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The Philippine Journal of

OTOLARYNGOLOGY – HEAD & NECK SURGERY

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EDITORIAL

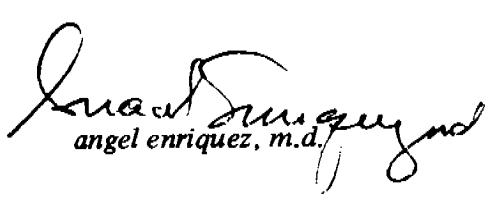
A GREAT STEP FORWARD

While the honor goes to the Manila Central University – FDT Medical Foundation for pioneering in the establishment of a separate and independent Department of Otolaryngology in its medical school in 1957, it is, however the creation of a separate Department of E.N.T. at the College of Medicine, University of the Philippines and its teaching affiliate – the Philippine General Hospital – that gave impetus and boosted that move. This momentous event was made possible through a resolution of its Board of Regents in its 690th meeting on November 1961. Changes of lesser magnitude – at the Pamantasan ng Maynila College of Medicine – Ospital ng Maynila complex, the Fatima Medical Science Foundation, General Emilio Aguinaldo College of Medicine, Philippine Muslim-Christian College of Medicine – among the crop of new medical schools – kept the PSO-HNS's top goal alive.

Although pursued with vigor, it is trite but true to say that progress has been slow. While medical schools proliferated, the Association of Philippine Medical Colleges – perhaps ignorant of the society's fundamental goal – has failed to give its wholehearted support.

The creation therefore, of a separate Department of Otolaryngology at the University of Santo Tomas Faculty of Medicine & Surgery in 1984, although long in coming, rekindled that goal and broke the myth that it has been left unaltered by time and progress. That this "Breakthrough" is bigger than the facts can only be gleaned when one realizes that the pontifical institution's Faculty of Medicine & Surgery is not only the oldest but also the biggest of its kind in the country.

This is the enthralling story of the specialty's euphoric days domestically.



angel enriquez, m.d.

President's Page

IN PURSUIT OF BRIGHTER VISIONS

In general, the year just past was a good one for the Society in spite of the tremendous difficulties that had beset the nation in the face of grave political uncertainties.

But this is not the time to dwell on the past any longer. Rather, we must now prepare ourselves to face the future.

This year may yet prove to be far better for all of us than many of the previous ones because it marks the conclusion of a dark and turbulent era and ushers in a period full of hope and radiant visions. As Filipinos and as members of the Philippine Society of Otolaryngology and Bronchoesophagology, we indeed have a good cause for jubilation.

As you may recall, we held four scientific meetings last year which had been well-attended by the residents of various medical teaching institutions such as the PGH, UST, UE, HBL, Fatima College of Medicine, Ospital ng Maynila, MCU, and Our Lady of Perpetual Health School of Medicine among others.

Discussed during those meetings were interesting cases as well as the latest surgical techniques in the filed of otolaryngology. In connection with this, I would like to take the opportunity to convey my thanks to MEDICHEM, which is headed by Drs. Salvador Franco and Gene Bautista, and Boehringer Ingelheim (Phil.) Inc., which is under Dr. Primitivo Chua, without whose participation and support the scientific meetings would not have been possible.

Aside from holding scientific meetings, we also accredited the UST Hospital's Department of Otolaryngology with Dr. Eusebio Llamas as its chairman.

The recent fulfillment of a long-pursued national dream could not have transpired at a more opportune time. For this year, we are honored to play host to the Asian Congress of Otolaryngology to be held sometime in early December. The Congress shall serve as the highlight and focal point of the Society's activities for the entire year. Dr. Mariano Caparas of the PGH will act as its overall chairman and with him at the helm, we can expect the Congress to be nothing but a success.

This is one major medical event that we should all look forward to and strive to turn into a big success. We cannot expect it to be such unless we, the officers and members of the Society, render our full cooperation and support to this highly significant undertaking. Thus, I now call on all of you to lend a hand to this worthy endeavor and to invite more participants from the various medical centers to join us in the forthcoming Congress.

I would also like to extend my gratitude to the different committees for their invaluable help and support on many previous occasions. I am confident that they will maintain the same enthusiasm in the months to come, especially when the Society goes into full gear in its preparation for the Congress.

My special thanks goes to the Ledesma Audiologic Center for its continuing assistance to the Philippine Journal of Otolaryngology–Head and Neck Surgery.

Let me also take this wonderful opportunity to congratulate those who have recently successfully hurdled the exams given by the Philippine Board of Otolaryngology. They are the following, namely: Drs. Apollo Garcia, Josefino Hernandez, Adonis Horada, Virgilio Liao, Jacob Matubis, Amado Pascio, and Rene Tuazon. I am delighted to welcome them to our Society as its newest members and I am proud to have them with us.

We have all just been through what could be rightfully considered as one of the most trying and difffficult epochs in our nation's history. But all that is well behind us now.

After being key witnesses to and active participants in a truly remarkable and unprecendented national transformation, we can now start afresh and pursue our aspirations. I salute the Filipino people for their awesome display of valor, faith, and determination which helped reshape our country's history.

Under a new dispensation that has vowed to uphold and preserve the pople's cherished ideals, we can now raised our hopes, build our dreams, and be assured of a more promising future.

But that kind of future is not without its fair price.

There is much that we, as responsible members of an important segment of society, can do to help pick up the shattered pieces and rebuild our country from the ruins. Each of us is called upon to join hands and be one with the others and contribute his share to this noble endeavor.

It is no simple nor easy task. But I honestly believe that there lies the real and greatest challenge to us all.

It is, therefore, my earnest hope that the great enthusiasm and tireless efforts you have unfailingly shown in the past will not wane but instead flourish and grow as we move forward in pursuit of even bigger tasks and brighter visions.

DR. REMIGIO I. JARIN

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Head & Neck
Surgery

CAUSES OF VERTIGO IN THE PHILIPPINES, 1983-85

Carlos P. Reyes, M.D.*

INTRODUCTION

Vertigo is one of the most common complaints an active physician encounters in his practice, yet is poorly understood. Many times there is little opportunity to take a careful history, perform appropriate physical examination, and order hardly any indicated laboratory tests. Even patients are not too knowledgeable about what they feel and may try to describe their symptoms best by such descriptive terms like: "Hilo" (any general term for imbalance or dizziness), "Lula" (fear of heights), or "Lio" giddiness or lightheadedness). Because of the participation of the Visual, Vestibular, and Propioceptive systems in the maintenance of equilibrium, it is not unusual for patients to use many terms in describing or attempting to give exact definition to their subjective feelings. Thus Syncope (disturbance of consciousness) may be included and its various causes mentioned and confused with true Vertigo (an illusion or percepton of motion). Many patients suspect a serious or life-threatening condition which causes a great deal of anxiety, making diagnosis a little bit more difficult. Often the physician sees the patient in an asymptomatic state when there are hardly any signs and symptoms to assist him establish the diagnosis. The purpose of this paper is to take a hard look at the problems of vertigo diagnosis, establish an etiological classification using a systematic approach, with particular emphasis on the significant details of the history. relevant physical findings, and laboratory tests. It is not intended to be an all inclusive final report, but rather, it is designed as an ongoing prospective study.

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METHODS AND MATERIALS

Three hundred and sixty-seven patients seen at an outpatient clinic between April 1983 to December 1985 were included in this study. The age and sex distribution are seen on table I. Each patient was made to fill up a standard Dizziness Questionnaire to the best of his knowledge as accurately as possible. Blood pressure was obtained from both arms and recorded. The examiner reveiws each accomplished questionnaire together with the patient and significant details of the history elicited. A complete Otolaryngological and Neurological examination is carried out.

The following tests were given: Pure Tone Audiometry, Electronystagmography (ENG), Evoked Potential Studies like Visual Response, Auditory Brainstem Response, and among Meniere's suspects, ElectroCochleograph (EcoG). Standard blood tests as outlined in Table II were performed at outside participating laboratories. When indicated plain X-rays, Polytomes, and CT-Scans of the head were obtained. All data were entered into a 6502 CPU compatible computer using the Database-II Program(**) and stored in five-inch floppy discs, for later recall and analysis.

RESULTS AND DISCUSSION

The history, physical findings, lab tests were correlated at the end of each examination and etiologic diagnosis established. Frequently the decision to classify a lesion as Central or Peripheral is facilitated by the results of ENG examination. The results can be seen in Table III. It appears that Central causes constitute the majority of vertigo patients (53.95%) and Peripheral causes comprise 40.8%. Those patients whose history appear to be rather vague and whose PE findings and lab tests were within normal limits were classified under Psychogenic; whereas patients who have not completed the battery of tests, or do not have sufficient data were classified under Undetermined causes.

Among the Central causes of vertigo, Vertebro-Basilar Insufficiency tops the list with 117 patients or 31.88% of the total. This category is also the most common cause of vertigo. The age and sex distribution are shown on Table IV. Case histories indicate that there may be varying stages of the disease from mild or transient attacks to actual "Drop Attacks" accompanied by Neurologic disturbances including dysarthria and dysphagia. A great majority report vertigo to be abrupt in onset, lasting several minutes associated with nausea and vomiting. What they consider as consider as constant attacks may be a series of overlapping episodes, with lingering after-effects. It is typical for them to experience more than one vertigenous episode daily, although the successive ones were of lesser intensity than the initial attack. Many experience anxiety effects that tend to increase the magnitude of the symptoms. Inability to maintain equilibrium while standing for a long period has been reported frequently, a feeling heightened by walking, with loss of equilibrium. Vegetative

manifestations like nausea, vomiting, tachycardia, are in general of lesser intensity than among those patients with peripheral disease. Many patients over 50 years have had one or both Cataracts extracted, which contributes to their loss of balance because of the difficulty of integration of visual signals by the Vestibulo-Ocular compensatory mechanisms.

Hearing loss appears to be common with advancing age due to causes other than those directly responsible for vertigo. Presbycusis is the most common etiology causing bilateral involvement. Other causes include Noise-Induced Hearing Loss, Tympanosclerosis, Chronic Otitis, and Ototoxicity. Some patients had unilateral involvement. Among younger patients the incidence of hearing loss was lower, although Noise-Induced deafness and Chronic Otitis were commoner. The incidence of tinnitus was variable in that not all with hearing problem had this complaint. Only a few reported bothersome tinnitus and most considered this tolerable.

Contrary to expectations there were a number of patients in the younger age group (20 to 49 years) with symptomatology similar to those in the older age bracket. The usual pattern is one of transient recurrent attacks of vertigo with or without signs of Brainsteam dysfunction (dysarthria, dysphagia), at sometime during the course of the illness, central findings on ENG, abnormalities in Brainstem evoked responses not attributable to hearing loss. CT-Scans did not demonstrate significant findings, in contrast to those over 50 years where various ischemic zones were revealed. Although unproven, vascular abnormalities involving the Vertebro-Basilar circulation may be speculated. Only angiographic studies may prove the existence of these lesions.

It has been proposed, and many practitioners believe, that Anemia is a cause of vertigo. In this series, none of our patients had Hemoglobin values below 11 gms. or Hematocrit values below 33 vol. %. RBC morphology was usually normal and platelets were often adequate. Blood pressures taken from both forearms were usually not more than 10 mm Hg. apart; in only one was there a difference greater than 20 mm. In this case the patient was diagnosed to have Scalenus Anticus Syndrome and has had surgery performed on her for the correction of this problem.

Since most patients seen were referred after an initial severe episode, there was no way of determining whether hypertension causes the attack or if it resulted from the disturbances brought about by vertigo. Many patients suffering or not from Hypertension have had systolic blood pressure elevations of 30-40 mm Hg. after the onset of vertigo. Unfortunately most BP readings were taken after the patient is seen by a physician, and do not reflect the pressures just before the attack. The author believes that rises in blood pressure is the result rather than the cause of vertigo, and atherosclerosis, as most authors report, is the most common predisposing factor.

The clinic has an alarming high pick-up rate for definite Multiple Sclerosis, perhaps because these cases are often referred by Neurologists for confirmatory Evoked Potential Studies, and at least have been partially worked up. Others were suspected after evaluation and referred to other Neurologists for additonal work up, and subsequently confirmed to be suffering from this disease.

Quite a number appear to have signs and symptoms of MS, have abnormalities in Visual Evoked Potentials not due to refractive errors, central patterns at ENG, but insufficient other lab data to establish definitive diagnosis.

These 31 cases (8.44%) were neveretheless included because they may later exhibit the classical signs and symptoms of definite Multiple Scerosis. Of the 4 cases of Retrobulbar Neuritis, two have elevated CSF IgG levels, without other manifestations. Only one patient had Magnetic Resonance Imaging which ruled out MS.

Head Trauma does not seem as common in an outpatient setting as in Emergency Rooms of well equipped hospitals, which is probably why there were only two cases in this series. History and ENG results were the most significant findings.

The other least common Central causes of vertigo can be seen listed in Table III. None of the patients seen had Hemoglobin levels below 12 grams so that Anemia can be excluded as a cause of Vertigo.

Peripheral Causes of Vertigo

Although peripheral causes constitute only 40.87% of the total causes, there is a greater variety of lesions found and the differences among the top six causes were not very marked. It can bee seen that the second most common cause is Positional Vertigo. Under this classification there are two varieties seen: Positional Vertigo of the Benign Paroxysmal Type (Cupulolithiasis of Schukknecht, involving the Semicircular Canal Ampullas), and Positional Vertigo of Otolithic Origin (involving either or both the Utricle and Saccule). The main difference in symptoms being the kind of stimulus likely to provoke the attack: linear acceleration as when turning head to one side while lying down in characteristic of the Benign Type (PVBP). On the other hand angular acceleration as when bending or stooping forwards while erect seems to be characteristic of Positional Vertigo of Otolithic Origin (PVOO). Of the two, the most common is the latter, which was found among 21 subjects, comprised 5.72% of Positional Vertigo. PVBP was found among 18 patients, comprising 4.90% only. ENG exam revealed positional nystagmus in the direction of the lowermost ear during positional testing in PVBP; while a transient nystagmus in the vertical leads was a common observation in PVOO cases. In either case the Caloric Responses were normal.

Vestibular Neuronitis or Epidemic Vertigo appears to be the next most common cause numbering 30 cases or 8.17% of the total. This disease does not seem to appear as common among countries in the temperate

zones as in tropical countries. Perhaps the climate in tropical countries combining high heat, humidity, rainfall, and almost constant temperature throughout most of the year takes its toll among the local population.

The clinical manifestation of Vestibular Neuronitis approximate that of Acoustic Neuromas, except for the absence of hearing loss. The initial symptoms can only be unsteadiness, and patients do experience actual vertigo when in a state of fatigue because of the loss of Vestibular compensation. There are hardly any sign of positional dizziness and there is always a loss of caloric response on one ear during ENG. ABR is most often normal or slightly impaired if there is hearing loss due to other causes, like for example, Noise-Induced Hearing Loss. InterPeak Latencies are also useful in determining abnormalities in Brainstem responses due to Neural factors. Plain X-rays of the Internal Auditory Canals are routinely done as part of the work-up. Most of these are self-limiting and patients are assured of eventual recovery.

Perhaps the disease that must be differentiated from Acoustic Neuroma is Labyrinthitis because it has all presenting signs and symptoms of unilateral hearing loss and episodic vertigo. It usually starts with a violent attack of sudden vertigo together with unilateral deafness. which could be sudden (Idiopathic Sudden Hearing Loss or ISHL), or progressive as in Viral Labyrinthitis. The hearing loss becomes severe or even profound as the years pass and seldom is there recovery to serviceable levels. Vertigo could be troublesome as it is known to persist many years later. In our series of 27 patients (7.35%) the majority had Viral etiology, comprising 24 patients (6.53%). Bacterial etiology as a complication of Chronic Otitis were present among three patients. One these latter has had a Translabyrinthine Vestibular Neurectomy nine years following a Radical Mastoidectomy because of troublesome vertigo.

Meniere's disease, contrary to prevailing notion constitutes only 25 cases of 6.81% of the total. We were once taught in Medical school that anyone with hearing loss, tinnitus, and vertigo had Meniere's. Although all these symtoms are present, there are qualifying characteristics which include: fluctuant hearing loss, fullness in the ear, episodic vertigo and tinnitus. The disease has to be classified into: Type 1 (Early Reversible), Type 2 (Established, Fluctuant) and Type 3 (Late, Non-Fluctuant) stages based on the criteria of Watanabe. This way confusion regarding its symptomatology can be cleared and such entities like Menieres Syndrome or Pseudo-Meniere's Disease can be excluded. There are two clinical variations: Cochlear Hydrops where only fullness, fluctuant hearing loss are present, and Vestibular Hydrops where fullness, episodic vertigo may be present. In both cases tinnitus may be experienced.

In addition to the routine Site-Of-Lesion test battery mentioned earlier, we utilized Extratympanic ElectroCochleography (ECoG) to facilitate classification into Watanabe's Stages. The silver-ball electrode was introduced into the meatus under microscopic guidance without anesthesia and was very well tolerated by all subjects. A recording of the Action Potential of the 8th nerve was obtained at increments of 10 dB. starting at 100 dBHL. The amplitudes of the AP and Summating Potential were compared, and the AP/SP ratio established. Figure 1 serves to illustrate the results. Majority (21 patients) had SP/AP ratios of 50%, or greater and one had a ratio of 100%. Those in State 1 had SP/AP ratios of 23.4% to 46%.

Of the 25 patients listed, there were 9 males and 14 males found to be suffering from this illness. Three females and one male were found to have early Meniere's (Stage 1), one male was classified Stage 3 (Late, Non-Fluctuant), while the rest were in Stage 2. Two females have bilateral involvement, of which one was found reactive to FTA-ABS test. There were an equal number of patients having left ear and right ear involvement. One 21 year old female had Utricular Hydrops which has not progressed to the full blown disease involving the Cochlea. While most responded to conservative management, two underwent Endolymphatic Sac surgery for intractable vertigo; one of whom eventually had Middle Cranial Fossa Vestibular Nerve section one year after Sac surgery failure. The male patient in Stage 3 may be considered for Middle Fossa or Retrolabyrinthine Vestibular Neurectomy to relieve vertigo and preserve residual hearing in the right ear.

We are still picking up quite a few patients who have positive contact with aminoglycosides, notably Streptomycin Sulfate. Although the shift to newer drugs in the treatment of Pulmonary Tuberculosis has been evident with the introduction of newer oral drugs, most who have been afflicted have been given Streptomycin. Hearing loss, however, has not been clearly associated with this unlike its effects on the Vestibular Neuroreceptors. ENG findings of absence of response to alternate bithermal calorization is the most consistent finding. Thus Ototoxicity to Streptomycin Sulfate remains a persistent health hazard. The next most common drug to produce similar findings are Anti-Malarials, notably Atabrine. It still seems common practice, in provincial areas endemic for this disease, to give prophylatic coverage whether a patient actually manifests the disease or not. There were five patients exposed to Streptomycin, in contrast to three patients given Atabrine. Of the patients with Streptomycin Ototoxicity, one had bilateral vestibular involvement: four had right side involvement. Most had moderate to severe SNHL. Those with Antimalarial Ototoxicity, one had bilateral Cochlear and Vestibular (severe) involvement; the rest had only right Vestibular involvement.

In three bilateral Vestibular involvement, drugs were not identified. One of these had an intra-abdominal operation for malignancy and received multiple drugs which were not known to be particularly ototoxic. Heavy Metals Screening was normal. Their principal symptom was ataxia and unsteadiness while in motion, relieved by being seated or reclined in bed. A month

after antivertigo therapy, a repeat ENG yielded hypoactive responses bilaterally with a general improvement and tolerance of his symptoms. The other bilaterally toxic patient has a history of exposure to Sulfonic Acid fumes. This is an effective cleaning agent for laboratory use. The remaining one is undergoing treatment for Parkinsons Disease. Unlike one patient who has Parkinsons, listed elsewhere in this paper (ENG revealing Central Pathology), this one had no Vestibular Responses bilaterally.

The incidence of Acoustic Neuromas is 2.17%. Among these eight patients only one was male. Three female patients had large tumors of 5-6 cm. in size, causing compression of the Brainstem. The presenting symptoms were unilateral hearing loss and unsteadiness. Tinnitus was a late sign, as well as Neurologic symptoms. One had ENG findings suggestive of central involvement, except for absent Vestibular Response in the affected ear. ABR was essentially "flat" on the ipsilateral ear and wave V was prolonged in the opposite side. This is a sign of Brainstem compression. Another female experienced numbness in the lower extremities in addition to unilateral deafness and unsteadiness. Two of these had subtotal removal during the first attempt thru the Suboccipital approach. One had complete removal at first attempt. Three females had tumors 4-5 millimeters in size removed by Translabyrinthine approach. All involved the Superior Vestibular Nerve. Two females had positive tumor confirmation preoperatively, but refused Translabyrinthine surgery for various reasons. The only male patient had a 2.5 cm. mass which was removed suboccipitally. All operated patients survived as of last follow up one year after surgery.

Meningitis, although essentially intracranial and central in origin has complications affecting the peripheral end organs. Severe to profound bilateral hearing loss and absent Vestibular Response have remained to be the stigma of the disease. All three (0.81%) were male; of these two had TB Meningitis and one had nonotitic bacterial Meningitis. All were adults over 20 years. One had his hearing improved by hearing aids, one has not decided on hearing rehabilitation, and one could not be helped by air or bone conducting hearing aids. He has being screened as a possible Cochlear Implant candidate.

Motion Sickness (0.27%) is uncommon after adolescence. This adult male patient had a profound functional component. All diagnostic tests including ENG were normal. Otosclerotic Inner Ear Syndrome mimics Meniere's Disease but has a predominantly conductive impairment of hearing. Since Otosclerosis is uncommon among Orientals, it was a rather unusual presentation for this only female patient (0.27%). The symptoms of episodic vertigo were relieved following Stapedectomy which also restored her hearing to within 10dB. of the bone conducting thresholds. Ramsay-Hunt Syndrome presenting as vesicles around the external ear, hearing loss, vertigo, and transient ipsilateral facial palsy affected this female adult patient nine years ago. She only had one severe bout of vertigo with nausea and vomiting, followed by a period of gradual recovery and no recurrence since. Her severe deafness has become a problem and could not be rehabilitated except with a bone-conducting hearing aid, which has changed her outlook and enabled her to work effectively as an administrator.

CONCLUSION

Three hundred and sixty-seven patients with vertigo as main complaint were seen within a two year period. The characteristics of each of their diseases were studied in a systematic approach which included Dizziness questionnaire, ENT & Neurologic findings, Audiometry, ENG, Evoked Potentials, plain X-rays, Polytomography, Ct-Scan and MRI. The results of the study were hereby presented and some observations and conclusions were drawn:

1. Vertigo is a common complaint affecting more females than males at a ratio of 3 to 2.
2. The peak incidence is between the ages of 30 to 39 years.
3. Central causes constitute the majority among causes of vertigo (53.95%).
4. Peripheral causes comprise 40.87% of the total causes.
5. The most common cause of vertigo due to all causes is Vertebro-Basilar Insufficiency (31.88%), with peak incidence at 60 to 69 years.
6. The second most common cause of vertigo is Positional Vertigo (10.62%), with peak incidence at 40 to 49 years.
7. The third most common cause of vertigo is Vestibular Neuronitis (8.17%), with peak incidence at 30 to 39 years.
8. The fourth most common cause of vertigo is Labyrinthitis comprising 7.37% of all vertigo causes, with peak incidence at 20 to 39 years.
9. Meniere's Disease constitute only 6.81% of all causes. It affects both males and females equally with peak incidence at 30 to 39 years.
10. The decision to classify whether a cause of vertigo is central or peripheral depends largely on findings at ENG.
11. There seems to be a rising incidence of Demyelinating Disorder (proven Multiple Sclerosis) among the young adult population (6.53%), which makes it almost as common as Meniere's disease (6.91%).
12. Acoustic Neuromas account for 2.17% of all causes. In this study it is seven times more common among females. It is now possible to detect this lesion at an early stage to ensure prompt and safe removal. The methodology in this study assures high pick-up rate.

13. Anemia has not been proven to be a cause of vertigo.

14. Elevation in blood pressure occurs in both hypertensive and non-hypertensives during attacks of vertigo, but does not seem to be a cause of this symptom.

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OTOMED CENTER
Ear & Vertigo Clinic
54 N. Domingo St.
Horseshoe Village
Quezon City 3008
Tel. 704-998

COCHLEO-VESTIBULAR WORK-UP

DATE:
PATIENT NAME:
TO LABORATORY:

REQUESTING PHYSICIAN: Dr. Carlos P. Reyes

I. BLOOD TESTS:
- CBC – WBC
- ESR
- Glucose <FBS> <RBS>
- Glucose Tolerance Test (5-hour)
- FTA-ABS
- Cholesterol
- Trigycerides
- Serum Sodium & Potassium
- T3, T4, TSH

II. AUDIOLOGIC ASSESSMENT:
- Air and Bone Conduction
- Speech Audiometry
- Auditory Brainstem Response (ABR)
- ElectroCochleography (ECoG)

III. VISUAL ASSESSMENT:
- Visual Evoke Response

IV. VESTIBULAR ASSESSMENT:
- Electronystagmography (ENG)

V. RADIOLOGIC ASSESSMENT:
- Plain X-rays of the Petrous and IAC's <P–A & Stenver's>
- Hypocycloidal Polytomography of Inner Ear <A P> <Lateral>
- CT-Scan of the Head
- Cisternal Myelography (for small Acoustic Neuromas)
- Magnetic Resonance Imaging (MRI) for early MS

(–) REQUESTED EXAMINATIONS.

OTOMED Cochleo-Vestibular Work-Up. Revised Feb. 1986.

TABLE I
AGE AND SEX DISTRIBUTION OF VERTIGO CASES
n = 367

RANGE	NUMBER	MALE	FEMALE
00-09	02	01	01
10-19	09	05	04
20-29	43	13	30
30-39	102	42	60
40-49	70	33	37
50-59	59	25	34
60-69	48	22	26
70-79	29	11	18
80-89	05	02	03
TOTAL:	367	154	213
%	100%	42%	58%

TABLE II
AGE AND SEX DISTRIBUTION
VERTEBRO-BASILAR INSUFFICIENCY
n = 117

RANGE	NUMBER	MALE	FEMALE
00-09	—	—	—
10-19	—	—	—
20-29	07	03	04
30-39	19	08	11
40-49	16	07	09
50-59	22	11	11
60-69	31	14	17
70-79	17	05	12
80-89	05	02	03
TOTAL	117	50	67
%	100%	42%	57.3%

CAUSES OF VERTIGO IN THE PHILIPPINES, 1983-1985

n = 367

I. CENTRAL CAUSES	=	198	(53.95%)
II. PERIPHERAL CAUSES	=	150	(40.87%)
III. PSYCHOGENIC CAUSES	=	12	(3.27%)
IV. UNDETERMINED CAUSES	=	7	(1.90%)

I. CENTRAL CAUSES:

		n	%
A) Vertebro-Basilar Insufficiency	=	117	(31.88%)
B) Multiple Sclerosis (definite	=	24	(6.53%)
* C) Multiple Sclerosis (possible)	=	31	(8.44%)
D) Retrobulbar Neuritis	=	4	(1.08%)
E) Head Trauma	=	2	(0.54%)
F) Hypothyroidism	=	2	(0.54%)
G) Postural Hypotension	=	2	(0.54%)
H) Brainsteam Hemorrhage	=	1	(0.27%)
I) Brain Tumor, Metastatic	=	1	(0.27%)
J) Parkinsons	=	1	(0.27%)
K) Polycythemia Vera	=	1	(0.27%)
L) Stokes-Adams Syndrome	=	1	(0.27%)
M) Vertigenous Epilepsy	=	1	(0.27%)

II. PERIPHERAL CAUSES:

		n	%
A) Positional Vertigo	=	38	(10.62%)
B) Vestibular Neuronitis	=	30	(8.17%)
C) Labyrinthitis	=	27	(7.35%)
D) Meniere's Disease	=	25	(6.81%)
E) Ototoxicity	=	15	(4.08%)
F) Acoustic Neuroma	=	8	(2.17%)
G) Post-Meningitis	=	3	(0.81%)
H) Motion Sickness	=	1	(0.27%)
I) Otosclerotic Inner Ear Syndrome	=	1	(0.27%)
J) Ramsay-Hunt Syndrome	=	1	(0.27%)

MOST COMMON CAUSES OF VERTIGO:

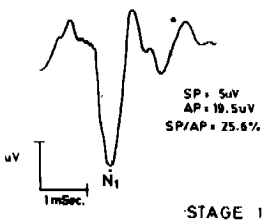
		n	%
1. Vertebro-Basilar Insufficiency	=	117	(31.88%)
2. Positional Vertigo	=	39	(10.62%)
3. Vestibular Neuronitis	=	30	(8.17%)
4. Labyrinthitis	=	27	(7.37%)
5. Meniere's Disease	=	25	(6.81%)
6. Multiple Sclerosis (definite)	=	24	(6.53%)
7. Ototoxicity	=	15	(4.08%)
8. Acoustic Neuroma	=	8	(2.17%)
9. Retrobulbar Neuritis	=	4	(1.08%)
10. Post-Meningitis	=	3	(0.81%)
11. Head Trauma	=	2	(0.54%)

(*)abnormalities in Evoked potentials & ENG, but other lab data insufficient to establish definite diagnosis!

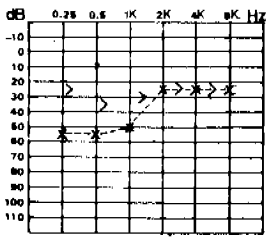
Note: Data on file, OTOMED CENTER. Revised Jan. 1986.

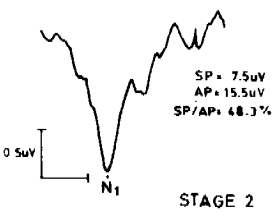
MENIERE'S CLASSIFICATION

(from WATANABE)



STAGE 1





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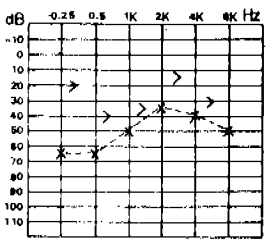
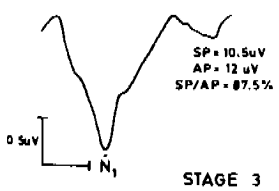
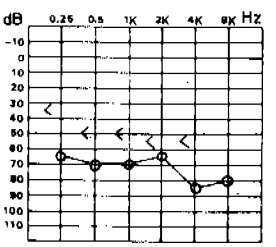




STAGE 3



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Head & Neck
Surgery

THE RELATIONSHIP OF THE UPPER AND LOWER AIRWAY: THE NASOPULMONARY REFLEX*

Jaime F. Flor, M.D.**

INTRODUCTION

During the reign of Trajan, the Roman Empire reached its greatest territorial extent. It was during this period in 131 A.D. that Claudius Galen was born. He was known for his works which include among others anatomical knowledge of the upper air passages. "It has been stated before in regards to the perforation within the nostrils, how wonderfully the bone situated in the front of the ventricles of the brain receives them, being similar to a sponge, and in regard to the pages of these into the mouth, which is in the palate, how it is arranged that the beginning of respiration is not directly into the trachea but there is a certain deflection of it, as a curve, before the breath arrives into the trachea which arrangement to me has a two-fold advantage: first because the air surrounding is at times quite cold and the lungs then would be chilled, and secondly, because particles of dust or of ashes or anything of this kind, may not fall into the trachea." This description seems like it had been lifted from a modern ENT textbook.

CASE PRESENTATION

This is a case of Mr. Jess Junio, 48 years old and Chief of the OPD-Chart Section in UP-PGH who was a known asthmatic for the past 11 years and whose history of asthmatic attacks were severe enough to need confinement on many occasions. The following is a case summary: (See Table I)

Since operation up to October 15, 1985, Mr. Junio has never had an asthmatic attack although he complains of occasional postnasal drip relieved by Dimetapp.

Table I.

4/1/76	Acute Asthma	Treatment: Aminophylline IV
11/19/78	"	Aminophylline, Bricanyl,
	Sinusitis	Robitussin, Vibramycin
10/14/80	Status Asthmaticus	Aminophylline, Bisolvon,
		Pentrexyl, Prednisone
3/10/81	AAA	Mucuspel, Ventolin
		Polymox, Prednisone
9/24/82	AAA	Aminophylline, Polymox
9/24/82	AAA	
	Consult with ENT	
	Severe septal Deviation left with Turbinoseptal Contact	
	Advised SMR	
10/20/82	SMR under GA	

The following questions are foremost in my mind:

1. Is allergy the sole factor for his AAA? It is recognized that allergy and sinusitis is a big factor because bacterial protein can act as antigen to which a sensitized individual reacts.
2. If, indeed, allergy is the only factor, why did he have an asthma-free period after the SMR?
3. What is the relationship between the upper and lower airway? Do we condemn the nose to be a mere conduit for the lung?

History is replete with the observations of great men on nose-lung relationship.

1. HIPPOCRATES (460 B.C.) lived in the glorious time of Greek civilization and culture, The Golden Age of Pericles, that his life overlapped the philosopher Socrates, the Sculptor Phidias, and the Scientist Aristotle. Hippocrates traced his ancestry to the demigod who was the son of Apollo. He was the first to bandage a wound, the first to tell men to draw teeth, and to purge their bowels. For these, he was worshipped but because he raised the dead and attempted to exercise his power of making men immortal, he was struck by lightning in Tartarus by the jealous Olumpia Zeus.

He left behind his COAN PROGNOSTICS where he noted that phthisis pulmonalis is a result at times of nasal catarrh, thus arising being considered most dangerous of all.

2. In 1871, VOLTILINI refined the technique of anterior and posterior rhinoscopy and based on his observations was first to report on reflex nasal neuroses. He drew intimate connection between asthma and nasal polypi and asserted that he had seen asthma disappear on removal of the polypi. He referred the idea of reflex action from irritation of mucosa.

3. Schaeffer and Hacks in 1882 drew attention to local disease of the upper airway as in exciting cause for asthma and other neuroses.

4. Sercer observed that there were reflexes from each nasal cavity to the homolateral half of the thorax, which may favor ventilation of the lung of the same side from which the nasal reflexes originate. Blowing air into one nostril caused an expansion of the corresponding side of the thorax which was observed especially in laryngectomized patients. This reaction was absent when the nasal mucosa had been anesthetized.

*Presented before the Wednesday Clinical Conference – Dept. of Otolaryngology, U.P.-P.G.H. Health Sciences Center.

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Injection of atropine also decreased the reflex. This reflex was probably transmitted from the nasal mucosa to the lungs via the trigeminal and vagus nerves. The phrenic nerve may also play a part since the nasopulmonary reflex was shown lacking in a patient in whom the nerve has been damaged.

Moreover, mechanical, chemical, or thermal stimulation of the nasal mucosa induced constriction or sometimes dilatation of the bronchi. The bronchial changes were not always accompanied by movements of the thorax and a direct reflexive influence by the nose on the bronchial tree was assumed. The clinical implication of this, he said was a disturbance of acid-base balance of the blood of patients with nasal obstruction which might be due to reduced pulmonary ventilation.

5. Luscher in 1930 suggested that the stimulus produced by air currents on the trigeminal nerves in the nasal mucus membrane played an important part in the movement of the thorax-lung system by reflex action.

6. Dixon and Brodie described reflex constriction of the bronchi after mechanical and electrical stimulation of the nasal mucous membrane in animals. These reflexes were abolished by section of the vagus nerve. They concluded that closure of the glottis, arrest or slowing of respiration, cardiac inhibition and peripheral arteriolar dilatation were protective devices to prevent irritant particles and vapors from entering the lung.

7. Anderson in 1953 reported that administration of droplets of ether intranasally in rabbits has resulted in diminution or cessation of respiratory movements, and the effect has been prevented by section of preganglion fibers of the fifth cranial nerve.

8. Bray expounded on the asthmagenic area and the nasopulmonary reflex. The asthmagenic area of the nose begins with the lower margin of the middle turbinate and includes all the upper air passages extending from this to the cribriform plate, both lateral and septal surfaces of the nose included. Sensory impressions gathered from this area pass through the sensory portions of the trigeminal and down the descending root of the trigeminal to end about the cells of the nucleus ambiguous which represents the motor root of the vagus and glossopharyngeal nerves. These connections explain how stimulation arising in the ethmoid region of the nose may lead to bronchospasm through the nasopulmonary reflex.

9. Widdicombe discovered that the lower respiratory tract was abundantly supplied by nerve endings which may affect the reflex contraction of the bronchi. These are. 1. pulmonary stretch receptor, 2. slowly adapting bronchial receptor, 3. rapidly adapting bronchial receptor, 4. intermediate bronchial receptor and 5. mediastinal receptor.

Physiology of the Nose

The size and shape of the nose play in important role in nasal air resistance. The nasal ala obtains some rigidity from the upper and lower cartilages. Normally on inspiration, a decrease in pressure occurs in the nose, tending to collapse the semirigid vestibular wall. As the valve closes and air flow decreases, the pressure upstream rises, tending to open the ala and thereby acting on a regulatory mechanism.

In septal deviation, by narrowing the alar opening, causes this pressure to further drop thus increasing the tendency of the ala to collapse.

The decrease in pressure follows The Bernoulli principle, "where velocity of a fluid increases, pressure decreases and where velocity decreases, pressure increases. The velocity increases as the diameter of a tube becomes smaller such as in septal deviations.

In effect with the septal deviation, you have smaller diameter in the nasal cavity which results in increase in velocity and a diminution of pressure. In the ala, the effect of this diminution of pressure has greater tendency to collapse and therefore increases resistance to inspiration.

In order to overcome this greater resistance, more driving force is necessary to effect a particular flow. This is expressed in Ohm's Law:

$$\text{Resistance} = \frac{\text{driving force}}{\text{flow}}$$

The resistance required in respiration consists of pulmonary chest wall resistance. Pulmonary resistance consists of airway resistance and pulmonary tissue resistance.

Airway resistance is defined as the friction between the respiratory air and the walls of the respiratory tracts. Tissue resistance is defined as the friction in the displacement of lung tissue.

Recent works defined the nasal resistance as the largest single component, consisting of nearly 30% of the total airway resistance.

It was only during the advent of DUBOIS Body Plethysmography that it was possible to separate pulmonary resistance to airway and tissue resistance. This method of investigating pulmonary mechanics consists of the simultaneous measurement of pressure difference, flow rate, and lung volume.

KAUFMAN AND WRIGHT, using the body plethysmograph, studied the effect of nasal and nasopharyngeal irritation on airway resistance. Ten subjects, 8 males and 2 females ranging in age from 21-60 years with no history of bronchopulmonary disease had the mucosa of the nasal and nasopharyngeal area exposed to silicate particles for 150 seconds. Since exposure needed to be confined only to the nose, nasopharynx, and oral cavity, the following method was used. The subject inhaled a deep breath of aerosol free air. The breath was held for 20 to 30 seconds and then slowly exhaled. During the breath holding and the exhalation period, a gentle spray

of aerosol was injected into the nose via a loosely fitting two prong glass cannula inserted through the external nares. Most of the jet stream circulated through the nose and nasopharynx and was passed out through the mouth with the air being exhaled from the lungs.

Significant increases in airway reristance were noted. The result suggested that stimulation of the receptor sites confined to the nose and the nasopharynx can initiate an increase in tracheobronchial airway resistance. The most likely mechanism is neural via reflex pathways. Because the irritant particles are trapped in the nose, the studies also suggested that the bronchospasm and resistance changes can be initiated by reflexes origination in the nose. This strengthened their contention that increased airway is cholinergic rather than humoral (histamine and serotonin) because of the confined area of stimulation and the blocks caused by atropine.

Prior intravenous atropine injections in patients with obstructive airway disease prevents bronchoconstriction after citric acid aerosol and charcoal dust inhalation but not cough. Simonson suggested that atropine acted on efferent vagus fibers but on cough reflexes.

Reflex bronchoconstriction is limited in time. Frank said, "Though exposure in 12 normal volunteers may be continued for a half hour, the increase in pulmonary resistance reaches its peak within 5 to 10 minutes and thereafter recedes. Anthonisen believed that bronchoconstriction in asthma may be initiated by smooth muscle spasm but is maintained by surface tension forces.

Walls observed that inhalation of cold air in patients with chronic respiratory disease who noted respiratory embarrassment in the cold environment was followed by marked rise in airway resistance but not when the face or torso was exposed to the same cold air while the subject breathed air at room temperature. Because cold air was warmed by passage through the upper respiratory tract it is possible that reflex bronchoconstriction was initiated in the upper airways. Similar studies in normal subjects failed to result in resistance changes suggesting that subjects with obstructive disease may have extra sensitive neural or humoral with obstructive disease may have extra sensitive neural or humoral mechanism in association with more dramatic tracheobronchial changes.

DRETTNER elucidated on the relationship between the upper and the lower airways involving several pathophysiological and clinical problems. Healthy persons with normal noses respired through the nose at rest and after exercise. None of the subjects were mouth breathers while 36% with septal deviation were mouth breathers at rest but not less than 88% after exercise. Thus, a high percentage of persons with septal deviation have an absolute or relative nasal respiratory insufficiency, which is certainly a disadvantage for the lower airways. Clinically, this disturbance in pulmonary gas exchange during nasal obstruction accounted for the decrease in alkaline reserve. Also, patients with hypertrophic tonsils without nasal obstruction showed low values.

The damage is not confined to the pulmonary system but may include the cardiovascular system. Massimi described serious heart disease caused by nasopharyngeal obstruction due to enlarged adenoids. Hemodynamic studies showed wide swings of pulmonary arterial and aortic pressures due to the hypoxemia and hypercapnea. This causes pulmonary vasoconstriction and elevated arterial pressure which during a period of months resulted in right cardiac hypertrophy and right cardiac failure. Emergency tonsillectomy and adenoidectomy gave complete recovery with drecrease in the heart size by radiography and normalization of the ECG.

All studies so far presented dealt with the effects of nasal disturbance on pulmonary mechanics. Does respiratory stress affect the patency of the nasal airways? Asphyxia, re-breathing in a bag, breathing with 7% carbon caused widening of the nasal airways. This widening of the nasal airways during physical exercise may be due to: 1. increased pressure from airflow during respiration causing compression of the nasal tissue; 2. active process like constriction of the blood vessels of the nasal mucosa. Recent findings point to vasoconstriction from local release of norepinephrine by sympathetic nerve endings.

What influence has pulmonary insufficiency on the ability to breathe through the nose? During dyspnea, most persons breathe through the mouth. The total work during mouth breathing is more than 2 1/2 times greater than the work during mouth breathing in normal subjects. The maximal ventilation decreased by 50% in normal persons when changing from oral to nasal respiration while corresponding decrease in persons with reduced pulmonary function was only 17%. Why? 1. Persons with reduced pulmonary function usually cannot increase their airflow in the lower airways above a relatively low limit. 2. With a low airflow also in the nose, the effort during nasal respiration may only be slightly greater than during oral respiration. 3. There is resistance to expiratory airflow in bronchioles in cases with reduced elasticity and pathologic constriction of the bronchioles.

Pulmonary resistance increases and compliance decreases with advancing degrees of nasal obstruction. These changes represent changes within the air passages.

Using the body plethysmograph, Ogura studied changes in pulmonary mechanics in patients with nasal obstruction before and after the surgical procedure correcting the nasal obstruction. Fifty-four subjects consisting of 41 men (14-46 yrs.) and 13 women (14-50 years) were examined rhinoscopically and classified into normal and abnormal nose groups according to the Anatomical and Physiological Classifications of Nasal Obstruction.

Classification of Nasal Obstruction Used in this Study

Classification		Description of Nose
Normal nose	0	Straight septum, perfectly good airway.
	1	Straight septum, slight enlargement of turbinates, no nasal obstruction.
	2	Deviated septum, with or without minimal nasal obstruction.
	3	Moderately deviated septum, septal spur, unilateral narrowing of middle meatus, fixed unilateral nasal obstruction.
Abnormal nose	4	Anterior deviation of nasal septum, unilateral impaction by the septum, and unilateral upper lateral cartilage collapse, with an open airway on the other side. Moderate obstruction.
	5	Same as classification 4, but with bilateral upper lateral cartilage collapse and moderate bilateral nasal obstruction.
	6	Severe anatomic bilateral septal deviation of the nose with severe bilateral nasal obstruction from septal and upper lateral cartilage. Impingement.

Subjects referred to as normal were defined as healthy persons without subjective complaints. Those referred to as abnormal were patients with nasal obstruction fixed anatomically or with recurrent, acute or chronic lower respiratory tract disease.

There were 8 in the normal nose group, 46 in the abnormal nose group. None of the cases had any history of allergic, cardiac, neurologic or significant pulmonary disease. In most cases, postoperative tests were performed after 4 months. Success was judged according to the improvement by at least one or more graded classification into the normal group following surgery.

Findings were:

1. Successful nasal surgery resulted in a significant improvement in all variables except Functional Residual Capacity; namely,
   a. decrease in resistance measured through the mouth as well as through the nose.
   b. increase in both compliance through the mouth and through the nose. Compliance maybe altered by change in connective tissue, tissue cells, smooth muscle, surface force of gasses, blood volume and mucus in the lungs, or surfactants.
   c. improvement of ventilation tests such as: vital capacity and one second vital capacity and maximal breathing.

Functional Residual Capacity may often show normal or near normal values even in the abnormal cases specially in the young subject. This probably represented compensatory effort and strength in the respiratory muscles.

2. Abnormal pre-operative values returned to normal range 4 to 6 months following successful surgery in about 85% cases.

3. Normal airway resistance measurements during mouth breathing pre-operatively, even though anatomic nasal obstruction was relatively high strongly suggested that surgery for function was not indicated. These patients continued to have symptomatic complaints following surgery even though the anatomic obstruction is sharply decreased. Failure to improve in this small percent maybe attributable to *minor organic lung change* undetectable at the time from physical or roentgenologic examination or *unsuccessful surgical procedure.*

4. A significant decline in tissue resistance measured during nasal breathing was noted following surgical correction of the obstructed nose suggesting *reversible* alterations produced not only in the nose but in pulmonary tissue as well.

OGURA concluded that "The magnitude of change in the pulmonary function following surgical relief of nasal obstruction is not a simple function of the mechanical obstruction which has been removed but it is likely that stimulus response is mediated through a reflex arc."

I, therefore, hold the opinion that:

1. There is indeed a relationship between the upper airway and the lower airway and this relationship is much more than the nose being a conduit for the lung.

2. I believe in the existence of a reflex arc between the nose and the lung, call it nasopulmonary reflex or naso-bronchial reflex.

3. The nasopulmonary reflex seens to be more consistently elicited in individuals with nasal and/or lung pathology who exhibit extrasensitive neural or humoral mechanism coupled with more dramatic tracheobronchial changes.

4. Patients who suffer from nasal obstruction and shortness of breath and who have marked unilateral septal deviations, cartilage collapse, polyps acquire tremendous clinical improvement with proper and careful surgical correction.

5. There is a need to look further into this nasopulmonary reflex and its effects in the Filipino patients with nasal obstruction. This would necessitate greater cooperation among the pulmonary specialist, the pulmonary physiologist and the otolaryngologist not only for research purposes but for the better evaluation and management of our patients.

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TRACHEOSTOMY AND ENDOTRACHEAL INTUBATION: A Review of Critical Aspects in their Use in Airway Management*

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There is nothing that spurs otolaryngologists to action more than the sight of a patient choking and gasping for dear life. In a matter of seconds, the choice between endotracheal intubation and tracheotomy is made. Almost automatically, we decide on the type of tube and cuff to be used, we evaluate the validity of the indication for our intervention.

Often this decision-making process can only be scrutinized retrospectively and in the inscrutable light of the patient's subsequent outcome. This paper, therefore, aims to dissect some theoretical and clinical aspects of upper airway management which critically influence the decision-making process and which can offer a more rational approach to the problems involved.

The Ideal Tube

An ideal tracheal tube does not exist because to be one it has to be appropriate to the indication for its use and to the peculiar requirements of each individual patient. At the same time, it should minimally interfere with the normal anatomic and physiologic characteristics of the laryngotracheal tree. The concept of an ideal tube, therefore, merely serves as a model which we try to approximate with our limited tube designs.

Ideally, a tracheal tube should be smooth and flexible. Its surface should be chemically inert to incite the least tissue reaction. Durability and resistance to corrosion are also desirable. The wall should be compliant to minimize mechanical trauma yet it should be stiff enough to resist kinking and collapse; moreover, it should not be so thick as to compromise the inner diameter of the tube. Silver tracheostomy tubes possess most of these characteristics save for pliancy. Plastic tubes offer flexibility but their thicker walls reduce their lumina; further, their plasticizers, elasticizers and sterilizing agents, including ethylene oxide residues, may be profoundly irritant to tracheal mucosa.

Theoretically, the radius and length of a tracheal tube should permit air to flow in laminar fashion, i.e., Poisseule's equation should hold and therefore, Reynold's number should not exceed 2000. Since Reynold's number also depends on the *shape* of the conduit, a tracheal tube must possess a certain shape, ideally describing an arc of a circle with a large radius, in order to maintain laminar flow. Too long a tube produces tip erosion and fistula formation (esophageal or arterial); too short a tube predisposes to accidental, occasionally catastrophic, extubation.

The tube, once inside the trachea, should occupy two-thirds of the tracheal diameter. This allows the trachea to hug the tube and prevent instability and torque transmission from tube to tracheal wall. This also allows for auxiliary air passage through the vocal folds when this is desirable.

The insertion of a tracheostomy tube produces the following profound effects on the laryngotracheal complex:

1. Laryngeal functions (cough, phonation, the Valsalva maneuver, protection from aspiration during swallowing) are lost. In children, the vocal cords cease to abduct on inspiration. Some claim that the loss of the glottic expiratory tide of air abolishes the stimulus for laryngeal growth and predisposes the child to difficult decannulation. Others, however, found no retardation in cricoid growth among tracheostomized children two months post-decannulation.

2. A dead space between glottis and tracheostome is created which accumulate mucus and other debris.

3. The filtration and humidification effects of the nasal chambers are lost.

4. Friedberg (1965), Paegle (1975) and Way (1965) documented the loss of ciliated epithelium twelve hours after tracheal tube insertion, followed by erosions and necrosis involving entire tracheal rings 3-5 days after, squamous metaplasia in denuded areas and finally, bacterial proliferation.

5. Infection in the form of tracheitis, laryngitis and pneumonia is the end-result of the previously mentioned alterations.

These changes have been observed in intubated tracheas even with deflated cuffs. They serve to remind us of the persisting discrepancies between the ideal tube and our present state of tube designs.

The Ideal Cuff

Cooper and Grillo (1969) studied the effects of tubes with inflated cuffs on tracheal mucosa and con-

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cluded that an ideal cuff should achieve tracheal seal by adapting to the irregular space between tube and trachea without significant pressure on the tracheal wall. Cuffs that depart from the ideal, i.e., non-compliant cuffs, would not adapt but would cause the trachea to expand until its contour matches that of the balloon. High pressures would be exerted against the tracheal wall, especially against the rigid, non-yielding cartilaginous rings. Proof of this was their observation of major tracheal damage being located in the cuff site. Superficial tracheitis progressed to coalescent ulcerations; softening, splitting and fragmentation of cartilage followed within 10-14 days. Mucosal damage usually began 1-1.5 cm. below the tracheal stoma and extended up to 2.5 cm. downward.

The primary mechanism of injury from cuffed tubes is ischemic necrosis whenever the cuff to tracheal wall pressure (CTP) exceeds the mean capillary perfusion pressure of 20 mm Hg. The pattern of ischemic necrosis being most prominent over the tracheal rings have been explained by two elegant studies on the tracheal microcirculation made by Sobin et. al. (1964) and Galoob et. al. (1977). These authors showed that the tracheal capillaries are superficially located in a single plane over the tracheal rings and that capillary pressures were lowest, and thus most occludable, in the vessels over the tracheal rings.

The search for the cuff that will produce the least embarrassment of tracheal circulation still goes on. Cooper and Grillo (1969) found that high-volume low-pressure cuffs produced much less mucosal damage than the low-volume, high-pressure, less compliant varieties. Dunn (1974) compared the effects of regular LVHP cuffs and "pre-stretched" cuffs. Tantalum tracheograms and arteriograms showed that mucosal injury and capillary occlusion was least with the use of "pre-stretched" more compliant cuffs. However, Paegle (1975), Klainer (1975) and Belson (1983) demonstrated that even HVLP cuffs produced areas of squamous metaplasia and ciliary denudation. More importantly, meticulous tracheostomy care and cuff monitoring did not effectively prevent mucosal injury.

Galoob and Toledo (1978) compared fived types of tracheostomy tubes and found that Portex and Lanz tubes were associated with less tube- and cuff-related problems than the Shiley, Surgitek and Bivona tubes. Herniation over the tube tip and migration into the tracheostome were some problems noted with large inflated cuffs.

While cuff designs continue to change and improve, we, otolaryngologists, should keep abreast with these changes and pay attention to details and specifics of tube size and cuff volume. Furthermore, we should assume responsibility for the prevention and repair of tracheal injury related to prolonged assisted ventilation. Only by expansion of our knowledge and responsibilities in these areas can we ever hope to maintain our role in the management of airway problems and laryngotracheal diseases.

The Indication: Tracheostomy or Intubation

Harrison and Hinchcliffe give four indications for tracheostomy:

1. acute/chonic airway obstruction
2. assisted medium/long-term ventilation
3. drainage of the lower respiratory tract
4. as an essential preliminary for some surgical procedure on the larynx which may temporarily occlude glottis.

While the last indication may be the least controversial at present, the first three have always suffered a constant flux of philosophical thinking and are, at best, relative. More importantly, since endotracheal intubation was introduced by MacEwan in 1868, it has gradually encroached on the role of tracheostomy in airway management by virtue of its simpler technique and lower complication rates. Lately, however, because of longer patient survival rates, more and more of the long-term complications of endotracheal intubation are being observed. The sway of present medical opinion favors endotracheal intubation as the initial means of securing the airway in acute obstruction. When to shift to tracheostomy is, however, still a hotbed of research. Lindholm (1969) established no time limit; Pontoppidan (1972) suggested 8 days, Safar (1973) 3 days, Fearon (1966) 2 days, Johnson (1973) and Geffin (1971) prolonged intubation up to 6 days. In general, Blanc and Tremblay (1974) suggested the maximal permissible time for safe prolonged intubation in adults of 8 hours to 1 week and in children from 48 hours to 3 weeks. The more pliable cricoid cartilage in neonates was regarded as a factor that favored prolonged intubation.

Various studies, prospective and retrospective, have been made comparing the results and complications of endotracheal intubation and tracheostomy. The most frequently drawn conclusions from these studies serve as a common body of clinical and experimental knowledge which form the basis for the decision-making process in artificial airway management.

1. Morbidity and mortality rates, the incidence of tracheal stenosis, cuff site lesions, and late laryngeal complications are all higher and more severe in tracheostomy than in endotracheal intubation.

2. Intubation damages the larynx (posterior glottic ulcers, vocal cord paralysis), cuff site and top tip site; tracheostomy damages the stomal site most, also the cuff site and the tube tip site.

3. A number of factors operative during insertion of artificial airways have been cited as possibly contributing to laryngotracheal injury, including the duration and total number of intubation/s, cuff pressure, size of tube, cuff and tube design, maximum cuff inflation pressure, movement of tube, chemical composition of tube and cuff, sterilizers, technique of intubation and

tracheostomy, infection, sex and age of patient, hypotension and use of corticosteroids.

4. Although cricothyroidotomy has been generally reserved for desperately emergent situations because of the high risk of subglottic stenosis, Brantigan (1976) showed that 93% of 292 patients coniotomized for 6 days or more did not have stenosis on long-term follow-up.

In conclusion, the decision to perform tracheostomy or to continue intubation when prolonged use of an artificial airway is needed must be made after a thoughtful consideration of multiple factors relevant to each individual patient and not as a matter of "routine." The maximal safe permissible time of prolonged tracheal intubation is that time when the incidence of sequelae increases to such a significant extent that they outweigh the benefits expected from intubation, such incidence having been obtained in that particular center where the patient is being treated.

Tracheostomy is still regarded, however, as the procedure of choice in medium- or long-term upper airway obstructions where patients are otherwise ambulatory (e.g., congenital airway anomalies, stenotic problems, vocal cord paralysis, sleep apnea, chronic obstructive lung disease, post-irradiation laryngeal fibrosis), in such infections as epiglottitis, diphtheria, severe croup or infectious mononucleosis and in laryngeal fractures.

Summary

Tracheostomy and endotracheal intubation remain as the cornerstones of management in upper airway obstruction. The safe and rational use of these two procedures depend on the continued use of tubes and cuffs that produce the least amount of mechanical and chemical trauma to the tracheal mucosa. While endotracheal intubation remains the procedure of choice in most cases of acute airway obstruction and in a growing number of cases requiring prolonged airway management, the time at which a shift to tracheostomy is made should be individualized, considering the patient's own factors and the institution's clinical experience, with the ultimate aim of improving the overall cure rate of the patient. Tracheostomy is still preferred in chronic ambulatory cases of obstruction and in other selected cases.

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COMPARATIVE STUDY OF CERUMINOLYTICS A SEARCH FOR CHEAPER ALTERNATIVES*

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INTRODUCTION

Otalgia, tinnitus, hearing loss———distressing conditions which can incapacitate a Filipino laborer for a day, a week, or even a month. For his family, it can mean another day, another week, or even another month of starvation. He goes to the Philippine General Hospital and the doctor who attends to him labels the cause of his misery as *Impacted Cerumen*. A ceruminolytic is prescribed and he rushes to the nearest drugstore only to realize that he cannot afford the medicine. In the Department of Ear, Nose and Thoat Out-Patient Section, this scene is re-enacted 14 times a week.

Impacted cerumen occurs in 18% of the normal adult population and it is the most common condition encountered in the practice of medicine (Ahmad and Scheer, 1972). This mixture of desquamated skin and wax stuck in the ear canal can lead to numerous and damaging consequences – local itching, sutophony, sensation of fullness, tinnitus, hearing loss, otalgia, vertigo and even otitis externa. Aside from the harmful sequelae of impaction, it is important to realize that a cerumen may surround an unsuspected tumor, keratoma, granulomatous polyp or foreign body or it may obscure the tympanic membrane preventing early detection of otitis media.

Removal of impacted cerumen is the key to alleviation of all these problems. It is a fact that this is the most common ear procedure in medical practice and as stated in the Morbidity Statistics for the General Practitioner ———"the average practitioner has to carry out this maneuver almost twice a week." Ear spoons, curettes and forceps are initially used; however, "stubborn" cerumen has to be softened first with a ceruminolytic. The most commonly prescribed ceruminolytic costs ₱34.65. For the Filipino laborer who earns ₱45.00 a day, prescribing this drug may be considered a futile effort. In answer to his need, the search for cheap and effective remedies is urgent. The solution———inexpensive household ceruminolytics like oil and hydrogen peroxide.

This preliminary trial was undertaken with the following objectives:

1. To compare the efficacy of household and commercially-available ceruminolytics using *in-vitro* evaluation.
2. To compare the efficacy of household and commercially-available ceruminolytics using *in-vivo* evaluation.
3. To observe unwanted side effects of these ceruminolytics.

MATERIALS AND METHODS

I. TESTS *IN-VITRO*

Specimens of hard ear wax were collected during routine ENT out-patient sessions by mechanical removal. These were placed in a sealed container to prevent further drying. Specimens were weighed using a Meetler P-1000 balance. 0.01 gram specimens were placed in 10 polyvinyl test tubes and packed at the bottom of the tube. Each solvent (antipyrine benzocaine glycerine preparation, coconut oil, baby oil, hydrogen peroxide and cooled boiled water) was placed in 2 test tubes at 3 drops 3 times a day for 7 days. This treatment regimen was chosen since it is the one that is commonly advocated in the out-patient clinic. On the third and seventh day, the appearance of the wax was noted. On the seventh day, it was subjected to the following tests:

1. Tilt Test – The test tube was tilted to the horizontal to determine whether there will be movement or removal of the wax specimen.
2. Probe Test – The wax was packed using an orange stick to determine its consistency.
3. Flush Test – 20 cc of NSS were instilled simulating aural irrigation.

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II. CLINICAL TRIAL

The clinical trial was conducted in a randomized, double-blind fashion.

A. Selection of patients – 37 patients, or a total of 50 ears, seen at the Department of ENT, UP-PGH starting January 1985, were consecutively chosen and included in the study. Subject pool included 46 adults and 4 children. Criteria for selection were as follows:

1. 10 years old and above – Clinical experiences reveal that children are often uncooperative and syringing may be difficult.
2. Presence of hard, impacted cerumen with total external auditory canal obstruction.
3. No history of application of ceruminolytic at least one month prior to consultation.
4. No history of tympanic membrane perforation, previous ear surgery or otitis media to avert serious consequences associated with aural irrigation.
5. No removal of cerumen after one irrigation (20 cc NSS at room temperature using an aural syringe).

B. Allocation of Ceruminolytics – The 5 solvents were given code letters and randomly distributed to the patients.

C. Application of Ceruminolytics – Patients were instructed to apply 3 drops of the assigned ceruminolytic to the affected ear 3 times a day for 7 days and to keep their heads tilted for 5 minutes aftery every application.

D. Technique of Syringing – After one week of application, aural irrigation was done by only one operator using an aural syringe to instill 20 cc of NSS at room temperature. A maximum of 5 irrigations was done.

E. Evaluation of Results – Evaluation was carried out by one observer. After each irrigation, the ear was inspected and evaluated based on the following:

Excellent – 100% visualization of the tympanic membrane;
No residual cerumen in the external auditory canal;
Subjective hearing improvement.

Very Good – 100% visualization of the tympanic membrane;
Some residual cerumen in the external auditory canal;
Subjective hearing improvement.

Good – More than 50% visualization of the tympanic membrane;
Some residual cerumen in the external auditory canal;
Subjective hearing improvement.

Fair – Less than 50% visualization of the tympanic membrane;
Most of the residual cerumen in the external auditory canal;
Subjective hearing improvement.

Poor – No visualization of the tympanic membrane;
Most of the residual cerumen in the external auditory canal;
No subjective hearing improvement.

Subjective and objective side effects such as itchiness, burning sensation, pain, edema, erythema and blisters were noted.

RESULTS

I. TESTS *IN-VITRO*

Table 1 shows the results of the *in-vitro* tests.

The oil-based ceruminolytics partially dissolved the wax while hydrogen peroxide and water completely removed the wax. In one trial, hydrogen peroxide dislodged the whole specimen upward immediately after its application. It was also noted that hydrogen peroxide and water evaporated so that on the seventh day, the wax specimens were dry but friable.

Table 1. Results of Tests *in-vitro*

Wax Solvent	Charater of Wax		Tests	
	3 days	7 days	Tilt	Probe	Flush
Commercial Preparation					
1	++	++	–	firm	superficial layer
2	++	++	–	firm	removed
Baby Oil					
1	++	++	–	firm	superficial layer
2	++	++	–	firm	removed
Coconut Oil					
1	++	++	–	firm	superficial layer
2	++	++	–	firm	removed
Hydrogen Peroxide					
1	*	*	*	soft	all the wax
2	+++	+++	–	soft	removed
Water					
1	+++	+++	–	soft	all the wax
2	+++	+++	–	soft	removed

Legend: - – no visible change
+ – slight solvent effect
++ – partial disintegration
+++ – complete disintegration
* – dislodged upward

II. CLINICAL TRIAL

A. Visualization of the Tympanic Membrane – 75% of the tympanic membrane was visualized in 9 ears using coconut oil, 7 ears using baby oil, 6 ears using hydrogen peroxide and 3 ears using the commercial preparation. The results are presented in Figure 1. Schwartz (1983) recommended that 75% of the tympanic membrane had to be visualized since it already included the primary ossicular landmarks and diagnosis of underlying conditions could be made with more confidence.

Statistical analysis using One-Way Analysis of Variance (ANOVA) was done. It showed that there were statistically significant differences among the groups at the 5% level. Further analysis using the T test showed that differences were statitically significant at the 10%

level between the following:

(1) coconut oil and hydrogen peroxide;
(2) coconut oil and commercial preparation;
(3) coconut oil and water;
(4) baby oil and commercial preparation;
(5) baby oil and water;
(6) hydrogen peroxide and water; and
(7) commercial preparation and water.

(Computation for ANOVA and T test is found in Appendix A.)

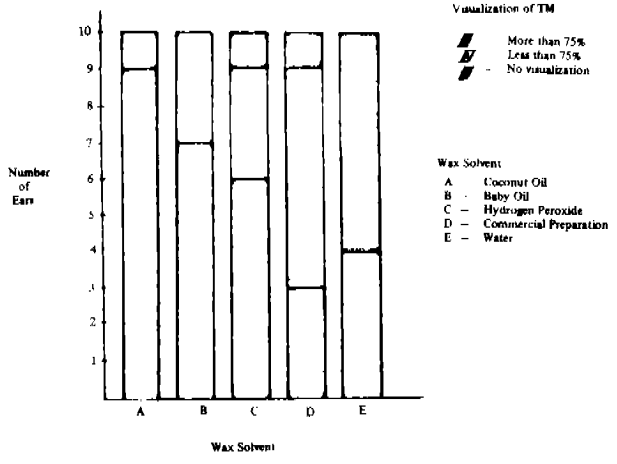

Figure 1. Visualization of the Tympanic Membrane after Aural Irrigation

B. Presence of Residual Cerumen – Cerumen was cleared in 7 cases using coconut oil, 6 cases using baby oil, 4 cases using hydrogen peroxide and 2 cases using the commercial preparation. Water failed to remove all the cerumen in all ears. The results are shown in Table 2.

Table 2. Presence of Residual Cerumen after Aural Irrigation

Wax Solvent	None	Some	Most	All	Total
Commercial Preparation	2	3	5	0	10
Coconut Oil	6	3	1	0	10
Baby Oil	6	1	3	0	10
Hydrogen Peroxide	4	2	4	0	10
Water	0	1	6	3	10

C. Subjective Hearing Improvement – Hearing improvement was noted in 9 cases with coconut oil, 8 cases with baby oil, 6 cases with hydrogen peroxide, 5 cases with the commercial preparation and 1 case with water. The results are presented in Table 3.

Table 3. Subjective Hearing Improvement after Aural Irrigation

Wax Solvent	Hearing Improvement (+)	(–)
Commercial Preparation	5	5
Coconut Oil	9	1
Baby Oil	8	2
Hydrogen Peroxide	6	4
Water	1	9

D. Rating of Solvents – Using the three criteria, coconut oil, baby oil, hydrogen peroxide and the commercial preparation are affective ceruminolytics although hydrogen peroxide failed to dissolve the wax in 1 ear. Water is not an affective wax solvent. The results are shown in Table 4 and Figure 2.

Table 4. Evaluation of Results after Aural Irrigation

Wax Solvent	E	VG	G	F	P	Effective (E, VG, G)	Total
Commercial Preparation	2	1	2	5	0	5	10
Coconut Oil	6	1	2	1	0	9	10
Baby Oil	6	1	0	3	0	7	10
Hydrogen Peroxide	4	1	1	3	1	6	10
Water	0	0	0	1	9	0	10

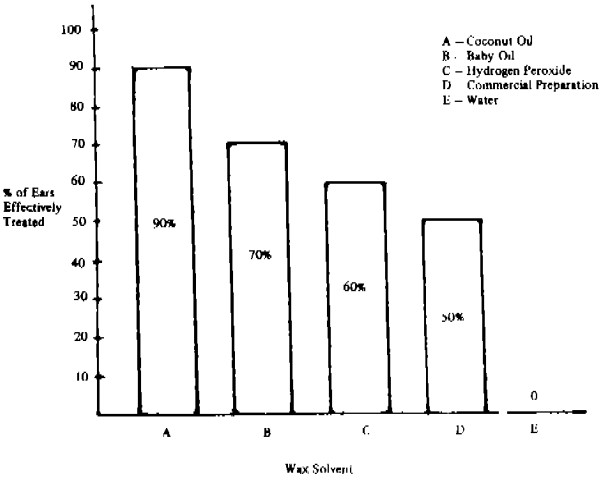

Figure 2. Efficacy of Household and Commercial Ceruminolytics using *in-vivo* Evaluation

III. SIDE-EFFECTS

There were no subjective or objective side effects noted.

DISCUSSION

The skin of the cartilaginous portion of the external auditory canal is an active organ. 1.0 to 1.5 mm. thick, it is lined by hair follicles into which empty 1,000 to 2,000 ceruminous and sebaceous glands. Adrenaline stimulates the alpha-receptors in these glands producing a colorless fluid surface film known as cerumen (Bonde, 1981). It may be yellowish-brown, wet and sticky or yellowish-gray, dry and brittle. The wet type darkens on exposure and with impaction, becomes rock-hard. Cerumen is malleable——drying up and separating as small flakes which fall out of the meatus aided by the muscles of mastication. Interference with this phenomenon results in the accumulation and sonequent formation of hard, impacted cerumen. Hammong (1971) attributed this to lack of separation and fall-out of the normal amount of wax while Mawson (1963) postulates

an increased production from the ceruminous gland. Mandour, et. al. (1974) proves via histological and histochemical investigations that the ceruminous glands are hyperactive, producing an increased amount of wax secretion. They further theorize that the abnormal irritation of the ceruminous glands is due to abnormal exogenous irritation to the skin of the external auditory canal and/or local hyper-stimulation of the autonomic nervous system.

The practice of attempting to clean the ears with cotton buds has been associated with impacted cerumen. Baxter (1983), in a routine examination of 111 children, noted that (1) 37% (41) had cerumen plugs and of these, 90% (37) cleaned their ears with cotton-tipped swabs; and (2) 71% (79) cleaned their ears with cotton-tipped swabs and of these, 47% (37) had cerumen plugs. The hypothesis that the use of the cotton buds encouraged formation of plugs was supported by the observation of a clean meatus with the cerumen found deeper inside the canal. Furthermore, cleaning the ears with cotton bud can rub away the protecting keratin layers, leaving the living skin cells exposed to minor trauma and infection. The debris that is produced can form the nidus of a wax plug. (Anonymous, 1972)

The removal of impacted cerumen is effected by using instruments such as ear spoons, curettes or forceps, syringing or by preliminary softening with a ceruminolytic. As early as 1705, Gran mentions the use of oil as a wax softener. The traditional method is to war a teaspoonful of olive oil and to pour it from the spoon into the ear. Several authors recommend a few drops of oil (mineral, olive and almond oil) 3 to 4 times a day from 2 to 7 days prior to syringing. Seiler (1980) states that 1 day is sufficient and that syringing is sometimes unnecessary. Other softeners include hydrogen peroxide (Saunders, 1976), liquid paraffin (Ellis, 1966), glycerin (Reynolds, 1983) and sodium bicarbonate (Fraser, 1970). A number of commercially-available ceruminolytics have been developed – each with its own added advantage such as single application, rapid action, added analgesia- and these include Cerumol, Waxsol, Xerumenex, Dicotyl ear capsules and Auralgan. Locally-available are Waxsol and Auralgan although the latter is more popularly used.

Opinions differ as to which wax solvent is the most effective and several studies have been undertaken in this aspect. Hinchcliffe (1955) compared olive oil, sodium bicarbonate and Cerumol wherein each was applied one-half hour prior to syringing. Failure to remove the wax within 5 minutes was considered a failure. Only olive oil was noted to be effective. Dubow (1969) observed that Xerumenex cleared wax in 70% of cases as compared to mineral oil and hydrogen peroxide. An *in-vitro* comparison of Cerumol, Dictyl ear capsules, Waxsol, Xerumenex and olive oil led Horowitz (1968) to state that "olive oil is useless and that only Waxsol is of any real value." Fraser (1970), in an *in-vitro* and *in-vivo* comparison of six commonly used solvents (sodium bicarbonate, olive oil, Cerumex, Waxsol, Dioctyl ear capsules and Xerumenex) concluded "Traditional remedies are reasonably effective, bland and cheap."

In the present study, *in-vitro* tests reveal that with hydrogen peroxide and water, the wax was completely be removed while the oil-based solvents partially dissolved the wax. Results are compatible with Fraser's (1970) study cited previously. However, the clinical trial has shown that coconut oil, baby oil, hydrogen peroxide and the commercial preparation are effective ceruminolytics. The discrepancy between the *in-vitro* and *in-vivo* findings can be explained on the basis of the following:

(1) A rigid, smooth-surfaced, tube cannot substitute for an elastic, tortuous ear canal which is lined by ceruminous and cebaceous glands continually producing wax. In the case of water, the shape of the ear canal and the oily suface prevented it from being absorbed. On the other hand, this characteristic surface allowed oil-based solvents to penetrate and soften the wax.

(2) In the upright test tubes, the water-based solvents rapidly evaporated. Furthermore, the wax was not adherent to the lining of the tube. The ear canal is horizontally-oriented and the solvent is less exposed to the atmosphere. The cerumen is found deeper and interconnections between the lining of the canal and the wax occur, making it more adherent. Upon evaporation of water, the cerumen also contracted and syringing facilitated its removal. Moreover, the water seeped through the sides of the tube and was absorbed by the wax.

The use of coconut oil as a ceruminolytic has never been mentioned in previous literature. Its local availability and widespread use——margarine, vegetable shortening, soap, shampoo, glycerin, hydraulic brake fluid, synthetic rubber ——prompted the authors to test its efficacy. The fact that this pale yellow oil is used in the manufacture of glycerin may explain its ceruminolytic activity. The results regarding its effectivity are encouraging, further enhanced by its relative safety.

Baby oil is mineral oil plus an added ingredient to provide fragrance. Schiff (1979) uses it to clean mastoid cavities and ear canals, citing it as "non-slergenic, with no real damage or discomfort produced even with a small perforation, inexpensive and with no shelf life of deterioration of any extent." The clinical trial findings support his contention.

Saunders (1976) mentions that hydrogen peroxide is effective in loosening epithelial collections due to desquamation and debris accumulation in the ear canal. An oxidizing agent, it is used most extensively in cleansing of wounds since the effervescence produced by the release of nascent oxygen affords a weak mechanical means for removal of tissue debris. Thus, dislodgement of the cerumen in the *in-vitro* test and its complete removal in four cases in the clinical trial are due to this mechanical effect. However, reliance on this action may not be sufficient to expel all of the wax as evidenced by its failure in 1 patient. The absence of side effects

and its bacteriostatic activity are plus factors.

The glycerin in the commercial preparation acts as the wax solvent; it dissolves the debris and then gradually evaporates and pulverizes (Anonymous, 1972). It is a demulcent and a high-molecular weight compound that has the ability to alleviate irritation by coating the surface of membranes. Antipyrine (54 mg.) and benzocaine (14 mg.) provide analgesia and anesthesia. No untoward effects were noted with its use although it is contraindicated in cases of known hypersensitivity to its components. Moreover, precaution must be exercised in administering it to pregnant and nursing women.

The absence of side effects renders these solvents safe. In Fraser's (197) study, otitis externa developed in 2% (6 ears) of the cases (3 received sodium bicarbonate, 2 Waxol and 1 Xerumenex).

Based on the findings of this study, coconut oil, baby oil, hydrogen peroxide and the commercial preparation are effective ceruminolytics. Statistical analysis done on the results of visualization of the tympanic membrane shows that the efficacy of coconut oil and baby oil, baby oil and hydrogen peroxide, and the commercial preparation and hydrogen peroxide are comparable. Moreover, coconut oil and baby oil are more effective than the commercial preparation. Overall evaluation also reveals that coconut oil is the most effective followed by baby oil, hydrogen peroxide and then the antipyrine benzocained glycerine preparation. As wax softeners, they are safe and they can be considered as cheap substitutes for the commercial preparation. Table 5 attests to this statement.

Table 5. Comparison of Costs for Each Solvent

Wax Solvent	Unit Cost	Cost/ml.	Cost/Treatment
Commercial Preparation (15 ml)	₱34.65	₱2.31	₱7.27
Coconut Oil (400 ml)	₱ 7.15	₱0.02	₱0.04
Baby Oil (25 ml)	₱ 4.50	₱0.18	₱0.57
Hydrogen Peroxide (120 ml)	₱ 4.00	₱0.03	₱0.06

(Prices as of October, 1985)

More importantly, these products are used for other purposes———medical or otherwise. Thus, a patient does not have to shell out ₱34.65 to relieve him of his symptoms. The cure might be in the kitchen cupboard, medicine cabinet or dresser. For the laborer, purchasing any of these items will no longer be a luxury since his wife can have cooking oil, his son can clean his wounds or his baby can have a softer and protected skin.

In this study, several criteria for evaluation have been introduced and these include. (1) the tilt, probe and flush tests used in the *in-vitro* evaluation; and (2) the visibility of the tympanic membrane and subjective hearing improvement used in the *in-vivo* evaluation. Results show that they are reliable parameters provided that *in-vitro* and *in-vivo* findings are always correlated.

LIMITATIONS AND RECOMMENDATIONS

Results of this study offer cheap, effective and safe remedies for a common condition. Further research along this line is advocated, taking into consideration the following limitations:

(1) Efficacy of each solvent was evaluated using only a small sample size. Deterrents included rigid criteria and poor compliance. The first factor cannot be modified as it will weaken there liability of the design. However, poor compliance can be dealt with by more adequate explanations on the necessity of aural irrigation and by providing incentives. Further studies should be carried out on a wider base.

(2) The anatomy of the external auditory canal (tortuousity and degree of hairiness) and the quality of wax are difficult to control. Fraser (1970) reduced the effect of such variation by choosing subjects with bilateral impacted cerumen, using one ear as control and the other as test ear.

(3) The patients were instructed to apply the drops. Such a procedure is subject to a lot of variation and this can be reduced if only a supervised staff applied the drops. However, this is only possible in hospitalized patients.

(4) The aural syringe was controlled by only one operator. Since pressure differences are always possible, standardization can be attained using a pressurized garden syringe (Fraser, 1970) or a water pik. Seiler (1980) states that the strength of the water can be varied and that leakages and "sore thumbs" are avoided.

(5) Statistical analysis can be further utilized if the data gathered is more objective. Thus, pre- and post-treatment pure tone audiometry can be done to detect improvement in hearing.

SUMMARY AND CONCLUSION

Traditional or household agents such as a coconut oil, baby oil, hydrogen peroxide and water were compared with a commercially-available wax softener as to their efficacy as ceruminolytics. *In-vitro* tests consisted of dissolving wax specimens in each of the solvents of 3 drops 3 times a day for 7 days and subjecting these specimens to tilt, probe and flush tests on the seventh day. Complete removal of the wax was noted with hydrogen peroxide and water; partial dissolution of the wax was observed using the oil-based solvents. Clinical trial was undertaken on 50 ears, 10 ears per solvent, in a randomized, double-blind design. Evaluation was based on the visibility of the tympanic membrane, presence of residual cerumen, subjective hearing improvement and presence of side effects. Coconut oil, baby oil and hydrogen peroxide proved to be effective, safe and cheap substitutes for antiphyrine benzocaine glycerine preparation.

The results of this study provide alternatives to the treatment of a common ailment attuned to times of economic difficulty——the use of some inexpensive

household agents for impacted cerumen. The authors feel the urgency to come up with a remedy that is affordable without sacrificing the principle of sound medical practice. There is no doubt that the target here is the daily wage earner – whose medical problem is only part of a multitude of daily burdens, probably all equally important. It is hoped that this research will serve as an impetus for further work along this line. In times of strife like these, the physician is most needed – the physician with a social responsibility as well as a medical obligation to fulfill.

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APPENDIX A. One-Way Analysis of Variance and T-Test

A. Null Hypothesis:
Commercial Preparation Coconut Oil Baby Oil Hydrogen Peroxide Water

B.

Commerial Prep'n	Coconut Oil	Baby Oil	Hydrogen Peroxide	Water
1.00	1.00	1.00	1.00	0.50
1.00	1.00	1.00	1.00	0.40
1.00	1.00	1.00	1.00	0.40
0.50	1.00	1.00	1.00	0.10
0.25	1.00	1.00	1.00	0
0.15	1.00	1.00	0.80	0
0.10	1.00	1.00	0.20	0
0.05	0.75	0.40	0.10	0
0.05	0.75	0.25	0.05	0
0	0.50	0.10	0	0
ΣX 4.41	9.00	7.75	6.15	1.40
$\bar{X}$ 0.41	0.90	0.775	0.615	0.14
ΣX^2 3.35	8.38	7.23	5.69	0.58
$\Sigma \bar{X}_t$ 0.57				

C. Total Sum of Squares

$$\Sigma X_t^2 = \Sigma X^2 \quad \frac{(\Sigma X)^2}{N} = 25.23 - 16.49$$

$$= 8.74$$

D. "Between" Sum of Squares

$$\Sigma X_b^2 = \left[\frac{\Sigma(\Sigma X)^2}{n}\right] - \frac{(\Sigma X_t)^2}{N} = 20.0167 - 16.49$$

$$= 3.53$$

E. "Within" Sum of Squares

$$\Sigma X_w^2 = \Sigma X_t^2 - \Sigma X_b^2 = 8.74 - 3.53 = 5.21$$

F. ANOVA

Source of Variation	df	Sum of Squares	$\bar{X}$ Square
Between	4	3.53	0.8825
Within	45	5.21	0.1157
Total	49	8.74	

G. $F = 7.63$ $\quad F\ 4,44\ \ 5\%\ \ 2.58$
$\quad\quad\quad\quad\quad\quad F\ 4,46\ \ 5\%\ \ 2.57$

Therefore, null hypothesis is rejected.

H. T Test

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{X_1^2 + X_2^2}{(N_1 + N_2)} - 2\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

Coconut oil and baby oil – 0.96
Coconut oil and hydrogen peroxide – 1.8
Coconut oil and commercial preparation – 3.5
Coconut oil and water – 10.45
Baby oil and hydrogen peroxide – 0.85
Baby oil and commercial preparation – 2.03
Baby oil and water – 5.04
Hydrogen peroxide and commercial preparation – 1.07
Hydrogen peroxide and water – 3.10
Commercial preparation and water – 1.93

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CONVEX SHADOWS IN THE MAXILLARY ANTRUM: A Correlation with Clinical and Operative Findings*

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INTRODUCTION

The otorhinolaryngologist encounters a good number of convex shadows in x-rays of the maxillary antrum. These are not associated with bony erosions or involvement of adjacent structures. The radiologist gives a differential diagnosis of " . . . retention cyst, mucosal cyst, mucocele, or polyp."

It has been of great interest to us to know exactly what these convexities are. Are they actually present on operation? Are they really benign or can they be malignant? Are we, indeed, dealing with either a polyp or a cyst? Is there a way of differentiating one mass from the other? What are their characteristics clinically, operatively and radiographically?

There is a paucity of local and foreign studies which compare the clinical and radiographic characteristics of these convex densities. Van Alyea of the University of Illinois made a study of these masses, specifically of polyps and cysts, but did not support his statements with specific figures. Hence, there appeared to be a need for a study correlating the clinical, operative and radiographic findings of these masses. This study was undertaken with the objectives of (1) correlating the radiologic and operative findings of these convex densities, (2) determining the incidence of these masses, (3) finding out whether these entities are benign or malignant, (4) determining their characteristics, and (5) comparing present findings with previous observations.

METHODS AND MATERIALS

The records of patients seen at the Department of Otorhinolaryngology, Philippine General Hospital from 1981 to 1985 were reviewed. Thirty-five records with radiologic documentation of convex antral shadows were gathered. Twenty-eight were selected based on (1) the presence of convex antral densities in radiologic studies of the paranasal sinuses, and (2) the performance of a Caldwell-Luc operation for the removal of the mass. The remaining records were excluded because five of the patients did not follow up after radiologic diagnosis and two patients were managed differently.

Data were gathered from the 28 records regarding each patient's age, sex, symptoms, physical findings, initial diagnosis and operative findings. Only six out of the 28 records had histopathologic readings so it was decided to limit the assessment of malignancy or benignity to gross operative findings.

Of the 28 sets of x-ray plates of the paranasal sinuses, only 21 were available. These were reviewed by three radiologists and the authors, who, at the time of the review, were not aware of the operative findings. Attention was focused on the (1) location and number of the masses, (2) antrum characteristics (haziness, mucoperiosteal thickening), and (3) mass characteristics (homegeneity, density, border). The opacity of a mass was determined by comparing its density with that of the adjacent zygoma.

The results were then gathered, tabulated and analyzed. All the cysts were referred to as antral cysts and not differentiated into the secreting and non-secreting types because the difference is academic.

LIMITATIONS

Firstly, the retrospective nature of this study limits the analysis of data to what is available. Most of the records were lacking in potentially informative data regarding histopathology, transillumination and other corollary diagnostic procedures.

Secondly, out of the 35 recorded cases seen at our hospital over a five-year period only 28 were documented. Perhaps a bigger number (around 60) of cases would be ideal as this would be statistically more significant.

FINDINGS

The age distribution of patients with convex radiodensities is shown in Figure 1. Majority of the patients (75 percent) were in the second to fourth decades of life. Out of the 28 patients, 25 had actual masses on operation. Of these 25 cases, 13 had polyps while 12 had cysts (Table 1). There were no other types of antral masses encountered.

Among those with cysts, the majority (67 percent) were in the third decade of life (Table II). Of those patients with polyps, majority (77 percent) were distributed over the third to fifth decades of life. Sixteen of the patients were male (57 percent) while twelve

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were female (43 percent). Majority of those with cysts (75 percent) were male (Table III). There was an almost equal distribution of males and females in those with polyps.

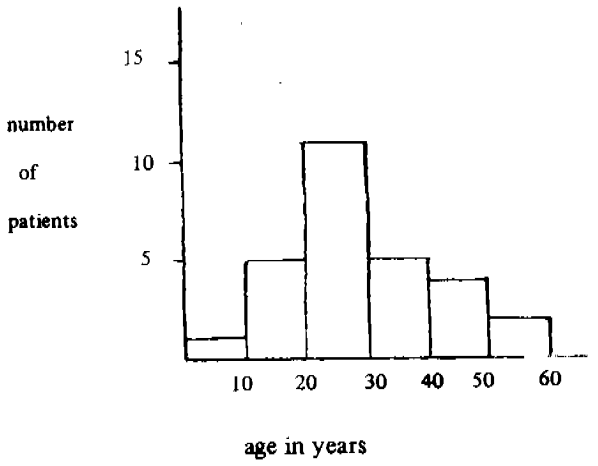

Fig. 1. Age distribution in 28 patients with convex radiodensities

Table I. Distribution of patients according to types of mass (25 patients)

Type of mass	Number	Percent
Polyp	13	52
Cyst	12	48
	25	100

Table II. Distribution by age of patients with polyps and patients with cysts (25 patients)

Age group (years)	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Under 11	1	8	0	0
11-20	2	15	1	8
21-30	3	23	8	67
31-40	4	31	1	8
41-50	3	23	0	0
51-60	0	0	2	17
	13	100	12	100

Table III. Distribution of male and female patients by type of antral mass (25 patients)

Sex	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Male	6	46	9	75
Female	7	54	3	25
	13	100	12	100

HISTORICAL AND PHYSICAL RELATIONSHIPS

All the patients with antral masses were symptomatic. The most common symptom was nasal obstruction (60 percent), followed by rhinorrhea and headache (Table IV). Majority of those with cysts (75 percent) presented with nasal obstruction while those with polyps were more evently distritubed over the various symptoms.

Table IV. Symptoms in patients with polyps and patients with cysts (25 patients)

Symptoms	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Nasal obstruction	6	46	9	75
Rhinorrhea	4	31	6	50
Headache	4	31	4	33
Sneezing	2	15	1	8
Cheek Swelling	2	15	1	8
Paranasal Pain	1	8	1	8
Cough	1	8	1	8
Sore Throat	1	8	0	0
Anosmia	1	8	0	0

The most common physical finding was nasal congestion (48 percent). Postnasal drip, nasal polyps, and nasal discharge were other common findings (Table V). Majority of those with cysts (58 percent) presented with nasal congestion. Many of those with polyps presented also with nasal congestion (38 percent) and postnasal drip (31 percent). Nasal polyps presented more with antral polyps than with antral cysts.

Prior to the finding of antral masses in the radiographs of these patients, a variety of clinical impressions were made. Majority of the patients were assessed to have sinusitis (Table VI.) More of those with cysts were assessed to have allergic rhinitis as compared with those who had polyps.

Table V. Physical findings in patients with polyps and patients with cysts (25 patients)

Physical Findings	Polyp (13) No.	Polyp (13) Percent	Cyst (11) No.	Cyst (11) Percent
Nasal Congestion	5	38	7	58
Nasal Polyps	4	31	2	17
Postnasal Drip	4	31	1	8
Nasal Discharge	2	15	2	17
Septal Deviation	2	15	1	8
Maxillary Swelling	2	15	1	8
Paranasal Tenderness	2	15	0	0
Others (Pharyngeal congestion, fistula)	3	23	0	0

Table VI. Initial impressions in patients with antral cysts and patients with polyps (25 patients)

Impression	Polyp (13) No.	Polyp (13) Percent	Cyst (11) No.	Cyst (11) Percent
Sinusitis	8	62	9	75
Allergic Rhinitis	3	23	5	42
Nasal Polyposis	4	31	2	17
Maxillary Mass	2	15	1	8
Laryngitis	1	8	0	0
Muscular Contraction Headache	1	8	0	0

Radiographic Characteristics

In the majority of the patients with polyps (88 percent), the involved antrum was not hazy. Majority of those with cysts (60 percent) had hazy antra (Table VII). Mucoperiosteal thickening was noted to have near equal occurrence in antra with either cysts or polyps (Table VIII). Majority (80 percent) of those without mucoperiosteal thickening belonged to the group with cysts. Only two patients manifested with irregular or scalloped mucosa and they had polyps.

Table VII. Distribution of patients with cysts or polyps according to haziness of the involved antrum (18 patients)

Involved Antrum	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Hazy	1	12	6	60
Clear	7	88	4	40
	8	100	10	100

Table VIII. Mucoperiosteal thickening in patients with polyps or cysts (18 patients

Mucoperiosteal Thickening	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Present	7	88	6	60
Absent	1	12	4	40
	8	100	10	100

Majority of the antral masses were homogenous (88 percent). This observation holds for both cysts and polyps (Table IX). With regards to the density of the mass, most of the masses were similar in opacity, whether cyst or polyp (Table X).

Table IX. Homogeneity of polyps and cysts (18 patients)

Mass	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Homogenous	7	88	8	80
Non.homogenous	1	12	2	20
	8	100	10	100

Table X. Density of polyps and cysts (18 patients)

Mass	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Opaque	7	88	8	80
Less opaque	1	12	2	20
	8	100	10	100

The radiologic outlines or borders of the masses were distinct in 50 percent of the cases of polyps and 60 percent of the cysts (Table XI).

Mass Border	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Distinct	4	50	6	60
Hazy	4	50	4	40
	8	100	10	100

Operative Findings

Twenty-five out of twenty-eight patients (89 percent) presented with masses in the antrum upon surgical exploration (Table XII). In three cases, only normal mucosa was encountered. The left and right antra were equally involved with both polyps and cysts (Table XIII).

Majority of the masses were located in the medial and inferior portions of the antra. Most of the polyps (60 percent) were on the medial wall while most of the cysts were on the floor and medial walls of the antra (Table XIV). Most of the masses were solitary whether cysts of polyps (Table XV).

Table XII. Presence of antral masses on radiographs and on operation (28 patients)

Presence of Mass	X-ray No.	X-ray Percent	Operation No.	Operation Percent
Positive	28	100	25	89
Negative	0	0	3	11
	28	100	28	100

Table XIII. Distribution of antral masses according to the antrum involved (25 patients)

Location	Polyp No.	Polyp Percent	Cyst No.	Cyst Percent
Right	6	46	5	42
Left	7	54	7	58
	13	100	12	100

Table XIV. Origin of antral cyst or polyp (20 patients)

Antral Wall	Polyp		Cyst	
	No.	Percent	No.	Percent
Floor	2	20	5	50
Medal	6	60	4	40
Infratemporal	2	20	1	10
	10	100	10	100

Table XV. Distribution of patients with antral masses according to quantity (25 patients)

Quantity	Polyp		Cyst	
	No.	Percent	No.	Percent
Solitary	9	69	11	92
Multiple	4	31	1	8
	13	100	12	100

Most of the cases were radiologically diagnosed based on a Water's view. It was noted that in majority of the cases (73 percent), the location of the mass on Water's view coincided with the actual location on operation Table XVI. In the other cases where the correlation was poor, most of the masses involved were relatively large.

Table XVI. Comparison between radiologic and operative locations of the cysts and polyps (15 patients)

Correlation	Polyp		Cyst		Total	
	No.	Percent	No.	Percent	No.	Percent
Positive	4	57	7	88	11	73
Negative	3	43	1	12	4	27
	7	100	8	100	15	100

A summary of findings between antral cysts and polyps is listed in the following Table XVII.

Table XVII. Summary of comparative findings between antral cysts and polyps

Characteristic	Antral cyst	Antral polyp
Incidence	48 percent	52 percent
Age	third decade	third to fifth decade
Sex	predominantly male	equal
Common symptoms	nasal obstruction (75%) rhinorrhea (50%) headache (33%)	nasal obstruction (46%) rhinorrhea (31%) headache (31%)
Common Physical Findings	nasal congestion (58%)	nasal congestion (38%)
Initial Impression	sinusitis (75%)	sinusitis (62%)
Location	antral floor (50%)	medial wall (60%)
Haziness of the Involved Antrum	60 percent	12 percent
Mucoperiosteal Thickening	positve (60%)	positive (88%)
Number	solitary (92%)	solitary (69%)
Opacity	opaque (80%)	opaque (88%)
Homogeneity	Homogeneous (80%)	Homogeneous (88%)
Mass Border	Distinct (60%)	Distinct (50%)

Discussion

Four types of intrinsic antral entities may present as convex radiodensities. These are (1) the *retention cyst* which is due to the obstruction and dilatation of a duct of a seromucinous gland, (2) the *benign mucosal cyst* which results when secretions escape from a damaged glandular duct and accumulate in the surrounding loose connective tissue, or when the fibers of an edematous connective tissue stroma break, resulting in the coalescence of several areas of fluid, (3) the polyp which is a focal reactive prominence of the lamina propia mucosae related to chronic inflammation, and (4) the *mucocele* which may result from an obstructed glandular duct (not different from a retention cyst) or from the obstruction of the sinus ostium and resultant collection of secretions.

The first two types of intrinsic cysts are referred to by the authors simply as *antral cysts* because differentiating them, as Rogers et. al. state, is academic. The mucocele from a radiographic point of view, is an encapsulated fluid mass that is large enough to cause expansion and thinning of the sinus walls. For this reason, only antral cysts and polyps are considered by the authors to manifest as intrinsic convex densities.

These convex radiodensities, especially the antral cyst, have been the subject of many previous reports. The *antral cyst* has been frequently described to be asymptomatic and appearing radiologically as solitary, lightly opaque, smooth-domed, homogeneous, arising from the antral floor, and not associated with other abnormalities of the affected sinus. The *antral polyp*, on the other hand, is most apt to occur in individuals with allergic manifestations and is often associated with nasal polyps. It appears radiologically to be more opaque than the cyst, is heterogeneous, multiple, originates from the margin of the maxillary ostium and is commonly associated with a thickened or scalloped mucosa.

There are, however, dissenting views regarding the characteristics of these antral masses. Van Alyea stated that antral polyps may be solitary. Gothberg and Little observed that symptoms are rather common in mucosal cysts of the antrum. They suggested that a history of allergy may be useful in distinguishing a mucosal cyst from other antral pathosis.

In whose statements are we to believe? May an antral polyp indeed be differentiated from an antral cyst? The results of this study will help us answer several questions.

Are antral cysts generally asymptomatic? No. On the contrary, all the patients were *symptomatic*. This finding is supported by the published report of Gothberg et al which stated that, in contrast to earlier studies, symptoms in mucosal cysts were rather common. The symptoms, however, are nonspecific.

Are antral cysts solitary? Yes. Only one out of the twelve patients with cysts had multiple cysts in

the antrum. Our finding is in agreement iwth the generally held impression of the *solitary* cyst. Antral polyps, however, are also shown by our study to be solitary.

Are antral cysts generally *homogeneous*? Yes. Eight out of ten patients had homogeneous cysts. Again, this observation is consistent with those of previous studies. Our study shows the antral polyp to be generally homogenous, too.

Are antral cysts less opaque than antral polyps? No. The degree of opacity in both cysts and polyps is *practically the same* as far as can be determined by the standard Water's view. This is contrary to previous statements that antral cysts are less opaque. It must be remembered that fluid is readily differentiated from soft tissue if there is a fluid level. The case of the encysted fluid as in the antral cyst is different, however, because there is no level to speak of. Hence, it would be very difficult to differentiate a cyst from a polyp using opacity as a criterion.

Do antral cysts mostly originate from the antral floor? No. This study shows an *almost equal distribution* of cysts arising from the floor and from the medial wall of the antrum. While Valvasson states that gravity plays a role in causing most cysts to form on the antral floor, we can explain the occurrence on the medial wall on the basis of the location of the mucosal glands. These glands are mainly located at the region of the ostium. Obstruction of any of these glands may lead to the formation of a cyst.

Are antral cysts usually not associated with other antral abnormalities? No. Sixty percent of those with cysts manifested with hazy antra and/or mucoperiosteal thickening. It should be noted, however, that among all the cases of antral masses without mucoperiosteal thickening, those with cysts comprised 80 percent and those with polyps only 20 percent. It is also interesting to note that, regarding antral haziness, six of the hazy antra contained cysts while only one contained a polyp. Majority of the polyps were associated with clear antra. The authors noted that most of those with hazy antra had masses on the medial wall which could possibly obstruct the ostium and cause secretions to pool within the sinus. Most of those with clear antra had masses on the floor or lateral walls of the sinuses. Haziness, then, would seem to be a function of the ability of a mass, whether polyp or cyst, to obstruct the ostium.

Thus far, we have answered questions regarding antral cysts. What about antral polyps? The questions, and the answers, are equally interesting.

Are antral polyps usually associated with allergic manifestations? *Not necessarily*. Based on the initial impressions, in only three out of eleven patients with antral polyps were diagnoses of allergic rhinitis made. Probably more important than this observation is the finding of similar diagnoses of allergic rhinitis in cases with antral cysts. In this study, 42 percent of those with antral cysts were diagnosed to have allergic rhinitis. In a study of mucosal cysts, Casamassimo and Lilly reported an allergy of some kind in 45 percent of their patients.

Are antral polyps usually multiple? No. Our finding is in contrast to the observation of Rogers et al that antral polyps are often multiple. There is a possibility, however, that the cases of *singular polyps* is our study would have, with time, become associated with other antral pathosis.

Are antral polyps usually heterogeneous? No. All except one of the patients presented with *homogeneous* polyps. Again, this is contrary to what has often been stated. It is possible that the characteristic of heterogeneity is imparted by varying areas of edema and fibrosis within the polyp. The property of homogeneity is perhaps to be found in those polyps with a more even distribution of transudated fluid and fibrosis.

Are antral polyps more opaque? No. Antral polyps are not any more opaque than the antral cysts in this study. Apparently, radiographs do not distinguish between fluid and soft tissue.

Do most antral polyps originate from the medial wall? Yes. Our finding is consistent with previous observations. The mucociliary movement of secretions is towards the ostium and it is along the pathway of infected discharge that mucosal reaction may be expected to be prominent. Also, the area of the ostium being a "tight" area, it is vulnerable to the effects of inflammation and edema. Chronic irritation at this area could lead to polyp formation.

Are antral polyps usually associated with mucosal thickening or irregularities? Yes, majority of the antral polyps tend to be associated with *mucoperiosteal thickening* but in only two of the cases were irregular or scalloped mucosae noted.

Now that we have answered the questions regarding the characteristics of convex antral densities, we see that there are more similarities than there are differences. These similarities suggest that antral polyps and cysts arise from similar disease processes. The polyp may be seen as a prominent mucosal reaction to chronic or on and off infection or irritation. The cyst may be seen to develop from obstruction or fluid accumulation secondary to this infection or irritation.

Knowing now that antral polyps and cysts share many characteristics and that convex radiodensities are benign, there arises the question of management and the propeity of doing a Caldwell-Luc operation in these cases.

It is generally believed that polyps originate in chronically infected sinuses so that surgical intervention is necessary. Cysts, on the other hand, are believed to be isolated pathologies which may require, at the most, puncture or aspiration of the fluid. The experience of a number of authors, however, show that cysts tend to recur with this kind of management. They would then advocate a Caldwell-Luc operation.

The necessity of performing a Caldwell-Luc opera-

tion for antral polyps and cysts was challenged by Eichel in 1977. Over a three-year period he showed that majority of isolated antral polyps and cysts respond to medical management by decreasing in size or completely disappearing. With this author's experience in mind, we realize that a convex density in the maxillary antrum is not an absolute indication for a Caldwell-Luc operation. We further realize that eight percent (36% polyps, 44% cysts) of the antral masses in our study were solitary and could have responded to medical management. A Caldwell-Luc operation would be necessary only when there is no response to medical therapy or irreversible mucosal changes are considered. This conservative outlook becomes even more relevant in the light of today's economic situation, prohibitive costs and the lack of available surgical expertise notably in the rural areas.

Mention should be given to the three patients who radiologically manifested with antral masses but had normal operative findings. We can only suggest possible explanations. The patient may have responded to medical therapy, resulting in disappearance of the mass. Or the mass could have been a collection of mucus and not a true cyst or polyp.

CONCLUSIONS

From this study, we can derive the following conclusions:

(1) A convex radiodensity confined to the maxillary antrum and not associated with bony erosion or involvement of adjacent structures is benign.

(2) These benign masses are usually polyps or cysts. Our study shows a near equal incidence – 52 percent of convex antral masses are polyps while 48 percent are cysts.

(3) There is a high degree of correlation between the radiologic and the operative existence of these antral masses. Twenty-five out of twenty-eight cases (89 percent) presented with masses in the antrum upon surgical exploration.

(4) Antral cysts and polyps display basically similar characteristics prior to operative diagnosis. The similarity between these masses of symptoms, physical findings, and antral characteristics suggest that they arise from similar disease processes. A common mode of management may then be worked out.

(5) While cysts and polyps have many similarities, our results suggest that a mass at the antral floor would more likely be a cyst.

(6) Likewise, a mass without associated mucoperiosteal thickening would more likely be a cyst than a polyp.

(7) A comparison of the results of our study with the observations of previous authors show that, indeed, antral polyps usually arise from the medial wall, manifest with symptoms (possibly allergic) and are associated with mucoperiosteal thickening. However, in contrast to previous studies, we noted that the majority of antral polyps are solitary, homogeneous and similar in opacity to antral cysts (Table XVIII).

(8) As with previous observations, our study shows that antral cysts are solitary and homogeneous. Contrary to previous statements, we found the cysts to be associated with symptoms, located on the medial wall as well as on the floor, similar in opacity to the polyps, and with mucoperiosteal thickening (Table XIX). We repeat, however, that among those masses with no apparent mucoperiosteal thickening, 80 percent are cysts.

Table XVIII. Comparison of previous and present studies on polyps

Previous Studies	Present Study
Symptomatic, with allergy	Symptomatic, with possible allergy
Multiple	Solitary
Heterogeneous	Homegeneous
More opaque than cysts	Similar to cysts in opacity
Medial wall origin	Medial wall origin
With mucosal thickening or irregularities	With mucoperiosteal thickening

Table XIX. Comparison of previous and present studies on cysts

Previous Studies	Present Study
Asymptomatic	Symptomatic, with possible allergy
Solitary	Solitary
Homogeneous	Homogeneous
Less opaque than polyps	Similar to polyps in opacity
Antral floor origin	Antral floor or medial wall
No mucosal abnormalities	With mucoperiosteal thickening

In summary, convex radiodensities are usually benign and most of the time are either polyps or cysts. These polyps and cysts might be differentiated from each other in specific instances such as when the mass is on the floor or there is absence of mucoperiosteal thickening. In general, however, our study shows that it is difficult to differentiate one mass from the other without surgical intervention. The many similar results we obtained disprove some of the pervading concepts regarding these antral masses. Because of the many similarities, it is suggested that these masses arise from common disease processes.

RECOMMENDATIONS

To further the study on antral polyps and cysts, we would like to suggest (1) a *prospective* study on the

same subject matter but involving a bigger population of at least 60 cases, (2) a study concerning the effect of medical management coupled with periodic x-ray examination of patients with antral polyps or cysts, (3) a study concerning the histopathologic examination of these masses, and (4) a study on the usefulness of transillumination in differentiating these antral masses.

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CEPHALOMETRIC ANALYSIS OF FILIPINO ADULT SKULLS*

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INTRODUCTION

Cephalometric analysis has been an enigma to plastic surgeons for a variety of reasons. Interpreting the multitude of lines points and angles as well as the actual tracing and measurement of the cephalometric radiograph has traditionally been the role of the orthodontist. To realize the full benefit of collaboration between plastic surgeon and orthodontist in the diagnosis and treatment planning of patients with craniofacial anomalies, each clinician should have a basic understanding of the others diagnostic techniques and approaches to treatment.

Cephalometric analysis is one of several sources of diagnostic information, which include history, clinical evaluation, frontal and profile photographs, intraoral and panographic roentgenograms and orthodontic study models.

The use of Cephalometric roentgenography was first proposed as an aid in the diagnosis and planning of surgical-orthodontic treatment of facial malformation in 1954 by Converse and Shapiro. At present it is widely used for this purpose; in addition, it provides a valuable record for studying postoperative changes.

Data collected from the cephalometric study must be considered within the context of information provided by the complete set of diagnostic record. It should be emphasized that because of routine radiographic image distortion and tracing and measurement error, the cephalometric drawing is, at best, only an approximation of the actual craniofacial structure being studied.

RESEARCH GOAL

To establish the normal cephalometry among Filipino adult skulls as future guide in the diagnosis and planning of facial reconstruction.

RESEARCH MATERIALS AND METHODOLOGY

Fifty lateral skull x-rays of adults were gathered at random from the files of the X-ray department of the Ospital ng Maynila. Lateral films taken with open mouth as well as Pediatric skull x-rays were excluded. Skull x-rays of children were excluded from this study because craniofacial growth centers are still active. For example, in females, studies utilizing computerized data analysis have shown that their mandibular anteroposterior growth is 98% completed by the age of 15. Males, on the other hand attain 98% of mandibular anteroposterior growth by the age of 19.

Cephalometric landmark used are as follows:

Landmark no. 1 – S (Sella), the center of sella Turcica

Landmark no. 2 – N (Nasion), nasofrontal suture point

Landmark no. 3 – A (Subspinale), the most posterior point between the anterior nasal spine and the crest of the maxillary alveolar process

Landmark no. 4 – B (Supramentale), the most posterior point between the pogonion and the crest of the mandibular alveolar process

Landmark no. 5 – Po (Pogonion), the most anterior point of the symphysis of the mandible

Cephalometric lines/angles used are as follows:

SNA – (sella-nasion-A): shows the anteroposterior relation of the maxilla to the cranial base; used to determine the degree of maxillary prognathism or retrognathism

SNB – (sella-nasion-B): shows the anteroposterior relation of the mandible to the cranial base; used to determine the degree of mandibular prognathism or retrognathism.

Using the five cephalometric landmarks, each film was marked with a dermatograph and with a protractor the angles were measured.

RESULTS

NO.	NAME	X-RAY NO.	SNA	SNB
1.	R.L.	99264	88	83
2.	A.T.	91075	86	79
3.	D.L.	91132	84	81
4.	Z.P.	67243	91	84
5.	R.F.	91543	81	79
6.	C.O.	91255	82	75
7.	C.N.	67537	81	74
8.	R.T.	80177	80	75

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9.	C.B.	94558	88	80
10.	J.B.	80378	89	79
11.	B.C.	80308	86	80
12.	R.L.	88755	89	85
13.	L.C.	88685	80	80
14.	F.D.	67462	87	87
15.	G.B.	67423	83	80
16.	Y.C.	32403	83	79
17.	P.J.	94911	88	84
18.	C.L.	86432	87	80
19.	A.J.	99970	90	88
20.	R.C.	98832	85	80
21.	R.E.	46316	81	78
22.	M.O.	46184	85	83
23.	L.T.	78964	83	74
24.	H.Y.	76778	85	81
25.	C.M.	45974	90	84
26.	R.A.	98459	80	79
27.	R.F.	97895	82	81
28.	A.R.	97919	84	81
29.	V.A.	97651	80	73
30.	L.A.	97620	84	77
31.	J.F.	97677	88	85
32.	S.M.	97698	90	85
33.	C.A.	97761	86	82
34.	R.D.	99713	83	79
35.	CSJ	97133	86	78
36.	T.L.	95751	81	77
37.	E.P.	97584	87	83
38.	C.M.	68807	81	77
39.	R.J.	76894	81	78
40.	M.L.	100725	83	81
41.	N.B.	100716	84	82
42.	E.A.	94372	81	77
43.	A.A.	93696	78	72
44.	W.D.	93884	82	81
45.	R.S.J.	100321	84	81
46.	V.P.	96911	86	81
47.	M.C.	96755	92	83
48.	C.M.	68807	81	78
49.	J.M.	69582	82	81
50.	J.M.	68542	84	81

RESULTS

ANGLES	RANGE	MEAN	SD
SNA	78–92^{o}	84.4^{o}	$\pm$ 3.371
SNB	72–88^{o}	80.1^{o}	$\pm$ 3.331

SNA measurement ranges from 78–92^{o} with a mean of 84.4^{o} and a SD $\pm$ 3.371. On the other hand, SNB measurements ranges from 72–88^{o} with a mean of 80.1^{o} and a SD $\pm$ 3.331.

DISCUSSION

Several instruments were employed to achieve stabilization in cephalometry. Cephalostat is one instrument that holds the head in a fixed and reproducible position. Stabilization is achieved by a pair of ear rods that enter the external auditory meatus and minimize changes in head position. A third point of fixation is achieved with a rod that rests passively on the soft tissue covering the inferior orbital rim or nasofrontal suture. This prevents head rotation along the sagittal plane.

Dr. Leslie G. Farkas and Curtis K. Deutsch, B.S. made use of what they termed as "small and large instrument." The "small instrument" measures the vertical profile line essential for judgment of the symmetry of paired facial features (e.g. inner commissures of the eye fissures, lower edges of the ears). To determine the vertical, the midpoints of the face and forehead are first marked on the skin with a pen. These points are the trichion, glabella, nasion, pronasale, labiale superius and mentum. The instrument is taped to the skin of the midforehead so that the black midline on the longer (vertical) arm is aligned with two vertical profile landmarks. On the other hand, the "larger instrument" is used to determine the Frankfurt horizontal line. The orbitale and tragion landmarks are marked on the skin. The black edge on the longer arm of the tool is then placed along the line connecting these two points. The Frankfurt horizontal is required to obtain a precise information about the inclination of various facial features (e.g. forehead, nasal bridge, upper lip, upper face profile line, ears).

The use of the Stellenbosch triangle analysis in conjunction with the well-known lateral cephalometric analysis makes a three dimensional analysis possible. The Stellenbosch-triangle analysis has been designed for the PA and basilar cephalograms and the results are evaluated from triangles constructed from various points on the head and face. The use of PA and basilar cephalometric analysis greatly aids the assessment of patients in need of orthognathic surgery. By using the triangular analysis of the posteroanterior view, the exact deviation of the basal and or alveolar bones of the maxilla and/or mandible in the superoinferior plane may be calculated. Midline asymmetries or displacement of the anterior nasal spine, the mentum, and the occlusal midline may also be assessed. The basilar cephalometric analysis should indicate deviations of the maxilla and/or mandible by the use of the maxillary and mandibular triangles in the medio-lateral dimension.

Several cephalometric studies were done in order to have a guideline in the diagnosis and treatment planning of patients with craniofacial anomalies. In this particular study, we made use of a lateral radiograph, 5 basic landmarks and 2 angles, the SNA and SNB. We chose these landmarks and angles because they are easy to plot and measure as well.

CONCLUSION

The SNA and SNB are two significant angles from which we could more less say that a particular case has maxillary prognathism if the SNA is greater than 84.4^{o} $\pm$ 3.371, and retrognathism if lesser. With SNB greater than 80.1^{o} $\pm$ 3.331, mandibular prognathism and if lesser retrognathism. With this two angles we

were able to establish a guide which maybe useful in the diagnosis and planning of facial reconstruction.

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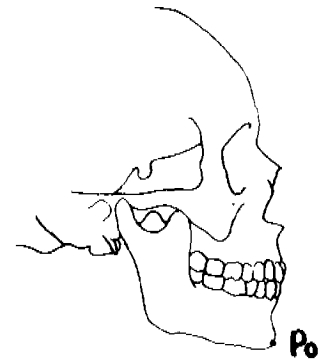
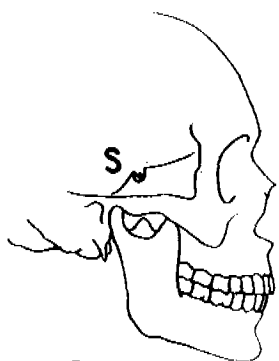
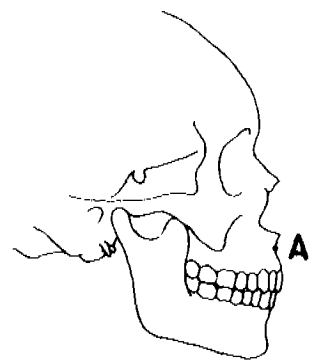


Po (POGONION)

SNA



S (SELLA)



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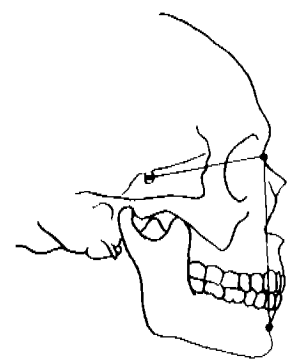
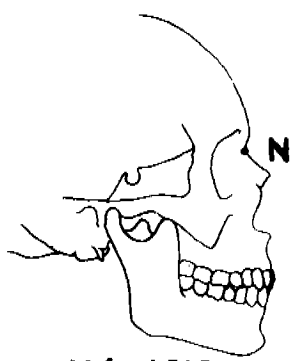
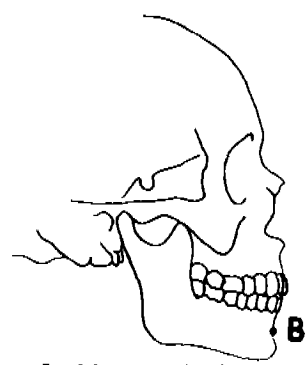


SNB



N (NASION)



B (SUPRAMENTALE)

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CERUMEN SUSPENSION FOR OTITIS EXTERNA*

Marlon V. del Rosario, M.D.**

INTRODUCTION

Several parameters which predispose the normal ear canal to infection have been reported in the literatures. However, these findings have largely been inconclusive, with the suggestion that external otitis results from no single condition, but a number of interacting conditions which alter the environment of the ear canal.[7]

The external auditory canal is self-cleaning. Migration of the squamous epithelium from the outer layer of the tympanic membrane to the external meatus is a natural phenomenon and is exquisitely sensitive to environmental and physical factors.[6] A combination of factors maintain the immunologic environment the pH and the normal cleansing mechanism of the external auditory canal and is responsible for hemostasis.

In cases of external otitis of bacterial origin in which there is excessive discharge from the ear, cerumen almost disappears from the canal. Does cerumen possess that protective barrier of the ear canal against bacteria that subsequent loss of this waxy substance predisposes the ear to infection? An attempt was therefore made at the Department of Otorhinolaryngology, Hospital ng Maynila to determine the role of the cerumen in the development of otitis externa and its use in the treatment of clinical otitis externa.

MATERIALS AND METHODS

Ten patients, who upon initial visit had signs and symptoms of acute otitis externa, were accepted as subjects for this study. This included 6 males and 4 females with average age distribution of 4-45 years and an average age of 26.2 years. The usual complete history and physical examinations were obtained. The degree and severity of external otitis were noted as follows:

Table 1

Pain (1-3)

Mild (1) – pain when tension is applied to straighten the ear canal

Moderate (2) – pain with pressure on the auricle or tragus

Severe (3) – persistent pain without touching the auricle

Edema of the External Auditory Canal (0-5)

No. 0 indicating no reduction of the lumen

No. 5 indicating complete obliteration of the lumen

Discharge (0-2)

No. 0 indicating no discharge

No. 2 indicating moderate amount of discharge

Grading of ear infection was based on the clinical evaluation of the signs and symptoms and interpreted as follows:

Table 2

	Mild	Moderate	Severe
Pain	0-1	1-2	2-3
Edema	0-2	2-4	4-5
Discharge	0-1	1-2	1-2

These patients were randomly divided into two groups. A and B consisting of five patients each. The first group was the Control group and the second the Cerumen group.

On the basis of the findings listed on Table 2, the ten ears were graded as follows:

Group A – 4 mild, 1 moderate

Group B – 3 mild, 1 moderate, 1 severe

Cerumen in oil labeled Formula X, was prepared in the following manner: 1) 0.5 gm cerumen, previously extracted from normal ears from patients seen in the OPD mixed with 5cc mineral oil and crushed manually to make an oily suspension, 2) the suspension is put in a sealed and sterilized bottle.

In Group A, the affected canal was cleansed with cotton swab, soacked with H_2O_2 and dried with cotton. In the second group, after cleansing the canal with H_2O_2 cerumen in oil is applied evenly to the canal using cotton applicator. Patients were asked to follow-up daily for the procedure and were reevaluated with regards clinical symptoms of pain, edema and discharge. Treatment was maintained until the ear canal returned to normal. Treatment success was recorded as resolution of the signs and symptoms and interpreted as follows:

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Table 3

Excellent	– no pain, no edema, no discharge
Good	– no pain, minimal edema, minimal discharge
Poor	– persistent pain, moderate edema, minimal to moderate discharge

RESULTS

In the Control Group A, poor response was obtained in all but one case. In four subjects, pain was persistent until the first week so much so that we have to use oral analgesics. Edema began resolving by the 7th day but did not return to normal until the second week. With the discharge persisting on the second week, we opted to give otic drops in the form of Synalar Otic until we obtained good response.

In Group B, one subject responded very well (excellent), three subjects with good response and one poor response. There was marked diminution of pain on the third day and edema began subsiding by the end of the first week. Although very minimal discharge was seen after the first week, all four ears returned to normal at the end of the second week. There was one subject with severe otitis externa who responded poorly after two weeks of treatment. The lumen was almost obliterated so much so that we cannot apply the solution to the ear canal.

DISCUSSION

Cerumen is formed from the combined secretions of the apocrine and sebaceous glands of the skin of the outer third of the external ear canal. It is hydrophobic, contains immunoglobalins and lysozomes and has an acid reaction. Its acid pH and Iron content lend to its bacteriostatic effect inhibiting the growth of bacteria and fungi.

Senturia and Liebman in their series suggested that tissue maceration and absorption of water by the stratum corneum is of major importance in predisposing the ear to infection.[5] This concept is also supported by the fact that there appears to be a direct correlation between the degree of water exposure in the ear canal and incidence of otitis externa. The possibility that exposure to water over a prolonged period of time is tantamount to subsequent loss of cerumen in the ear canal and the consequent elimination of an important barrier to infection maybe justified since its lipid content tends to prevent moisture and organisms from entering the pilosebaceous units and causing maceration of the epithilium.[8] Several studies have shown changes in the microbial flora of the ear, a shift from gram positive to gram negative bacteria following prolonged exposure to water and the subsequent development of clinical external otitis.

It can be recalled that in our study, four out of five ears with external otitis return to normal after two weeks of treatment. This study, wherein we reintroduced cerumen to diseased ear canal accentuates the importance of maintaining an environment in the external ear canal that would interfere with further growth of infecting organisms and would favor the growth of a normal bacterial ear flora for hemostasis. Although no studies had been made to support the idea that removal of cerumen per se is sufficient insult to result in the development of external otitis, Wright and Dureen in their series noted that when such cerumen-free ears were challenged with P. aeruginosa, external otitis followed rapidly.

COMMENT

Because of the limitation of the study, however, such as the small number of subjects, the failure of obtaining culture and sensitivity of the ear canal before and after treatment and other technicalities, we cannot conclusively say that cerumen is a definitive form of treatment of otitis externa although this study supports and concept that cerumen plays a vital role in maintaining hemostasis in the ear canal.

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DAPHNIA BIOPSY AN EXPERIMENTAL APPROACH IN THE DETECTION OF MALIGNANCY*

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INTRODUCTION

Since Hippocrates described the disease now known as cancer, pathologist have striven to discover methods for its early diagnosis. Prognosis of malignancy in its advanced stage is universally poor and the terminal phase of this incurable disease is protracted and severely distressing.[10] Therefore, the need for a good screening procedure need not be overemphasized.

As we all know, early detection and recognition means early diagnosis and treatment, simple and less radical intervention, improved survival rates, and prevention of metastasis.[6]

Presently, a number of techniques have been employed to achieved detection of malignancy which already includes both invasive and non-invasive approaches like exfoliative cytology, punch biopsy, radiography, nuclear scan, thermography, and computerized tomography among others. What probably defeats the practitioner in his early detection of malignancy is the relative paucity of these highly sophisticated instruments within his reach. The rural areas in particular is devoid of expensive and modern instruments as well as especially trained personnel. Hence, diagnosis is purely based on clinical signs and some on mere intuitive guess.

It has been the policy and priority of the Ministry of Health to maximize all efforts in delivering the much needed facilities in the remote areas and create an atmosphere of health awareness among the people.

It is an accepted fact that rural folks are generally governed by socio-cultural factors and habits like betel nut chewing and inverted smoking which in themselves are cancer inducing. Without the much needed facilities, delay in diagnosis adds to cumbersome prognostication. This is even further aggravated by the assumption of low index of suspicion for a benign appearing lesion which can turn out to be malignant. So introducing a method of differentiating benign from malignant lesion and a refined diagnostic acumen of the practitioner would help facilitate diagnosis especially in the rural setting.

Even with the availability of the latest tools in modern medicine, the challenge remains and still overwhelms the practicing physician as to what is the best and yet most simple, practical, accurate, and available method.

In view of the above reasons, this study was conceived in order to introduce a new, diversified, and simple approach in the detection of malignant tissues by the use of water flea. *Daphnia pulex* commonly called daphnia.

MATERIALS AND METHODS

A total of 37 suspected malignant tissues based on histopathological report were assayed. All specimens included in the study were obtained intraoperatively.

Table 1: Types of cancer examined

A.	Breast	
	1. Invasive ductal CA	8
	2. Paget's disease with invasive ductal CA	2
B.	Nasopharynx	
	1. Well differentiated squamous CA	4
	2. Moderately differentiated squamous CA	3
	3. Poorly differentiated squamous CA	1
C.	Buccal mucosa	
	1. Well differentiated squamous CA of soft palate	4
D.	Maxilla	
	1. Well differentiated transitional CA	2
	2. Adenocystic CA	2
E.	Ovary	
	1. Serous cystadeno CA	2
F.	Uterus	
	1. Well differentiated adeno CA	2
G.	Mandible	
	1. Adamantinoma	2
H.	Colon	
	1. Moderately differentiated mucinous Adeno CA	2
I.	Cervix	
	1. Invasive squamous cell CA, large cell non-keratinizing	2

PROCEDURE

1. Live daphnias (water fleas of the family Crustacea, order Brachiopada, sub order Cladocera)[2] were placed in five numbered test tubes with 0.2cc of water where they swim vigorously. To all test tubes, equal amount of 1%

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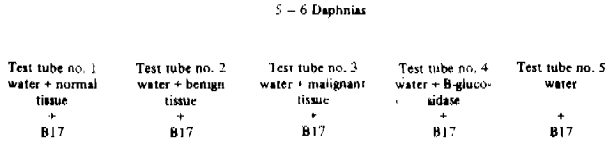
vitamin B17 was incorporated.

2. Tissue juice from freshly excised normal, benign, and cancerous tissues were placed on test tube number 1, 2, and 3 respectively. To test tube no. 4, 0.2cc of freshly prepared solution of 0.25% of Beta-glucosidase was added. In each of the five test tubes the effect on the swimming daphnias was noted after the addition of each kind of tissue juice.

Positive and negative controls were done for comparative purposes. Extracts from normal and benign tissues and Vitamin B17 (amygdalin) were used as negative control. B-glucosidase was used as positive control.

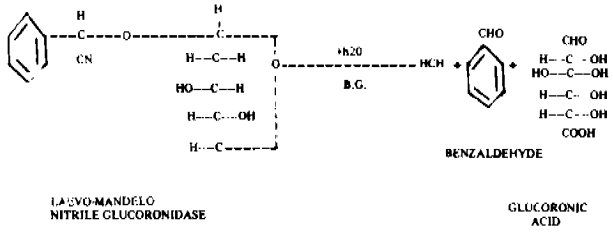
The presence of Beta-glucoronidase in the cancer tissue extract was determined by the color reaction in the sodium picrate paper (Guignard's test) which turned orange to hydrocyanic acid (HCN). This proved lethal with the subsequent death of the daphnia in this experiment.



RESULTS

Daphnias swimming in solution containing Beta-glucosidase and extracts from malignant tissues (test tube no. 3 and 4) in all series except in eight cases of nasopharyngeal CA died within 30-60 seconds. In test tubes 1, 2, and 5 the daphnias remained alive for more than an hour. This experiment showed that some toxic substances were released in test tubes number 3 and 4. Since test tube no. 4 contained the enzyme B-glucosidase which is capable of hydrolyzing Vit. B17 to liberate HCN, test tube no. 3 must have similar enzyme present in the cancer tissue to liberate HCN to cause the death of the flea. The equation for such release is shown below.[10]

Table III. Chemical reaction showing the release of HCN



The presence of hydrocyanic acid in test tubes no. 3 and 4 containing the dead daphnia was demonstrated by the Guignard's test. Test paper moistened with sodium picrate changed in color from yellow to orange within the duration of 15-30 seconds. The test was negative in cases of nasopharyngeal CA. One case of breast CA and one case of uterine CA showed false negative result. However, with repeated test, positive results were obtained. It was assumed that not enough tissue juice concentration containing Beta-glucoronidase was obtained in the first trial.

Table IV. Results

	Normal Tissue	Benign Tissue	Malignant Tissue	Enzyme B-Glucosidase	1% Vit. B17
Effect on Daphnia	1 (–) alive	2 ( ) alive	3 (+) dead	4 (+) dead	5 (–) alive
Color Reaction (GUIGNARD)	(–) yellow	(–) yellow	(+) orange	(+) orange	(–) yellow

DISCUSSION

The cancer cell is surrounded by a sea of enzyme Beta-glucoronidase which hydrolyzes the cyanoglycosides.[1,4,5] On splitting, the cyanogenetic glycosides releases one or two molecules of sugar (depending on the source), an aldehyde or a ketone, and hydrogen cyanide (HCN).[8] The presence of HCN has caused the death of the daphnia which was verified and demonstrated by the positive Guignard's test (yellow to orange).

Daphnia was used as experimental animals to demonstrate the presence of Beta-glucoronidase (glucosidase) in cancer tissues and the action of Vitamin B17.

When tissue juice from cancerous tissue was added to a solution of Vitamin B17 in which the daphnias are swimming freely, death ensued in 30-60 seconds, but not with the tissue juice obtained from normal and benign tissues. In the test tube containing vit. B17 in which the daphnias are seen swimming, death ensued in 30-60 seconds upon addition of Beta-glucosidase (capable of splitting Vit. B17). From the experiment it was demonstrated in test tube number 3 and 4 the release of HCN upon the addition of tissue juice containing the enzyme from cancer tissues.

In eight cases of nasopharyngeal malignancy, the test turned out to be negative. This could be attributed to the fact that not enough tissue juice concentration of the enzyme has been obtained due to the relatively small size of the specimen.

It is recommended that a sizable tissue be obtained to create an impression. Various methods are presently being investigated so as to obtain a better concentration of the tissue juice. If such innovation in lieu of the crude method used in this experiment is perfected, false positive and false negative results can be totally eliminated.

In some cases, the dark color of the solution did not

allow observation of the motility of the daphnia. However, this was corrected and counterchecked by the Guignard paper test which is very sensitive to HCN release.

RECOMMENDED PROCEDURE

5-6 live daphnias in 0.2cc water
Add 0.2cc of 1% Vitamin B17
Add 0.2cc of tissue extract
then:

1. Observe if death of the daphnia will occur.
2. Note for the color reaction change (yellow to orange) in the Na picrate paper.

CONCLUSION

Daphnia biopsy method of differentiating benign and malignant lesions can well compliment findings and presentation solely based on gross examination of the specimen. Such method is basically cheap and simple and may prove vital and useful during instances when no qualified pathologist and expensive equipments are available. It can be useful not only to the pathologist but mostly to other practitioners who have limited experiences with early malignancy. It can be of help to the inexperienced clinician to keep a low false negative diagnostic rate and to make detection of malignant tissue when for one reason or another the presenting microscopic pattern of the histologic section is not malignant.

It is recommended that further studies be initiated to improve and define the sensitivity of the procedure.

This paper does not in any way intend to be a substitute in the presence or availability of a qualified pathologist or definitive yet expensive diagnostic examination but to be a part of the diagnostic armamentarium of a medical practitioner particularly in remote areas where access to modern diagnostic procedures are limited or not available.

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GLOTTIC OPENING SIZE ESTIMATE IN FILIPINO CHILDREN*

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INTRODUCTION

Foreign bodies in the air and food passages, whether endogenous or exogenous are countless. Accidental occlusion of either vital supply line can instantly create a life threatening situation or a near panic condition necessitating emergency management.

The management of foreign bodies aspirated in the trachea and esophagus are two entirely different entities. A correct diagnosis is mandatory for its proper treatment.

It is a known fact that most physicians are fully aware of the classic manifestations of esophageal and laryngeal foreign bodies. However, most clinicians are often unaware that upper airway obstruction can occur likewise with esophageal foreign bodies compressing on the trachea.[9]

To determine whether respiratory distress caused by laryngeal foreign bodies or by esophageal foreign bodies compressing on the trachea by posteriorly situated esophagus, special attention must be focused on the glottic region which is ordinarily considered to extend from the free margin of the ventricular fold to the free margin of the vocal fold.[7,9]

Exact dimensions of the major air passages have been the subject of few detailed investigation in both local and foreign studies.[1]

The objectives therefore of this study are:

1. To estimate the normal value of glottic opening size in Filipino children.
2. To correlate the variables of sex, weight, age and body surface area with the glottic opening size.
3. To compute for the mathematical estimate correlating the best predictive variable with the glottic opening.

MATERIALS AND METHODS

One hundred and forty-seven infants and children (55 males, 92 females) whose ages range from 0-18 years with American Society of Anesthesiologists classification of physical status I or II,[14] anesthetized via the orotracheal route at the Santo Tomas University Hospital, Clinical Division during the six months period from January to June 1985 were studied consecutively.

Pre-operative medications were administered consisting of appropriate doses of Diphenhydramine HCl (1.25 mg/kg), Promethazine HCl (1.25 mg/kg), Meperidine HCl (1 mg/kg) and Atropine (0.01-0.02 mg/kg) 60 minutes prior to induction of anesthesia.

Anesthesia was induced with nitrous oxide-oxygen and halothane or enflurane. As soos as unconsciousness occured, suocinylcholine (1-2 mg/kg), a short acting muscle relaxant was given intravenously. The largest tube that could not be introduced with gentle pressure was considered the negative end point. The next smaller tube was then employed.

Age, weight (in kg.), sex and body surface area (in square meter) were recorded. Tube size was designated in *mm.* Internal diameter and the corresponding outer diameter were determined. All tubes were of the Shiley variety.

RESULTS

The data on the different variables of age, weight, body surface, internal and outer diameter of the endotracheal tube for males and females are presented in Table I and Table II respectively.

Statistical analysis using the T test for significance between sexes was done on the above data. Result showed a significant difference with respect to sex pattern. Females were older, heavier larger in body size, had longer glottic opening size than the male group with a p value < 0.005 to a p value < 0.05 which is statistically significant.

Correlation coefficient between age, weight and body surface of both sexes performed with the glottic opening size as the dependent variable are shown in Table III and Table IV.

Result showed a significantly higher correlation between age ($r = 0.91$ for male; $r = .92$ for female); weight ($r = 0.85$ for male, $r = 0.92$ for female) body surface area ($r = 0.85$ for male; $r = 0.92$ for female) in relation to glottic opening size.

Linear regression analysis was performed and the goodness of fit was most consistent with age and glottic opening size than the other variables investigated with a value of 0.83 for male and 0.85 for female. It is thus possible to estimate the glottic opening size of pediatric

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patients based on the derived linear regression formula when a rough and ready approximate is necessary especially in emergency situations where the glottic opening size is an important tool for diagnosis prior to definitive management and treatment.

DISCUSSION

As a result of increased use of prolonged endotracheal intubation in the management of critically ill patients, the size of glottic chink has become likewise a point of interest to the anesthesiologists because of untoward complications such as post-intubation granuloma, acquired subglottic stenosis.[2,3,4,6,12,13] For them, the choice of proper endotracheal tube is of utmost importance. A tube that is too small may demand more respiratory effort, while one that is too large may cause the development of laryngotracheal edema.[6,11,12]

From the viewpoint of an Otolaryngologist, the interest is compounded by the increasing frequency of foreign body aspiration. According to a report of the National Council of Safety of Chiacgo in 1980, they estimated approximately 600 children under the age of 15 years die each year of suffocation because of complications related to foreign bodies in the air and food passages.[10]

While diagnosis of foreign bodies in the air and food passages is usually made without any difficulty from an accurate history and good ancillary procedures, there are rare instances where it can be potentially misdiagnosed. According to a case report by Martinez et al in 1985,[8] following the dictum that flat object always lie with their greatest diameter in the coronal plane of the body when in the esophagus, in the sagittal plane when in the trachea, a case of a foreign body in the esophagus was misdiagnosed as an airway foreign body because of the typical radiographic picture and classical symptomatology. The author feels then that had there been means to estimate the glottic opening size and correlate it with the size of the foreign body, errors in the diagnosis of foreign bodies in the trachea and esophagus could be minimized.

Various methods have been devised to estimate the size of glottic chink. Some use the lumen of the external naris or the diameter of the little finger.[12]

In a local study made in 54 Filipino adult cadavers and autopsy specimens, the height, length of the third finger and circumference of the fifth finger were correlated with the cricoid ring size for use in estimating the proper size of endotracheal tube.[11]

Several formulas to determine the proper tube size in relation to glottic opening size have been suggested and proved to be useful but not exact.[12]

Cole's Formula (1957)

$$\text{Tube size} = \text{age in years} + 17$$

Penlington's Formula (1972)

For children under 6 years old

$$\text{Tube size (mm ID)} = \frac{\text{age (year)}}{3 + 3.5}$$

For children 6 years and over

$$\text{Tube size (mm ID)} = \frac{\text{age (year)}}{3 + 4.5}$$

My study on age, weight and body surface area showed high correlation with glottic opening size, but age was the most accurate and consistent tool to estimate the size of glottic chinck of pediatric patients based on the derived linear regression formula.

SUMMARY

One hundred and forty-seven Filipino infants and children with ages ranging from 0-18 years old, of which 55 were males and 92 were females underwent endotracheal intubation by the orotracheal route.

Intubation was done by general mask inducation of anesthesia with a short acting muscle relaxant to provide adequate relaxation during intubation.

Age, weight, sex and body surface area of these patients were statistically correlated with glottic opening size. Linear regression analysis performed showed that goodness of fit was most consistent with age and glottic opening size with a value of 0.83 for males and 0.85 for females. From this study, a more accurate estimate of the glottic opening size can be obtained using the linear regression formula in relation to age.

Table I — MALE — N = 55

VARIABLE	RANGE	MEAN ± 1 SD
AGE	1 month – 18 years	5.09 ± 4.14 year
WEIGHT	4 – 45 kg.	15.65 ± 8.48 kg.
BSA	0.25 – 1.89	0.72 ± 0.35
ID	3.5 – 7.5 mm	4.97 ± 0.97 mm.
OD	4.3 – 10.3 mm	6.92 ± 1.29 mm.

Table II — FEMALE — N = 92

VARIABLE	RANGE	MEAN ± 1 SD
AGE	26 days – 18 months	8.16 ± 5.04 year
WEIGHT	4 – 46 kg.	23.56 ± 12.24 kg.
BSA	0.25 – 1.93	1.03 ± 0.49
ID	3 – 8 mm.	5.52 ± 1.19 mm.
OD	4.3 – 10.9 mm.	7.66 ± 1.59 mm.

X	r	df	p	Goodness of fit	Linear Regression
Age	0.91	90<	0.001	0.83	Y = 0.28X + 5.47
Weight	0.85	90<	0.001	0.72	Y = 0.13X + 4.9
BSA	0.85	90<	0.001	0.72	Y = 3.23X + 4.61

Table III. Correlation between variable (X) and OD (Y) in male patients

X	r	df	p	Goodness of fit	Linear Regression
Age	0.92	53<	0.001	0.85	Y = 0.29X + 5.24
Weight	0.92	53<	0.001	0.85	Y = 0.12X + 4.84
BSA	0.924	53<	0.001	0.853	Y = 3X + 4.56

Table IV. Correlation between variable (X) and OD (Y) in female patients

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TRIGEMINAL NEURALGIA: SURGICAL TREATMENT VIA THE TRANSANTRAL APPROACH*

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Mariano B. Caparas, M.D.****

INTRODUCTION

Without warning, like sudden lightning, the awful pain of trigeminal neuralgia strikes the face and mouth – intensely, briefly, but repeatedly. It prevents eating, drinking, talking, touching the face, and brushing the teeth. It disables the whole person, creates constant fear of recurrence, and makes life miserable. There is no visible abnormality. At first the patient may believe he has a toothache, and healthy teeth may be extracted without relief. Relatives and friends may suspect hysteria, especially when onset or recurrence takes place during emotional stress.

But a knowledgeable physician can diagnose the condition and treat it successfully with specific anticonvulsants like carbamazepine and diphenylhydantoin. However, high doses are often required and side effects are frequent particularly sedation, idiosyncratic reactions and occasionally, blood dyscracia. Benefit, therefore, is unlikely to be permanent and between 25-50% of the patients (Dallesco, 1981) will eventually fail to respond to drug therapy and need some form of surgical treatment.

The choice of surgical therapy is wide but is often left to the neurosurgeons who prefer the more sophisticated techniques like microvascular decompression of the trigeminal sensory root, percutaneous radiofrequency rhizotomy and percutaneous retrogasserian glycerol injection. However, not only are they tedious to perform but major complications can occur like intracranial hematoma and brain abscess. So that, peripheral neurectomy remains the safest and simplest method of denervation.

Peripheral neurectomy has been used to control the paroxysms of pain in trigeminal neuralgia since Nicholas Andre' performed the first authenticated neurectomy in 1732. In 1965, Quinn, in the largest series ever reported advocated the use of repetitive neurectomy in the treatment of trigeminal neuralgia. Later in 1977, Braun and Sotereanos introduced the transantral approach to maxillary neurectomy in the treatment of intractable trigeminal neuralgia.

The maxillary antrum and the pterygopalatine fossa are areas best known to the otolaryngologist. With the introduction of the transantral approach, the otolaryngologist is now placed in a significant position as far as surgical treatment of trigeminal neuralgia is concerned. This paper, introduces a *modified* procedure in the treatment of refractory trigeminal neuralgia – transantral sphenopalatine ganglion and electrocoagulation. A comparative analysis concerning its effectiveness, advantages and complications is also carried out.

MATERIALS AND METHODS

Patients who were clinically diagnosed to have trigeminal neuralgia by the Department of Neurology, UP-PGH seen from April 1983 to April 1985 were included in the study. All patients were unresponsive to medical therapy (carbamazepine) for at least three months immediately preceding surgery. Patients who have had previous neurosurgical intervention, those without prior medical treatment, those with associated neurological findings and those wherein facial pain was attributable to other causes were excluded from the study.

Pre-operatively, all patients underwent a complete physical and otolaryngologic examination including an evaluation of the trigeminal division involved, location of trigger zones and nature of provoking stimuli.

The surgical procedure was done with the patient either under general endotracheal anesthesia or local anesthesia. For patients with pure maxillary (V_2) nerve involvement, an infra-orbital neurectomy and a sphenopalatine ganglion (SPG) electrocoagulation were done. For patients with combined involvement of both the maxillary (V_2) and mandibular (V_3) divisions, a mental nerve avulsion was done as an added procedure.

All patients were evaluated immediately postoperatively every month for the first six months and every six months thereafter. Criteria for evaluation were as follows (modified from Voorhies and Patterson, 1981 and Tew and Mayfield, 1974):

1. Complete pain relief
   – no attacks of pain whether spontaneous or precipitated by stimulating the trigger

*1st Prize – The 4th Scientific (Surgical & Instrument Innotions) Research Contest in Otolaryngology held on December 3, 1985 at the Century Park Sheraton Hotel.

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zones
- no further medical or surgical treatment needed

2. Partial pain relief
   - frequency of attacks decreased by 50%
   - intensity of pain tolerable, relieved with or without minimal medical treatment
   - no further surgical treatment needed
3. Minimal pain relief
   - frequency of attacks same as before surgery
   - intensity of pain tolerable, relieved with or without minimal medical treatment
   - no further surgical treatment needed
4. Failure
   - presence of spontaneous attacks of pain of the same intensity as that before surgery, uncontrolled by medications
   - further surgical treatment needed

All intraoperative and post-operative complications were noted.

The surgical technique consisted of an intraoral incision extending from the maxillary tuberosity to the midline in the maxillary vestibule. A mucoperiosteal flap was fashioned to expose the anterolateral maxillary wall, zygoma and the infraorbital foramen. The infraorbital neurovascular bundle was then visualized leaving the foramen (Fig. 1). This was isolated, grasped with two hemostats just outside the foramen, and was cut in between. Then an electrosurgical electrode was introduced into the canal and as much of the existing neurovascular bundle was cauterized. (One must be cautious about pushing the needle too far into the infraorbital canal because it is often roofless and the contents of the orbit could be injured). A 3 x 2 cm window was then fashioned along the anterolateral maxillary wall. The mucosa from the posterior wall was elevated and a 1.5 x 1.5 cm. posterior window was created in the superomedial portion of the antrum. The thin periosteum was incised and elevated. With careful dissection, the descending palatine nerves were exposed. These were then traced superiorly to the *sphenopalatine ganglion* which was then isolated and completely electrocauterized (Fig. 2). The posterior antral mucoperiosteum was repositioned and closed. A foley catheter ballon with 5-10 cc of sterile water was placed inside the maxillary antrum for hemostasis, exiting into the nasoantral window. The anterior mucoperiosteal flap in the maxillary vestibule was repositioned and closed with no. 3-0 chromic sutures. The foley catheter was deflated and removed after one day.

For mental neurectomy (Fig. 3), an intraoral incision at the mentum was done. The mucoperiosteal flap was developed exposing the mental foramen and the thread-like tissue emerging from it was avulsed. The stump was electrocauterized with the probe tip inserted into the mental foramen as far as possible. The flap was then repositioned and closed with no. 3-0 chromic sutures.

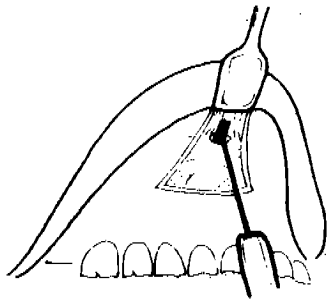

FIGURE 1. INFRAORBITAL NEURECTOMY

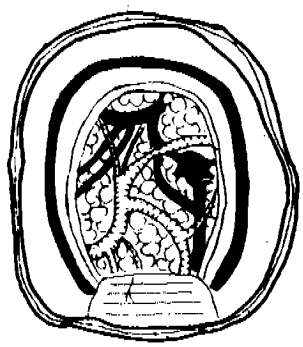

FIGURE 2. TRANSANTRAL SPHENOPALATINE GANGLION ELECTROCOAGULATION

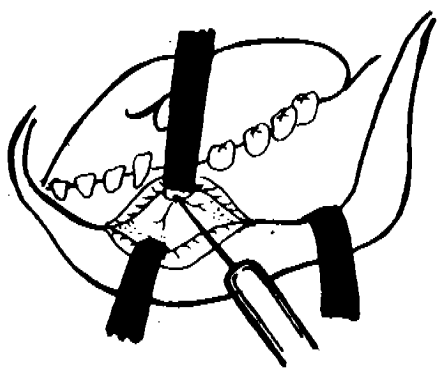

FIGURE 3. MENTAL NEURECTOMY

RESULTS

The procedure was performed on a total of seven patients (Table 1). There was notably twice as many females as males (5:2). The right side was involved in five patients (71%) and the left was involved in two patients (29%). No patient presented with bilateral involvement. Ages ranged from 34 years to 66 years old with the majority belonging to the 51-60 years age bracket (Table 2). Trigger factors are shown in Table 3.

Table 1. Clinical Summary of Data

PATIENT	SEX	AGE	INVOLVEMENT NERVE SIDE		PREVIOUS INTERVENTION	SURGICAL* PROCEDURE	DURATION FOLLOW-UP (Months)	PAIN RELIEF IMMEDIATE POST-OP	PAIN RELIEF ON LAST FOLLOW-UP
CB	F	55	V_2	R	None	A	31	Complete	Complete
NE	N	34	V_2	R	None	A	31	Complete	Complete
PB	F	66	V_2	R	None	A	18	Complete	Complete
RO	F	58	V_2	R	None	A	11	Complete	Complete
AS	F	49	V_2+V_3	L	None	B	16	Immediate failure	Complete (After 2nd operation)
AS	M	54	V_2+V_3	R	Alcohol Block	B	8	Complete	Complete
TF	F	55	V_2+V_3	L	Mental nerve operation (?)	B	7	Complete	Complete

*A = Transantral sphenopalatine ganglion electrocoagulation and infraorbital neurectomy
B = Transantral sphenopalatine ganglion electrocoagulation, infraorbital and mental neurectomy

Table 2. Age Distribution of Patients

Age Bracket	No. of Patients	Percentage (%)
31 – 40	1	14.3
41 – 50	1	14.3
51 – 60	3	57.1
61 – 70	1	14.3

Table 3. Tabulation of Trigger Factors

Trigger Factors	No. of Patients
1. Eating	6
2. Touch	5
3. Breeze on face	4
4. Water	2
5. Talking	1
6. Smiling	1

Pain involved only the second division (V_2) of the trigeminal nerve in four patients (57%) while pain involved both second and third divisions (V_2 and V_3) in three patients (43%; see Table 1). Of these three, two had previous interventions. Patient No. 6 underwent alcohol block of the infraorbital nerve and patient no. 7, had an unknown type of mental nerve operation done by a dentist. This last patient consulted for persistent pain along the maxillary distribution only and was treated only for such (sphenopalatine ganglion electrocautery and infraorbital neurectomy). After six months of follow-up, pain along the mandibular division recurred so that a mental neurectomy was also done.

The results show that our procedure (transantral sphenopalatine electrocoagulation and avulsive peripheral neurectomy) successfully controlled the pain in six patients immediately after surgery. In one patient, the pain was not relieved immediately after surgery and up to four days post-operatively. She subsequently underwent a repeat cauterization on the 5th post-operative day, under local anesthesia. Immediately after second operation, the patient was relieved. In general, the total pain free period for all patients ranged from 7 to 31 months with a mean of 17 months.

Post-operative complications are given in Table 4.

Table 4.

Complications	Number (%) Immediately post-op	Number (%) On last follow-up
1. Hyposthesia	7 (100%)	7 (100%)
2. Altered sensation		
– aware of it	7 (100%)	7 (100%)
– bothered with it	5 (71%)	2 (29%)
3. Dysesthesia	0	7 (100%)
4. Corneal anesthesia	0	0
5. Neurolytic keratitis	0	0

During the immediate post-operative period, all patients had hyposthesia and were aware of altered sensation. Seventy-one percent were bothered by this altered sensation. As of their last follow-up, all patients still had hyposthesia and altered sensation but only 29% (2) were bothered with it. In addition, all patients at this time had dysesthesia (particularly paresthesia) along the distribution of the maxillary division of the trigeminal nerve. The sensation was described as "pricking or crawling" and was tolerable. There was no case of severe dysesthesia.

Table 5 gives the comparison of the degree of hypothesia during the immediate post-operative period and as of the last follow-up. All patients had total sensory loss (complete numbness) immediately after surgery but this improved by an average of 36% by their last follow-up date. Despite the recovery of sensation, no patient experienced recurrence of pain.

Table 5. Degree of Hyposthesia

Patient	Immediately Post-op (%)	Last follow-up (%)	Duration of follow-up (months)
1. CB	100%	60%	31
2. NE	100%	60%	31
3. PB	100%	60%	18
4. RO	100%	60%	11
5. AS	100%	70%	16
6. AS	100%	70%	8
7. TF	100%	80%	7

DISCUSSION

Currently, there is much controversy concerning the etiology of trigeminal neuralgia, but recent evidences support the peripheral theory wherein it is postulated that degeneration of the myelin sheath produces partial or complete demyelination of a segment of the nerve and results in exposure of the axons (Kerr, 1967). Short-circuiting can occur when these exposed axons approximate each other. This results in the electric-like paroxysms of pain characteristics of the disease. This situation can be compared to exposed electric wires that have lost their insultation with resultant short circuiting between them.

Peripheral avulsive neurectomy and electrosurgical cauterization is effective in relief of pain because it interrupts the flow of sisnificant number of afferent impulses to the central trigeminal apparatus. Neurectomy not only removes the sensory receptors of the peripheral nerves but with the considerable trauma that is produced, results in ganglionic cellular degenerative changes that interfere with the nerve's ability to conduct impulses and therefore with the production of pain (Quinn, 1965).

Successful treatment, however, does not end here since the pain of trigeminal neuralgia is not limited to the distribution of the peripheral nerves like the infraorbital and the mental nerves. The pain in trigeminal neuralgia involves the nose, gums, palate and the tonsils which are supplied by the sphenopalatine ganglion. Effective treatment, therefore, should also involve the said ganglion.

In addition, long-lasting relief is said to be more likely if facial sensation is altered permanently, which requires that the lesion be placed more centrally in the gasserian ganglion or in the nerve root (Voorhies and Patterson, 1981). These structures, however, are far too central and access to them usually involves neurosurgical procedures so that, for our purposes, the sphenopalatine ganglion offers the best alternative.

The transantral approach to the sphenopalatine ganglion was first advocated by Sewall (1937) and was extensively used by Golding-Wood (1962) in the treatment of chronic vasomotor rhinitis and by Hirsch (1936) and co-workers in the treatment of epistaxis. It was not until 1977 was the approach used in the treatment of trigeminal neuralgia by Braun and Sotereanos.

Unlike the previous works, our procedure used electrosurgical cauterization of the sphenopalatine ganglion and not neurectomy, for several reasons. First, it has been shown that the poorly myelinated fibers which carry pain are more sensitive to thermal lesions compared to the large fibers which mediate touch, mastication and facial movements (Letcher & Golding, 1968). Second, aside from being equally effective, the procedure is simple and safe since it eliminates unnecessary manipulation and introduction of instruments into the pterygopalatine fossa which is highly vascular and lies in close proximity to the orbit. Lastly, the procedure is economical since it precludes the use of very specialized instruments needed for a neurectomy done in a very limited space.

With the combined procedure of peripheral nerve avulsion and cautery and transantral sphenopalatine ganglion cautery, the chances of nerve regeneration is far less than when either procedure is used alone. If and when regeneration occurs, the pain fibers may not recover as much because of the thermal injury applied to them.

The results of the treatment with this new procedure is encouraging and comparable to those of other procedures (Table 6). The success of either microvascular decompression or radiofrequency rhizotomy, two popular neurosurgical procedures, has been reported to be in the range of 80-90%. Using our technique, we obtained a comparable success rate of 85.7%. Our results even closely approximates, if not actually exceeds that of percutaneous retrogasserian glycerol injection.

Table 6. Comparative analysis of results

Procedure	% success	% sensory loss	% Recurrence rate	Follow-up period (months)
Microvascular decompression[1]	90–94	12.5–17.6	0–9	9–72
Radiofrequency rhizotomy[2]	90	15	10–14	6–48
Retrogasserian glycerol injection[3]	77–89	37	17	5–31
Transantral SPG cautery & peripheral neurectomy	85.7	100	0	7–31

[1]Based on Voorhies & Patterson (1981), Barba & Alksne (1984), Rushworth & Smith (1982)

[2]Based on Tew & Mayfiled (1974)

[3]Based on Hakanson (1981), & Lunsford (1982)

We had one failure attributable to faulty surgical technique. On the first operation, the fibrofatty tissue located immediately behind the posterior maxillary antrum were the structures cauterized, instead of the SPG. So that on reexploration, sphenopalatine ganglion was properly identified and cauterized. The patient was subsequently relieved of her pain and remained so

throughout his follow-up period (16 months).

In effect, therefore, with proper execution of the procedure, all patients were relieved of pain so that the success rate may be said to approach 100%.

Sensory loss is a constant finding but is not an exclusive complication of our technique. As shown in Table 6, hyposthesia also occurs with the other surgical procedures. Admittedly, the chances of developing hyposthesia with the other procedures is much less. However, one should note that these are also the procedures that are prone to develop major complications such as intracranial hematoma, brain abscess, transient ataxia and brainstem infarcts. Complications which are highly unlikely as far as our technique is concerned.

Loss of sensation should not be a major source of anxiety for the post-neurectomy patient. Helson reported that despite total section of the sensory root of the trigeminal nerve, there was a gradual return of sensation to the denervated area over a period of years. Much of their functional return, he claims, might be due to ingrowth of fibers from the central plexus or to sensory fibers in the facial nerve; there seemed to be also the possibility that afferent fibers in the cervical sympathetic trunk might be implicated. In our series, sensation gradually returned to all of the patients. Recovery ranged from 20-40% with an average of 36%.

The return of sensation after peripheral neurectomy has been a major drawback since the literature states that with the return of sensation, pain almost always recurs (Voorhies & Patterson, 1981). However, this is true only as far as plain neurectomy alone is concerned. With our combined procedure of peripheral nerve avulsion and sphenopalatine ganglion electrocoagulation, the chances of nerve regeneration is far less than when either procedure is used alone. Furthermore, as stated earlier, pain fibers are the most sensitive to thermal lesions. So that, if and when regeneration occurs, the pain fibers may not recover as much because of the thermal injury applied to them. As such, with our procedure, sensation returned without the development of recurrence – a result worth taking note.

CONCLUSIONS

Avulsive peripheral neurectomy and sphenopalatine ganglion electrocoagulation provides satisfactory method for the treatment of trigeminal neuralgia. Pain relief can be obtained regardless of a history of previous therapy. Although majority of the patients experienced post-operative trigeminal sensory loss, all recovered and no major complications were encountered. More importantly, the procedure may be performed on all individuals, including the elderly and medically infirm who are at greater risk when undergoing an intracranial procedure. Although simple, the procedure demands precision and care in execution lest the wrong structures be cauterized and the disease left untreated.

The transantral approach takes away from the neurosurgeon the monopoly to treat trigeminal neuralgia and provides the otolaryngologist with an effective alternative treatment which he can offer to patients reluctant to undergo craniotomy procedure. Avulsive peripheral neurectomy and transantral sphenopalatine ganglion electrocoagulation is relatively safe and simple in the hands of an experienced otolaryngologist. The results are comparable with other surgical procedures and are promising enough to warrant a wider application in the treatment of refractory trigeminal neuralgia.

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ERRATA

The name of the senior author — Dr. Mariano Caparas — was inadvertently omitted in the following two articles appearing in the 1986 issue of the Philippine Journal of Otolaryngology–Head & Neck Surgery.

1. ***A Clinical Trial of a Combination of Erythromycin Ethylsuccinate and Sulfisoxasole Acetyl in Bacterial Otitis Media in Filipino Children.***
2. ***Tracheal Resection: A Surgical Option for Tracheal Stenosis.***

The Phil.
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Head & Neck
Surgery

A NEW HOPE FOR THE GOOD OLD ENDOSCOPES*

Abraham B. Reyes, M.D.
Milagros Lopez, M.D.
Milagros Amarra, M.D.

INTRODUCTION

The Rigid type of Endoscopes that we've learned to trust and love for so many years is facing a serious problem-extinction. The more expensive and sophisticated fiberoptic endoscope has taken the place of the Rigid Endoscope. The problem is the availability of the pillings bulb. We still have the told scopes but the bulb that gives it the required illumination has become the missing link in our quest to make the scopes valuable once more.

OBJECTIVE

Without the pillings bulb these good old endoscopes are useless. Although they are still in good condition; they are facing a major threat from the dust, moisture and dirt which could threaten its durability. The bulb has to be produced or these scopes will be the latest member of the (CHE) Condemned Hospital Equipment. The original pillings bulb costs more or less $20 a piece (₱375.40) if they are still available. At this point of our Residency Training, to be able to secure the bulb locally and economically excited our keen obsession.

THE INSTRUMENT

The quest for a viable solution started with a store to store survey. We landed at a small electronic repair shop at the corner of Aurora Blvd. They sell pilot lamps. The 9 volt neon pilot FM bulb was the eye of the selection, because of its small size and shape like the original pillings bulb. A long slender computer wire was attached to serve as the carrier, then insulated it with an ordinary polythelene tubing We attached it on the scope from the front end and connected to an adaptor behind.

We are about to test the bulb on a fish, when brown out came. The test was done the next day, and it was an astounding success.

But what about Brownouts?

We prepared a diagram for the battery operated power source in case brownout occurs or in some weird situation like Laryngoscopy under the tree.

A 9 volt battery was commissioned. Connected to a Potentiometer (volume control for radio), an extension wire for the adaptor, and when tested the same goes great.

But what about Safety?

We are to use it on a human body. We know very well the consequence of an Iatrogenic FE especially a light bulb on a human Trachea or Esophagus. A glue that would hold the bulb steady at the same time water proofed proved to be the solution. We tried it on a patient and the result was an astounding success.

DISCUSSION

The original bulb which is hard to find aside from being expensive might cause delays and postponements of procedures when not at hand. The alternative use of bronchoscope, and endoscopes by fiber optics might not be readily available in all hospitals. The dollor restrictions at present placed us in a situation where we could not easily procure these instruments even in pesos.

The innovations that we've made could save us on time, effort even dollars. The availability of materials used here aside from its price is the major factor.

9 volt bulb	₱ 14.00
9 volt battery	10.00
Potentiometer	18.00
wire	1.00/foot
switch	16.00

With our innovations old scopes maybe brought back to life and maybe reliable as before. On the economic side, the whole unit cost a little higher than ₱50. We are not against the modern fiber optics, in fact we like to have them, because of their safety and convenience. But not all of us can afford it. Perhaps in the future if I could save enough DOLLARS to buy them, I would not hesitate to do so. But for the present financially burdened situation, the old inexpensive but still reliable WILL DO.

As the saying goes, "Ang lumang kasangkapan kapag pinagyaman may silbing kabutihan."

*2nd Prize – The 4th Scientific (Surgical & Instrument Innovations) Research Contest in Otolaryngology held on December 3, 1985 at the Century Park Sheraton Hotel.

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AESTHETIC VALUE OF BONE GRAFTING IN MAXILLO-FACIAL DEFORMITIES*

Cesar Villafuerte, Jr., M.D.**
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INTRODUCTION

The aesthetic repair of maxillo-facial defects is one of the difficult challenges that the otolaryngologist-head and neck surgeon is confronted with. Be it congenital, traumatic, infectious or as a result of the treatment of neoplasms, defects on the facial region is dealt with twofold: (1) the soft tissue loss can be repaired with the different skin flaps of the head and neck, and the versatile and reliable chest flaps, (2) the reestablishment of the normal physiologic structure and aesthetic facial contour by skeletal displacement and bone grafting. These two methods give the face its relief, shape and aesthetic proportions, and these should be utilized by facial surgeons whose priority is the repair of the underlying bone (Tessier, 1981). The repair of soft tissue should be attained only after corrective bony procedures have already been accomplished (Obwegeser).

Personal experiences of the authors with iliac and rib bone grafting, as part of the reconstruction of facial deformities will be presented in line with the following objectives:

(1) To determine the cosmetic and aesthetic value of bone grafting in the management of maxillo-facial deformities,

(2) To characterize the cosmetic deformities that are produced by facial trauma, infection, congenital anomalies and tumor resection,

(3) To evaluate the technique of bone grafting in terms of intraoperative difficulties and complications,

(4) To evaluate the post-operative results of bone grafting in terms of aesthetic and physiologic improvement of maxillo-facial defects.

MATERIALS AND METHODS

All patients diagnosed clinically and radiologically to have maxillo-facial deformities secondary to congenital anomalies, infection, trauma, and treatment of head and neck neoplasms under the service of the Department of ENT UP-PGH from 1982 to the present, who underwent bone grafting were included in the study.

Pre- and post-operative pictures were taken and compared whenever possible. Intraoperative findings as well as surgical technique were noted.

Post-operative results were evaluated using the following parameters:

(1) restoration of an aesthetically accepted facial proportions,

(2) reestablishment of physiological function, if affected,

(3) presence of complications.

OPERATIVE TECHNIQUES

A. Harvest of Iliac Bone Graft:

Iliac bone grafts were harvested using the new technique of Tessier (1979). With a folded pelvic pad beneath the donor hip, the skin was pushed superiorly so that the oblique 5cm. incision lay under the level of the iliac crest. From the anterior superior spine running posteriorly and superiorly, the incision was carried through muscle and periosteum. Using a sharp osteotome, the outer ridge of the crest was obliquely split and reflected, leaving muscle and periosteum attached, leaving the spine intact. Retractors were fitted over the reflected osteoplastic flaps. A portion of the ilium 8 to 10 cm. in size could then be entirely removed and harvested. The two osteoplastic flaps of the crest were then wired firmly to one another and fixed solidly to the anterior superior spine with a figure of 8 wire passed through the bone with a straight awl. The wound was closed in layers and pressure dressing applied.

B. Harvest of Rib Graft

We used the technique described by Converse in harvesting rib grafts. An incision was made parallel to the sixth or seventh rib from the angle of the scapula to the anterior axillary line, cutting through the latissimus dorsi and raising the lower edge of the trapezius. The fibers of the serratus anterior was split anteriorly. The periosteum was incised and carefully elevated. After removal of the rib, the periosteum was closed with a running catgut sutures, muscles in figure of 8 fashion with chromic catgut and the skin closed with nylon sutures.

*3rd Prize – The 4th Scientific (Surgical & Instruments Innovations) Research Contest in Otolaryngology held on December 3, 1985 at the Century Park Sheraton Hotel.
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C. On Lay Grafting:

Bone grafts harvested were decorticated exposing the cancellous portion to the appropriate size and shape using osteotomes and burrs. A slightly oversized graft is desired to compensate for partial resorption.

The recipient areas were decorticated exposing the cancellous portion using burrs. The bone grafts were laid over the recipient site with the cancellous portion of the graft in contact with the "freshened raw" area or the cancellous exposed surface of the recipient site. The cortical side of the graft was in contact with the soft tissues. They were immobilized using wires.

RESULTS

A total of 24 patients were included in the study, 16 were males and 8 were females with a mean age of 34 years. The breakdown of patients is shown on Tables I and II.

Table I. Number of Cases According to Etiology.

Congenital	3
Infectious	3
Traumatic	12
Post Tumor Resection	6
	24

Table II. Number of Cases According to the Site of Deformity.

Nasofrontal	12
Maxilla	4
Orbit	3
Mandible	3
Zygoma	2
	24

Postoperatively, all had aesthetically good results. Three patients developed post-operative infections, which were managed with debridement and regrafting once the infection subsided with antibiotics.

CASE SUMMARIES: (Representative Cases)

Case Number 1:

66/M with a squamous cell carcinoma on the tip of the nose, columella and supralabial area. Wide Excision resulted in the loss of the anterior portion of the nose and supralabial area. Iliac Bone grafting using cortici-cancellous grafts was done to reconstruct the nasal framework. (The authors prefer to use bone grafts rather than allograft implants in cases such as old trauma and tumor resection, as with Wheeler and Kawamoto's experience, any minor exposure of the implant will lead to total extrusion of the implant.) Via an external approach, undermining was done, followed by decortication of the nasal dorsum creating a groove for the bone graft. Using circumferential wiring, the bone grafts were stabilized with the cancellous portion in contact with the decorticated recipient bed. The columella was reconstructed using a submental tube flap with an iliac bone graft as support. The soft tissue defect was reconstructed using bitemporal flaps. The result was that of an aesthetically acceptable anterior nose.

Case Number 2:

73/F with a basal cell carcinoma on the nasal dorsum extend to the left paranasal area. Wide excision of the involved area (the left nasal bone and the left medial aspect of the maxilla) resulted in a very challenging defect. Iliac bone grafting using cancallous and cortico-cancellous grafts were done. Soft tissue defects were reconstructed using cheek Mustarde Flap and Converse Scalp Flap. The ala was repaired using a delayed composite cartilage graft. The result was cosmetically acceptable. Now on her third year of follow-up, there was no evidence of disease and no further corrective surgery was needed.

Case Number 3:

26/M with an eight-month old fronto-orbito-nasal complex fracture with a blow out fracture of the left orbital floor. The fronto-orbito-nasal complex was severely impacted into the skull and a limited upwar gaze on the left was noted. There was an accompanying diplopia. Iliac bone grafting was done using cancellous and cortico-cancellous grafts. Using the H-Open sky incision over the nasion and a left subciliary incision, the old fractures were explored. The left inferior rectus muscle was entrapped in the fractured segments. This was released and all fibrotic tissue were removed. A flat cortico-cancellous graft was placed on the orbital floor with the cortical side of the graft in contact with the orbital adnexae and the cancellous portion in contact with the remnants of the orbital floor. Cancellous bone grafts were fitted over the nasion, after the latter was decorticated using burrs. Transnasal medial canthopexy was done. The interfrontal sinus septum was removed forming one cavity and the right nasofrontal duct was made patent. Wounds were closed in layers. The result show a good nasal contour and a restoration of the function of the inferior rectus. Six month follow-up x-ray showed an intact grafted bone.

Case Number 4:

22/M with an old depressed fracture of the frontal sinus: Via a butterfly incision, the outer table of the frontal sinus explored. The outer table was comminuted, including the intersinus septum. Cortico-cancellous grafts from the ilium were laid and stabilized using interossous wiring. The left nasofrontal duct was cannulated and made patent. The result was a normal contour of the frontal sinus outer table.

Case Number 5:

35/M with a current fronto-ethmoidal mucocoele, whose previous operation was eight years prior to

this operation: Via a Lynch incision, the fronto-ethmoidal area was explored showing the absence of the outer-table of the frontal sinus and superior orbital wall. The exposure was noted to be inadequate, thus a coronal incision was done. The mucocoele was excised resulting in a huge defect on the frontal part of the cranium. Iliac bone grafting was done. Cortico-cancellous grafts were fitted to the defect and stabilized with wires. (Supraorbital roof was reconstructed to avoid any future meningocoele effect i.e. a prolapse of the frontal lobe that will cause proptosis.) Post-operatively, it showed a good aesthetic result.

Case Number 6:

22/M with a three-month old tripod and blowout fracture, complaining of loss of malar prominence and diplopia: Open reduction and contouring of the malar prominence using bone grafts from the ilium were done. Orbital floor defect was corrected using cortico-cancellous grafts. The result showed a good malar contour and a loss of diplopia.

Case Number 7:

28/M with an eight-month old tripod and blowout fractures: The patient also complained of loss of malar prominence and diplopia: This case differed from the one above in the rotation of the zygoma and the zygomatico-frontal wall of the orbit. Iliac bone grafting to correct not only the floor of the orbit, but also the lateral orbital wall. Result was excellent and a loss of the diplopia complaint.

Case Number 8:

5/F with a congenital oromaxillary cleft Tessier Type V classification, with a hypoplastic maxilla: Split rib graft was done to augment the depressed area, resulting in a cosmetically proportional facial contour. (Patients below 15 years of age still have a relatively soft and cartilagenous Ilium, thus Iliac bone grafting is not advised in this age group).

Case Number 9:

17/F with a congenital oro-ocular cleft Tessier Type IV Classification. Initially, a curved silastic implant was used to correct the floor of the left orbit and left hypoplastic maxilla. One week post-operatively, the silastic implant extruded from the orbital floor. We were forced to remove the implant and use iliac bone grafts. Slight ectropion occured one month post-operatively, which was later repaired using full thickness skin graft.

Case Number 10:

28/M with an ameloblastoma involving the left body of the mandible, wherein wide resection was done. In our experience, we delay reconstruction of the mandible and do closure of the oral mucosa first to prevent contamination and infection of the graft from the oral cavity. We apply Kirschner wires to the two cut segments of the mandible and delay bone grafting after three weeks, so no assymmetry and widening of the defect occurs. After three weeks, we reopen the patient via a submandibular incision and iliac bone grafting is done. The bone graft is scored and decorticated for re-vascularization and for a good bending of the bone graft. A biphase external appliance was applied, because there was no way to establish immobility due to the edentulous condition as a result of the extent of tumor involvement.

Case Number 11:

32/F Status-post orbital exenteration for a retinoblastoma in childhood: Iliac bone grafting was done to correct and recontour the atrophied right lateral orbital wall, malar prominence and anterior maxillary wall, which were noted to be depressed pre-operatively.

Case Number 12:

27/M with an old gunshot wound on the left cheek: The following are the skeletal defects: absence of the lateral orbital wall and orbital floor, loss of malar prominence and anterior half of the zygomatic arch, shattered left maxilla. The soft tissue defects consisted of the absence of the left ala, obstructed left nostril, cheek scar with an antro-cutaneous fistula, left ectropion and contracture of the left upper lip due to scar fibrosis and skin deficiency. Split rib grafting were done on the zygomatic arch, lateral and inferior orbital wall, and lateral margin of the left piriform sinus of the vestibule of the nose. Iliac bone grafting was done to fill up the orbital floor and maxillary defects. Indian Forehead Flap was used to reconstruct the nose while a delto-pectoral flap was utilized to reconstruct the skin loss on the cheek. The final result is that of a cosmetically proportional face.

DISCUSSION

The ilium and the rib are the two common donor sites of bone grafts in the repair of maxillo-facial deformities. The ilium is one of the favorite source of autograft because it is very accessible and it contains a large amount of cortical as well as cancellous portions. The ribs are usually utilized if long, narrow and flat grafts are needed.

In our series of cases, we harvested bone grafts from the anterior portion of the ilium. Grafts can also be taken from the posterior ilium but it has with it the disadvantage of rotating the patient to the prone position, this site however, contains a more generous amount of cancellous bone.

We used the technique of Tessier in harvesting iliac bone grafts. The advantages of this technique are as follows:

(1) There is less post-operative pain and the patients can comfortably walk in a few days.

(2) No deformity of the iliac crest occurs therefore is cosmetically good.

The rib graft harvest method as described by Converse is widely accepted. Highlights of the procedure are:

(1) Care should be taken not to perforate the pleura.

(2) Only alternate ribs should be taken.

(3) Ribs are split lengthwise to expose the cancellous portion.

(4) In females, the incision should coincide with the mammary sulcus to hide the scar.

Revascularization is the key to the success of take in bone grafting. There should be bone to bone contact especially the cancellous portion, whether partially or as a whole, to insure vascularization. In post traumatic cases (old fractures), all fibrous and scar tissues should be removed to facilitate bone to bone contact.

Homstrand demonstrated that new blood vessels from the bed enter the haversian system of the graft on the second week. By this time, partial resorption have already taken place, that is why a slightly oversized graft should be fitted into the defect.

CONCLUSION

We have presented twenty-four cases of maxillo-facial deformities managed with iliac and rib grafts. Our case series has included defects secondary to trauma, infection, congenital anomalies and tumor resection. We have also described the techniques of harvesting and onlaying the bone grafts, the high-points of which are: (1) bone to bone contact should always be present, (2) revascularization is the key to the success of take, and (3) a slight overcorrection is desired. Post-operative results were satisfactory in terms of aesthetic correction of maxillo-facial deformities, and complications were few. Representative cases were presented to illustrate the individualized approach to the different types of deformities.

We have found bone grafting to be highly effective in the definitive management of maxillo-facial deformities. We believe that it fully satisfies the demands of the head and neck reconstructive surgeon for cosmetic improvement and physiologic restoration and that it provides the means to achieve the goal enumerated by Pope Pius XII. "Aesthetic surgery restores the perfection of that greatest work of creation – Man."

APPENDIX

CASES OF MAXILLOFACIAL DEFORMITIES TREATED WITH BONE GRAFTING AT THE DEPARTMENT OF ENT, UP-PGH MEDICAL CENTER 1982-1985

NAME	AGE/SEX	DIAGNOSIS	MANAGEMENT/COMPLICATIONS
1. R.B.	28/M	Ameloblastoma, left mandible	Hemimandibulectomy, Iliac grafting, External appliance fixation, post-op osteomyelitis
2. C.P.	21/F	Cleft lip and palate, S/P Cheiloplasty	Uranoplasty, Augmentation Rhinoplasty with Iliac graft
3. F.M.	26/M	Fronto-orbito-nasal complex fracture, old	Open reduction, augmentation rhinoplasty and orbital floor repair with Iliac grafting
4. F.G.	29/M	Ameloblastoma, right hemimandible	Partial mandibulectomy, Iliac grafting
5. E.C.	29/M	Nasoethmoidal Fracture, S/P enucleation with periorbital defect	Medial transnasal canthopexy, bilateral with Iliac grafting
6. M.B.	7/F	Oro-ocular cleft Type 4, S/P Silastic Implant Extrusion	Facial contouring with Rib bone graft (split)
7. D.A.	18/F	Nasal Columellar defect secondary to infection	Iliac bone graft
8. E.G.	22/M	Frontal Sinus Fracture, old	Open reduction, Iliac bone grafting
9. E.T.	35/M	Recurrent fronto-ethmoidal mucocele, left	Excision and Iliac bone grafting
10. J.G.	5/F	Oro-maxillary cleft, left type 5	Facial contouring with split rib graft
11. M.L.	22/M	Tripod and blowout fractures, left, old	Open reduction, Iliac Bone graft
12. E.G.	28/M	Tripod and blowout fractures, old	Iliac bone graft, Open reduction
13. L.C.	22/M	Fronto-orbital fracture, old	Open reduction, Iliac bone graft
14. L.A.	38/F	Ameloblastoma, left hemimandible	Partial Mandibulectomy with Iliac grafting
15. M.Z.	66/M	Squamous cell Ca, nasal tip, columella, supralabial area	Wide excision, Iliac graft Bitemporal and submental flaps
16. C.S.	27/M	Old GSW, multiple facial fractures, left with antro-cutaneous fistula, cheek skin contracture	Iliac graft, post-op osteomyelitis; Indian forehead flap and deltopectoral flap
17. A.N.	73/F	Basal cell Ca, naso-maxillary area, left	Wide excision, iliac graft, post-op osteomyelitis; Mustarde and Converse Scalp Flaps
18. E.C.	37/M	Frontoetsoethmoidal and orbital fractures	Iliac graft
19. A.B.	56/M	Rhinosclerosma	Iliac graft
20. M.D.	42/F	Nasal Bone fracture, old	Rhinoplasty with Iliac graft (Open reduction)
21. B.H.	26/F	Nasal Bone fracture, old	Open reduction, Iliac graft
22. M.J.	38/F	Nasal Bone fracture, old	Open reduction, Iliac graft
23. C.P.	46/M	Nasal Bone fracture, old	Open reduction, Iliac graft
24.E.G.	32/F	S/P orbital exenteration for retinoblastoma with cheek atrophy	Facial Contouring with Iliac graft

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A DISPOSABLE MYRINGOTOMY KNIFE*

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INTRODUCTION

Myringotomy is probably one of the most common procedures performed by an otolaryngologist nowadays. Several types of myringotomy knives have been designed in an attempt to come out with the most suitable for the procedure.

However with the present economic difficulties we are experiencing, importations have slackened thus making it quite difficult to acquire this instrument, not to mention the cost of procuring one. All the while the simplest of myringotomy knives – the intravenous catheter needle is within everybodies reach and readily available.

The purpose of this article therefore is to present a new and adaptable instrument for myringotomy.

MATERIALS AND METHODS

Criteria for the patient selection was based on a bulging tympanic membrane with otalgia. There were a total of 12 patients 5 male and 7 female with an age range of 3-45 years old and an average of 14 years old. A sterile gauge 18 IV catheter needle was the author's choice as a substitute myringotome, with an optional 2.5 cc syringe to be used as a handle and at the same time used to aspirate the effusion from the TM. The needle is bent at an angle for better visualization. The patient was in a supine position during the procedure.

Anesthesia for the adult patient was topical Bonain solution and general IV anesthesia (Ketalar) for the uncooperative Pediatric patient. Incisions were all done at the postero-inferior quadrant. An aural speculum and operating microscope was used to clearly visualize the effectivity of the needle.

RESULTS

A total of 12 patients were used in this study all with the presenting s/s of otalgia and a bulging TM. All 12 patients underwent paracentesis of the middle ear. There were no complications except in one case where the mediolateral depth of the tympanic cavity was deeper than usual so that the needle was inserted way past the beveled portion of the needle making a rounded perforation rather than a clean incision. However on subsequent follow-up, the minute perforation was noted to be healing. Two patients also underwent tube insertions because of the chronicity of their ear problems. Tube insertion was handily done through the incision created by the IV cath. needle.

DISCUSSION

The IV cath. needle definitely has penetrating effects due to the sharpness of its point. The question is, does it have cutting properties? Trying the needle on paper of any kind in order to simulate the procedure on the TM will readily demonstrate that the beveled portion of the needle does have cutting properties. As far as handling the needle as a knife is concerned, with a little practice one can use the needle with relative ease. The length and thinness of the needle accounts for the adequate visualization of the TM. However if an operator's hand is much too large to handle the needle, one can attach the needle to a syringe and use the syringe as a handle, if visualization is hampered by the added syringe then one can bend the needle at an angle for better vision.

Table

Name	Age	Sex	Substance Aspirated	Tube Insertion	Post-op Complication
S.A.	3	M	serous	none	none
T.V.	8	M	serous	none	none
S.F.	12	F	serous	none	none
G.R.	45	F	serous	none	none
L.L.	30	F	serous	none	perforation
H.Y.	11	M	suppurative	yes	none
P.O.	7	F	serous	none	none
T.R.	6	M	serous	none	none
UC.	15	M	suppurative	yes	none
L.D.	22	F	serous	none	none
L.G.	5	M	serous	none	none
F.E.	14	F	serous	none	none

*Read before the 4th Scientific (Surgical & Instrument Innovations) Research Contest in Otolaryngology held on Dec. 3, 1985 at the Century Park Sheraton Hotel.

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Another inherent advantage the needle has is that aside from its cutting properties, one can use it as a suction tip immediately upon incision of the TM, so much so that one can even do away with the usual suction tip for the procedure.

The most salient feature of this simple but rather innovative instrument is that it is economical and abundant in supply so that one can dispose of it after one use and procure another one for the next myringotomy thus assuring the operation of always having a sharp and unused knife at all times.

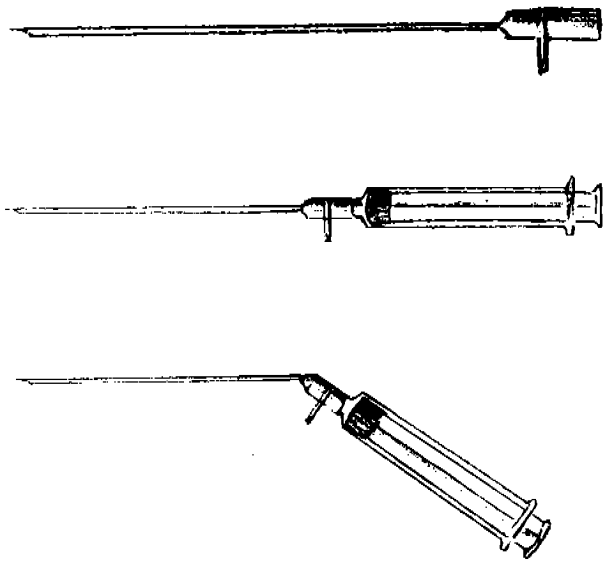
As in any surgical procedure the operator must be well versed with the operative technique and at the same time well acquainted with the instrument he is to use. The beveled portion of the needed which is the cutting portion of the needle has an average length of 3-4 mm depending on the brand. The tympanic cavity has a medio-lateral depth range of 2-6 mm, wherein, it is widest at 6 mm along the superior quadrant of the pars tensa. It is narrowest at the mid-portion somewhere between the umbo and the periphery of the TM and this is due to the promontory sticking into the tympanic cavity. Then it widens slightly at 4 mm at the hypotympanum. The TM itself has an average thickness of 0.074 mm, it is thickest near the annulus, inferiorly and anterosuperiorly at 0.09 mm and thinnest in the middle of the posterosuperior quadrant at 0.055 mm.

Without even correlating these figures with one another we can readily see that there is a wide margin of safety as far as the effectivity of the needle as a myringotome is concerned. With the thickest portion of the TM being less than 1 mm, one only has to visualize how much of the beveled portion is within the TM or cavity itself to insure that the entire layer has been incised. For those belonging to the school of thought wherein one must not only pierce the TM at the posteroinferior quadrant but also feel the promontory with the tip of the knife, a margin of safety of 0.91 is till at hand. Detractors may say that all these measurements will be put to naught since in a bulging membrane the depth measurements in relation to the underlying structures are wider. All one has to do is aspirate the fluid content of the cavity to confirm that the needle has penetrated the entire membrane.

CONCLUSION

The author firmly believes that the IV catheter needle is an excellent and economical substitute for the myringotomy knife. Except for some difficulty in handling the needle which can be negated by practice, it is indeed a practical instrument for myringotomy.

For those with an abundant supply of myringotomy knives, then maybe this article can at least emphasize that measuring ones knife particularly the cutting edge can add more precision to ones myringotomies.



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ABSCESS TONSILLECTOMY*

Tomas S. Antonio, M.D.**
Eduardo C. Yap, M.D.***

INTRODUCTION

Does abscess tonsillectomy pose a significant higher morbidity than routine tonsillectomy?

Inspite of an exhaustive study by Dr. Brandow on 2.936 such cases carried out between 1922 and 1964[1], this question has remained unresolved especially among those who have never done it. To satisfy our curiousity, a similar study although on a very much smaller scale, was undertaken at the Hospital ng Maynila.

MATERIALS AND METHODS

A total of 18 patients were selected (Table I) all admitted from December '83 to November '85 with the typical clinical features of a swollen peritonsillar area displacing the uvula towards the opposide side, partial trismus, spiking temperature, odynophagia, etc. There were 8 females and 10 males with ages ranging from 14 years to 51 years — all experiencing the problem for the first time. A loading dose of Penicillin G was given to all patients prior to operation. A comparison study was done with 96 patients who underwent routine tonsillectomy during the same period.

Before embarking on this operation, three conditions are satisfied:

1. There must be a reasonable expectation of finding pus.
2. The patient must have been in high dose of penicillin (by injecting for at least 24 hours, and shown some response i.e. lowering of temperature)
3. A skilled anaesthesiologist must be available, confident of his ability to induce anaesthesia in such a way to avoid aspiration of pus into the trachea.

RESULTS

All the 18 patients tolerated the procedure well with a mean blood loss of 183.3 cc as compared to 145 cc of routine tonsillectomy (Table II and III). The relief of pain was prompt. Total hospital stay was 3.39 days against 2.65 days in routine tonsillectomy. There were no post-op complications seen in abscess tonsillectomy.

Table I

Name	Age	Sex	Date Admitted	Date Operated	Date Discharge	Chief Complaint	Meds	Hosp. Days
N.N.	21	M	12-12-83	12-13-83	12-15-83	Odynophagia	Pen G	3
R.E.	25	M	2-10-84	2-11-84	2-13-84	Odynophagia	Pen G	3
M.A.	22	F	3-27-84	3-28-84	3-30-84	Odynophagia	Pen G	3
P.L.	29	F	4- 6-84	4- 7-84	4- 9-84	Dysphagia	Pen G	4
F.R.	24	F	4-14-84	4-14-84	4-18-84	Dysphagia	Pen G	4
P.R.	35	M	4-27-84	4-28-84	4-30-84	Odynophagia	Pen G	3
F.P.	48	F	5-26-84	5-27-84	5-29-84	Dysphagia	Pen G	3
C.A.	30	F	6-15-84	6-16-84	6-18-84	Odynophagia	Pen G	3
A.T.	23	M	6-25-84	6-26-84	6-29-84	Odynophagia	Pen G	4
R.M.	29	M	11-5-84	11- 7-84	11- 9-84	Dysphagia	Pen G	4
F.L.	32	F	1-28-85	1-29-85	2- 1-85	Odynophagia	Pen G	4
A.D.	24	F	1-29-85	1-29-85	2- 1-85	Odynophagia	Pen G	3
S.A.	29	M	3-14-85	3-15-85	3-18-85	Dysphagia	Pen G	4
F.R.	24	F	4-20-85	4-21-85	4-23-85	Odynophagia	Pen G	3
L.B.	28	M	5-10-85	5-11-85	5-13-85	Odynophagia	Pen G	3
P.L.	31	M	7- 5-85	7- 8-85	7- 9-85	Dysphagia	Pen G	4
A.V.	14	M	9-25-85	9-26-85	9-28-85	Odynophagia	Pen G	3
B.E.	51	M	11-11-85	11-12-85	11-14-85	Dysphagia	Pen G	3
Mean	28.83						Mean	3.39

Table II

Name	Ave. Bld Loss (cc)	Relief of Pain	Total Hosp Stay (days)	Post-op Complication
N.N.	200	Prompt	3	None
R.E.	150	Prompt	3	None
M.A.	200	Prompt	3	None
P.L.	175	Prompt	4	None
F.R.	350	Prompt	4	None
P.R.	150	Prompt	3	None
F.P.	200	Prompt	3	None
C.A.	300	Prompt	3	None
A.T.	200	Prompt	4	None
R.M.	250	Prompt	4	None
F.L.	150	Prompt	4	None
A.D.	175	Prompt	3	None
S.A.	200	Prompt	4	None
F.R.	100	Prompt	3	None
L.B.	125	Prompt	3	None
P.L.	100	Prompt	4	None
A.V.	150	Prompt	3	None
B.E.	125	Prompt	3	None
Mean	183.30		Mean 3.39	

*Read before the 4th Scientific (Surgical & Instrument Innovations) Research Contest in Otolaryngology held on December 3, 1985 at the Century Park Sheraton Hotel.

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Table III

	No. of Px	Ave bld Loss (cc)	Total Hosp Stay (days)	Post-Op Complication
Abscess T.	18	100 – 300 = 183	3.39	None
Routine T.	96	100 – 200 = 145	2.65	2 – bleeding in first 24 hrs

OPERATION TECHNIQUE

Under general endotracheal anaesthesia, patient was properly positioned and draped. Whitehead Jennings mouth gag was left in place. The left tonsil was grasped and pulled medially using White tonsil seizing forceps. With surgical blade no. 12, the mucosa of the tonsil capsule was separated from tonsillar bed, from the superior pole down to the inferior pole and a good amount of pus exuded. Using Eve's tonsil snare the triangular fold in the inferior pole was then severed. This was repeated on the contralateral side.

DISCUSSION

Peritonsillar abscess usually occur in the posterior superior portion of the space an area occupied by loose areolar tissue. Trismus is a very convincing sign of peritonsillar abscess, but it is lacking in abscesses located deep behind the tonsil. Brandow in a study of 156 patients with definite peritonsillar abscess that were diagnosed at tonsillectomy, noted that 30% of the patients had loculated collections in areas other than the superior pole.[2] The cardinal principle in the treatment of an abscess is incision and drainage; however this may not be adequate enough to drain an abscess cavity mentioned above. Immediate tonsillectomy (tonsillectomy à chaud) satisfies this principle to a greater degree since during tonsillectomy the entire medial wall of the abscess cavity is removed.[3] The operation assures total evacuation of pus and exteriorizing the entire tonsillar fossa as reflected in a complete recovery from both trismus and pain the day after the operation.

Another rationale for immediate tonsillectomy is based mainly upon the premise that abscess will recur in a significant percentage of patients to warrant tonsillectomy. Bonding reported a previous abscess rate of 11% in 304 patients with peritonsillar abscess.[3] Templer et. al. reported 8.5% in 85 patients with peritonsillar abscess.[4] Neilsen et. al. reported that the frequency of another peritonsillar abscess was 23% in 2-4 years. Among patients under 30 years of age the frequency was 33%; among those over 30 years old it was 6%.[5]

There is a relative ease of operation in immediate tonsillectomy since the abscess in itself has dissected the plane of cleavage. The average blood loss approximates that of an elective tonsillectomy, thus refuting the objection to immediate tonsillectomy on grounds that it could be more. The incidence of operative complications is thus of the same order in abscess tonsillectomy as in elective tonsillectomy.

COMMENT

This concept is not new and the operation has been joined for decades in many medial centers. Several authors have emphasized that tonsillectomy completely opens all areas of possible accumulation of pus.[6]

Even for simple incision and drainage, patients frequently have to be hospitalized for the acute symptoms. The patient is certainly sick for several days. When hospitalized for the tonsillectomy, he will be in for two or more days and will again have a convalescent period. The patient treated by immediate tonsillectomy will usually be hospitalized for a shorter period. One of the greatest advantage is that there is only one period of convalescence, and the patient will generally miss fewer work days. The total period of hospitalization is thus reduced by almost 50%, an economic factor of considerable importance in terms of the contemporary cost-benefit equation.[7]

SUMMARY

Abscess tonsillectomy is a safe, reliable and expeditious method for the treatment of peritonsillar abscess. The procedure is technically less difficult than interval tonsillectomy and constitutes a one-stage curative operation. In summary, the benefits of an immediate tonsillectomy are as follows 1) wide drainage; 2) rapid relief of pain and trismus; 3) short hospitalization; 4) repeated admission not needed for a tonsillectomy.

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FOREIGN BODIES IN THE AIR AND FOOD PASSAGES
A Potential Misdiagnosis*

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INTRODUCTION

"Flat objects, like coins, ALWAYS lie with their greatest diameter in the coronal plane of the body, when in the esophagus; in the sagittal plane, when in the trachea or larynx." (Jackson and Jackson, 1947)

Foreign bodies in the esophagus and tracheobronchial tree are often found in the pediatric age group. It reaches its peak when the child starts to crawl and gradually diminishes when the child reaches school age. Statistics in the United States reports that 600 children under the age of 15 years die each year of suffocation because of complications related to foreign bodies in the esophagus and airways.[1]

Esophageal foreign bodies, particularly the radiopaque variety presenting with respiratory distress, have been well documented in the otolaryngologic literature. Most family practitioners, pediatricians and radiologist are fully aware of the common presenting symptoms of esophageal foreign bodies, among them excessive drooling, poor feeding, and dysphagia. However, these same physicians are often unaware that some esophageal foreign bodies may present with stridor, wheezing, chronic pneumonia simulating asthma, croup, bronchitis, and bronchopneumonia particularly under three years of age.[2]

A case is reported of a child who was initially treated as a case of upper respiratory tract infection and later diagnosed by x-ray to have a foreign body in the trachea. The foreign body was absent on bronchoscopy but was discovered in the esophagus on esophagoscopy.

CASE REPORT

A two-year old female was taken to the emergency room in respiratory distress. She presented with a one-month history of noisy breathing and intermittent chest pain on feeding, relieved by ingestion of water. There was no history of choking or of ingestion of a foreign body.

Two weeks prior to admission, the child would vomit after initial feeding. She had low-grade fever and productive cough. Consultations were made and she was managed as a case of upper respiratory tract infection with no apparent improvement.

One day prior to admission, the patient developed suprasternal and supraclavicular retractions and was rushed to a provincial hospital where a chest x-ray taken revealed a foreign body in the trachea. However, due to lack of facilities, the patient was transferred to our institution. Examination revealed suprasternal and mild intercostal retractions with tachypnea. Auscultation showed bilateral wheezes and inspiratory stridor. A repeat x-ray was requested and was interpreted as a foreign body in the trachea.

Under general anesthesia with insufflation of xylocaine diluted to 1:20, a no. 11 Jackson laryngoscope was inserted and through this, a no. 4 Jackson bronchoscope was inserted up to the level of the right and left bronchi. No foreign body was seen. Esophagoscopy was then performed using a Robert esophagoscope and right underneath the cricopharynx, an old five-centavo coin was discovered with the edge seen on anteroposterior view. Around the coin were food particles. The foreign body was removed using a grasping forceps. The post-operative course was unevently and she was discharged after five days.

DISCUSSION

The propensity for small children to put whatever comes into their grasp into their mouth is well known. Carelessness may contribute to foreign body ingestion in many ways: improper preparation of food, hasty eating and drinking, allowing children to play while eating, talking with food in the mouth, giving food such as peanuts or hard candies to children who do have the proper molar teeth, improper supervision of small children playing in the vicinity of infants.

Coins are the most frequent offending agent in the pediatric age group, usually lodging in the upper esophagus just below the cricopharyngeal constrictor at the thoracic inlet.[2,3,7,8] A local study conducted at the UP-PGH from November 1979-November 1982 showed that out of 88 cases of esophageal foreign bodies, 42 cases were attributed to coins. According to Jackson and Jackson, the cervical esophagus has peristalsis to carry downwards a bolus of well masticated food but not enough to carry downwards the physically different foreign body.[2]

Most physicians realize that foreign bodies in the tracheobronchial tree may simulate the signs and symptoms of relatively common respiratory diseases; however, many do not realize that esophageal foreign bodies

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may also give rise to signs and symptoms mimicking respiratory disorder particularly in children under three years of age. It is important that all physicians be completely aware that esophageal foreign bodies can cause a variety of symptoms that often overshadow any esophageal symptoms.

Upon ingestion of the esophageal foreign body, there may be a brief period of coughing and choking but the initial symptoms soon subside and are followed by relatively symptomless interval.[4] As the normal diet in this young age group consists largely of liquid and pureed food that easily pass an esophageal foreign body, esophageal symptoms are often absent even with large foreign bodies.[5] On occasions, small children who ingest smooth objects such as coins or buttons may remain in a place for a long period of time before a diagnosis is made.

The diagnosis of foreign bodies in the esophagus is usually straight forward since the history and symptoms are most of the time classic. Since a high proportion of esophageal foreign bodies are opaque, diagnosis is readily made on plain X-ray, while barium swallow is sufficient for the others. In contrast, ten to fifteen percent of tracheobronchial foreign bodies are visualized radiologically. Therefore, indirect signs must be sought on X-ray such as atelectasis, pneumonia or more commonly obstructive emphysema.[1]

Pitfalls in the diagnosis of foreign body include: (1) failure to consider the possibility; (2) absence of history of foreign body ingestion; and (3) instances wherein foreign body aspiration may masquerade as a more benign viral infection of the tracheobronchial tree or swallowed foreign body treated as plain indigestion.

As demonstrated in our case, the patient presented with all the hallmarks of respiratory difficulty and without a history of ingestion of a foreign body. The radiologic finding of a round opaque object en facie on lateral view of the neck and the edge of the coin seen on anteroposterior view made us think of a coin in the tracheobronchial tree. Following the dictum that flat objects like coins ALWAYS lie with their greatest diameter in the coronal plane of the body when in the esophagus; in the sagittal plane when in the trachea or larynx lead to the misdiagnosis.

The pathogenesis of the respiratory symptoms caused by esophageal foreign bodies relate to compression of the trachea by the posteriorly situated esophagus. In children small esophageal foreign bodies can produce airway symptoms owing to the relative softness of the tracheal rings and the small caliber of the tracheal airway. Aspiration of pooled secretions in the pyriform sinus can occur from esophageal obstruction and lead to pneumonitis or tracheobronchitis. Long standing esophageal foreign bodies may produce respiratory symptoms from cricoid perichondritis or periesophagitis. The late sequelae include esophageal and mediastinal abscesses.[6] Very rarely, the esophageal foreign bodies may pass through the acquired tracheo-esophageal fistula and obstruct the airway.[2]

The following radiographic work-up is advised to exclude an ingested foreign body in all young children with pro longed respiratory symptoms, particularly stridor of otherwise unknown etiology: (1) routine chest radiograph with inspiratory and expiratory frontal views to quickly detect obvious radiographic foreign bodies such as coins, keys, and safety pins and to exclude a foreign body producing a check-valve obstruction of a bronchus; (2) an anteroposterior view and a lateral plain film of the neck in inspiration with the neck hyperextended to pick up the harder-to-detect foreign bodies such as chicken bones or radiopaque buttons. This view may also reveal a soft tissue mass or tracheal displacement by the radioluscent esophageal foreign body. (3) Fluoroscopic examination of the hypopharynx, larynx and trachea. (4) Barium swallow examination of the esophagus at the time of fluoroscopy to detect the radioluscent esophageal foreign body; this, however, is contraindicated in patients with complete esophageal obstruction since it may lead to aspiration.[2,6]

After the diagnosis of esophageal foreign body is made, early endoscopic removal is indicated. The unusually large foreign body that may be encountered can make endoscopic removal difficult or even impossible. Surgical exploration and removal of the foreign body by esophagotomy may be necessary at times.

In conclusion, the possibility of an unsuspected foreign body ingestion should be kept in mind during the evaluation of respiratory distress in children since the actual event is not witnessed in nearly one third of cases. Even in today's environment of sophisticated medical technology, the most well-intended evaluation of patients in a busy hospital or office situation may occasionally overlook the diagnosis, an error that carries potentially lethal consequences.

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CAFE CORONARY*

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INTRODUCTION

Foreign bodies within the air and/or food passages are almost exclusively encountered among children below the age of reason. However, there is one particular foreign body which is almost exclusively found among adults only. One such object is false denture. If the diagnosis is promptly made and skillfull endoscopic care given, the mortality rate is minimal[1]. In many cases a delayed or wrong diagnosis frequently results in serious complications and if the dictum "you may learn from your own mistakes" is true, then perhaps there are plenty to be learned from the following case.

CASE HISTORY

F.D.G., Male, 66 years old from Cavite City was admitted for the first time at Ospital Ng Maynila on August 12, 1983 under Surgery Service due to difficulty of urination and was later referred to ENT Department for evaluation of persistent dyspnea and dysphagia.

Course in the ward:

August 15, 1983: Undergone Bladder diverticulectomy. Intraoperatively, the blood pressure of the patient became unstable, so the contemplated suprapubic prostatectomy was postponed.

Final diagnosis: Benign Prostatic Hypertrophy, Grade 11 with Bladder Diverticulum.

August 25, 1983: Operative wound dehisced, cleaning and debridement were done.

September 9, 1983: Wound was resutured.

September 29, 1983: Arterial blood gases determination done.
Result: Uncompensated metabolic alkalosis.

September 27, 1983: Patient referred to Anesthesia Service.

Evaluation: Patient belongs to ASA IV.

October 4, 1983: Patient suddenly became dyspneic and was referred to Medicine. Aminophylline, Bricanyl and Solmux broncho were given.

October 7, 1983: Patient developed substernal retraction, flaring of ala nasi and profuse sweating.
Vital Signs: PR: 114/min.
RR: 44/min. BP: 140/80

October 7, 1983: 5:55 pm: Emergency tracheostomy done by Surgery Service.

6:00 pm: Referred again to Medicine Service. Lanoxin 0.5 mg. and 500 mg.

Aminophylline 8-10 microdrops/min. were given.
E.C.G: Sinus Tacchycardia
9:00 pm: Referred to ENT Dept. for further evaluation of worsening dyspnea

Prior to ENT referral, STAT cervical X-ray (PA/L) were requested due to an alleged missing denture of the patient. X-rays initial reading given was negative for any foreign body.
Pertinent PE Findings:

Indirect laryngoscopy: Pinkish, rigid, foreign body noted to be lodged in the hypopharynx in the area of glottic aperture.

Removal of the foreign body done at bedside and successfully extracted using bayonet forcep with only slight resistance. Immediate relief of dyspnea and dysphagia were noted and expressed by the patient. After a careful inspection of the foreign body recovered, it revealed a plastic lower full denture of the patient.

From the foregoing, it was quite clear that patient's respiration was unimpeded until October 4, 1983 at which time he "suddenly became dyspneic" and when seen by the Medical people the following were given-bronchodilators (Aminophylline, Bricanyl) and a mucolytic agent (Solmux broncho) apparently on the basis of a Chronic Obstructive Pulmonary Disease like Bronchial Asthma. When the patient failed to improve, only then did the Surgical people thought of re-routing his airway,

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a tacit disagreement with the Staff of the Department of Medicine that this was a case of Bronchial Asthma, is as much as tracheostomy is never indicated to relieve distress in asthma. After, all according to C. Jackson, "not all that wheeze is asthma."

Unsatisfied with the results of the first consultation, the surgeons referred this patient back to the internists whose attention this time was focused on the cardiac status inspite of a normal electrocardiogram, probably because the patient's respiration remained labored even with tracheostomy tube in place. Fortunately, a watcher by the patient's bedside volunteered the information, that the patient's false denture is nowhere to be found. Although taken lightly by those in attendance, nevertheless, a lateral neck X-ray was obtained. Verbally interpreted by the X-ray Resident on call, his diagnosis was negative for foreign body and whatever telltale abnormality appeared in the film was read as "artifacts." This was confirmed by one of their consultants the following day. When referred to the ENT Department, the resident on duty disagreed with the opinion expressed by the X-ray people and if only to confirm or prove they were wrong, an indirect visualization of the patient's hypopharynx and larynx was performed and true enough a full denture was found right smack at the glottic aperture as to obstruct the patient's airway and constitute that special type of foreign body described by Haugen, Weston and others, that led to the coining of such terms as "cafe coronary" or "steak-house syndrome," usually applied to situations in which a person, who is eating or drinking excessively or arguing may all of a sudden clutch his throat and slump over the table as to given an impression that it is of cardiac origin.

COMMENT

A common clinical feature in "cafe' coronary" is the complete respiratory obstruction, is almost always silent, disproving the misconception that all patients who have "chocked" on something will be coughing, sputtering and so forth[2]. It should take very little logic that had the attending doctor bothered to do a more complete examination the condition would have been discovered much earlier.

While nonendoscopic techniques for foreign body removal are to be avoided, nonetheless, whenever feasible like in this instant case, where the patient is already tracheostomized, the foreign body can be grasped with anything and extracted. The abdominal thrust (Heimlich manuever, Heimlich 1975) may also be attempted. If the victim is standing or sitting he should be grasped from behind with thumb side of the fist against the abdomen immediately below the xiphoid. The fist is clasped with the other hand and pressure into the victim's abdomen with a quick upward thrust. This forces the diaphrapm superiorly, increasing the intrathoracic pressure and, forcing the foreign body from the patient's mouth like a "cork out of a champagne bottle."

The danger of a foreign object in the hypopharynx is that it may begin a downward descent into the respiratory or gastrointestinal tract, thus, it should be removed before such migration occur.

SUMMARY

In examining a patient with dyspnea, one has to evaluate not only the lungs but the whole respiratory tract which starts from the nose down to the alveoli. Failure to do so, may well spell the difference between life or death. This has been well elucidated in this one illustrative case.

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SQUAMOUS CELL CARCINOMA OF THE MIDDLE EAR: A DIAGNOSTIC PROBLEM*

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INTRODUCTION

Cancer of the middle ear is an uncommon occurrence and rarely diagnosed early in its development. Squamous cell carcinoma is the most common malignant tumor of the middle ear. It has an even sex distribution and the median age for these cancers is about 55 years. According to Goodman (1971), about 50% of these arise in ears with a history of chronic drainage. The remainder have an associated infection dating back six months to a year. Newhart (1917) stated that there was a purulent chronic otitis media in 85% of all patients with squamous cell carcinoma. The symptoms of middle ear carcinoma simulate those of chronic infection of the middle ear, so that usually, an otolaryngologists may miss the diagnosis of malignancy.

Other tumors involving the middle ear, like Glomus Jugulare tumors, Sarcomas, Benign and Malignant Glandular neoplasms (Ceruminoma), and Basal cell carcinoma have more or less similar symptoms as that of chronic middle ear infection.

Because of these, we are presenting this case with the following objectives:

1. To present a rare case of middle ear carcinoma which is the first in our institution since 1957.
2. To list pitfalls in the diagnosis of middle ear carcinoma.
3. To determine the signs and symptoms leading to the diagnosis of middle ear carcinoma.
4. To emphasize the importance of close communication with the pathologists.

CASE REPORT

B.M. ,a 33-year-old male, farmer, from San Isidro, Nueva Ecija was admitted at UERM Hospital for the first time because of chronic bilateral foul smelling ear discharge, left side otalgia, hearing loss and left facial paralysis of seven months duration.

Since seven years of age, he started to have chronic bilateral aural foul smelling discharge. The ears drained occassionally for 25 years until 7 months PTA when persistent drainage developed on the left ear. He also started to complain of sensation of fullness in the same ear associated with left hemicranial headache and mild to moderate otalgia.

A week after, a left sided facial weakness, dizziness and hearing loss were noted. An Otolaryngologist advised him surgery at this time but patient refused for financial reasons.

Two months PTA, the conditioned worsened and this time there was already complete left facial paralysis plus dysphagia noted. He was eventually referred and admitted to UERM Hospital.

On physical examination, he had complete left facial nerve paralysis and left sixth nerve palsy. Otoscopic examination of the right ear revealed a subtotal central perforation with whitish to yellowish purulent foul smelling dischage. The left ear showed a bloody tinged mucoid foul smelling discharge with granulation tissues occupying the canal with sagging of the posterosuperior meatal wall. No tympanic membrane was appreciated. Nasopharynx and throat were negative for a mass.

An admitting diagnosis of chronic tympanomastoiditis with cholesteatoma in the left ear to rule out brain abscess was made. Hematologic work-up showed a leukocytosis. Culture of the ear discharge showed Proteus Mirabilis. Chest x-ray was negative. Mastoid film revealed a sclerotic right mastoid with a lucent defect with ill-defined margins. The left mastoid revealed a big radioluscent defect with area of sclerosis. The left petrous ridge is interrupted and there is destruction of the lateral sinus plate. Findings are consistent with chronic mastoiditis with a big cholesteatoma. Neurosurgical consultation was made to rule out meningitis and brain abscess. Lumbar tap yielded negative results. Plant CT scan showed extensive left petrous bone destruction. Auditory structures are no longer discernable. Findings are highly indicative of extensive cholesteatoma with external rupture.

The patient underwent radical mastoidectomy on the left ear. Intra-op findings revealed granulation tissue with cholesteatoma matrix and sequestration of the mastoid cortex. Destruction of the lateral sinus plate and posterior bony canal wall with exposure of the dura were noted. Initial histopath revealed granulation tissues only. He did well for a few days, however, bloody mucoid discharge, severe otalgia, trismus, dysphagia plus left fronto-occipital headache persisted for a month.

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At this time, there was also an enlarging mass noted inferior to the left post auricular incision measuring 2.5 cm. in diameter, firm, fixed, non-tender. Incision and drainage however revealed a solid mass.

Revision mastoidectomy was done and revealed a pinkish white, firm to friable mass noted at the posterior portion of the mastoid cavity. Histopath revealed a Squamous cell carcinoma, well differentiated. A re-cut of the first specimen was requested and this time revealed Squamous cell carcinoma. Patient was advised to undergo radiation therapy but refused and was discharged against advice. One month later, the patient died.

DISCUSSION

All middle ear neoplasms are rare with an incidence varying from one per 6,000 to one per 20,000 in patients with ear disease. Malignant neoplasms of the middle ear are more frequent than benign tumors. In Figi's review of middle ear malignancies at Mayo clinic, the incidence was 0.003% among clinic patients. Manson (1963) of Baltimore estimates that it is reasonable to expect one case per 25,000 of general patients and the chance of developing middle ear carcinoma in comparison to other sites to be one in 1,500.

It has been said that chronic suppuration with its constant irritation of the middle ear is the significant factor in the development of middle ear carcinoma. This hypothesis i.e. irritation has been advanced as a caused of carcinoma in other parts of the body. Newhart (1917) believed that continued purulent discharge produced a chemical irritation of the epithelium of the middle ear which resulted in the development of the carcinoma.

Early symptoms of middle ear carcinoma are hearing loss with otorrhea, granulations and ulcerations in the auditory canal and mastoid tenderness. These symptoms are also seen in chronic otitis media, so that commonly, these lull the surgeons into thinking that chronic otitis media with or without cholesteatoma is present.

In series made by Chen, K., et al (1978) of twenty-four cases of squamous cell carcinoma of the middle ear, the most prevalent initial symptoms was purulent bloody otorrhea which occurred in 50% of cases (12 of 24 patients). Local pain was seen in 46% of cases (11/24 cases) and hearing loss in 29% of cases (7/24 cases). Facial paralysis was present in three patients (13%). The duration of the symptoms ranged from one month to four years. On occasion, multiple biopsies were required before a definitive diagnosis was established, because of the infection, hemorrhage and necrosis. Roentgenographic examination demonstrated bony destruction in six patients (25%).

Lewis of New York (1973) stated that one-fourth of his series of squamous cell carcinoma of the middle ear occurred with cholesteatoma. Chronic otitis media with cholesteatoma is the most common cause of bone destruction in the middle ear and inner ear resulting to facial nerve paralysis. If the cholesteatoma is complicated by apical petrositis, sixth nerve palsy and fifth nerve pain may result. Other signs and symptoms of middle ear carcinoma and chronic otitis media with cholesteatoma, which are less commonly seen and usually indicating more advanced disease are – sudden and episodic vertigo, mild tinnitus, mandibular ankylosis or trismus and difficulty in swallowing or vocalization because of involvement of adjacent cranial nerves.

In a series made by Conley and Schuller (1976), about 60% of cancers of the ear canal and middle ear present with bone involvement at the time of the initial examination. Once the cancer has extended into and beyond the mambranous and bony canal walls or has invaded the middle ear and temporal bone, there should be no hesitancy regarding an aggressive therapeutic program, often combining radical ablation and irradiation. The cure rates for the moderately advanced cancers is improved with radical surgical ablation usually combined with post-op irradiation. In a review of 273 malignant tumors of the ear from the Pack Medical Foundation for the past 27 years (1945-1972), majority of the 25 cases with middle ear carcinoma were treated by temporal bone resection and post-op irradiation. Within twelve months, 69.2% of patients showed a local recurrence and 31.6% never had local recurrence. Compared with radiation therapy alone as the treatment for middle ear CA as advocated by Boland and Paterson (1955), five year survival rate ranged from 0% to 22%. In a series made at M.D. Anderson Hospital, absolute five year survival rate with surgical therapy alone was 29% (6 of 24 cases of squamous cell carcinoma of middle ear).

When cancers has extended to the apex of the petrous bone or has involved cranial nerves other than VIIth and VIIIth CN, cure is highly unlikely by any method of treatment.

SUMMARY

In summary, we have here a case of squamous cell carcinoma of the middle ear which presented as chronic middle ear infection. Because of the rarity of the condition, presenting symptomatology, x-ray findings and initial biopsy yielding granulation tissue only, we were made to believe that this was a case of middle ear infection with cholesteatoma formation.

The need for earlier diagnosis and more effective therapeutic protocols are the obvious challenges of squamous cell carcinoma of the middle ear. Just as with cancer else where, the patient's best and almost only hope of survival lies in an early detection of carcinoma and a well planned and well executed first operation.

There are no pathognomonic signs and symptoms which distinguish one type of neoplasm from another, but there are signs and symptoms which would alert one to this possibility. As stated by Shambaugh (1967), A HIGH INDEX OF SUSPICION which was lacking in

our case, may lead one to the correct diagnosis.

The characteristic clinical signs and symptoms therefore which should alert one to suspect the presence of malignancies of the middle ear are:

1. Intractable external otitis and otitis media which is resistant to every form of treatment.
2. Tendency for tympanic lesions to bleed easily.
3. Paralysis of the facial nerve.
4. Severe otalgia – especially at night, a very common symptom of carcinoma involving the middle ear.

Therefore, once these signs and symptoms are seen together with a polypoid, nodular, friable, hemorrhagic tissue and granulations in the posterior canal and middle ear cavity, a biopsy and histological examination are mandatory to establish the diagnosis. Perhaps utilizing papanicolaou smear from a suspicious middle as described and advocated by House (1949) may be of help in an early diagnosis.

Finally, there should be sufficient communication between the otologists and the pathologists especially if the former suspect a malignancy so as the pathologists will exert extra effort in looking for any focus of malignancy.

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THE "CRAB" IN THE NASOPHARYNX*

Abraham B. Reyes, M.D.**

INTRODUCTION

We all know that the "crab" symbolizes CANCER in the zodiac. This particular kind of crab never fails to make it to this annual noble occasion.

The incident rate of malignancy in the nasopharynx among Filipinos is alarmingly getting higher. The lethal outcome of the disease has compelled practicing oto-laryngologist, always in search of a way for its early detection and probably its ultimate cure.

CASE HISTORY

Our patient is a 40 year old male from Aklan who was admitted for the first time at the Hospital ng Bagong Lipunan because of nasal stuffiness, and blurring of vision of the left eye.

Seven months prior to admission the patient experienced nasal stuffiness of the left nostril for which no medication was taken. Six months prior to admission, he developed minimal bleeding from the left nostril about 1 cc., which was not related to any form of trauma, occuring about once a week.

Four months prior to admission, with the above signs and symptoms persisting, he developed nasal twang which became progressive in nature. Three months prior to admission, epistaxis became more frequent occuring about three times a week and the amount increased to 5 cc. each episode. He also noted a foul smelling nasal discharge, as well as increased lacrymation and blurring of the vision of the left eye.

One month prior to admission he developed massive epistaxis (100 cc.) for which he sought consultation to an EENT specialist in his province. He was prescribed Ery Max 250 mg., and actified tabs, which according to the patient relieved the epistaxis temporarily. He was subsequently referred to the Hospital ng Bagong Lipunan for further evaluation and management.

PAST MEDICAL HISTORY

Was confined at the St. Ignatius Hospital (Aklan) for Bronchopneumonia

Personal and Social Background:

Married with three children, he is a fisherman by night and a farmer by day. Smokes 2-3 packs of cigarette a day, drinks 2-3 liters of alcoholic beverages per session.

Family History:

No hereditary familial illness in the family.

PHYSICAL EXAMINATION

General Survey: F/N, F/D, conscious coherent, Ambulatory not in respiratory distress.

Vital Signs: B/P 110/70, CR 70/min, FR 22/min
Weight 162 lbs.

Head; Normocephalic

Eye;-	Vod – 20-25	Pod – 20/25	Jod – 1	Tog – 9/7.5
	Vos – 20/70	Pos – 20/70	Jos – 10	Tos – 9/7.5

Adnexae:
Od – Unremarkable
Os – Has slight proptosis

Anterior segment:
Od – Unremarkable
Os – Clear cornea, anterior chamber is normal in depth pupils 2 mm. sluggish in reaction to light, lens is transparent.

Corneal reflex – (+) both eyes

Fundoscopy:
Od – Normal Fundus
Os – Disc borders are not delineated, A; V ratio 2:4 several micro hemorrhages as well as splinter hge.

Extra ocular Motility:
Od – No impairment in all directions of gaze
Os – With limited motility towards the superior, nasal, lateral gaze

Exopthalmometry:

7-21-85	Od – 18	7-25-85	Od – 18
	Os – 20		Os – 25

Nose:
Anterior Rhinoscopy: Has foul smelling discharge composed of mucoid greenish material from the left nostril, a greyish fungating mass, which bleeds to touch, obstructing the nasal cavity of the left nostril.

Posterior Rhinoscopy: Mass coming from the choanae extends upward to the base of the skull.

Oro pharynx: Tonsils are not enlarged, no inflammation, no granulation, no congestion.

Hypopharynx: Vocal cords are well coaptated, no

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mass noted.

Ears: Ad; EAC Patent, hyperemic, TM, no congestion

As; EAC Patent, hyperemic, TM slightly bulging, dull, no secretions and no perforation noted.

Neck: Non tender, No lymphadenopathy.

Heart: Normal rate, Regular Rhytm, No murmurs.

Lungs: Clear breath sounds, no rales

Abdomen: Soft flat non tender, no organomegaly

Genitalia: No gross deformity

Extremities: No deformities.

LABORATORY RESULTS:

1. CBC:

RBC: 5.05 x 10^{12}/L	Polys: 0.49
WBC: 7.8 x 10^{9}/L	lympos: 0.49
Hgb. 160g/L	Non Seg. 0.02
Het: 0.50	Baso: 0.01
Plateletes: 212 x 10^{9}/L	Mono: 0.01

2. ESR: 22
3. Blood morphology: No abnormal cells found
4. Routine Urinalysis:

Yellowish	Bacteria: few
Clear	Amorphous urate: none
Sp. Gr.: QNS	
Wbc: 5-10/hpf	
Rbc: none	

5. Chest X-ray – Sub Pulmonic Effusion R.
6. X-ray of the Para nasal sinuses:
   There is a large soft tissue mass, left nasal cavity, clouding the left maxillary, ethmoids, and frontal sinuses, probably secondary.
7. Waters View: Maxillary sinusitis L

Histopath reports:

1. (7-21-85): Acute necrotizing inflammation.
2. (7-25-85): Chronic inflammation, non specific, Negative for Malignancy.
3. (8-1-85): Sections from the tissue fragments taken from the nasopharynx, reveal mostly necrotic tissues and blood clots although there are small portions and irregular sheets and masses of atypical cells, with hyper chromatic nuclei and often times clear cytomplasms, noted. This neoplastic mass are supported by fairly abundant fibrous tissue.

   Diagnosis: UNDIFFERENTIATED CARCINOMA.

10. CT Scan: Large tumor mass lesion primarily in the nasal cavity involving the contiguous maxillary antra, anterior and posterior ethmoids, superior nasopharynx, retro orbital areas, and the Basisphenoids. There is no evident cervical and nasopharyngeal lyphadenopathy.
11. Audiometry: Normal air and bone conduction.

Course in the ward:

Upon admission the aforementioned work ups are requested, the biopsy and the CT scan as special procedures were also requested. Progression of the above signs and symptom occurred, with the blurring of vision of the left eye progressed to total monocular blindness. Since CT scan revealed an extension to the Basisphenoids, surgery was not deemed possible, due to the location of the mass. The patient was then referred to the National Cancer Control Center, for radio and chemotheraphy.

DISCUSSION

Since time immemorial, the diagnosis of nasopharyngeal carcinoma is a challenge to any practising Otorhinolaryngologist. Perhaps this is because of the multitude of signs and symptoms, which could not be adequately, in a sense, be put under one roof.

The nasopharynx is bounded and associated with so many structures, that understanding of its interrelationship is paramount to its diagnosis. Nasopharyngeal carcinoma, usually originates in the lateral wall, roof, and supero-posterior wall of the nasopharynx.

The different structures intercommunicating and associated with the nasopharynx are the posterior choanae, oropharynx, eustachean tube and the base of the skull. The foramen lacerum, which is adjacent to the fossa of Rossenmuller, provides the route of access to the anterior group of cranial nerves and the cavernous sinus. Lateral to this lies the carotid, jugular foramen, and the hypoglossal canal, which incorporate the last four cranial and sympathatic trunks.

In our particular case the most common presenting symptoms are nasal stuffiness and epistaxis respectively. These were associated with the more peculiar symptom of blurring of vision, which led to total monocular blindness of the left eye. Hence our patient may be said to have one common and an uncommon symptom. The common one, epistaxis usually presents itself as the initial symptom in the majority of nasopharyngeal malignancies. Painless monocular blindness was reported by Carlin et al. in 1981 but was not elaborated in later journals and presentations. The symptom of painless monocular blindness in this particular case maybe supportive of Carlins earlier study.

With malignancy having extended to the Basisphenoid (T3NOM1) surgical resection, is definitely out of the question. Our patient at present, is undergoing Radiotherapy and Chemotheraphy, which maybe considered palliative, rather than curative measure. Undifferentiated carcinomas of the nasopharynx, extending to the base of the skull, in very few reported cases, treated with chemotheraphy, combined with Radiotheraphy, has five year survival rate of less than 5%.

To reiterate, this particular case, it shows that most nasopharyngeal carcinomas are diagnosed in the late

rather than early stage. Only the high index of suspicion by the Otolaryngologist, warrants further examination, as exemplified by this case, where it took at least three biopsies to confirm the diagnosis.

We still believed that nasopharngeal carcinomas is still very prevalent in our country and in ever increasing frequency of cases. Hence, the importance of early diagnosis and treatment should not be undermined. Perhaps in the future if we can devise a way which we can diagnose nasopharyngeal carcinoma in the very early state, then cases like this will no longer be presented in this forum.

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EXTRAMEDULLARY PLASMACYTOMA OF THE OROPHARYNX: A CASE REPORT*

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Extramedullary Plasmacytoma (EMP) is an uncommon plasmacell neoplasm, indistinguishable histologically from plasmacell tumors arising in the bone marrow, occur almost anywhere in the body such as the airway passages, gastrointestinal tract, skin and nodes, but most frequently in the soft tissues of the head and neck. Plasmacytomas usually arise independently of generalized myeloma, thus representing an isolated area of plasmacytic dyscrasia, but occasionally these tumors can be the first evidence of the generalized dyscrasia.[6,7]

Extramedullary Plasmacytoma arising in the soft tissues are relatively uncommon tumors comprising only a small percentage of all plasma cell malignancies. In the series of cases done by Pahor, the incidence of EMP as compared to Multiple Myeloma is 1:40. The tumor occurs in men about three times as often as in women and generally is seen in the 50-70 year age group, but may develop at any age.[1,2]

In a few patients with isolated plasmacytic tumors, Multiple Myeloma may develop subsequently; others die from uncontrollable local extension. It is thus the primary purpose of this report to present a rare case of an oropharyngeal EMP, which later in the course of the disease, proved to be fatal.

CASE REPORT

J.R., a 71-year-old, male noted weight loss of 13 lbs. in three weeks. He had a ten-day history of dysphagia. This rapidly progressed three days after, this time even to liquids, for which a medical consult was made. Upon examination of the oral cavity, a mass was noted bulging at the posterior pharyngeal wall and a diagnosis of pharyngeal mass probably malignant was given. X-ray of the cervical spine was requested which revealed degenerative changes with cervical spondylosis. Esophagography and skull x-rays were likewise done but unremarkable. He was subsequently advised admission at the STUH, Division of Otorhinolaryngology for further evaluation and management.

Physical examination revealed a hyposthenic man. Vital signs were within normal limits. Examination of the throat showed a smooth mass which was fixed, soft to doughy, non-tender and bulging from the posterior oropharyngeal wall extending into the area of the hypopharynx. There were no palpable cervical lymph nodes and the rest of the physicl examination were unremarkable.

The patient is a known diabetic for twenty years and has been taking Chlorpropamide (Diabenese) regularly. Past personal history revealed that he smoked one pack of cigarette per day for fifty years, but has quit the habit for the fast five years.

The condition of the patient was evaluated preoperatively with chest x-ray and hemogram studies which were within normal limits except by hyperglycemia of 8.6 mMol/L (n.v. = 3.9–5.8).

The patient was scheduled for excision of the pharyngeal mass under general anesthesia on the third hospital day. Tracheostomy was done at the level of the third tracheal ring. To achieve adequate exposure of the hypopharyngeal wall a transhyoid pharyngotomy approach was utilized. Upon exposure, the mass was seen extending from the level of the soft palate to the level of the cricopharynx measuring about 8 x 10 cm. in diameter, smooth, soft to doughy with ill-defined margins. Blunt and sharp dissection were utilized in excising the tumor. The submucosal mass was removed in fragments but some parts were inaccessible because they were deeply embedded in the surrounding soft tissues and some parts about the medial pterygoid process and goes posteriorly to the vertebral body. Adequate closure of the posterior pharyngeal mucosa using chromic 3–0 was done and an NGT was inserted. The patient was stable postoperatively.

Sections of the specimen showed white-red variegated cut surface. Microsections of the mass disclosed mature and immature plasma cells, some exhibiting bizarre large nuclei and others showing multinucleation. These cells are separated in nests by dense eosinophilic material. Histopathological diagnosis was Plasmacytoma.

The patient was referred to the Hematology department for co-management. A serum electrophoresis, total proteins and A/G ratio were requested which revealed low values with inversion of the ratio (1:1.2). The patient was started on hyperalimentation, and a bone marrow biopsy was likewsie performed which revealed normal findings.

Profuse greenish tracheal secretions was noted on the 8th post-op day for which a culture and sensitivity test was requested which later revealed heavy growth

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of Klebsiellasp and moderate Candida sp. Appropriate antibiotics were immediately instituted. On the 10th post-op day, the patient started to complain of left shoulder pain. A referral to Rehabilitation Medicine was made. X-ray of the cervical spine was reviewed and x-ray of the shoulder girdle was requested and revealed Peritendinitis Calcarea, left shoulder joint. The patient was started on a rehabilitation program designed to diminish pain.

On the 12th post-op day, an indirect laryngoscopy was done. The wound was clean, hence, the NGT was removed. Likewise, the tracheostomy tube was removed and a butterfly dressing was applied. The patient still had dysphagia even to liquids and occasional bleeding coming thru the tracheal stoma. However, the bleeding became moderate in amount and was coming out from the mouth and stoma. Emergency laryngoscopy and esophagoscopy was performed on the 14th post-op day and revealed dehiscence of the incision site at the posterior pharyngeal wall with recurrence of the tumor at the area of the cricopharynx which easily bled to touch. The rest of the air and food passages were unremarkable and there was no bleeder seen in the area of the tracheal stoma. Cryosurgery was employed over the mass which subsequently controlled the bleeders. Noteworthy was a hard prominence noted below the recurrent mass. An NGT was re-inserted and the tracheal stoma was sutured.

During the post-op period, the patient noticed left hemiparesis and a neurological consult revealed a 50% sensory deficit in the left half of the body, obtunded DTR' sand (+) Babinksi left. An impression of right cerebral infarction, thromboemboilic, R/O cervical metastasis and/or extension from a primary pharyngeal malignancy was given. He was started on cerebral decompression and an EEG and CT scan were requested. However, in a span of six hours, in additon to the left hemiparesis, the patient developed a progressive right hemiparesis with bilateral Babinski. This time, a cord problem in the cervical segment was strongly considered. A repeat x-ray of the cervical spine was requested which revealed severe subluxation with posterior displacement of vertebral bodies C1,2,3. Soon after, the level of consciousness of the patient deteriorated and he started to develop hypotension. Finally, on the 19th hospital day, he went into cardio-pulmonary arrest despite resuscitative measures.

DISCUSSION

Plasma cell neoplasms presenting on the head and neck create considerable diagnostic and therapeutic problems for the head and neck surgeon. Solitary or multifocal, they have been categorized as: (1) a manifestation of Multiple Myeloma; (2) a manifestation of Plasma Cell Myelomatosis; (3) Solitary Plasmacytoma of the bone; and (4) Extramedullary Plasmacytoma ("Primary" Plasmacytoma of soft tissues).[3] (Fig. 1)

The integral cell among these lesions is the plasma cell, the secretory form of B-lympocytes, which differ principally by the presence of abundant protein-synthesizing equipment in its cytoplasm. Plasma cell diseases as a group of clinical disorders are characterized by growth of a single clone of cells that elaborate a single, homogenous immunoglobulin molecule. The most important and numerous of these diseases is Multiple Myeloma.[5]

The enigmatic relationship among these lesions has generated a plethora of clinical and pathologic reports. Fig. 2 summarizes the interrelationships of the plasma cell tumors affecting the head and neck, linked by a single pathological change – the abnormal proliferation of plasma cells derived from the progenitor cells in or outside the bone marrow.[2,3]

Patients with Solitary Plasmacytroma of the bone radiographically manifest a solitary lytic lesion with no evidence of plasmacytosis in a random bone marrow examination, and no monoclonal protein in serum and urine electrophoretic studies. Nearly 60% of cases are skeletal in mode of spread with the spine, pelvis and femur as sites of predilection. Extramedullary spread is quite unusual. After dissemination, which occurs in the first three to five years after primary diagnosis, the clinical, pathologic and laboratory findings are indistinguishable from Multiple Myeloma.[2,8,9]

Multiple Myeloma is the most common malignant neoplasm of the bone in adults. The vertebral bodies, ribs, pelvic bones and the skull are most frequently involved. Bone pain, the cardinal symptom, is present in more than 75% of patients early in its course. The diagnosis is based on the increased number of abnormal atypical or immature plasma cells in the bone marrow and a monoclonal protein in the serum or urine (Bence-Jones proteins) or roentgenogram evidence of bone lesions appearing as punched-out areas.[2,6,10]

Extramedullary Plasmacytoma, as the term implies, is a plasma cell tumor presenting outside the bone. Wiltshaw suggested that EMP arises from the B-type lymphocytes of bone marrow origin that have migrated to peripheral lymphoid tissues and undergone plasmacytoid differentiation.[4] It either takes the form of a local lesion or terminate in a disseminated form known as Myelomatosis. Up to 80% have been recorded as arising in the upper air passages and oral cavity, nasopharynx and paranasal sinuses. It arises in the submucosal tissues in these sites. Ulceration is rare but invasion of underlying bone occurs especially in the more malignant types. Grossly, the appearance is non-specific, varying from polypoid to sessile, becoming lobulated with increasing size.

The histologic appearance of EMP consists of a monocellular proliferation of plasma cells set in a very sparse matrix. Cellular and nuclear atypia may be minimal or prominent.[3]

Presenting symptoms relate to the site of primary lesion, and primarily caused by its mass effect. Tumors in the oropharynx and larynx produce a sensation of lump in the throat, dysphagia, hoarseness and stridor.[4]

Hematological, serological, skeletal survey and bone marrow examination are expectedly normal. Thus, the clinician depends solely on the histological diagnosis in dealing with such tumors.[14]

The EMP and Solitary Myeloma of the bones are considered as components of a continuous spectrum of Plasma Cell disorders. They may assume the following clinical characteristics: (1) the initial clinical evidence of a recognized diffuse myeloma; (2) evolve into systemic myeloma after a variable latent period; (3) remain localized and persistent, causing death by expansile growth; (4) respond satisfactorily to local treatment without evidence of recurrence or dissemination, over long periods of follow-up.[3]

In the Extramedullary form, two clinicopathological findings appear to have an unfavorable effect in the clinical course of the disease, namely: (1) recurrence and/or persistence after initial treatment; and (2) invasion of underlying or contiguous bone.[3]

It has been reviewed by Wiltshaw that 40% of EMP spread beyond the presenting site and its draining lymph nodes. Of these 81% developed bone lesions and 62% had visceral and soft tissue deposits.[2,3] Cervical lymph node involvement occured in approximately 25% of cases and it is difficult to determine whether it connotes metastasis or primary disease. In any case, the primary tumor is considered malignant and treated accordingly.[14]

Clinical staging of EMP was suggested by Woodruff et al as: State I – tumor confined to primary site; II – involvement of draining lymph nodes; III – metastatic spread or extensive local tumor formation.[13,14]

It is well established that localized EMP of the head and neck can be ablated by surgery, irradiation or a combination of the two.[4] It is radiosensitive and excellent long term results have been reported following radiotheraphy alone. It is therefore advocated by some authors that radiation, either alone or with subtotal excision, is the best treatment for almost all cases and certainly for the sessile, extensive and infiltrative forms.[6,12,14]

Prognosis depends on the size and location of the tumor, destruction of bone and cartilage and lymphatic involvement. Survival rate is favorable with Plasmacytoma than Multiple Myeloma. Only 18% of those with Multiple Myeloma survive for five years as compared to 66% of patients with Plasmacytoma. Life long follow-up is essential in all cases because local recurrence as well as subsequent development into Multiple Myeloma is well recognized.[12]

The case thus presented demonstrated the difficulty encountered in the diagnosis and shows that local recurrence is possible as early as two weeks with extensive destruction of underlying skeletal tissues.

During the early post-op days, the patient started to complain of left shoulder pain. This could be indicative of a local extension of the mass to the underlying vertebral body compressing the dorsal root ganglea of C2,3,4, ending up with radicular pain. Surprisingly, the pathologic process rapidly progressed causing severe diffuse osteoporosis of the vertebral bodies C1,2,3, later producing subluxation with posterior displacement. Clinically, this phenomenon proved to be fatal. With posterior displacement and subluxation of the vertebral bodies, a spinal cord compression at the cervical level was produced. Thus, the patient started to develop left hemiparesis and pathologic reflexes which progressed to quadriplegia.

Local recurrence of the tumor was evident on the 14th post-op day. Pharyngeal examination showed wound dehiscence as the residual mass increased its demensions. Could the rapid growth of the mass be attributed to the surgical intervention, or to the true aggressive nature of the disease? In literature, it has been documented that EMP is notorious, being persistent, recurrent and locally invasive, but the process takes several months to years.[3,6] The growth of the mass in this case was unusually and surprisingly fast.

Due to the rapid downhill course of the patient, the cause of death could be due to direct cord compression with concomitant vascular compromise to the brainstem, particularly in the area of the medulla which contains the vital centers for respiration and cardiac function.

This case is not merely illustrative of a fatal EMP in the oropharynx, it also serves as an excellent reminder that even the rarest among the rare exists with a very aggressive nature. This awareness may eventually decrease the morbidity and mortality with proper management.

Figure 1: Classification of Plasma Cell Tumor

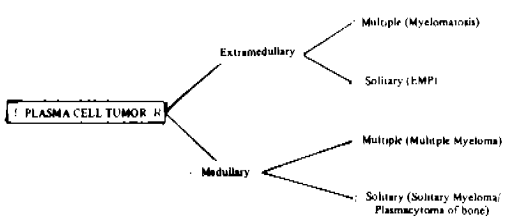
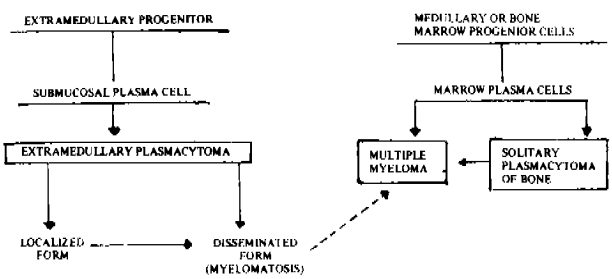


Figure 2. Interrelationships of Plasma Cell Tumors of the Head and Neck



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OSTEOGENIC SARCOMA OF THE MANDIBLE*

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INTRODUCTION

Osteogenic sarcoma of the mandible is a rare tumor. A search of the literature reveals that this tumor comprises less than 0.5% of all malignant tumors of the head and neck. Garrington et. al. have estimated an incidence of 0.07 cases per 100,000 population per year. Because of the rarity of this lesion, review of the subject and presentation of a case seen at the UERM Memorial Hospital seemed worthwhile.

CASE REPORT

M.B., an 18 year old female was first admitted at the UERM Memorial Hospital on September 1984 because of a mass at the right lower jaw.

For two months, the patient had noted a painful mass in the right jaw which had gradually increased in size. She had been seen first by a dentist four weeks PTA after the extraction, the patient noted the mass to have enlarged and become more tender.

On physical examination, the patient presented with a swelling of the right side of the face extending into the submandibular area. Intraoral examination revealed a fungating mass about 7 cm. by 4 cm. in size involving the right lower jaw extending posteriorly almost as far as the mandibular angle and anteriorly within a centimeter of the mental prominence. The tumor was friable with areas of necrosis and bleeding on the surface. It was fixed to the mandible and extended into the gingivobuccal gutter with some extension into the floor of the mouth. Examination of the neck showed no obvious adenopathy.

Hematologic work-up showed no remarkable findings. Chest x-ray was likewise negative. X-ray of the mandible showed a large lucent defect on the right side with highly irregular borders. Soft tissue swelling overlying the lesion was also noted. Primary consideration was a malignant tumor to rule out osteomyelitis and malignant form of ameloblastoma.

Initial biopsy of the oral lesion revealed giant cell reparative granuloma. This was excised and the mandibular lesion was curretted based on an initial impression of an osteomyelitis. Recurrence of the mass was noted two weeks post-operatively and this time, partial resection of the mandible was carried out. The specimen was sent for histopathologic examination. Patient was then subsequently referred for cobalt irradiation.

Gross description of the right mandible showed the entire specimen to measure 8.5 x 5.5 x 6.0 cm. It is dark brown to grayish and doughy. An irregularly shaped mass is attached or noted at the posterior surface towards the anterior measuring 5 cm. x 6 cm. It is brownish grayish, firm and is located 1 cm. from the distal point of resection and 1.5 cm. from the proximal. Cut section of the mass shows reddish, discoloration surrounded by brownish white area. The ramus of the mandible is broken with sclerotic changes. Areas of necrosis and hemorrhage are noted everywhere.

Microscopic examination of the section shows a tumor consisting of malignant stromal cells ranging from spindle-shaped to polyhedral cells with ovoid to vesicular nuclei and prominent nucleoli and atypical multinucleated giant cells surrounding a neoplastic osteoid tissue. In other areas, numerous multinucleated giant cells of the osteoclastic type are seen. They are concentrated more in the areas of hemorrhage and tumor necrosis. Sections taken from the decalcified mandible also show variegated histological appearance consisting mostly of malignant stromal cells surrounding immature bone. The periphery shows lamellae of sclerotic bone tissue. A pathologic diagnosis of osteogenic sarcoma of the mandible was given.

DISCUSSION

An osteogenic sarcoma may be defined as a specialized connective tissue which forms neoplastic osteoid and osseous tissue in the course of its evolution. Schwartz in his review found approximately 4% of the osteogenic sarcoma present in the mandible. Mandibular osteogenic sarcoma is seen most frequently in the second and third decades with the males affected more than the females by a ratio of 2:1. The pathogenesis of the disease remain unknown. No constant relationship to trauma has been established, although there is overwhelming experimental and circumstantial evidence that radiation can induce bone sarcoma in man.

In more than 50% of cases, the tumor is located in the body. The remaining tumors are found in the angle, symphysis, vertical ramus and rarely in the temporomandibular joint.

The presence of a mass, lump or swelling is the

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presenting complaint in about 90-95% of patients. Pain is the second most common symptom. Dental problems, such as loose teeth, displaced teeth or toothache are not unusual in the mandible. It is of special interest that in a considerable number of reported cases, a history of tooth extraction in the region of the tumor is given usually within the preceding year. A dentist is often the first professional contacted and over one-fourth of the patients had dental extraction before diagnosis.

On physical examination, the majority are found to have this described mass. Typically, the lesion causes a change in the contour of the face, depending of course on its presentation toward the buccal or lingual side of the mandible. Within the mouth, the alveolar process is seen to be distended, the gingiva is reddish and is frequently raw and ulcerated.

The radiographic appearance of osteogenic sarcoma is often difficult to interpret. In one series of this disease, the accuracy of x-ray diagnosis was only 68%. In most instances, the classic zones of destruction with or without regions of increasing density are found. The lesion may appear to be osteolytic, osteoblastic or a mixture of both. In the osteoblastic type, x-ray shows periosteal spicules in the lamellae giving the typical "sun ray effect." A smooth lesion with a circumscribed defect is usually benign, whereas high aggressiveness is suggested by a motheaten or permeative pattern of destruction, ill-defined margins, cortical destruction, soft tissue mass and interrupted periosteal responses (spiculated or laminated).

The histologic pattern of an osteogenic sarcoma is extremely variable since it is formed by the proliferation of a typical osteoblasts and their less differentiated precursors. Thus, one may see different forms, such as chondroblastic, osteoblastic or fibroblastic depending on the predominant cell type. In any event, two criteria have to be met to give a histologic diagnosis of osteogenic sarcoma.

1) evidence of malignancy in the proliferating cells,
2) osteoid production by at least some of the malignant cells.

DIFFERENTIAL DIAGNOSIS

1) GIANT CELL GRANULOMA

Histophatologically, the appearance is one of a proliferation of many fibroblastic or mesenchymal connective tissue which is richly vascular and on which a variable number of multinucleated giant cells are always present.

Mitotic figures and production of bone are found in most giant cell granulomas, but lack of hyperchromatosis and other nuclear abnormalities differentiates the lesion from sarcoma.

X-ray show radiolucent areas of varying size and on occasion, the ubiquitous "soap-bubble" appearance is presented.

2) OSTEOMYELITIS OF THE MANDIBLE

This is the most common benign disease simulating a malignant process in the mandible.

In the acute stage, a permeative pattern of bone destruction may be present.

The identification of sequestra and solid types of periosteal reaction is of value in ruling out malignancy.

3) FIBROUS DYSPLASIA

This is characterized by very cellular tissue and superficially may resemble osteogenic sarcoma. The lack of nuclear aplasia and the characteristic meaningless masses of osteoid and bone distinguishes the former.

The radiographic density of fibrous dysplasia of bone varies from total radiolucency to a very sclerotic process depending upon the degree of mineralization of the abnormal fiber bone.

4) CHONDROSARCOMA

The lesion is composed entirely of malignant cartilage in contrast to chondroblastic osteogenic sarcomas in which, although the tumor differentiates along cartilagenous lines, the neoplastic cells produce osteoid directly in at least some foci.

On x-ray, a discrete ringlet pattern of calcification within an osteolytic region is helpful in the identification of the lesion.

TREATMENT AND PROGNOSIS

Radical or local surgical resection, interstitial and external irradiation and chemotherapy have all been employed in the treatment of this disease. In a series of 66 cases seen at the Mayo Clinic covering a period of 60 years, treatment for osteosarcoma of the jaws was divided into nine categories.

Table 1. Treatment of Osteosarcoma of the Jaw

Treatment	Patients	Deaths
Radical resection		
Alone	15	3
Plus radiation	12	8
Plus chemotherapy + radiation	1	1
Plus radium implants + radiation	2	2
Local surgery		
Alone	12	7
Plus radiation	11	9
Plus radium implants	7	7
Plus radium implants + radiation	4	4
Radiation	2	1
Total	66	43

In this series and in all other reports, radical surgical resection was ultimately the most effective single therapeutic measure. Radical resection was the term used if

hemimandibulectomy or wide resection of the tumor and soft tissues with tumor-free margin was performed. The over-all five-year survival rate was 39.7% which is similar to that found in some series in the literature Chambers and Mahoney have reported a five-year disease-free survival rate of 82% in 27 patients with osteosarcoma of the mandible treated with high dose interstitial radiation (10,000 to 16,000 rads) followed by immediate mandibulectomy. Neck dissection is indicated only in the presence of clinically positive nodes. Reconstruction if carried out is delayed. The recurrence rate for all patients regardless of treatment is 70%. Once the patient had a recurrence, the chance for survival is greatly decreased. Of the patients who died, 50% died within the first year and 78% died within a two year period.

Patients with peripheral osteosarcoma usually die because of early hematogenous metastasis to the lungs. While this also occurs with jaw lesions, massive local recurrence with intracranial extension is a more frequent problem. Schwartz found evidence of local recurrence in 23 of 23 autopsied patients with mandibular osteosarcoma. Pulmonary metastasis were present in only three. The high survival rate for patients with osteosarcoma of the jaw is difficult to explain. The tumor does tend to invade locally and metastasize to the lungs late. However, if anything, the delay in clinical recognition is greater than for the peripheral lesions, and the region involved is not as amenable to radical ablative surgery. There is no constant relationship of survival to an osteoblastic, chondroblastic, or fibroblastic histologic type, or to the radiologic appearance. The jaw lesions are generally of a lower grade. Garrington, however, could not correlate grade with prognosis.

SUMMARY

Osteogenic sarcoma is a rare malignant disease that may affect the jaws, with young adult males being affected primarily. Swelling and pain are the most frequent presenting complaints. The body of the mandible is the most frequent site of involvement. Importance of initial biopsy of both the bone and soft tissue is hinted as often a gingival biopsy alone will be inadequate for diagnosis since the soft tissue changes may reveal only inflammatory or degenerative changes which are secondary to the main lesion in the bone. Treatment results are generally poor and recurrence rates are generally high. Radical surgery offers the best five-year survival rate. The best chance for cure is obtained in the initial surgical assault on the neoplasm, hence, the need for an accurate diagnosis on initial biopsy cannot be overstated. An over-all five-year survival rate of about 40% can be expected with nearly 80% of the deaths occurring within the first two years.

This paper has reviewed the clinical, pathologic and radiologic manifestations of a rare entity, osteogenic sarcoma of the mandible seen at the UERM Memorial Hospital.

ADDENDUM

The patient died on August 1985 at her hometown in Romblon, 13 months after the symptom was first noted. No postmortem examination was obtained.

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OTITIS INTERNA*

Alberto F. Calderon, M.D.**

INTRODUCTION

A discussion of labyrinthitis seems at first glance, a resurrection of a somewhat outdated topic, since so much was written on this subject in earlier years, and so little in recent years. Although antibiotics have curtailed it's incidence, labyrinthitis is still relatively common and clinically important.[5]

In a span of six months, the department of Otolaryngology of Hospital ng Maynila admitted two cases of this supposedly rare entity. One case exhibiting the classical picture of labyrinthitis, since no form of medications were taken prior to consultation, while the other case had a more subdued clinical symptomatology due to previous intake of medications particularly antibiotics.

PURPOSE

The purpose of this report is to review the clinical signs and symptoms of tympanogenic labyrinthitis.

CASE NO. 1

The first case is a 15-year-old male admitted due to complaints of dizziness and vomiting. The patient has been having a discharing right ear, purulent and foul smelling for 11 years with no form of medications taken. Patient was prompted to seek consultation only because the signs and symptoms, most especially the dizzy spells became severe.

Pertinent findings were a discharging right ear, the discharge being sero-purulent and the tympanic membrane having a marginal perforation of 70-80%. Tuning fork test revealed a (+) Rinne's on the left ear and a (–) Rinne's on the right ear. The Weber's test was positive on the right ear. A Towne's view of the skull showed a cholesteatoma in the right mastoid area.

CASE NO. 2

A 33-year-old male admitted for dizziness; this time the history is much shorter and the episode more acute, with a three-month history of a bloody mucoid discharge from the left ear, later becoming associated with severe dizziness. Unlike the first case, this patient took antibiotics prior to the consultation.

The right ear showed a mucoid discharge with a perforation of about 50% on the tympanic membrane. The left ear had similar findings but the perforation was only 20%. Rinne's test was (–) AD and (+) AS, with the Weber's test showing lateralization to the right ear. A positive fistula test was elicited on the left ear.

DISCUSSION

It is clear that inspite of newer and more potent antimicrobials, cases of tympanolabyrinthitis are still being encountered, and in increasing number at that. Perhaps abuse of antibiotics is a contributory factor. The bacterial flora of the middle ear are increasingly becoming refractory to treatment.

Perhpas in the light of recent findings that while the two major pathogens involved – Streptococcus pneumoniae and Hemophilus influenzae maybe taken cared of with the Ampicillins and the Sulfamethaxasoles, refractoriness soon develops. For many years this was attributed to the production of B-lactamase by H. influenzae. Newer studies have shown that the greater bulk of the B-lactamase which neutralizes the ampicillins is actually produced by a non-pathogen. N. catharralis, ignored entirely by current therapeutic regimen. The respiratory syncitial viruses, adenovirus, influenzae and parainfluenzae viruses are likewise left out, this inspite of our knowledge that viruses are more virulent than bacteria since 98% of patients with viral infection, will certainly manifest signs and symptoms of the disease while only 50% of those with bacterial infections will do likewise.

Another reason may be that bactericidal drugs supress the host's immune response. Once the invading organisms are eliminated, the antigenic stimulus to the immune system is abolished. It is therefore not surprising that the host is left practically defenseless and easily overwhelmed as illustrated in the second case. Ordinarily, it takes quite some time for the disease process to involve the labyrinth, if at all, since the anatomic barrier between the middle ear and the inner ear is quite formidable. Pre-antibiotic era labyrinthitis are most often secondary to cholesteatoma invasion of the semicircular canals with fistula formation. What is surprising in the second case is the rapidity in which the inner ear got involve. In the light of newer theories as to the actual case of the localized bone resorption however, this is not surprising since it has been said that toxic

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material can reach the labyrinth throught the round window.

While it is common observation that there is a substantial quantitative difference in the amount of bone when a cholesteatoma is present, it is only because as shown in recent studies that the keratinized epithelium of a cholesteatoma is not inert as it was previously believed. By means of immuno-histochemical labelling experiments, Langerhan cells – sentinel cells of the cutaneous immune system have been demonstrated in much larger numbers than those seen in the normal ear canal skin and tympanic membrane. Langerhan cells do recognize antigens and present them to T-lymohocytes and possibly macrophages.

When keratin debris, intracellular debris and bacteria collect within a retraction pocket, infection sets in. The keratin, intraçellular debris and bacteria may act as non-specific antigens and are thus recognized by the Langerhan cells which bind them and are presented to the T-lympocytes either in the epithelium or regional lymph nodes. Cytotoxic T-cells response is generated and directed at the initial stie of sensitization. In a cholesteatoma, this reaction is unable to correct the anatomic defect of the retraction pocket, therefore, it becomes chronic. This helps explain whey there is more bone destruction when a cholesteatoma is present.

COMMENT AND CONCLUSION

Inspite of the advent of newer and more potent antibiotics, involvement of the labyrinth may still be expected. Under the present economic crisis and the ever increasing prices of drugs as to be unavailable and unaffordable to a great many of our countrymen, labyrinthitis which has long been forgotten, may show an upsurge – here and now.

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PENDRED'S SYNDROME
A Case Report*

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Romeo Villarta, Jr., M.D.***

Jon Benedict Molina is a four-year-old boy from Manila who was first brought to PGH by his parents on September, 1984 for anterior neck mass and suspected difficulty of hearing.

John Benedict was born apparently healthy and rapidly progressed thru the psychomotor developmental milestones of his first seven months of life.

At about eight months, however, John Benedict's mother noted that the boy preferred more and more to stay in his crib all day long, refusing to play with his other siblings. He was becoming less responsive to name-calling and other verbal stimuli. His own verbal repertoire was not progressing any further from babbling sounds, from squeals or whimpers.

John Benedict's parents soon realized that their youngest child has also been stricken by the same malady that has afflicted their two other older sons – difficulty of hearing. They took all three affected children to Manila Hearing Aid Center, per advice of a neighbor, where hearing tests revealed severe hearing loss. Hearing aid and speech therapy were suggested but they could not afford the expenses entailed by such a program of treatment.

Four months before admission or on June, 1984, a firm non-tender mass about 4 cm. in diameter was palpated on John Benedict's anterior neck area. The mass gradually expanded but otherwise caused no symptoms. Unable to afford the cost of confining the children in several private hospitals, the parents brought John Benedict and an older brother, Mark Louie, to PGH.

In Mark Louie's case, difficulty of hearing was noted at 1 1/2 years of age. An anterior neck mass was similarly palpated four months prior to consultation.

A reveiw of John Benedict's past illnesses revealed that he had measles at one year of age with no apparent sequelae. He has no history of ear discharge, frequent URTI, mumps, chickenpox or head trauma. Mark Louie had measles at age 1 1/2 years.

Both patients were born full term by Caesarean Section for previous Caesarean Section to a 29-year-old G4P3 (3-0-0-3) without any complications. No febrile illnesses, vaginal bleeding episodes, intake of drugs or exposure to irradiation occurred during pregnancy.

John Benedict regarded at two months, turned from side to side at four months, sat without support at seven months, stood at one year, walked at one year and two months and ran at one-a-half years.

Presently, both boys are active, playful and sociable who respond readily to stimuli by a system of signals that they have developed among themselves. Their verbal responses consist of high-pitched squeals, moans and squeaks. Aside from the severely limited language, their psychomotor development seem to be at part with other normal children.

The medical background of their family is as follows:

(+) kidney disease in maternal grandmother

(+) heart disease in paternal great grandfather

Goiter was found in two paternal aunts and great grandfather as well as the paternal grandmother.

The proposed pedigree is as follows:

PHYSICAL EXAMINATION

I. General Survey: fairly developed, well nourised, active

II. Vital Signs:

ML	JR
PR – 100/min.	88/min
PR – 32/min	30/min
BP – 90/60	90/60
t – 36°C	36.3°C
ABW – 18.2 kg (18 kg.)	16.1 kg. (16 kg.)
ABL – 103 cm. (105 cm.)	98 cm. (100 cm.)
AHC – 50.5 cm. (49.2 cm.)	50 cm. (48.3 cm.)

III. HEENT – normocephalic, pink conjunctival, anicteric sclerae, clear corneas

– diffusely enlarged thyroid gland, smooth, non-tender, moves with deglutition, no bruit, no cervical lymphadenopathy.

IV. Lungs – equal chest expansion, clear breath sounds, no rales or wheezes.

V. Heart – PMI at 4th ICS, LMCL; AB at 4th ICS, LAAL; distinct regular heart sounds, no murmurs.

VI. Abdomen and genitalia – flat, soft, non-tender; no masses; descended testes

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VII. Extremities – warm, full peripheral pulses, no edema.

VIII. Neurologic Examination – essentially normal

MATERIALS AND METHODS

The thyroid work-up consisted of T3, T4, TSH and two-hour RAI uptake determinations. The perchlorate test was performed as follows: I·131 (20 Micro-Curies) was administered orally. After two hours, RAI uptake was obtained using the Picker Magna. Neck and thigh counts were determined. The uptake was expressed as follows:

$$\text{Uptake} = \frac{\text{neck count} - \text{thigh count}}{\text{standard I 131 count}} \times 100\%$$

Potassium perchlorate (400 mg) was administered orally. Uptakes were then determined 15 mins. 30 mins. 1 hour and 2 hours after perchlorate.

Tuning fork tests (Weber, Rinne and Schwabach) using a 512 Hz tuning fork and caloric tests using the Kobrak method were performed. Play audiometry was done on John Benedict and play pure tone audiometry on Mark Louie.

Buccal smears, dermatoglyphics, bone aging and psychometric evaluation were done.

RESULTS

	John Benedict	Mark Louie
T4 (normal: 60-160 nmol/l)	116	94
T3 (normal: 1-2.4 nmol/l)	2.1	2.7
TSH (normal: 0-7.0 mIu/l)	62.1%	58.1%
RAIU (normal: 0-15%)		
Perchlorate tests		
RAIU (% discharge)		
15 mins	50.1%	64.0%
30 mins	49.2%	63.5%
2 hours	45.3%	63.5%
2 hours	43.3%	58.5%

Expressed graphically, the results are as follows:

Since the upper limit of RAI discharge drop after perchlorate administration is 10-15% (Illum, 1972) and the range is 15-85% Praser, 1960), John Benedict's discharge of 30% was considered positive.

Tuning fork tests and audiometry revealed profound sensorineural hearing loss throughout the entire frequency range tested for both patients. Caloric responses were hypoactive to absent. Buccal smears and dermatoglyphic studies revealed no diagnostic abnormalities. Bone age is compatible to chronological age. Psychometric evaluation revealed short attention span with ability to imitate lip movements, follow instructions with visual cues, copy letters and signs and to vocalize inconsistently. However, identification of the parts of the body, common objects, colors and letters was not accomplished.

DISCUSSION

Pendred's syndrome is postulated to be caused by a defect in the stage of inorganic iodide into the thyroglobulin molecule where it is bound in organic form to tyrosyl radicals. This defect can be detected by the ability of certain inorganic anions such as perchlorate and thiocyanate to discharge unbound inorganic iodide from the thyroid gland. This defect was later found to be secondary to a deficiency in the peroxidase enzyme system of the thyroid. In normal glands, organic incorporation of iodide is very rapid and very little inorganic iodide can be discharged by the perchlorate or thiocyanate ion. Thus radioiodine uptake remains more or less the same. On the other hand, in the presence of peroxidase defect, large pools of unbound iodide accumulate and are released by the anions, causing a fall in uptake. The diagnosis of Pedred's disease, therefore, rests on the triad of congenital deafness, goiter and a positive perchlorate test.

Brain's findings on the genetics of Pendred's disease was substantiated in 1960 by Fraser, Morgans and Trotter. Based on the data of 18 families with 28 cases of deafness and goiter, the three authors observed that Pendred's disease was encountered almost exclusively in single generations, that a high rate of consanguinity was found within families and that the proportion of affected to total number of sibs approached the expected ratio of 1:4 for autosomal recessive inheritance.

The Thyroid Lesion

The goiter in Pendred's syndrome is a result of prolonged TSH secretion as an attempt to compensate for decreased thyroxine synthesis. Usually, goiter becomes clinically apparent in middle childhood but is not very prominent particularly in males. The typical results of thyroid studies include normal T3 and T4, that is, patients are euthyroid, with elevated TSH and RAI uptake. Our two patients conform very well to this clinical picture, except for the high normal TSH on John Benedict and the slightly elevated T3 of Mark Louie. These deviations are not completely unexpected. The goiter in Pendred's syndrome is very variable because the clinical lesion is several steps removed from the metabolic defect, that is, the peroxidase enzyme. Thus, both environmental and genetic factors can influence the ultimate clinical presentation at several key points.

The wide variations in RAI wash-out after perchlorate is also a reflection of the multiple factors operating within the thyroid gland. Analysis of thyroid specimens by Fraser (1960) led to two findings which may help explain this wide range: (1) assays of thyroid biopsies revealed localized areas of iodine depletion interspersed with iodine-rich zones; (2) chromatographic analysis showed an excess of iodotyrosines over iodothyronines, pointing to a defect in the enzyme that controls the "coupling reaction." Since then, the search for other enzymatic defects as well as efforts to definitively elucidate the previously identified defects

became the major thrust of research in Pendred's disease. By 1964, five types (sites of defect) of familial goiter could be described:

1. inability to trap iodide
2. inability to convert inorganic iodide to organic form
3. defect in iodination of tyrosine in the thyroglobulin molecule
4. impaired dehalogenase activity
5. impaired condensation or coupling

Hollander et al (1964) reported a 28-year-old female with congenital deafness and goiter but with negative perchlorate and thicoyanate tests. Chromatographic analysis of the labeled materials in the thyroid gland following oral I 131 revealed abundant labeled iodotyrosines and absent labeled iodothyronines. A factor necessary for the formation of the ether linkage of the thyronines was hypothesized.

Niepominisczeze et al (1971) reported a 16-year-old girl with goiter since age 6, normal hearing and 50% perchlorate discharge. Thyroid assays demonstrated lack of peroxidase activity. A genetic alteration in the protein structure of the peroxidase enzyme was postulated to be the underlying defect.

Burow et al (1972), on the other hand, noted ample peroxidase activity in the thyroid issue of a 12-year-old female with euthyroid goiter, bilateral perceptive deafness and positive perchlorate discharge. A high MIT; DIT ratio suggested a coupling defect.

These studies help explain the wide range of perchlorate discharge: the enzymatic defects are not only partial but also multiple. The negative perchlorate test in Mark Louie can also be explained by the failure to control the RAI uptake prior to testing. Presumably, the heightened avidity for iodine makes it difficult for the perchlorate ion to discharge unbound iodide. The diagnosis of Pendred's disease can be made in both patients, however, because even in the presence of negative perchlorate discharge, the co-existence of goiter and deafness in Mark Louie as well as the presence of the full-blown syndrome in his brother is enough to satisfy the criteria (Illum, 1972).

The Auditory Lesion

John Benedict's deafness was first noted at 8 months of age and Mark Louie's at 36 months. The tuning fork tests, play audiometry and caloric tests showed severely impaired cochlear and vestibular functions. These findings agree well with the description made by Fraser, Morgan and Trotter in 1959: "The deafness in our subjects .. . has nearly always been symmetrical, hearing has been more completely lost for high than for low tones, and testing by bone and air conduction has given approximately equal results. These characteristics and the absence of detectable middle ear lesions, place the defect in the category of perceptive deafness. The poor vestibular responses in those cases in which caloric tests were performed suggest a lesion of either the cochlea or the auditory nerve." In an independent article, Fraser (1964) concluded from a study of 207 families that the deafness, probably present since birth, remained inapparent until 3-4 years of age or even until age 45. Recruitment was elicited by Nilsson et al (1964). By histological and tomographic studies of the temporal bone, Hvidberg-Hansen and Jorgensen (1968) found bilateral cochlear malformation of the Mondini type the most characteristics feature of which is that the basal turn is retained while the apical turns form a large common cavity.

The biological relationship between the severe sensorineural deafness and the euthyroid goiter in Pendred's disease resists conclusive demonstration. What is known is that overwhelming evidence does not impute antecedent hypothyroidism as culpable for the deafness. Most patients are euthyroid with normal physical and mental development as our two patients in this study. Furthermore, the hearing deficiency in Pendred's disease does not respond to timely thyroid replacement therapy unlike the deafness of postnatal or adult myxedema or following anti-thyroid drugs.

The most widely accepted theory is still that which was expounded by Brain in 1927: Pendred's disease results from a pleiotropic gene, that is, a gene with two independent effects. However, no corresponding defects in the peroxidase system or other enzyme systems in the labyrinth have been demonstrated in patients with partial or total enzyme deficiencies in the thyroid.

It should be remembered that while the acoustic nerve and auditory organ are just starting to develop in fetal life, the thyroid gland should have already attained some degree of maturation. Any environmental or genetic insult occurring at the time the thyroid is developing may thus impair inner ear growth. A genetically determined deficiency in the enzyme controlling iodine metabolism may produce abnormal metabolites that may exert deleterious influences on the eighth nerve (Batsakis and Nishiyama, 1962). Fraser acutely noted that the findings with the perchlorate tests would be the same if patients were taking small to moderate quantities of antithyroid drugs of the thiouracil type. He thus hypothesized that both the thyroid and the inner ear lesion may have been produced by a circulating substance produced elsewhere which inhibited enzyme activity in both organs.

The Mondini defect is considered as a developmental arrest malformation involving the modiolus at the seventh fetal week. The basal part of the cochlea, having been shown to be better vascularized than the apical turn, is able to resist the insult more strongly and thus comes to attain its adult form.

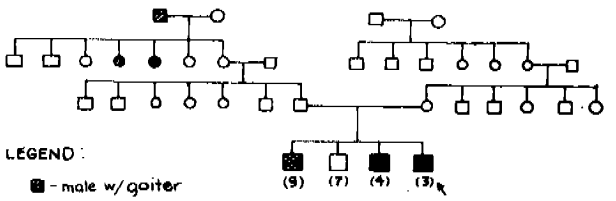
SUMMARY

Two patients, John Benedict, age 4, and Mark Louie, age 5, are presented. Both have deafness, goiter, and in John Benedict's case, positive perchlorate test. Both patients are shown to be euthyroid by their normal

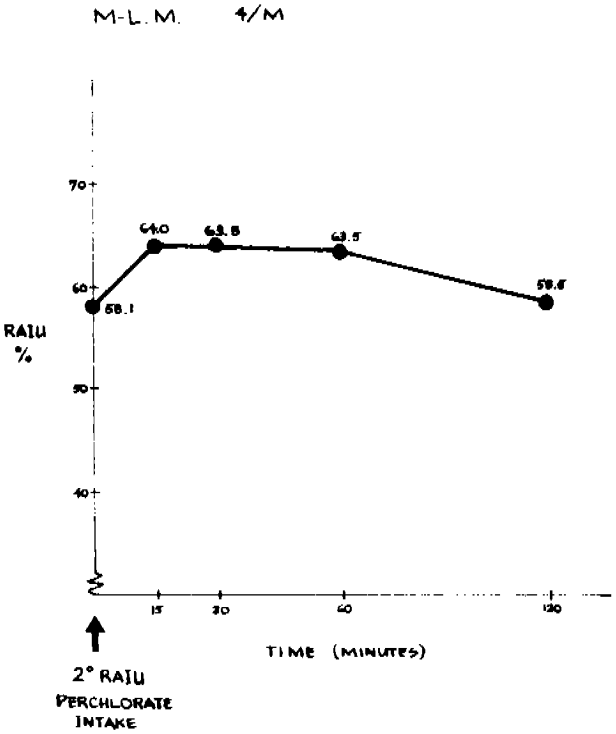
physical and mental development as well as by thyroid studies. Audiometry and caloric tests indicate severe bilateral cochlear and vestibular impairments. The diagnosis of Pendred's disease is made in John Benedict because of his fulfillment of the three criteria of deafness, goiter and positive perchlorate test; the diagnosis is also made in Mark Louie based on his deafness and goiter and his close relationship to John Benedict.

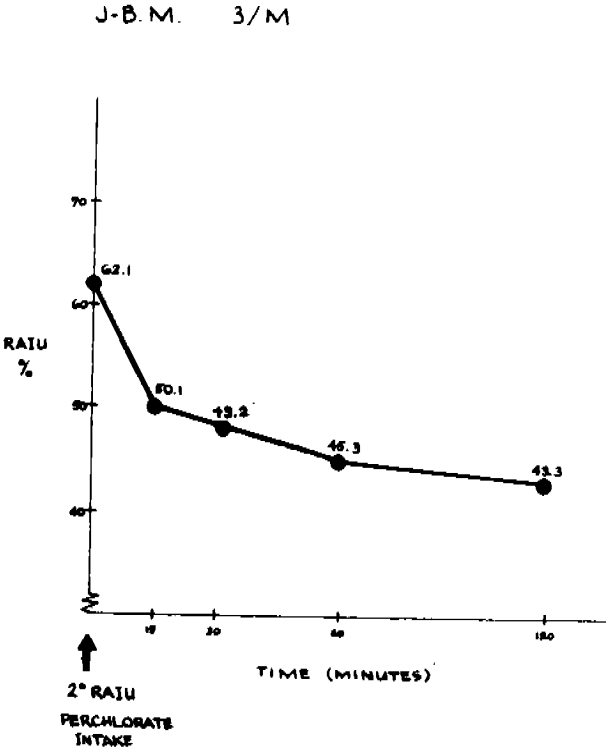
RECOMMENDATIONS

Since the goiter in Pendred's syndrome responds very well to thyroid hormone therapy, this form of treatment should be started as early as possible. Speech therapy and educational placement in special schools for congenital deaf-mutes will help in ensuring that these patients become productive members of society. Powerful hearing aids may be tried during the period of speech rehabilitation. The parents should be counselled then, since Pendred's syndrome is transmitted as an autosomal recessive trait, these is a 25% chance of a child acquiring the disease.



Proposed Pedigree





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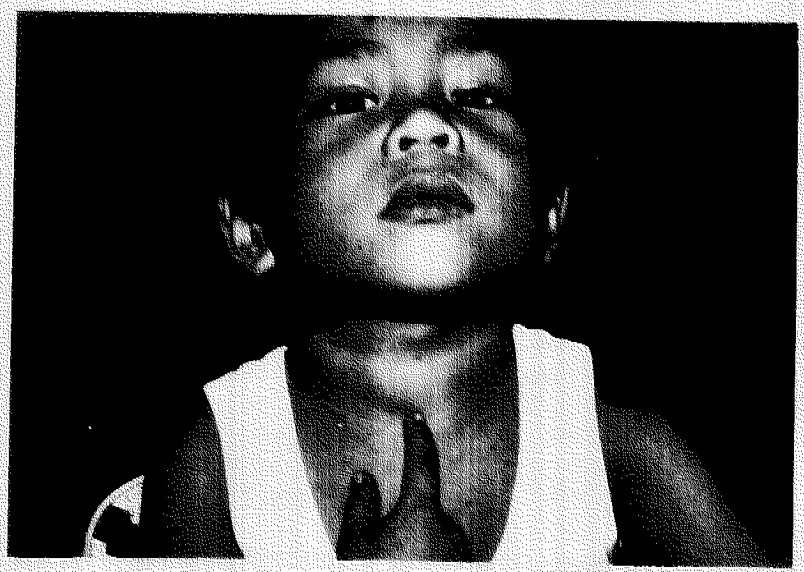

John Benedict Molina 4/M Pendred's syndrome

Mark Louie Molina 5/M Pendred's syndrome

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"SCREENING AUDITORY DIFFICULTIES IN YOUNG CHILDREN*

Nelly Reyes-Ledesma, M.A.

Introduction

Adequate hearing is essential for normal language development. So interrelated are these processess that Fletcher (1953) states: "We speak with our ears." While talking, hearing serves as a monitor for our speech sounds, loudness, pitch, quality, inflection, rhythm, and stress patterns. In addition hearing systems monitor our pronunciation and grammar. Other sensory systems do supply some feedback information while we talk, but the auditory sense is dominant for most of us. We do play our musical instrument by ear (Katz 1978).

These functions of the auditory monitoring process assume the person has already acquired the speech sounds of the language, the vocabulary, the rules of grammar and skills involved in listening and talking. In relation to my paper – *Hearing Serves as the Basic Sensory Channel for the Learning of Language and Speech Skills. The speech patterns must be heard completely for the normal receptive and expressive language processess to develop.* The understanding of speech (listening skills) develops before talking (speaking skills). Receptive skills precede and exceed in quantity and complexity expressive skills. The language to be spoken must be understood.

It follows, then, that a general relationship exists between hearing sensitivity and the normal spontaneous development of language in a child; between hearing sensitivity and the individual's speech quality. These general relationships help determine the emphasis in various educational programs and the appropriate placement of the hearing impaired person within these programs.

Paper read during the UP-MECS-sponsored course on Teaching of Benginning Reading in coordination with the UP College of Education's Department of Reading, September 5, 1986.

Results of Some Studies About the Education and Achievement of the Hard of Hearing Children–

A child's success or failure in school is obviously of importance to the psychologist, audiologist, as well as to the educator.

There have been a number of studies comparing normal and hard of hearing children in such educational indications as grade repetition and scores from standardized educational achievement tests (Pintner et al 1946). Generally, it was found that the hard of hearing repeated more grades and were likely to be retarded in educational achievement.

Henry (1947) studied the impact of low, middle and high frequency hearing losses upon educational achievement. Significant difference in threshold between the best and poorest readers were found for those subjects with middle and high frequency losses. Low tone loss was not related to proficiency in reading.

Fisher (1966) in England studied vocabulary and basic school subjects in 83 hard of hearing children in the public schools. They had a mean hearing level of 38 dB with a range of 20 to 64 dB. Their mean chronological age was 10.1 years. Although these children were normal in intelligence as measured by the Raven's progressive matrices, they were substantially retarded in vocabulary in basic school subjects.

Young and Mc Connel (1957) compared normal and hard of hearing children, equated for age, grade, and socio-economic status, in intelligence using the Raven's progressive matrices, a non-verbal test, and in vocabulary with the Amon's full-range picture vocabulary test. The hard of hearing subjects had a mean hearing loss of 61 dB in the better ear. The results indicated that the groups were equal in non-verbal intelligence, but significantly different in vocabulary with the normal subjects showing a distinct superiority.

The effects of slight to mild hearing loss, usually congenital, upon language development in children have received but little attention by researchers. Goetzinger (1962) after a longitudinal observation of children with sensori-neural (SN) hearing losses of 30 to 45 dB in the better ear concluded that such losses induced a language lag of 12 to 19 months at age 3 when intelligence is normal. Hearing losses of this degree do not preclude the development of language but frequently cause a speech defect. Children between 2 to 4 years of age with slight sensori-neural hearing losses are often misdiagnosed as being emotionally disturbed, aphasic, retarded or as having learning disabilities when there is an absence of hearing test information.

Language of the Hearing Impaired Children

In the Pittsburg study (Eagles, et al 1968) more than one half of the children with hearing levels of 25 to

40 dB were found to have delayed language.

The Pittsburg study showed that almost a third of the total number of cases with hearing loss had hearing levels of 40 to 55 dB and could be considered to have moderate hearing losses. Generally speaking, these children require hearing aids as soon as after diagnosis is possible. It is not unusual for a diagnosis of a hearing loss in the mild and moderate classifications to be confirmed during the first year of life. Thus, remedial procedures may be initiated to overcome the language retardation.

In the Pittsburg study only 2 of the 4,064 children had 70 dB or greater– hence less than 1 in 1,000 children in the public schools are classified as educationally deaf. However, there are 53,009 children in the schools and classes for the deaf in the U.S. For the majority of these children the visual channel is the primary avenue through which they will acquire language. The child who is either born deaf or who suffers deafness before the acquisition of language is cut off from the spoken word through which language is learned. Since hearing is omnidirectional, and a sense for perceiving at distances, the child with normal hearing is continuously saturated with incidental language from everyone and in addition may be exposed to an incidental teaching situation with the mother even though she is not in the same room. Unfortunately, the deaf does not have an exposure to incidental learning. His language experiences which are mainly through the visual channel are comparatively meager, and his incidental contacts are almost nil, unless the speaker is in his direct line of vision. Therefore, the need is great to expose the child to language continuously during the formative years (birth to 5 or 6 years) and to provide him with the best possible medium for acquiring facility of language.

There is a need to review studies of early language development in children in order to devise controlled language procedures which could be used by parents. Authorities recommend the use of video tape recording involving the parents and other members of the family. Using video tape as a supplement in presenting controlled language to the child. For example, depending upon one's methodologic presentation – action verbs such as "run", "jump" short sentences as "open the door", appropriate nouns, language principles as "under", "over", and so forth could be systematically presented to the child in games to assure adequate learning experience for receptive language development.

After the child reaches the age of 3 years a more formal approach to the development of receptive language should begin. The children should be required to identify the correct stimulus as initiated by the teacher or parent.

After the child reaches a mental age of 6 years, instruction to the printed word should begin. Some techniques may now be used to attach vocalized speech, sign or a combination of them to corresponding printed symbols. If a basic language comprehension has been established previously, the transfer to the printed symbol and, consequently, reading should be analogous to the child with normal hearing. Since it is only through reading that level of cognitive development and verbal abstract functioning of which they are inherently capable, it is imperative that research be directed to language development during the first 5 to 6 years.

Hearing Screening of Young Children

It is common practice in hearing screening to use the simpler, more easily defined pure tone as the signal of choice. Speech, noisemakers and various animal and environmental sounds continue to be used when, for some reason, it appears too difficult to get children to respond to pure tones.

The choice of hearing screening procedure for any given program is not a simple matter. Each advocate feels that his/her procedure is the one of choice for the population of interest. Since no one procedure enjoys any clear-cut superiority for all ages or groups, people responsible for the local hearing health care must determine the most efficient and appropriate procedures for their population. They must give consideration to the following factors: (1) the goals of the program; (2) the ability of the children to accomplish the task required of them for any given procedure; (3) the testing environments which are available; (4) the equipment which is currently available and the maintenance of this equipment; and (5) the personnel who can carry out the program.

To resolve the vexing problem of whether to use group or individual hearing screening procedures is to use both, beginning with the initial group screening by a skilled technician followed by individual screening and threshold testing by an audiologist.

It is assumed that the goal of hearing screening testing in pre-school and school age children is to identify the children with actual or potential hearing impairments of significance as communication or health problems; the criteria for identification will have to be consistent with this goal. This signals used in behavioral testing which must be correctly detected or recognized in order for the child to demonstrate hearing within normal limits must be representative of the frequency range considered to be important for these purposes and must be at a level at which it is reasonable to expect their detection. The level of the signal must not be so high, nor the frequency range so restricted, that the child with an existing or potential hearing problem is not identified. What criteria represent a happy medium between these extremes and are relevant for children's needs.

In 1961, the National Conference on Identification Audiometry (Darley, 1961, p. 31) recommended that pure tones can be used as the signals for hearing screening and that:

> *. . . only four frequencies shall be considered in the criteria for referral: 1000, 2000, 4000, and 6000 cps. It is recommended that screening be done at the 10 dB* level with reference to the present American Standard audiometric zero (ASA-1951) *for the frequencies of 1000, 2000 and 6000 cps, and at the*

20 dB level for the frequency of 4000 cps. A child would be judged to have failed the screening test and to be a candidate for referral for the next step if he failed to hear . . .

any of the signals at these levels in either ear.

Anderson (1965) and Lloyd (1966) have pointed out that an easy and useful conversion of these levels to the ISO-1964 reference levels is made by using a level of 20 dB (ISO-1964) at all frequencies.

The ASHA Committee on Audiometric Evaluation (1975) recommends the use of the following priorities for an audiologic referral:

a. Binaural loss in both ears at all frequencies
b. Binaural loss at 1000 and 2000 H_z only
c. Binaural loss at 1000 or 2000 H_z only
d. Monaural loss at all frequencies
e. Monaural loss at 1000 and 2000 H_z
f. Binaural or monaural loss at 4000 H_z only

The combination of tympanometry, acoustic reflex, and behavioral procedures is growing in popularity. It should be noted that we still need research to help us resolve the question of which children should receive which screening procedure in order to avoid unproductive duplicity of effort.

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A SPECIAL REVIEW OF AN AUDITORY PROSTHESIS FOR THE PROFOUNDLY DEAF CHILDREN/ADULTS – THE COCHLEAR IMPLANT

Nelly Reyes-Ledesma, M.A.

The United States Food and Drug Administration (FDA) formally recognized the "3M Cochlear Design" as a safe treatment for the profoundly deaf. The marketing approval to the manufacturer was granted only on November 26, 1984. The FDA noted that this was the first time a medical device had been approved that partially restored the sense of hearing – one of the five major senses.

There have been many researches about cochlear implant during the past four (4) years. A number of devices for electrical stimulation of the auditory system are undergoing clinical trials for both children and adult patients. Berliner, Elsenberg and House believe that the greater benefits from these auditory prosthesis will be for children – the House single cochlear implant by 3M Company which is approved in the U.S. for trial in children.

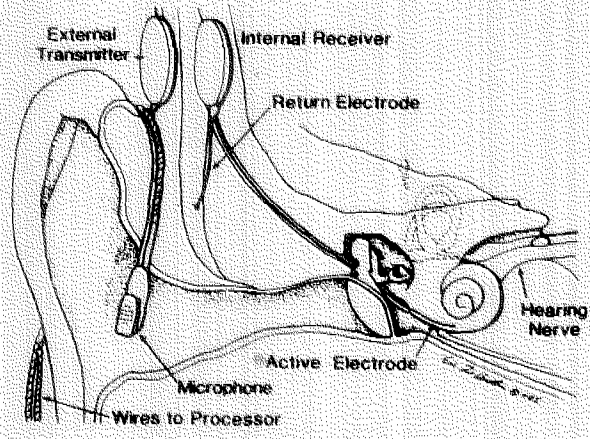

Figure 1. Illustration of cochlear implant system showing placement of internal receiver and electrodes.

At the House Ear Institute (HEI) in Los Angeles the Cochlear implant program represents a multidisciplinary approach to evaluation and treatment of the profoundly deaf. Information about this procedure includes a wide variety of backgrounds such as otology, audiology, psychology, speech/language pathology, education of the deaf, and engineering.

Not much has been written about cochlear implant in the Philippines. However, in the U.S. authorities believe that they are there to stay. They have introduced a unique concept into the treatment of profound sensorineural deafness – teamwork. Cochlear implant is not just a surgical treatment nor just an audiological treatment. It requires the cooperative efforts of both professions. Professionals from a variety of disciples must work together to maximize potential benefits for the deaf child/adult. A challenge does now exist for hearing health care professionals to integrate this new solution into their educational programs and clinical practices.

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