ F.T. & R.T
R.S	T3N0Mx Stage III	Total laryngectomy w/ F.T & R.T.
F.R.	T3N0Mx Stage III	Total laryngectomy w/ F.T.
J.C	T3N1Mx Stage III	Total laryngectomy w/ F.T., RND (R) & R.T.
L.R	T3N0Mx Stage III	Total laryngectomy w/ F.T., RND (L) *& R.T.
B.C	T3N0Mx Stage III	Total laryngectomy w/ F.T.
J.J.	T3N0Mx Stage III	Total laryngectomy w/ F.T. & R.T.
M.L	T3N1Mx Stage III	Total laryngectomy w/ F.T., RND (R), mRND (L)** & R.T.

F.T. – Funnel technique R.T. - Radiation Therapy, RND – Radical Neck Dissection, mRND – Modified Radical Neck Dissection, RND - RND8 done 12 weeks post-op, mRND (L)** - done 8 wks Post-op*

Table 3 shows the results of patients regarding their speech intelligibility scores Eight out of ten patients were able to acquire speech, among which 4 had intelligible voice, with daily use with unselected speakers. Two had intelligible voice used occasionally and one with poor voice that was not used habitually.

Table 3. Speech Scoring (St. Guily)[3]

Patient	Speech	
B.A.	S1	
C.S.	S0	
L.M.	S1	S0 = 1
R.S.	S3	S1 = 3
F.R.	S1	S2 = 2
J.C.	S2	S3 = 4
R.L.	S3	Total = 10
B.C.	S3	
M.L.	S2	
J.J.	S3	

S0 – failure, no voice S1 – poor voice/no habitual use, S2 – intelligible voice/occasional use S3 – intelligible voice, daily use with unselected speakers

Only one patient had not acquired speech post operatively, because of significant edema around the tracheostoma.

Table 4 shows the grading of patients regarding the complications of aspiration after surgery. Complications of aspiration were graded from a modified Leipzig Classification[4]. Two patients had no secretions coming from the neoglottic fistula even when eating or drinking. Seven patients had occasional bubble on the neoglottic fistula and one had occasional cough due to secretions from the neoglottic fistula. There were no episodes of constant cough nor episodes of aspiration pneumonia among the 10 patients in the study.

Table 4. Aspiration Grading Modified from Leipzig Classification[4]

Patient	Aspiration	
B.A.	G0	
C.S.	G1	G0 = 2
L.M.	G1	G1 = 7
R.S.	G1	G2 = 1
M.M.	G0	Total = 10
J.C.	G1	
R.L.	G2	
B.C.	G1	
M.L.	G1	
J.J.	G1	

G0 – No secretions from neoglottic fistula, G1 – Bubble on neoglottic fistula G2 – Occasional cough G3 – Constant cough, worse with eating/drinking; G4 – Pneumonia

Table 5 shows the period of voice acquisition per patient after the procedure. Patients have learned to speak in 2-6 weeks with an average of 4 weeks. One patient has not acquired his voice due to persistent edema around the tracheostoma.

Table 5. Period (in weeks) prior to voice acquisition post operatively

Patient	Period of voice acquisition post op
B.A.	6 weeks
C.S.	Not applicable
L.M.	3 weeks
R.S.	2 weeks
F.R.	5 weeks
J.C.	4 weeks
L.R.	4 weeks
B.C	2 weeks
J.J.	3 weeks
M.L.	5 weeks

DISCUSSION

In this institution, most of the patients with laryngeal cancer have advanced disease. Most will present with a chronic history of hoarseness accompanied by obstructive symptoms – dyspnea, stridor and dysphagia. Thus, total laryngectomy is the primary mode of management with or without post operative radiotherapy.

Total laryngectomy produces a handicap in communication affecting the quality of life of the patient. Thus, efforts to rehabilitate laryngectomees (patients who have undergone laryngectomy) have understandably centered on restoration of vocal communication by various methods and procedures to help achieve an optimal quality of life.

The primary voice reconstruction using a TEF is a single-stage procedure which is done as part of total laryngectomy. This would enable post-total laryngectomy patients to acquire speech by diverting the air from the lower airway into the esophagus via the surgically-created TEF. The patient would take a deep breath, completely cover the tracheostoma with a light digital pressure and speak like a normal person. The voice is produced by the vibration of the pharyngo-esophageal mucosa and the resultant sound is converted to understandable speech by the intact articulatory structures.[1] The Funnel technique employs the same principles.

In this institution, a series of 10 patients with squamous cell carcinoma of the larynx stage III, underwent total laryngectomy with primary voice reconstruction using the original surgical Funnel Technique from January 1995 to January 1997. The Funnel Technique enabled 9 out of 10 patients to acquire speech. One patient failed in speech acquisition due to persistent edema around thee tracheostoma.

Two patients who had contralateral neck metastasis after total laryngectomy underwent a second surgery (radical neck dissection) eight and twelve weeks respectively. These patients failed to follow our treatment protocol to have post-operative radiotherapy. However, these patients maintained their speech capabilities inspite of the second operations and post-operative radiotherapy.

The incidence of serious post-operative aspiration has not been encountered in this series. Seven out of ten patients had bubbles on the neoglottic fistula and 2 had no secretions from the neoglottic fistula.

The Funnel technique is a one-stage procedure that is performed together with the classical laryngectomy. All patients undergoing total laryngectomy are candidates for the primary reconstruction using the Funnel technique. The technique does not compromise the margin of the tumor resection inspite of the extent of the laryngeal malignancy and is still applicable with patients with previous tracheostomy. The diagonal cut on the trachea during the laryngectomy allows enough tracheal tissue for use in the Funnel Technique. Furthermore, an additional tracheal tissue can be recruited if necessary by freeing the trachea, pulling it up and anchoring it to the surrounding tissues to stabilize it.

The funnel-shaped tunnel of the technique, allows an aerodynamic system to operate efficiently facilitating sufficient volume of air from the lower airway into the

neoglottis (see fig. 6). The increased volume of air results in an increase in force of air sufficient to open the tracheo-esophageal fistula. The tracheo-esophageal fistula has a bigger opening at the tracheal side (1cm.) than at the thinned esophageal mucosa (3-5mm.) creating a funnel-shaped opening (see fig.7). This allows an air jet with sufficient force into the esophagus easily, but not food particles from the esophagus into the trachea. All these would explain the efficiency of the Funnel technique for voice production and prevention of aspiration. The technique is also designed to safeguard against aspiration. If secretions at the tracheo-esophageal fistula is present, the patient can apply light digital pressure on the skin overlying the TEF, found just superior to the tracheostome.

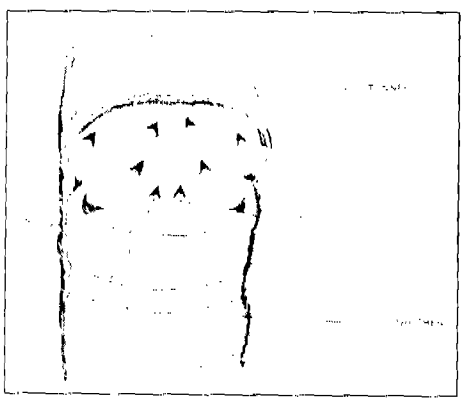

Figure 6

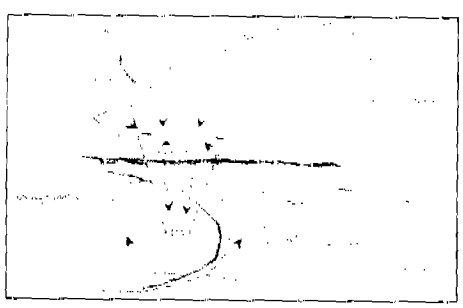

Figure 7

CONCLUSION

The Funnel technique, an original surgical primary voice reconstruction procedure in total laryngectomy patients, is presented with its advantages. It is associated with no serious complications of aspiration in this series of ten cases. The initial results are acceptable for voice rehabilitation in total laryngectomy patients in this institution using the criteria adapted from St. Guily (1992).

The Funnel technique shows promising initial results among laryngectomees. The quality of voice produced by this technique is good, intelligible and easily acquired by the patient. The technique is reproducible and one-staged without an additional expense to the patient. Furthermore, it can be applied to all patients diagnosed with laryngeal cancer who will undergo total laryngectomy, with or without radical neck dissection, and post-operative radiation therapy because it does not affect the standard surgical extirpation in laryngeal malignancies.

It is, therefore, recommended that further study of the Funnel Technique in a larger series of patients be done in comparison with other acceptable primary voice reconstruction techniques like the Amatsu and other voice rehabilitation procedures.

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ENDOSCOPICALLY-GUIDED SURGICAL EVALUATION AND TREATMENT OF MAXILLOFACIAL FRACTURES: A PRELIMINARY REPORT*

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ABSTRACT

Five illustrative cases out of 14 patients with maxillofacial fractures (4 fronto-orbito-nasal, 7 zygomatic, 3 condylar) undergoing endoscopically-guided evaluation procedures in a tertiary Philippine hospital from May 1996 to June 1997 are presented. Approaches, applications and advantages of endoscopy applied with conventional methods of evaluation and treatment are discussed in detail.

Keywords: Maxillo-facial fractures, evaluation and treatment, endoscopically-guided

INTRODUCTION

The application of rigid endoscopy in the field of Otolaryngology was advanced back twenty-five years ago with the advent of Functional Endoscopic Sinus Surgery. This technology was then extended into the area of Aesthetic Surgery, better known as Endoscopic Face-lift, Brow lift and Forehead Lift. It was with this enthusiasm that the idea of further expanding the current landscape of endoscopically-assisted techniques to cases of maxillofacial fractures was conceived fully aware that the endoscope is now an increasingly popular tool of otolaryngologists. Like the many other important technical advances made in surgery in recent decades, this does not replace existing techniques. Rather, it tremendously enriches the options and approaches available to the ENT and Maxillofacial surgeons. Furthermore, it helps refine existing procedures and, ultimately, results in better surgical and cosmetic outcomes because of its minimally invasive nature. However, there have been very few reports to date of the use of endoscopic techniques in craniomaxillofacial fractures. To stimulate the development of endoscopic approaches in facial fractures particularly complex ones, this initial experience with these techniques in a variety of applications performed from May 1996 to June 1997 is being presented.

The main purpose of this study is to illustrate the possible advantages of endoscopically guided surgical evaluation and treatment of maxillofacial fractures, particularly in its long-term results.

PATIENTS AND METHODS

From May 1996 to June 1997, fourteen (14) complex cases of maxillofacial fractures underwent endoscopically-guided evaluation procedures in this medical center. There were four (4) cases of fronto-orbital-nasal, seven (7) cases of orbito-zygomatic complex (tripod), and three (3) cases of condylar fractures.

Instruments and equipment used include rigid 4mm diameter 30 degree angle endoscope (Karl Storz), retractor sheaths, light source (xenon), freers and other modified slim septal and subperiosteal

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elevators, insulated suction cautery tip, long 6-inch dissecting alligator forceps, skin retractors, small bone hooks and long slim plate and screw holder. Video systems are optional. (Figure 1).

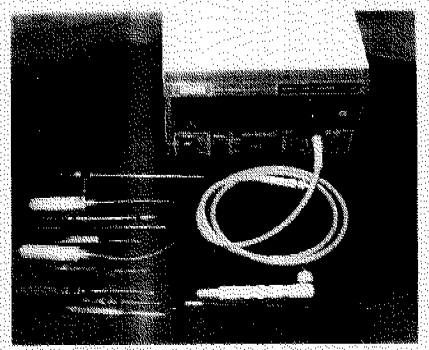

Figure 1

The following illustrations show the incisional approaches performed prior to creating longer incisions.

1. 1.0 cm., vertical in direction just behind the hairline for the frontal region. This approach is used to examine directly the status of the frontal bone fracture. (Fig.2).

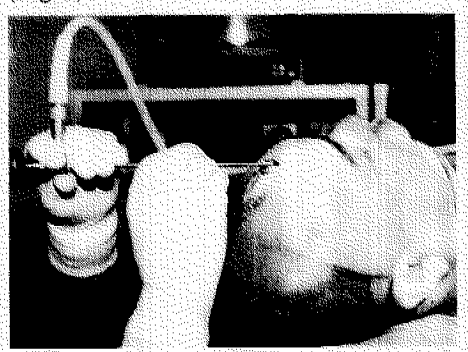

Figure 2

2. 1.5 cm. Incision along the lateral brow for fractures along the supraorbital rim. (Fig.3A).
3. 2.0 cm. lateral infraciliary incision to examine the fronto-zygomatic suture line (lateral orbital wall), floor of the orbit (Fig.3B), anterior and lateral wall of the maxilla (Fig. 3C), and malar-zygomatic arch (Fig.3D).

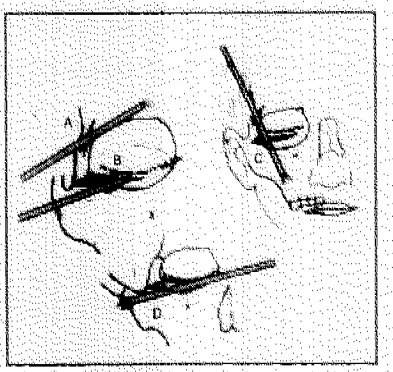

Figure 3. Endoscopic Diagnosis of Fractures in the (A) Supraorbital Rim, (B) Floor of the Orbit, (C) Maxillary Buttress & Lateral-Anterior Maxilla and (D) Malar-Zygomatic Arch.

4. 5.0 cm. pre-auricular incision extended upward for the management of comminuted displaced fracture of the zygomatic arch, instead of a bicoronal incision. (Fig. 4A).

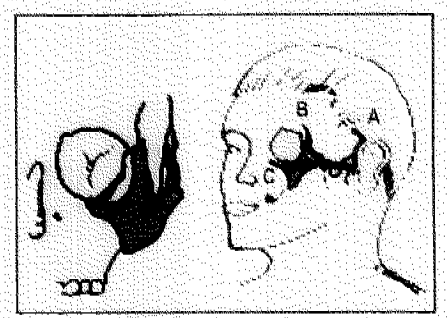

Figure 4. Different Incisional Approaches for Diagnostic Endoscopy of Orbitozygomatic Complex Fracture.

5. 2.5 cm. pre-auricular incision and a 1.5 cm. intrabuccal incision for condylar fractures. (Fig. 5A).
6. A 4.0 cm. mandibular angle rim incision is another option to approach externally the condylar fracture for fixation. (Fig. 5B).

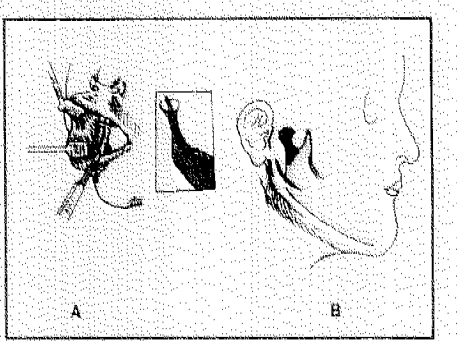

Figure 5. Incisional Approaches for Diagnostic Endoscopy of Condylar Fracture
(A) Intrabuccal Approach
(B) Mandibular Angle Rim.

7. 1.0 cm. gingival sulcus incision for possible maxillary fractures such as Le Fort fractures without zygomatic arch and infraorbital rim fractures.

CASE REPORTS AND RESULTS

Case 1:

A 52-year-old male sustained a right fronto-orbito-zygomatic complex fracture due to a vehicular accident as confirmed by CT-scan. It was not clear from the radiological exam whether or not there is a need to reduce and rigidly fix the frontal fracture component. Incidentally, the patient had a laceration along the hairline extending to the middle of the forehead. An endoscope was used to assess the fracture line through the laceration. A wider exposure by extending the laceration or a hemi-coronal incision was not necessary because the fracture was properly aligned and not depressed as seen through the endoscope. Because of this, the patient was spared from a long incision and scar. The rest of the zygomatic-orbital complex fracture was reduced by open reduction using rigid fixation. Upon follow-up five months later, the patient was seen without any deformity in the frontal region and right supra-orbital rim.

Case 2:

A 42-year old man was involved in a mauling incident. On physical examination it was noted that there is a 5.0 cm. angular forehead laceration about 5.0 cm. superior to the level of the eyebrows. Radiologically, it was not clear whether or not the glabellar-frontal fracture was depressed and comminuted. Patient also had a left complex orbito-zygomatic fracture. An endoscope was inserted through the forehead laceration. This examination revealed a comminuted and depressed fracture along the anterior frontal sinus wall which warranted wider exposure for open reduction with rigid fixation.

Case 3:

A 24-year old female sustained multiple facial fractures during a fire drill. The complex orbito-zygomatic fracture on the left was not reduced by the previous attending surgeon. Six-weeks later, the patient complained of limited mouth opening. Physical examination revealed asymmetry of the left malar prominence and a depressed zygomatic arch. A 3-D CT scan was done which revealed a left lateral and infra-orbital rim fracture with depressed and comminuted zygomatic arch segment.

The lateral and infra-orbital rim fractures were exposed and fixed with rigid fixation via lateral eyebrow and infraciliary incision. The zygomatic arch comminuted fracture was reduced utilizing the infraciliary incision as well as a pre-auricular incision along the anterior margin of the helical crus extending upward 5.0 cm. long and curved anteriorly.

The comminuted zygomatic arch fracture was exposed through this limited pre-auricular incision and explored using the endoscope to obviate the long and unsightly bicoronal incision, the traditional approach to this type of fracture. The scalp extension of the pre-auricular incision was used to expose the deep temporal fascia. Using a slim periosteal elevator, dissection of the superficial surface of the deep temporal fascia was done superiorly to permit endoscope placement. Again, dissection was carried in this plane down to the subperiosteal level starting from the root of the zygoma to the entire length of the zygomatic arch properly visualized and magnified by endoscopic assistance.

The segmental arch fracture measuring 1.5 cm. was dissected free from soft tissue under endoscopic visualization and removed from the operative field. This was plated to a long miniplate on a side table (Fig.6A). The lateral and infra-orbital fractures was first reduced and fixated with miniplates (Fig.6B). The plate with the zygomatic arch segment was then tunneled and replaced accurately in the gap of the zygomatic arch by endoscopic assistance (Fig. 6C). The plate at the root of the zygomatic arch was then anchored with screws which are already visible from the pre-auricular incision. (Fig. 6D).

Finally, the fracture at the zygomaticomalar segment was fixed by screw fixation as seen directly in the malar region through the lateral end of the infraciliary incision. During the process of screw fixation of this fracture, the endoscope

is placed through the lateral eyebrow incision to visualize whether the fracture line in the zygomatic arch is accurately realigned while tightening the screws during fixation. (Fig. 6E). Five months later, follow-up showed evidence of restoration of the patient's normal facial contour. Limitation of mouth opening was improved. Water's and submento-vertical view X-rays were done which revealed normally contoured zygomatic arch and anatomically positioned lateral and infra-orbital bone.

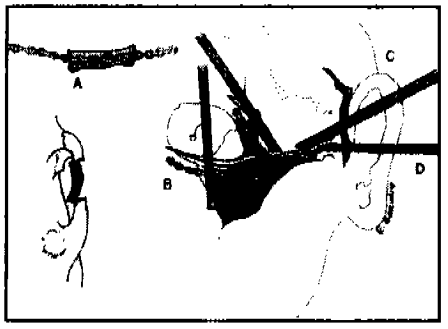

Figure 6: New Technique for Open Reduction Internal Fixation of Comminuted Zygomatic Arch Fracture with Endoscopic Guided Realignment.

Case 4:

A 52-year old woman was involved in a vehicular accident hitting the left side of the face. On physical examination, a depression along the left malar prominence was noted. Radiologically, there was a left orbito-zygomatic complex fracture with a comminuted fracture of the anterior wall and buttress of the maxilla. These fractures were reduced via lateral eyebrow and infra-ciliary incision using adaptive miniplates and screws. During the process of anchoring screw in the left lateral orbital rim, the endoscope was passed through the lateral end of the infra-ciliary incision to confirm whether the zygomatic arch fracture component is anatomically realigned after which all the screws were tightened. The maxillary buttress fracture was noted to be comminuted as seen through the endoscope which was passed along the infraciliary incision. This would warrant a gingival incision intraorally to fix the fracture using miniplates. Occasionally, a bone hook is applied under the malar region to lift and recreate the malar prominence contour if it is displaced downward and, at the same time, applied rigid fixation for maxillary buttress comminuted fracture. Patient was seen four months later and a normal facial contour was noted especially with symmetrical malar prominence. A post-operative x-ray reveals an anatomically positioned complex orbito-zygomatic fracture.

Case 5:

A 27-year old man was involved in a fistfight wherein the left side of the lower jaw was hit by a hard punch. The patient complained of joint pain and slight difficulty of opening the mouth. Radiological examination revealed a laterally displaced subcondylar fracture. A 2.5 cm. preauricular incision was done to burr holes and apply screws. (Fig. 7A) This was properly visualized using an endoscope, which was inserted through a 2.5 cm. incision intra-orally along the anterior edge of the ascending ramus. Intermaxillary closure was also done to better align and position the displaced condylar head. Prior to the tightening of the screws, the proximal segment of the condylar fracture was being repositioned using bone hook placed through the intraoral incision. A long slim miniplate holder was also used which was inserted intraorally. All the screws were anchored via the small pre-auricular incision avoiding the long pre-auricular extended incision to the temporal region. Five days post-operatively, elastic maxillo-mandibular fixation was done only for 5 days. This patient was also advised to do wide mouth opening exercises. Seven months later the patient was followed up with a normal occlusal plane and mouth opening without any complaints of TMJ pain.

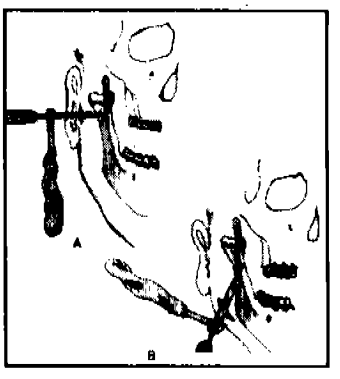

Figure 7. Different Approaches for Rigid Internal Fixation of Condylar Fracture after Realignment of Fracture Segments.
(A) Pre-auricular Approach,
(B) Mandibular Rim Approach.

DISCUSSION

Results are presented according to type of procedure. The uses of endoscopically guided technique in the management of some complex cranio-maxillary fractures have proven to have some advantages. Appropriate indications for the application of these techniques would need a continuous review. Certainly, with increasing experience, the indications and applications of endoscopically-guided technique facial skeletal fractures will be further refined (3). This paper should, therefore, be regarded as no more than just a preliminary report.

The main advantage of endoscopically-guided techniques in maxillofacial fractures would obviate the need of doing long incisions such as the bicoronal incision and the long extended upward preauricular incision for exposure of fractures of the anterior frontal bone, zygomatic arch and condylar fractures. This would also avoid any possible deformity of the frontal bone such as depression if one could properly assess the condition of the fractures in that area. Aside from the long scar and other undesirable sequela, the bicoronal incision could produce morbidity such as neuropraxia secondary to stretching of the frontal branch of the facial nerve (3) and loss of sensory innervation of the scalp.

In addition, the use of endoscopy allowed magnified visualization of the fracture pattern permitting accurate anatomic repositioning, clear view of the dissection planned and decision making whether one should have longer incision lines for wider exposure. As for complex, comminuted, and displaced zygomatic arch fractures, a shorter and limited incision to create access tunnels with the aid of the endoscope can be done rather than the bicoronal incision. Endoscopically-guided repair of the zygomatic arch results in improved anatomic realignment as well as stability of the displaced zygomatic-malar and condylar fractures.

CONCLUSION

A variety of procedures have been presented in this small series, reinforcing the belief that there are indeed advantages in the use of endoscopically-guided evaluation and surgical treatment in the management of maxillofacial fractures. The scope of these applications will undoubtedly expand and morbidity will be further reduced as instrumentation and technique continue to be developed. It is, however, important to remember that the ultimate arbiter of the value of these or any new technological application is patient benefit. The saying that "What you see is what you get" applies to this presentation; but conversely "you do not get what you do not see", which applies to the avoidance of bad results when using this technique.

RECOMMENDATIONS

1. Make a study of the efficiency and cost-effectivity of doing diagnostic endoscopy compared with sophisticated radiological examinations like CT Scan (3D reconstruction) and MRI in cases of suspicious maxillofacial fractures.
2. Follow-up study to document the long term results of maxillofacial fractures evaluated and treated under endoscopic guidance compared with conventional techniques.

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A PRELIMINARY REPORT ON THE VERSATILITY AND MODIFICATION OF THE RADIAL FOREARM FREE FLAP FOR HEAD AND NECK RECONSTRUCTION: EXPERIENCE OF A TERTIARY HOSPITAL IN THE PHILIPPINES*

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ABSTRACT

An initial series of the use of the Radial Forearm Free Flap in Head & Neck Reconstruction is reported utilizing eight patients (5M:3F) who underwent ablative surgery for squamous cell carcinoma of the oral cavity; oro and laryngopharynx in a tertiary Philippine hospital from March 1996 to May 1997. Six patients had good flap viability; one patient with good flap viability expired after 3 days; the remaining patient had infected flap which was removed after three days and replaced with a deltopectoral flap. Various applications and advantages of the flap are discussed together with a suprafascial modification of the traditional subfascial plane for harvesting.

Keywords: RFFF, reconstruction, head and neck surgery

INTRODUCTION

In the Philippines, traditional reconstruction after ablative cancer surgery has been of the myocutaneous nature, particularly the pectoralis major myocutaneous and deltopectoral flaps—until now. With the introduction of the RFFF in Philippine shores, it is now possible to achieve the primary goal of soft tissue reconstruction of the oral cavity and pharynx (which is to achieve a watertight seal in a safe, reliable, one-stage procedure) while restoring function.

Introduced by Drs. Yang Guofan and Gao Yuzhi of the Ba-Ba Chung Hospital in the People's Republic of China, the flap was initially developed through cadaveric injection studies in 1978. Later in 1981, at the Shenyang Military Hospital, Yang et al reported their first clinical series; it was an astounding success. It did not take too long for their Western counterparts to take note of this remarkable "Chinese flap", and its versatility proved sound in a variety of oral reconstruction following tumor extirpation.

Two decades since its inception, the radial forearm free flap (RFFF) has seen a wide array of application in head and neck reconstruction. In addition, it carries added features of having abundant, thin, pliable tissue with a reliable vascular pedicle, reproducible sensory restoration, safety, ease in harvesting, application in covering complex defects, being a predominantly hairless, forearm skin, and having an inconsequential defect to the donor site.

This study aims to: 1) report the first series of the use of the RFFF in head and neck reconstruction in the Philippines; 2) present the diversity of applications of the

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flap in various tumor surgery of the oral cavity, pharynx, larynx, and palate; and 3) introduce a modification (i.e., suprafascial dissection during harvesting) of the conventional RFFF.

CASE REPORT

Eight patients (five males and three females), with age ranging from 40-72 years underwent ablative surgery for squamous cell carcinoma of the oral cavity, oro-, and laryngopharynx at a tertiary hospital from March 1996 to May 1997. All patients underwent neck dissection followed by tumor removal and reconstruction via microvascular surgery using radial forearm free flap (RFFF).

Table 1. Patient Data

Patient	Age	Sex	Diagnosis	Flap Viability
1	49	F	Tongue CA $T_4N_1M_0$ (Stage 4)	+
2	53	M	Transglottic CA $T_4N_2M_0$ (Stage 4)	+
3	59	F	Buccal CA $T_4N_1M_0$ (Stage 4)	+
4	40	M	Tongue CA $T_4N_1M_0$ (Stage 4)	+
5	72	F	Palatal CA $T_4N_1M_0$ (Stage 4)	+
6	47	M	Tongue CA $T_4N_2M_0$ (Stage 4)	+
7	49	M	Oropharyngeal CA $T_3N_1M_0$ (Stage 4)	+
8	42	M	Floor of Mouth CA $T_3N_1M_0$ (Stage 3)	Not assessed*

*Patient expired third day post-op due to cardiopulmonary arrest.

Of the eight patients, 6 were noted to have good flap viability as determined by the skin prick test, where brisk bleeding of the flap resulted from a needleprick after 24 hours and rechecked daily thereafter. Patient No. 8 who underwent excision of floor of the mouth carcinoma, had good flap viability until expiration on the third post-op day due to cardiopulmonary complications. Patient No. 7, on the other hand, also had a viable flap up to the fourth post-op day, when sluggish bleeding of venous blood was noted on skin prick test. The patient underwent removal of the infected failed flap three days later and was reconstructed using a deltopectoral flap.

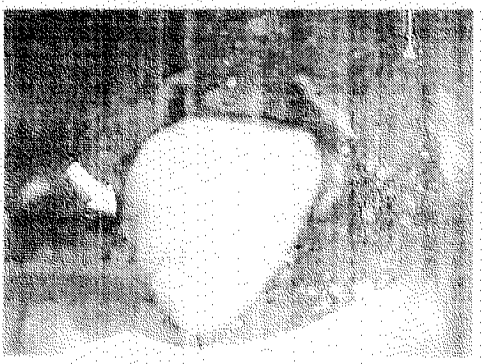

Figure 1. Intraoperative gross appearance of tongue cancer (white arrow) prior to resection via lingual drop.

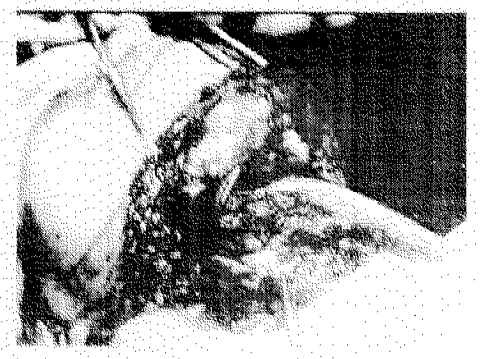

Figure 2. Hemiglossectomy with extension to floor of the mouth.

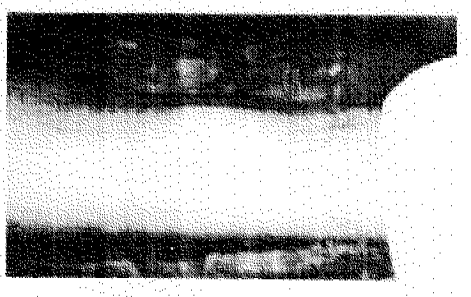

Figure 3. Radial forearm donor site with measurement of flap prior to harvesting.

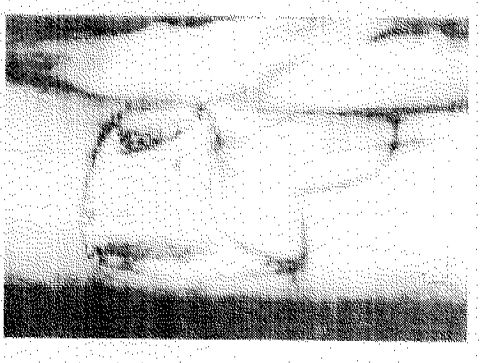

Figure 4. Harvesting of the radial forearm free flap.

Figure 5. Radial forearm free flap in place via microsurgical anastomosis.

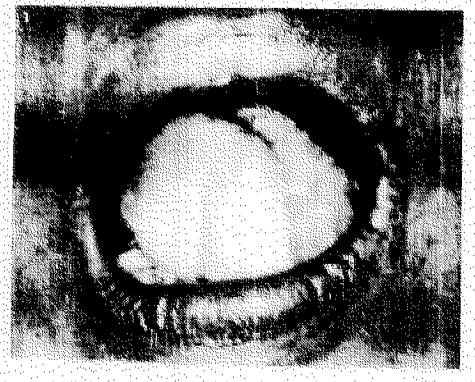

Figure 6. Four months post-operatively. Note excellent color match.

DISCUSSION

The last fifty years has offered the otolaryngologist-head and neck surgeon with a variety of treatment options. By and large, defects have been repaired using traditional techniques, such as the pectoralis major myocutaneous and deltopectoral flaps. This armamentarium of reconstruction choices for ablative surgery has been greatly advanced with the advent of microvascular surgery.

Of late, the radial forearm free flap (RFFF) has become the new workhorse for head and neck reconstruction, particularly in developed nations. In the Philippines, microvascular surgery is an emerging tool for the head and neck surgeon but has yet to become widely popular. The introduction of the RFFF to the authors' institution has widened treatment options for head and neck reconstruction. For this purpose, the RFFF is ideal for the following reasons: (1) adequate drainage of the flap is provided by three separate venous systems, namely the cephalic vein, basilic vein, and two venae comitantes that accompany the artery. Further, the cephalic or basilic vein is commonly raised with the flap and flap viability is not dependent on which vein is chosen; (2) the skin of the entire forearm can be used. If necessary, large defects from 12 cm up to 20 cm can be covered; (3) the vascular pedicle is quite long, so that vein grafts are not used; (4) lumen diameter is larger near the elbow. This facilitates a high volume of blood flow and relative ease of anastomosis; and (5) the flap's thinness make it malleable for many options in coverage.

The decision to use this flap is made if the defect needs a non-bulky, thin, malleable piece of reconstruction material which is non-hair bearing. For reconstruction of the aerodigestive tract, the RFFF was clearly the flap of choice in all eight patients.

Once this choice is made, pre-operative assessment of the donor site is essential. The non-dominant forearm is preferred and an Allen test performed. It is vital to ensure that the viability of the hand is not be impaired after the dissection of the radial artery. The radial artery appears to be relatively free from arterial disease even in the elderly. Thus, age is not a contraindication for free tissue transfer.

Briefly, the operative technique commences with a neck dissection followed by tumor removal, estimation of defect size, and measurement of donor size.

Dissection of the flap proceeds under tornique control following elevation exsanguination. In three patients, the flap was dissected using the traditional subfascial plane. However, healing of the donor site defect took longer than expected (more than one month). Therefore, the RFFF was modified by utilizing the suprafascial plane of dissection, where rich vascularity is available and where the underlying muscle and tendon fascia offers protection of the donor site. On the next five patients on whom this was adopted, the results were clearly more than satisfactory,

where, on the average, complete healing took place on the third week post-op. The donor site was then covered with a split thickness (0.015mm) skin graft from the upper inner aspect of the thigh. A volar splint was applied to the patients' forearm

Insetting of the flap to the area of defect was done prior to anastomosis of the recipient and donor vessels. Patency of the anastomosis was tested prior to closure of the tumor site defect, and post-operatively monitored daily via the skin prick technique.

CONCLUSION AND RECOMMENDATIONS

This study presented the first known reported series of patients in the Philippines who underwent reconstruction using the RFFF after tumor removal in the head and neck region. Its versatility was shown in a diversity of applications in various tumor surgery of the oral cavity, pharynx, larynx, and palate. In addition, a modification of the conventional harvesting of the RFFF was introduced by adapting the suprafascial dissection instead of the traditional subfascial plane.

In spite of the limited number of patients in the series, the authors believe that the RFFF can show great promise and advance head and neck reconstruction in the Philippines. Increased future utilization of this technique, which may involve neural anatomosis and exploration of other usage in the supraclavicular region, is encouraged.

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TRANS-SPHENOIDAL PITUITARY SURGERY THROUGH A TRANS-PALATAL APPROACH*

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ABSTRACT

This is a surgical innovation report of a series of trans-sphenoidal pituitary surgery through a trans-palatal approach done in this institution. This is reported to share and learn from the experience and to show the versatility of this approach compared to the newer and commonly used techniques.

Four patients went through the procedure in joint management with the Neurosurgery Service. Three cases had pre-operative bitemporal hemianopsia of which one had complete disappearance of the symptoms post-operatively and there were no complications post-operatively.

The advantages of this technique over the others commonly used to access the post-nasal area include easier accessibility into the sphenoid sinus and beyond; a more open and wider exposure eliminating a tunnel vision; a need for lesser instrumentation; and post-operatively, the patient can breath through the nose without difficulty; no risk of septal perforation; no annoying crusting and dryness in the nose during immediate post-operative period; and no sequelae of intranasal adhesion. The simplicity of this approach allows the surgeon to access this notably difficult region with greater ease and confidence.

Keywords: Pituitary surgery, transpalatal-transsphenoidal approach

INTRODUCTION

Direct access to the structures of the postnasal area has always been a challenge in the practice of Otorhinolaryngology. Accurate assessment of maladies afflicting this site requires tedious evaluation utilizing careful physical examination, radiologic evaluation and instrumentation. Once a diagnosis has been made and a surgical procedure has been contemplated the usual approaches to this site has been through transnasal and transantral routes which are relatively tunnel procedures. Nothing could be more convenient to the surgeon, especially when operation beyond the sphenoid sinus is indicated, if wider and more direct visualization could be achieved intra-operatively.

This paper describes a technique hardly used to visualize the sphenoid sinus directly. This procedure facilitates a better access to the hypophysis and was further utilized because of the advantages of this technique over the other techniques that are being patronized at present. Four cases of pituitary tumors were operated using this approach in joint management with the Neurosurgery service.

HISTORY OF EXTRA-CRANIAL APPROACH FOR THE PITUITARY TUMORS

Until 1900, pituitary lesions were described rather than treated. During the first ten years of this century, there were

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some attempts of trans-cranial removal that ended in disaster. In the same decade the pituitary was successfully approached through the transeptal route but the entire nasal organ was destroyed. The turbinates and septum were resected and the external nose was turned aside. Transethmoid, transantral and transpalatal operations were introduced and by 1910 all of the extracranial routes had been attempted. In 1912, Cushing combined some of the best features available, that is, an incision that was off the face (Halsted's Sublabial Incision) and Hirsch's transeptal route, which was deep to the septal mucosa rather than through it and started publishing the results of transeptal surgery of adenomas combined with this technique until 1920's.

The time from 1920's to 1940's was a period when the Neurosurgeons put the Otolaryngologists out of business by the spectacular success and development of the transcranial procedures. Most surgeons lost sight of the extracranial approach. However, one of Cushing's pupils, Norman Dott, in Scotland, persisted with the transeptal approach, and Guiot carried his approach to France. Then Hardly eventually repopularized the transeptal, transsphenoidal approach in the U.S., and it is now the most common method used to expose the sphenoid sinus for hypophysectomy.

Another important factor, and one that brought Otolaryngologist into the fold, was the publication of Luft and Olivecrona in the 1950s showing the effects of transphenoidal hypophysectomy on patients with metastatic hormonally dependent cancers of the breast and prostate. These were patients who were not suitable for the transfrontal craniotomies then in vogue because they were too ill but could tolerate an extracranial operation. It is important to note, however, that it was also on the same year that Escher and Naumann revived and promulgated the transethmoidal approach.

There are other routes that should be mentioned: a transantral approach popularized by Hamberger and used in Scandinavia since 1961; the transpalatal approach started by Trible and Morse in 1965; and the transnasal osteoplastic approach which includes external incision over the nose as used by Macbeth in England.

Of late, newer approaches were developed by the Europeans, relative to the site of the tumor. Noteworthy are the works of Ugo Fisch and Pillsbury on the infratemporal fossa approach to the base of the skull in 1970. Another technique is the Subcranial approach for the fronto-orbital and anteroposterior skull base tumors describes by Raveh and Ladrach. In the early 1980s a British trained Hongkong surgeon, William Wei, demonstrated access to the base of the skull by the maxillary swing. Just this year another fellow from Singapore, Sethi presented a successful report using a transseptal approach to the pituitary.

In the field of Otolaryngology, the transpalatal technique was not frozen to oblivion. In fact, it is the more widely used route to approach tumors of the nasopharynx (i.e. Juvenile Nasopharyngeal Angiofibroma) since time immemorial. Its use, however, as an access to the sphenoid sinus and subsequently as an extracranial route remained unthreaded until an idea of a team approach for pituitary tumors resurfaced in one of the interdepartmental referrals between the Neurosurgery service and Otolaryngology in early 1995 at the Davao Medical Center.

SURGICAL ANATOMY OF THE SPHENOID SINUS AND RELATED STRUCTURES

The sphenoid sinus lies in the midline of the sphenoid bone behind the upper part of the nasal cavity. It is bounded superiorly by the cribriform plate and the pituitary, laterally by the optic nerve and the cavernous sinus, anteriorly by the nasal cavity and ethmoid sinuses, inferiorly by the nasopharynx and, posteriorly by the clivus and the brainstem (Figure1). The sphenoid sinus connects with the nasal cavity via the sphenoethmoid recess which drains on the superior meatus. The septum between the two sphenoid sinuses is often incomplete and very thin, hence, it is regarded as a single cavity.

Lateral wall of the left nasal cavity, in a midline sagittal section of the skull (*The middle concha has been removed to show the ethmoidal bulla*)

1. Occipital condyle
2. Hypoglossal canal
3. Groove for inferior petrosal sinus
4. Internal acoustic meatus
5. Clivus
6. Dorsum sellae
7. Sella turcica (pituitary fossa)
8. Sphenoidal sinus
9. Ethmoidal sinus
10. Superior concha
11. Ethmoidal bulla
12. Uncinate process
13. Frontal sinus
14. Inferior concha
15. Incisive canal
16. Hard palate
17. Maxillary sinus
18. Perpendicular plat of palatine
19. Sphenopalatine foramen
20. Medial pterygoid plate
21. Pterygoid hamulus

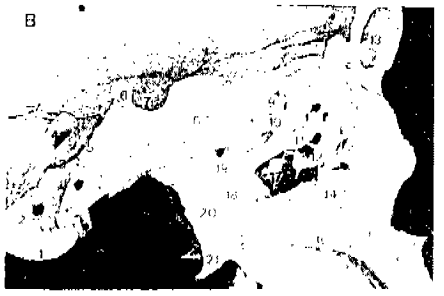


Figure 1. *The sphenoid Sinus in relation to its surrounding structures.*

The natural orifice of the sphenoid sinus is located at the anterosuperior portion of the sphenoid sinus. An average orifice measures 2 mm x 3 mm and lies 10 mm above the floor of the sinus.

The lateral wall of the sphenoid sinus articulates with the orbital plate of the ethmoid bone above, and with the orbital process of the palatine bone below. This provide the guideline for avoiding the damage to the orbital contents.

The roof of the sphenoid sinus is continuous with the roof of the ethmoid labyrinth (fovea ethmoidalis) anteriorly in a smooth curving line. Observation of this limit prevents violation of the anterior cranial fossa.

The pituitary gland is located posterior and superior to the sinus and commonly bulging into the superior wall. This relationship enables one to perform a transsphenoidal hypophysectomy through the inferior wall of the sella turcica.

INDICATION

The main indication of the transpalatal technique is to provide direct access to the post-nasal area. Hence, it is a diagnostic and therapeutic means for any suspicious mass in the area. Sphenoid new growth that are difficult to biopsy by conventional methods or exposed by transnasal or transmaxillary approaches lends well to this technique. It is also an easier approach to access structures beyond the sphenoid sinus like the pituitary gland.

PRE-OPERATIVE PREPARATION / CRITERIA FOR INCLUSION

Active sinus disease and oro-dental infection should be controlled prior to the procedure. Poor pneumatization or limited air cell development of the sphenoid sinus is a contraindication. The degree of pneumatization of the sphenoid sinus varies greatly. In relation to the transsphenoidal approach to the pituitary gland, the sphenoid sinus pneumatization have been divided into three types: (1) postsphenoid pneumatization (about 60%); (2) presphenoidal pneumatization (about 40%); and (3) conchal pneumatization (about 1%). It can be determined by doing a lateral X-ray of the skull (Fig. 2). Mediastinal metastases sometimes cause venous congestion of the head and neck because of obstruction to the superior vena cava. This is an absolute contra-indication to the operation because the hemorrhage increases the difficulty of the operation, and if, in spite of this, the pituitary is successfully removed, it is impossible to control the flow of the CSF and the patient will die in the post-operative period. Secondary metastases to the liver with normal liver function are not a contra-indication to operation. But if there is evidence of failure before the operation, the patient will not survive in the post-operative interim. Therefore, evidence of liver failure is a definite contraindication to operation.

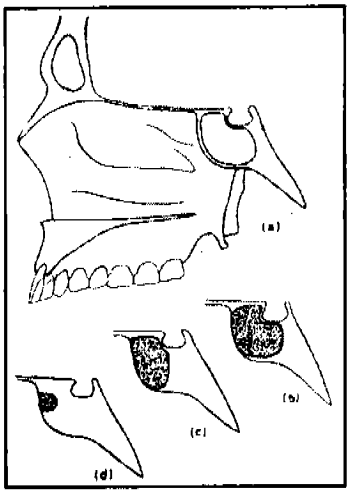


Figure 2. *A. Diagrammatic representation of lateral radiograph of the skull showing the relation of the pituitary fossa to a well pneumatized sphenoid sinus.*
B. Postsphenoid pneumatization.
C. Presphenoid pneumatization.
D. Conchal pneumatization of the sphenoid.

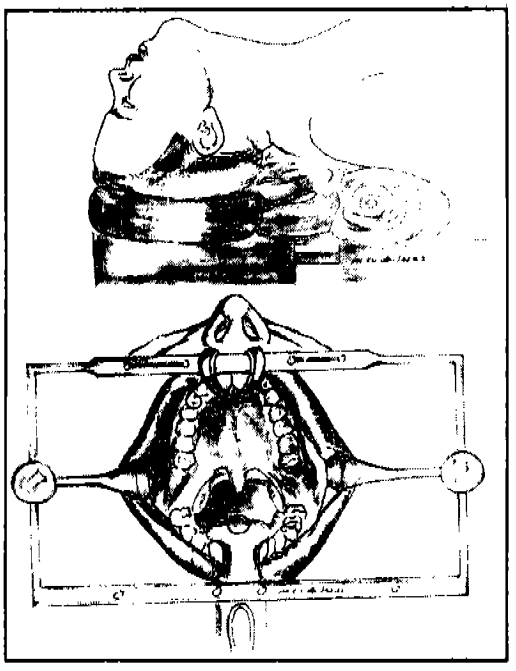
Some limitations are: (a) a giant pituitary tumor that frequently cannot totally be managed through a transsphenoidal approach alone and (b) vascular lesions that can be managed only in special circumstances because of the limitations of exposure.

ANESTHESIA

General orotracheal anesthesia is done with tube placed midline to the mouth held securely in place in the center by Dingman mouth gag or Crowe-Davis mouth retractor with a tongue blade with center tube grooving. Armoured endotracheal tube or a Ray tube is ideal for gas delivery.

POSITION AND PREPARATION OF THE PATIENT

The patient is placed in the operating table in a supine position with a hyperextended neck manner, head thrown back and stabilized with a doughnut rest. Neck curvature must be supported by a rolled towel or water filled plastic bag. The nose, oral cavity and face are prepped and draped in the standard fashion. With the Dingman or Crowe-Davis mouth retractor, mouth should be opened as wide as possible. The position of the head is so adjusted that the surgeon looks directly on top of the palate. A head light will facilitate better illumination to the operative site. The surgeon is sitting and positions at the head of the table.

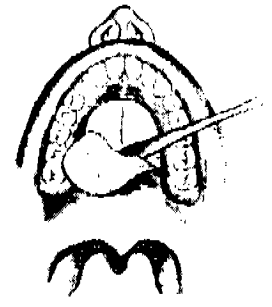


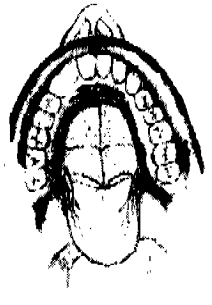
SURGICAL TECHNIQUE

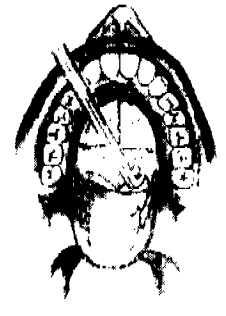
A. TRANSPALATAL ROUTE TO THE SPHENOID SINUS

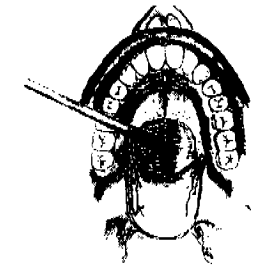
Dotted lines mark the line of incision along the mucosa of the hard palate which is made parallel to the gingival margin leaving enough mucous membrane in the gingival side for placement of closure sutures (Figure 3A). After infiltrating the mucosa of the hard palate with a 1% lidocaine + 1:100,000 epinephrine solution, the incision is done. The mucoperiosteal flap of the hard palate is elevated with the use of a freer dissector until the whole bony plate is exposed to its margins (Figure 3B). Further elevation of the palatal mucosa until separation of the nasal mucosa is done. Precaution is important not to injure the greater palatine vessels and nerves on the lateral sides (Figure 3C). Starting from the posterior rim of the bony palate, resection is carried on using a Kerrison forcep exposing wider area of the nasal mucosa anteriorly. A part of the hard palate is removed as necessary to gain better exposure (Figure 3D). The bony septum, composed in part by the

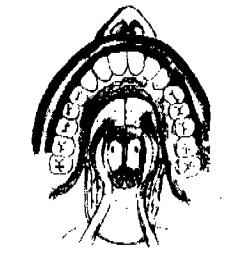
perpendicular plate of the ethmoid and the vomer is exposed at the midline .with the resection of the bony palate anteriorly (Figure 3E). The nasal mucosa is elevated along the margins of the bony septum until the antero-inferior wall of the sphenoid sinus is exposed. Exposure is widened laterally by further reflection of the nasal mucosa and elevating further the mucosa of the anterosuperior face of the sphenoid sinus thus exposing the natural ostia on both sides (Figure 3F). The bone septum is removed gradually (Figure 3G). The posterior part of the septum is detached as intact as possible and set aside for future use. The sphenoid sinus is entered by insinuating gently a Kerrison punch forceps and pushing at its weakest point along the natural ostium aided with a freer elevator (Figure 3H). Once it is accomplished, the sinus is further widened along its margins and further resection of the vomer is done (Figure 3I). A wide view of the sphenoid sinus is obtained and with the use of a curette, the mucosa within the interior of the sphenoid sinus is elevated and stripped to expose the bony interior of the sinus (Figure 3J). The bulge of the sella turcica on the posterior wall is identified after the intersinus septations are removed with bone rongeur (Figure 3K). Further surgery to the hypophysis may be done with direct visualization or with the aide of a working microscope and scopes if it is available.

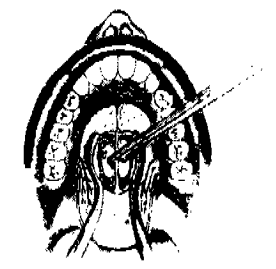


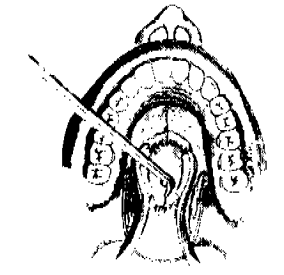








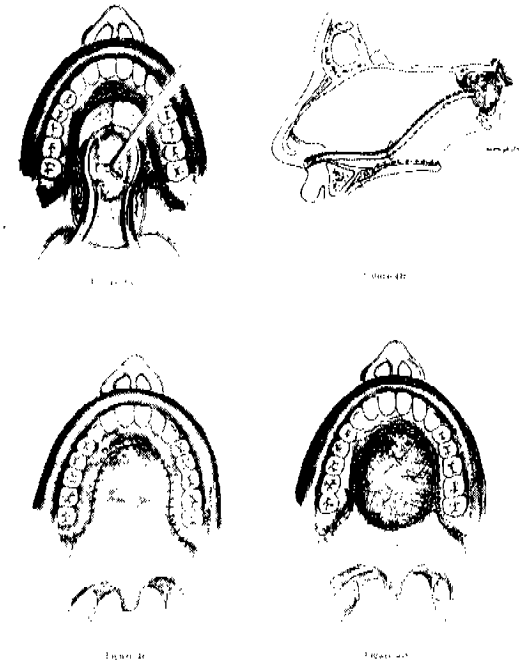




B. TRANSSPHENOIDAL ROUTE TO THE PITUITARY

With the above procedure carried out, the hypophysis is entered by extending the dissection. The roof of the sphenoid is contiguous with the floor of the sella turcica. By using a 4 mm. osteotome and mallet under an operating microscopic guidance a window is gently made in the bone over the bulge of the sella turcica. Then the sella turcica is exposed and the window in enlarged using a small right angle punch (Figure 4A). The entire face and floor of the

sella should be removed but it is important to leave a thin rim circumferentially so that there is something to place the bone against for closure. The pituitary tumor is removed. After the desired procedure is completed, a tube drain is placed anterograde running through a tunnel created along the floor of the nasal cavity between the mucosa and the remaining bony plate exiting at the anterior nares (Figure 4B). Hemostasis and obliteration of the dead space is achieved by using a gelfoam, a surgicoele or abdominal fat packing lightly in the cavity. The nasal mucosa is sealed off using absorbable sutures and the tube drain is left (Figure 4C). The deflected palatal mucosa is repositioned and sutured with placement of hammock dressing (Figure 4D).



RESULT

Of the four (4) patients who went through this procedure, one had persistent CSF leak which was remedied using a fascia lata graft; one had intra-operative bleeding which was controlled using local packs. Their courses in the ward were unremarkable.

Three (3) cases had pre-operative bitemporal hemianopsia of which one (1) had complete disappearance of the symptom post-operatively. There were no complications of oronosal fistula, velopharyngeal insufficiency, and meningitis.

CONCLUSION

The advantages of this technique over the others commonly used to access the post-nasal area include easier accessibility into the sphenoid sinus and beyond; a more open and wider exposure eliminating the tunnel vision; a need for lesser instrumentation; and post-operatively, the patient can breath through his nose without difficulty; no risk of septal perforation; no annoying crusting and dryness in the nose during in the immediate post-operative period; and no sequelae of intranasal adhesion that may form post operatively.

The simplicity of this approach allows the surgeon to approach this notably difficult region with greater ease and confidence.

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ORBITAL DISASSEMBLY FOR TUMORS IN THE ORBIT*

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EDUARDO C. YAP, M.D.***

ABSTRACT

An alternative approach to deep-seated orbital tumors using lateral orbital wall disassembly in a 23 year old female with a superolateral intraorbital tumor is described. The advantages and disadvantages of the approach vis-a-vis conventional surgical approaches to orbital surgery are discussed.

Keywords: Orbital tumors, surgery, disassembly

INTRODUCTION

There are three basic surgical approaches to the orbit which are widely used and accepted in the field of orbital surgery. These are (1) anterior orbitotomy, (2) transcutaneous medial orbitotomy and (3) lateral orbitotomy. There are cases, however, when these approaches may be insufficient with regards to maximal exposure of certain orbital tumors. Thus, a need for innovative approaches to orbital surgery.

OBJECTIVES

The objectives of this paper are:

1. To describe and illustrate an approach (via coronal forehead flap with orbital disassembly) for orbital surgery.
2. To cite specific case wherein this approach was utilized for a superolateral intra-orbital tumor.
3. To describe and illustrate the conventional approaches in orbital surgery and discuss their limitations.
4. To cite the advantages and disadvantages of this alternative approach for orbital surgery.

CASE REPORT

A 23 year old female sought consult at the Department of Ophthalmology in this institution due to proptosis of the right eye (Figure 1).

Figure 1. Proptosis of the right eye of patient clearly seen

Routine laboratory work-ups including CT scan were requested. Pertinent physical examinations centered on ophthalmologic findings revealing a decreased visual acuity of the affected eye at 20/70. Exophthalmometry revealed a (+) 5mm difference between the normal affected eye. There were no limitations in extraocular motility. CT scan reveals a hypodensity at the superolateral region within the intraorbital area, measuring 4x 5 cms (Figure 2). The patient was then referred to ENT for co-management and was then scheduled for excision of the

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intraorbital tumor via coronal forehead flap with lateral orbital wall disassembly.

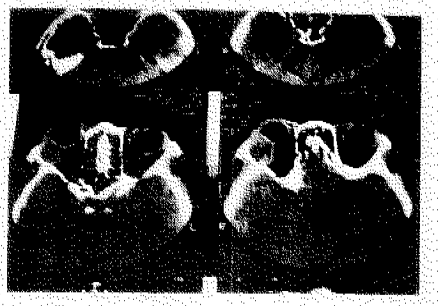
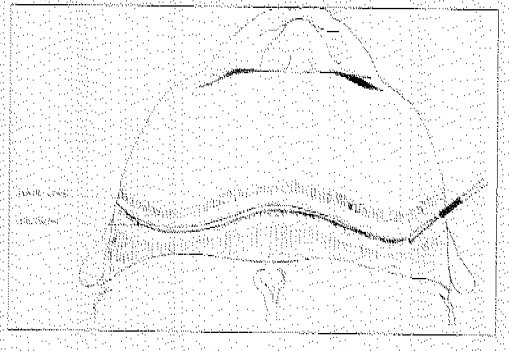


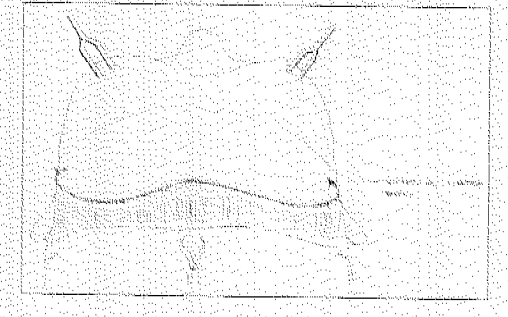
Figure 2. CT Scan revealing the hypodensity at the superolateral region with in the intraorbital area of the right eye.

THE SURGICAL TECHNIQUE

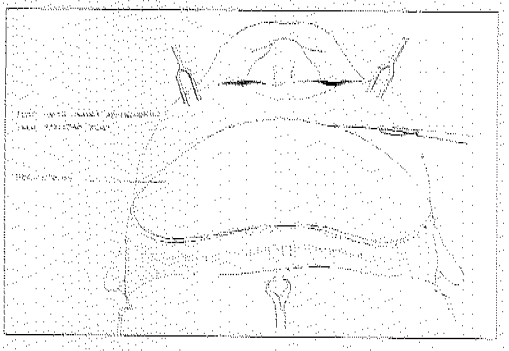
A bicoronal scalp incision around 1-2 cm posterior to the hairline after infiltration with xylocaine 1% with a 1: 100,000 adrenaline. The incision extended from the preauricular creases above the pinnae and across the temples, forming a gentle curve behind the hairline. Hair was held out of the way with elastic bands covered with towels and attached to the scalp. Incision was done along the hair follicles and carried through the subcuticular galeal tissue.



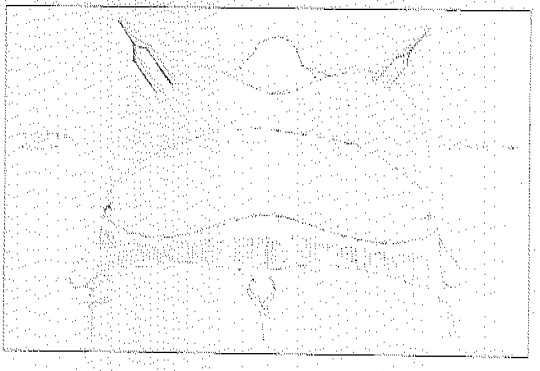
Branches of the superfacial temporal artery were clamped and ligated with 3-0 silk.



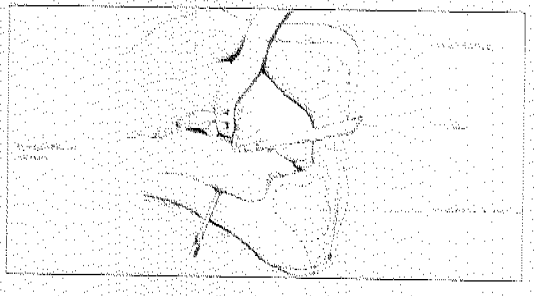
A plane between the galea and periosteum and forehead tissues was elevated and rolled over the projection of the superior orbital rims.



The periosteum was not incised until the surgeon is close to the orbital rims.



The supratrochlear and supraorbital vessels that entered the flap were preserved.



Lateral dissection was done in a plane deep to the temporalis fascia. Gentle traction was applied to avoid injury to the frontal branch of the facial nerve (Figure 3).

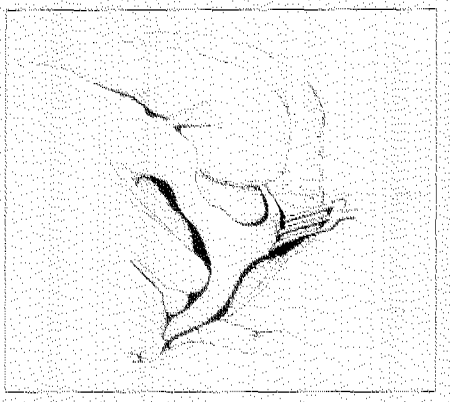


Figure 3. Lateral dissection was done at a plane deep to the temporalis fascia.

Subperiosteal dissection was done at the lateral superior rim of the orbit. With the malleable retractors in place to protect the orbital contents and the globe, a cutting disc was used to cut the lateral area of the rim between the holes (Figure 4).

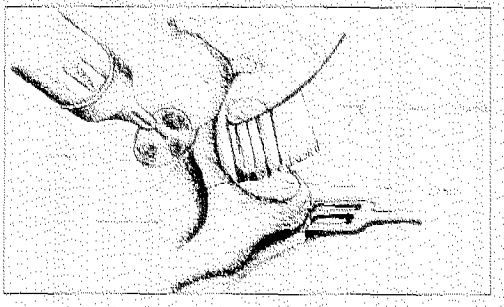
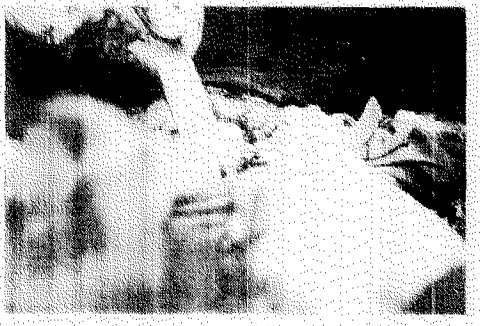


Figure 4. A cutting disc was used to remove the lateral rim of the right orbit.



After the cuts were made in the lateral orbital rim, an Allis clamp was used to remove the bone, after which the bone was placed in an antibiotic solution.

Intraoperatively, a well-defined, easily resectable, pale yellow, firm 4 x 5 cm tumor was excised from the superolateral area of the right orbital cavity (Figure 5).

Figure 5. A pale yellow, easily resectable, firm 4x5 cm tumor was removed from the superolateral area of the right orbital cavity.

After the lesion was excised and complete hemostasis established, the lateral orbital rim was then put into position with titanium plates and screws (Figure 6) into the preplaced holes. The periorbita was then closed anteriorly with 4-0 chromic sutures.

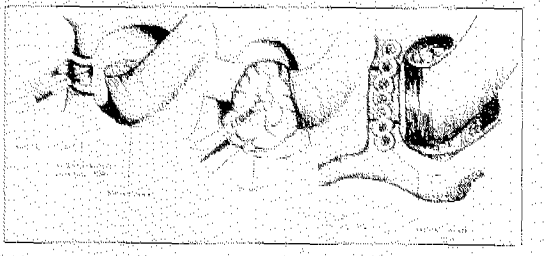
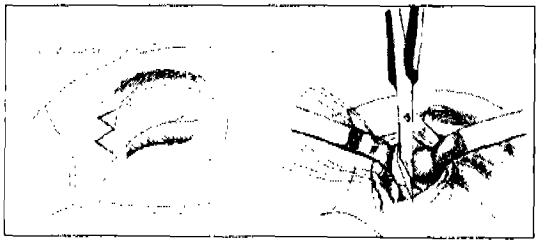


Figure 6. The lateral orbital rim was replaced using titanium plates and screws.

The subcutaneous and skin layers were sutured separately. Drains were

C. MEDICAL ORBITOTOMY

The transcutaneous medial orbitotomy approach allows access to the medial subperiorbital and peripheral surgical space. A lazy-Z incision is utilized in this approach. The trochlea and medial canthal tendon represent the superior and inferior limits of the skin incision. After subcutaneous dissection is done, the medial tissues are retracted. The medial periorbita is incised vertically and reflected off the bone.[4]



These are the three conventional approaches widely used for surgeries involving orbital tumors.

Considering that the subperiorbital space lies between the orbital walls and periorbita, the peripheral surgical space between the periorbita and the intermuscular septum behind the globe, one can readily surmise that when dealing with large encapsulated masses more deeply situated in the orbit, aside from insufficient exposure, the unsightly scar as a result of using these approaches will surely pose as problems.[5]

Therefore, the coronal forehead flap with orbital disassembly may be considered as an alternative approach in such cases involving large intraorbital tumors for better exposure and more surgical space.

Utilization of this approach .may mean an increase in total surgical time due to the more extensive incision. However, it facilitates dissection and precision osteotomy, thereby leading to easier orbital disassembly and reassembly. With regards to blood loss, this may be minimized by using the coronal folder clips for hemostasis of the coronal forehead flap.[6] Also, one clear advantage is the cosmetic benefit as a result of non-utilization of an external visible incision. This is very beneficial for individuals who are very particular of their facial appearance.

CONCLUSION

This paper has described the conventional approaches to orbital surgery. These are the anterior, medial and lateral orbitotomy approaches. These approaches are usually sufficient for most orbital surgeries.

The authors do not actually aim to revolutionize these standard procedures. These conventional approaches still remain the main strongholds for orbital surgery. However, another approach was presented when dealing with large and deeply situated retro-orbital tumors if the use of one of the conventional approaches may prove insufficient in terms of exposure and even cosmesis.

A step-by-step description of the approach via a coronal forehead flap with orbital disassembly was discussed. An actual case using this technique was presented. With this innovative approach, orbital tumors can be excised with confidence and convenience due to better exposure, larger surgicalworking space, and utmost care in dissection with concomittant cosmetic advantage.

In conclusion, it is recommended that, in dealing with similar cases in the future wherein there is presence of a large tumor deeply situated in the orbit and total excision is needed, the coronal forehead flap with orbital wall disassembly may be used.

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placed post-operatively, positioned bilaterally at the inferior temporal areas. Pressure dressing was placed over the coronal incision site.

Post-operatively, the visual acuity of the involved eye improved to 20/20. Exophthalmometry revealed normal results. The patient was discharged three days post-op.

DISCUSSION

The need for surgical entry into the orbit occurs in a variety of clinical situations. The surgical approach into the orbit is dictated by a variety of factors including the location, size, and type of lesion in question. In addition, the surgical objective (excision, biopsy, or drainage) will also influence the type of entry into the orbit.

For surgery of orbital tumors, there are three basic approaches described which are widely used and accepted in the field of Ophthalmology. These conventional approaches include (1) anterior orbitotomy; (2) transcutaneous medial orbitotomy; and (3) lateral orbitotomy[1]

Thorough preoperative imaging with CT or MRI scans are important to characterize the anatomic location and soft tissue characteristics of an orbital lesion. It should be determined if the lesion is infiltrative, has bone involvement or has intracranial or sinus extension. This allows the proper choice of the surgical approach for each lesioon for maximal exposure.

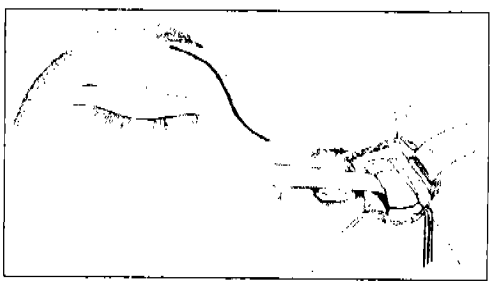
If preoperative evaluation demonstrates that the lesion is indeed large and involves both muscle cone and occupies a large intraorbital area, then proper exposure for complete resection and adequate surgical space is necessary.

The conventional approaches for orbital surgery include the following:

A. LATERAL ORBITOTOMY

In dealing with tumors involving the lateral subperiorbital, peripheral, and central surgical spaces, a "lazy-S" (Wright-Stallard) skin incision for lateral orbitotomy may be utilized.

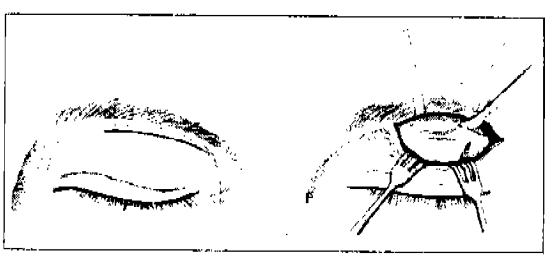
The superior aspect of the incision of the begins in the lateral area of the brow. The incision is carried inferiorly along the orbital rim and terminates at the level of the zygomatic arch. Sharp and blunt dissection through the subcutaneous and orbital orbicularis muscle layers is completed. The skin flaps are undermined to expose the periosteum along the lateral orbital rim and temporalis fascia. Malleables or rake retractors may be used to retract the skin-muscle flap to expose the lateral rim periosteum. The periosteum is then incised vertically approximately 5 mm from the medial edge of the lateral rim. A periosteal elevator is used to reflect the periosteum laterally and medially to expose the bone.[2]



B. ANTERIOR ORBITOTOMY

The anterior orbitotomy approach allows access to lesions in either the subperiorbital or anterior periphreal orbital surgical spaces. Inflammatory tumors, lymphomas, and cystic masses are among the common lesions encountered in the anterior orbit. Lacrimal gland masses can be biopsied with this approach.

A skin incision for supero-anterior orbitotomy is made just inferior to the brow. The incision should follow the natural brow contour and remain inferior to the brow cilia. Superiorly, the supraorbital nerves and vessles and trochlear bundle should be avoided. With the edges of the skin and subcutaneous tissues retracted, the periosteum is incised above the orbital margin. It is then reflected off the bone with a Freer elevator. [3]



SUPRACRICOID LARYNGECTOMY WITH CRICOHYOIDOEPIGLOTTOPEXY FOR GLOTTIC CARCINOMA OF THE LARYNX*

DOMINIC C. SIA, MD**
REBECCA G. ROSALES-FELICIANO, MD**
ALFREDO Q.Y. PONTEJOS, JR., MD***

ABSTRACT

The use of supracricoid laryngectomy with cricohyoidoepiglottopexy in a 67 year old male with Stage II transglottic squamous cell carcinoma of the larynx is discussed in comparison with other conservative laryngectomy procedures. Indications and contraindications are enumerated; and functional results including stenosis and application are evaluated.

Keywords: Laryngeal cancer, conservative laryngectomy, one-stage procedure

INTRODUCTION

One of the foremost aims of surgery is to restore function. And more and more, the need for this dictum in the treatment of laryngeal cancer is being appreciated. As clinical and diagnostic tools become more refined and the awareness of the public increase cases of laryngeal CA are detected earlier. Hence the need for conservation surgery becomes greater.

Conservation surgery of the larynx aims to achieve maintenance of physiologic function of the larynx without compromising eradication of the disease. These functions include speech, respiration and deglutition. Various techniques have been introduced which find their application in specific cases and stages of the disease: cordectomy is useful for malignancy limited to the mobile true vocal cord; supraglottic horizontal laryngectomy, on the other hand, is useful for supraglottic carcinomas that do not involve the true cords and/or the pre-epiglottic space: a variety of vertical partial laryngectomies are available for cases where glottic carcinoma has invaded anteriorly or posteriorly past the true cords.[1]

Studies have shown that the larynx is functionally divided into compartments which prevent the spread of malignancy.[6] However, disease that has invaded the paraglottic space have also been shown to spread more readily to the thyroid cartilage.[7] This readily leads to spread all over the larynx. It is these cases where involvement of the paraglottic space is definite or suspected that require the removal of the entire thyroid cartilage. Considering that all the types of conservation surgery so far mentioned leave behind part if not all of the paraglottic space, the need for a technique that entirely removes this space is apparent.

Short of doing total laryngectomy, this technique aims to provide the otolaryngologist with other options in the treatment of laryngeal cancer. It is a conservative technique that removes the paraglottic space with the associated thyroid cartilage and reanastomoses what remains (hyoid and cricoid) with each other. This ensures adequate margins of resection while maintaining adequate function.

The technique is not new, it has been described by Majer and Rieder in 1959, Labayle and Bistmuth in 1971, Piquet, et al in 1974 and Laccourreye in 1990.[2] It is the aim of this paper to introduce this technique

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into the field of Otolaryngology in the Philippines, to give an additional option for surgeons who would wish to maintain function without sacrificing treatment.

CASE REPORT

I.S., a 67 old male from Cagayan presented with a 6 mos. history of hoarseness w/ progressive but slight dyspnea. On consult, patient was noted to have a laryngeal mass and biopsy via direct laryngoscopy revealed Well Differentiated Squamous Cell Carcinoma. The patient, Stage II T2NOMx, was admitted and underwent pulmonary radiographs and pulmonary function tests to evaluate the possibility of conservative surgery. Finally, the decision was made and the patient underwent supracricoidlaryngectomy with cricohyoidoepiglottopexy.

DESCRIPTION OF TECHNIQUE*

Preparation

The patient is placed supine, awake with neck hyperextended. A tracheostomy is done under local anesthesia via a horizontal incision over the anterior neck. General anesthesia is then instituted through the tracheostomy.

Exposure

A horizontal incision is made along a skin crease on the anterior neck area 2 cm. above the tracheostomy site and is carried down to just past the platysma. A superiorly based subplatysmal skin flap is developed up to 1 cm above the hyoid bone; and an inferiorly based subplatysmal flap developed until the edge of the clavicle.

The sternohyoid and thyrohyoid muscles are transected along the superior border of the thyroid cartilage and mobilized. The sternothyroid muscles are transected along the inferior border of the thyroid cartilage. The thyroid gland is then split at the isthmus and each lobe dissected off attachments to the trachea. The inferior pharyngeal constrictor muscles on each side are transected along the posterior border of the thyroid lamina.

Blunt dissection is done to free the trachea to the level of the carina to mobilize it upwards.[1]

Resection

The thyrohyoid membrane is entered through a transepiglottic laryngotomy along the superior border of the thyroid cartilage opposite the mass. A transverse medial cricothyroidotomy is done disarticulating both cricothyroid joints along the superior border of the cricoid being careful to stay at the superior border of the joint to spare bilateral recurrent laryngeal nerves.

Excision of the tumor is done under direct vision with a 5 mm. margin via vertical pre-arytenoid incisions carried down along the posterior borders of the thyroid alae to connect with cricothyroidotomy on both sides. Both arytenoids* and the epiglottis are spared. The trachea with the cricoid is mobilized upwards to approximate the hyoid bone.

Closure

The anterior limb of the arytenoids is sutured to the cricoid with Vicryl 2-0. Vicryl-0 is then looped submucosally around the hyoid and the cricoid at 3 sites (anteriorly and 1.5 cm. from midline at both sides) and slowly pulled tight to pull the hyoid and cricoid together; the middle loop passes through the remaining epiglottis. The Vicryl are then ligated together making sure that

Although based on and very similar to the technique described by Laccourreye (1990), the procedure described does not exactly match Laccourreye's technique. Those interested for academic purposes are referred to the reference section of this work.

* A variation of this procedure involves sparing just one arytenoid and removing the other with the specimen. This is done in cases where there is tumor involvement of the arytenoid or when there is limitation of movement of the arytenoid

the hyoid and cricoid are well impacted together.

The sternohyoid muscles are reapproximated with Vicryl 2-0 sutures. Suction drains are placed bilaterally through incisions below the clavicular level.

Skin closure is done in two layers: chromic 3-0 for the subcutaneous tissue and platysma; and silk 4-0 for the skin.

The specimen removed was sent for histopathology showing Transglottic Well Differentiated Squamous Cell Carcinoma with all lines of resection negative for tumor.

RESULTS

Post-operatively, the patient was maintained on nasogastric feeding and the tracheostomy tube maintained. Antibiotics were given IV for 4 days and then shifted orally per nasogastric tube. Speech was evaluated 1 week post-operatively and noted to be present. Patient sounded as if whispering and was unable to speak in a loud voice. Examination revealed movement of the right arytenoid with paralysis of the left. Corking was started on the 11th post-op day.

On the 14th post-op day, the tracheostomy tube was shifted to a smaller size and the nasogastric tube removed. However, the nasogastric tube was reinserted 2 days later because of aspiration.

On the 20th post-op day, the nasogastric tube was removed and decannulation of the tracheostomy tube.was done.

The patient remained asymptomatic, with good deglutition, breathing and speech until the 5th week post-operatively when the patient was noted to develop progressive dyspnea. Examination revealed a narrowing airway, which required reinsertion of the tracheostomy tube. The patient underwent bougienage of stenosis and steroid injection twice without improvement. Six (6) months post-operatively, the patient underwent laser surgery of the larynx for excision of the stenosis. Patient has done well on subsequent follow-up and is presently being weaned off the tracheostomy tube for decannulation.

No recurrence of the malignancy has been noted on present physical examination and with a repeat CT scan 6 months post-operatively.

DISCUSSION

The unique physiology of the larynx enables millimeter surgery for laryngeal carcinoma. The vertical and horizontal compartmentalization of the larynx endowed by both embryology and the laryngeal framework of fibroelastic membranes provide the rationale for conservation surgery of the larynx.

The aim of conservative laryngectomy is not to replace total laryngectomy. Its aim is to provide a treatment option for cases where, without sacrificing the extent of cure available, the functions of the larynx which basically include respiration, deglutition and. more importantly, speech can be preserved. Patients can very well do without a permanent external stoma that constantly produces mucus from the irritation by non-humidified air. Patients would also appreciate being able to speak without suffering any swallowing problems. The advantage of the technique being presented in this paper is that it gives all these results without any decrease in the prognosis, even in cases of more advanced disease where other conservative laryngectomies would not be of any use.

The advantage of this procedure over other conservative laryngectomies is that it involves complete removal of the paraglottic and pre-epiglottic spaces, structures that may easily be invaded by carcinoma, in continuity with the thyroid cartilages. Studies have shown that lymphatics in the posterior half of the larynx are rich and tend to cross the midline.[6] Furthermore. Nakayama and Brandenburg[7] reported the clinical underestimation of T4 laryngeal cancer because of inaccurate diagnosis of thyroid cartilage involvement. This means that tumors that present with impairment of

vocal cord mobility and encroach on the posterior half of the larynx may already involve the quadrangular membrane and thyroid cartilage and/or may already have spread to the opposite side.

Various authors have described the technique. Variations of the technique first described by Majer and Rieder in 1959, of reanastomosing the hyoid bone to the cricoid, have been made by Labayle and Bistmuth, 1971, Piquet, et. al, 1974, Laccourreye, et. al, 1990 and Chantrain and Deraemaecker, 1994.

Laccourreye, in a study of thirty-six (36) patients reports an 86.5% 3-year actuarial survival rate with a 5.5% local recurrence rate.

One variation of the technique described above is the removal of one arytenoid. This is done in cases where the tumor is encroaching on or has grossly involved the arytenoid, or in cases where there is limitation of movement of the arytenoid. Fixation of the arytenoid is a contraindication for this procedure as will be mentioned later.

Maintenance of the cricoid cartilage allows for early decannulation and the preservation of at least one (1) mobile arytenoid cartilage results in physiologic speech and swallowing. Furthermore, there is the added advantage of exposure inherent in this technique. Other vertical laryngectomies have to go through the thyroid cartilage with a narrow field of exposure and possible violation of tumor margins from the blind entry. With this technique, there is wide exposure and good visualization of the tumor as the margins are cut.

Functional Results

Problems encountered in this case had to do with aspiration and stenosis. The patient experienced significant aspiration which entailed maintaining the nasogastric tube for longer that the prescribed 10 days. However, the patient was able to regain physiologic swallowing by the 3rd post-op week. Previous studies have shown that nasogastric tube feeding extended from 9 to 30 days with an average of 15 days with 97% of patient regaining deglutition by the first post-operative month.

Stenosis was the more severe complication noted which developed one month post-operatively. The stenosis was noted to develop progressively during the 5th post-operative week. Foreign studies do not report any experience with such a complication. Explanations for the development of stenosis in this patient may include the propensity of dark-skinned Orientals to develop scars more readily than do Caucasians as well as possible inexperience with the use of the technique. As this is but the first case done, the development of stenosis may mean that further refinement and standardization of the technique is necessary before controlled trials can be attempted.

The patient regained speech post-operatively. Speech can be characterized as "breathy" like a patient with laryngitis consistent with that noted in studies done abroad.

Tumor Recurrence

Regular follow-up to the present has revealed no recurrence of the tumor both by physical examination and via a CT scan done 6 months post-operatively.

Indication and Contraindications

In this institution at present, the use of supracricoid laryngectomy with cricohyoidoepiglottopexy are limited for the following cases:

1. Bilateral T1 glottic carcinomas with or without anterior commissure involvement
2. Unilateral T1 glottic carcinomas with anterior commissure involvement
3. Unilateral or bilateral T2 glottic carcinomas with or without impaired mobility of the true vocal cord
4. Select T3 lesions that present with a freely mobile arytenoid even though the vocal cord is fixed

However, in the future, when the technique has been refined and mastered, its use for other T3 and probably even some

select T4 lesions may be considered as long as the arytenoids are involved with tumor and at least one in freely mobile.

Exclusion criteria for this procedure include the following:

1. Bulky pre-epiglottic space involvement
2. Gross thyroid cartilage destruction
3. Interarytenoid or bilateral arytenoid involvement.
4. Fixed arytenoid - invasion of the cricoarytenoid joint, posterior cricoarytenoid muscles or posterior portion of the cricoid cartilage
5. Subglottic extension > 1 cm anteriorly or > 0.5 cm, posteriorly
6. Invasion of the suprahyoid epiglottis or the vallecula.
7. Inadequate pulmonary reserve.

Cricohyoidopexy

A variation of this procedure involves removal of part of if not all of the epiglottis. This is indicated for cases where invasion of the pre-epiglottic space is highly suspected, more commonly seen in supraglottic cancers of the larynx but also probable when the anterior commissure has already been invaded by tumor. Though this variation bears mention, it is beyond the scope of this paper.

CONCLUSION AND RECOMMENDATIONS

A surgical procedure that increases the options available to the otolaryngologist in the surgical treatment of laryngeal carcinoma is presented. Supracricoid laryngectomy controls disease as effectively as radical surgery and yet gives the patient the functional benefits of conservative laryngectomies in terms of breathing, swallowing, and speech.

There is a need for a partial laryngectomy that avoids a medial cut through the thyroid cartilage and results in total removal of the paraglottic space, anterior commissure and thyroid cartilage. Specially in cases where glottic carcinoma has spread beyond the confines of the membranous true vocal cord, such a technique is useful if not warranted.

The use of the technique is presently limited to T1 and T2 lesions. However, once the technique has been standardized and refined, its eventual use and benefit for T3 and some select T4 lesions may be considered.

The development of stenosis in the case presented point to the need for further refinements in technique before undertaking more extensive clinical trials.

APPENDIX

TECHNIQUE OF OPERATION

Preparation

Figure 1. The patient is placed supine, awake with hyperextended.

Figure 2. A tracheostomy is done under local anesthesia via a horizontal incision over the anterior neck. General anesthesia is then instituted through the tracheostomy.

Exposure

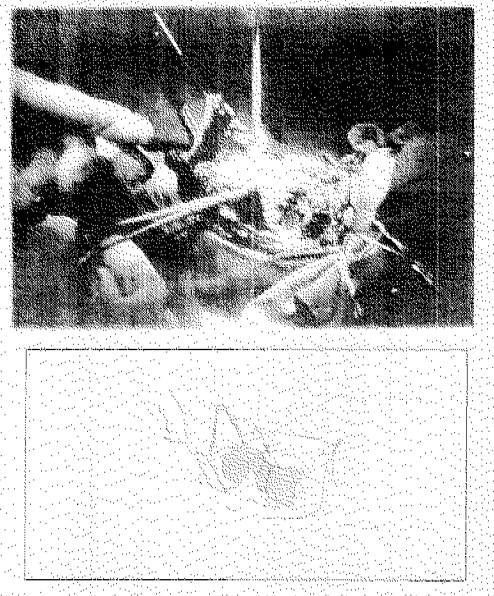


Figure 3. The sternohyoid and thyrohyoid muscles are transected along the superior border of the thyroid cartilage and the sternothyroid muscles along the inferior border of the thyroid cartilage.

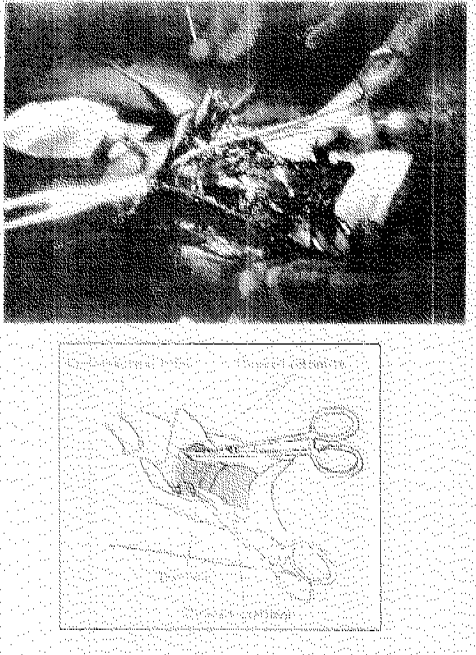


Figure 4. The thyroid is then split at the isthmus and each lobe dissected off attachments to the trachea.

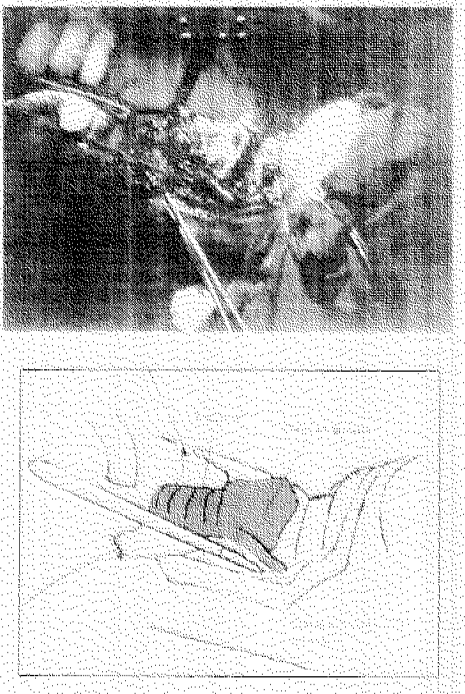


Figure 5. The inferior pharyngeal constrictor muscles are transected along the posterior border of thyroid lamina on the left.

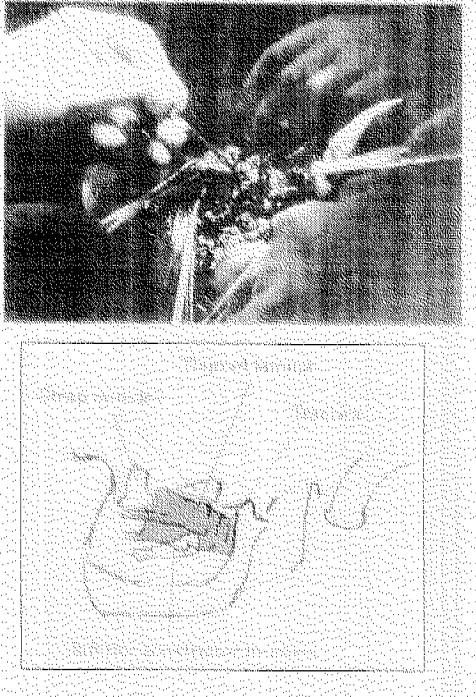


Figure 6. The inferior pharyngeal constrictor muscles are transected along the posterior border of thyroid lamina on the right.

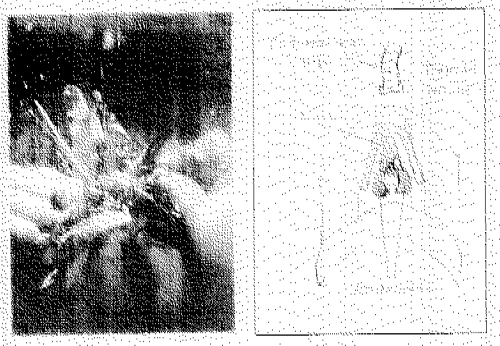


Figure 7. The thyroid membrane is entered through a transepiglottic laryngectomy along the superior border of the thyroid cartilage opposite the mass. A transverse medial cricothyroidotomy is done sparing both recurrent laryngeal nerves.

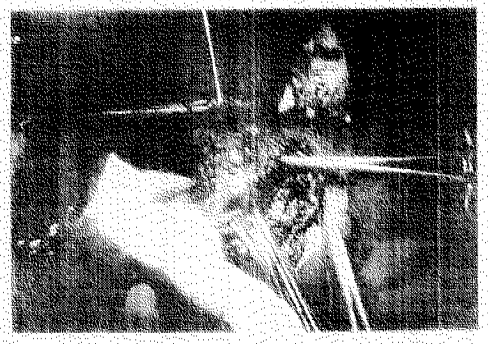


Figure 8. A vertical pre-arytenoid incision is carried down along the right posterior border of thyroid alae to connect with cricothyroidotomy keeping a 5 mm. margin from tumor.

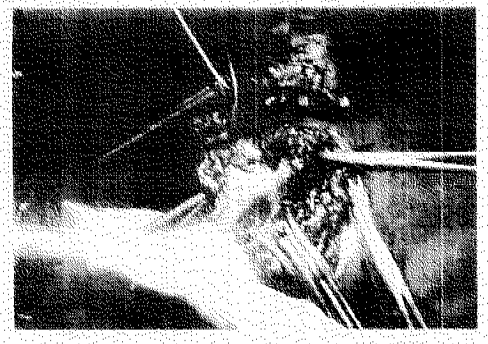


Figure 9. The tumor is examined closely as the prearytenoid and posterior thyroid incisions are made to keep a 5 mm. from the tumor.

Figure 9 (continuation)

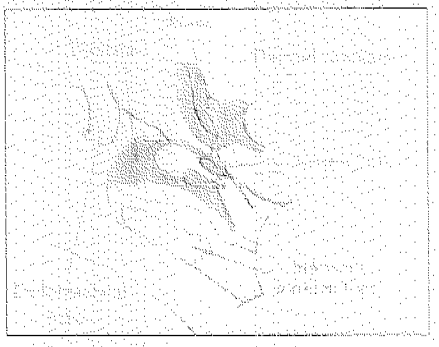
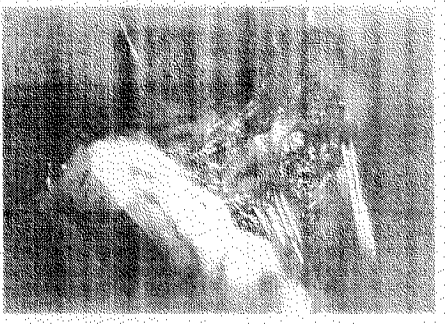


Figure 10. A vertical pre-arytenoid incision is carried down along the left posterior border of thyroid. Remaining attachments of the specimen are cut to remove specimen; thyroid cartilage, mass and bilateral true and false vocal cords.



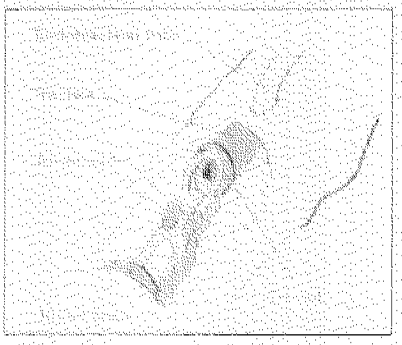


Figure 11. The defect after removal of the specimen showing both arytenoids, the cricoid and the base of the hyoid.

Closure

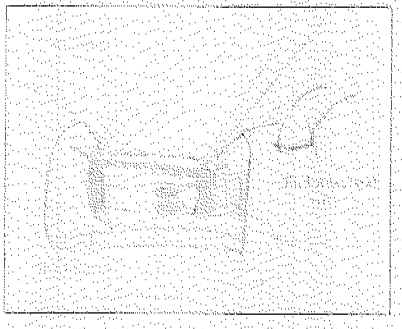
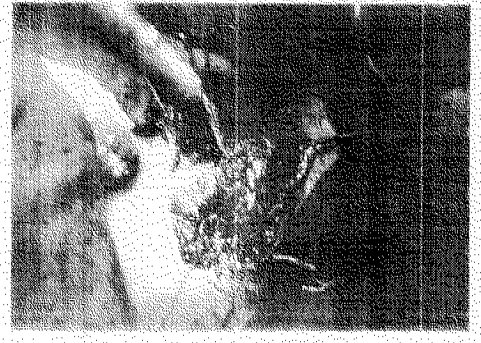


Figure 12. The anterior limb of arytenoids are sutured to the cricoid with Vicryl 2-0. Vicryl-0 is looped around the hyoid and the cricoid at 3 sites submucosally and slowly pulled tight to pull hyoid and cricoid together.



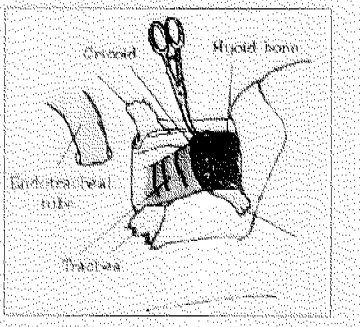


Figure 13. The Vicryl-0 are then tied together making sure there is no space between the hyoid and cricoid.

Figure 14. The Sternohyoid muscles are reapproximated with Vicryl2-0 sutures.

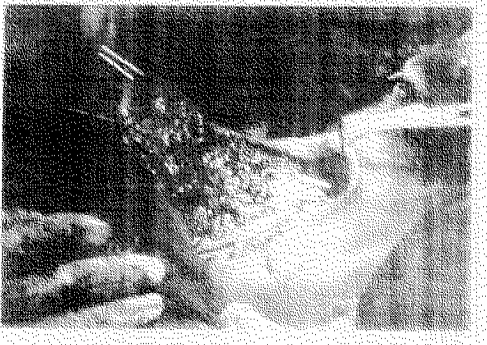


Figure 15. Suction drains are placed bilaterally through incisions below the clavicular level.

Figure 16 & 17. Skin closure is done in two layers: chromic 3-0 for the subcutaneous tissue and platysma, and silk 4-0 for the skin.

Post-operatively

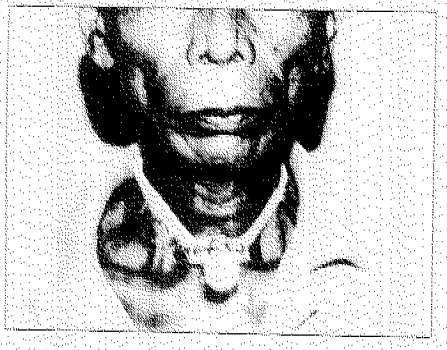


Figure 18 & 19. 20th day post-operation, the patient was decannulated.

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Foreign Bodies in the Food and Air Passages at the Dr. Jose R. Reyes Memorial Hospital*

JOSE D. CHAN, MD**

"Foreign bodies of the Food and Air Passages" is, perhaps, a very appropriate subject for the address I will give you tonight. Appropriate because, this lecture is dedicated to one who, until death at the peak of his career in 1945 at the close of the Second World War, blazed a one-lane trail in the practice of broncho-esophagology in the Philippines. It is even more appropriate because the Vivencio C. Alcantara Memorial Lecture should fall on the Silver Anniversary of the Philippine Opthalmological and Otolaryngological Society.

Dr. Vivencio C. Alcantara, the Father of Broncho-esophagology in the Philippines, was the first one whose work was zealously dedicated to this specialty. Broncho-esophagology started in the Philippines with the establishment of the Department of EENT in the Philippine General Hospital in 1911. It was exclusively limited to foreign body removal and the earliest cases were recorded in 1912 as foreign bodies in the esophagus.

There were very few doctors who engaged in broncho-esophagoscopic work and the field was only a minor part of otolaryngology. When in 1920, Dr. Alcantara graduated from the UP College of Medicine and served as resident in the Department of EENT, broncho-esophagology was hardly in its infancy. Because of his fascination and love for the work, he started a one-man task, devoting all his energies to it. In 1927, he was sent abroad as a fellow of the office of Speaker Manuel Roxas to Temple University and then to the Jackson clinic in Philadelphia to train in peroral endoscopy. He stayed in the United States for 9 months and toured other centers in Europe before returning to the Philippines in December 1928. He joined the staff of the EENT department of the PGH.

After his arrival, Dr. Alcantara was placed in charge of the broncho-esophagologic services in the PGH. He introduced the Jackson method of peroral endoscopy. He subsequently wrote articles and gave lectures to arouse interest in broncho-esophagology not only in foreign body removal but also in its diagnostic and therapeutic aspects.

Ten years after his return to the country, broncho-esophagology had progressed tremendously. It had extended beyond foreign body work. Case like esophageal stricture due to caustic and acid burns, esophageal and mediastinal tumors, spasms of the esophageal sphinctera, pulmonary tumors and abscess of laryngeal and tracheal stenosis especially due to diphtheria, were left undiagnosed and untreated, were appreciated and remedied.

It was at the outbreak of the Second World War that I had a cursory glance of the man in whose honor this lecture is dedicated. I was then an intern at the PGH and it was a pity to see a man who knew so much, whose enthusiasm was boundless and whose interest in broncho-esophagology was unlimited and yet was impotent to do much because he was a victim of paralysis due to cerebral hemorrhage. This ended even more tragically when he died during the liberation of the country.

The death of Dr. Alcantara was a great loss to his family, to the UP College of Medicine and the PGH, to the public, and above all, to the nation. Yet, God, in his infinite wisdom saw to it that the work which he started so magnificently should not be wasted. He was succeeded by men who were inspired by his teachings and his lecture.

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*Speech at Vivencio Alcantara Memorial Lecture.

**Associate Professor B Department of Otolaryngology, Far Eastern University-Nicanor Reyes Memorial Foundation

Dr. Jose N. Cruz, his devoted pupil, was one of those men. While Dr. Alcantara pioneered in broncho-esophagology, Dr. Cruz made it possible that this specialty should have a firm foot hold in our medical practice. This, Dr. Cruz was able to achieve by making the specialty popular because of its life-saving and diagnostic potentialities.

The flame that Dr. Alcantara started burning soon spread to other institutions. One of these was the Quezon Institute which now handles the greater bulk of broncho-esophagology work.

We at the Dr. Jose R. Reyes Memorial Hospital, formerly the North General Hospital, started broncho-eesophagology quite dramatically yet unexpectedly. In 1952, seven years after its emergency foundation, not one among us knew the rudiments of broncho-esophagology, much less had even the barest instruments along this line. But in one God's good times, he sent to us at the close of that year, a young girl, 2 years of age, by the name of Defunctorum with a straight pin in her right lung. Dr. Jose R. Reyes, the director of the hospital, in whose honor the NGH was fittingly, appropriately and deservedly named, accompanied this child to the U.S. He was severely criticized in some quarters for making the trip but having been a man endowed with keen foresight, he saw in it an opportunity and a chance to get the much needed instruments to start a broncho-esophagology section of the EENT department. He got these instruments and whatever contributions we have given the nation the past few years, we owed it to him And so with the arrival of these instruments in 1953, we lost no time in making the best out of them. Dr. Heraldo del Castillo, the present director of Quezon Institute, helped us in our pioneering work. Dr. Ariston Bautista, an amiable past president of the POOS worked with me too. Through the years we were able to pursue a gradual but progressive work and I can say with grateful appreciation that we were able to arouse the interest of some young doctors. In foreign body work, I can also say with humility that we have done much, especially for the poor.

It is interesting to note that like the PGH four decades ago, the greater bulk of our work has been on foreign bodies. There is, however, one big difference. Dr. Alcantara and his associates started with the coin catcher. Because this instrument was used blindly, the mortality rate was very high. On the other hand, we in JRRMH were blessed with these modern instruments when we started our work. Thus, our mortality rate has been relatively lower.

For tonight I have prepared some slides showing statistics about our foreign body work. Some of these foreign bodies are quite interesting and at times unusual. I shall also try to discuss some deaths we have had. But before doing so, I would like you to take note of what I think are essential in dealing with foreign bodies of the food and air passages.

INDICATIONS AND CONTRA INDICATIONS

It is the consensus of all bronchologists today that bronchoscopy should be done in all cases of foreign bodies on the lungs, present or suspected. This is fully justified by the fact that X-ray and physical examination may not show the intruder and bronchoscopy is the only sure way of diagnosing or treating the case.

There are no absolute contraindications to bronchoscopy of a foreign body present or suspected, but there are reasons for postponing it. Pneumonia. abscess or gangrene or even serious health are no contraindications to bronchoscopy. However, a child worned down by previous bronchoscopes or from digital efforts to remove foreign bodies or from shock or dehydration should be spared of an unwarranted and possibly risky bronchoscopy. In our practice, however, especially in public institutions like ours, these relative contradictions maybe quite a problem considering the attitude of most parents that delay in surgery is often interpreted as negligence. A child brought to us after several days in the province,dyspneic and dehydrated due to lack of sleep accompanied at times by politicians demanding immediate intervention maybe too much to some of us to be rational. I believe some of our deaths are due to our failure to insist on the best approach to a patient because of fear of

unnecessary adverse publicity brought about by the newspapers especially. What happens at times is that when a patient dies without bronchoscopy because of an attempt to build him up first, is oftentimes interpreted as negligence. Should the patient die when bronchoscopy is done at a period of time later, we are often accused of not giving immediate attention.

Likewise, esophagoscopy should be done on all foreign bodies known to be or suspected of being in the esophagus. Unlike bronchoscopy, the urgency of doing esophagoscopy is not compelling. One has time to combat dehydration first by fluids. We can saturate him with antibiotics if there is secondary infection from the foreign body that stayed too long in the organ. Disease of the cervical spine that may endanger cervical fractures during the procedure is a contraindication. Also, when there is perforation of the esophagus due to esophagoscopy or by the foreign body itself, the procedure is contraindicated.

DIAGNOSIS

History is very important. It is usually expected that the patient is apparently healthy before the accident takes place. The patient, therefore, suddenly gets ill, more so if the foreign body lodges in the respiratory airway. From the history too, the nature of the foreign body can be more or less determined until the procedures to be followed can be planned accordingly. It is advisable that a specimen similar to the one inspired or ingested be asked from parents so that proper instrument can be prepared.

Physical examination should never be neglected specially in foreign bodies of the respiratory tract. The site can be determined easily be it at the glottic opening, freely movable in the trachea or impacted in one of the 2 main bronchi.

X-RAY

X-ray of the lungs is imperative in all cases when foreign body is suspected to be present. It is likewise important to do X-ray whether the foreign body is radio-opaque or not. Similarly it is important that it be done prior to bronchoscopy no matter how many times previous x-rays were done before. Experience tells us that occasionally the foreign body appears to be different from what the parents suspect it to be. Foreign bodies may shift in position so that X-ray has to be done prior to bronchoscopy. With the X-ray picture, we may able to prepare what instrument should be used, what procedure should be followed and what problems are expected to arise.

ANESTHESIA

As a rule general anesthesia should not be done in removing foreign bodies in the respiratory airway. Barbiturates are given to counteract the side effects of local anesthesia. We have been using protocaine ½ to 1% for children and 2% for adults. It is used as spray.

In esophagoscopy the same procedure is done as in bronchoscopy. Removal of foreign bodies in the esophagus below the esopharyngeus may be done under general anesthesia especially if it will need undue manipulation or take a longer time to take the intruder out. In children, it is the only safe procedure because esophagoscopy under local anesthesia may produce pressure in the party wall and compress the trachea causing asphyxia.

PITFALLS

There are pitfalls in the mechanical problems of foreign body removal, both in the respiratory and food passages. Some of these are the following

1. Lack of appreciation of the problems relative to the nature of the foreign body like the presenting parts and the study of the foreign body itself with models.
2. Depth perception is important. The foreign body should be approached carefully and any attempt to remove it with the tube very far from the foreign body is dangerous.

3. Traction on the presenting part without a good hold is not a safe procedure.
4. Beware of the spurs between the segmental bronchi which may be caught in the blades of the Forcep. This may produce pneumothorax.
5. Do not override a foreign body when the scope is introduced.
6. Do not remove foreign body as soon as it is seen. Study the case properly and, if necessary, do version before grasping the foreign body in an ideal position.
7. The esophagoscope is not introduced; it is insinuated in the cricopharyngeus.
8. Never push the scope unless the full view of the lumen is seen.

I would like to close with a note of gratitude. I must confess that I am overwhelmed by your decision to have me speak before you tonight though I feel that others perhaps are better qualified to do this. Be that as it may, I want you all to know that I consider this rare opportunity to be with you, as a moment in my professional career that I will always cherish. Here is my fervent wish that the Philippine Opthalmological and Otolaryngological Society, will be prestigious as it used to be and that those who guided its course through the years will continue to serve it with unselfish devotion.

Goodnight and thank you...

TRANSIENT THRESHOLD SHIFT IN NOISE INDUCED HEARING LOSS: A DESCRIPTIVE STUDY*

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INTRODUCTION

Noise induced hearing loss is an omnipresent danger to the human auditory system in this modern era of electronics. Although the precise mechanism of noise induced hearing loss is not well defined yet, the phenomenon known as the transient threshold shift (TTS) has been postulated, and that, if progression is not stopped, the transient nature of the hearing loss will become permanent and the cochlear damage will then be irreversible. Thus, it is very important that one should try to understand or, at the very least, be aware of this phenomenon.

Questions concerning the anatomical, biochemical, and physiological basis of TTS are still unanswered. The factors responsible for transforming the nature of the hearing loss from transient to permanent, the factors responsible for attenuating or preventing the progression, and the critical level of sound intensity and duration that makes hearing loss irreversible all are still not well understood and all of these are fertile grounds for research.

At present, researches are being done in both animal and human beings to answer these questions; however, there is still a paucity of studies with human beings as subjects, the reason being obvious, it having to do with ethical reasons.

This paper will have human beings as its subjects and will try to describe the phenomenon of transient threshold shift.

OBJECTIVES

1. To determine the existence of threshold shift on exposure to loud sounds

2. To describe the nature of threshold shift on exposure to loud sounds by using pure tone audiometry

    2.1. to determine which frequency is most involved when threshold shift occurs,
    2.2. to observe the time of occurrence of the threshold shift on exposure to loud sounds.
    2.3. to observe the time the threshold shift reverts to the pre-exposure level,
    2.4. to determine if there is an observable pattern of responses on exposure to loud sounds,

3. To observe the difference, if there is any, between the right and left ear in their response to loud sounds

MATERIALS AND METHODS

1. This was a descriptive study. Thirty volunteer subjects had their pure tone audiogram taken after being free of exposure to loud sounds (more than 90

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dB) for at least 24 hours. This was their pre-exposure PTA. Excluded were those with moderate and severe hearing loss.

2. All volunteers were exposed to loud sounds at a range of 90 to 100 dB for a period of 120 minutes. This is to approximate the usual time spent by the average disco goer inside the disco.
3. Post-exposure PTA was taken within 30 minutes after exposure and then at 2 hr, 6 hr, 9 hr and 18 hrs post exposure to the loud sounds. The PTA were stopped whenever the PTA returns to the pre-exposure level.
4. Location for exposure to loud sounds: Zigzag disco house
5. Instrument for measurement of sound pressure level at the disco house: Rion sound level meter calibrated on the A scale.
6. The Pure Tone Audiometry was be taken at the PGH audiometry booth. Readings on air conduction audiogram were taken at 250, 500, 1000, 2000, 4000, 8000 Hz. Bone conduction readings were not done.

RESULTS

Thirty subjects were included in this study. All subjects were screened for history of noise exposure to levels of 90 dB or louder. If present, these subjects were excluded from the study to prevent residual hearing loss from affecting the results of the study. According to the 1974 OSHA regulations, in order for a test to be valid, a subject must not be exposed to sound greater than or equal to 80 dB for at least 14 hours.

Among the 30 subjects, 18 were females and 12 were males, making a female: male ratio of 1.5:1.0. Among the 18 female subjects, 16 were between 21 and 28 yrs old, with one each at 19 and 35 yrs of age. Among the 12 male subjects, 10 were between 22 and 26 yrs old, with one each at 19 and 29 yrs old. Out of the 30 subjects, 25 were hospital workers, the majority being physicians.

The number of subjects that demonstrated threshold shifts of greater than or equal to 10 dB distributed as to side of the ear affected per frequency for the duration of the study is as follows:

	250 Hz		500 Hz		1000 Hz	
	right	left	right	left	right	left
0 hr	2	1	3	0	1	1
2 hr	1	2	2	1	0	1
6 hr	2	0	0	1	0	0
9 hr	0	2	1	1	0	1
18 hr	0	0	0	2	0	0

	2000 Hz		4000 Hz		8000 Hz	
	right	left	right	left	right	left
0 hr	1	1	12	11	7	7
2 hr	1	1	9	8	3	5
6 hr	0	0	0	2	0	4
9 hr	0	1	1	1	1	2
18 hr	0	0	0	0	0	0

At 4000Hz, 24 out of 30 subjects demonstrated threshold shift of greater than or equal to 10dB. Of the 24 subjects 7 had bilateral involvement, whereas 8 had unilateral right and 9 had unilateral left involvement. Thus, for the right ear: 15 subjects demonstrated a threshold shift, 14 out of the 15 subjects shifted at 0 and 2 hrs post exposure. Out of these, 9 reverted to their pre-exposure level within 9 hrs. For the left ear, out of the 16 subjects that showed a threshold shift, 13 occurred at 0 and 2 hr, and out of the 13 subjects, 8 reverted to their pre-exposure level within 9 hrs. For both ears, those that did not revert back to their pre-exposure level at 9 hr post-exposure, the presence of persistent shifts could not be determined because no PTA were done on the 18th hr.

Of the 30 subjects 7 demonstrated threshold shifts of greater than or equal to 10 dB at 4000 Hz combined with 8000 Hz. Two had bilateral ears affected. For the right ear, 3 shifted, all occurred on the 0 hr., and 2 reverted to their pre-exposure level within 9 hrs. For the left ear, 4 shifted on 0 hr, 2 reverted to their pre-exposure level at 6 hr. For both ears, 2 had persistent shift of 5 dB at the 18th hr, and for the remaining 2 subjects that didn't revert back to normal on the 9th hour, it cannot be ascertained if there is still persistent shift on the 18th hour because PTA were not done on the 18th hour.

Of the patients 8 demonstrated threshold shift of greater than or equal to 10 dB for 4000 Hz taken together with either 2000 or 8000 Hz. Among the 8 subjects, 2 had both ears shifted. For the left ear, 6 demonstrated shifts, 4 occurred on the 0 hr, and 2 occurred on the 6th post-exposure. Among the 6 subjects, 4 reverted to their

pre-exposure level within 6 hrs, the other 2 had persistent shift and the 18th hr post-exposure. For the right ear, 4 ears shifted, and all occurred at 0 hr. Among the 4, 3 reverted back to normal within 18 hrs, the last one had persistent shift of 5 dB as of the 18th hr.

DISCUSSION

All the discussion on the results showed above will pertain to threshold shift in response to sound exposure of 90-100 dB for a 2 hour duration. The following observations are made on the results:

1. Threshold shifts of greater than or equal to 10 dB occurred with the highest frequency at 4000 Hz, followed by 8000 Hz. The frequencies 1000 and 2000 Hz were apparently not affected because of the number of subjects who showed threshold shift of greater than or equal to 10 dB is minimal.

The result conforms to the 4 kHz notch commonly observed by studies done abroad. The most common initial noise-induced audiogram would center around the 4000 Hz. This pattern typically appears regardless of the noise-exposure environment.

Several hypothesis had been postulated regarding the origin of the 4 kHz notch (Lim and Dunn, 1979). One experiment attributed it to the resonator function of the external auditory ear canal (Caiazzo and Tonndorf, 1977). Others postulated the presence of vascular insufficiency in the 4 kHz region of the cochlea (Crow et al 1934). Another would postulate that the speed of propagation of the travelling waves is still sufficiently high and the amplitude of displacement in the cochlear duct is building in that area (Shuknecht, 1960) while others attributed it to the indeterminable innate properties of the inner ear (Schuknecht, 1974) such as reduced vascular supply to this region of the basilar membrane. (Chadwick, 1971) At present, the exact origin is still not determined. Probably all of these factors play a part.

2. Both ears seems to be equally involved on all frequencies except on 8000 Hz where there are more left ear affected than the right ear. Usually, the profile of noise induced hearing loss is symmetrical (Lonsbury-Martin and Martin, 1986). Although there are innate differences between the cochleas of different people (Ward, 1979), at present no study has documented the difference in susceptibility, if there are any, to noise induced hearing loss between the right and the left ear in the same individual.
3. For the right ear, threshold shift of greater than or equal to 10 dB is of highest occurrence at 0 and 2 hr. post exposure. In the left ear, threshold shifts of greater than or equal to 10 dB is of highest occurrence at 0, 2, 6 hr for 4000 and 8000 Hz. For the other frequencies, no definite pattern is seen, this might be due to the low number of subjects affected, e.g. at 9 hr post exposure, only 5 ear out of 60 ears demonstrated shifts of greater than or equal 10 dB. Normally, threshold shifts secondary to auditory effect occurs immediately post-exposure. The reason as to why some of the subjects shifted only on the 2nd hr, 6th hr and even 9 hr post-exposure is unclear.
4. At 4000 Hz, a significant number of subjects (24 out of 30) shifted, this finding is important because the number of subjects affected is large, and the amount of threshold shift (greater than or equal to 10dB) is significant. The majority also reverted back to their pre-exposure level within 9 hours. Taken as a whole, this would demonstrate not only the existence of a threshold shift at 4000 Hz on exposure to sound level of 90 to 100 dB for 2 hours, but would also show the transient nature of the shift.

Traditionally, hearing loss secondary to chronic exposure to moderate intensities of sound termed as noise induced hearing loss (NIHL) has been divided into two stages (in terms of degree of cochlear damage): the first stage is the transient threshold shift (TTS), which involves a decrease in hearing acuity that lasts from minutes to as long as 18 hours. The second stage of cochlear damage occurs if the threshold shift becomes permanent and is

referred to as a permanent threshold shift (PTS).

Studies, have shown that the threshold shift rises precipitously for intensities above 90 – 100 dB and may indicate a division between fatigue which is transient and physiological and that which is more permanent and pathological.

At present, although the precise nature or mechanism of progression from transient to permanent threshold shift remains unsettled, several theories have been proposed explaining how the transition may happen. One of this is the concept of "equal-temporary effects". This postulates that the magnitude of the initial reversible threshold shifts produced by a given exposure sets the upper limit for growth of PTS. However, the observation that permanent threshold shift eventually develops from such repeated exposures suggests that the early so-called transient threshold shifts episodes may be accompanied by microscopic permanent alterations to hair cells that go undetected by current behavioral indices.

5. Since 4000 and 8000 Hz has the highest number of subjects with threshold shift of greater than or equal to 10 dB, it might be interesting to note how many shifted together on both frequencies taken together. Surprisingly, only 7 out of 30 subjects were affected. However, except the 2 subjects that did not have records for the 18th hr PTA, the majority reverted back to their pre-exposure PTA level on the 9th hr, demonstrating again the transient nature of the threshold shift.
6. Taking 4000 Hz together with either 2000 or 8000 Hz, only 8 out of 30 subjects demonstrated shifts of greater than or equal to 10 dB. However, if the number of subjects that demonstrated shift of greater than 10 dB at 4000 Hz taken together with shifts of greater than or equal to 5 dB at 2000 or 8000 Hz are counted, the number of affected subjects would be 24 out of 30, a majority.

5 dB has been determined to be limit for inter-test variation. However, to be on the safe side, 10 dB was arbitrarily set as the limit for a significant shift. Out of the 8 subjects that had shifts of greater than or equal to 10 dB, the majority reverted back to their pre-exposure level within 18 hrs post-exposure. This again demonstrated the transient nature of the threshold shift.

Transient threshold shift is considered to be the most common index of auditory fatigue and determination of post-stimulatory auditory fatigue after noise exposure can be studied by measuring the amount of threshold shifts and the recovery times.

In human beings, examination of the temporal bone by a number of researchers has resulted in the documentation of progressive damage to the cochlea as exposure to noise continues over the years. (Bredberg, 1968; Igarashi et al, 1964, Johnson and Hawkins, 1976; McGill and Schuknecht, 1976).

However, studies to establish a structure-function relationship between anatomic damage and hearing loss yielded conflicting experimental findings. Some studies found normal hearing despite extensive hair cell losses (Ades et al. 1974;Ward and Duvall, 1971) whereas other studies found severe losses of auditory sensitivity in the absence of any measurable effect on the cochlea. (Moody et al, 1978)

At present, the focal point of research interest remains on the fundamental mechanism by which the sensory cell degenerates or is damaged after exposure. A number of mechanisms have been proposed, including mechanical injury cause by severe motion of the basilar membrane, metabolic exhaustion of activated cells, vascular narrowing that causes ischemia and ionic poisoning from interruption of the chemical gradients of the inner ear.

The most convincing morphologic evidence to date supports a combination of the mechanochemical theories. Thus, a direct mechanical disruption probably results in a toxic mixing of endolymph and perilymph through microbreaks in the structural framework of the cochlear duct which leads to secondary effects including

loss of hair cells and corresponding nerve fibers. (Bohne, 1976)

The current allowable maximum time-weighted daily exposure to sounds are as follows:

90dB for 8 hours
95dB for 4 hours
100dB for 2 hours
105dB for 1 hour

No exposure to continuous sound above 115 dB is allowed.

The basis for the above regulation is partly due to the "equal energy" or the "total energy" hypothesis. This postulates that cumulative damage to the auditory system is a function of the total acoustic energy that has reached the cochlea during the lifetime of an individual (Ward and Nelson, 1971). In other words, it assumes that permanent damage to hearing is related to total sound energy, which is a product of the noise level in dBA and the duration of exposure.

Although a known certain preventive method exist for noise induced hearing loss, and that is to reduce the present level of noise, it is unlikely that it will be reduced.

Other preventive methods have been proposed. One worker suggests the inhalation of hyperoxygenated air as prophylaxis for noise induced hearing loss (Joglekar et al, 1977). Another proposed the administration of dextran to speed the process of recovery from exposure to noise (Kellerhals, 1977).

At present, no proven treatment or cure exists. Consequently, detecting the early stages of NIHL is of utmost importance to prevent permanent injury to the organ of Corti.

The possible sources of error for this study are:

1. design of the study, such as the duration and level of sound exposure were not high enough for ethical reasons; the environment post-exposure was not really controlled
2. technical errors: the absence of a sound proof room, calibration errors, headphone position variations, headset pressure against the external ears
3. subject variability in terms of the concentration of the subject since part of the test were done after midnight

SUMMARY

30 volunteer subjects were exposed to noise for 2 hours at 90-100dB. Pre-exposure audiometry as well as serial post-exposure air conduction audiometry were taken. A majority of the subjects demonstrated the phenomenon of transient threshold shift at 4000 Hz. The shift usually occurred early, at the 0 and 2 hr post-exposure. Among those who shifted, the majority reverted to their pre-exposure level within 9 hours. No significant difference was observed between the right and left ear in their response to noise exposure. The most important observation from this study is that, most likely no permanent damage will ensue if one is exposed to sound level of 90 to 100 dB for 2 hours.

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THE TIP OF THE ICEBERG: NOT ALL THAT PALSIES IS BELL'S: A CASE SERIES OF FIVE NERVE NEURILEMMOMAS IN THE PHILIPPINES*

JOSE FLORENCIO LAPEÑA JR., MD**
CHARLOTTE M. CHIONG, MD***

ABSTRACT

Facial nerve neuromas are rare and account for less than 1% of all intrapetrous tumors. This descriptive series reviews five cases of histologically proven facial nerve schwannomas, with emphasis on clinical presentation, diagnostic evaluation, correlation with intraoperative findings and choice of surgical approaches and subsequent outcome. As the most common presenting symptoms aside from facial paralysis (5 patients) were hearing loss (4 patients) and an external auditory canal mass (3 patients), audiologic and otoscopic evaluation may be helpful in all cases of facial palsy. Facial nerve weakness was House-Brackmann Grades III-IV in this series with a duration of 3 months to 20 years. In four cases there were varying degrees of conductive hearing loss, mixed with sensorineural hearing loss in one. Thin section high resolution temporal bone CT scans were not very accurate in determining tumor extent and location, while Gadolinium-enhanced MRI, although correlating excellently with intraoperative tumor extent, was not very helpful in determining bone involvement. Surgery utilizing a transmastoid facial recess approach (2 cases), translabyrinthine transmastoid approach (2 cases) and a parotid unified approach (1 case) achieved complete tumor excision, but different reanimation procedures had varying degrees of success. Optimal results were achieved with a VII-XII anastomosis in one case and with preservation of an attenuated nerve in another. Sir Terrence Cawthorne's admonition that "all that palsies is not Bell's" is evident in these cases, all presenting with facial palsy and all initially managed with vitamins and/or physical therapy. Subsequent management by other specialists failed to uncover the diagnosis and, in at least one case, even the otolaryngologists failed to diagnose the facial nerve neurillemmoma. As "keepers of the facial nerve," a high index of suspicion and familiarity with the disease entity are in order. This series suggests that all patients with facial dysfunction be evaluated for hearing loss, and that where this is documented, MRI with Gadolinium or at least high resolution CT with 1.5 mm temporal bone cuts be requested. Early intervention can avoid the consequences which, as seen in this series, can be disastrous.

Keywords: Facial palsy, neurilemmomas, diagnostic procedures, surgical approaches

INTRODUCTION

Unlike acoustic neuromas, facial nerve neuromas are cited as being rare[1-3] or at least uncommon, [4] accounting for less than 1% of all intrapetrous tumors (in Parnes et al.[5]). First described by Schimidt in 1930, [6] these tumors arise from the schwann cell sheath of the facial nerve and may be found anywhere along its course. [5] Presenting signs and symptoms are related to the site of facial nerve involvement and tumor size. [5] Retrocochlear findings are suggestive of cerebellopontine angle and internal auditory and canal involvement while a parotid mass may be the manifestation of more distal involvement. Various types of facial nerve dysfunction, including acute facial paralysis and facial pain may be manifest regardless of site.[7]

The most common presenting symptom is facial weakness, either acute or

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progressive,[2-4, 8-11] followed by hearing loss[11-13] and otalgia.[12] Most patients are treated for months or years until properly diagnosed[2], with few surgeons acquiring significant experience in managing these lesions.[13] The Philippines is no exception insofar as misdiagnosis and mismanagement are concerned, as seen in this preliminary series. As the first local series reported, this study serves as a valuable source of information on initial symptoms and presenting signs. Its retrospective nature allows surgical comparison with preoperative investigations localizing tumor site and size as well as a commentary on various diagnostics and therapeutics.

This paper reviews five cases of facial nerve neurilemmomas in the Philippines, four at the Department of Otorhinolaryngology of a tertiary government hospital and one at another tertiary government hospital, from 1991 to 1996. The clinical features of each case are discussed, juxtaposing presenting symptoms and signs with site of facial nerve involvement and tumor size based on the diagnostic investigations, surgical approaches and findings.

MATERIALS AND METHODS

Five cases of histologically diagnosed facial nerve neurilemmomas seen between 1991 to 1996 were included in the study. Four were operated on by the senior author, another has been published.[14] Chart reviews were made and a comparative tabulation constructed for each case focusing on chief complaint, history of present illness, initial physical findings and assessment. Actual physicians involved were consulted for each case. Clarifications were also sought from the patients, when needed. All diagnostic investigations and results were reviewed and compared with physical examination findings. Finally, surgical approaches and results were analyzed, and preoperative and postoperative comparisons were made including post-operative follow-up. The data was then compared with a literature review and findings were reported.

CASES

Case 1

A 37 year old female consulting for right facial palsy had a four-year history of a slowly growing right infra-auricular mass and facial numbness and a one-year history of gradually progressive inability to close the right eye and facial deviation to the left (Figure 1.1). CT scan done at another institution was interpreted as normal, and the patient was advised rehabilitation therapy. Five months PTC a foul, yellowish right ear discharge and decreased hearing developed, prompting consult.

Figure 1.1

The patient presented with complete Grade VI facial palsy on the right and a whitish fleshly right external auditory canal mass with foul, yellow ear discharge (Figure 1.2). A5 x 4 cm. non-tender right infra-auricular mass was noted (Figure 1.3).

Figure 1.2

Figure 1.3

Weber lateralized to the right, where there was a negative Rinne. Pure tone and speech audiometry revealed moderate to severe conductive hearing loss on the right. Topognostic testing suggested an infrachordal lesion. A mastoid series showed no localizing sign. Repeat CT showed a soft tissue mass with bony destruction in the right mastoid consistent with mastoiditis with cholesteatoma formation (Figure 1.4). Punch biopsy of the auditory canal mass severe showed acute and chronic inflammation with severe necrosis, while fine-needle biopsy of the infraauricular mass was read as benign mixed tumor.

Figure 1.4

Initial assessment was parotid malignancy with facial nerve paralysis and right aural polyp versus chronic tympanomastoiditis with facial nerve paralysis and aural polyp. A parotidectomy and mastoidectomy were performed via unified incision, revealing a deep lobe parotid mass extending into the right stylomastoid foramen with erosion of the cartilaginous and bony external auditory canals. The mass was dumbbell in shape and continuous with the aural "polyp" (Figure 1.5). The mass was excised and signed out as neurilemmomas. Four months later, a facial sling was constructed, with good static cosmetic results. There was no evidence of recurrence on follow-up at one year.

Figure 1.5

Case 2

A 68 year old female was referred by neurology. Ten years PTC, while brushing the teeth, the patient was suddenly unable to move half of the right face and since then had intermittent ipsilateral otalgia and cranio-facial pain. Unrelieved by various medications, the patient eventually consulted at this institution. Assessed to have Bell's palsy, the patient was referred for a facial sling. Review of systems showed fluctuating hearing loss on the right for the past year but no vertigo or tinnitus.

Initial examination showed Grade V palsy on the right (Figure 2.1) and a fleshy polyp-like right external auditory canal mass with the tympanic membrane appearing intact medially (Figure2.2). Weber lateralized to the right, where there was a negative Rinne. Pure tone and speech audiometry showed a moderate to severe conductive hearing loss on the right. Topographic mapping suggested an infrageniculate lesion with only slightly increased lacrimation on the right. A CT scan showed an enhancing soft tissue mass in the right external auditory canal and middle ear (Figure 2.3). Electromyography with nerve conduction velocity tests showed incomplete right facial neuropathy with acute and chronic changes. Punch biopsy of the canal mass was read as neurilemmoma.

Assessment was right facial nerve palsy, Grade V, secondary to a right external auditory canal mass, neurilemmoma by biopsy, rule out intratemporal facial nerve neurilemmoma. An extensive tumor filling

up the mastoid cavity, extending from the geniculate ganglion to the stylomastoid foramen into the middle ear and external auditory canal was excised via a transmastoid facial recess approach (Figure 2.4), with frozen sections read as neurilemmoma. A greater auricular nerve graft was interposed between the stumps. No improvement in facial function has taken place after two years, and the patient has since admitted that the duration of palsy prior to consult was 20, not 10 years. A temporalis sling has been proposed, but refused.

Figure 2.1

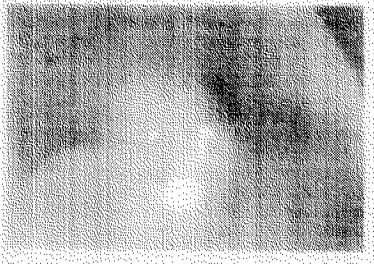

Figure 2.2

Figure 2.3

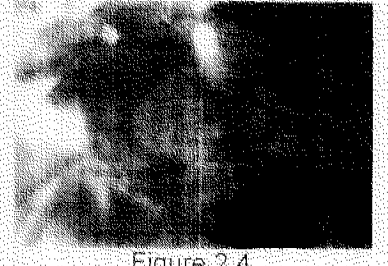

Figure 2.4

Case 3.

A 26 year old male consulted for progressive facial palsy of a year's duration, beginning with the lip, later involving the eye and, finally, the forehead on the left, and unrelieved by physical therapy. There was also progressive hearing loss of 7 months duration but no vertigo, tinnitus or otorrhea.

Initial office examination showed a grade VI palsy on the left, with severe mixed hearing loss on audiometry. Electromyography with nerve conduction velocity and blink reflex testing of the facial nerve showed left trigeminal and facial nerve afferent and efferent axonal and demyelinative dysfunction probably secondary to compression. A CT study showed an isodense lucency in an enlarged left medial internal auditory canal with erosion and an expanded horizontal facial canal with an isodense lucency in the medial tympanic cavity wall and possible cochlear and ossicular involvement (Figure 3.1). MRI with Gadolinium only showed a small avascular left epitympanic nodule with focal bone destruction (Figure 3.2).

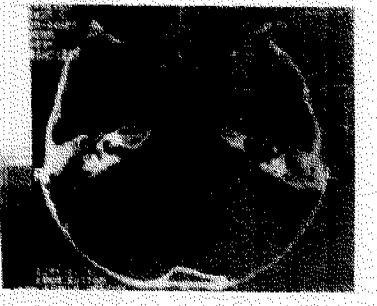

Figure 3.1

Figure 3.2

Assessment was left intratemporal facial nerve neuroma, and a transmastoid-translabyrinthine intact canal excision was

performed. A fibrous soft tissue mass was excised at the second genu with frozen sections read as neurilemmoma. A cholesteatoma-like mass excised from the geniculate ganglion, extending to the internal auditory canal with erosion of the middle cranial fossa floor in the epitympanic region. Frozen section was read as epidermoid cyst. Figure 3.3 shows both masses. Final H & E sections were signed out as neurilemmoma and epidermoid cyst, respectively. Despite preservation of the edematous facial nerve, the patient had not recovered any facial function two months post-operatively, but has since achieved Grade V function after one year.

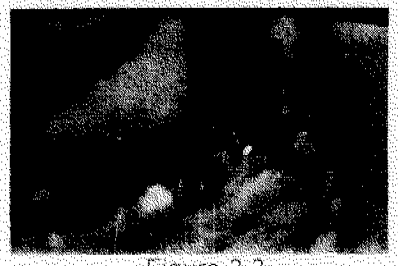

Figure 3.3

Case 4

A 43 year old female consulted for right facial palsy. Eight months earlier, a sense of obstruction or fullness in the right ear with intermittent facial twitching on the right was experienced. There was associated tinnitus and decreased hearing also. Six months PTC, the patient began having difficulty closing the right eye, and later had progressive facial asymmetry. Unrelieved by vitamins prescribed at another hospital four months before consult, the patient eventually came to this institution.

The patient had a Grade III facial palsy on the right with moderate conductive hearing loss on pure tone audiometry. Otoscopy showed a retrotympanic mass (Figure 4.1). Auditory brainstem response had a delayed wave I on the right with normal interpeak latencies. A CT scan showed an epitympanic soft tissue density with evident ossicular displacement but was only read as chronic mastoiditis with cholesteatoma formation and otitis media (Figure 4.2). MRI showed an enhancing geniculate mass lesion (Figure 4.3).

Figure 4.1

Figure 4.2

Figure 4.3

Assessment was intratemporal facial nerve neuroma with grade III facial paralysis and conductive hearing loss, AD probably secondary to ossicular chain dysfunction. A transmastoid facial recess approach was used to dissect a tumor wrapped around the horizontal and descending portions of the facial nerve, and the facial nerve and posterior canal wall were preserved. Frozen sections were read as neurilemmoma and confirmed by final histopath. Although the patient had grade III function post-operatively, delayed-onset worsening of function developed a month later.

Case 5

A 30 year old male was seen at another hospital for right facial palsy. Twenty months before this, the patient had difficulty closing the right eye with facial asymmetry when smiling, progressing to full palsy in a year despite vitamin B therapy. Eight months PTC, a progressively enlarging right external auditory canal mass with worsening autophony was noted, eventually prompting consult. The patient denied any tinnitus or hearing loss.

Physical examination revealed a Grade VI facial palsy on the right with a right external auditory canal mass occupying about 80% of the canal and an intact tympanic membrane visualized medially. Audiometry showed a mild to moderate conductive hearing loss on the right. Topographic mapping localized the lesion below the geniculate ganglion. A Towne's radiograph showed haziness in the right mastoid antrum. CT scan showed a homogenous non-enhancing mass lesion in the right mastoid antrum extending to the external auditory canal and posterior fossa with osseus destruction of the mastoid tip (Figure 5.1). An aural punch biopsy was read as neurilemmoma.

Figure 5.1

A facial nerve mass from the geniculate ganglion to the stylomastoid foramen eroding the sigmoid plate and posterior canal wall, continuous with the external auditory canal mass was excised via a transmastoid-translabyrinthine approach with blind sac closure of the EAC. Eight months post-operatively, a facial-hypoglossal nerve crossover reanimation was made (Figure 5.2), which improved facial nerve function from grade VI to V after two months, and grade III after 10 months. After two years, the patient is undergoing rehabilitation with no evidence of recurrence on CT scan (Figure 5.3).

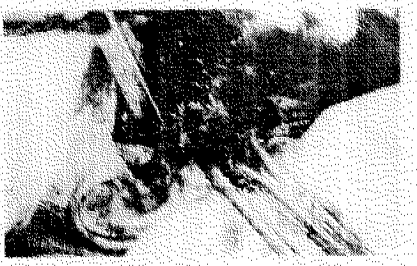

Figure 5.2

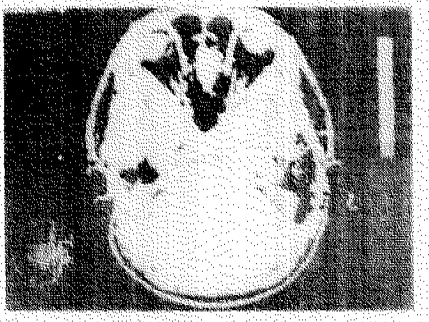

Figure 5.3

RESULTS AND DISCUSSION

Age and Sex

Three females and two males with ages ranging between 26 and 68 were initially seen for facial palsy. Four cases involved progressive facial weakness over a period of 6 to 20 months (average of 12.5 months), while one patient (Case 2) experienced sudden facial hemiparesis 20 years PTC (please refer to Table 1). The age at onset of initial palsy ranged from 25 to 48 years (average of 35.8 years). These findings are consistent with the classic literature on the subject. Miehlke's extensive review[15] updating Altmann's original 1935 descriptions, mentions that "two thirds of the patients are women" and that "the condition is met mainly between the 2nd and 4th decade of life."

Symptoms

Several series have identified facial nerve dysfunction as the most common presenting complaint.[4,8,11,12,16] Although some patients may present with acute-onset facial paralysis simulating Bell's palsy (as in Case 2), most patients experience a gradually increasing paresis over a period of

weeks to months (please refer to Table 1 below).

Table 1. Signs and Symptoms

SIGN AND SYMPTOMS	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CROSS-CASE TRENDS
1. Facial Dysfunction	+	+	+	+	+	+ 5/5
Age at onset	35	48	25	42	29	M = 35.8
Months of Progression	12	acute	12	8	20	M = 12.5
House Brackmann Grade	VI	V	VI	III	VI	R = III to VI
2. Hearing Loss	+	+	+	+	-	+ 4/5
Months of Progression	5	440	?	8	NA	R = 5 to 440
Pure Tone Correlation	+ moderate to severe CHL	+ severe CHL	+ severe MHL	+ moderate CHL	+ mild to moderate CHL	R_{PTA} = mild to severe
3. Others						
Otalgia	-	+	-	-	+	+ 1/5
Otorrhea	+	-	-	-	-	+ 1/5
Ear Fullness	-	-	-	+	-	+ 1/5
Autophony	-	-	-	-	+	+ 1/5
Tinnitus	-	-	-	+	-	+ 1/5
Otoscopic Mass						
EAC	-	+	-	-	+	+ 3/5
Retrotympanic	-	-	-	+	-	+ 1/5
Parotid Mass	+	-	-	-	-	+ 1/5

[1] biopsy: acute and chronic inflammation with severe necrosis
[2] biopsy: neurilemmoma
[3] biopsy: benign mixed tumor

Normal facial nerve Atrophic facial nerve (Bell's palsy)

Figure 6

The average time-frame of 12.5 months of progression in this series confirms the observation that any paralysis that lasts more than six months is not Bell's palsy, as the latter spontaneously remits within 4 to 6 and always by 12 months.[17] In this regard, even the solitary case of acute-onset facial paralysis with associated pain characteristic of Bell's palsy[18] should not have been mistreated as Bell's palsy for 20 years! Unlike idiopathic Bell's palsy with cellular atrophy and degeneration (Figure 6), dysfunction in facial nerve neurilemmomas results from direct compression.[19] As was the case with one of the patients (Case 4, in whom facial twitching occurred for 2 months prior to initial difficulty in closing the ipsilateral eye), facial paresis may be preceded by fasciculations or hemifacial spasm, which are not seen in Bell's palsy.[19] Waxing and waning, fluctuating paresis should be considered the result of a nerve tumor until proved otherwise[2-4,6,8-10] (see also Altmann, 1935 in Meiehlke[15]).

The second most frequent complaint is hearing loss,[11,12] as was seen in four of the cases (Please refer to Table 1). The remaining patient who did not complain of hearing loss (Case 5) had mild to moderate conductive hearing loss on audiometry. Since most intratemporal facial nerve neurilemmomas extend into the tympanum,[20] conductive hearing loss easily results from ossicular chain disruption,[13] and may be the patient's only presenting complaint. Four patients in this series had conductive hearing loss on audiometry consistent with tuning fork tests in two, in whom these were recorded (Cases 1 and 2). One of the patients (Case 4) had decreased hearing with tinnitus and ear fullness for 2 months prior to onset of gradual facial palsy, although ipsilateral facial twitching (see above) was present during this time. Depending on tumor involvement, cochlear or retrocochlear sensorineural hearing loss may also occur, as when the otic capsule or porus acousticus are involved, respectively.[12] Interestingly, while four patients with varying degrees of conductive hearing loss had middle ear lesions (three having external auditory canal masses as well), the only patient (Case 3) with mixed hearing loss (but no vertigo) had no cochlear and internal auditory canal involvement on CT scan.

Otalgia is a less common presenting complaint,[8] frequently due to such secondary complications as otitis externa or media, vestibular involvement or intracranial extension (Schroder in Mehlke[15]). In this series, only the patient (Case 2) who had acute-onset facial palsy and an external auditory canal mass had intermittent otalgia and cranio-facial pain, although two others (Case 1 and 5) also had external canal masses (one of these two having foul yellowish ear discharge as well).

three others (Case 3,4,5) had mastoid involvement, and four others had varying degrees of middle ear involvement. The pain experienced by this patient are consistent with the initial diagnosis of Bell's palsy, but are also seen in cases of herpetic neuropathy or tumor.[7,21,22]

Physical Findings

All the patients in this series had lower motor neuron facial palsy, three having House-Brackmann[23] Grade VI involvement and one each (Case 2 and 4, respectively) having Grade V and III palsy. There may be some be correlation between degree and duration of palsy as all three cases of complete paralysis had progression of symptoms of more than a year, while the case (4) with Grade III palsy had facial palsy of only 6 months. On the other hand, the case (2) with over 20 years palsy had only Grade V involvement. Site and extent of involvement may also correlate with degree of palsy, as the case (4) with the least palsy (Grade III) had minimal tumor involvement of horizontal and vertical intratemporal facial nerve segments allowing nerve and posterior canal wall preservation. However, the case (2) with Grade V palsy again diverges from the trend, as the tumor filled up the mastoid cavity from the geniculate ganglion to the stylomastoid foramen and extended to the external auditory meatus. Similar cases have been reported in the literature, attributed to the facial nerve being able to accommodate tumor expansion before significant pressure and dysfunction occur.[6,11]

Neurilemmomas arise from the Schwann cell sheath of the facial nerve,[24] and may be found anywhere along its course, mostly from the "middle to distal intratemporal segment, although a predilection for the geniculate ganglion has been suggested.[15,25] A few cases of external auditory canal neurilemmomas arise from facial nerve branches such as the chorda tympani segment but cause no facial paralysis.[26] Tumors causing paralysis which appear in the external auditory meatus invariably arise from the vertical portion of the facial nerve.[15, 18] Such cases are extremely rare and often diagnosed as polyps,[12, 17] with most patients being treated for months until the proper diagnosis is made.[2] Histopathologic examination reveals Verocay spindle cells with ovoid nuclei and fibrillar eosinophlic cytoplasm (Figure 7) arranged in parallel rows of cells with intervening cellular fibers in pallisading (Antoni A) or fasciculated (Antoni B) patterns.[28]

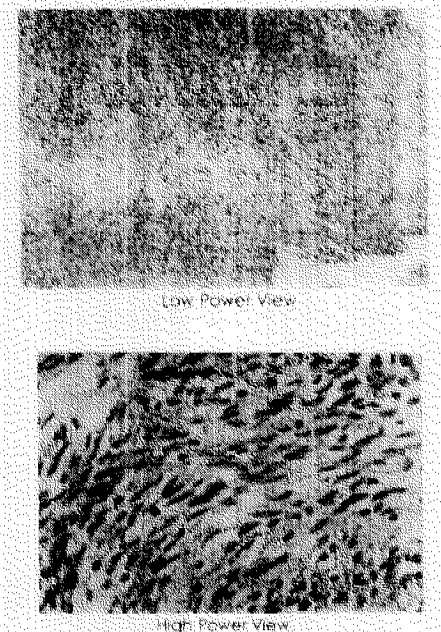

Figure 7

Three of the patients (Cases 1,2,5) had fleshy external auditory canal masses on consult, with two (Cases 2 and 5) having seemingly intact tympanic membranes visualized medially, the other (Case 1) having foul yellow ear discharge. Although all three had a punch biopsy, only two were signed out as neurilemmoma. The biopsy of the polyp from the discharging ear yielded inflammation and necrosis, further supporting the initial alternative impression of chronic tympanomastoiditis with facial nerve paralysis and aural polyp. As this patient also had a nontender infraauricular mass with a fine-needle biopsy reading of benign mixed tumor, the initial assessment was a parotid malignancy with facial nerve paralysis. These two red herrings may have been disclosed had either the punch or fine-needle biopsy detected neurilemmoma. In contrast to the rarity of external auditory meatus presentations, parotid involvement is "a relatively common situation in which a neurilemmoma extends along the path of least resistence...externally through the

stylomastoid foramen into the parotid gland."[12]

Diagnostic evaluation

Routine diagnostic evaluation of facial palsy includes topognostic tests, electrical tests and radiographic studies.[17] Topographic mapping, a mainstay in localizing facial nerve lesions is unreliable for preoperative evaluation of neurilemmomas.[3] Although one patient (Case 1) had infrachordal localization consistent with intraoperative distal vertical nerve involvement extending to the external auditory canal and parotid, two other patients with infrageniculate localization (Cases 2 and 5) had actual tumor involvement of the geniculate ganglion (cf. Table 2 below). Indeed, "despite normal tearing and normal stapedius reflexes, both the geniculate ganglion and distal facial nerve may be involved with tumor."[24] This may be due to sparing of the peripherally located sensory component fibers (Figure 8).

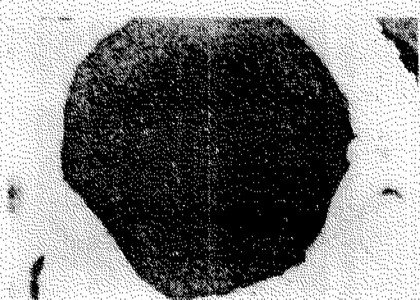

Figure 8

Table 2. Diagnostics

Diagnostics	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
Topognostics			√	√	
Suprageniculate					
Infrageniculate					
Infrachordal					
CT Scan	1st scan normal, 2nd scan ST mass with bone destruction on R mastoid consistent with mastoiditis with cholesteatoma	enhancing ST mass, R EAC and middle ear	isodense lucency in enlarged IAC with erosion and expanded horizontal facial canal with isodense lucency, medial tympanic cavity wall with possible cochlear and ossicular involvement	epitympanic ST density with ossicular displacement read as chronic mastoiditis with cholesteatoma formation and otitis media	homogenous non-enhancing mass @ mastoid antrum with EAC and posterior fossa extension osseous destruction of mastoid tip
MRI with gadolinium			small avascular (L) epitympanic nodule with focal bone destruction	enhancing geniculate mass lesion on T1 weighted image	

Although "high resolution CT is useful for outlining the temporal bone anatomy",[5] tumor may extend beyond the area of obvious nerve swelling seen on CT.[3] In this series two CT studies (Cases 1 and 4) were interpreted as mastoiditis with cholesteatoma formation but only one of these (Case 1) showed actual bony destruction. Interestingly, this patient had a previous normal CT study of the head a year earlier despite parotid involvement! Two others patients (Cases 2 and 5) had extensive tumors filling the mastoid cavity from the geniculate ganglion to the stylomastoid foramen and extending to the external auditory canal which were not detected on CT. One of these (Case 2) had an enhancing soft tissue mass in the middle ear and external canal only; the other (Case 5) had a non-enhancing mass lesion in the mastoid antrum extending to the posterior fossa and external canal with osseus destruction of the mastoid tip. Although on CT study (Case 3) picked up an isodense lucency in the epitympanic horizontal facial canal with possible cochlear and middle ear involvement, it also noted a medial internal auditory canal isodense lucency with canal enlargement and erosion. MRI collaborated the former, but not the latter lesion.

Mastoid radiographs are mentioned as a matter of academic interest, but are even less reliable than CT scans in the diagnosis of facial nerve tumors. Of the two cases in the series (Cases 1 and 5) on whom such x-rays were requested, one showed no localizing signs while the other had a hazy mastoid antrum despite both having extensive mastoid tumor involvement. Likewise, electromyography and nerve conduction velocity tests, while giving an idea of nerve functional status, can not compare with intraoperative localization. Moreover, even intraoperatively observed neural distension does not correlate with tumor extent since "tumor infiltration into normal looking adjacent nerve segments makes radiologic and topodiagnostic test unreliable".[10] Thus, frozen section margins have been recommended.[3] However, even these have been proven inadequate by immunohistochemical stains.[25]

Recently, Gadolinium enhancement of the geniculate ganglion and distal facial nerve on MRI have been proposed as the most useful means of preoperative assessment of facial nerve neuromas.[5] The defined extent on MRI, when used as an adjunct to intraoperative high magnification,

may be the "most reliable means to achieve complete tumor extirpation".[25] Indeed, the two patients in the series (Cases 3 and 4) on whom an MRI was done had excellent intraoperative correlation with MRI findings insofar as facial nerve neuroma was concerned. However, Case 3 also had an extensive cholesteatoma-like geniculate mass whose capsule extended into and eroded the internal auditory canal which was picked up on CT scan but missed by MRI. Perhaps the sensitivity of Gadolinium for neurilemmomas should be balanced by the CT scan bone window capabilities.[11] Interestingly, congenital cholesteatomas of the petrous bone are uncommon lesions that usually present with hearing loss and facial dysfunction, and can, therefore, be mistaken for facial neuromas.[29] That this patient (Case 3) had both a facial neuroma and what may well be a congenital cholesteatoma is a matter for further discussion elsewhere.

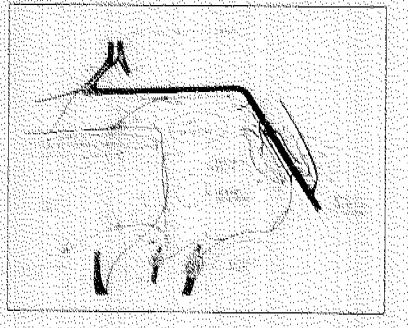

Figure 9

Surgical therapy and follow-up

Surgical treatment of facial nerve neuromas aims at complete tumor removal and possible restoration of facial nerve function.[30] Four cases (please refer to Table 3 and Figure 9) had tumors between the geniculate ganglion and the stylomastoid foramen. Of these, two (Cases 2 and 5) filled up the mastoid cavity extensively with protrusion through the external auditory canal; one (Case 4) involved the tympanic and vertical segments minimally and one (Case 3), though confined to the second genu tympanic segment, also had a cholesteatoma-like mass around the geniculate ganglion extending into the internal auditory canal and eroding the middle cranial fossa floor. The remaining case (1) involved the intratemporal segment extending proximally to the stylomastoid foramen and external auditory canal and distally into the parotid gland.

These findings reflect those of Lipkin et al.[2] whose review of 239 cases showed that the tympanic (58%), vertical (48%) and labyrinthine/geniculate (42%) segments were most commonly involved. Such tumors "almost always require facial nerve resection" via suboccipital, middle fossa or transmastoid approaches.[20]

Table 3. Surgical Approach and Findings

SURGICAL APPROACH AND FINDINGS	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CROSS-CASE TRENDS
Transmastoid Facial Recess	+	+	+	+	+	5/5
Transmastoid translabyrinthine		+	+		+	3/5
Mastoidectomy-Parotidectomy unified approach	+	+	+	+	+	5/5
Tumor extent						
Internal auditory canal	+	+	+	+	+	5/5
geniculate ganglion	+	+	+	+	+	5/5
horizontal facial nerve	+	+	+	+	+	5/5
second genu	+	+	+	+	+	5/5
vertical facial nerve	+	+	+	+	+	5/5
EAC extension	+	+	+	+	+	5/5
Stylomastoid foramen	+	+	+	+	+	5/5
parotid extension	+	+	+	+	+	5/5
Facial Nerve Preservation	+	+	+	+	+	5/5
Intraoperative Greater Auricular Nerve Interposition Graft	+	+	+	+	+	5/5
6th month postoperative hypoglossal cross-over	+	+	+	+	+	5/5
4th month postoperative hypoglossal cross-over	+	+	+	+	+	5/5

+ improved from grade VI-to V after 1 year;
maintained grade III immediately post-op with delayed-onset worsening;
no improvement in grade V palsy after 2 years; for 2nd stage temporalis slin;
improved from Grade VI-to V after 6 months, then Grade III 10 months thereafter;
good static cosmetic results on one year follow-up

In this series, a transmastoid facial recess approach was used in two cases (2 and 4), and was combined with a translabyrinthine approach in two (Cases 3 and 5) and with a parotidectomy unified incision in one. Facial nerve resection was performed in three cases (1,2, and 5) with one immediate greater auricular nerve interposition graft (Case 2). Another case (5) underwent second-stage facial-

hypoglossal nerve crossover reanimation 8 months post-operatively while a facial sling was constructed 4 months post-operatively for the other case (1). Excision of such larger tumors as the preceding cases necessitates subsequent facial reanimation by interposition nerve grafting, mobilization with end-to-end anastamosis, or crossover procedures. [24] The facial nerve was preserved in two cases (3 and 4), where tumor could be dissected off the horizontal and descending portions of the nerve. Indeed, with small to medium size tumors, "some normal facial nerve fibers may remain and may be preserved with surgical excision,"[13] or partial nerve resection with on lay nerve grafting.[4]

Post-operative follow-up shows good static cosmetic results for the facial sling (Case 1). The greater auricular nerve graft has shown no effect on facial nerve function after one year, although this patient (Case 2) originally withheld the 20 year duration of palsy from the historians for fear of not being operated on any longer. A second-stage temporalis sling has been proposed but refused. The facial-hypoglossal crossover (Case 5) seems to be taking, with improvement of facial nerve function from Grade VI and III after 10 months of rehabilitation. One patient with facial nerve preservation (Case 4) initially maintained the preoperative Grade III function, but had delayed-onset worsening of function 1 month post-operatively. The other patient with facial nerve preservation (Case 3) has improved from the preoperative Grade VI palsy to Grade V function after 1 year. Comprehensive management of the affected eye, as outlined by Catalino, et al.[31] is also being planned, specially for the cases with no dynamic eyelid function.

CONCLUSION AND RECOMMENDATIONS

Sir Terrence Cawthorne's admonition[19] that "all that palsies is not Bell's" is evident in these cases. all presenting with facial palsy and all initially managed with vitamins and/or physical therapy. In all cases, subsequent management by other specialists (neurologists and neurosurgeons) before ENT referral failed to uncover the diagnosis of facial nerve neurilemmoma, and, in at least one case, even the otolaryngologists failed to make the diagnosis. "As guardians of the facial nerve", a high index of suspicion and familiarity with the disease entity are in order. In accordance with the literature, this series suggests that all patients with facial dysfunction be evaluated for hearing loss, and that, where this is documented, MRI with Gadolinium or at least high resolution CT with 1.5 mm temporal bone cuts be requested. Early intervention can avoid the consequences which, as seen in this series, can be disastrous. Indeed, facial palsy is a proverbial 'tip of the iceberg' that poses no mean warning to those who would navigate the hidden depths of the temporal bone, a dictum no less true in the Philippines than in abroad.

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LASER ASSISTED CRYPTOLYSIS AS AN ALTERNATIVE MANAGEMENT FOR RECURRENT TONSILLITIS*

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ABSTRACT

43 patients (22F: 21M) with recurrent tonsillitis underwent out patient CO_2 laser-assisted cryptolysis under local anesthesia a private Metro Manila University Hospital over a 15 month period. There were no cover of intra-and postoperative bleeding. Postoperative edema was seen in 4 (9%); immediate postoperative pain was reported by 12 (28%). Mild discomfort was reported by 8 (19%) for 1 week postoperatively. However, all patients showed normal activities within 24-48 hours.

There were recurrences in 40 (93%) in a 6 months of follow-up period, while 3 (7%) underwent subsequent conventional tonsillectomy due to recurrence.

Keywords: Laser assisted, cryptolysis, recurrent tonsillitis, alternative management

INTRODUCTION

Tonsillectomy remains to be the procedure of choice for the otolaryngologist treating common problems related to the tonsils.[1] This is one of the oldest surgical procedures still being advocated. According to Macbeth's 1950 review, the first tonsillectomy was described by Caque of Rheims in 1757.[2]

Cryptic tonsillitis is the cause of recurrent infections, sore throats and halitosis. Since the advent of antibiotics, the frequency of operative procedures declined drastically. Furthermore, a better understanding of the surgical indications and appropriate patient selection reduced its frequency.

Like any other surgical procedures, tonsillectomy is not free from morbidity and possible mortality. Hence, alternative procedures to the standard technique like hot (electrocautery) or cold (scalpel) excision were developed. [3] Recent advances in laser technology has expanded the surgeon's armamentarium in dealing with tonsillar infections leading to the introduction of CO_2 laser for tonsillopharyngeal applications.

The CO2 laser is aimed at the tonsil crypts, sterilizing the tonsils surface as well as making the crypts more shallow. Hence, the term "**Laser Assisted Cryptolysis**". It incorporates a new concept and surgical technique employing a handheld CO_2 scanning device used to vaporize and ablate tonsillar crypts. [1] Despite being a relatively new surgical procedure, laser assisted cryptolysis is accepted in Europe and the United States as an alternative management for recurrent tonsillitis due to its significant advantages. In the Philippines, no study has yet been made with its use in recurrent tonsillitis, thus the conception of this study.

OBJECTIVE

To describe the effect of laser assisted cryptolysis in the management of recurrent tonsillitis.

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*2nd Place, PSOHNS Descriptive Research Contest, September 26, 1997, Jade Valley Restaurant, Quezon City

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METHODOLOGY

A. SUBJECTS

Forty three cases of recurrent tonsillitis occurring more than 5 episodes in a year, seen over a 15 month period from October 1995 to February 1997 at a private university hospital in Metro Manila were included in the study. The mean age was 30 years (13 to 54 years), with almost equal sex distribution (22 females and 21 males). All underwent laser assisted cryptolysis using the CO_2 laser machine. Informations gathered were the patients' name, age, address, telephone number and attending physicians. The duration of operation as well as the laser power settings were also noted. Patients were routinely advised that several sessions might be needed for complete cure, especially those with large tonsils or deep crypts.

B. MATERIALS

The equipment used include an ENT examination chair, a CO_2 laser machine with a scanning device, an oropharyngeal handpiece, a smoke evacuator, tongue depressor, 2% xylocaine with adrenaline at 1:100,000 dilution, 10% xylocaine spray, 10 cc syringe with gauge 25 needle at 1.5 inches or longer and a headlight. All individuals inside the laser room are always required to wear protective glasses (Figs. 1 a-f).

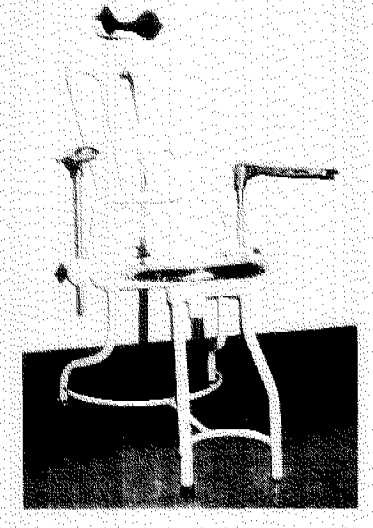

Figure 1a. An ENT examination chair

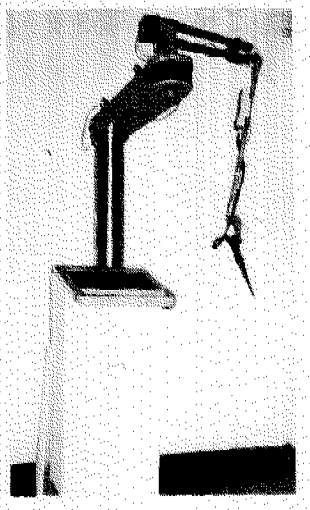

Figure 1b. The CO_2 Laser machine

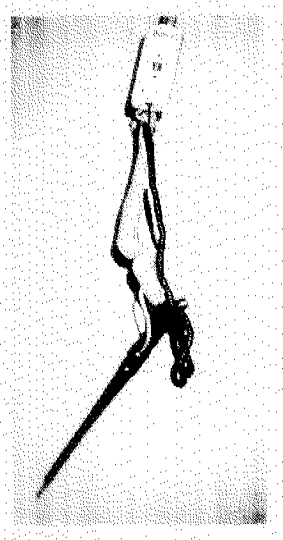

Figure 1c. The oropharyngeal handpiece with a scanning device attached to it.

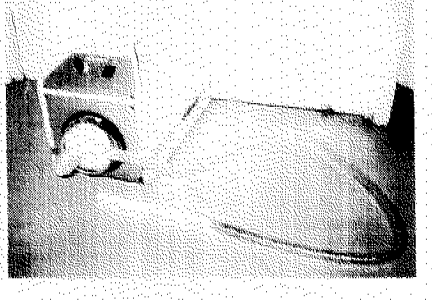

Figure 1d. Smoke evacuator for the laser plume.

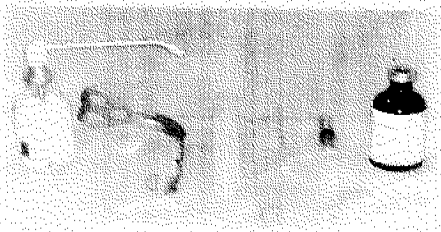

Figure 1e. Local anesthesia used include 10% xylocaine spray and 2% xylocaine with adrenaline (1:100,000). A syringe with G25 needle and tongue depressor also shown.

Figure 1f. Headlight and protective eyewear.

C. CONDUCT OF PROCEDURE

Patients remained seated wearing an eye protector (Fig.2). An anesthesia spray of 10% xylocaine spray was applied to the tonsillar fossa (Fig. 3) and also to the base of the tongue if the patient has a strong gag reflex. If the patient cannot tolerate the pain, the anterior pillar and the tonsils substance were infiltrated with 2% xylocaine with adenalin at 1:100,000 dilution (Fig. 4). The laser machine was then set from 10 to 20 watts, in focus and continuous mode with the scanner on.

Figure 2. Patient positioning during the procedure. Note the protective glasses worn by the patient and the surgeon.

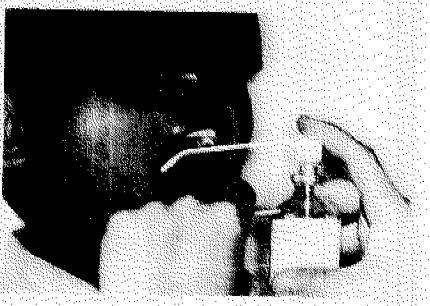

Figure 3. Anesthesia spray applied to the tonsillar fossa as well as to the tongue base if with strong gag reflex.

Figure 4. Infiltration of anterior pillar and tonsils substance with 2% xylocaine + adrenalin if pain was intolerable.

During the procedure, the patient was instructed to breathe in deeply and prolong the exhalation phase during which the CO_2 laser was activated and applied to the tonsils (Fig. 2). The controlled breathing cycle elevates the soft palate, stabilizes the tongue and reduces the risk of laser plume inhalation. Plume was suctioned off by a smoke evacuator via the oropharyngeal handpiece. The procedure was normally completed with several passes of laser to both tonsils until the crypts were shallow (Fig. 5). Postoperative care included oral rinses and gargle. Appropriate oral antibiotics and analgesics were prescribed and patients were sent home.

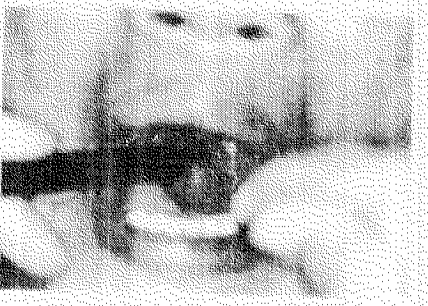

Figure 5. Char-free ablation using CO_2 laser with handpiece directed to the tonsil surface. Note the shallowing of the crypts.

All were placed on soft diet for 1 week and advised of possible complications like postoperative bleeding, airway obstruction or infections. Follow-up at 1 week, 2 weeks, 1 month and 6 months postoperatively were done. Patients were also instructed to report at once to the attending physician for any symptoms that might appear outside the follow-up period like sorethroat or dysphagia. During the follow-ups, tonsils were examined for presence of any reinfection, at which time the need for further laser treatment was assessed.

RESULTS

All 43 patients underwent cryptolysis once. Intraoperative bleeding was not observed. There was absence of postoperative hemorrhage. Only 4 (9%) patients had tonsil edema immediately after operation. Twelve (28%) patients experienced the expected pain immediately postoperative and this was easily managed appropriate analgesics. The recovery was rapid with all patients resuming normal activities within 24 to 48 hours.

The average duration of the procedure took only 14 minutes (range of 8 to 20 min) for the surgeon to complete lasing both tonsils, with a mean power setting of 12 watts (range of 10 to 20 watts). Char-free ablation of the tonsils using the CO_2 laser was accomplished in all patients. Shallowing of the crypts as well as gross reduction in the tonsil tissues were noted (Fig. 6b).

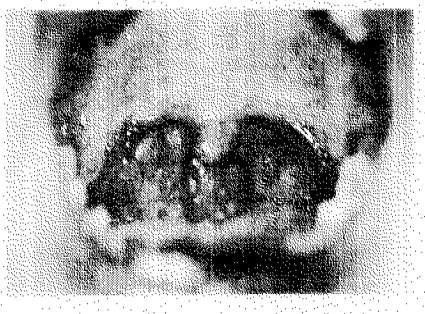

Figure 6a. Preoperative view prior to Cryptolysis. Note the deep crypts and slightly enlarged tonsils.

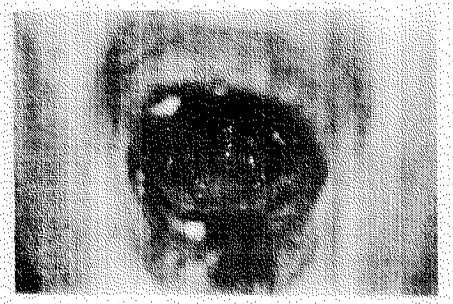

Figure 6b. Immediate postoperative view. Note the gross reduction in the tonsil tissues.

Eight (19%) patients, however experienced mild to moderate degree of discomfort for 1 week after the procedure. On physical examination, a white coagulum persisted for 1 to 2 weeks and complete healing of the tonsils occurred 2 to 3 weeks following and sloughing of the eschar (Fig. 7).

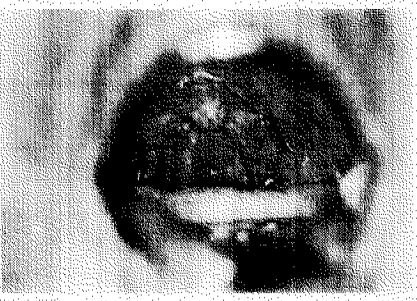

Figure 7. Same patient seen 1 month post-cryptolysis. Note the flattening of the tonsils with almost absent crypts.

Elimination of tonsillitis was effective in 40 (93%) patients showing no recurrence of symptoms during the follow-up period of 6 months. Only 3 (7%) patients complained of sorethroats [2(5%) patients had recurrence 1 month postoperative and 1(2%) patient 6 months postoperative]. Second stage cryptolysis was advised but patients refused further laser treatment and opted instead to undergo conventional tonsillectomy.

Table 1 shows a summary of the effect of laser assisted cryptolysis in the management of recurrent tonsillitis among 43 patients.

TABLE 1. Effect of Laser Assisted Cryptolysis Among Patients with Recurrent Tonsillitis

Assessment, number (%) of patients (N=43)					
	Immediately postop	1 week postop	2 weeks postop	1 month postop	6 months postop
BLEEDING	-	-	-	-	-
EDEMA	4(9%)	-	-	-	-
PAIN	13(28%)	9 (12%)	2(5%)	-	-
RECURRENCE	-	-	-	2(5%)	1(2%)

DISCUSSION

Chronic tonsillitis represents persistent inflammation of the tonsils as a result of acute or subclinical infections. [3] Its diagnosis, although dependent mainly on clinical grounds, should also be documented by cultures. The microbiologic cause is group A beta-hemolytic streptococcus in 90% of cases. [4] Other organisms are alpha and gamma streptococcus, diphtheroids and rarely Staphylococcus aureus and Haemophilus influenzae (Brodsky et al., 1988a). Anaerobes have been recovered from the surface and the core of the tonsils, most belonging to the Bacteroides melaninogenicus group (Brook et al., 1981).

Treatment of chronic recurrent tonsillitis is generally symptomatic but does include those measures used in the management of acute inflammations, such as rest, fluids, analgesics and antibiotics when indicated. Definitive therapy involves tonsillectomy since affected tonsils may become a chronic nidus for infection or their blood flow may be so reduced that any medical therapy given may be ineffective. [3] Conventional surgical removal of the tonsils may be accomplished by several methods: sharp dissection with a scalpel or scissors; excision with snare, eletrocoagulation or cryosurgery. [5] However, it has inherent disadvantages such as exposure to general anesthesia; complications like postoperative bleeding and edema leading to airway obstruction and possible mortality; and the added expense following a major surgical procedure and the need for hospitalization.

Doctor and patient attitudes are constantly changing and currently are more favorable toward conservative management in which less tonsil tissue is removed so as to retain immunological properties. The combination of improved technology and attitudinal changes resulted in an expanded use of laser surgery. [6] In addition, recent trends in the health economics encouraged patients to seek surgical care that is safe, economical and achievable with minimal discomfort. [1]

Whereas conventional techniques employ extirpation of the tonsil itself. CO_2 laser is directed at ablation of the tonsillar crypts and gross reduction of the tonsillar tissues. Hence, the term **CO_2 Laser Assissted Cryptolysis**. [7] It is believed that in "lasing" these crypts, some of the surface pathogens are sterilized. Furthermore, the epithelial debris and food particles collected in these crypts, which may serve as foci for recurrent infections, are vaporized. It is with these principles that laser assisted cryptolysis is used in the management of recurrent tonsillitis.

In this case series, a total of 43 patients underwent cryptolysis using the CO_2 laser. Like other biologic tissues, the tonsils can highly absorb the CO_2 laser making it the laser of choice for cryptolysis. The CO_2 laser can create intense localized heating sufficient to vaporize both extra- and intracellular water producing a coagulative necrosis. [8] Intra- as well as postoperative bleeding were not noted among these patients because the heat generated by the laser sealed off the small vascular channels. [9] Because the CO_2 laser can be precisely delivered to the target tonsil tissues, there is minimal damage to surrounding normal tissues resulting to less edema formation immediately after the operation. The laser can also generate heat sufficient to seal lymphatic channels and sensory nerve endings resulting decreased postoperative in pain. [9] Although there were 8(19%) patients who complained of mild to moderate degree of discomfort for 1 week postoperatively, none required hospitalization. Elimination of tonsillitis was successful in 40 (93%) patients. The recurrence seen in 3 (7%) patients may be attributed to insufficient ablation of the tonsil crypts. Laser assisted cryptolysis is very much dependent upon the skill of the surgeon performing the procedure. The endpoint in cryptolysis is when the crypts are very shallow or when there is almost flat tonsil surface [1] Another factor which might explain the recurrence is the presence of core pathogens in the residual tonsil tissues

which are virulent enough to cause another infection. A second stage cryptolysis was advised to recurrent cases but patients refused further treatment and opted to undergo conventional tonsillectomy.

Although tonsillectomy can be done under local anesthesia, it carries higher risks and tension for both the patient and the surgeon. Complications like massive bleeding and postoperative edema may cause life threatening situations. Since cryptolysis is being done under local anesthesia, the risks for patients undergoing general anesthesia, as in cases of conventional tonsillectomy, were not encountered. The effectiveness of laser assisted cryptolysis in the management of recurrent tonsillitis can be equated to the conventional tonsillectomy as shown by a low recurrence rate (7%) in our study. Lastly, laser assisted cryptolysis requires no confinement in the hospital and, therefore, entails lesser expense on the part of the patients.

CONCLUSION

The CO_2 laser method may be considered to be a vast improvement over conventional means in the management of recurrent tonsillitis. Laser assisted cryptolysis is well tolerated and does not produce untoward side effects. The results from this study showed that Laser Assisted Cryptolysis provides a safe, effective and economical alternative to standard, older surgical techniques. The desired effect is achieved with minimal discomfort and side effects and thus recovery is rapid.

RECOMMENDATIONS

The absence of serious complications, the rapid recovery rate and the relatively low recurrence rate indicate that laser assisted cryptolysis warrants consideration and may be highly recommended in properly selected patients. Laser Assisted Cryptolysis is, therefore, reserved for those patients who are reluctant to undergo general anesthetic or for those who are unable to tolerate the loss of work experienced with conventional tonsillectomy.

Hopefully, this study showing the efficacy of cryptolysis in the management of recurrent tonsillitis will spur its increased use in other institutions so that these findings can be confirmed in a larger number of patients.

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ANATOMIC DIMENSION OF THE FILIPINO TRACHEA BASED ON CADAVER DISSECTION*

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ABSTRACT

The average anatomic dimensions of thirty-six normal adult Filipino tracheas (24M: 12F) obtained from cadavers in several Metro Manila morgue, were determined according to length, transverse diameter, antero-posterior diameter and number of tracheal rings. Male-Female differences were likewise compared.

Average length of the male trachea was 10.48 cms (vs. 10.10 cms for the female trachea), with the former being 12.67% shorter and the latter 1% longer, from the adult averages set by Jackson in 1950. Transverse diameters were 19.54 mm and 17.60 mm while A-P diameters averaged 15.61 mm and 14.09 mm in males and females, respectively, with the former rings an average of 17.58 tracheal rings compare to 18.42 rings for the latter. Although a significant difference between male and female transverse and A-P tracheal diameters exist; no such difference between sexes was noted with length and number of tracheal rings.

Keywords: Filipino trachea, anatomic dimensions, cadavers

INTRODUCTION

The knowledge of anatomy cannot be overemphasized in the performance of surgery. The success of a surgical procedure lies not only in the expert hands of the surgeon but also in his knowledge of the basic anatomical dimensions of the organs involved.

The dimensions of the normal trachea has been a subject of many studies in the past. Cadaveric and radiologic dimensions have been described by various authors, each setting a different norm from the other. Most, if not all, of these studies were made by foreign authors on foreign subjects, mostly on Caucasians.

Asa, et.al.[1] and Montemayor, et.al..[2], both from the same institution in the Philippines conducted studies on the anatomic dimensions of Filipino larynges and esophagus respectively. Based on the premise that since the Filipino is anthropometrically smaller than Caucasians, the Filipino larynges and esophagus are proportionately smaller. Both found significant differences between Filipino and foreign larynges and esophagus. This study is conducted to determine the average measurements of the Filipino trachea and to determine any differences between sexes.

MATERIALS AND METHODS

Thirty-six cadavers were used in the study, 24 of which were males and females. The dissection was done within 24-28 hours from the time of death. The cadavers were placed in the basic anatomical position supine on the operating table. The standard Y-incision used in autopsies was made with further dissection of the anterior neck done to expose the thyroid cartilage. The trachea and the viscera of the thorax and neck were examined for any gross enlargement or deformity which may alter the normal position and dimensions of the trachea. The thyroid isthmus was separated from the trachea, transected and retracted laterally.

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The following measurements were then obtained:

1. Length (L) – measured in centimeters using a standard ruler from the inferior border of the cricoid cartilage to the carina.
2. Transverse diameter (T) – measured in millimeters using a caliper after separating the trachea from its superior attachment to the inferior border of the cricoid and the esophagus.
3. Antero-posterior diameter (AP) – measured in millimeters using a caliper after measuring the transverse diameter.
4. Number of tracheal rings (TR) – from the first ring below the cricoid to the last ring just before the tracheal bifurcation.

To determine the significance of the differences, the following null hypothesis was formulated:

Ho: There is no significant difference between the Filipino tracheal dimensions along the following: a) length (L), b) transverse diameter (T) antero-posterior diameter (AP) and d) number of tracheal rings (TR).

Statistical Treatment

To attain the first objective, the mean of measurements were computed. In making comparisons of the anatomic dimensions between males and females, the t-test was used to test the null hypothesis.

RESULTS

The average length of the male trachea was 10.48 cms while that of the female was 10.10 cms. Transverse diameter averages were 19.54 mm and 17.60 mm in males and females respectively. Antero-posterior diameter averages were 15.61 mm in males and 14.09 in females. Males have an average of 7.58 tracheal rings and while females have an average of 18.42 rings (Tables 1 & 2).

The t-test was used to test for the significance of the differences between the dimensions of the male and that of the female. Results showed that at a=0.05, there was a significant difference between sexes as far as transverse and antero-posterior diameters are concerned. However, no significance was found between the differences between the two groups as far as length and number of tracheal rings are concerned (Table 3).

The average lengths of both sexes were compared to the averages set by Jackson (1950)[3]. Averages of tracheal length for adults according to Jackson were 12 cms. and 10 cms. for males and females respectively. By inspection, the average length of the Filipino male trachea is 12.67% shorter while that of female Filipino is slightly longer by 1%. The average number of tracheal rings fell within the range of 16-20.

Table 1. Dimensions of the Male Filipino Trachea (cadaver study)

Age	Length (cms)	Trans Diameter (mm)	Ant.-post Diameter (mm)	Tracheal Rings
24	9.7	19.0	15.2	18
28	10.9	18.4	14.8	18
38	11.2	18.2	14.6	20
23	10.9	19.2	15.4	17
36	9.9	19.7	15.0	16
49	10.7	19.4	15.6	19
51	10.8	19.7	15.7	18
37	10.2	19.5	15.6	16
32	10.3	20.8	16.6	16
54	9.9	19.3	15.5	16
36	11.7	19.8	15.8	20
39	11.2	19.6	15.7	20
25	10.3	19.0	15.3	16
48	10.1	19.2	15.4	18
40	10.7	19.4	15.5	17
41	11.3	20.2	16.1	17
22	10.7	20.1	16.0	16
21	10.3	18.5	14.9	18
51	10.7	19.5	15.6	20
19	9.6	21.0	16.7	16
26	10.6	19.3	15.5	18
54	9.7	20.7	16.5	17
44	9.8	19.2	15.4	16
56	10.4	20.4	16.3	19
Ave	Ave	Ave	Ave	Ave
37.25	10.48	19.54	15.61	17.58
	SD=0.78	SD=0.99	SD=.49	SD=1.44

TABLE 2. Dimensions of Female Filipino Trachea (cadaver study)

Age	Length (cm)	Trans Diameter (mm)	Ant.-post Diameter (mm)	Tracheal Rings
27	10.1	16.4	13.3	20
50	10.6	19.0	15.2	17
29	9.7	17.2	13.9	18
35	10.1	17.9	14.4	19
24	9.2	16.1	13.1	19
40	10.3	17.9	14.4	18
32	9.3	18.4	14.8	20
33	10.1	16.0	12.0	19
46	11.2	18.2	14.6	17
35	10.3	18.0	14.5	17
34	9.5	18.6	14.9	19
28	10.8	17.9	14.0	18
Ave	Ave	Ave	Ave.	Ave
34.40	10.10	17.60	14.09	18.42
	SD=0.58	SD=0.95	SD=0.86	SD=1.04

TABLE 3. t-test For Significance of the Differences Between the Dimensions of Male and Female Filipino Trachea

Dimension	Mean Male	Mean Female	Difference	t-value computed	Significance a=0.05	Decision
Length	10.48 cms.	10.10 cms.	0.38	1.73	not significant	Accept Ho (a)
Trans	19.54 mm	17.80 mm	1.15	3.48	significant	Reject Ho (b)
Ant Post.	15.61 mm	14.09 mm	1.52	5.85	significant	Reject Ho ©
T tings	17.58	18.42	0.84	2.04	not significant	Accept Ho (d)

DISCUSSION

Breatnach, et.al.[4] in a study of 808 lateral chest radiographs of normal patients set the normal values of the diameters of the trachea at 13-25 mm (AP) and 13-27 mm (transverse) for males; and 10-21 mm (AP) and 10-23 mm (transverse) for females. No statistical correlation was found between tracheal caliber and body weight or body height. The result of the current study could not be compared to this previous set of norms due to the different methods used in gathering the data.

An interesting point in the determination of tracheal dimensions is the comparison between cadaver and living subjects. Dimensions in the living subjects is dynamic and somewhat longer[3]. However, most studies on live subjects were done using radiographs and computed tomography rather than actual, direct measurements[4,5,6,7].

Several factors have been implicated in the differences in tracheal dimensions. Kawakami, et.al.[8] suggested that genetic factors affect tracheal width and lung dimensions. Age, sex, height and body weight were among the more common factors related to tracheal dimensions. Griscom, et al,[5] in a study of 34 children aged 6 and below found out that there is no significant difference between sexes and that dimensions were related to body height. In a related study by the same author, results show that this non-difference continues until the age of 14 years when girl's tracheas stop growing and that male trachea continue to continue to enlarge but not lengthen for some time after growth in height ceases[6]. This finding tend to support current findings that difference among sexes in adults was more in the diameters rather the length. This also tends to validate current findings notwithstanding the fact that the results for trachèal lengths vis-à-vis the standards set by Jackson were shorter for males and longer for females.

CONCLUSION

On the basis of the foregoing findings, this researcher arrives at the conclusion that:

1. As far as the cases covered in this study is concerned, regarding the average length of trachea, the Filipinos have relatively shorter trachea than those cases on studies by Jackson. On the other hand, the same study revealed the average length for Filipino female is slightly longer (0.10 cm) than that of foreign subjects. However, the non-significant of the difference between sexes as far as length is concerned in the current study is consistent with findings of other investigators.
2. The significance or non-significance of differences in the dimensions of the variables covered in the study on the Filipino male and female trachea may serve as basis for surgeons in planning and females.
3. The measurements would be useful for both investigational and patient care purposes such as the detection of tracheal abnormalities, in endotracheal intubation,, tracheostomy, endoscopy as well as studies in respiratory physiology concerning male and female patients.

RECOMMENDATIONS

1. Otolaryngologists-head and neck surgeons may create an awareness of the findings in this study when subjecting male and female subjecting male and female patients to surgical procedures on the trachea.
2. Deviations from the average measurements may need further attention and scrutiny as indications of certain abnormalities among patients.
3. Further studies may be conducted on correlations between measurements of these dimensions and variables such as age, height and weight using cadavers as subjects.

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THE OTOLOGICAL PROFILE AND HEARING LOSS PREVALENCE AMONG ELEMENTARY SCHOOL CHILDREN IN THE VICINITY OF THE NINOY AQUINO INTERNATIONAL AIRPORT AND VILLAMOR AIRBASE*

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ABSTRACT

As the country pushes for industrialization for economic development, one of the major concerns is the expected rise in environmental noise pollution brought about by commercial transportation centers near residential and school areas. To curb this growing problem, the local government of Paranaque cooperated in the effort to determine the otologic profile and the prevalence of hearing loss among elementary school children in the vicinity of Ninoy Aquino International Airport (NAIA) and Villamor Airbase (VAB). The aircraft noise, were recorded at 110-125 dB, lasting for 15-20 seconds, occurring intermittently every 10-15 minutes during class hours. The general data was obtained from 3,165 students, randomly selected from the official roster of 4 different public schools. Each were subjected to otoscopic examination and audiometric screening. Hearing loss due to middle ear pathology were noted in 7% (n=433). Of the ears examined 32% (n=2,036) have either an impacted or a retained cerumen, representing 24% of the hearing impaired. A high prevalence rate of hearing loss was obtained at 29.8% (n=943). Likewise, 5% (n=165) of the population suffered from noise induced hearing loss. Based on the findings, hearing loss is prevalent among the school children studying in the vicinity of the airport. However, in view of the limitations of the study, the findings of noise induced hearing loss among a small population of students cannot be claimed conclusive.

KEYWORDS: noise induced hearing loss, hearing loss prevalence, airport.

INTRODUCTION

Primary education is the basis for any future academic and cognitive growth. It is during the early years of education that a child's mind develops the proper language and mental skills necessary in preparation for endeavors in the fields of higher learning. The hearing impaired child, while appearing to function well on cursory examination, often have overt deficiencies in and subtle problems with linguistic skills that do not allow for effective and successful competition with their normal peers.[1]

One of the greatest handicap in dealing with hearing impairment is the lack of awareness about its true prevalence, incidence and etiology in national and global context. Otitis media, fungal infection, ear deformity, impacted cerumen and other causes have all been associated with hearing loss. Many of these are preventable while others are curable.[2,3,4] In the Philippines, relatively little information is available about hearing loss and otologic status at the school level although several investigators have described series of

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patients drawn from clinics or communities.[5,6]

As the Philippine government pushes for industrialization to support the country's need for economic development, one of the major concerns is the expected rise in environmental noise pollution. This situation is usually brought about by the establishment of commercial transportation centers near residential and school areas. Erroneously, it has been tacitly accepted that noise pollution is a "necessary nuisance" on the road to progress. It is, therefore, imperative that steps be taken to identify sources of environmental noise pollution and institute control measures to minimize the effects on the population.[7]

In an effort to curb this growing problem, the local government of Paranaque, concerned with the proximity of airport along the elementary schools located in the first district, cooperated in the effort to determine the otologic profile and the prevalence of hearing loss among elementary school children in the vicinity of Ninoy Aquino International Airport (NAIA) and Villamor Airbase (VAB).

METHODOLOGY

The study was conducted between January to March of the schoolyear 1995-1996, at 4 different public elementary schools in district 1 of Parañaque, namely: Parañaque (Central, I,II) and La Huerta. These schools were chosen on the basis of being on the direct flight path of arriving and departing commercial and military aircraft from the NAIA and VAB. Noise level measurements and frequency of occurrence were taken in the school area using Radio Shack sound level meter (CAT No. 33-22050) set to A-frequency during and between over-fights of air-crafts.

The subjects of this study represented a random sample of every third student from grade I to grade VI from the official roster of the 4 schools. The data gathered included among others the name, age, sex and the number of years in school. These were tabulated before conducting the otologic examination using a Welch Allyn model no. 2000- halogen 3.5 v otoscope. History and otologic findings were recorded on a standard form, a sample of which appears in appendix A. Audiometric screening was carried out in a sound untreated but quiet room located at the Philippine School for the Deaf. The measured noise levels in the room did not exceed the maximum allowable frequency limits for ambient noise proposed by the American Speech and Hearing Association (ASHA, 1985) as shown in table 1 below.[8] Ambient noise levels were measured using the handheld Quest 215-45 sound level meter.

TABLE 1. FREQUENCY SPECIFIC MAXIMUM ALLOWABLE LIMITS FOR AMBIENT NOISE PROPOSED BY ASHA (Katz, 1994).

Frequency (Hz)	Maximum limit for ambient noise
4000 Hz	62 dB SPL*
2000 Hz	54.5 dB SPL
1000 Hz	49.5 dB SPL
500 Hz	41.5 dB SPL

*Sound Pressure Level

Before each testing session, the subjects were assembled along with their teachers for a demonstration of the procedure. Otoscopic examination and screening audiometry were all described in the vernacular by a member of the resident staff to lessen or minimize language barrier.

Hearing screening was performed using 4 audiometers (model AS 7 Maico Hearing Instruments) which were calibrated by a qualified electronics technician at the Manila Hearing Aid Office. Air conduction audiometry with pure tone threshold at 0.5, 1, 2 and 4kHz. were taken on both ears. The subjects were positioned to face away from the examiner and were instructed to raise the hand whenever a faint tone is heard on the side of the ear being tested. Children with pure tone average (indicates average of hearing threshold at 500, 1000 and 2000 Hz.) greater than 30 dB hearing level in either ear after audiometric testing were labeled as abnormal.[8] Level of impairment was determined for each ear according to the World Health Organization classification[2]. A diagnosis of Noise Induced Hearing Loss (NIHL) was based on the characteristic involvement of the midfrequency range between 3 and 6 kHz (4 kHz notch) with little or no loss below 1 kHz.

Children with otitis media, otitis externa and otomycosis were treated with oral antibiotics and/or ear drops as indicated, free of charge. Those who needed further treatment were referred to the Santo Tomas University Hospital in Manila.

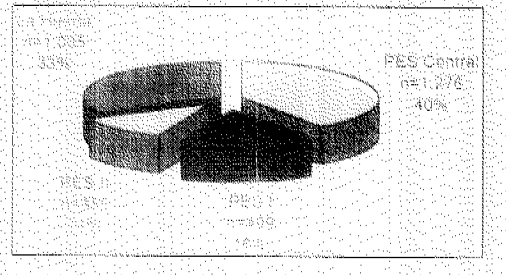
RESULTS

The air-craft noise encountered in the vicinity of the test site (first district of Paranaque) were recorded at 110-125 dB lasting for about 15-20 seconds, and occurring intermittently every 10-15 minutes during class hours (7:00AM – 5:00PM).

A total of 3,165 children between the ages of 6 and 13 years were subjected to an otologic examination and audiometric screening for hearing loss. The sample consisted of 1,582 boys (50%) and 1,583 (50%) whose average age was 10.24 years.

Of the four schools represented in the population screened, 40.3% (1276) came from Paranaque Elementary School Central (PES Central), 15.7% (499) from Paranaque Elementary School I (PES I), 11.2% (355) from Paranaque Elementary School II (PES II) and 32.7% (1035) came from La Huerta elementary school (figure I).

Figure 1. Number of students screened per school



The otologic history and otoscopic examination were carefully carried out and recorded with the aid of a prepared checklist. Otoscopic examination was normal in 3,823 (60%) ears, and abnormal otoscopic findings were noted in 2,507 (40%). There were 274 (4%) cases diagnosed to have chronic otitis media and 159 (2.5%) with acute otitis media. Impacted cerumen were found in 1,253 (19.8%) and 783 (12%) have retained cerumen. Twelve (0.19%) have crusting of the external auditory canal or otitis externa at the time of examination while 22 (0.34%) showed evidence of fungal infection (otomycosis). Seven (0.11%) children have foreign body in the external auditory canal. A detailed listing of otoscopic findings are shown in Table 2.

TABLE 2. OTOSCOPIC FINDINGS

OTOSCOPIC FINDINGS	EXAMINED EAR n=6330
Normal	3,823 (60.3%)
COM	274 (4.3%)
AOM	159 (2.5%)
Impacted cerumen	1,253 (19.8%)
Retained Cerumen	783 (12.3%)
Otitis Externa	12 (0.19%)
Otomycosis	22 (0.34%)
Foreign Body	7 (0.1%)

There were 943 students exhibiting hearing impairment. Thus, a value of 29.8% prevalence rate was obtained. Of these cases, 48 (5.1%) had unilateral hearing loss, while 895 (94.9%) had bilateral hearing loss.

Of the 6,330 tested ears, 4,494 (71%) were within normal hearing threshold. There were 1,836 (29%) tested ears with increased threshold levels (above 30 dB). Of these, 1,533 (24%) had mild, 250 (4%) with moderate, 37 (0.6%) with severe and 16 (0.3%) had profound hearing impairment (Table 3).

TABLE 3. DEGREE OF HEARING LOSS

Level of hearing loss	PTA, (dB)	No. (%) of ears n=6330
Normal	<30	4,494 (71)
Mild	31-44	1,533 (24)
Moderate	45-64	250 (4)
Severe	65-84	37 (0.6)
Profound	>84	16 (0.3)

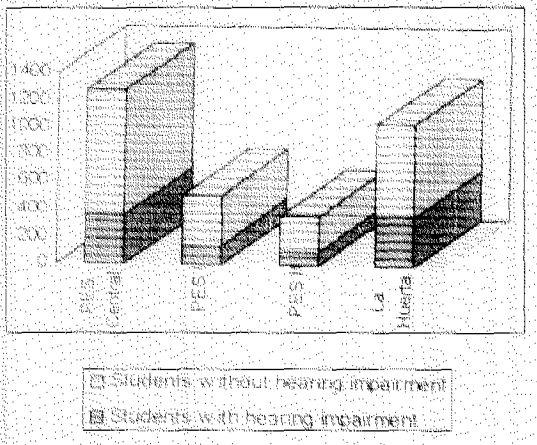
(The PTA is defined as the average of the air conduction threshold at 500, 1000, 2000 Hz. Category limits are based on the WHO Classification of hearing loss with correction factor of +5 dB for sound untreated rooms).[9]

There were 9 students with bilateral profound hearing loss giving a deafness prevalence of 3 per 1000 of the population. Four of these were boys, and five were girls. Figure II illustrates the prevalence of hearing loss among the different schools, while table 4 provides the tabulation for age-specific prevalence of hearing loss.

TABLE 4. AGE SPECIFIC PREVALENCE OF HEARING LOSS

Age	No. of children screened	Prevalence
6	148	42.6
7	804	44.2
8	534	26
9	403	23.5
10	353	21.9
11	314	25.1
12	297	17.8
13	312	27.6

Figure 2. School prevalence of hearing impairment



A total number of 165 school children mostly belonging to the higher grade levels (5&6) were classified as having noise induced hearing loss. This comprises 5% of the population screened.

DISCUSSION

Sources of noise pollution abound in all sectors of society. Occupational safety regulations are clear on the allowable noise levels and duration of noise exposure in the workplace. The question remains on whether chronic exposure to brief bursts of high frequency noise can exert a cumulative effect on hearing acuity. Based on known guidelines of occupational safety, duration of exposure at the recorded intensity of 110-125 dB for 15-20 seconds occurring intermittently every 10-15 minutes is not deemed enough to cause noise induced hearing loss.[10] However, the complaints of teachers and schoolchildren over constant disruption of classes during overflights warrants an investigation.

The study conducted in Paranaque revealed a high prevalence rate of 29.8% hearing loss among the elementary school children. This findings tends to confirm with what has been noted in third world studies. Comparatively, studies performed outside the Philippines were found to have an average prevalence rate of 27%. In contrast, a developed country like the United States had a merely 1% prevalence of childhood hearing loss. These are considered handicaps and are given access to low-cost treatment and rehabilitation.[11,12] A thorough screening in Thailand, revealed an overall prevalence of hearing impairment at 5% for the 0-15 age group.[13]

Although there was a relatively much lower population of children in this study afflicted with noise induced hearing loss than expected, a 5% incidence among children who are schooled around airports is nevertheless one hearing impaired child too many. The effects of noise induced hearing loss may not be evident now in the sample population. However, its long term effects into adulthood warrant closer scrutiny.

Thirty two percent (n=2,036) of ears examined have either an impacted or a retained cerumen, 24% of which have hearing impairment. Important emphasis on aural hygiene should be disseminated by educators to these schoolchildren with goals of reducing the incidence of hearing loss as well as possible future otological pathologies brought about by these conditions.

Results of the study showed that one of the major causes of hearing impairment in the sample population was due a middle ear pathology in 7% (n=433). These diseases are usually preventable and curable either by medical or surgical means. As an institutional policy, the authors have adopted "no screening without service". Aside from performing audiometric screening, the resident staff has provided the students free medical assistance in an effort to prevent the possible complications that arises from these illnesses.

The principal strength of the study is that it is school-based and provides added information for further studies of similar purpose. The study is also justified on the basis of the high prevalence of hearing loss among school age children, educational handicaps resulting from hearing loss and the prognosis of rehabilitation with regard to early intervention. Additional benefits include increased awareness of hearing loss

by school staff so that proper attention can be given to those children with hearing impairment.

Clinic-based studies of hearing loss may not give an accurate population data in the prevalence or cause of hearing loss, and their results are inevitably skewed toward people with access to medical facilities. Also, these studies usually focus on children with more severe hearing loss, thus failing to capture the full impact of hearing loss in the area.

Community-based studies may not give an accurate representation on children with hearing loss for the simple reason that people in these communities know that the project involves screening for hearing loss. Parents might preferentially bring in children with hearing loss, whereas, children with normal hearing, especially those who live farther may not attend the screening. [13]

The study have limitations intrinsic to itself, either with respect to inclusion of only 4 public elementary schools or with respect to further investigation of subjects. School-based study provides limited information on the causes of hearing loss because their parents or guardians who knew most of the child's medical history were not available for questioning.[13] Despite these limitations, there is not a shade of doubt about the high prevalence of hearing impairment among schoolchildren. Further investigations to clarify hearing loss risk factors and to understand the natural history, diagnosis and treatment of common otologic diseases should be performed. It is hoped that the findings of this study could augment the dearth of data needed in conducting researches, investigations, or case studies about Filipino children.

CONCLUSION

Based on the foregoing findings, hearing loss is prevalent among the school children studying in the vicinity of the Ninoy Aquino International Airport and Villamor Airbase. In view of the limitations of the study, the findings of noise induced hearing loss among a small population of students cannot be claimed conclusive.

RECOMMENDATIONS

1. Screening of students to detect hearing loss must be implemented so that school officials will be aware and appropriate measures could be undertaken. Likewise, technologies such as simple, cost-effective screening audiometers which were formerly considered only "hospital-based" need to be adapted and transferred in part to peripheral health care or school facilities.
2. Similar studies should be done in other schools nationwide so that the overall picture of hearing impairment will be known.
3. The government or policy makers should be made aware of this problem so that it could allocate resources in order to initiate a multidimensional effort encompassing research, services, training and technological advancement to prevent hearing impairment as well as to promote its early detection, management and rehabilitation.

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APPENDIX

APPENDIX A. ADAPTED FROM THE WORLD HEALTH ORGANIZATION PREVENTION OF HEARING IMPAIRMENT AND DEAFNESS EAR EXAMINATION FORM.

A. CENCUS

Code		Date		Country no.	
Strata No.		Cluster No.		Household No.	
Name		Age		Male	Female
Occupation		Exam. Status			

BASIC EAR EXAMINATION

	R	L
Normal Findings		
Abnormal Findings		
(Mark all which apply)		
Auricle		
Inflammation		
Malformation		
Ext. Ear Canal		
Occluding wax		
Foreign body		
Otorrhea		
Inflammation		
Fungi		
Atresia		
Ear drum		
Perforation		
Scars		
Dullness		
Retraction		
Bulging		
Middle Ear		
Otorrhea		
Effusion		
Granulation/polyp		
Cholesteatoma		
Ossicular defect		
Others		
OTHER RELATED CONDITION		
Previous Surgery		
Mastoid swelling		
Cleft Palate		
Nasal Discharge/obstruction		

ANATOMICAL CLASSIFICATIO
(To be accomplished in case of hearing impairment)

	R	L
Auricle		
Malformation		
Others		
Ext. ear Canal		
Wax		
Otitis Externa		
Foreign Body		
Atresia		
Others		
Middle Ear		
Acute Otitis Media		
Chronic Otitis Media		
Active		
Inactive		
Cholesteatoma		
Otitis Media w/ Effusion		
Others		
Inner Ear		
Severe Hearing Impairment with normal ext. and mid ear		
Central Nervous System		
Severe hearing impairment w/ normal ext & mid ear & other		
CNS disturbance		
Uncertain		
(Conditions does not fit above)		
PRINCIPAL DIAGNOSIS		
Right:_____		
Left:_____		

COMPARATIVE EFFICACY AND SAFETY OF OFLOXACIN AND POLYMYXIN OTIC DROPS FOR CHRONIC SUPPURATIVE OTITIS MEDIA*

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INTRODUCTION

The initial treatment of chronic suppurative otitis media is preferably medical. The aims are essentially to treat the infection and obtain a dry ear. Besides aural toilet and use of local antiseptic, the standard form of medical treatment consists of oral and ototopical antibiotic with or without steroids.[1-4] Antibiotics have been shown to be efficacious although recurrence rates of otorrhea remain high.[5-6]

Antibiotic otic drops is a more popular form of medical therapy over oral antibiotics because of convenience and a relatively cheaper cost. This mode of treatment is not only used for cases treated conservatively but also for pre-operative patients to provide an optimal environment for surgery. Hence, its usefulness in the management of otorrhea has been recognized since the 1960s.[7-8]

The main objective of antibiotic therapy is the eradication of the gram positive and gram negative pathogens particularly Pseudomonas spp. and Staphylococcus aureus. Hence, the antibiotic content of most antibiotic ear drop preparations include polymyxin, neomycin and gentamicin which have been shown to be effective against these organisms.[3, 9-13] However, as these antibiotics posses ototoxicity, newer antibiotics such as the fluoroquinolones are undergoing investigation.

In vitro and animal studies have demonstrated the effectiveness of flouroquinolones for Pseudomonas spp., Staphylococcus aureus, Proteus and other aerobic organisms.[14-20] Clinical studies on ciprofloxacin otic solution show favorable results in the treatment of chronic otitis media.[24-32]

The ofloxacin otic drop format has recently been introduced and initial clinical studies show very favorable results. However, these studies were mostly non-randomized trials with limited data on ototoxicity. Therefore, this prospective, randomized, single-blind, comparative study was undertaken to more rigorously evaluate the efficacy and safety of ofloxacin otic solution for chronic suppurative otitis media against a control group. Polymyxin was selected as the comparator drug on the basis of its well established efficacy and relatively low ototoxicity which has made it the most common antibiotic component of the currently available otic preparations.

MATERIALS AND METHODS

This was a randomized single blind study. Patients with suspected chronic otitis media and recurrent otitis media were recruited for inclusion in the study.

Criteria for selecting patients for inclusion in the study included the following:

1. Patients with persistent ear discharge of at least three months duration or a recurrent discharge

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within the past three months with active discharge of at least one month duration.
2. Patients with pars tensa perforation.
3. Patients must be 8 years of age or older.
4. Patients must not have received ototopical or systemic antibiotics two weeks or longer prior to enrollment.

Criteria for exclusion included the following:

1. Patients with cholesteatoma formation on clinical examination and confirmed by radiologic examination.
2. Patients with intracranial or extracranial complications.
3. Patients with sensori-neural hearing loss.
4. Pregnant or lactating women.
5. Patients with known history of vertigo in the recent past.
6. Patients with known history of drug sensitivity to any of the trial drugs.
7. Patients with other serious medical conditions such as immunodeficiency states, malignancy of blood dyscracia.
8. Patient without any written informed consent.

Patients meeting the criteria for inclusion in the study underwent detailed otoscopic, rhinoscopic and nasopharyngeal examination including pure tone audiometry and mastoid X-ray evaluation consisting of the Mayer's, Schuller's and Towne's views.

Detailed description of the secretion and mucosa were taken. Copious secretions especially when totally occluding the canal was removed by cotton swab until the middle ear cavity was clearly seen. The outer canal was wiped with alcohol. A small cotton was inserted into the medial portion of the canal under direct view to obtain samples of middle ear secretion. A small amount of the secretion was wiped on a glass slide for gram stain. Another amount was aspirated into a culture agar for aerobic examination. Any growth on the culture media was subjected to sensitivity studies for polymyxin, ofloxacin, ciprofloxacin, neomycin, gentamicin, chloramphenicol and framycetin.

Otoscopic findings of note included the following:

1. Perforation of the tympanic membrane which were either central or marginal and < 50% or > 50%.
2. Ear discharge quality descriptors included consistency (mucoid/purulent/sanguinous), color (whitish/yellowish/greenish) and odor (foul/non-foul).
3. Ear discharge quantity descriptors included: copious (thick discharge obstructed view of the perforation edge and drum annulus), moderate (edge of perforation was seen but not the entire middle ear mucosa), minimal (evaluation of entire mucosa was possible).
4. Middle ear mucosa was described as smooth/velvety/polypoid, white/pinkish/congested/reddish and thin/thickened.

Patients were stratified with regard to age (< or > 15 years old) and randomly assigned to receive either the ofloxacin or polymyxin treatment.

Otic ofloxacin preparation was sourced from the manufacturer, Daiichi Pharmaceuticals of Japan while polymyxin otic solutions (Aerosporin) was secured from a commercial distributor.

Drug application was carried out for two weeks for patients in both treatment groups. Ear instillation of both otic preparations were as follows: Cleansing of the external auditory meatus with a hydrogen peroxide dipped cotton application, then drying the ear canal by wiping with a dry cotton applicator whenever secretion is copious. With the patient lying on his side such that the affected ear faces upwards, the auricle is pulled upwards and backwards and a maximum of 5 drops of the otic solutions were carefully instilled into the side of the meatus to allow it to slide into the canal as the air column in the canal is displaced outwards. The patient was instructed to swallow 3-5 times to allow the solution to get into the middle ear cavity.

Otic ofloxacin was administered twice daily while polymyxin was

administered three times daily for 2 to 4 weeks.

Each patient was furnished with a diary to record any improvement/worsening of their ear discharge. Patients were instructed to record and report any adverse drug event that they experienced such as intense otalgia, itchiness, diminution of hearing or vertigo.

No other antibacterial medications, systemic or topical were allowed during the entire treatment period. Medications that were allowed included multivitamins and paracetamol which were administered in cases of otalgia.

One week after the initiation of therapy, patients return for otoscopic examinations to determine response to treatment. Side effects were closely monitored and therapy was discontinued if any serious adverse events were encountered.

Two weeks after therapy, otoscopic, audiometric and bacteriologic studies were done. Medication was continued in patients with persistent discharge and discontinued for those with dry ears. All patients are told to come back after two weeks and to continue filling up their clinical diaries.

Four weeks after initiation of therapy otoscopic, audiometric and bacteriologic studies were repeated. Treatment with the otic preparation were discontinued in all patients at this time.

Outcome Parameters

Clinical response was the main parameter for evaluating treatment outcome. Clinical response includes the following categories:

1. Cure- coexistence of all three of the following: (a) Ear free of discharge; (b) Pink mucosa; (c) Absence of mucosal edema
2. Marked improvement- two-step improvement in at least two of the following: (a) Decrease in ear discharge; (b) Decrease in the turbidity of the ear discharge; (c) Improvement in mucosal appearance
3. Minimal improvement- one-step improvement in at least two of the following: (a) Decrease in ear discharge; (b) Decrease in the turbidity of the ear discharge; (c) Improvement in mucosal appearance
4. No Change- unaltered clinical findings or very minimal change that fails to qualify in the previous categories.
5. Worsened- existence of at least one of the following: (a) Increase in ear discharge; (b) Increase in the turbidity of the ear discharge; (c) Change for the worse of the mucosal appearance compared to initial findings; (d) Appearance of new symptoms not previously noted such as otalgia, hearing loss, dizziness or imbalance
6. Recurrence- reappearance of any of the following after the ear had become dry; (a) Ear discharge; (b) Mucosal changes including granular appearance and mucosal polyp.

Audiometry assessed the short-term effect on hearing level according to four categories: (a) No change in pre and post treatment audiograms; (b) Hearing diminution of 20-40 db; (c) Hearing diminution of 41-60 db; (d) Hearing diminution of 61-90 db.

Assessment of the bacteriological outcome includes the following categories:

1. Eradication- disappearance of a baseline pathogen
2. Colonization- appearance of a nonpathogen in specimen cultures of patients with improved or unaltered clinical results
3. Superinfection- appearance of a new pathogen in association with clinical evidence of a new infection
4. Relapse- reappearance of the pathogen which had been eradicated in association with clinical improvement and subsequent worsening
5. Failure- baseline pathogen is not eradicated

RESULTS

Sociodemographic profile (Table 1) of patients included in the study shows that there were no statistically significant difference between the two groups in terms of age and sex distribution (x^2 p=0.458 for sex distribution). Mean age were comparable for both groups: 24.78 years for the ofloxacin group and 25.14 years for the polymyxin group with majority of patients greater than 15 years old.

Table 1. *Sociodemographic Profile of Patients*

Mean Age	24.96 (Range 9 to 54)		
	Ofloxacin (O)	Polymyxin (P)	TOTAL
AGE			
8-15 years	4	3	7
>15	19	19	38
Total	23	22	45
SEX			
Male	10	12	22
Female	13	10	23
Total	23	22	45

Clinical response

Clinical response 1 week after treatment showed that cure/improvement was significantly higher in the ofloxacin group (13/23) over the polymyxin group (6/22) using the (Mann-Whitney U-Wilcoxon Rank Sum Test, p=0.2).

After 4 weeks, cure/improvement was 22/23 for ofloxacin and 18/22 for polymyxin; the difference between the two groups was not statistically significant (Mann-Whitney U Wilcoxon Rank Sum Test, p=0.12).

Multivariate analysis was also done using duration of illness and persistence or recurrence of symptoms by medical history as covariate. The effect of covariate was not statistically significant.

Table 2. *Clinical Response (Cumulative frequency)*

		Wk. 1	Wk. 2	Wk. 3	Wk. 4
		No %	No %	No %	No %
Cured Marked Imp.	O	13 (56.5)	18 (78.3)	21 (91.3)	22 (95.7)
	P	6 (27.3)	18 (81.8)	19 (86.4)	18 (81.8)
Minimal Imp No Change	O	9 (39.1)	5 (21.7)	2 (8.7)	0
	P	12 (54.6)	3 (13.6)	1 (4.5)	2 (9.0)
Worsened	O	1 (4.3)	0	0	1 (4.3)
	P	4 (18.2)	1 (4.5)	2 (9.1)	2 (9.1)
P value on cure		0.0288	0.4969	0.3755	0.1258

Analysis of individual clinical parameters

The appearance of middle ear mucosa was observed at baseline to 4 weeks of treatment. The characteristics noted were thickness, color and texture.

Before treatment, all patients in the ofloxacin group (100%) and 95.5% in the polymyxin group were noted to have thickened middle ear mucosa (Fig. 1). After 4 weeks treatment, only 21.7% in the ofloxacin group and 45.5% in the polymyxin group had thickened middle ear mucosa. This difference however was not statistically significant (Friedman's ANOVA, p=0.4010).

Likewise, before treatment, 65.2% in the ofloxacin group and 59.1% in the polymyxin group had swollen and reddish middle ear mucosa (Fig.2). After 4 weeks treatment, reddish mucosa was not observed in any patient in the ofloxacin group; 13.6% of patients in the polymixin group had reddish mucosa. The difference, however, was not statistically significant (Friedman's ANOVA, p=0.1721).

Improvement in the texture of the middle ear mucosa (Fig.3) was seen in patients in both groups. Before treatment, polypoid or velvety middle ear mucosa was seen in 95.7% of the ofloxacin group and 90.9% of the polymyxin group. After 4 weeks treatment, only 13% in the ofloxacin and 27.3% in the polymyxin had velvety appearance. The difference was also not statistically significant (Mann-Whitney U Wilcoxon Rank Sum Test, p=0.19).

Ear discharge was monitored in terms of quantity, color, odor and consistency (mucoid/purulent/sanguinous). Quantity of discharge decreased after 4 weeks treatment in the 2 treatment groups (Fig.4). All the patients presented with ear discharge before treatment and after 4 weeks ear discharge disappeared in 87% of the ofloxacin group and 77.2% of the polymyxin group.

Four weeks after treatment, improvement based on ear discharge odor and color was not significantly different in the two treatment groups (Friedman's ANOVA for color p=0.3158, for odor p=0.2200 and for quantity p=0.3084).

Significant improvement in ear discharge consistency was observed in the ofloxacin group over the polymyxin group 1 week after treatment (Mann-Whitney U Wilcoxon Rank Sum Test, p=0.0225).

Bacteriological response

Of 23 patients treated with ofloxacin, 13 had unilateral and 10 had bilateral infection. In the polymyxin group, 14 had unilateral while 8 had bilateral ear involvement. On the patients' second visit after 1 week of treatment, repeat culture showed a 91.3% bacterial eradication rate in patients on ofloxacin compared to 72.7% for the polymyxin-treated group (Table 3a). Statistical analysis based on Fisher's Exact Test for determining differences in proportions showed the differences in proportions showed the difference to be not statistically significant.

Table 3a. *Bacteriological Eradication (All Patients)*

	ERADICATED	NOT ERADICATED	TOTAL
O	21 (91.3%)	2 (8.7%)	23
P	16 (72.7%)	6 (27.2%)	22
P value = 0.134			

However, separate analyses according to ear involvement using the Mann Whitney Wilcoxon Rank Sum Test (Table 3b) showed that patients treated with ofloxacin had a significantly higher bacterial eradication rate as far as clinical response of the left ear (A.S. or aditus sinister)

Table 3b. *Bacteriological Eradication (By Ear Involvement)*

	ERADICATED	NOT ERADICATED	TOTAL
Ofloxacin			23
Unilateral	12 (92.3%)	1 (7.7%)	13
Bilateral			10
A.S.	10 (100%)		
A.D.	9 (90%)	1 (10%)	
Polymyxin			22
Unilateral	11 (78.6%)	3 (21.4%)	14
Bilateral			8
A.S.	5 (62.5%)	3 (37.5%)	
A.D.	6 (75%)	2 (25%)	

The most common bacterial microorganisms isolated included Pseudomonas aeruginosa, Proteus mirabilis and Staphylococcus aureus (Table 4). All the pathogens were sensitive to ofloxacin. Resistance was noted in Proteus spp., Pseudomonas sp. & Staph. aureus to polymyxin (Figure 7a & b).

Table 4. *PATHOGENS*

TOTAL SPECIMENS = 59Isolates in pure culture = 31	Isolates in mixed culture = 28
Pseudomonas spp = 10	Pseudomonas sp = 16
Pseudomonas aeroginosa = 6	Pseudomonas aeroginosa = 6
Fluorescent pseudomonas = 4	Fluorescent pseudomonas = 4
Proteus mirabilis = 2	Staphylococcus aureus = 9
Morganella morganii = 2	Staphylococcus epidermis = 1
Staphylococcus aureus = 7	Staphylococcus xylosus = 1
Staphylococcus epidermis = 1	Staphylococcus hominis = 1
Staphylococcus haemolyticus = 1	Staphylococcus aerogenes = 1
Staphylococcus hominis = 1	Staphylococcus saprophyticus = 1
Citrobacter sp. = 1	Staphylococci sp = 1
Enterococcus sp = 1	Bacillus sp = 6
Enterobacter agglomerans = 1	Klebsiela pneumoniae = 4
Acinetobacter baumannii = 1	Klebsiela ozanae = 1
Bacillus sp = 2	Proteus mirabilis = 7
	B-hemolytic group A = 1
	Acinetobacter baumannii = 1
	Alkaligenes faecalis = 1
	Citrobacter sp = 1
	E. coli = 1
	Candida sp = 1
	Providencia stuartii = 1
	Enterobacter aerogenes = 2

Audiometry findings

Audiometry was carried out to evaluate drug ototoxicity. The accepted indicators of ototoxic effect on cochlear function are a 20 db change in bone conduction threshold between the baseline and post-treatment levels in one frequency or a 15 db change in two frequencies or a 10 db or > change in three frequencies.[33] Post-treatment audiogram findings did not show any cochlear toxicity in 9 and 12 patients in the ofloxacin group 2 and 4 weeks after treatment respectively; likewise no abnormal finding was seen in the 14 (2 weeks) and 16 (4 weeks) patients in the polymyxin group.

Adverse drug events

Adverse drug events were experienced by 6 patients in the ofloxacin group and 4 in the polymyxin group. The most common complaint was itchiness and earache. Two patients, one in each group, complained of "hearing loss." Results of the audiometry studies (2 and 4 weeks) in both patients, however, were essentially normal and did not show any diminution of hearing function. None complained of any joint pain or swelling.

Table 5. Adverse Drug Events

Ofloxacin Group				
Pt. Initial	Week 1	Week 2	Week 3	Week 4
EB	Itchiness	Itchiness	None	None
VR	Earache, itchiness, headache	None	None	None
MCG	None	Itchiness	None	None
MJ	Hearing loss (?), earache itchiness	Earache	Hearing loss (?), earache	Hearing loss (?), earache, itchiness
FB	none	None	Earache	None
EM	Giddiness, itchiness	Itchiness	Giddiness	Giddiness, itchiness
No. of pts	4	4	3	2

Polymyxin Group				
Pt. Initial	Week 1	Week 2	Week 3	Week 4
LM	none	None	None	Itchiness
FG	earache	Earache	Earache	Earache
MH	Hearing loss (?)	None	None	Earache
LL	Itchiness	Itchiness	None	itchiness
No. of pts.	3	2	1	4

DISCUSSION

Assessment of clinical responses based on improvement of the middle ear mucosa, disappearance of ear discharge as well as improvement in color, odor and consistency showed that patients in the ofloxacin group had a significantly better clinical improvement after 1 week of treatment. The rapid improvement in ear discharge and mucosal appearance are the primary outcome of interest in the medical treatment of chronic suppurative otitis media.

The bacteriologic findings concurs with the findings of other investigators regarding the predominance of Pseudomonas spp. and Staphylococcus aureus as the most common pathogens in chronic otitis media [10, 12, 34-36]. The other significant pathogens are Proteus, E. Coli, Citrobacter, Morganella morganii. Sensitivity studies show that these bacterial pathogens are susceptible to ofloxacin. Brook and other investigators [34-40] reported that anaerobic culture was not performed in this study. Quinolones had been of major interest lately against these organisms because of their broad spectrum of activity and their potency against Pseudomonas spp. [41-42] Concentrations that far exceed MIC levels of the bacterial pathogens can be achieved by topical instillation of the antibiotic.

The significantly better clinical improvement achieved with ofloxacin otic solution compared with polymyxin after one week treatment (Table 2) validated the in vitro results. A study using oral fluoroquinolone for CSOM showed a comparable result within the higher bacterial eradication rate (Table 3a & 3b).

Clinical efficacy studies on topical otic solutions must include a safety evaluation that focuses on ototxic effects. Numerous studies have demonstrated the ototoxic effects of otic preparations especially among laboratory animals such as the guinea pig and chinchillas which includes neomycin and polymyxin[44-50]. However, in spite of ototoxicity, these preparations remain accepted. [51] Many authors believe that the ototoxicity may be lower in human because of anatomical differences and a lesser drug absoption into the round window. Furthermore, inflammation and the presence of secretions can result in a decrease in absorption because of thickening of the mucosal layer.

The ototoxic effects of topical agents are dose- and duration- dependent. Ototopical antibiotic agents such as ofloxacin which brings about a significant clinical improvement after a short course of therapy have less potential to induce ototoxicity. The audiometric results confirm the absence of short-term cochlear ototoxicity. These results must, however, be validated by further studies after a long-term follow-up period and at frequencies higher than 8,000 Hz whereby early cochlear toxicities are usually detected.

Ototoxicity evaluation by adverse event monitoring showed that itchiness and earache were the most common complaint. It is possible that this may have been due to mucosal irritation. However, the severity was not sufficient to cause a discontinuation of treatment. Other subjective complaints included giddiness but results of audiogram studies post-treatment and after 4 weeks were essentially normal and did not substantiate any organic pathology secondary to the drugs.

CONCLUSION

Clinical and bacteriological response to treatment was significantly

better in patients treated with ofloxacin as compared to polymyxin after one week of treatment.

Comparison of clinical response 2 weeks and longer after treatment showed no statistically significant difference between the two treatment groups.

Ofloxacin and polymyxin had comparable safety profiles following 4 weeks of ototopical antibiotic administration. Incidence of adverse events was comparable in the two treatment groups and were generally not serious enough to warrant discontinuation of treatment. Results of audiogram studies showed that ototopical ofloxacin and polymyxin did not result in cochlear toxicity.

The rapid improvement in clinical and bacteriological responses as well as the safety profiles indicate the superiority of ototopical ofloxacin in the medical treatment of chronic suppurative otitis media among adults and children.

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DOUBLE BLIND CONTROLLED STUDY ON THE In Vivo AND In Vitro EFFICACY OF Ipomoea muricata (TONKIN) VERSUS POLYMIXIN B-NEOMYCIN-FLOUCINOLONE ACETONIDE IN THE MEDICAL TREATMENT OF CHRONIC SUPPURATIVE OTITIS MEDIA*

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ABSTRACT

The search for indigenous material and scientific use of herbal medicine in the cost effective treatment of Chronic Suppurative Otitis Media (CSOM) is encouraged by both government and private sector. Ipomoea muricata, or "tonkin" is a plant which holds promise in the local treatment of CSOM, because of its known anti-bacterial, anti-inflammatory and analgesic properties. It is the objective of this study to determine the in vivo and in vitro efficacy of tonkin seed extract coded CMMG 30 versus Polymixin B-Neomycin-Floucinolone Acetonide (Aplosyn™) otic solution in the treatment of CSOM. A double-blind, randomized, controlled clinical trial was performed. There were 38 ears from 31 patients exhibiting otorrhea and tympanic membrane perforation of more than three months that were entered in the study. In vivo evaluation was based on the resolution of otorrhea after the 14-day clinical trial. For the in vitro study, specimen was taken from the middle ear discharge and was sent for gram staining and aerobic culture & sensitivity. The overall clinical response is similar for both medications (94% versus 94%, p=0.5132, Fisher's exact test). Statistical analysis of in vitro studies with Point Biserial Coefficient of Correlation reveals the broad spectrum of activity of CMMG 30 for gram positive and gram negative organism (r_{pb} = 0.18, p=0.27). T-test confirms a significantly higher mean diameter of zone of inhibition for CMMG 30 than Polymixin B-Neomycin-Floucinolone acetonide (t = (-) 6.09, p<0.0001). The results of this prospective randomized study confirms the efficacy of treatment in reducing otorrhea by the daily use of CMMG 30 or Polymixin B-Neomycin-Floucinolone acetonide topical otic solution. The study likewise demonstrated the efficacy of Ipomoea muricata seed extract on microbiological assay by demonstrating a broad spectrum of activity to gram positive and gram negative organisms. Likewise, a better zone of inhibition is demonstrated by CMMG 30. Cost comparison reveals that commercial otic drops are five times more expensive than Ipomoea muricata seed extract.

Keywords: Chronic Suppurative Otitis Media, Ipomoea muricata, herbal medicine topical otic antibiotic.

INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is one of the most common causes of hearing impairment in the Philippines.[1] Active otorrhea in patients with CSOM poses a management problem for clinicians especially in those patients being considered for surgical treatment. To provide an optimal environment for surgery, it is best to treat in an attempt to convert active into inactive disease.[2] In addition, the

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debilitating effects of recurrent ear discharge and the potentially lethal consequences of intracranial complications justify efforts to control and reverse its progression.

In April 1996, a group of ENT specialist convened in Nasugbu, Batangas to deliberate on the issues regarding guidelines on the management of common ENT diseases, included, of course, was CSOM. Based on scientific evidence and strong panel consensus it was "strongly recommended" that topical antibiotics should be the initial management of CSOM for two weeks or less if the ear discharge has dried. Also noted in the review was that there was no convincing evidence to suggest that one topical antibiotic was better than another or that topical antibiotics caused ototoxicity to humans[1]. Since most of these topical antibiotics are imported, great consideration is, therefore, given to finding an inexpensive alternative local topical antibiotic.

Ipomoea muricata, (L) Jacq. (Convolulaceae), commonly known as "tonkin" or "Dominican Bean" is a plant which holds promise in the local treatment of chronic suppurative otitis media because of its known anti-bacterial, anti-inflammatory and analgesic properties[5]. Clinical evidence shows that more and more herbal medicines have produced convincing results in the treatment of various illnesses. The use of Ipomoea muricata is timely especially when the scientific use of herbal medicine is being encouraged by both the government and the private sector.[4]

The general objective of this study is to determine the in vivo and in vitro efficacy of Ipomoea muricata seed extract when compared to Polymixin B-Neomycin-Floucinolone Acetonide (Aplosyn™) otic solution in the treatment of chronic suppurative otitis media.

The specific objectives are: to determine the in vivo efficacy of Ipomoea muricata seed extract in the local treatment of CSOM by noting the improvement, based on the resolution of ear discharge with or without healing of the tympanic membrane perforation; to determine if there is a significant correlation between the type of microorganism (gram negative or positive) and the diameter of the zone of inhibition produced by the alcoholic seed extract of Ipomoea muricata; and to compare the bactericidal property by the mean difference in diameter of the zone of inhibition between the alcoholic seed extract of Ipomoea muricata and Polymixin B-Neomycin-Floucinolone Acetonide (Aplosyn™) otic solution.

METHODOLOGIES

A double-blind, randomized, controlled clinical trial was performed to determine the in vitro and in vivo efficacy of the oil extract from the seed of Ipomoea muricata as compared to commercially available Polymixin B-Neomycin-Floucinolone Acetonide (Aplosyn™) otic solution in the treatment of CSOM. Included in the study were patients seen at the Santo Tomas University Hospital Division of Otorhinolaryngology out-patient-department from August 1997 to November 1997. A detailed clinical history and thorough otologic examination was performed on patients exhibiting otorrhea of more than three months and exhibiting the presence of tympanic membrane perforation.

The following patients were excluded in the study:

1. Patients who have had previous ear surgery.
2. Patients with history of sensitivity to any of the trial drugs.
3. Patients undergoing treatment of CSOM with topical or oral antibiotics within a period of three weeks prior to clinical trial.
4. The presence of suspicious cholesteatoma on mastoid radiograph
5. The presence of otomycosis and/or otitis externa.
6. Children under 4 years old, (lack of pneumatization of the mastoid bone may mimic mastoiditis)
7. Pregnant and Lactating women.

The procedure was carefully explained to each of the participants and an informed consent, written in English and the vernacular was obtained prior to the clinical trial. The test drugs (otic preparation) used in the study were 5 ml of a glycerin preparation with 30% of the crude alcoholic

seed extract of Ipomoea muricata coded as CMMG 30 and 5 ml of the commercially available Polymixin B-Neomycin-Floucinolone Acetonide (Aplosyn™) Otic Drops. The materials were placed in white opaque bottles, all labeled in red, and coded by the senior author from the College of Pharmacy.

Patients entered in the study were assigned randomly to either of the treatment groups: alcoholic seed extract of Ipomoea muricata coded as CMMG 30 or Polymixin B-Neomycin-Floucinolone Acetonide Otic Drops. The patients were advised to apply the medication in a supine position with the involved ear facing the ceiling. Three drops of either medication were to be introduced in the external auditory canal at each application. This procedure was repeated three times a day for two weeks.

A mastoid radiograph was performed prior to enrollment to exclude patients exhibiting suspicious cholesteatoma. A pre-study Pure Tone Audiometric Test was requested to obtain a baseline audiometric level. At the end of the 14 – day treatment, a post-study Pure Tone Audiometric Test was done to observe changes in threshold levels and to determine the possibility of ototoxicity produced by either medication.

After the preliminary examination, swabs of specimen from the middle ear discharge were sent to the University of Santo Tomas Department of Microbiology for gram staining and aerobic culture & sensitivity.[6] The duration of treatment recommended was for two weeks. Patients were evaluated thrice: on the day of inclusion, on the 7th day, and on the 14th day of treatment. Aural toilet was performed on each visit.

Assessment of signs and symptoms were performed by the junior investigator who was blinded to the subjects medication. Patients who exhibited the absence of otorrhea with or without tympanic membrane perforation at the end of the two-week observation period were labeled "improved" while those with persistent otorrhea after the 14th day clinical trial were labeled "not improved" and were subjected to a repeat culture & sensitivity. The choice of treatment for these non-responders were based on the results of the culture & sensitivity.

For the in vitro analysis, the specimen from the middle ear discharge that was sent for evaluation was incubated in a broth for 18-24 hours at 37oC. Gram staining was performed to identify microbiological growth. A portion of the specimen from the incubated broth was inoculated into a Muller Hinton Agar culture medium and tested for CMMG 30 and Polymixin B-Neomycin-Floucinolone Acetonide. The zones of inhibition were measured in mm after an 18-24 hour incubation period and duly recorded.

The content of the corresponding coded bottles were revealed and matched to the patients name and number at the end of the study period. The patients were likewise informed of the test materials at a much later date.

The results of the in vivo study were analyzed using the Fisher Exact Probability Test in order to determine if CMMG 30 is associated with cure. To determine the correlation between the type of bacteria and the diameter of the zone of inhibition produced by CMMG 30 in the in vitro study, the Point Biserial Coefficient of Correlation was used. Finally, a T-test was done to determine the in vitro mean difference in the diameter of zone of inhibition produced by CMMG 30 and Polymixin B-Neomycin-Floucinolone Acetonide on the cultured microorganisms of each subject.

RESULTS

A total number of thirty eight (38) ears from thirty one (31) volunteers demonstrating ear discharge and tympanic membrane perforation were entered into the study. Of the 31 subjects, 7 had bilateral ear discharge and 24 had unilateral ear discharge. The side affected by CSOM was more common on the left ear (AS) with 20 (53%), than the right ear with 18 (47%). The study population consisted of 22 (70%) females and 9 (30%) males, with an age range of 8-75 years old. Pre-study and post-study pure tone audiometric findings were identical for each subject. The mastoid

radiographs interpretation were mastoiditis in 29 patients and normal in two patients (Table1).

Table 1. Mastoid x-ray and Pure Tone Audiometric findings.

PL No	Name	Age Sex	Mastoid X-ray	PTA Pre-study	PTA Post-study
1	S G	60/ F	Mastoiditis AU	Mild CHL, AD Mod CHL, AS	Mild CHL, AD Mod CHL, AS
2	J C.	31/ I	Mastoiditis AU	Normal, AD Mild CHL, AS	Normal, AD Mild CHL AS
3	A T	20/ M	Mastoiditis, AU	Normal, AD Mild CHL, AS	Normal, AD Mild CHL, AS
4	J P	9/M	Normal	Normal, AU	Normal, AU
5	C. R	75/ F	Mastoiditis AU	Mod MHL, AD Sev MHL, AS	Mod MHL, AD Sev MHL, AS
6	R C	36/ F	Mastoiditis AD	Sev MHL AD Mild SHL, AS	Sev MHL, AD Mild SHL, AS
7	A R.	35/ M	Mastoiditis AU	Sev MHL, AU	Sev MHL, AU
8	C R	26/ F	Mastoiditis, AD	Sev CHL, AD Normal, AS	Sev CHL, AD Normal, AS
9	A R.	30/ M	Mastoiditis, AU	Sev MHL, AU	Sev MHL, AU
10	G T.	22/ M	Mastoiditis, AU	Mod CHL, AU	Mod CHL, AU
11	P P	26/ F	Mastoiditis AU	Mild SHL, AD Sev CHL, AS	Mild SHL AD Sev CHL, AS
12	L G.	48/ M	Mastoiditis AU	Sev MHL, AU	Sev MHL, AU
13	I G	48/ M	Mastoiditis, AU	Mod CHL, AD Sev CHL, AS	Mod CHL, AD Sev CHL AS
14	M, A	25/ F	Mastoiditis AS	Mod CHL, AU	Mod CHL, AU
15	S S	15/ F	Mastoiditis, AU	Mild CHL, AD Normal, AS	Mild CHL, AD Normal, AS
16	N A	38/ M	Mastoiditis AU	Mild CHL, AU	Mild CHL, AU
17	M N	26/ F	Normal	Mild CHL, AU	Mild CHL, AU
18	M C	8/F	Mastoiditis AU	Mild MHL, AD Normal, AS	Mild MHL, AD Normal, AS
19	M W	23/ F	Mastoiditis AD	Normal, AD Mild MHL, AS	Normal, AD Mild MHL AS
20	P L	24/ F	Mastoiditis AU	Normal, AD Mod MHL, AS	Normal, AD Mod MHL, AS
21	A Y.	43/ M	Mastoiditis AU	Sev. CHL, AU	Sev CHL, AU
22	M K	51/ F	Mastoiditis AU	Normal, AU	Normal, AU
23	N O	39/ F	Mastoiditis AU	Mod CHL, AU Mild CHL, AS	Mod CHL, AU Mild CHL, AS
24	B R	53/ M	Mastoiditis, AU	Mild CHL, AU	Mild CHL, AU
25	A A.	37/ F	Mastoiditis, AU	Mild CHL, AS Normal, AD	Mild CHL, AS Normal, AD
26	I A	47/ F	Mastoiditis, AU	Mod MHL, AD	Mod MHL, AD Sev CHL, AS
				Sev CHL AS	
27	A R.	40/ F	Mastoiditis, AU	Mild CHL, AD Mod CHL, AS	Mild CHL AD Mod CHL AS
28	A V	22/ F	Mastoiditis, AU	Mod CHL, AU	Mod CHL AU
29	T D	45/ F	Mastoiditis, AU	Mod CHL, AD Mild CHL, AS	Mod CHL AD Mild CHL, AS
30	F B	14/ F	Mastoiditis, AD	Mod CHL, AD Sev CHL, AS	Mod CHL AD Sev CHL, AS
31	D. D.	19/ F	Mastoiditis, AU	Mild CHL, AD Normal, AS	Mild CHL AD Normal AS

LEGEND: CHL-conductive hearing loss MHL-mixed hearing loss SHL-sensorineural hearing loss, Mod-moderate Sev-severe AD-right ear; AS-left ear AU-both ears

There were 19 (50%) ears treated with the alcoholic seed extract of Ipomoea muricata and 19 (50%) ears treated with Polymixin B-Neomycin-Floucinolone Acetonide Otic Drops. Of the 38 ears included in the study, 36 (95%) were labeled "improved" on demonstrating the absence of an ear discharge at the end of the 14 day study period. Eighteen (94%) out of 19 ears treated with CMMG 30 experienced improvement by noting the resolution of otorrhea after the 14 day clinical trial. Likewise, 18 (94%) out of 19 ears improved with Polymixin B-Neomycin-Floucinolone Acetonide. The remaining 2 (5%) ears, one (6%) from each of the study group that demonstrated otorrhea at the end of the clinical trial were labeled "not improved". The ears with persistent otorrhea were subjected to a repeat culture & sensitivity in particular with Ofloxacin, and were treated respectively. Complete resolution of the otorrhea on these two patients were noted after another two weeks. (Table 2).

Table 2 In vivo observation of symptomatology and improvement with test materials

Otic Solution	Pt No	Name	Age Sex	OTORRHEA Day 1	OTORRHEA Day 7	OTORRHEA Day 14	PERFORATION Day 1	PERFORATION Day 7	PERFORATION Day 14	Remarks
Tonkin	1	S G	60/ F	AD, P AS, P	AD A AS, P	AD A AS A	AD P AS P	AD P AS P	AD P AS P	Improved Improved
Polymixin	2	J C	31/ F	AS P	AS, P	AS, A	AS P	AS P	AS P	Improved
Tonkin	3	A T	20/ M	AS P	AS, A	AS A	AS P	AS A	AS A	Improved
Polymixin	4	I D	9/M	AS P	AS A	AS A	AS P	AS D	AS A	Improved
Tonkin	5	C H	75/ F	AS P	AS P	AS A	AS P	AS D	AS P	Improved
Polymixin	6	R L	36/ F	AD, P	AD A	AD A	AD P	AD D	AD P	Improved
Tonkin	7	A R	35/ M	AD P	AD A	AD A	AD P	AD P	AD P	Improved
Polymixin	8	C R	26/ F	AD P	AD A	AD A	AD P	AD A	AD A	Improved
Tonkin	9	A H	30/ M	AS, P	AS P	AS A	AS P	AS P	AS P	Improved
Polymixin	10	S T	22/ M	AS, P	AS, P	AS, A	AS P	AS P	AS P	Improved
Tonkin	11	P P	26/ F	AS, P	AS P	AS A	AS P	AS D	AS P	Improved
Polymixin	12	V P	64 F	AD P AS P	AD P AS P	AD A AS A	AD P AS D	AD P AS D	AD P AS P	Improved
Tonkin	13	I G	48/ M	AD P	AD P	AD A	AD D	AD D	AD A	Improved
Polymixin	14	M A	25/ F	AD P	AD P	AD A	AD D	AD D	AD A	Improved

Tonkin	15	S S	15 F	AD P	AD, P	AD, P	AD, P	AD, P	AD P	Not improved
Tonkin	16	N A	38 M	AD P AS P	AD P AS, P	AD A AS, A	AD, P AS, P	AD, P AS P	AD P AS A	Improved Improved
Polymixin	17	M N	[illegible] F	AD P	AS P	AD A	AD P	AD P	AD A	Improved
Polymixin	18	M C	8 F	AD, P	AD P	AD A	AD P	AD P	AD P	Improved
Tonkin	19	M W	[illegible]	AS P	[illegible]	AS A	AS P	AS P	AS P	Improved
Polymixin	20	P L	[illegible]	AS P	AS P	AS A	AS P	AS P	AS P	Improved
Tonkin	21	A [illegible]	13 M	AD P AS P	AD P AS P	AD A AS A	AD P AS P	AD P AS P	AD P AS P	Improved Improved
Polymixin	22	M K	51 F	AS P	AS, A	AS, A	AS P	AS P	AS A	Improved
Tonkin	23	N O	39 F	AD, P	AD A	AD A	AD, P	AD P	AD P	Improved
Tonkin	24	H R	53/ M	AS P	AS A	AS A	AS, P	AS, P	AS, P	Improved
Polymixin	25	A A	37/ F	AS, P	AS A	AS A	AS P	AS, P	AS, A	Improved
Tonkin	26	L A	47/ F	AD P AS P	AD P AS P	AD, A AS A	AD P AS P	AD P AS P	AD, P AS P	Improved Improved
Tonkin	27	A R	40/ F	AS P	AS A	AS A	AS P	AS P	AS P	Improved
Polymixin	28	A V	22 F	AD P AS P	AD P AS P	AD A AS A	AD P AS P	AD P AS P	AD P AS P	Improved Improved
Polymixin	29	I D	45 F	AD P	AD, P	AD, P	AD, P	AD P	AD P	Not Improved
Polymixin	30	E B	14 F	AD P AS, P	AD P AS P	AD, A AS A	AD, P AS, P	AD P AS P	AD P AS P	Improved Improved
Polymixin	31	D D	19 F	AD P	AD P	AD, A	AD, P	AD P	AD, P	Improved

LEGEND: **AD**-right ear, **AS**-left ear **AU**-both ears, **P**-present, **A**-absent

Statistical analysis of the in vivo study, using the Fisher's Exact Probability Test reveals a p-value of 0.5132 (Figure 1). This means that there is no significant difference between the improvement of symptoms when using the alcoholic seed extract of Ipomoea muricata when compared to Polymixin B-Neomycin-Floucinolone Acetonide Otic Drops.

Figure 1. Statistical analysis using Fisher's Exact Probability Test showing association between treatment with CMMG 30 and Polymixin B-Neomycin-Floucinolone Acetonide

	Improved	Not improved	
CMMG 30	18	1	19
Polymixin B-Neomycin-Floucinolone acetonide	18	1	19
	36	2	38

$$P = \frac{(A+B)!(C+D)!(A+C)!(B+D)!}{N!A!B!C!D}$$

$$P = \frac{(36)!(2)!(19)!(19)}{38!18!18!1!1}$$

$$P = 0.5132$$

Gram staining and culture of the clinical isolates obtained from 38 ears identified a total number of 39 organisms, 30 (76%) were gram negative and 9 (23%) were gram positive organisms. Of the gram negative organism, Pseudomonas aeroginosa 24 (61%) was the most common isolate followed by Providencia 2 (5%), Proteus 1(2%), Klebsiella oxytoca 1(2%), Klebsiella pneumaniae 1(2%) and Escherrichia coli 1(2%). The gram positive isolates were, Staphylococcus aureus 6(15%). There were one each of the following: Staphylococcus epidermidis 1(2%), Streptococcus pneumoniae 1(2%), and Diptheroids 1(2%). No bacterial growth were cultured from middle ear discharges of three ears (Table 3).

Table 3. In vitro study of the zone of inhibition in (mm) with the corresponding type of microorganism isolated from patients

Pt No	Name	Age Sex	Microorganisms	Gram staining	Zone of Inhibition (mm)	
					Polymixin B Neomycin Floucinolone acetonide	CMMG 30
1	S G	[illegible]	Staphylococcus aureus AD Staphylococcus aureus AS	(+) (+)	10 10	[illegible] [illegible]
2	J C	31 F	Staphylococcus aereus	(+)	9	[illegible]
3	A T	20 M	Pseudomonas aeroginosa	(-)	18	[illegible]
4	J P	9 M	Pseudomonas aeroginosa	(-)	16	[illegible]
5	C R	75 F	Pseudomonas aeroginosa	(-)	15	[illegible]
6	R C	36/F	Pseudomonas aeroginosa	(-)	15	[illegible]
7	A R	35 M	Pseudomonas aeroginosa Providencia	(-) (-)	14 R	[illegible] 27
8	C R	26 F	No growth			
9	A R	30 M	Pseudomonas aeroginosa Providencia	(-) (-)	20 15	[illegible]
10	B T	22 M	Pseudomonas aeroginosa	(-	13	[illegible]
11	P P	26 F	Pseudomonas aeroginosa	(-)	[illegible]	[illegible]
12	V E	64/F	Pseudomonas aeroginosa AD Pseudomonas aeroginosa AS	(-) (-)	11 14	23 [illegible]
13	L G	48 M	Escherichia coli	(-)	15	22
14	M A	[illegible] F	Pseudomonas aeroginosa Proteus	(-) (-)	17 R	[illegible] [illegible]
15	S S	[illegible] F	Diptheroid	(+)	R	[illegible]
16	N A	38 M	Staphylococcus epidermidis AD Pseudomonas aeroginosa AS	(+) (-)	13 15	[illegible] [illegible]
17	M D	76 F	Pseudomonas aeroginosa	(-)	16	[illegible]
18	M C	8 F	Pseudomonas aeroginosa	(-)	14	[illegible]
19	M W	23 F	Pseudomonas aeroginosa	(-)	13	[illegible]
20	P L	24/F	Pseudomonas aeroginosa	(-)	13	R
21	A Y	43/M	Pseudomonas aeroginosa AD Pseudomonas aeroginosa AS	(-) (-)	19 18	27 22
22	M K	51/F	Streptococcus pneumonide	(+)	13	[illegible]
23	N O	39 F	Pseudomonas aeroginosa	(-)	11	[illegible]
24	B R	[illegible] M	No growth			
25	A A	[illegible] F	Staphylococcus aureus	(+)	17	[illegible]
26	L A	17 F	Pseudomonas aeroginosa, AD Pseudomonas aeroginosa AS	(-) (-)	[illegible]	[illegible]
27	A R	40/F	Staphylococcus aureus AD Staphylococcus aureus AS	(+) (+)	[illegible]	[illegible]
28	A V	22/F	Klebsiella oxytoca, AD Klebsiella pneumonide AS	(-) (-)	[illegible] 13	[illegible] 21
29	T D	45 F	Pseudomonas aeroginosa	(-)	10	1
30	E B	[illegible]	Pseudomonas aeroginosa AD No growth AS	(-)	17	[illegible]
31	D D	[illegible]	Pseudomonas aeroginosa	(-)	[illegible]	[illegible]

LEGEND: **AD**-right ear **AS**-left ear **AU**-both ears

To determine the significant correlation between the type of microorganism (gram negative or gram positive) and the diameter of the zone of inhibition produced by CMMG 30, a Point Biserial Coefficient of Correlation was used. A p value =0.27, shows that there is no significant correlation between the zone of inhibition on gram positive and gram

negative organism. This indicates that the alcoholic seed extract of Ipomoea muricata covers both types of organism and has a broad spectrum of activity (Figure 2).

Figure 2. Statistical analysis using Point Biserial Coefficient of Correlation to determine between the type of microorganism and the diameter of the zone of inhibition with CMMG 30.

Mean of gram (-) microorganism	Number of gram (-) microorganism
X (-) = 20.3	N (-) =20.3
Mean of gram (-) microorganism	Number of gram (+) microorganism
X (+) = 19	N (+) =20.3
Standard Deviation	Number of microorganism
Sx = 7.09	N = 20.3

Formula

$$r_{pb} = \frac{X(-) - X(+)}{Sx} \cdot \frac{N(-)N(+)}{N(N-1)}$$

$$\frac{20.3 - 19}{7.09}$$

$r_{pb} = 0.18$ $P = 0.27$

By using a T-test to determine the difference in mean diameter of the zone of inhibition produced by the bactericidal activity of 30% alcoholic seed extract of Ipomoea muricata and Polymixin B-Neomycin-Floucinolone Acetonide Otic Drops, a value of t=(-) 6.09, p<0.0001 shall be obtained. This means that the difference in mean diameter of the zone of inhibition in CMMG 30 is significantly bigger than that of Polymixin B-Neomycin-Floucinolone Acetonide (Figure 3).

Figure 3. Statistical analysis using T-test to determine the mean diameter of the zone of inhibition of CMMG 30 with Polymixin B-Neomycin-Floucinolone Acetonide.

$t = \frac{\bar{d}}{S/\sqrt{N}}$	Number of subjects
	N = 39
$t = \frac{7.31}{7.49/\sqrt{39}}$	Mean difference
	D = 7.31
t = 6.01 p < 0.0001	Standard deviation
	S = 7.49

None of the patients in this study demonstrated deterioration in hearing by audiometric findings, hypersensitivity reaction, or vertigo during the four month study.

DISCUSSION

Ipomea muricata or "Tonkin" is plant having originated from the Kingdom of Tonkin, possibly in Hanoi.[8] It is commonly known as "kaladana" in Hindustani, a native of Persia and known in India as "Bhonvari".[9] It has long been cultivated here in the Philippines primarily for its medicinal properties. The seeds, stems and leaves of tonkin are said to be effective against several type of skin ailments. The oil from the seed is said to relieve stomach pain and ear aches.[10]

The late Fr. T. Cajigal, OP then of the Dominican Priory in Manaoag, Pangasinan has been raising Tonkin from 1931-1981. Using the oil extract form pounded seeds, the analgesic and antiseptic effects on various forms of ailments[11] was demonstrated.

The plant is known in the Philippines as "Pepitas de tonkin". Fr Domingo Andres, OP describes the plant as bearing flowers like "campanillas" (bell shaped"); when dried the seeds are white.[8]

The Ipomea muricata plant cultivated at the UST Botanical Garden is an annual herbaceous twining vine growing best in well drained soil. It can grow in most parts of the country. Tonkin is a dry season crop ideally planted in Manila from November to January. Under normal environmental conditions for growth and development, the plant matures in about 3 to 3 ½ months.[11]

The biologically active constituents of Ipomoea muricata are more concentrated on the seeds that are also found to contain alkaloids and sterols.[5,12] Clinical trial by Sibulo et al in 1982 demonstrated the efficacy of Ipomoea muricata in the local treatment of otitis externa. It likewise revealed that the alcoholic extract from the seeds exhibited antibacterial effect against Pseudomonas aeroginosa, Proteus sp, Streptococcus, and Staphylococcus aureus.[4]

Lerma et al (1992), likewise, performed clinical trials on follicular lesions of the oral cavity and oropharyx. The study revealed that Ipomea muricata has a demonstrable antimicrobial, anti-inflammatory, and analgesic properties based on in vitro and vivo testing.[18]

The results of this prospective randomized study confirms the efficacy of treatment in reducing the symptom of ottorhea by the daily use of topical otic solution (antimicrobials) for a 14 day period whether from the alcoholic seed extract of Ipomoea muricata (CMMG 30) or Polymixin B-Neomycin-Floucinolone Acetonide Otic Drops, (94% versus 94%, p=0.5132, Fisher's exact test). It also noteworthy to point out that there was no incidence of hypersensitivity reaction nor untoward effects from the use of Ipomoea muricata.

An illusion of better mean diameter of the zone inhibition by CMMG 30 versus Polymixin B-Neomycin-Floucinolone Acetonide was likewise noted in the study. The discovery of an inexpensive material to substitute costly topical otic preparations is considered a medical breakthrough.[19] Furthermore, the authors' major consideration is the cost effectiveness of the treatment.[20] A 5 ml bottle of a reputed standard commercial topical otic preparation cost approximately P140.00, while a 5 ml solution of alcoholic seed extract of Ipomoea muricata (CMMG 30) costs only P30.00.

Another major problem in the treatment of CSOM is the growing number of antimicrobial resistance of Pseudomonas aeroginosa, which is the most common isolate in CSOM.[14,15] The demonstration of Ipomoea muricata's antimicrobial activity against gram negative and gram positive organism during the in vitro study, makes it an ideal choice of medication in local treatment of CSOM. The cost effectiveness of treatment with Ipomoea muricata and coverage to Pseudomonas aeroginosa are the two main reasons for this clinical trial.

CONCLUSION

In conclusion, this study has demonstrated the in vivo and in vitro efficacy of Ipomea muricata seed extract in the treatment of Chronic Suppurative Otitis media based on the following:

1. The in vivo clinical trial in terms of improvement by the resolution of otorrhea with or without tympanic membrane perforation after local treatment of Chronic Suppurative Otitis Media.
2. The in vitro microbiological assay Ipomoea muricata on the zones of inhibition of aerobic gram negative and gram positive.

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Topical Ciprofloxacin in the Management of Chronic Suppurative Otitis Media in Adults: Preliminary Experience in Forty Patients*

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ABSTRACT

40 patients aged 19-59 years old with chronic suppurative otitis media were controlled in a prospective randomized double-blind study to determine and compare the therapeutic efficacy of topical Ciprofloxacin and Polymixin-Neomycin-Dexamethasone Otic Drop in the treatment of Chronic Suppurative Otitis Media in adults in a tertiary Philippine Medical Center from March 1996 – October 1996.

Topical solutions of Ciprofloxacin and Polymixin-Neomycin-Dexamethasone were administered to two groups of 20 patients each, three times daily for 14 days. The former group had an 85% cure rate compared to 45% in the latter and topical Ciprofloxacin was found to be a safe and cost-effective topical treatment for chronic suppurative otitis media in adult.

Keywords: Ciprofloxacin, CSOM, "dry ear"

INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is defined by the persistent perforation of the tympanic membrane with ear discharge of more than three months. It is a chronic inflammatory process which is slow and insidious in its course, tends to be persistent and is very often destructive with sometimes irreversible sequelae. The prevalence of CSOM is estimated at 2.5 % to 29.5 % based on the several surveys among Filipino children.

Most chronic ear drainage result from mixed infections of aerobic and anaerobic pathogens. Predominating organisms are usually gram negative bacilli, commonly Pseudomonas aeruginosa, Klebsiella pneumoniae and Proteus mirabilis. Other pathogens include gram positive cocci, namely; Staphylococcus aureus and Streptococcus pneumoniae.

To obtain a "dry" ear is the ultimate goal of the Otorhinolaryngologist prior to surgery if necessary. Therapy consists of meticulous and repeated cleaning of middle ear and ear canal, the use of topical antimicrobial medication and the creation of an unfavorable environment for bacterial and fungal growth. In the Philippines, treatment of CSOM consists of topical antimicrobial medication with or without steroids and aural cleansing of middle ear and ear canal with Hydrogen Peroxide or 2 % Acetic Acid solution.

Multiresistant bacteria and low concentration of antibiotics in the middle ear are the main causes of treatment failure with conventional systematic antibiotics. Foreign studies have been reviewed using topical Ciprofloxacin for treatment of chronic ear diseases have found out that topical Ciproflaxin is safe and effective in the treatment of CSOM. Ciprofloxacin is a relatively new flouroquinolone that is highly active against gram negative bacteria, especially against Pseudomonas and Methicillin-resistant Staphylococcus aureus. Ciprofloxacin inhibits the enzyme DNA gyrase. During the proliferation phase of bacterium, a segmental twisting and

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untwisting of the chromosome take place. With the inhibition of this enzyme DNA gyrase, vital information can no longer be read from the bacterial chromosome, hence, arrest bacterial metabolism.

To date, Ciprofloxacin is not a well-known agent for use as a topical otic preparation in the management of Chronic Suppurative Otitis Media. In the Philippine setting, none, but few Otorhinolaryngologists are using the Ophthalmic Ciprofloxacin hydrochloride solution in the treatment of CSOM. Topical Ciprofloxacin is being manufactured as ophthalmic solution rather than an otic solution. No study has been made here in the Philippines regarding the use of Ophthalmic Ciprofloxacin HCl solution in the management of CSOM.

The goal of the author is to determine and compare the therapeutic efficacy of topical Ciprofloxacin and Polymixin-Neomycin-Otic Drops in the treatment of Chronic Suppurative Otitis Media. The study aims to determine the most common microorganisms seen in patients with CSOM. It also aims to determine and compare the duration of treatment of CSOM using the topical Ciprofloxacin against Polymixin-Neomycin-Dexamethasone Otic Drops as well as the success rate of the two topical solutions.

METHODOLOGY

This is a prospective randomized double-blind study carried out in the University of the East Ramon Magsaysay Memorial Medical Center- Out Patient Department, Manila. Philippines between March 1996 and October 1996. All adult patients with a history of otorrhea for more than 3 months were examined by the ENT Resident Physician at the OPD. Those forty (40) adult patients, aged 19 to 59 years old, diagnosed to have chronic suppurative otitis media were included in the study. Twenty-five (25) patients were female and fifteen (15) were males. Patients who had a history of allergy to fluroquinolone derivatives, aminoglycosides and Polymixins, those with history of allergic rhinitis, those who were younger than eighteen years of age or who had a history of general health problems were excluded from the study. Patients who did not use the topical solutions regularly and those who had taken any other medications during the study period or at least 10 days prior to treatment were excluded from the study. Each patient was assigned a number and all odd numbered patients were assigned to the study group. The study group received Bottle A containing Ciprofloxacin Ophthalmic solution (0.3%) to be instilled locally five drops three times a day to the affected ear. All even numbered patients were assigned to the control group. The control group received Bottle B containing Polymixin SO4-Neomycin SO4- Dexamethasone (1.25 mg, 3.5 mg, and 1.00 mg, respectively) Otic Drops to be instilled to the affected ear five drops three times a day. Both medications were placed in an identical amber-colored bottles. Neither the ENT physician at the OPD nor the patients were aware of the contents of both bottles. Both groups has their affected ears meticulously cleaned with 2 % Acetic Acid. Cultures of the ear discharge were done before treatment, upon cessation of otorrhea and after treatment period. All patients were followed-up on the 3^{rd}, 5^{th}, 7^{th}, 10^{th} and 14^{th} day. Outcomes were evaluated by otoscopic examination. The cessation of otorrhea and eradication of the microorganisms in the post-treatment cultures were accepted as clinical success.

The Unpaired Students T-Test was used to compare the duration of treatment and the Chi square test used to compare the success rate of both groups.

RESULTS

Forty patients with a diagnosis of chronic suppurative otitis media were enrolled in the study. Twenty- five (25) were female and fifteen (15) were male; their ages ranged from 19 to 59 years old. The mean age was 29 years. Twenty (20) patients were randomly assigned to the study group and twenty (20) patients belonged to the control group.

Table 1 shows the culture results of the ear discharges of all the patients. The most common microorganisms isolated in the culture were Pseudomonas aeruginosa (62.5%), Staphylococcus aureus (17.5%) and Proteus mirabilis (10%).

Table 1 Culture Results Pre-treatment

MICROORGANISM	NO OF PATIENTS
Pseudomonas aeruginosa	25(62.5%)
Staphylococcus aereus	7(17.5%)
Klebsiella pneumoniae	3(7.5%)
Proteus mirabilis	4(10%)
Enterobacter	1(2.5%)
No Growth	0

Culture results of pre-treatment and post-treatment periods in the study group (Ciprofloxacin) are shown in Table 2. Seventeen (85%) of the twenty (20) patients with CSOM were cured and 3 (15%) patients had persistence of otorrhea with positive cultures of P. aeruginosa and Klebsiella after day 14.

Table 2 Culture Results of Pre-treatment and Post-Treatment in Ciprofloxacin Group

MICROORGANISM	PRE-TREATMENT	POST-TREATMENT
Pseudomonas aeruginosa	14	2
Staphylococcus aureus	3	0
Klebsiella pneumoniae	1	1
Proteus mirabilis	1	0
Enterobacter	1	0
No Growth	0	17

In the control group, as seen in table 3, nine (45%) of the 20 patients showed no growth in the post-treatment cultures. Eleven (55%) patients showed slight clinical improvement but no bacteriologic change. Pseudomonas aeruginosa persistently appeared in the cultures done after the post-treatment period.

Table 3 Culture Results of Pre-treatment and Post-Treatment in Polymixin-Neomycin-Dexamethasone Group

MICROORGANISM	PRE-TREATMENT	POST-TREATMENT
Pseudomonas aeruginosa	11	5
Staphylococcus aureus	4	2
Klebsiella pneumoniae	2	2
Proteus mirabilis	3	2
Enterobacter	0	0
No Growth	0	9

The duration of treatment between the study and control groups are reflected in Table 4. For the study group, at Day 7, nine (45%) patients had a cessation of otorrhea and eradication of microorganisms. However, three patients had persistence of otorrhea with positive bacteriologic studies. For the control group, only two (10%) out of twenty patients were cured at day seven and eleven (55%) patients had persistent otorrhea and positive bacteriologic studies after day 14. However, seven (35%) patients were cured at day 10. The Unpaired Students T-Test was used to compare the duration of treatment of the two groups. The differences were significant ($P<0.01$).

Table 4 Duration of Treatment (DAYS)

DAY	STUDY GROUP	CONTROL GROUP
3	0	0
5	5	0
7	9	2
10	3	7
14	0	0
>14	3	11

The success rate of treatment is shown in Table 5. In the Study group, seventeen (17) out of twenty (20) patients or 85% recovered during the treatment period of two weeks while three (15%) patients had persistence of otorrhea with positive bacteriologic cultures after the 14 day treatment period. The control group has a lower percentage recovery of 45% with a treatment failure of 55%. Chi-square test was used to compare the success rate of the two topical solutions and it was significant ($P<0.01$).

TABLE 5 Success Rates

GROUP	RECOVERY RATE	FAILURE OF TREATMENT (%)
Study Group	17 (85%)	3 (15%)
Control Group	9 (45%)	11 (55%)

DISCUSSION

The goal of treatment for an acute exacerbation of COM is to achieve a dry, aerated ear and to prepare a subset for subsequent surgery. Therapy includes frequent aspiration and protection of the ear and the use of oral or topical antimicrobials. According to the ENT Clinical Practice Guidelines of the Philippine Society of Otorhinolaryngology Head and Neck Surgery, aural hygiene is an essential part of the treatment of CSOM in all patients. Topical antibiotics for two weeks or earlier if the ear discharge has dried, should be used for the initial management of CSOM. For treatment failures, an additional two weeks of topical antibiotic therapy should be tried. Based on strong scientific evidence from the results of the meta-analysis of Acuin et al, topical antibiotics are more effective than systematic antibiotics (either alone or combined with topical antibiotics). The panel members of the consensus building of the Phil, Society of Otorhinolaryngology Head and Neck Surgery also agreed upon

the ineffectiveness of most systematic antibiotics in resolving CSOM. However, a lot of practicing Otorhinolaryngologists still use oral antibiotics combined with a topical antimicrobials in the treatment of CSOM. The mode of antibiotic administration remains controversial.

The most common causative agents in CSOM are Pseudomonas aeruginosa, Staphylococcus aureus and Proteus mirabilis which are often resistant to several classes of antibiotics. Therefore, the first drug of choice should be active against these microorganisms. Polymixin-Neomycin SO4 with Dexamethasone is highly effective against gram negative bacteria, and was chosen for the study as it is commonly employed in the topical treatment of CSOM. Although, the ENT Clinical Practice Guidelines of the PSO-H & N Surgery states that there is no convincing evidence to suggest that one topical antibiotics is better than another. Ciprofloxacin, a new flouroquinolone derivative, has been used clinically in oral and in topical forms.

In 1985, in two different studies in Japan, Fujimaki et al and Mori et al reported a high frequency of clinical resolution and bacteriological eradication following oral administration of 200 mg. of Ciprofloxacin HCl three times a day. Wright and Meyerhoff observed a low percentage of remission and bacteriological eradication following a 250 mg. dose of Ciprofloxacin given orally twice daily and good results obtained following topical treatment with the same drug.

To date, Ciprofloxacin is not a well-known agent for use as a topical otic preparation. There are, however, a few recent studies that support the use of Ciprofloxacin as a topical otic preparation. Esposito et al evaluated topical and oral treatment of chronic otitis media with Ciprofloxacin. Sixty patients were randomized to three groups: group A received 250mg. of oral Ciprofloxacin, twice daily; group B received 3 drops of ototopical Ciprofloxacin (250 micrograms/ml), twice daily; and group C received both treatments. Maximum duration of treatment was ten days. In 46% (28/60) of patients, ear cultures grew P. aeruginosa; the remainder had gram positive cocci (39%) and Enterobactericeae (15%). Eight (40%) of 20 patients in group A, 19 (95%) of 20 patients in group B and 17 (85%) of 20 patients in group C had no bacteria 24 hours after cessation of therapy. No adverse effects were observed in any patient, and patients receiving ototopical therapy had no change in their hearing. The investigators concluded that locally administered Ciprofloxacin is effective in curing chronic otitis media.

Hart et al reported a study using topical Ciprofloxacin (0.3%) for otorrhea after tympanostomy tube replacement in ten children aged 3 to 8 years old. The study showed nine out of ten children were improved or cured at day 7 of treatment. No adverse effects were noted. Ciprofloxacin did not affect the hearing of the children tested.

Tutkun et al investigated fortyfour adult patients with chronic suppurative otitis media using topical Ciprofloxacin and Gentamycin otic drops and compared the therapeutic efficiency of the two drugs. All the patients were randomized to two groups: group A received topical Ciprofloxacin (200 mg/ml) to be instilled five drops three times a day and group B received Gentamycin otic drops (5 mg/ml) to instilled five drops three times a day. The maximum duration of treatment was ten days. P. aeruginosa was the most common microorganism isolated in the patients' cultures. Eighty eight percent of the patients in the Ciprofloxacin group were totally cured after ten day treatment while only thirty per cent in the Gentamycin group with CSOM were cured. No side effects were noted. The author concluded that topical Ciprofloxacin is more efficacious than topical Gentamycin for the treatment of CSOM, suggesting the use of this formulation as a first choice treatment in these patients.

Considering the results of these studies, the author decided to do a similar study in the Philippine setting by comparing the therapeutic efficacy of the commercially available Ciprofloxacin ophthalmic solution and Polymixin-Neomycin-Dexamethasone otic drop as well as compare the duration of treatment and success rate of the two topical solutions.

In the present study, P. aeruginosa (62%) was the most common aerobic gram negative pathogen isolated from forty patients with CSOM based on the pre-treatment cultures. Topical Ciprofloxacin was effective in eradicating the microorganisms in 85% of the patients with CSOM. Topical Polymixin-Neomycin-Dexamethasone otic drops has a lower response rate of 45% in eradicating the pathogens in patients with CSOM. Topical Ciprofloxacin has a shorter duration of treatment as compared to topical Polymixin-Neomycin-Dexamethasone drops. No adverse effects were noted in the use of topical Ciprofloxacin. The amount of Ciprofloxacin in the preparation is sufficient for obtaining a dry ear, which is the goal of medical treatment for CSOM and a clinical objective in the anticipation of surgery.

CONCLUSION

Although the findings were based on a small sample size, the study shows that topical Ciprofloxacin seems to be useful, effective and safe to use in the treatment of chronic suppurative otitis media suggesting the use of this formulation as an alternative treatment.

RECOMMENDATIONS

The author would like to recommend the following:

1. Future studies should be done using topical Ciprofloxacin in the treatment of CSOM in a large sample size.
2. A similar study should be done on children with CSOM using topical Ciprofloxacin.
3. A similar study should be done on patients with CSOM using topical Ciprofloxacin comparing the hearing levels of patients before and after treatment.
4. A future study should be done on patients with CSOM with in-vitro studies of susceptibility of microorganisms to Ciprofloxacin.

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A Study Comparing Nasal Endoscopy with Anterior Rhinoscopy + Posterior Rhinoscopy + Decongestion + Suctioning in Evaluation of Nasal Discharge in Sinusitis*

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ABSTRACT

To determine whether a difference exists in the evaluation of nasal discharge in patients with sinonasal using conventional rhinoscopy (anterior and posterior with decongestion and suctioning) versus nasal endoscopy, a double blind, prospective, analytical study involving 60 patients was conducted at a tertiary Philippine Medical Center.

Thirty outpatients with sinonasal complaints and thirty outpatients with other ENT problems were screened endoscopically, for nasal discharge, and enrolled in the study and control group respectively, for nasal discharge,

Keywords: Nasal endoscopy, anterior rhinoscopy + posterior rhinoscopy + decongestion + suctioning, nasal discharge, physical evaluation of sinusitis

INTRODUCTION

Sinonasal endoscopy has dramatically revolutionized the care of patients with sinus and nasal diseases.[1] Its value in evaluating the depths of the nasal cavity and anatomy of the lateral nasal wall cannot be overemphasized. Its role in surgical management of chronic sinus diseases, nasal and paranasal sinus neoplasms is well established. It has allowed better visualization of landmarks in the surgical field, provided access to difficult areas of the sinuses, reduced morbidity and surgical complications compared to traditional approaches to the sinuses.

Numerous authors have advocated nasal endoscopy to be a part of the routine evaluation of patients with sinonasal complaints. Levine[1] found that nasal endoscopy revealed 38.7% additional pathology as compared to traditional anterior and posterior rhinoscopy. Gustafson and Kern[2] suggested that routine endoscopy be performed over anterior rhinoscopy citing its numerous advantages. Castellanos and Axelrod[3] found flexible rhinoscopy of value in evaluation of sinus diseases. Benninger's series[4], on the other hand, showed that diagnostic nasal endoscopy did not substantially improve diagnosis and treatment planning in patients who presented with nasal-sinus complaints in comparison with history and anterior/posterior rhinoscopy in the office setting.

In a developing nation such as the Philippines, the availability of such sophisticated tools are limited and the cost is exorbitant, especially in the rural setting. Should nasal endoscopy be done in all patients with nasal-sinus complaints? Is routinely a disservice to patients done when routine nasal endoscopy is not performed?

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Thorough history taking, coupled with the anterior rhinoscopy, posterior mirror examination, adequate decongestion and plain radiographs have been the armamentarium of the ENT specialists in the diagnosis of sinusitis. Stammberger and Wolf proposed the triad of nasal obstruction or stuffiness, pathologic secretions (purulent or mucoid) and headache or tenderness localized to the area of the sinuses as diagnostic of sinusitis. The Philippine Society of Otolaryngology-Head and Neck Surgery Clinical Practice Guidelines-1996 suggested that the diagnosis of sinusitis can be made with the presence of purulent nasal discharge either from the middle meatus or occasionally form the superior meatus. Several studies confirmed that purulent nasal discharge is the most consistent finding in patients with this disease entity.

OBJECTIVE

This study was made to determine if there is a difference in evaluating the presence of nasal discharge in patients with sinonasal complaints using **anteior & posterior rhinoscopy + decongestion + suctioning** against **nasal endoscopy**, the latter serving as the gold standard.

MATERIALS AND METHODOLOGY

Thirty patients (GroupA) with sinonasal seen at the out patient department from July to September 1997 were randomly chosen. **Screening endoscopy** was done by the senior author using either 4.0 mm or 2.7 mm (zero and thirty degree) endoscopes (Figures 1 & 2). Positive purulent nasal discharge either from middle meatus or vicinity of the nasopahrynx was thus determined by endoscopy (Figure 3). Unilateral or bilateral nasal discharge was acceptable.

Figure 1. Initial examiner performing nasal endoscopy to determine presence of purulent nasal discharge.

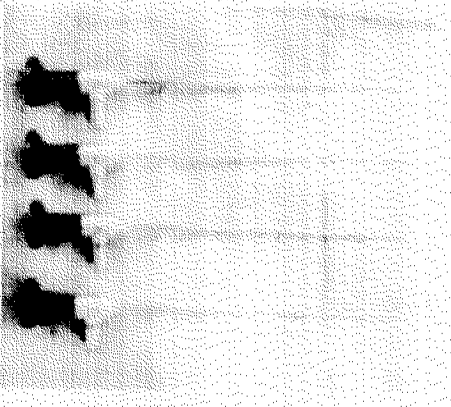

Figure 2. Profile of the nasal endoscopes used for screening (2.7 mm and 4.0 mm)

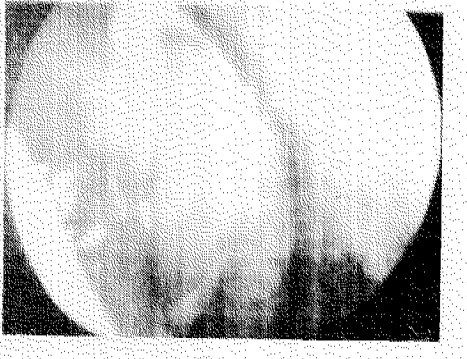

Figure 3. Endoscopic view of purulent nasal discharge from middle meatus.

Another set of thirty patients (Group B), age-and sex-matched against the study group, who came to the outpatient department with problems other than sinonasal complaints were screened endoscopically.

On a random basis, a second examiner, blinded to the patients' complaints and endoscopic findings, performed **anterior & posterior rhinoscopy + decongestion + suctioning** on each patient. Xyclometazoline was used as decongestant. Presence of purulent nasal discharge was determined by rhinoscopy and further confirmed by suctioning using transparent nasal tubing (Figure 4). This was labeled positive (+) and absence of discharge was considered negative (-). Even with discovery of purulent nasal discharge on initial anterior and posterior rhinoscopy, all patients were decongested and suctioning was still performed to confirm the finding. Irrespective of the laterality of the discharge, the presence of purulent discharge on suctioning on either nostril was considered positive.

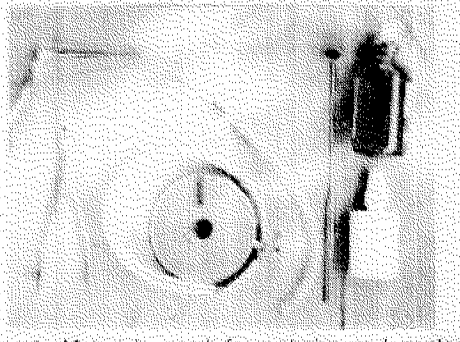

Figure 4. Materials used for anterior and posterior rhinoscopy, decongestion and suctioning.

Those with benign or malignant nasal or paranasal sinus neoplasms (nasal polyps, papillomas, SCCA, hemangiomas), with history of epistaxis, with severe septal deviation, hypertrophied turbinates, history of nasal bone fracture or previous sinunasal surgery, pregnant and lactating females, patients with bleeding disorder and hypertension were excluded in the study.

Chi-square analysis was used as statistical device.

RESULTS

Age range of both groups were from 20-50 years old, mean age was 34.1 years. There were 29 males and 31 females. In **Group A** (those with nasal discharge on screening endoscopy), 16 patients were diagnosed to have Chronic Sinusitis, 10 had Acute Sinusitis and 4 had Chronic Sinusitis with bilateral Chronic Suppurative Otitis Media. Eighteen patients (18) had nasal discharge as the main problem, 9 had nasal obstruction and nasal discharge while the remaining 3 patients had facial pain as complaints for consultation. Twenty-five (25) of the 30 patients in the group had purulent nasal discharge upon suctioning. Most of the discharge came from the middle meatus especially in patients with Acute Sinusitis. No discharge was seen on 5 patients using the routine anterior & posterior rhinoscopy with suctioning. Of the five patients, 3 patients had Chronic Sinusitis, while the other patients had Chronic Suppurative Otitis Media and Chronic Sinusitis. Complaints for consult were nasal discharge and nasal obstruction. In these patients, the secretions came from the superior meatus as seen on endoscopy. (Table1)

Table 1. GROUP A (Study Group)

Patient	Age	Sex	Chief complaint	Diagnosis	Nasal Endoscopy	MM-SM-SP
U. S.	29	Male	Nasal discharge	Chronic Sinusitis	(+) MM-SM	(+) purulent discharge
D. S.	29	Male	Nasal obstr./discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
E. C.	20	Male	Nasal discharge	Acute Sinusitis	(+) MM	(+) purulent discharge
R. B.	40	Female	Nasal obstr./discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
C. A.	35	Female	Nasal discharge	CSOM,C Sinusitis	(+) MM	(+) purulent discharge
M. R.	23	Male	Nasal discharge	Chronic Sinusitis	(+) SM	(+) purulent discharge
F. M.	38	Male	Nasal discharge	CSOM,C Sinusitis	(+) SM	(+) purulent discharge
R. L.	40	Female	Nasal discharge	Chronic Sinusitis	(+) MM/SM	(+) purulent discharge
R. D.	39	Male	Nasal discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
T. L.	31	Female	Nasal discharge	Acute Sinusitis	(+) MM/NP	(+) purulent discharge
C. A.	28	Female	Nasal obstr./discharge	CSOM,C Sinusitis	(+) SM	(+) purulent discharge
A. P.	20	Female	Nasal obstr/discharge	Chronic Sinusitis	(+) SM	(+) purulent discharge
R. S.	50	Male	Nasal obstr/discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
C. M.	37	Female	Nasal discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
A. dC.	26	Male	Nasal discharge	Acute Sinusitis	(+) MM/NP	(+) purulent discharge
[illegible]	31	Female	Nasal discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
M. SJ.	31	Female	Nasal discharge	CSOM,C Sinusitis	(+) SM	(+) purulent discharge
S. A.	40	Female	Nasal obstr/discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
O. M.	27	Male	Nasal discharge	Chronic Sinusitis	(+) SM	(+) purulent discharge
V. G.	33	Female	Headache	Acute Sinusitis	(+) MM/NP	(+) purulent discharge
D. B.	45	Female	Nasal obstr/discharge	Chronic Sinusitis	(+) MM	(+) purulent discharge
M. M.	40	Male	Nasal obstr/discharge	Acute Sinusitis	(+) MM	(+) purulent discharge
L. B.	20	Female	Headache	Chronic Sinusitis	(+) SM/NP	(+) purulent discharge
C. C.	30	Female	Nasal obstr/discharge	Chronic Sinusitis	(+) MM-SM	(+) purulent discharge
V. L.	20	Male	Headache	Acute Sinusitis	(+) SM	(+) purulent discharge
A. M.	31	Female	Nasal obstr/discharge	Chronic Sinusitis	(+) MM-SM	(+) purulent discharge
A. T.	37	Female	Nasal discharge	Acute Sinusitis	(+) MM	(+) purulent discharge
V. R.	44	Male	Nasal discharge	Chronic Sinusitis	(+) SM/NP	(+) purulent discharge

A C	36	Female	Nasal discharge	Acute Sinusitis	(+) MM	(+) purulent discharge
E L	26	Femal	Nasal obstr/disch arge	Acute Sinusitis	(+) MM/NP	(+) purulent discharge

LEGEND: AR+PR+D+S= Anterior Rhinoscopy + Posterior Rhinoscopy + Decongestion + Suctioning

Of the 30 patients in **Group B** (those belonging to the control group), the result of anterior rhinoscopy + posterior rhinoscopy + decongestion + suctioning was negative. No purulent secretions were suctioned from all patients after adequate decongestion.(Table 2)

Table 2. GROUP (Control Group)

Patient	Age	Sex	Chief complaint	Diagnosis	Nasal Endoscopy	AR+PR+D+S
M G	22	Male	Ear discharge, left	CSOM AS	negative	Negative
N dG	25	Female	Mass cheek right	Sebaceous Cyst	negative	Negative
S J	26	Male	Headache	Cluster Headache	negative	Negative
L M	33	Female	Otalgia right	Otitis Externa, AD	negative	Negative
A A	31	Female	Otalgia right	Impacted, Cerumen	negative	Negative
B P	42	Female	Aural fullness bilateral	Impacted Cerumen	negative	Negative
G R	47	Female	Otalgia left	Impacted Cerumen	negative	Negative
T A	50	Male	Sore throat	Acute Tonsillitis	negative	Negative
A A	47	Female	hoarseness	T/C VC nodule	negative	Negative
E dJ	29	Male	dysphagia	Acute Pharyngitis	negative	Negative
C S	35	Female	Sore throat	Acute Tonsillitis	negative	Negative
F R	21	Male	Otalgia right	Otitis Externa AD	negative	negative
M R	21	Male	Pre-auricular mass left	T/C Parotid NG	negative	Negative
D M	44	Male	Otalgia left	Impacted Cerumen	negative	Negative
A B.	30	Male	Pre-auricular mass left	Sebaceous Cyst	negative	Negative
J L	50	Female	Pre-auricular mass left	T/C Parotid NG	negative	Negative
A N	22	Female	Sore throat	Acute Tonsillitis	negative	Negative
I S	46	Male	Ear discharge right	CSOM, AD	negative	Negative
D C	44	Female	Recurrent epistaxis	Blood Dyscrasia	negative	Negative
H O	16	Female	Aural pruritus	Otomycosis AD	negative	Negative
D P	37	Male	Mass lower lip	T/C Hemangioma	negative	Negative
I V	37	Male	Sore throat	Acute Pharyngitis	negative	Negative
M S	49	Female	Itchiness right ear	Otomycosis AD	negative	Negative
G G	21	Male	Headache	Cluster Headache	negative	Negative
C M	25	Female	Aural fullness, left	Impacted Cerumen	negative	Negative
N C	25	Male	dysphagia	T/C Globus	negative	Negative
F C	37	Male	Sore throat	Acute Pharyngitis	negative	Negative
K G	31	Male	Ear discharge left	AOM AD	Negative	Negative
P G	43	Male	hoarseness	Acute Laryngitis	negative	Negative
J B	49	Female	hoarseness	NG glottis	negative	Negative

LEGEND: AR+PR+D+S= Anterior Rhinoscopy + Posterior Rhinoscopy + Decongestion + Suctioning

ANALYSIS OF DATA

Using the chi-square test ($p<0.05$), there is no significant difference between anterior rhinoscopy + posterior rhinoscopy + decongestion = suctioning as against nasal endoscopy in evaluation of nasal discharge in patients with sinusitis.(Table 3)

Table 3. Statistical Analysis using Chi-square

		Purulent nasal discharge on Endoscopy		
		+	-	
AR+PR+D+S	+	25	0	25
	-	5	30	35
		30	30	60

N=60

$$X^2=\frac{((A-D)-1)^2}{A+D}$$

$$=\frac{((25-30)-1)^2}{25+30}$$

$X^2=0.654$ *p (<0.05)=3.84 df=1

DISCUSSION

Until the turn of the century, the performance of thorough intranasal examination remained an elusive goal.[2] For years, the nasal speculum and posterior mirror remained as the armamentarium of the rhinosinusologist. However, in 1901 Hirschmann introduced the technique of nasal and sinus endoscopy using a modified cystoscope.[2] Comprehensive works by Messerklinger and Terrier further improved this technique which subsequently gained acceptance.

Many have advocated routine use of the endoscope in evaluating patients with nasal or sinus related problems. Nasal endoscopy has its inherent advantages,[2] namely: a) brilliant illumination and enhanced visualization of entire nasal cavity, b) better documentation; c) excellent teaching tool for students and residents alike. However, its use in all patients with rhinologic complaints may not be needed. The use of endoscopy entails practice and experience. There are also costs associated with the procedure not only for the patient but likewise for the physician. The patient may have to pay additional fees for the procedure. Another factor to consider is the purchase, maintenance, care and possible repair of the scopes. Like any other invasive procedure some morbidity may be associated with endoscopy but this can be minimized with experience and proficiency.

The nasal speculum and the posterior mirror have its limitations. These

include difficulty to visualize anatomic structures beyond the anterior tip of the middle turbinate, limitation in the presence of several anatomic variations such as severe septal deviation, hypertrophied turbinates or paradoxically bent uncinate process for the anterior rhinoscope. The posterior mirror often fails to visualize normal anatomic structures especially in the presence of profuse discharge or nasopharyngeal lesion. However both instruments are readily available and affordable for the practicing otorhinolaryngologist.

The use of the endoscope in the initial visit of patients with history and physical examination consistent with sinusitis and complaining of nasal discharge may not be needed as shown by this study. Twenty five (25) of the 30 or 83.33% of patients belonging to **Group A** had positive results using the traditional method. It must be emphasized that not only anterior and posterior rhinoscopy should be done but adequate decongestion and more importantly, suctioning should be performed also not only to confirm the presence of any form of discharge but also to determine the quality of the discharge. Because of time constraints, most specialists fail to do this last procedure which is very important not only for the physician but, more importantly, for the patient. Suctioning of secretions relieves the patient of the sense of nasal obstruction. Likewise, suctioning will outline the anatomy previously obscured by the discharge affording a better perspective of the interior of the nasal cavity. Thus, small polyps or lesions may be detected. Anterior and posterior rhinoscopy, decongestion and suctioning are complementary procedures in evaluating patients with history of sino-nasal complaints.

Of the 30 patients in the control group, all had no discharge upon anterior rhinoscopy, posterior rhinoscopy, decongestion and suctioning. This indicates that the possibility of getting false positive results is remote. Negative findings on nasal endoscopy would mean the same on anterior rhinoscopy, posterior rhinoscopy, decongestion and suctioning.

The endoscope may be considered by many to be the most exciting development in the field of rhinology since the introduction of the operating microscope which revolutionalized otologic surgery. However, we believe that there is still a niche for anterior rhinoscopy, posterior mirror examination and suctioning for diagnostic purposes. This is especially true for patients who are unable to afford the fee for such a procedure and more importantly for the practicing ENT specialist who does not have the luxury of acquiring such an expensive instrument.

CONCLUSION

There is no significant difference between **anterior rhinoscopy + posterior rhinoscopy + decongestion + suctioning** and **nasal endoscopy** in the evaluation and visualization of nasal discharge for the diagnosis of sinusitis.

RECOMMENDATIONS

a. Anterior rhinoscopy + posterior rhinoscopy + decongestion + suctioning is sufficient for evaluating patients with sinunasal complaints during their initial visit.
b. Diagnostic nasal endoscopy may be used after failure of treatment to further assess the nasal cavity for any pathology not appreciated using the above procedure.

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CLINICOPATHOLOGIC PROGNOSTICATION OF NASOPHARYNGEAL CARCINOMA IN FILIPINO PATIENTS*

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ABSTRACT

Different parameters have been used in prognostication of squamous cell carcinoma of head and neck. This study was designed to address the correlations between various clinical, histological, and immunuhistopathological factors of nasopharyngeal carcinoma afflicting Filipino patients studied. In addition, it aimed to establish the prognostic weight of these parameters with the 24-month survival rate in the group under investigation post-Cobalt therapy. A total of 19 patients were biopsied for diagnosis of NPCA. All patients underwent Cobalt therapy and had regular follow-up for 2 years. Fresh biopsies were stained with H & E and evaluated based on differentiation, nuclear grading, growth patterns, desmoplasia, inflammatory infiltrates, tumour vascularization (angiogenesis), and mitotic index. In addition, immunohistochemical staining with cytokeratin 5& 8 was done and slides were evaluated with light microscopy for the presence or absence of high molecular weight cytokeratin. Odds ratio was used to describe the strength of relationship between the parameters observed at the 24-month survival rate post-Cobalt therapy and Cox-Mantel logrank statistics has established the difference in the survival rates of cytokeratin-positive and cytokeratin-negative groups. High odds ratio were noted in the following parameters; namely. cytokeratin 5 & 8 - 5.84, inflammation- 5.5, tumor growth 2.20 level of nodal involvement 1.16, and vascularization or angiogenesis- 1.50. The over-all 24 month survival rate for this group of patient was 68.42%. Those whose tumour stained positively with cytokeratin 5& 8 was 87.5% while those that did not stain with cytokeratin 5 & 8 was 50%. The difference between the 2 groups compared was statistically significant. Among the parameters investigated, positive immunohistochemical staining with cytokeratin 5 & 8, had the highest prognostication weight.

Keywords: NPCA, clinicopathologic parameters, prognostication

INTRODUCTION

Nasopharyngeal carcinoma or NPCA originates from the stratified squamous epithelium of the nasopharynx. It has been regarded as a fascinating disease for it occurs in any age group and can mislead the physician for its array of subtle signs and symptoms. Epidemiologists focus to its high incidence among certain Chinese population and the role of environmental factors while pathologists are bewildered despite its origin of microscopically uninteresting tissues, its pathology has a variety of histologic forms. In 1958, Scanlon and colleague[1], described nasopharyngeal carcinoma as:

" Always a challenging problems, both from the diagnostic and therapeutic standpoint.... Perhaps the most misdiagnosed, most poorly understood, and most pessimistically regarded of all tumors of the upper part of the respiratory tract"

The World Health Organization (WHO) has classified NPCA based on light microscopy into three categories. The predominant histologic type in the primary

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lesion is considered the type of the tumor. WHO type I includes squamous cell carcinoma, keratinizing type, WHO type II includes non-keratinizing type, and WHO type III includes all the undifferentiated types.

Numerous factors have been considered in evaluation of tumors of head and neck for their potential prognostic value. These factors are categorized into patient-related, tumor-related, and treatment-related parameters. Primary tumor location and extension, nodal involvement, and distant metastasis are the tumor-related factors used in the therapeutic decision while historical grading based on Broder's classification is a standard pathological diagnostic parameter. Because of its inherent subjectivity, extensive scoring methods have been used to histological grading to minimize subjectivity; thus achieving prognostic accuracy.

Recently, tumours of the head and neck are evaluated based on specific factors such as tumours vascularization (tumour invasion and angiogenesis), qualitative and quantitative cytokeratin expression, and tumour DNA content. These new techniques have set a new trend in prognostication of different malignancies particularly those involving the head and neck.

The value of nuclear ploidy as a prognostic parameter in various solid tumours involving head and neck remain controversial. Nuclear ploidy is measured with the use of flow cytometry that measures cellular kinetics in different stages. Although it has been reported that aneuploid tumours are more chemosensitive, several recent investigations have indicated that Ki67 and proliferating cell nuclear antigen (PCNA) staining can not be used for prognostication of head and neck tumours[2].

Several immunologic and biochemical characterizations were done for NPCA. The association of Ebstein Bar virus (EBV) with certain types of NPCA is being established by the detection of IgA (VCA) viral capsid antigen and diffuse component of EA (early antigen). The serum level of antigen dependent cellular cytotoxicity (ADCC) has already been correlated with the activity of NPCA but this examination is not available commercially even in other countries[3]. The potential use of this factor clinically is still nil.

The introduction of the hybridoma technology and the development of the monoclonal antibodies directed against cellular components have generated improved methods of identifying anaplastic tumors. The goal of such technique is the development of an antibody directed against a specific cell or cellular component such as cytokeratin and epithelial membrane antigen (EMA) for the squamous cell carcinoma, S-100, Keratin, EMA, vimentin, desmin, and CEA for the salivary glands, and LCA and OKT (CD) antigens for lymphoma.

Intermediate filament proteins (IFPs) are important marker of tissue differentiation and have been receiving increasing interest in recent years through their increasing applicability in the characterization of malignant tumors. A certain family of IFPs are cytokeratin (CKs) that are typically specific for epithelium and are expressed in certain combinations depending on the type of the epithelium and degree of differentiation. Immunostaining for the high molecular weight cytokeratin can be a potential biomarker of the degree of differentiation. Its presence or absence can influence the prognosis of certain tumours and, thus, their management. Also, fragments of cytokeratin called Cyfra 21-I cytokeratin is being expressed in the blood of the patients with squamous cell carcinoma of the head and neck. Its biomarker potential for prognostication is still under intensive foreign research.

This investigation was designed to address the correlation between various clinical, histological, and immunohistochemical factors of nasopharyngeal carcinoma afflicting Filipino patients in a tertiary hospital seen from January 1995 to December 1995. In addition, it aims to establish the prognostic weight of various histological and immunohistochemical factors with the 24-month survival rate of Filipinos with NPCA who underwent Cobalt therapy. In this paper, the prognostic impact of several parameters on the 2-year survival post-radiotherapy was investigated.

METHODOLOGY

Patients

The materials for this study consisted of 20 consecutive specimens from newly diagnosed and untreated patients with squamous cell carcinoma of the nasopharynx or NPCA in different grades of the disease biopsied for diagnosis from January 1995 to December 1995 in a tertiary hospital. These patients did not have any other medical illness and have no other malignancy except for the NPCA. Chest x-ray must be normal after biopsy and prior to Cobalt therapy. All patients must have undergone a full dose Cobalt therapy for the disease in one tertiary hospital and must have a regular follow-up for assessment.

Treatments

All patient underwent a detailed clinical and laboratory examination including flexible nasopharyngoscopy and punch biopsy with the use of forward biting forcep and 0 degree rigid scope for direct visualization of the nasopharyngeal tumour under local anesthesia, pre-treatment CT scan of the head and neck. Biopsy of nasopharyngeal mass under local anesthesia has been found out to have no statistical difference than the biopsy done under general anesthesia.[4] Patients were all sent for radiotherapy in another tertiary hospital with an average follow-up of every 4 months in 2 years.

Histological Examination

Fresh biopsies were fixed in formalin and embedded in paraffin. Sections (4um) were stained with hematoxylin and eosin for histological evaluation, vascular count, and mitotic index.

Different histological parameters were evaluated and tumours were graded as follows: well differentiated, moderately differentiated, poorly differentiated depending on the degree of keratin pearl formation, keratinization, and overall resemblance of carcinoma to normal squamous epithelium according to World Health Organization criteria. Other parameters were assessed according to modification of Crissman grading system[5] nuclear grade (1. regular nuclei 2. slight atypia 3. strong 4. severe); growth patterns (1 pushing borders 2. large sheets 3. fine sheets 4. isolated cells); desmoplasia (1.hyalinized 2. fibrous 3. partially fibrous 4. edema); inflammatory infiltrates (1. acute, 2. subacute 3. chronic or small infiltates 4. not inflammatory)

TV and MI were counted at 400 (31 x 31 um) in ten consecutive randomly chosen fields in the area of high capillary density (angiogenesis). Fields presenting less than 50% of tumours tissues were eliminated. Vascular dilated area, hemorrhagic and necrotic or fibrotic areas were omitted. TV was evaluated as a numeric score of all sections of all anatomical types of vessels (with or without erythrocytes). MI was counted in the same fields analyzed for vascularization. For MI, the cut off point was 40 mitosis vessels per ten HPFs was used.

Immunohistochemical Staining and Analysis

Immunohistochemical cytokeratin 5 and 8 staining was carried out on unstained paraffin-embedded sections with the use of Histostain SP Kit-Zymed LAB SA system. This examination made use of HorseRadish Peroxidase (HRP), strepavidin, and affinity-purified antibodies into the Labeled - [strep] Avidin-Biotin (LAB-SA) method also known as Strepavidin-Biotin Amplication. The primary antibody to Cytokeratin 5 and 8 were used in all slides. All slides were reviewed by light microscopy. Brown deposits found in the tumour located subepitheally point to the localization of the antigen.

Statistical Analysis

Qualitative and semiqualitative variables were tabulated in a contingency table and analyzed using odds ratio and Cox-Mantel logrank statistics. Odds ratio was used in order to describe the strength of relationship between the 24-month survival post-radiotherapy and various parameters investigated. This test is used in categorical data being adopted in this study. A higher odds ratio value denoted a stronger correlation between the 2 variables in

question. Cox-Mantel logrank statistics was used for estimation of survival. This was used to compare the number of observed mortality in each group with the number of deaths that would be expected from the losses in the combined groups. An approximate Chi-square test was used to test the significance of the mathematical expression involving the observed and expected mortality.

Results and Discussion

This study attempts to correlate different parameters to the 24- month survival rate of nasopharyngeal carcinoma. The well known complexity of tumor behavior and management strategies for patients with NPCA require more objective prognostic parameters to subdivide patients. Tumour parameters, namely, nodal level, differentiation, nuclear grading, tumour pattern of growth, inflammation, tumor vascularization, mitotic index were evaluated through light microscopy with the addition of immunohistochemical staining for high molecular weight cytokeratin specific for stratified squamous epithelium were used for prognostication purpose. In this country, the primary mode of treatment of NPCA is radiotherapy particularly Cobalt therapy because most of the cases seen are in the late stage of disease already with the involvement of bilateral neck nodes and varying neurological manifestations. This is the reason why several parameters were correlated with 24-month survival rate after radiotherapy alone.

A total of 20 patients, 11 male and 9 females were included in the present study. Five patients had WHO Class I (squamous cell carcinoma – keratinizing varity with intercellular bridges and high nuclear and cellular pleomorphism, 10 patients belong to WHO Class II (loss of keratinization and intercellular bridges, and high nuclear and cellular pleomorphism) and 5 had undifferentiated tumors (including lymphoepithelioma) belonging to WHO Class III. The median age was 45.78 with 18 years old being the youngest and 75 years old being the oldest patient. One patient died before the start of radiotherapy making the total number of samples to 19.

Figure 1. Poorly keratinizing squamous cell carcinoma of the nasopharynx (H & E 100x).

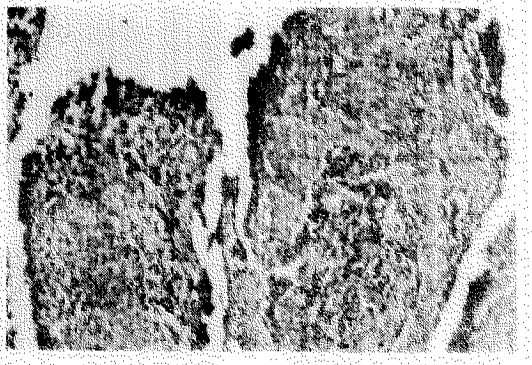
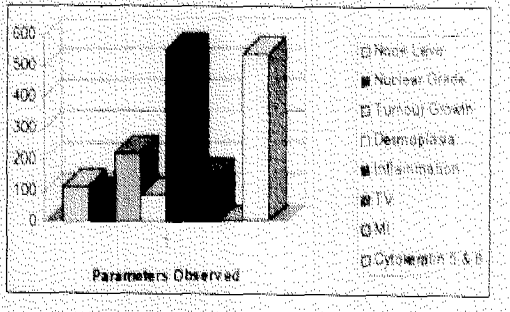


Table 1. Results of Computation of Odds Ratio of Each Parameters Used in Evaluation of Tumours of Patient with Nasopharyngeal Carcinoma.

PARAMETER	ODDS RATIO
Node	1.16
Nuclear Grade	0.88
Tumour Growth	2.20
Desmoplasia	0.89
Inflammation	5.50
TV	1.50
MI	0
Cytokeratin 5 & 8	5.84

Graph 1. Comparison of Odds Ratio of Various Parameters in NPCA Tumour Evaluation



Examination of the Odds Ratio graph has revealed high values for nodal involvement, tumour growth, degree of inflammation within the tumour and cytokeratin 5 & 8 staining. A good correlation between the level of lymphadenopathy with the survival rate after radiotherapy has supported the predictive significance of this parameter recognized by N staging system instead of the size of the node. The involvement of the infrathyroid nodes has demonstrated less survival rate probably secondary to higher rate of metastatic potential.[6] In the study done by Koukourakis[7] in 1996, the level of lymphadenopathy was a prognostic factor related to distant failure with metastasis rate

of 50% and distant relapse rate of 40% even in early T stage.

Mitotic index has a low odds ratio with the 24-month survival rate post-radiotherapy. Although, several researches have demonstrated that biological aggressiveness is associated with aneuploidy, high proliferating cell nuclear antigen (PCNA) fraction, or both. More recent investigations have shown that neither PCNA nor Ki67 values were significantly different between irradiated and non-irradiated tumor in patients who later developed lymph node metastasis in squamous cell carcinoma of the head and neck.[8]

The presence of inflammation in a tumor demonstrate the response of the body to the carcinoma. A vigorous inflammatory reaction demonstrates better response in limiting the spread of malignancy resulting to better 24-month survival rate post-radiotherapy. Host immunity against a tumour is mainly mediated by cellular immunity which includes lymphocytes, macrophages, and mononuclear-phagocytic system. An increase in lymphocytic infiltration in tumour tissue is associated with better prognosis. This is a manifestation of cell-mediated immunity. In NPCA, several investigators have placed ADCC of antigen dependent cellular cytoxicity level in serum to be predictive of the tumor outcome. Neel, et al have included this parameter recently in the revised prognostication scoring for NPCA. This study has demonstrated that an increase level of lymphocytic infiltration results to better post-radiation survival.

Tumor growth denotes the pattern of cellular local invasion seen under light microscopy. It has been shown that lower local aggressiveness has positive effect in the 24-month survival rate of patients with NPCA who underwent Cobalt therapy. Local growth of malignant tissue is characterized by invasion of surrounding tissue, most of the time with the extensive tissue destruction. Local invasion results from the balance of tissue destruction and synthesis of vascular and stromal support. The primary prerequisaite for local invasion is the ability of tumor cells to synthesize and secrete extracellular proteases and collagenases attacking components of basement membrane and extracellular matrix (laminin, fibronectin, and collagen). The secretion of tumour growth factor B (TGF-B) stimulates fibroblastic growth and migration into an area. This promotes local spread by inhibiting the growth of normal cells and stimulating the development of stromal support. The communication between the cytoskeleton of tumour cells with extracellular matrix occurs at the point of adherence. This is achieved by transmembrane feedback system involving the cytoskeleton which is responsible for cell motility.

The role of immunohistochemical approach in prognostication of any head and neck tumor is still at its early stage of investigation. This study is an initial attempt to investigate the relation of immunohistochemical staining for cytokeratin 5 & 8 with the survival of NPCA. A demonstration of cytokeratin 5 & 8 staining in NPCA is seen in poorly and undifferentiated types particularly in those patients who survived 24-months post-radiotherapy.

Immunohistochemical detection of intermediate filament protein (IFPs) is not only important in the study of histogenesis but provides new insights into the nature and progression of carcinogenesis in tissues. Cytokeratin belongs to IFPs which is one of the three types of cytoskeleton that forms the meshwork[9]. The family of IFP is composed of 5 biochemically distinct protein characteristic of different cell types. Cytokeratin or prekeratin are found in cytoplasm of all true simple and squamous (keratinizing and non-keratinizing) epithelia. Although, epidermal keratin are biochemically different from the keratins of non-stratified (simple) epithelium, both share the same antigenic determinants. Hence, the generic term "cytokeratin". Cytokeratin is a complex family of at least 19 different polypeptide expressed in various but specific combinations. CK 1 has the highest molecular weight (67kd) and isoelectric pH and CK 19 being the polypeptide with the lowest molecular weight (40 kd) and isoelectric pH. Most simple epithelia express low molecular weight CK (40 to 54 kd) like ductal epithelia whereas CK expressed in stratified squamous epithelium like surface epithelium are generally larger

(48 to 67 kd). It has been found out that, generally, IFPs are retained in the cell even after malignant transportation.

Figure 2. Moderately differentiated squamous cell carcinoma of nasopharynx (cytokeratin 5 & 8, 100X). This slide shows negative immunostaining with cytokeratin 5 & 8)

Figure 3. Poorly differentiated NPCA (cytokeratin 100x). this slide show a 80% immunostaining with cytokeratin 5 & 8.

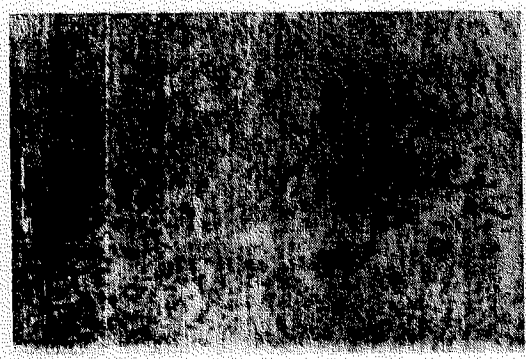
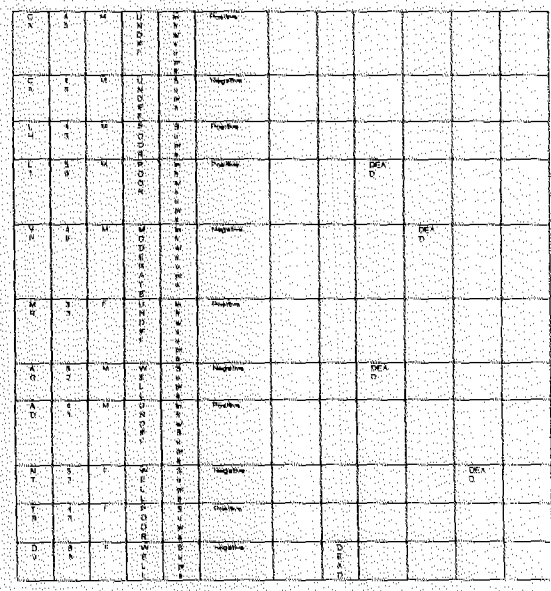


Table 2. Survival Table of Patients with Nasopharyngeal Carcinoma who underwent Cobalt Therapy

Cox-Mantel Logrank Statistic for theComparison of 24-Month SurvivalPost-Cobalt Therapy Between Cytokeratin 5 & 8 Positive and Negative Groups



Ho: There is no significant difference in the 24-month survival post-Cobalt between patients with NPCA positive with cytokeratin 5&8 than those that negative with cytokeratin 5&8.

H1: There is a significant difference in the 24-month survival post-Cobalt therapy between patients with NPCA positive with cytokeratin 5&8 than those that negative with cytokeratin 5&8.

No. of months of survival	ACTUAL risk			OBSERVED risk			EXPECTED risk		
	+	-	Total	+	-	Total	+	-	Total
4	9	1 0	10	0	1	1	.474	.526	1
8	9	8	16	0	1	1	5	5	1
12	9	8	17	1	1	2	1.059	.941	2
16	8	7	15	0	1	1	.533	.467	1
20	8	6	14	0	1	1	.571	.429	1
24	8	5	13	0	0	0	0	0	0
				1	5	6	3.137	2.362	6

$X^2 = (1-3.137) + (5-2.362)$
$3.137 \quad 2.362$

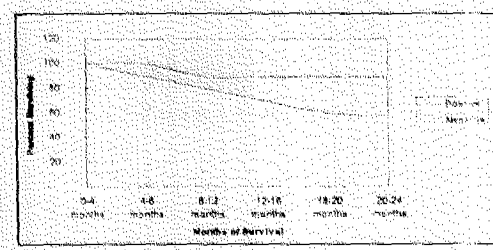
$= 1.456 + 2.362$

X^2 computed = 4.402 X^2 critical = 3.841
degree of freedom = 1 $\alpha = .05$

X^2 computed > X critical
Decision: Reject Ho

Conclusion: There is a statistical difference between the 24 month survival post-Cobalt therapy of patients positive for Cytokeratin 5 and 8 immunostaining and patient negative for cytokeratin 5 and 8 immunostaining.

GRAPH 2. Survival Curves of Filipino Patients with NPCA Post-Cobalt Therapy.



Correlation between immunohistochemical staining for high molecular weight and 24 month survival post-Cobalt therapy in patients with NPCA has shown the highest odds ratio of 5.835. This means that patients whose tumours were positive for cytokeratin 5 & 8

immunostaining have 6 times more chances of 24-month survival post-radiotherapy than those that do not stain with cytokeratin 5 & 8. In this regard, immunohistochemical staining for cytokeratin 5 & 8 can be considered as a positive biological marker. In relation with this finding, the investigation done by Dowack, et al.[10] on 1995, the potential of Cyfra 21-I serum level as a biological marker for squamous cell carcinoma affecting head and neck was established. Cyfra 21-I is a product of cytokeratin degradation detected in the blood.

Figure 4. Poorly differentiated NPCA (Cytokeratin stain 400x). This slide shows the detailed distribution of cytokeratin.

A significant higher serum level of Cyfra 21-I is seen in patient with untreated squamous cell carcinoma of head and neck with sensitivity of 60% and specify of 94%. Also the serum level of such substance have been discovered to decrease with treatment thus following the course of the disease and can be used for therapeutic monitoring. In addition, this substance is higher in poorly differentiated carcinoma than in well differentiated group like its cellular cytokeratin counterpart shown in this study. The over-all 24-month survival rate post-Cobalt therapy in the population studied was 68.42%. The survival rates of the patients whose tumours stained positively with cytokeratin 5 and 8 was 87.5% and those patients whose tumours are negative for cytokeratin was 50%. These two survival rates are significantly different with 99.5% confidence as tested using the Cox-Mantel log rank statistics.

CONCLUSION

Several clinicopathologic parameters can be used in prognostication of nasopharyngeal carcinoma affecting Filipino patients. In the group of patients studied, it has been found out that the level of nodal involvement, degree of inflammatory infiltration of the tumor, pattern of tumour growth, and immunohistochemical staining with high molecular weight cytokeratin particularly cytokeratin 5 & 8 can be used to predict the 24-month survival rate post-Cobalt therapy. Among the parameters investigated, immunohistochemical staining for cytokeratin 5 & 8 has the highest prognostication weight. Thus, immunohistochemical staining for cytokeratin 5 & 8 in nasopharyngeal carcinoma can be used as a tool to aid in the therapeutic decision. This study has established the prognostic significance of high molecular weight cytokeratin to the 24 month survival after radiotherapy in the group of patient studied.

RECOMMENDATION

Because of the several limitations of this investigation, the following are recommended for future study. A multicentric study involving more patient lasting to 5 years must be done in order to gain confidence in establishing the role immunostaining in prognostication of nasopharyngeal carcinoma affecting Filipino patients. The evaluation of the degree of cytokeratin staining with the tumour behavior is also another good study. Since the present paper is limited to Cobalt therapy, a possible correlation between cytokeratin staining and survival with chemotherapy, radiotherapy, or both is a good point to investigate. Other substances like galectin 1 & 3 and laminin can also be correlated with the survival of patients with NPCA.

END NOTES

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[2]Jones, AS, et al. A Comparison of Cell Proliferation Marker in Squamous Cell Carcinoma of the Head and Neck. Journal of Laryngology & Otology 1994, October 108 (10): 859-864.

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[5]Janot, FJ, et al: Prognostic Value of Clinocopathological Parameters in Head and Neck Squamous Cell Carcinoma: A Prospective Analysis. British Journal of Cancer 1996, 73: 531-538.

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3. Dowack, A, et al: Cyfra 21-I: A Potential tumour marker for Squamous Cell Carcinoma of Head and Neck. Archives of Otolaryngology Head and Neck Surgery 1995; February 12 I (2): 177-181.
4. Janot, FJ, et al: Prognostic Value of Clinicopathological Parameters in Head and Neck Squamous Cell Carcinoma: A Prospective Analysis. British journal of Cancer 1996, 73:531-538.
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APPENDIX I

Table 1. Tabulation for Different Parameters in Evaluation of Filipino Patients with Nasopharyngeal Carcinoma Seen Before Cobalt Therapy.

FACTORS	CATEGOTIES																		
Patient No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Age																				
	<50	x	x	x	x	x	x	x	x	x	x			x	x		x		x	
	>50											x	x			x		x		x
Sex																				
	Male	x		x	x	x	x	x				x	x			x	x			
	Female		x						x	x	x			x	x			x	x	x
Node																				
	Suprathyroid	x					x	x	x		x	x				x		x	x	x
	Infrathyroid		x	x	x	x				x			x	x			x			
Differentiation																				
	Well diff.											x				x		x		x
	Moderate diff.							x			x									
	Poorly diff.	x	x	x	x	x	x		x	x			x	x	x		x		x	
Nuclear grade																				
	1 and 2			x		x					x	x						x		x
	3 and 4	x	x		x		x	x	x	x			x	x	x	x	x		x	
Growth pattern																				
	1 and 2		x									x						x	x	
	3 and 4	x		x	x	x	x	x	x	x	x		x	x	x	x	x			x
Desmoplasia																				
	1 and 2				x		x					x			x	x	x	x		
	3 and 4	x	x	x		x		x	x	x	x		x	x					x	x
Inflammation																				
	1 and 2		x	x	x	x		x	x	x	x	x		x		x	x		x	
	3 and 4	x					x								x			x		x
TV																				
	<29						x				x			x	x					
	>29	x	x	x	x	x		x	x	x		x	x			x	x	x	x	x
MI																				
	<26	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
	>25												x	x						
Cytokeratin																				
	Present	x		x		x	x	x					x		x		x		x	
	Absent		x		x				x	x	x	x		x		x		x		x
Survival																				
	After 2 years																			
	Alive	x	x	x		x	x	x	x	x	x	x					x		x	
	Dead				x								x	x	x	x		x		x

Sample Computation of ODDS RATIO:

Odds Ratio for Cytokeratin:

	Alive	Dead	
Cytokeratin Positive	7	1	8
Cytokeratin Negative	6	5	11
	13	6	19

$$OD = \frac{(7/13) / (6/13)}{(1/6) / (5/6)} = \frac{7/6}{1/5} = 5.835$$

PRE-OPERATIVE ORAL STEROID IN PATIENT WITH NASAL POLYPOSIS*

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ORESTES C. MONAKIL, MD**
JOSEFINO G. HERNANDEZ, MD***

ABSTRACT

An experimental study regarding pre-operative oral steroids in patients with nasal polyps was done in a tertiary hospital. A total of 38 cases had been included in the study to determine if there is a decrease in size of nasal polyps and the amount of intra-operative blood loss after giving oral steroids for one week prior to operation. All patients received Cotrimoxazole and decongestant with 19 cases belonging to the control group also receiving Methyprednisolone (Medrol) 16 mg Alternate-Day-Therapy (ADT) and Ranitidine. Ten cases (52.6%) with Methylprednisolone intake resulted in a decrease in the size of nasal polyp and 4 cases (21.1%) without steroid intake resulted in decrease in the size of nasal polyp. Nine cases (47.3%) under the study group and 15 cases (78.9%) under the control group had no demonstrable decrease in the size of the nasal polyp. There was a significant decrease in amount of intra-operative blood loss under the study group as compared to the control group. Chi-square test for the size of the nasal polyp and t-test for the intra-operative blood loss implied a statistical significance ($p<0.05$). The use of Methylprednisolone (Medrol) 16 mg ADT one week prior to operation resulted in a significant decrease in the size of nasal polyps as well as the intra-operative bleeding which will allow better visualization of the landmarks contributing to minimal morbidity and better sinus surgery.

Keywords: Oral steroid, pre-operative, nasal polyp, size, blood loss

INTRODUCTION

Nasal polyposis remains a significant challenge to the attending physician. Multiple factors including infection, allergy, trauma, chemicals, metabolic disease and psychogenic factors have all been implicated as possible etiologies of nasal polyposis. However, the pathophysiology and pathogenesis are still unclear[1-4]. Allergies, asthma, aspirin intolerance are often associated with nasal polyps and make the treatment more difficult[4].

In the past, management of nasal polyposis has been mainly surgical. The surgical management of nasal polyps dated back to the time of Hippocrates (463-370 BC) who used a "sponge method" to remove them[2]. Since then, many modifications have been made in the surgical management plan.

Sinus surgery is a dangerous and formidable operation and has been described by Mosher as the blindest of all surgeries. The surgeon works along narrow clefts and passageways inside the nose. If one goes too medial and too high, one enters the brain, and if one goes too lateral, one enters the orbit. Surgeons are very conscious of these complications and this is one reason why a significant number of polyps after surgery recur, because of incomplete excision. One should always be in the area of the ethmoids and visualization of the landmarks is of utmost importance.

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*Presented, PSOHNS Analytical Research Contest, December 5, 1997, Manila Midtown Hotel, Manila
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Endoscopic sinus surgery as a surgical form of management was introduced sometime in the seventies. The "functional endoscopic sinus surgery" technique with the use of an endoscope provides a tool by which the clinician can accurately diagnose as well as meticulously and atraumatically perform surgery. However, in patients with polyps, significant bleeding may occur during operation thereby causing difficulty for the surgeon to visualize the landmarks and, thus, making the surgery more dangerous and difficult.

The use of corticosteroids has given the otolaryngologist a powerful weapon in combating polyp disease[4]. While many researches have proven that steroids help in the medical management of nasal polyps, this research aims to document that oral steroids decreases the size of the polyp. prior to operation and minimizes bleeding intra-operatively thereby affording better visualization which should be translated to better surgery.

MATERIALS AND METHODS

All patients with nasal polyps for Functional Endoscopic Sinus Surgery are enrolled in this study form January 1996 to December 1996. Excluded are those with serious unstable concurrent diseases such as PTB, Diabetes Mellitus, Hypertension, etc. An enrollment form for data gathering are inserted in all charts of the patients (Appendix 1). Endoscopic examination is performed using a 70-degree Storz sinuscope at the Out Patients Department and nasal polyps are graded accordingly prior to treatment.

GRADE I: confined within the middle meatus
II: beyond middle turbinate but not beyond inferior turbinate
III: beyond inferior turbinate but not beyond mucocutaneous junction
IV: beyond mucocutaneous junction

APPENDIX 1

ENROLLMENT DATA SHEET

Name _____
Age _____

Address _____
Sex _____
Civil Status _____
Date _____

Chief Complaint

History of Present Illness

Allergy.
Infection.
Past Medical History
Personal and Social History
Family History:

PNS X-ray:

Physical Examination

Before therapy

After therapy

Endoscopic exam

Other E. N. T. Exam

Diagnosis

Blood Loss:
A. Amount of blood in suction bottle = _____cc
B _____(No. of soaked OS) x 10 cc = _____cc
Total = _____cc

A resident assigns the patients who will receive the Methylprednisolone and patients who will not. All patients are given antibiotics (Co-trimoxacole) and decongestants (Phenylpropanolamine maleate). Patients are numbered accordingly. Patients with **odd numbers** (treatment group) are given Methylprednisolone 16 mg ADT and Ranitidine HCL (Zantac) 150 mg BID for one week while patients with ***even numbers*** are not and formed the control group.

After one week of treatment, patient is examined by using the endoscope and the sizes of nasal polyps are re-evaluated and scheduled for Functional Endoscopic Sinus Surgery the following day. Pre-operatively, 0.05% oxymetazoline nasal spray is used to initially decongest the nasal turbinates. The operations are done by two senior residents under general anesthesia without the knowledge of which patient did or did not receive the steroid pre-operatively. Bleeding during operation is measured by the anesthesiologist as follows: soaked 4 x 4 OS = 10 cc plus the amount of blood in the suction bottle minus the measured plain NSS solution which are used for washing. Statistical significance of the results are analyzed using chi-square test for the size of the nasal polyp and t-test for the blood loss.

RESULTS

In the study group, all patients complied with alternate-day intake of Methyprednisolone (Medrol) 16 mg tablet in combination with broad spectrum antibiotics

and oral decongestants for one week. Six patients have bilateral nasal polyposis equivalent to 12 cases while seven patients have unilateral nasal polyposis. There were seven female and six male patients. Age ranges from 17 to 59 years old.

Table I. Polyp grade with corresponding number of cases for study group

POLYP GRADE	NO.OF CASES
I	0
II	4
III	14
IV	1
Total	19

Table II. Polyp grade before and after giving Methylprednisolone (Medrol)

POLY GRADE		NUMBER OF CASES
Before Steroids	After Steroids	
IV	III	1
III	III	6
III	II	7
III	I	1
II	II	3
II	I	1

After one week of alternate day intake of steroids, a total of ten cases were noted to have a decrease in size of the nasal polyp with one case decreasing two grades while nine cases had no demonstrable difference in the size of the nasal polyp. Overall, 52.6% showed shrinkage of the polyp while 47.3% did not. Intra-operatively, the average blood loss is 228.6 cc and 258.3 cc for unilateral and bilateral polyposis respectively.

In the control group, a total of twelve patients, seven with bilateral and five with unilateral nasal polyposis, were included. Among the subjects, there were seven male and five females who took the preoperative drug regimen consisting of oral broad spectrum antibiotics and decongestants. Age ranges from 18 to 48 years old.

Table III. Polyp grade with corresponding number of cases for control group.

POLY GRADE	No. of Cases
I	1
II	9
III	7
IV	2
Total	19

Table IV. Polyp grade with corresponding number of cases for control group.

POLYP GRADE		Number of cases
Before	After	
IV	IV	1
IV	III	1
III	III	5
III	II	2
II	II	8
II	I	1
I	I	1

Table V. Summary of cases with change in size of nasal polyp with and without Methylprednisolone.

	No of patients with decrease in nasal polyp size	No. of patients without decrease in nasal polyp size
With Methylpredniso lone	10 (52.6%)	9 47.3%)
With Methylpredniso lone	4 (21.1%)	15 (78.9%)

Table VI. Average amount of blood loss intra-operatively.

	Unilateral	Bilateral
With Methylprednisolone	228.6 cc	258.3 cc
Without Methylprednisolone	490 cc	550 cc

A total of fifteen cases (78.9%) showed no change in nasal polyp sizes after intake of the drug regimen of antibiotics and decongestant while 4 cases (21.1%) decreased in size one grade lower. Average blood was recorded at 490 cc unilateral cases and 550 cc for bilateral nasal polyps.

DISCUSSION

The resurgence of enthusiasm in the use of corticosteroid for nasal polyp has been noted in the recent years. Topical as well as systemic steroid has been included in the armamentarium of the otolaryngologist in managing nasal polyps because of its excellent anti-inflammatory activity. Corticosteroids inhibit the inflammatory response whether the inciting agent is mechanical, chemical or immunological[1,4] Methylprednisolone is an intermediate acting steroid which limits capillary dilatation and inhibits the growth of new capillaries as well as stabilize lysosomal membranes resulting in the decrease in blood loss intraoperatively. In this study, in order to minimize the side effects of steroids therapy

such as adrenocortical suppression, an alternate-day therapy was given for one week prior to the operation. Alternate-day therapy is a corticosteroid dosing regimen in which twice the usual daily dose of corticoid is administered every other morning. The purpose of this mode of therapy is to allow the adrenals a one-day rest to minimize certain undesirable effects, including pituitary-adrenal suppression. One week duration of steroid is used since satisfactory clinical response is commonly observed in 4-10 days in many allergic and collagen diseases. In this study, in the group which received Methylprednisolone, antibiotics, and decongestant (study group), a total of 10 (52.6%) cases showed a decrease in size of the nasal polyps while 9 (47.3%) cases had no demonstrable difference in the size after intake of Methylprednisolone. Overall, 52.6% showed shrinkage of the polyp while 47.3% did not. In the control group, those who only received antibiotics and decongestant, a total of 4 (21.1%) cases showed a decrease in size of nasal polyps while 15 (78.9%) cases showed no demonstrable change in size. More patients who received Methylprednisolone showed a decrease in size (52.6%) as compared to those who did not receive Methylprednisolone (21.1%). This is a 31.5% difference in the number of patients who demonstrated a decrease in size of the polyp. Statistical analysis using Chi-square test implied a significant decrease ($p<05$) in the size of the nasal polyp between the group of patients who received and the group of patients who did not received Methylprednisolone.

In the study group, the average blood loss intra-operatively is 228.6 cc and 258.3 cc for unilateral and bilateral polyposis respectively. In the control group, the average blood loss is 490 cc and 550 cc for unilateral and bilateral polyposis respectively. These show a decrease of 161.4 cc or 32.9% for unilateral polyps, and a decrease of 291.7 cc or 53% for bilateral polyps. Statistical analysis using t-test implied a significant difference ($p<0.05$) in the amount of blood loss between the group of patients who received and the group of patients who did not receive Methylprednisolone. This reduction in bleeding intra-operatively should result in better visualization of the operative field which can help the surgeon identify landmarks during operation which should result in better sinus surgery.

Appendix 2

Statistical Analysis for the effect of Methylprednisolone on the size of nasal polyps With and Without Methylprednisolone

	With decrease in size of nasal polyps	Without decrease in size of nasal polyps	Total
With Methylprednisolone	10(7)	9(12)	19
Without Methylprednisolone	4(7)	15(12)	19
Total	14	24	38

Chi-square test.

$$Xc2 = \sum_{All\ ij} \frac{(Oij - Eij)2}{Eij}$$

$$= \frac{(10-7)2}{7} + \frac{(9-12)2}{12} + \frac{(4-7)2}{7} + \frac{(15-12)2}{12}$$

$$= 1.3 + 0.75 + 1.28 + 0.75$$

$$= 4.08$$

Degree of Freedom

$$Df = (r-1)(c-1)$$
$$= (2-1)(2-1)$$
$$= 1$$

Statistical interpretation: Since the calculated probability of commiting an error is less than the preset 5% level of error There is a strong chance that rejecting a hypothesis is a valable option.

Medical Interpretation: The rate of decrease in size of nasal polyposis in patients receiving steroid differ significantly from the decrease in size of nasal polyposis in patients not receiving steroid

Appendix 3

Statistical Analysis for the effect of Methylprednisolone on Intraoperative Bleeding

Table: Amount of intraoperative blood loss on nasal polyp With and without Methylprednisolone

With Methylprednisolone	Without Methylprednisolone
300	500
300	700
150	900
300	300
200	500
200	450
200	500
300	600
100	450
300	400
300	500
300	800
200	

t-test: Two-Sample Assuming Unequal Variance

	With Steroid	Without Steroid
Mean	242.3077	550
Variance	4935.897	29545.45
Observation	13	12
Df	23	
T- Test	2.1986	
T Critical	2.0687	

Statistical interpretation: Since the calculated probability of committing an error is less than the preset 5% level of error. There is a strong chance that rejecting a hypothesis is a variable option.

Medical Interpretation: Mean blood loss in patients with steroids are significantly lesser than in patient without steroids.

Appendix 4

UNILATERAL NASAL POLYPOSIS

Study Group

Case	Name	Age Sex	Polyp Grade				Amount of Blood Loss		Total Blood Loss
			Pre-op		Intra-op		Soaked OS	Blood Suction Bot	
			Right	Left	Right	Left			
1	De la Cruz	20/M	III		II		40	160	200
2	Fabian, M	40/M		III		II	50	150	200
3	Ameta I	24/F		III		II	[illegible]0	150	200
4	Cruz F	49/M	III		II		100	200	300
5	Casabar R	58/M		III		I	20	80	100
6	Cerda P	21/F		IV		II	100	200	300
7	Rimamba B	20/M	III		I		80	220	300
								Total	1600
								Average	228.6

Control Group

Case	Name	Age Sex	Polyp Grade				Amount of Blood Loss		Total Blood Loss
			Pre-op		Intra-op		Soaked OS	Blood in Suction Bot	
			Right	Left	Right	Left			
1	[illegible]	27/M		IV		IV	100	500	600
2	Velasquez	18/M		III		II	100	350	450
3	Bocanegra	29/M		II		I	150	250	400
4	Olipas	25/F	III		III		150	350	500
5	Ocon S	32/M	IV		III		100	400	500
								Total	2450
								Average	490

Appendix 5

BILATERAL NASAL POLYPOSIS

Study Group

Case	Name	Age Sex	Polyp Grade				Amount of Blood Loss		Total Blood Loss
			Pre-op		Intra-op		Soaked OS	Blood Suction Bot	
			Right	Left	Right	Left			
1	Fernandez M	21/F	III	I	I	II	100	200	300
2	Gonzales, T	21/F	II	I	I	III	100	200	300
3	Rosales M	44/F	III	II	I	III	40	110	150
4	Marcelino	32/F	II	II	II	III	80	200	300
5	Laqui R	17/M	III	II	III	II	60	140	200
6	Candazo E	17/M	III	II	II	II	100	200	300
								Total	1550
								Average	258.3

Control Group

Case	Name	Age Sex	Polyp Grade				Amount of Blood Loss		Total Blood Loss
			Pre-op		Intra-op		Soaked OS	Blood in Suction Bot	
			Right	Left	Right	Left	150	350	500
1	Alimpoyo E	19/M	II	II	II	II	200	500	700
2	Ongon R	19/M	III	II	III	II	200	700	900
3	Sampag	24/F	III	III	III	III	100	300	400
4	Reyes	33/F	I	II	I	II	150	350	500
5	Lozada R	48/F	III	II	I	II	50	400	450
6	Matining	25/M	II	II	I	II	100	400	500
7	Collado C	29/F	II	III	I	III		Total	3850
								Average	550

CONCLUSION

Combined medical and surgical management with close follow-up appears to provide the best chance for long term improvement of these patients with nasal polyps[2]. The functional endoscopic sinus surgery approach often is an excellent technique with which to provide the surgical part of this management. Methylprednisolone (Medrol) 16 mg alternate-day therapy given for one week pre-operatively has resulted in a significant decrease in the size of the nasal polyps. Likewise, its use has resulted in a significant decrease in blood loss during operation. The smaller polyps as well as decrease in blood loss during operation will, therefore, allow better visualization and precise atraumatic surgical technique which should result in minimal morbidity and better sinus surgery.

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AMELOBLASTOMA WITH MALIGNANT TRANSFORMATION: A Report of A Case*

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ABSTRACT

Ameloblastoma are locally aggressive tumors of the jaws with high propensity for recurrence and are believed to arise from the remnants of odontogenic epithelium.[1] It is a histologically benign tumor with a tendency to undergo malignant transformation. Ameloblastoma occurs in only about 1% of all tumors and cysts involving the jaw[2] so that it would be more unusual to see variants or malignant change of the primary lesion.

The case to be presented is a mandibular ameloblastoma in a 31 year-old female from Iloilo City who underwent a total of six surgical procedures in a span of 20 years because of recurrences and extension of the tumor. A sphenoidal and orbital extension was noted after 22 years from the onset of the initial symptoms prompting suspicion of a worse condition and a poor prognosis. Histopathologic studies revealed squamous metaplasia and radiographic findings showed metastatic bone disease. The tumor extension was noted to be distinct from the primary lesion and site of recurrence and it was concluded that the mandibular ameloblastoma underwent malignant change with metastasis to the spheno-orbital area.

OBJECTIVES

1. To present a rare and unexpected course of ameloblastoma.
2. To review the literature of odontogenic tumors with emphasis on ameloblastoma and its propensity for malignant change.
3. To emphasize the need for close follow-up of patients with Ameloblastoma to monitor early recurrences, new patterns of growth, or malignant transformation.

INTRODUCTION

Ameloblastoma is a tumor arising from embryonal cells of developing teeth. Although most of these tumors simulate other slow growing, benign tumors, some can develop malignant tendencies. Degeneration of this tumor into carcinoma has been reported.[3] Apart from its characteristic clinical features, roentgenographic examination and histopathologic studies play important roles in the diagnosis.

The case presented here is one unique form of ameloblastoma that initially involved the mandible but progressively affected adjacent structures such as the soft tissues, temporo-orbital bone and even the sphenoid. Of the many cases of ameloblastoma seen in Western Visayas, this is the only one of its kind.

CASE REPORT

This is the case of LJ, a 31 year old female, married from Iloilo City who was admitted in this institution on September 1, 1996 because of a slow-growing, firm, 6x6 cm mass at the left parotid area with no facial asymmetry but with pain due to

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pressure effect. Eight years ago, patient underwent a hemimandibulectomy with TMJ disarticulation for a recurrent ameloblastoma.

In 1976, 20 years PTA, patient underwent mandibular scraping and biopsy of a left mandibular cystic mass which revealed "adamantinoma".

After four years (1980), another gradually enlarging mass was noted on the same site and the same operation was done by the same surgeons only to recur once more after two years. A third scraping of the bone was done, this time a denture was fitted after the surgery. Another recurrence in 1984 was operated by an ENT specialist in a private hospital and a radical procedure (hemimandibulectomy) was suggested but the patient did not consent. Excision of the mass through a submandibular approach was done.

A fifth recurrence of the tumor was noted in 1988 where a hemimandibulectomy with TMJ disarticulation on the left side was done. The histopathologic result revealed Ameloblastoma. The patient was free of symptoms until 1995 (seven years after) when a mass on the same side was noted with abscess formation for which only incision and debridement was done because the patient was pregnant.

That mass on the left parotid area progressively enlarged after giving birth to a normal baby girl through Cesarean section. Repeated aspiration of the mass that was more cystic than solid was made to relieve the pressure effect. Cytologic diagnosis revealed negative findings in smears consisting mainly of blood suggesting a cystic component. There was also associated pain but no facial asymmetry. The patient did not have weight loss or loss of appetite during the development of this newgrowth. There were no cervical lynphadenopathies. In 1996, patient was operated on at a government hospital under general anesthesia using a parotid (lazy S) incision. Histopathologic diagnosis revealed Ameloblastoma with cystic degeneration, squamous metaplasia and foci of hypercellularity. (Plate 1 photocopy of the actual histopathologic report).

Plate 1

Clinical Diagnosis: Parotid mass left

GROSS DESCRIPTION:

Specimen Labelled A_1

Received preserved in formalin is a abrownish black, firm, globular, previously sectioned cystic mass with rough outer wall surface, measuring 9 x 7 x 0.5 cm. Cut sections reveal an empty lumen with smooth to granular brownish red inner wall surfaces with a wall thichness of up to 0.6 cm.

Representative sections submitted for embedding.

Specimen Labelled A_2

Received separately is a brownish, firm, irregularly-shaped tissue with attached bony fragments measuring 7 x 6.5 x 1.1 cm.

Representative sections submitted forembedding.

Specimen Labelled B

Received preserved in formalin are several granular, soft, reddish brown tissue fragments measuring 3x 2.5 x 0.9cm.

Entire Specimen submitted for embedding.

MICROSCOPICDESCRIPTION

Hematoxylin and Eosin sections from specimen A, reveal a fibrous to fibrocollagenous cyst wall with foci of vascular proliferation with congestion, hemorrhages, and granulation tissue formation and mild to moderate infiltration of leukocytic cells composed of mono-nuclears and polymorphonuclears and foci of necrotic tissue. Cholesterol clefts are also seen. The wall is lined by fibrin and red blood cells.

Hematoxylin and Eosin sections from Specimen A2 reveal an area with gland-like structures having central loose stellate reticulum-like tissue with peripheral cells having palisading orientation. Focal squamous metaplasia and cystic changes are seen. However cellular areas are noted. Unremarkable bony tissue fragments are also noted.

Hematoxylin and Eosin sections from specimen B reveal only red blood cells and fibrin.

HISTOLOGIC DIAGNOSIS

AMELOBLASTOMA WITH CYSTIC DEGENERATION, SQUAMOUS METAPLASIA AND FOCI OF HYPERCELLULARITY

In March 1997, five months after the last surgery, a mass at the left temporal area was noted. An incision biopsy was suggested but the patient refused. Instead, patient consulted an oncologist who suggested a bone scan after a review of the

slides taken from specimen of the recent surgery. The bone scans showed evidence of metastatic bone disease in the midline sphenoid and orbital portion of the left temporal bone. (Plate 2 photocopy of the full report).

PLATE 2

RADIONUCLIDE BONE IMAGING
AGENT: 99mTc-HDP
DOSE: 20 mCi I.V.

Total body bone images obtained in the anterior and posterior projections show good general bone-to soft tissue activity ratio. Kidneys: are visualized without significant pelvocalyceal stasis.

Increased tracer uptake is noted in the midline sphenoid and orbital portion of left temporal bone on SPECT images.

The left mandible is surgically absent.

Osteoarthritic changes are noted in the shoulders, knees and feet.

Radiotracer distribution in the remainder of the skeleton is symetric and physiologic.

INTERPRETATION

Evidence of metastatic bone disease in the midline sphenoid and orbital portion of left temporal bone.

A Computed Tomography was also performed which revealed a probably neoplastic left temporomandibular mass (Plate 3). Radiation therapy was done for 3 months. The recent consult (March 1998) after radiation treatment showed no regression of the left temporal newgrowth. Instead, there was extension of the tumor to the left zygoma.

PLATE 3
COMPUTED TOMOGRAPHY REPORT

CRANIAL CT SCAN

Plain and contrast-enhanced axial and coronal sections of the head were obtained.

There is a soft tissue mass of heteregenous density with areas of enhancements in the left temperomadibular area. The left masseter, pterygoid and temporalis muscles are ill-defined. There is extension of the mass into the left temporal fossa with associated osseous destruction of the left hemimandible, maxilla, zygoma and temporal bone.

There is asymmetry of the nasopharyngeal area with slight bulging at the left side.

There is no facial intracranial mass lesion nor abnormally enhancing structures.

The fourth, third and lateral ventricles are unenlarged.

There is no displacement of the midline structures.

The sulci and cisterous are intact.

There is no evident extraaxial fluid collection.

The posterior fossa, brainstem and sellar region are not unremarkable.

The potromasteids, paranasal sinuses, orbita and bony calvarius are unremarkable.

Impression

LEFT TEMPOROMANDIBULAR MASS, AS DESCRIBEDPROBABLYNEOPLASTIC.

The diagnoses based on the clinical picture, histopathologic reports and radiographic findings throughout the patient's course of therapy are as follows:

1. (1998) Ameloblastoma, left mandible; S/P Hemimandibulectomy
2. (1996) Ameloblastoma, left parotid area with cystic degeneration and squamous metaplasia; S/P Excision biopsy
3. (1997) Metastatic bone disease, midline sphenoid and left temporo-orbital area; S/P radiation therapy.

DISCUSSION

Ameloblastoma (adamantinoma, adamantoblastoma, basiloma, epithelioma ameloblastoides) is one of the most significant odontogenic tumors in terms of behavior and frequency. It is part of a group of epithelial odontogenic neogrowths with minimal inductive change in the connective tissues justifying its benign character. It was first recognized by Cusack in 1827 and was later described by Falksan. The term adamantinoma was introduced to denote the tumor by Malassez in 1885. Ivy and Churchill, favoring terminology that did not imply a calcifying neoplasm, suggested the name AMELOBLASTOMA. The other groups of epithelial odontogenic tumors are variants with marked inductive change in the connective tissues and, thus, have a greater tendency for malignant transformation.

Most ameloblastomas are diagnosed in the 3rd to the 5th decade of life with very few cases seen in the first decade. Mean age of diagnosis is 38.9 years. Sex distribution is nearly equal. Ameloblastomas are seen more frequently in the mandible than in the maxilla with the posterior region most commonly affected. Table 1 shows the localized sites of ameloblastoma.[4]

Table 1. LOCALIZED SITES OF AMELOBLASTOMA

Site	Frequency	
Mandible	81%	
Posterior region		56.7%
Premolar region		16.2%
Anterior region		8.1%
Maxilla	19%	
Posterior region		14.6%
Premolar region		2.5%
Anterior region		1.9%

The typical presentation of this disease is a slow-growing painless swelling of the jaw or alveolar area. Other less common manifestations include teeth mobility, ill-fitting dentures, malocclusion, ulceration, draining sinuses, and nasal obstruction. The size of the tumor may vary from small, asymptomatic lesions up to disfiguring tumor masses as large as 16 cms.

Radiographic studies are basically important especially if the typical radiolucency with no calcified or radio-opaque components is present. Ameloblastic lesions may demonstrate unilocular or multilocular types with the former often confused with benign cysts.

Ameloblastomas grow by extension into adjacent tissues and may perforate the investing bone. A biopsy should always precede treatment since these tumors frequently present individual characteristics. Some are slow growing, expensive tumors requiring many years to manifest subjective symptoms. Others grow more rapidly and present definite malignant tendencies.[3]

Histopathologic diagnosis is also very important. Microscopically, the lesion is composed of nests, strands and cords of ameloblastic epithelium, all separated by relatively small amounts of fibrous connective tissue stroma. Two predominant patterns are seen, the follicular and plexiform types. In the follicular type, the epithelial islands contain central portions that are composed of a loose network resembling the stellate reticulum of the enamel organ. In the plexiform type, the epithelium is arranged in anastomosing strands and cords resembling dental lamina. The epithelial cells are closely apposed and morphologically appear basaloid or cuboidal. Of the two patterns, the follicular one is more commonly seen.

Cystic degeneration may occur in the central stellate area of the follicles and also in the stroma resulting in cystic ameloblastoma. Happonen and Newland, in a study of 12 cases of cystic ameloblastomas by light and electron microscopy, observed areas of squamous metaplasia in the stellate reticulum.[5] When squamous metaplasia of the stellate reticulum-like areas become extensive and form islands of keratinizing squamous epithelium, the tumor is often referred to as acanthomatous ameloblastoma. Calcification of metaplastic epithelium in ameloblastomas has also been reported.[6]

In cases of malignant ameloblastomas, which are apparently unusual, the characteristic cytologic findings include fibrovascular central cords surrounded by palisading crowded basaloid or columnar cells or both and rosette-like structures of tumor cells with central fibrillary material.[7]

The conventional ameloblastoma has a capacity for continued growth and a tendency to infiltrate between bony trabeculae. The recurrence rate for ameloblastomas treated by enucleation or curettage is reported to be 55-90%.[8]

In the event that ameloblastomas may not progress into a malignancy, it can still develop into one of the many variants.

Based on the clinical presentation and histopathologic report seen in this case, the diagnosis of ameloblastoma with malignant transformation was made in this patient. An acanthomatous type or a rare variant such as malignant ameloblastoma is considered, although there were no apparent signs of malignancy, such as

weight loss or lymphadnopathy. Bone scans showed evidence of metastasis.

When malignant epithelial neoplasms arising from the odontogenic apparatus occur, albeit rarely, the diagnosis and classification is difficult. Some of the reported cases have developed as a result of malignant transformation of a conventional ameloblastoma and retain the histopathologic features of ameloblastoma in the primary tumor and metastatic lesions. Such tumors have been called malignant ameloblastomas. In others, however, the tumor arises from an ameloblastoma but appears poorly differentiated- the so-called ameloblastic carcinoma.

A third type, the primary intraosseous carcinoma is indistinguishable from keratinizing and non-keratinizing squamous cell carcinoma of oral mucosa origin and is often diagnosed by exclusion.[10]

Of these odontogenic carcinomas mentioned, metastasis was reported in the lung, the lymph nodes, spleen, kidneys, liver, ilium, ribs and vertebrae.[11] Prognosis is poor and survival rate is slow.

As to management of the tumor, the therapeutic goal of any extirpative surgical procedure is to remove the entire lesion, leaving no neoplastic cells that could proliferate and cause a recurrence of the lesion. Foremost, it is imperative to histologically identify the lesion with biopsy. Other factors that must be evaluated prior to extirpative surgery are the anatomic location of the lesion, its confinement to bone, the duration of the lesion, and the possible methods for reconstruction following surgery. The three main modalities of surgical excision of odontogenic tumors are (1) enucleation or curettage, (2) marginal or partial resection and (3) composite resection.

Tumors that behave more aggressively like ameloblastomas require wide margins of uninvolved tissue to adequately excise the lesions. Radical treatment in cases of malignant varieties includes consideration of radiation and chemotherapy in addition to surgery.[4]

CONCLUSION

A rare case of ameloblastomas is presented. The patient, a 31 year old female from Iloilo City, was first operated on at age 11 years and underwent a total of six surgical procedures in 20 years due to recurrence of the tumor and an extension to adjacent structures in the head. The patient's problem started as an odontogenic tumor that appeared benign but behaved aggressively without apparent disturbance. A malignant transformation with metastasis was noted so that the patient was given radiation therapy but there was no regression of the neogrowth.

In the review of literature, ameloblastomas may appear benign but are actually aggressive in behavior and invasive in character, slow-growing but with propensity for malignant change. Aside from a tendency for malignant transformation, the disease process may present as other variants of odontogenic lesions which are difficult to classify or diagnose. Histopathology and roentgenographic studies are, therefore, very important in order to arrive at a correct diagnosis.

An important cue in the management of ameloblastoma is aggressive surgery once diagnosis is made to prevent recurrence. Furthermore, the need for close follow-up of the patients with ameloblastoma is recommended to monitor recurrences, new patterns of growth or metastasis.

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CENTRAL SLEEP APNEA: CHALLENGE IN THE DIAGNOSIS AND TREATMENT*

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ABSTRACT

The Department of Pediatrics and Otolaryngology-Head and Neck Surgery of Corazon Locsin Montelibano Memorial Regional Hospital in Bacolod City encountered a case of a poorly studied sleep related disorder. The Pediatricians were the first to see the patient. Evaluations and attempts at treatment were made. Consultation was sought from ORL-HNS department to rule out obstructive type. However all these failed and they were left with a young child with persistent and worsening sleep apnea

CASE REPORT

This is the case of a 3yo female patient which was admitted for the first time because of cessation of breathing and cyanosis. The present illness started about 22 days PTA, as occasional, non productive cough associated with low grade fever for 2 days. No consultation was done but was given by the mother Allerin syrup which provided little relief. Mother noticed 17 days PTA that the patient had episodes of disturbed sleep described as struggling to breath during sleep. Patient was brought to a nearby hospital 14 days PTA and was treated as a case of Pneumonia and Bronchial Asthma. However, because of persistence of abnormal breathing at night, the child was brought to the city for consultation. Several minutes PTA, while on the way to the hospital the patient fell asleep and subsequently stopped breathing with her lips and skin gradually turning blue. The panic strickened mother administered mouth to mouth resuscitation until the Emergency Room was reached where proper resuscitative measures successfully revived the patient.

PERTINENT PHYSICAL FINDINGS

Unconscious, arm borne, in respiratory arrest

Vital Signs:
BP – 120/70 mmhg
RR – 0
PR – 140 beats/min.

Skin:
Cyanotic & cold

Direct Laryngoscopy:
Normal cartilagenous support, Epiglottis normal shape, vocal cords are mobile, no mass at the vallecula

Nasopharyngoscopy: no obstruction

Chest X-ray: Primary PTB

Brain CT Scan: essentially normal result

PERTINENT LABORATORY RESULTS

CBC (taken with the following results)

Hgb	– 11.5 g/l
RBC	– 4.12 X 10/L
Hct	– 34.9%
WBC	– 24 X 10/L
Lymp	– 3.5
Granulocyte	– 18.6

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ABG

PH	– 7.07
PCO2	– 130.7
PO2	– 135.6
HCO3	– 38.6
BE	- + 2.9
O2 Sat	- 97.1%

DISCUSSION

Many of the sleep related breathing disorders mentioned in a number of journals are of the Obstructive type. The authors were able to obtain very few articles about Central Sleep Apnea. These publications provide exquisite description of the Pathophysiology and management of CSA.

The purpose of this case report is to tickle one's awareness of this sleep disturbance and to invite genius minds to create definite treatments for this abnormality. Central sleep apnea has been poorly studied as cited in EUR RESIR J. that there is accumulating evidence that CSA should be considered as the end of the spectrum. Instability in the breathing pattern is the main underlying mechanism as stated in another journal. Causes of sleep apnea can be classified into 4 groups: neurologic disorders, periodic breathing, upper airway abnormalities, and idiopathic syndromes. Clinical features result from the interaction between the underlying disorder and control of respiration.

Two different prototypes emerge: patients who are hypercapneic (central hypoventilation and/or impaired respiratory mechanics) to which this patient belongs and those who are eucapneic or hypocapneic (periodic breathing and idiopathic hyperventilation). There are some reports that airway collapse may cause Central Sleep Apnea. Treatment strategies are remarkably few in number. Use of nasal ventilation and inhalation of carbon dioxide are mainly of theoretical interests since patients do not tolerate these more invasive therapies. Drug treatment with Acetozolamide is easier to perform. Stimulation of upper airway reflexes, less invasive methods seems to be promising for the near future.

But what really caused this central sleep apnea? Could it be a bout of CNS infection? Or something else. The patient went home with tracheostomy. This make it easy for the folks to stimulate breathing. This case had provided the clinicians experience in managing and understanding central type of sleep apnea which were encountered only in textbooks.

JET STROBE: A FILIPINO MANUFACTURED SUPPLEMENTAL STROBOSCOPIC APPARATUS FOR LARYNGOSCOPIC EXAMINATION*

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ABSTRACT

State-of-the-art laryngeal instrumentation (e.g. computer-integrated stroboscopy systems), though highly accurate, is virtually inaccessible due to its expense and only well-funded tertiary hospitals are equipped with such instruments. Patients who are seen in less equipped centers are, therefore, not completely evaluated. It is the aim of this study to design a simple, portable, inexpensive supplemental stroboscopic device for laryngoscopy using locally available materials and to describe a possible alternative technique for stroboscopic evaluation using a rotating perforated disc short of a modern stroboscopic equipment. Such device was named the JET strobe. This supplemental tool circumvented the principle of stroboscopy by periodically interrupting the line of vision (instead of electronically flashed beam of light) utilizing a rapidly rotating perforated disc while the examining field is in continuous high intensity illumination. The JET strobe enable the examiner to assess the mucosal wave in the absence of the modern stroboscopic equipment utilizing computerized electronic tube flashes and extends the ability of the examiner to visualize the vocal cords while in motion which cannot be achieved through ordinary indirect laryngoscopy using laryngeal mirrors. It also helps in the possible detection of vocal cord lesions and gives the examiner an idea as to the extent and depth of the lesion.

Keywords: Stroboscopy, mucosal wave, laryngoscopy

INTRODUCTION

Evolution is said to have reached its apex in man. It is man's capacity for abstract thought and highly developed communicative skills that have set man apart from his predecessors. Phonation, which is among the three known function of the larynx (the other two being respiration protection), has enabled man to express complex ideas and articulate these in comprehensible speech.

The assessment of vocal cord mobility is integral in every otolaryngologic examination. It is the key in the evaluation of voice production and in the diagnosis of laryngeal pathology. Various methods are available, among which is stroboscopy, currently the gold standard in vocal cord assessment. Since its inception in the 1800's stroboscopic evaluation of the larynx has incessantly evolved to become an invaluable tool in the assessment of the vibratory function of the vocal cords. State-of-the-art laryngeal instrumentation (e.g. computer-integrated stroboscopy systems), though highly accurate, is virtually inaccessible due to its expense, and only well-funded tertiary hospitals are equipped with such instruments. Patients who are seen in less equipped centers are, therefore, not completely evaluated. It is the aim of this study to produce an inexpensive alternative to the costly imported stroboscopes by utilizing readily available materials.

PRINCIPLE OF STROBOSCOPY

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In 1878, Oertel applied the principle of stroboscopy in the field of laryngoscopy for investigating voice production describing his observations of the movement of the vocal cords based on a regular interruption of a high intensity beam of light utilizing a rotating perforated disc and used the alternating light produced to visualize the larynx through indirect laryngoscopy. The short duration high-intensity flashing light produced a visual impression that objects in rapid unperceptive oscillatory movement appears to be at a standstill or moving very slowly whenever the frequency of illumination was in synchrony with the frequency of the vocal cord vibration or the illumination is slightly desynchronized with the vocal cord frequency, respectively. As long as the illumination takes place more frequently than every fifth of a second, the observer will have an illusion that the field has a constant source of light. This phenomenon was based on Talbot's law which state that an image on the human retina persists for a duration of 0.2 seconds, making immediate sequential events imperceptible. This fundamental method of examination was also utilized by numerous scientists whose work have been focused on voice evaluation. Unfortunately, the disc stroboscope elicited as much criticism as praise, and as a result, this promising method of examination was abandoned before it became widely used.

OBJECTIVES

To design a simple, portable, inexpensive supplemental stroboscopic device for laryngoscopy using locally available materials.

To design a possible alternative technique for stroboscopic evaluation using a rotating perforated disc short of a modern stroboscopic equipment.

MATERIALS AND INSTRUMENT DESIGN

This instrument was basically manufactured using locally available material and was designed as a supplemental device to a pharyngolaryngoscope. It is composed of an 8.9 cm. diameter, lightweight, opaque rotatory disc with two perforations near its edge placed opposite each other (Figure 1). The disc was attached from its center to the rotor shaft of a direct current (DC) motor having a speed of 2400 revolution per minute powered by a 9 volts battery. The motor, on the other hand, was soldered to a 1 kilo ohm variable resistor which also served as a shut-off switch once placed at maximum resistance level. The motor and disc were affixed to a metal spring clamp using glue and aluminum tape while the variable resistor was fashioned with a velcro for its attachment. The whole assembly was attached proximally, using the metal spring clamp, on top of a 70 degrees or 90 degrees fiberoptic laryngopharyngoscope (i. e., Berciward by Storz) (Figure2). The center of the disc and the fiberoptic lens was vertically aligned with the plane of the disc situated a few millimeters from the fiberoptic lens covering it entirely except within the areas of perforation which periodically aligns with the endoscopic lens upon rotation. The variable resistor, however, can be fastened to either side of the scope with its knob accessible to handling of the thumb. An adaptor was also fashioned to fit a videocamera system, whenever available, for possible documentation. This supplemental device was named JET strobe (Figure 3).

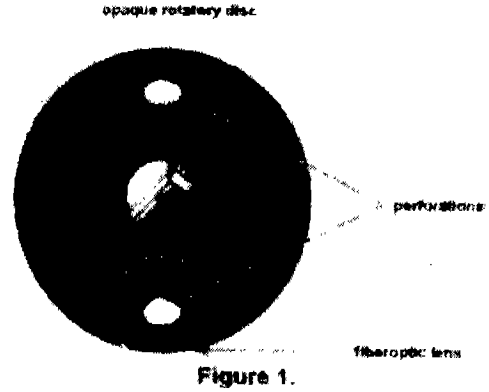

Figure 1.

Figure 1

Figure 2

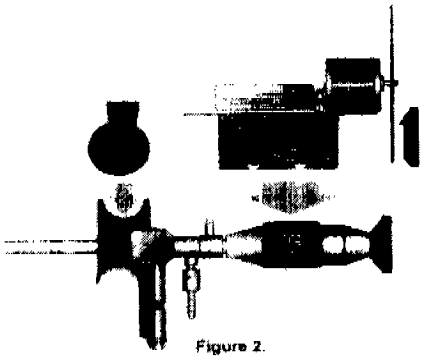

Figure 2.

Figure 3

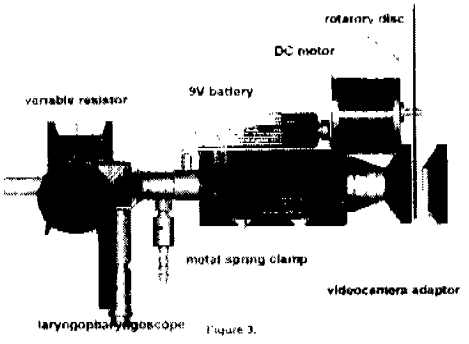

Figure 3.

MECHANISMS AND PRINCIPLES

All present-day stroboscopic equipments were designed with computerized electronic flash tubes that are capable of producing very short duration, high intensity flashes with automatically regulated discharge rate either in synchrony or desynchronous with the vibratory frequency of the vocal cords. On the other hand, the JET strobe circumvented this principle by periodically interrupting the line of vision (instead of electronically flashed beam of light) with a rapidly rotating perforated disc while the examining field was in continuous high intensity illumination. The split second alignment of the perforated portion of the disc with that of the endoscopic lens and line of vision, while the glottis is intensely illuminated, captures the vibrating vocal folds in "snapshot or distinct separate events of the glottic cycle creating an illusion of cessation of motion or very slow vibratory movement depending on the synchrony of the line of vision-disc perforation-endoscopic lens alignment with that of the frequency of oscillation. The rate at which the disc rotated, as long as it is more than five per second, created an illusion of continued field illumination. The rate of rotation was controlled manually by means of a variable resistor which was regulated to match the frequency of the vocal cord movement to produce the desired stroboscopic effect. Such still or slow motion effect can also be achieved by instructing the subject to maintain a certain frequency for a certain duration during phonatory tasking. Although this device was meant for "on the spot" clinical evaluation of the vocal folds, the JET strobe can also be connected to a videocamera system for documentation, review and comparison between follow-ups.

USE AND APPLICATIONS

Analysis of the oscillatory movement of the vocal folds utilizing stroboscopy can assist otorhinolaryngologists in understanding the effect of various vocal cord pathologies on its normal vibratory functions, thus aiding in the detection of organic lesions that might be missed during an ordinary indirect laryngoscopic examination. To better understand or interpret stroboscopic images, it is necessary to review the physiology of laryngeal vibration. Because of the different stiffness characteristics of the vocal fold layers (i.e., the stiff muscular portion of the vocal cord and the pliable superficial lamina propia and overlying mucosa), the superficial portion can, therefore, oscillate with a degree of freedom and accounts for the mucosal wave visualized in laryngostroboscopy. It is through the observation of this characteristic mucosal wave of the vocal folds during phonatory task which will prove the absence of a suspected vocal fold lesion.

Nowadays, physicians gain access to modern sophisticated stroboscopic apparatus by referring patients to well equipped tertiary hospitals who have sufficient means for acquiring this very expensive piece of equipment. This was the main reason for the production of the JET strobe, a simple, portable and inexpensive locally manufactured supplemental stroboscopic device adapted for fiberoptic pharyngolaryngoscopes which is a practical

tool for close examination of the larynx and is commonly acquired by most practicing otolaryngologists. The JET strobe enables the examiner to assess the mucosal wave in the absence of the modern stroboscopic equipment utilizing computerized electronic tube flashes. This supplemental device was not intended to replace the existing gold standard. It only extends the ability of the examiner to visualize the vocal cords while in motion which cannot be achieved through ordinary indirect laryngoscopy using laryngeal mirrors. It also helps in the possible detection of vocal cord lesions and gives the examiner an idea as to the extent and depth of the lesion.

INSTRUMENT COST

The expenses incurred on the production of the JET strobe was approximated at 200.00 Pesos only as compared to the standard cost of the more advanced stroboscopic equipment with a price ranging from 500,000.00 to 1,500,000.00 Pesos.

CONCLUSION

The JET strobe is a simple, portable and inexpensive Filipino-made supplemental stroboscopic device for fiberoptic laryngoscopy short of a modern stroboscopic equipment. It has also presented a possible practical alternative technique for stroboscopic evaluation using a battery powered rotating perforated disc.

RECOMMENDATIONS

It is encouraged that further studies and experiments be conducted regarding the use of the fiberoptic laryngoscope in combination with the rotating perforated disc to establish the optimum speed and number of perforations of the disc or even develop a compact fiberoptic laryngoscope with a built in high speed rotating perforated disc for stroboscopic evaluation in the absence of the more expensive stroboscopic equipment.

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SUCTION CAUTERY DISSECTOR (ScuD) FOR TONSILLECTOMY*

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ABSTRACT

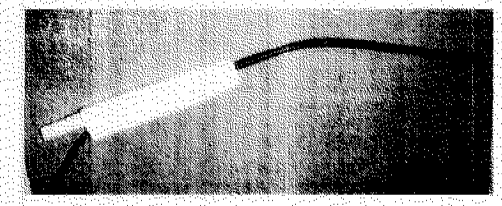
The suction cautery dissector (ScuD) is an amalgamation of two distinct instruments used for tonsillectomy. These are suction cautery and suction dissector. With proper technique and increased experience, operative time, blood loss and post-op pain will be reduced to minimal. The ScuD tonsillectomy provides important features that are simple, practical and safe.

Keywords: Instrument, tonsillectomy, suction cautery dissector

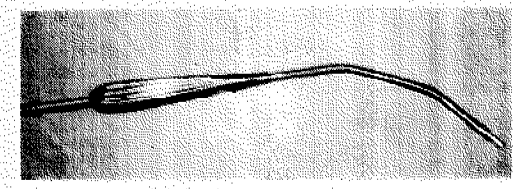
INTRODUCTION

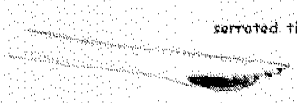
Tonsillectomy remains one of the most common surgical procedures performed in the world.[1] Numerous techniques have been used from the conventional sharp/snare dissection to electrocautery and laser surgery but there is no consensus as to the best method.[2] Electrocautery excision is a popular method since it is also extensively used in head and neck surgery. The use of suction cautery and the suction dissector is not a new concept (Fig. I) and are both used for tonsillectomy locally. Reports to date, however, showed no amalgamation of these two instruments in which their distinct advantages are combined into one innovative unit: a suction cautery dissector for tonsillectomy.

Figure 1. Suction Cautery



SUCTION CAUTERY





SUCTION DISSECTOR

OBJECTIVES

1. To present a new instrument for tonsillectomy that offers an almost bloodless surgical field with limited tissue trauma.
2. To provide the oral surgeon with a reusable, reliable and affordable basic oral surgical instrument that is competitive quality and craftsmanship.

MATERIALS AND METHODS

The materials used for the suction cautery dissector (ScuD) were selected with regards to their durability, availability and cost. The stainless brass steel is the metal used, a bronze alloy, being highly resistant

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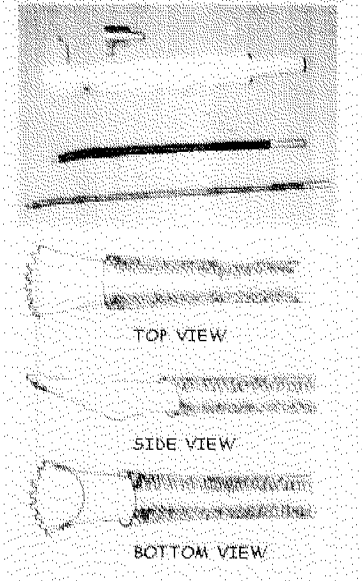
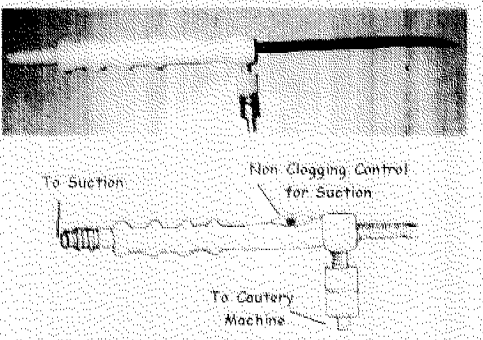
to rust and corrosion. The steel content gives it hardness and durability while the bronze content offers malleability and low heat yet high electrical conducting capacity for electrocautery.[3] The metal is easily availability at a very affordable cost. This is properly measured, cut and bent and adapted perfectly to the suction plastic handle. Proper electrical insulation using a rubber mesh insulator was fitted the entire length of the metal rod cautery leaving a 0.5 cm. exposure of the cautery tip.

The ScuD was based on the basic design from the commercially available suction cautery. The tip, however, was designed to conform to the purpose of dissection through the fibrovascular tonsillar bed. The tip opening was cut in an oblique fashion with superior half slightly flared and noncutting serrations created along its tip margins (Fig. II). Its widest dimensions measuring 4 mm. by 2.5 mm. width (but can be as wide as 6 mm. x 2.5 mm. especially for adult surgery). This metal cautery rod is snugly fitted and secured in place to an electrical plastic suction handle with an index finger for a nonclogging control of suctioning. The ease and light handling of the instrument is as apparent as one holding a pen. Its caudal end is attached through a rubber tubing to a strong suction machine. On its ventral surface is the connection to a monopolar cautery attached to the energy source. Any available cautery machine is adaptable to this instrument.

Figure II. The ScuD (suction cautery dissector)



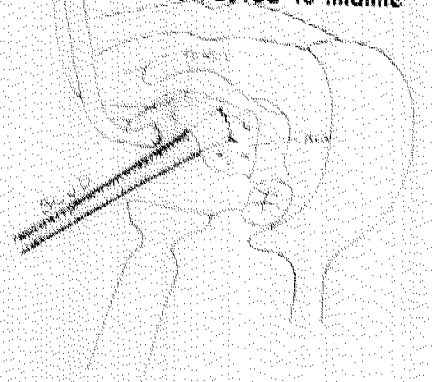


Other instruments for the ScuD tonsillectomy procedure includes the basic mouth gag preferably the Dingman with three variably sized blades, a grasping forceps with noncutting edges, a regular forceps for packing and a pillar retractor. Scissors and a needle holder are included as accessory instruments. A good illumination is mandatory.

Under general anesthesia, the patient's head is slightly extended and the surgeon is comfortably seated or standing at the head of the operating table. The mouth gag is first positioned to expose the inferior tonsillar pole. A classical mucosal anterior pillar incision is performed after local infiltration of lidocaine-epinephrine solution of 1:100,000 dilution. Separating the superior tonsil pole from its bed after being grasped with an Allys forcep is done by dissection along the mucotonsillar transition using the ScuD instrument. The technique should follow a sequential dissection between the capsule and bed going caudal towards the inferior pole and cautery of visible feeding vessels is done before it retracts into the tonsillar bed (Fig. III). The same procedure is in order if performed under IV sedation except for a manual tongue retractor used. This is for easy removal if the patient wanted to swallow or spit out secretions. The goal is an almost bloodless surgical field with limited tissue trauma. The serrated tip affords dissection and detection of small vessels and before suction, spot cautery is performed. Early identification decreases the need for aggressive cautery with an associated increase in thermal damage to adjacent tissue (Fig. IV). For recalcitrant bleeders the usual suture ligature may be done. The electrocautery machine is usually set to 20-25 W when using the Aesculap brand or 6-7 W for the Valley lab brand of electrocautery machine.

Figure III

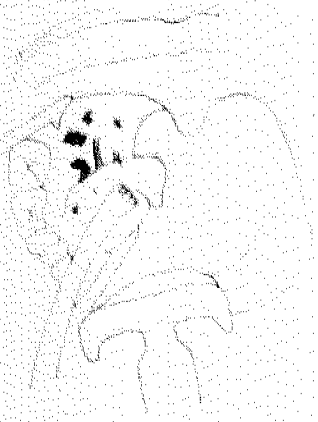
Tonsil retracted to midline



Selective spot cautery of tonsillar bed

NOTE: Actual patient done under Local Anesthesia

Figure IV



SCuD identifies feeding vessels

Proper way of handling SCuD

RESULTS AND METHODS

The instrument underwent trials on 4 patients all performed by the author. Three were under GA and one under IV sedation. These were aged 16,19,26, and 27. No postoperative complications, in particular hemorrhage, were observed. Blood loss were recorded as minimal which is

estimated at 50 cc or less. Even in a patient with marked fibrosis, wherein malignancy was entertained because of a unilaterally enlarged and fungating tonsil, met the defined criteria for success. Although it is difficult to make comparisons between different techniques,[4] it was observed that using the instrument is associated with less pain in the post-operative period. This is the result of selective vascular electrocoagulation, in concert with gentle dissection of the surrounding musculature. Of some note is the reported data indicating that conventional tonsillectomy with secondary electrocautery produces more pain than when hemostasis is obtained by suture ligatures.[5]

DISCUSSION

The use of the ScuD instrument brings additional advantages in the surgical technique of tonsillectomy. Correct technique requires the lowest effective power setting of the electrocautery, thereby limiting unnecessary thermal injury to the surrounding musculature and subsequently reducing post-op pain. The cautery tips must be kept clean. Because tonsillectomy using the ScuD instrument can be performed with reduced blood loss, the suction component of the instrument is used mostly to improve exposure and as a smoke evacuator.

Sequential identification and electrodissection of tonsil vasculature prevent bleeding vessels from retracting into the muscle bed, thereby lessening muscle injury dramatically. With increased experience, the operative time will be reduced when compared to traditional dissection technique.

Sterilizing the instrument is simple. The instrument should be soaked for 20-30 minutes in 1:1000 aqueous solution of Zephiran or in 70% alcohol. Or it can be placed in a closed container with formaldehyde crystal for at least one day. Autoclaving is recommended. The ScuD instrument total cost of P250 is very affordable. Its low price, however, should not be equated with low quality. Its fine finish is definitely at par or even better than the imported instruments.

CONCLUSION

The simplicity, safety, and fundamental soundness of this instrument make tonsillectomy routine. More than just a simple combination of a suction, cautery and dissector, the use of this instrument represent a novel concept in tonsil surgery. The ScuD establishes new confidence in tonsillectomy for surgeons, patients and their families.

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