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Percutaneous Transtracheal Jet Ventilation Device Simple Solution for Difficult Upper Airway Problems

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Valedictory Address

Teodoro P. Llamanzares, M.D.
Outgoing President, PSO-HNS

First of all, before I join the ranks of "Has Beens", I would like to congratulate the new set of officers elected unanimously last December headed by President Vic Chiong. I see no reason why it should not have been unanimous since these new leaders have contributed their share in organization building, having successfully handled various positions in the past.

This is how our Society was ran and managed before and this is how it should be - no politics, no "ningas kugon", just plain and simple meeting of the minds to achieve a common goal - a strong and formidable society, the way you envision it today - almost immune to bikerings from its members and all controversies settled in the negotiating table, the traditional democratic way of settling disputes.

I have the unique experience of leading the Society during the tumultous and very eventful years of 1989 - 1990. Each of us has a role and story to tell concerning these events - a devastating array of coups, destabilization attempts, earthquakes, floods, welga and so forth-enough to break the spine of a weak leader. But your leadership accepted this as a challenge and even improved on the proceedings of the past - with the inauguration of an ENT Week of sportsfests, free clinics and surgeries, inter-hospital grand rounds and year end Annual Conventions. The out of town mid-year convention was started in June, 1990. It was a modest success but proved to be devastating because the disco that culminated the event apparently shook the foundation of the Nevada Hotel in Baguio contributing to its total collapse during the earthquake.

I am proud to announce that the Society is financially sound, a result of ethical fund raising and donations from generous benefactors. It would be wise for the incoming officers to be modest in their spending to be able to cope with financial emergencies in the future.

Meanwhile the routine Scientific meetings on Interesting Cases, Clinical Research, Surgical and Instrument Innovations, are all on going projects.

Our ties with the ASEAN Otorhinolaryngology Federation was renewed April, 1989 when a sizeable delegation from our country went to Singapore and presented five worthwhile scientific papers.

Occasions like these tend to project a glowing image of our Society and naturally detractors will come along the way, even casting doubts as to our ability to do head and neck surgery. For this reason we joined the on going "Council of Head & Neck Surgery" an Ad Hoc Committee of the Philippine College of Surgeons. The latest "come on" for us is to make automatic members of all ENT diplomates once a new "Head and Neck Society of the Philippines" is formed. This might be an attractive bait but still I will endorse it for serious consideration by our members since we will constitute an overwhelming majority in this proposed organization.

All these milestones in the history of our Society could not have been realized if not for the selflessness of my fellow officers whose private practice somewhat suffered during all these activities. To cite names will be tantamount to mentioning the rank and file of the organization.

In closing, it is, therefore, my wish, as your outgoing president, that the future leadership of our Society to continue exploring the path in the pursuit of bigger tasks and greater accomplishments and, for the past leadership, always to lend a guiding hand.

Inaugural Address

Vicente T. Chiong, M.D.
Incoming President
PSO- HNS, 1991-1992

Magandang gabi po sa inyong lahat.

Ako po ay nagagalak na makita ko kayong lahat dito ngayong gabi.

I would like to express my gratitude to all of you for giving me this chance and the big honor to serve as the 18th President of the Philippine Society of Otolaryngology-Head and Neck Surgery.

Our Society is a relatively young Society. More than 50% are in the below 45 years old bracket as you can see in the audience tonight. This is a very vibrant group.

We should always strive to improve ourselves in all areas of our specialties and remember what Maimmonides said "May there never develop in me the notion that my education is complete but give me the strength, leisure and zeal continually to enlarge my knowledge".

In line with this policy of continuing medical education, which we will emphasize during the year, much preparation is going into our coming annual convention. To date at least 6 notable speakers from all parts of the globe have expressed their willingness to grace the occasion. At this early date, we have received enthusiastic response from our colleagues from neighboring countries. Your support in this huge endeavor would guarantee the success of the affair. The over-all chairman is Dr. Carlos Reyes and Dr. Norbie Martinez is the Convention secretary.

Because of the success of the mid- year convention last year, provincial chapters will be formed this year and guidelines are being prepared by a committee headed by Dr. Zenaides Wi from Northern Luzon. It is Southern Luzon's turn this May or June and on this occasion I take the privilege of appointing Dr. Fita Pascual - Guzman as Chairwoman. God willing the Visayas-Mindanao group will be the host next year. I hope that this will promote more camaraderie and in a small way encourage our young specialists to go "balikprobinsya". There is an over concentration of specialists here in Metro Manila.

Being president of the Society is a big task and that the road ahead of us may at times be rough. Our Society is faced with some problems, with stresses from almost all sides just to mention a few like problem in -

- Head and Neck with general surgery

- Maxillo-facial from other disciplines

We are accused of putting our fingers in almost everything though it is very clear that our specialty is where the future for progress and improved health care for patient with head and neck problems rest. We will improve further and maintain to be "the best" in these areas. We will further improve our skills and we will not give up any inch of the territory in Head and Neck Surgery that we enjoy at present.

As your president and in the name of the other officers, we vow to protect the best interests of our Society. We have learned some lessons from the latest Gulf Crisis. Battles are won and victory achieved because of the leadership and the united men behind them. I know that sometimes we have some differences but it is for our own interest to talk, listen, then, work together, and unite for our success. As long as we are united, we will achieve our goals. We will fail if we ourselves are wounded and scored. We can build a bright future for Otolaryngology-Head and Neck Surgery if we work together.

Guest Editorial

I welcome this opportunity to once again break bread with you, renew acquaintances and make new ones.

Some 25 odd years ago under similar circumstances but in a different venue, I was inducted as President of the Philippine Society of Otolaryngology and Bronchoesophagology as we were then known. Happily, Dr. John Bordley, the Chairman of the Department of Johns Hopkins University was visiting the country and consented to induct the Officers of the Society and delivered a short talk. It was a professional crowd, as it is now, but the faces are different. Many are sorely missed. Some having gone to the great beyond, some to retirement and others to "greener pastures" or whiter adventures. Happily some of the "old guards" are still around, active in the affairs of the society. I believe I am with you tonight by virtue of being an old guard, one of the more senior member of the organization.

On the other hand, as I look at this gathering, I see many new faces, young, enthusiastic, some are sons and daughters of our members, many have been under our guiding hands.

My friends, our organization during its infancy and growth have always prided itself in being united in purpose and objectives. We have grown like any other organization as it should be, our membership has increased many fold, and our frontiers have been expanded to what we may refer to as "gray" areas in our specialty.

Today, we are embattled because some organizations are of the belief that we cannot and should not include H and N surgery in our title altho' admitting our right to practice such specialty. Again, in this regard we stand united that of all the disciplines in surgery we have the right to that appellation.

Lately also, some specter of dissent has arisen in the matter of accreditation.

What is really the objective of our organization? Are we geared to produce safe otolaryngologist H and N surgeons who can be trusted to go their respective provinces, cities and towns to practice otolaryngology safely and competently? Or are we to produce super specialties, whose training can only be had in a few "selected" places? And produce professors of otolaryngology in academic institutions, and tertiary medical centers.

I believe we should get together and review the requirements of our organization in order to be more realistic and attuned to our needs. I believe that, under the present circumstances, such requirements are so rigid, so inflexible and impractical that training can only be available to a selected few. With the incumbency of any new board, amendments take place, new requirements imposed, making it nearly impossible for some institutions to comply with.

Our by-laws should be strong and enduring and should not be altered or changed by the caprices and whims of a few. If any such change or alteration should take place, it should be with consent of the governed. Only then, can we be truly faithful to our objectives.

My friends, you have listened to enough talk this evening. I wouldn't want to strain your listening capacity than I should. Allow me to end by predicting that under the aegis of these young faces, our wards, sons and daughters, our organization is, and will be, equal to the challenges of the future. Thank you and good night.

Ariston G. Bautista, M.D.
Guest Speaker, Induction Ceremonies
PSO-HNS, Inc., 1991

To our founding fathers, the "Heroic Nine", some of whom are here tonight like Dr. Angel Enriquez, President of the Philippine Board of Otolaryngology-Head and Neck Surgery, Dr. Ariston Bautista our inducting officer/keynote speaker. . . . be rest arrured that the high standards that you have aimed for our Society about 35 years ago are still with us and has not gone to waste and for these we are very grateful.

The evening will not be complete if I do not give tribute to our past President, Dr. Teddy Llamanzares. I would like to congratulate him for his numerous accomplishments. Just as he said in his President's address "I will as your president "attempt" to improve on a masterpiece". He has done such a good job that I know it would be difficult to further improve on such a masterpiece.

And to my fellow officers I know that we will succeed. Let us work together for the interests of our Society.

To the members of our Society, we will reach our goals, survive any crisis and bring our Society to greater heights as long as we have the spirits and remain united. As the saying goes - "kayang-kaya basta't sama-sama.

Maraming salamat po!

THE NEW SET OF OFFICERS OF THE PHILIPPINES SOCIETY OF OTOLARYNGOLOGY - HEAD AND NECK SURGERY.

Seated from L-R: Drs. Dominador Almeda, Ma. Fita P. Guzman, Edilberto M. Jose, Vicente T. Chiong

Standing from L-R: Drs. Cesar Villafuerte, Jr., Robie Zantua, Alfredo Q. Y. Pontejos, Jr., Angel E. Enriquez, Teodoro Llamanzares, Edgardo C. Rodriguez, Jacob S. Matubis, Rene S. Tuazon.

A MODIFIED RECORDING SYSTEM FOR NYSTAGMOGRAPHY*

DANIEL M. ALONZO, MD**
VICENTE C. CAVALIDA, MD***
CARLOS P. REYES, MD****

INTRODUCTION

The symptom of dizziness is an enigma. The challenge of a patient who says "I am dizzy" involves a major problem in differential diagnosis. Investigation has to be more extensive because such patients can prove to have serious medical or surgical problems. Electronystagmography (ENG) can provide much information and ultimately assist in diagnosis.

Electronystogamography is an electrical method of recording eye movement or nystagmus. It has considerable advantages over methods that rely on visual observation alone. Its greatest advantage is that nystagmus can be recorded with the patient's eyes closed, thus permitting inspection of nystagmus that might otherwise be missed due to visual fixation. It eliminates to a large extent the possibility of various observers having various interpretation. The nystagmograms are available for analysis by other persons as well. When no nystagmography is employed, only the duration can be measured with fair accuracy, the duration being to a great extent an unreliable property of the nystagmus. ENG provides us with the data concerning the speed of the slow phase, the total amplitude and the number of beats, which are more reliable properties of the nystagmus. It makes it infinitely easier to decide that the patient has a normal vestibular mechanism, disease of the labyrinthine end organs or retrolabynthine or central nervous system disease. It provides an objective and permanent record for follow-up and medico-legal purpose.

In the United States, the clinical use of ENG has expanded rapidly in the past ten years. In the Scandinavian countries and Japan, ENG has been in widespread use for more than two decades. In the Philippines, however, its use has been limited primarily because of its cost. The cheapest single channel ENG recorder is presently valued at P75,000.

OBJECTIVE

The main purpose of this paper is to provide an alternative to the more expensive commercially available electronystagmographic apparatus.

PRINCIPLES OF ENG

ENG is the graphic registration of nystagmus made possible by the existence of a biological corneo-retinal potential which can be detected by periorbital electrodes. Since the cornea is relatively positive in electrical charge in relation to the negative electrical charge of the retina, a voltage differential exists between the cornea and the retina. The electric potential developed between the electrodes change in both magnitude and polarity as the eyes move. The degree of change depends on the magnitude and intensity of eye movement. This electrical potential (300-1,000 microvolts) can be utilized to deflect the needle in a meter or drive a galvanometer, which will move a pen writer or mark a trace on an oscilloscope screen.

When the eyes are directed straight ahead, a level of potential exists, and this level is utilized as a baseline or zero line. When the eyes deviate to the right, a change in potential occurs; this is reflected by upward pen movement. If the eyes deviate to the left, the pen movement occurs in the opposite direction, or downward. This convention of right eyeball movement causing upward pen deflection had been agreed upon by the ENG Study Club and is being followed in all ENG testing and reporting. (Figure I)

This pen movement up or down reflecting a right or left eye movement can be used to record the right and left eyeball rotations that occur during nystagmus. When the electrodes are placed at each outer canthus horizontal eye movement are recorded, and when the electrodes are placed above and below the eyes, vertical movements can be recorded. Three skin electrodes are employed to record horizontal nystagmus. One electrode is placed on the forehead and the other two are placed at the outer canthus of each eye (Figure II). The electrodes are connected to a recorder with amplifiers (Figure III).

---

* Presented at the 6th Scientific (Surgical Innovation and Instrument Design) Research Contest at Quezon City Sports Club on Dec. 4, 1987.

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*** Resident, Division of Medicine, Sto. Tomas Univ. Hosp.
**** Consultant, Division of ENT, Sto. Tomas University Hosp.

INSTRUMENTATION

Our system consists of:

1. 3M silver-silver chloride electrodes for the stimulus pick-up
2. 3M micropore tape for attaching the electrode to the skin
3. Nihon Kohden EEG paste for providing conductivity from the skin to the electrodes
4. Sanborn 500 ECG apparatus as the recorder
5. 50 (mm)w x 30(m)l chart paper

Much of the technical difficulty encountered in ENG has been due to inadequate electrodes, careless attachment, arrangement, or care of electrodes.

The efficiency of electrode application depends upon 2 factors: firm electrode attachment, and optimal electrode position. The nearer the electrode is placed to the source of the potential, the stronger the recorded potential. The basic working principle of ENG is amplification of potential difference. In the course of eye movements, one electrode picks up increasingly positive potentials and the other picks up increasingly negative potentials.

We initially used ECG electrodes but the recorded potentials seemed to be very small. It was later discovered that because of the bigger size of the ECG electrodes, they were positioned farther away from the latera canthi.

To avoid extraneous biological potentials like muscle noise, electrode-skin resistance was kept as small as possible. This was achieved by carefully cleaning the skin with 70% alcohol and use of electrolyte paste. Motion artifacts were likewise avoided by fixating the electrodes to the skin using micropore tape. Muscular activity due to blinking results in characteristic sharp spikes easily distinguishable form nystagmus beats.

The ECG machine used in this paper was originally designed to pick up biological potentials within the range of 0.5mV to 5mV with a maximum sensitivity of 2 cm/mV or 0.5mV/cm. To serve the purpose of an electronystagmographic recorder the differential amplifier was adjusted with a resultant increase in sensitivity to 7.4 cm/mV or 0.135mV/cm or 135uV/cm. With this resolution this machine can even pick up potentials way below the cornea-retinal potential range reported by Spector (300-1,000 uV, with an average of 580 uV).

We arbitrarily used lead III adjustment utilizing the electrodes for the left arm, right leg and left leg for the reference, left eye and right eye respectively. This combination makes an upward deflection of the stylus when the patient looks to the right and a downward deflection when looking to the left.

Most of the artifacts encountered were primarily due to patient motion. This machine may pick up muscle potentials if the electrode is placed directly over a muscle. During the tests we made sure that the electrodes were positioned at the flat bony portion of the lateral orbital rim. The recorder has a built-in filter to eliminate interferences from other sources.

PERFORMANCE OF THE TESTS

To test if the system works, the following procedures were done:

Calibration: During an ENG examination calibration is routinely done at the beginning and at the end of the recording and just prior to each caloric stimulation. The beginning calibration tells one that the ENG apparatus is working for the determination of the velocity of each caloric response.

To calibrate the signal, the patient, while in a sitting position, is asked to look alternately at two spots 20 degree on the wall. The spots are about 3 feet apart while the patient is 8.5 feet away from the wall (Figure IV).

An amplication that gives a millimeter of movement of the pen for one degree of eye movement is aimed for. But if this is not possible, the degree of deflection is computed using the formula: (Figure V)

$$\frac{\text{Upward movement (mm)}}{\text{Downward movement (mm)}} - 20$$

Caloric Testing: Cold water (20°-30°) caloric testing was done with the patient in the sitting position. The head was hyperextended 60° to bring the lateral semicircular canal to a horizontal position, then the ear was irrigated with 250 ml cold water for a duration of 30 seconds. Speed of the slow component was measured by using the formula: (Figure VI)

$$\text{Average amplitude of 10 successive beats} \times \text{Calibration factor} \times \text{paper speed (25 mm/sec)}$$

In both procedures, tracings were taken. Representative tracings and computations are shown in Figure VII.

COST

To complete this project we just spent a minimal amount of P1,500, mostly for the repair of the ECG machine. This is an old model which has been relegated to the junk room. Three of its Five vacuum tubes had to be replaced. The electrodes used had already been discarded by the EEG laboratory. We just identified the disrupted segment and soldered it. A standard multi-tester was used to verify the electrode circuit integrity.

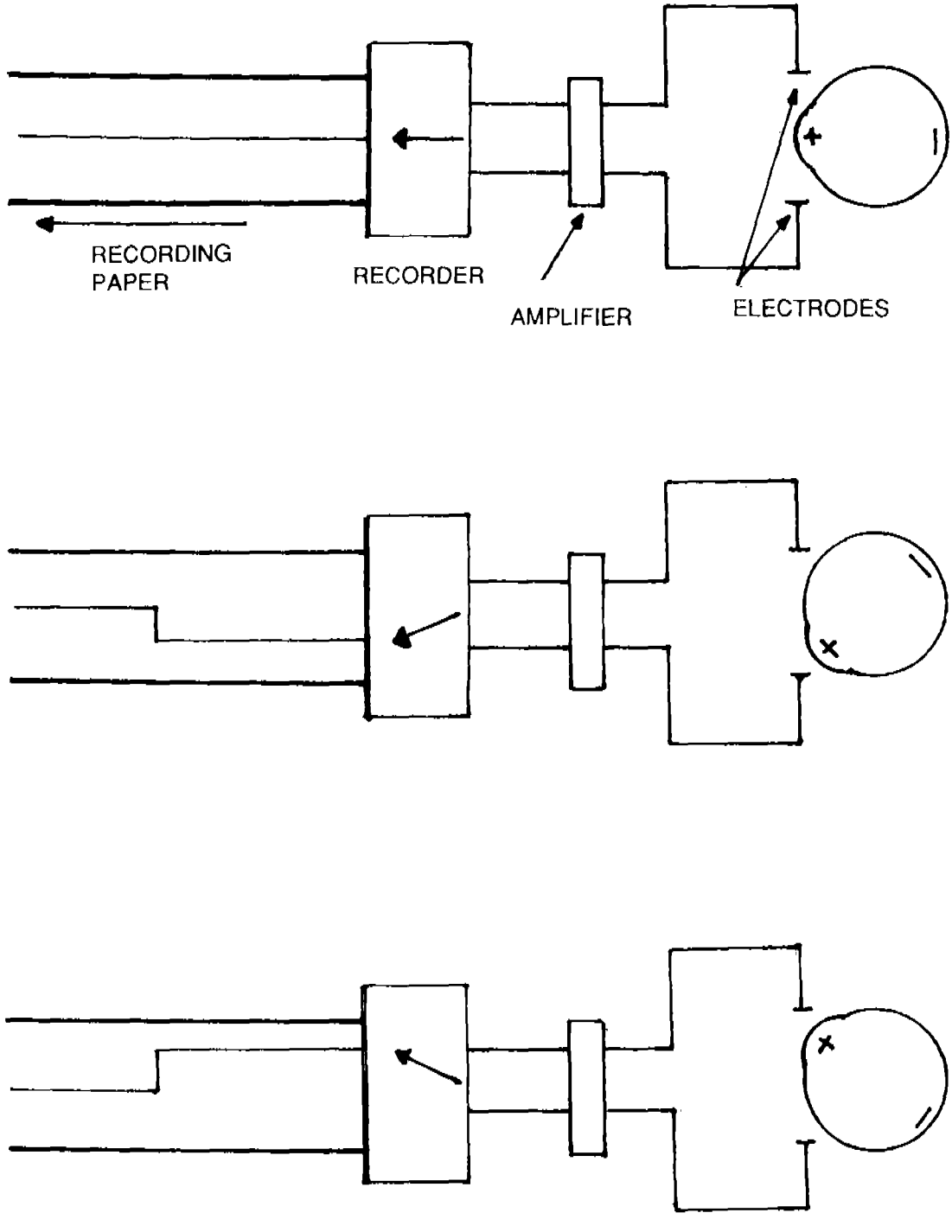

Figure 1. The principle of electronystagmography. The corneoretinal potential is illustrated as a "+" (i.e., positive voltage) at the front of the eye and a "-" (i.e., negative voltage) at the back. Eye movement displaces this potential. This displacement is "seen" by electrodes placed in the plane of the eye movement, because the head is an electrical conductor.

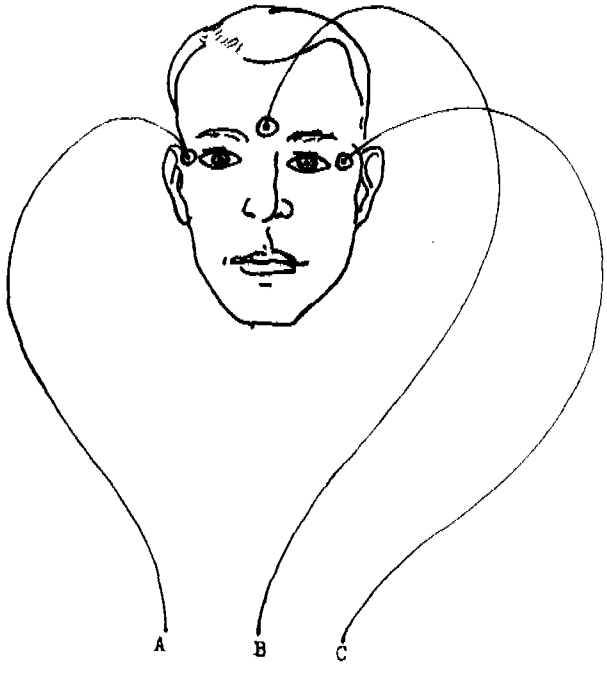

Figure II. Electrode locations for recording horizontal nystagmus. A is connected to left leg electrode, B to ground (left arm) and C to right leg. The electrodes are attached to the patient with squares of adhesive tape.

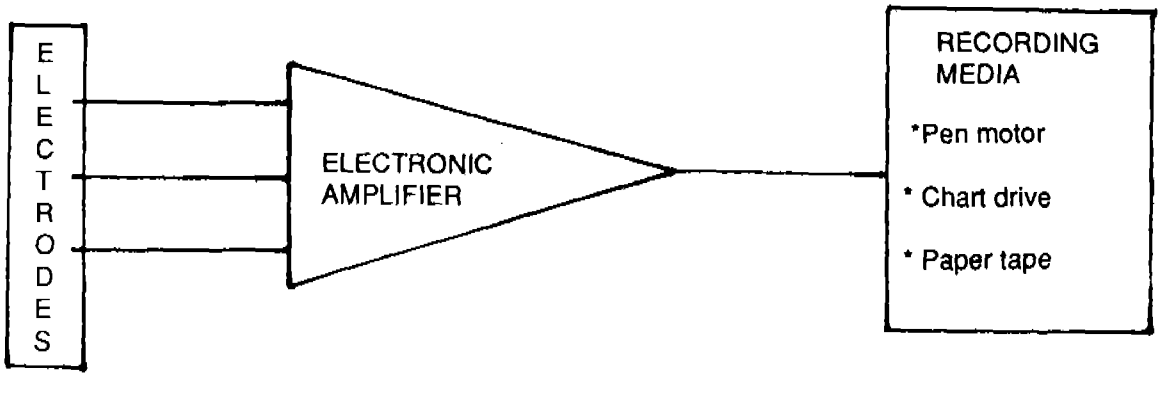

Figure III. Single channel ENG system.

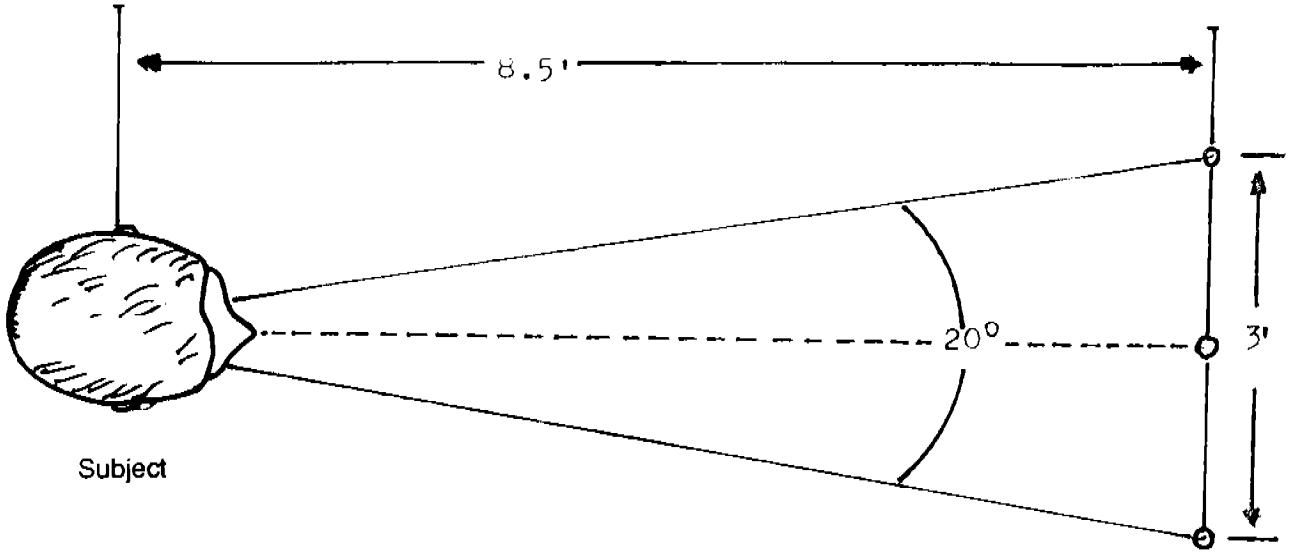

Figure IV. Patient calibration. This calibration routine may be modified using the formula:

$$\tan 10^{\circ} = \frac{y}{x}$$

where y = the desired distance of the patient from the wall or ceiling, and
x = the distance of one spot from the center.

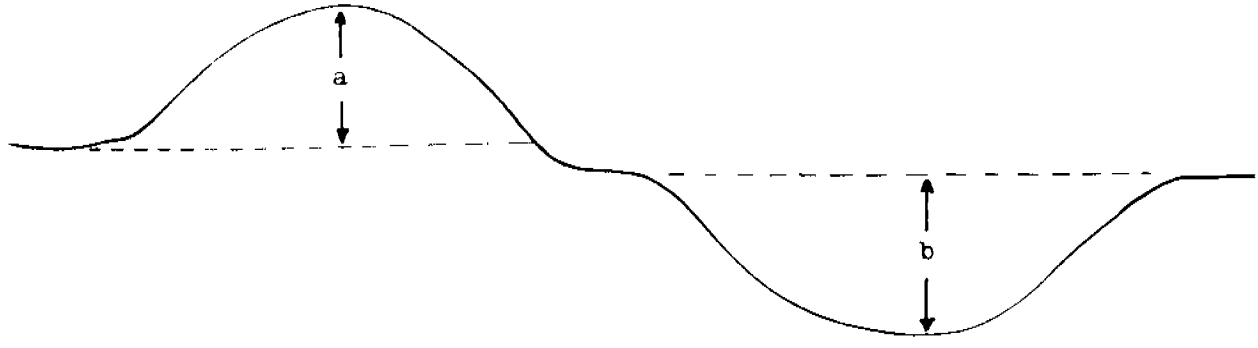

Figure V. Calibration factor =

a + b + 20 degrees

If all the material will be purchased individually, one will spend around P8,600 broken down as follows:

1. ECG machine: P5,000 to P7,000 for a second hand vacuum tube model. Second-hand newer models would cost half its original price which is about P15,000.

2. EEG Electrodes: A set of 12 of this same type (3M) costs P4,000. If only a single channel using 3 electrodes is desired, a group of 4 persons can probably buy a set wherein each one will spend P1,000. If there's an EEG lab in your area, you can probably ask for the discarded ones and repair it.

3. EEG paste: a 500 gm container cost P420.

4. Chart paper (50x30): P80/roll

CONCLUSION

The use of electronystagmography offers a finer and more quantative method of study of the vestibular apparatus than gross studies. Because of insurmountable costs, we in the Philippines have lagged behind our European and American confreres in its use. With this presentation the authors have proven that ENG can be inexpensive diagnostic tool and may routinely be used in office practice.

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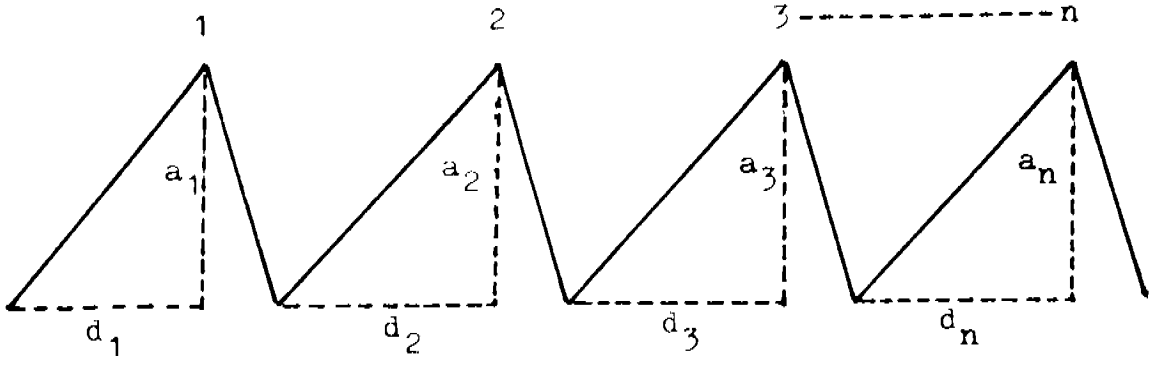
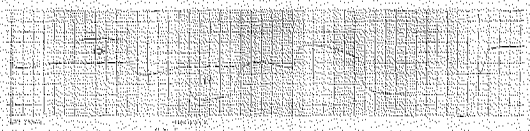


$$SSC = \frac{\text{total a}}{\text{total d}} \times \text{calibration factor} \times \text{paper speed}$$

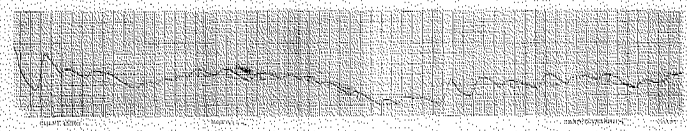
Figure VI. Determination of the speed of the slow component (SSC). N beats occur during the period over which the average is obtained. a = slow phase amplitudes; d = slow phase durations;



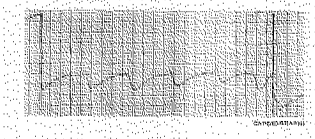
12 + 17 = 29/20 = 1.45° /mm

COLD - L

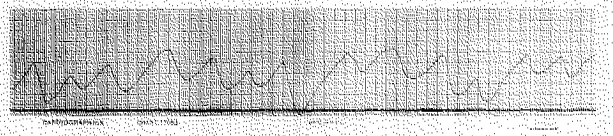
eyes close



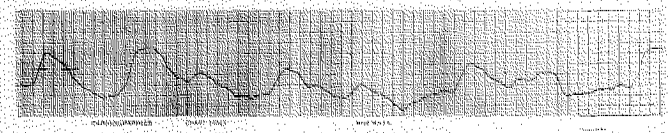
SSC = 5/91 x 1.45 x 25= 13.9 °/sec



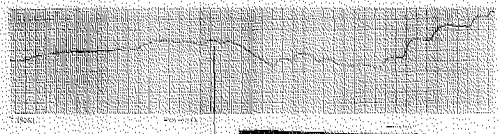
Blink Pattern
(voluntary, in succession)



COLD (R)

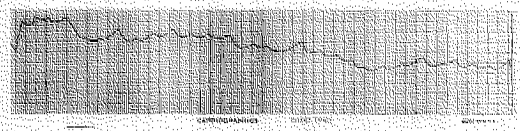


COLD (L)



eyes open eyes close

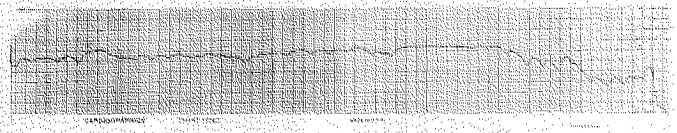
COLD (L) WITH PATIENT MOTION



COLD (R)

COLD (L)

COLD (L)



OSSEOUS RECONSTRUCTION OF THE RESECTED MANDIBLE USING HORIZONTAL SLIDING OSTEOTOMY: A PRELIMINARY REPORT*

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ABNER L. CHAN, MD***
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ABSTRACT

Horizontal sliding osteotomy as a technique for reconstructing the anterior mandibular arch in two cases of ameloblastoma is reported. The technique is described with emphasis on factors deemed critical for graft survival. A review of previously used materials and technique as well as basic regarding bone healing in osteotomy procedures are briefly discussed. This surgical technique provides a relatively safe, simple and practical approach either used alone or in combination with another technique with good aesthetic and functional results.

Primary reconstruction of mandibular defects following ablative tumor surgery remains a challenge to the head and neck surgeon despite significant advances in techniques over the last two decades[1]. Ameloblastoma is a controversial tumor characterized as an invasive, destructive and locally malignant tumor[2].

Treatment directed towards a complete removal of the diseased tissue with adequate normal bony margins while giving the best chance of cure and preventing recurrence poses problems from loss of mandibular segments. Localization of this tumor in the mentum is considered rare [3] but creates a more problematic situation.

Central defects of the mandible if not reconstructed primarily results in the "Andy Gump" deformity as shown in Figure 1. The surgeon needs to consider problems like poor control of salivary secretions, poor masticatory function, speech problems in addition to the severe cosmetic disfigurement.

Historically, sliding osteotomy whether horizontal, vertical, sagittal or oblique have all been used for treating cosmetic deformities like retrognathia or prognathism[4]. Literature review, however, failed to reveal the use of sliding osteotomy to reconstruct the resected mandible following ablative surgery. This report describes a preliminary experience using horizontal sliding osteotomy to reconstruct the anterior mandibular segment following radical excision of ameloblastoma. A review of previously used techniques is briefly outlined and basic studies of relevance to this clinical problem are presented.

REPORT OF CASES

Case 1.

A 66 year old woman (Figure 2) from Tarlac presented with a right gingival mass in the mandible of 6 months duration. The mass (Figure 3) was described as non-tender, hard, slowly enlarging with associated displacement and loosening of teeth overlying the mass and malocclusion. Past medical history is positive for hypertensive heart disease and previous surgery for goiter (1982). Mandible x-rays showed a unilocular-radioluscent lesion. Wedge biopsy showed ameloblastoma. A repeat biopsy was done to confirm the diagnosis of ameloblastoma considering the absence of the classical x-ray findings in the case.

Initial examination showed a 6 x 3 cm hard mass in the mentum more towards the right with loose central and lateral incisors. No mucosal erosion was evident. A radical excision was planned and pre-operative prosthetic evaluation was done. An occlusal splint was made and strict oral hygiene was initiated. On February 8, 1990 she underwent surgical excision with bony margin via a submandibular incision. A visor flap developed at subplatysmal level was done until complete exposure of the mandible from angle to angle (Figure 4). The extent of tumor was delineated and the extent of excision marked and measured with a gauze strip. The intraoral incision with 1 cm margin from tumor was done using electrocautery. A carious lower molar in the right was extracted. Segmental mandibulectomy was carried out using Gigli wire. Sliding osteotomy was done on both sides allowing a 1.5 cm margin to bridge the 5 cm gap created (Fig. 5). Osteotomy was done without stripping

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the periosteum and a 4 cm segment of bone was advanced to the midline from each side (Fig. 6). The bony edges at midline were wedged to add more stability during interosseous wiring (Fig. 7). Oral mucosal suturing was done using Dexon 3-0 and silk 2-0 for watertight closure. The occlusal splint was applied to the lower mandible and fixed by circumferential wiring. NGT was inserted. Using the patient's upper denture with holes in place (Fig. 8), wiring to the alveolus was done prior to maxillomandibular fixation. Tube drains were placed bilaterally. Closure of the wound was done first by suturing the suprahyoid muscles to anterior periosteum then soft tissue closure with chromic 3-0 and skin closure with silk 4-0. Pressure dressing was placed. Intravenous antibiotics in the form of clindamycin 300 mg IV q 6° and metronidazole 1 gm suppository q 8° were given. NGT feeding was started after 24 hours. Post-operative course was uneventful with mild drooling of saliva encountered while swelling was present. At 5 days post-surgery, antibiotics were shifted to the oral preparation. Sutures were removed after 8 days. Patient was discharged with NGT and home medication of ofloxacin 200 mg BID. Final histopath was ameloblastoma with all lines of resection negative for tumor. Maxillomandibular fixation was continued for 6 weeks and panoramic x-ray of mandible used to confirm bony union before removal of the occlusal splint (Fig. 9). Intraoral silk sutures were also removed and the patient started on soft diet. Patient was last seen 7 months post-operatively with satisfactory cosmetic and functional results (Fig. 10).

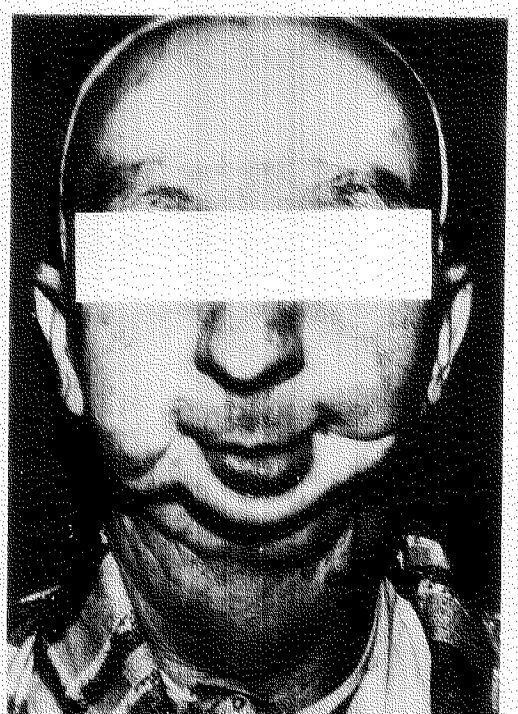

Figure 1. "Andy Gump" deformity.

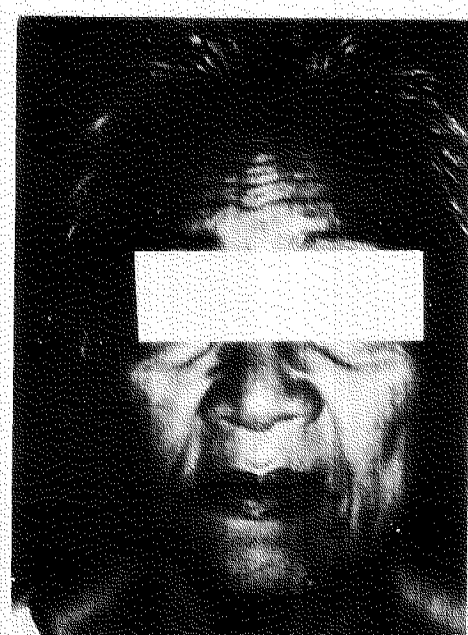

Figure 2. Preoperative picture (Case 1).

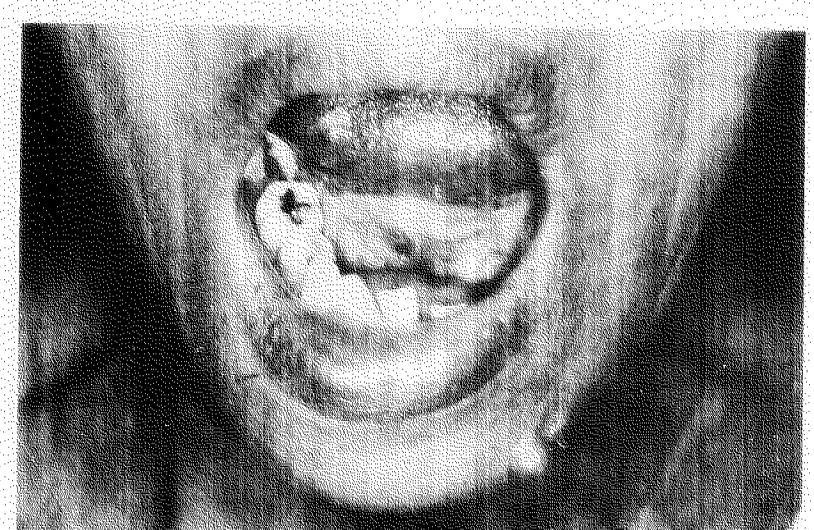

Figure 3. Intraoral mass located in the mentum

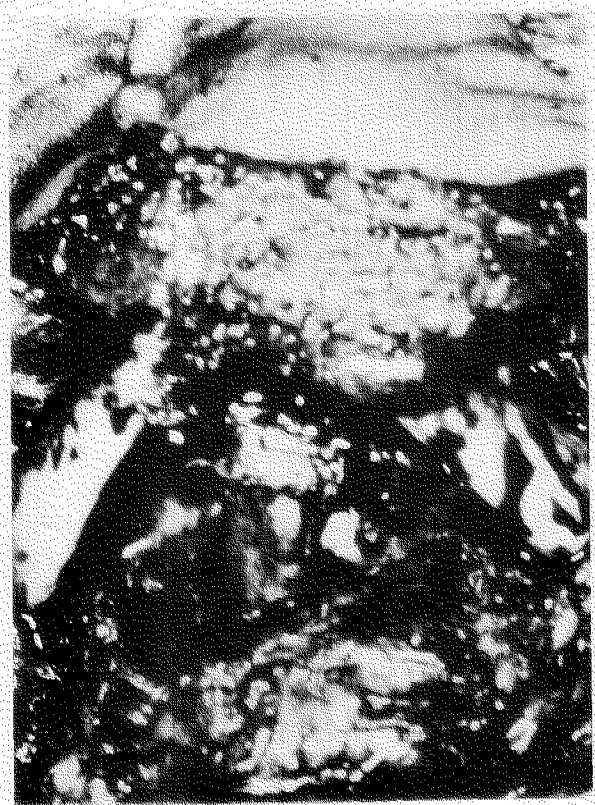

Figure 4. Exposure of mandible with note of the mass at the midline.

Figure 6. Bone fragment after horizontal osteotomy slides to midline.

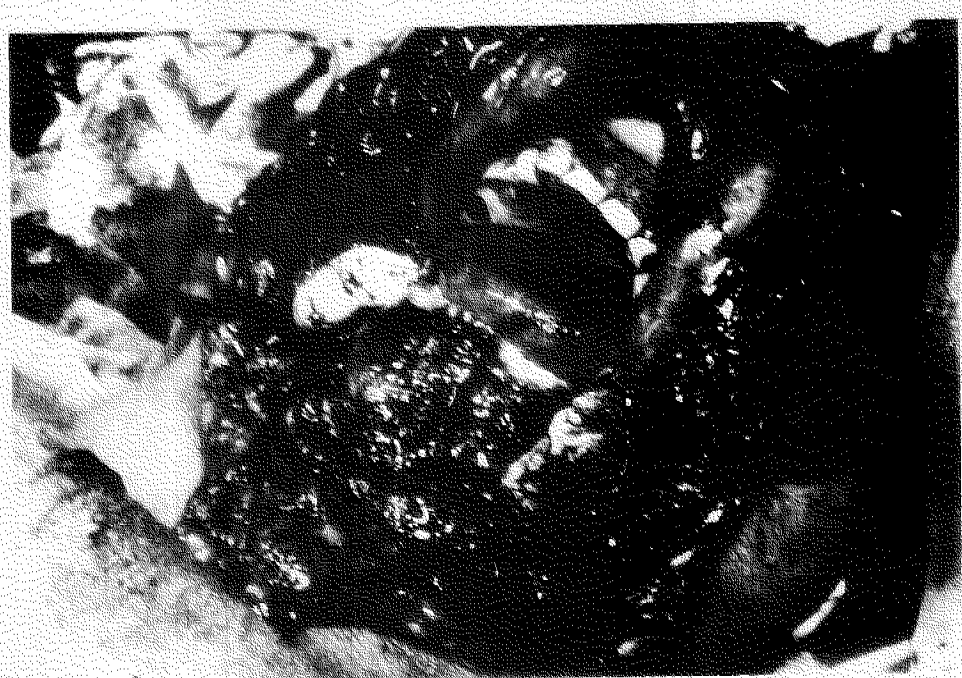

Figure 5. The mandibular defect (5 cm) after resection of tumor.

Figure 7. Interosseous wiring at midline after wedging the edges for stability.

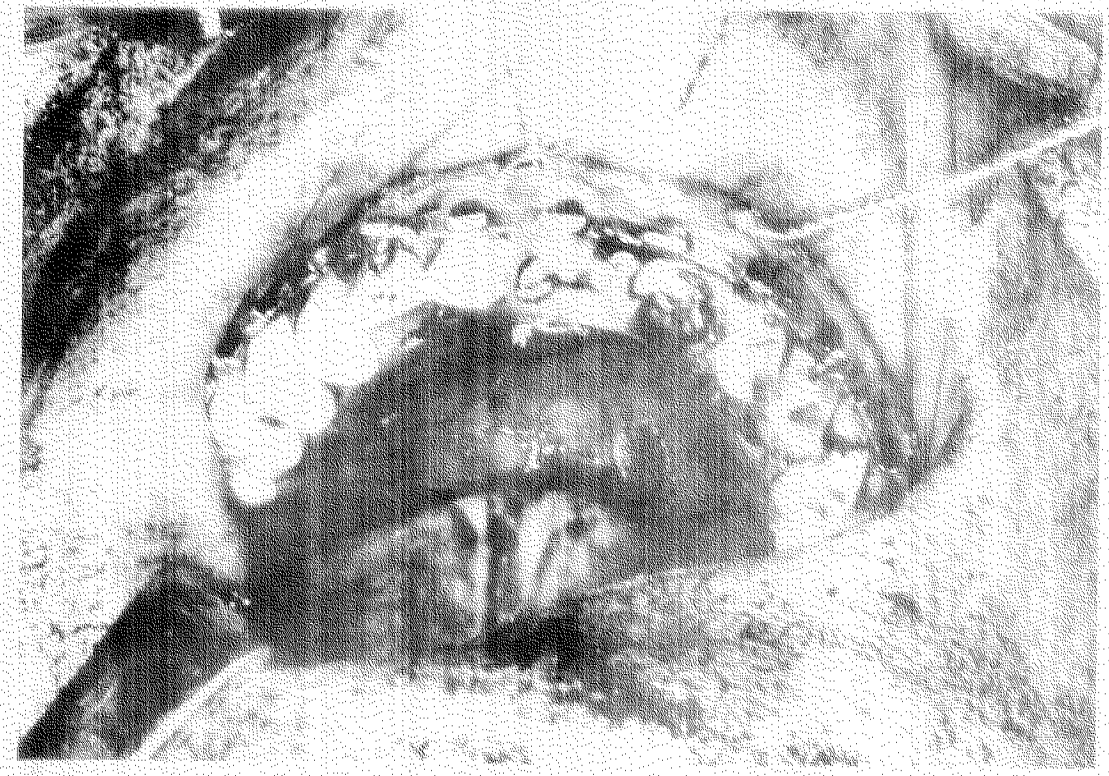

Figure 8. Upper denture wired to alveolus prior to maxillo-mandibular fixation.

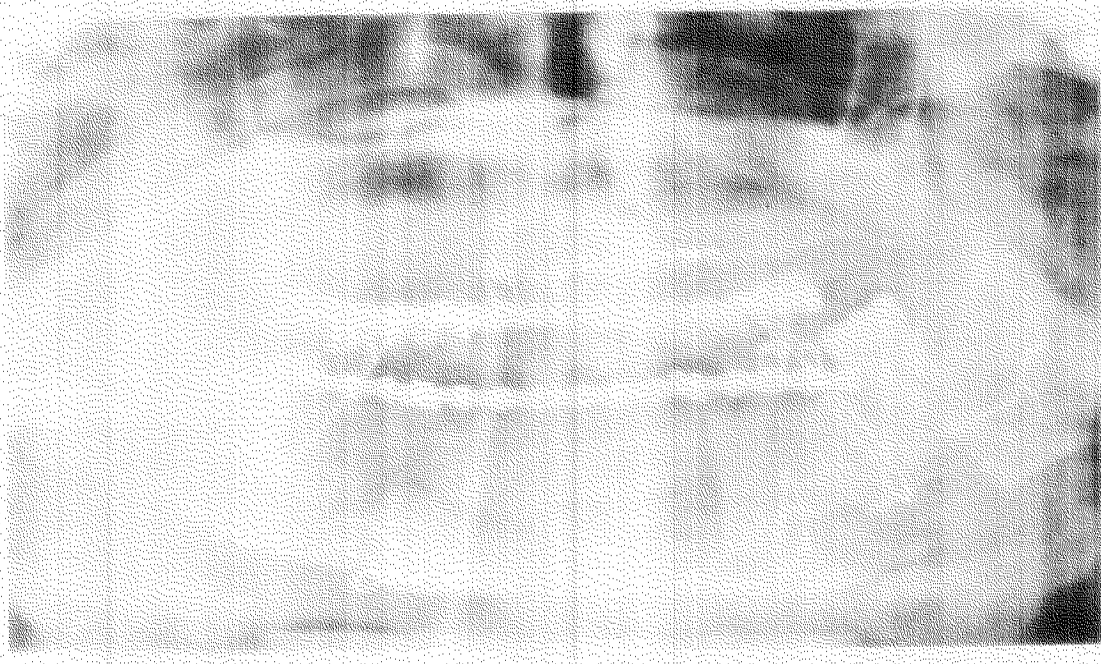

Figure 9. Panorex view to confirm bony union before removal of maxillo-mandibular fixation (Case 1.)

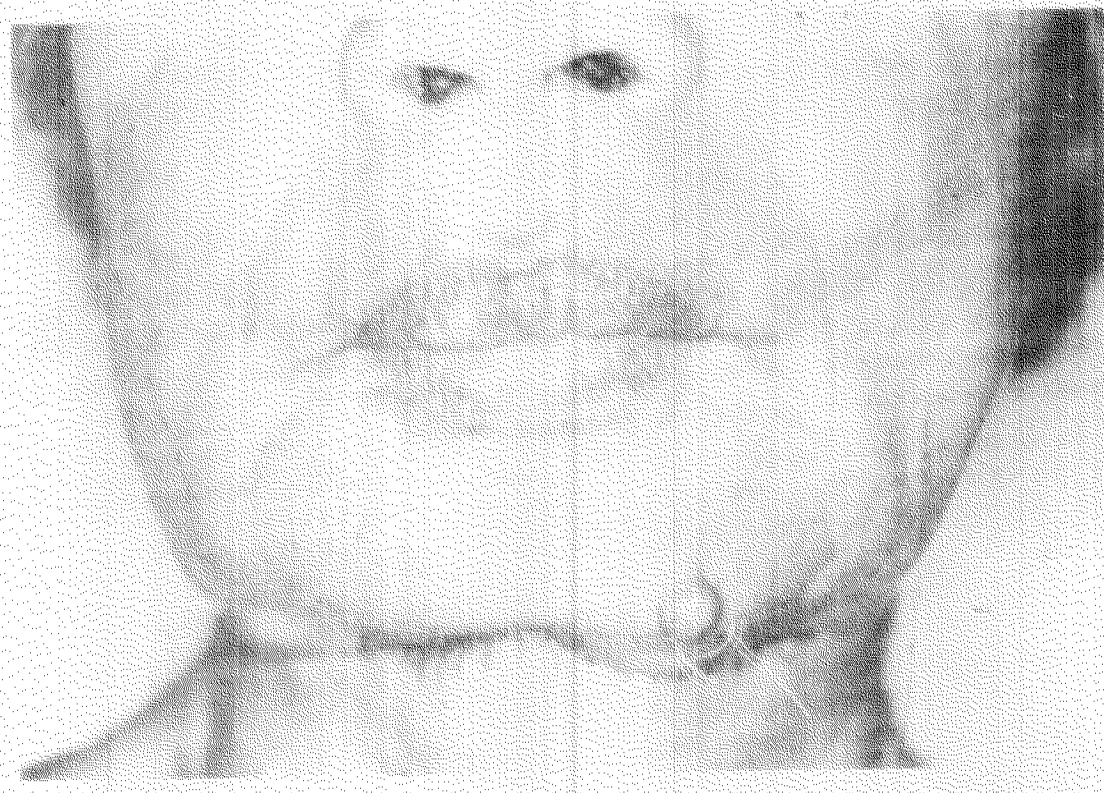

Figure 10. Postoperative picture (Case 1).

Case 2

A 48 year old female presented with a gingival mass in the mandible of 1 year duration. The mass was described to be hard, non-tender and slowly enlarged from a size of 2 x 1 cm. There was note of loosening of the teeth over the mass but no history of mucosal bleeding or ulceration. There was no associated trismus. Physical examination (Fig. 11) centered on the mandible with an 8 x 5 cm non-tender bony hard mass on the left hemimandible to the right premolar area with no mucosal ulceration. Loose lower lateral incisors and premolars were noted. Mandible x-rays showed an expansile lesion of the mandible with areas of lysis and calcification compatible with ameloblastoma (Fig. 12). Electrolytes were normal except for slightly low potassium. There was also decreased prothrombin time. Urinalysis also showed increased wbc count consistent with urinary tract infection. Aquamephyton was given as well as oral KCl 10% solution at 30 cc TID for one week. Cotrimoxazole was given for treatment of urinary tract infection. Wedge biopsy was done after correction of hematologic and electrolyte abnormalities. Histologic examination revealed "ameloblastic fibroma" and patient was subsequently admitted. Pre-operatively an occlusal splint was made. On March 2, 1990 the patient underwent excision of ameloblastoma with 1 cm normal margin of bone via a submandibular incision with a visor flap developed in a subplatysmal plane. The mandible from angle to angle was exposed (Figure 13). Intraoral incision with 1 cm margin was made. The resected specimen was 4.5 cm long left of midline and 2.5 cm right of the symphysis. To reconstruct the left hemimandible, the clavicle with sternocleidomastoid attachment and intact periosteum was used. Horizontal sliding osteotomy on the right side with 4.0 cm segment of the bone was advanced towards the midline (Fig. 14). To reconstruct the left hemimandible,the head of the clavicle was shaped and a bony wedge done on the medial edge of the 6.0 cm pedicle bone graft for added stability during interosseous wiring. Closure of oral defect using Dexon 3-0 suture and silk 2-0 was done with watertight closure.The occlusal splint was placed and circum-mandibular wiring was done. NGT was placed. Maxillomandibular fixation was done with arch bars placed to the upper dentition. The suprahyoid muscles were sutured to the periosteum. Closure in layers with chromic 3-0 sutures was followed with skin closure using silk 4-0 sutures. Negative tube drains were placed bilaterally. Pressure dressing was applied. Clindamycin 300 mg IV q 6 and metronidazole 1 gm suppository q 8 were given. Patient however developed hematoma in the left supraclavicular area within 24 hours. This was promptly evacuated under general anesthesia and a Y tube drain placed with negative pressure. Osterized feeding per NGT was started after 24 hours. Intravenous clindamycin was given for 14 days more while metronidazole was shifted to oral on the fourth post-operative day. There was note of a 1 cm wound dehiscence intraorally but this was managed conservatively with closure noted after 1 week. Patient was discharged on the 18th post-operative day. Panoramic x-ray of the mandible was done to confirm bony union 4 weeks post-surgery (Fig. 15). Maxillomandibular fixation was removed at 6 weeks post-op and patient allowed soft diet intake. Serial x-rays were done to objectively evaluate bony resorption and a prosthesis was placed after 4 months for complete functional rehabilitation of the patient (Fig. 16-17).

Comment

Ameloblastoma is one of the controversial tumors of the jaw although it accounts for only 1% of all these tumors. It is characterized as invasive, destructive, locally malignant although histologically benign. It has an 80% predilection for the mandible with 20% localized to the maxilla [3]. The mentum was rarely involved as reported by Eufemio in a local study [5]. Treatment is directed towards a complete removal of diseased tissue with adequate margin of normal bone. The radical approach, while offering the best chance of cure and preventing recurrence, results to problems regarding reconstruction of the resulting mandibular deformity. Loss of mandibular segments do result to serious disabilities including impairment of mastication, articulation, poor control of salivary secretions and moderate to severe cosmetic disfigurement. These problems become more critical when the segment resected includes the symphysis. Unlike the ramus, angle and body of the mandible which are readily duplicated, establishing the curvature of the symphysis and maintaining stability in this location are more technically difficult[6]. In addition, the symphyseal and parasymphyseal areas are considered to be at greater risk of bone graft failure because of their poorer blood supply, increased stress from muscle pull at the mentum and relatively inadequate soft tissue coverage [7]. The well known "Andy Gump" deformity with all its attendant problems are encountered. Aside from location of the tumor, both the timing of repair and the choice of surgical techniques are of paramount importance. Primary reconstruction is preferred over delayed reconstruction because of soft tissue contracture encountered in the latter. In addition, secondary reconstruction may already present with displaced mandibular segments, facial disfigurement, dental malocclusion as well as masticatory problems. Immediate or primary reconstruction, however, is not without its disadvantages, especially where there is an intraoral extension of tumor. A potentially infected site usually compromises the bone graft take. Aside from timing, the reconstructive surgeon has to choose from among a variety of materials used in mandibular reconstruction as shown in Table 1.

Autogenous bone was initially harvested from the tibia

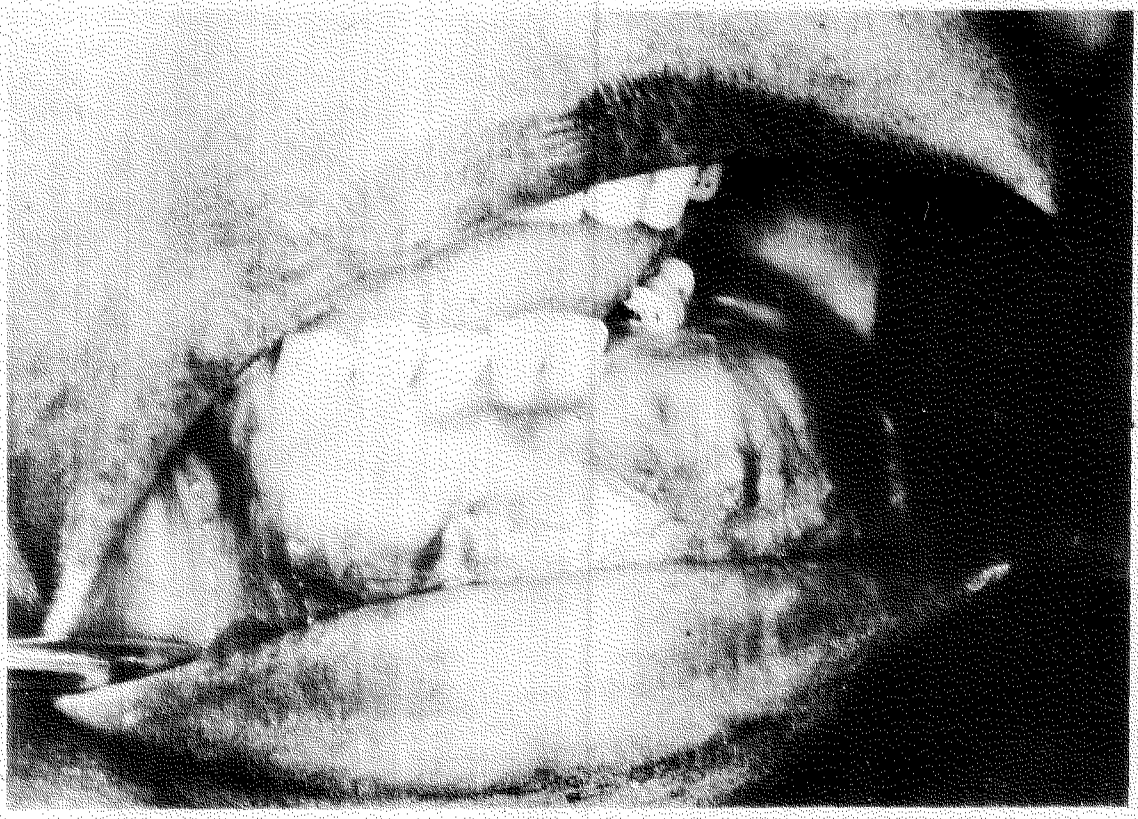

Figure 11. Large mass involving the left hemimandible and crossing the midline.

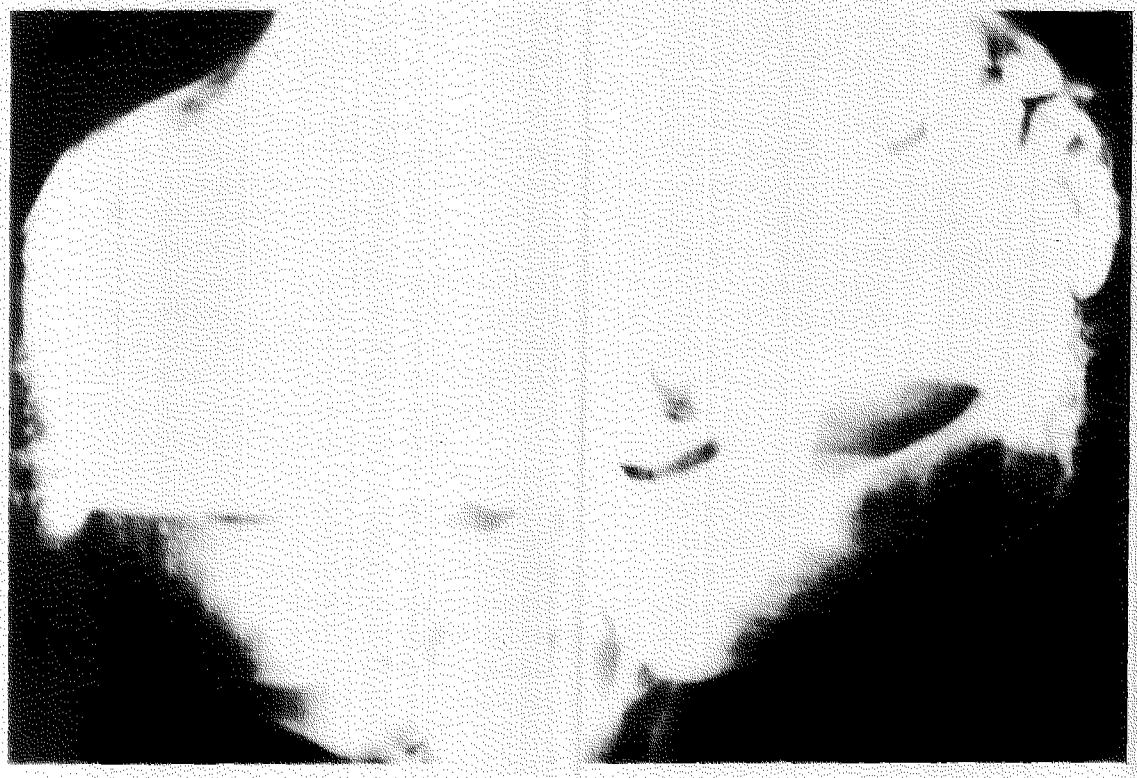

Figure 12. Pre-operative mandible APO x-ray to show lytic expansile mass.

Figure 13. Wide exposure using visor flap to include both angles of mandible.

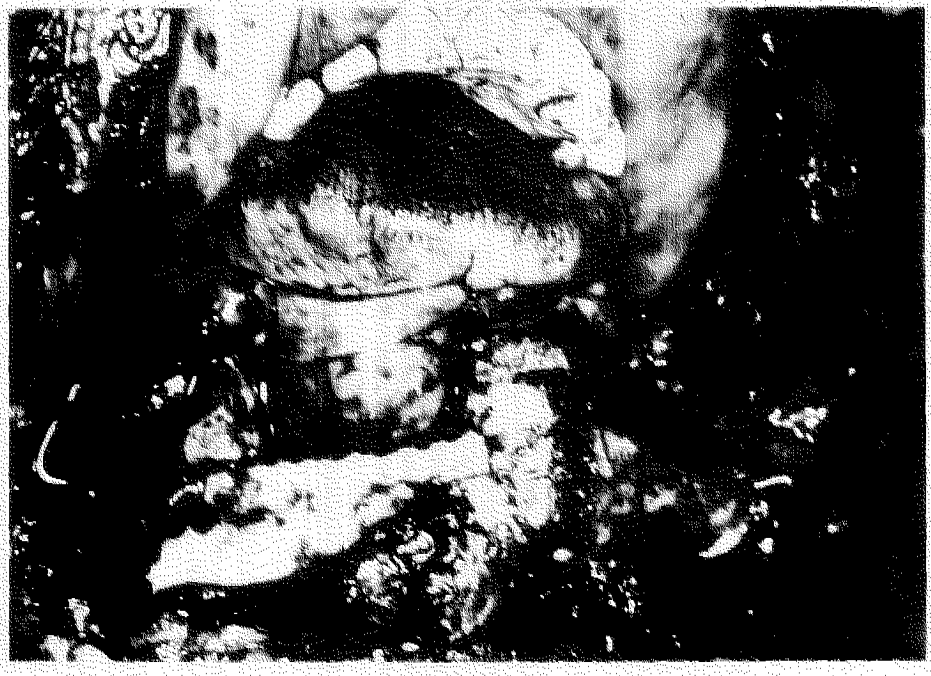

Figure 14. Right bone segment slid to meet edge of clavicle-myoosseous flap at left. About 1.5 cm contact to adjacent mandible is maintained.

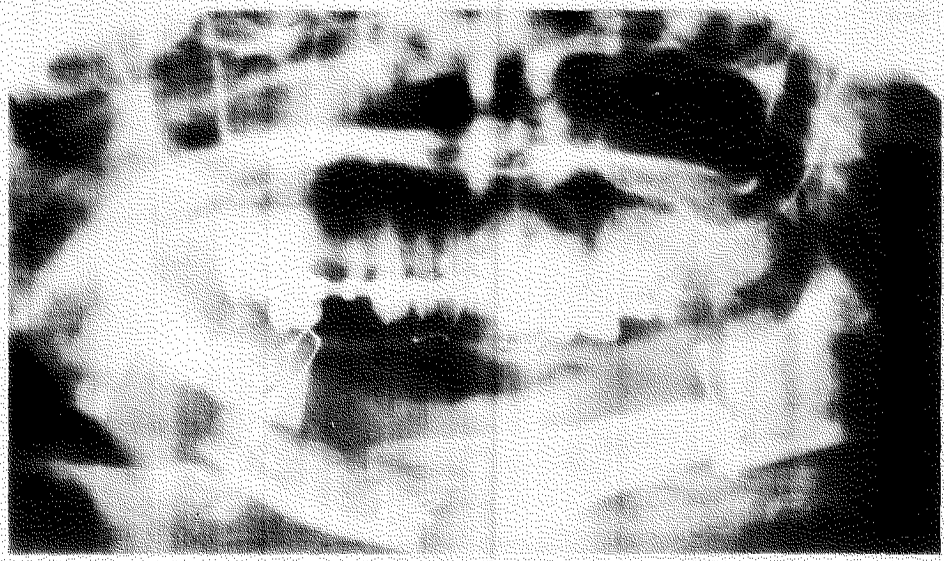

Figure 15. Panoramic view of mandible to confirm bony union (Case 2).

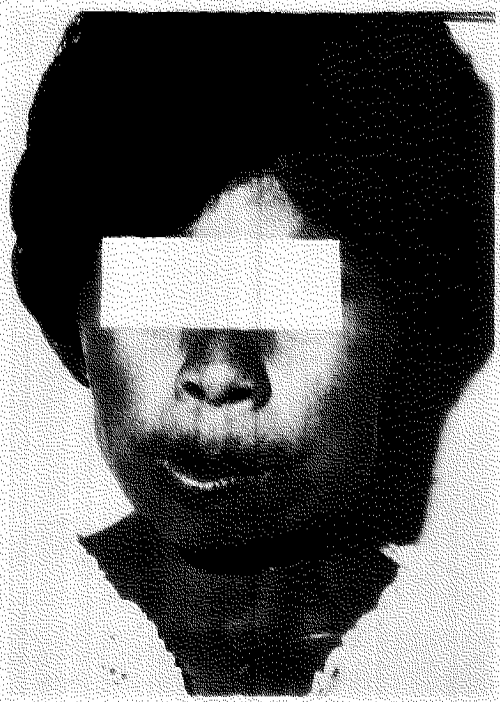

Figure 16. Picture of the patient at 7 months post-surgery.

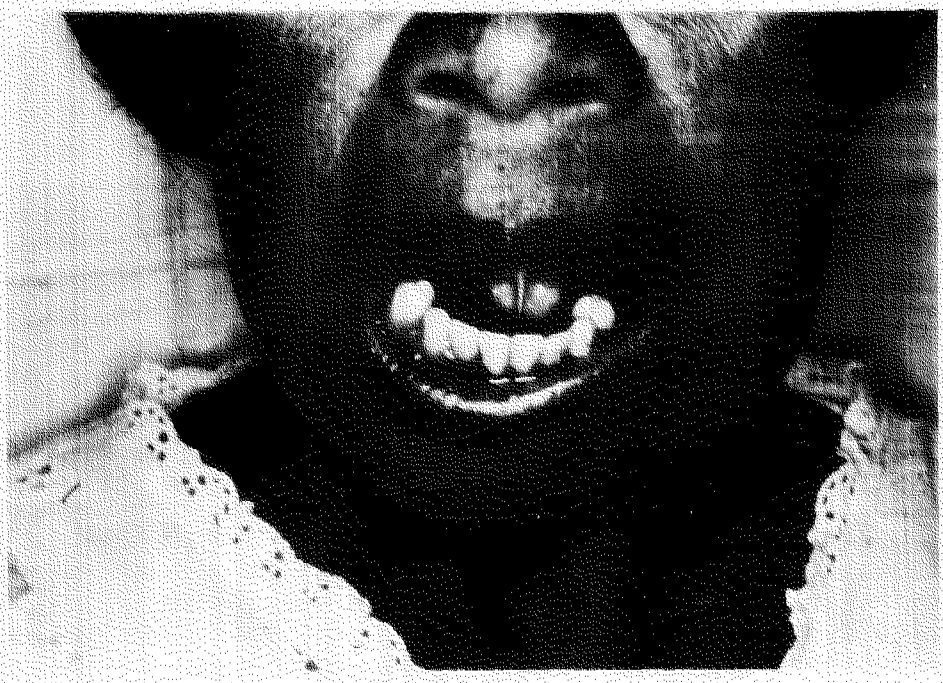

Figure 17. Lower denture fitted to patient for complete functional rehabilitation.

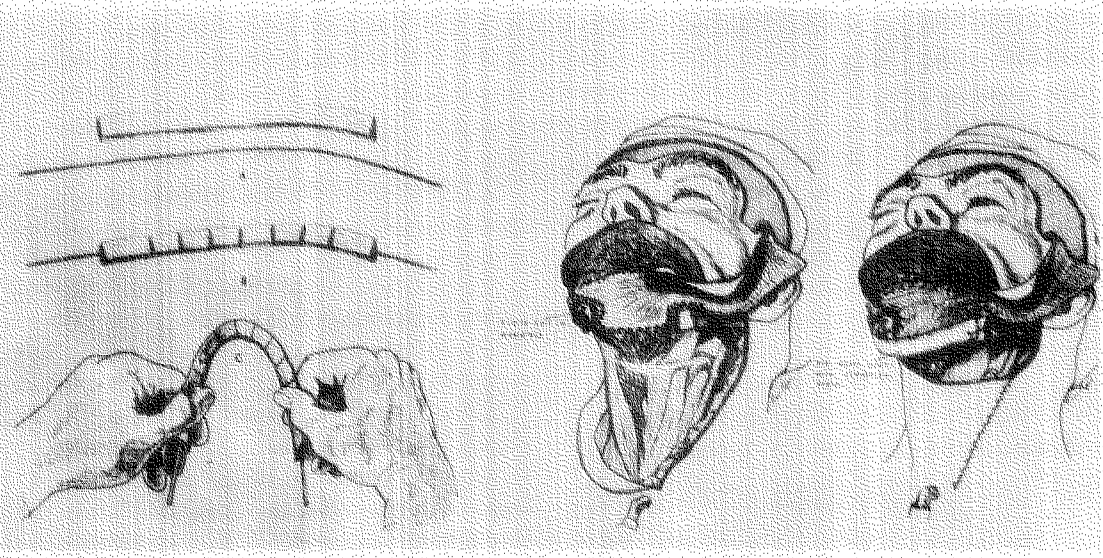

Figure 18. Left, scored and skewered rib graft bent to contour. Right rib graft in place.

or rib by Bardenheuer[8] in 1892. In 1916, Blocker and Stout[9] successfully utilized iliac bone for reconstruction of large mandibular defects. In the 1940's, a trend towards grafts with predominantly cancellous surfaces was begun with the landmark work of Mowlem[10]. The problem with bone chip grafts was the tendency of soft tissues to displace the bone particles during consolidation[11]. Since then, many surgeons have started using various alloplastic materials to support both block and particulate marrow grafts. A Kirschner wire has been used to skewer the graft to render it more stable and contour the graft [12] (Fig. 18). Tantalum is used in a sheet or mesh form as an aid in mandibular reconstruction. Although it cannot be fabricated in a form strong enough to be permanently self-supporting, it is valuable as a temporary splint for bone support. Vitallium mesh has been used most widely as a result of 90% success rate reported by Hahn and Corgill[14]. Recent advances in metal research has given rise to titanium with its increased use as an implant material. Similar operations with the use of Dacron-urethane composite trays have been reported with good results up to one year[15]. Although short term results can be good, these implants may loosen with time and ultimately erode through skin. Boyne and Zarem[16] described their technique of using particulate grafts of autogenous marrow and cancellous bone in a titanium mesh with a frank failure rate of 17%. In 1981, Hamaker popularized the use of the free autogenous irradiated mandibular graft in seven cases[17]. This technique although plausible, results in extrusion of the graft in the majority of cases. Recent reports using freeze dried bone grafts revealed problems related to soft tissue breakdown of overlying mucosa. Advances in microvascular surgery have led to use of neovascularized bone grafts. Snyder[18] and Conley[19] introduced osteocutaneous flaps as a means to reconstruct the mandible. They reported a fair success rate of 35% in non-irradiated beds. Recent reports by Panje and Cutting[20], Cuono and Ariyan[21] reveal success rates ranging from 50-80%. The varied success rates and the numerous unacceptable donor site defects have made such methods unattractive. Urken and co-workers have described the use of combined internal oblique iliac crest for oromandibular reconstruction[22]. Other authors have used the pectoralis muscle with rib graft[23], revascularized scapular osteocutaneous flaps[24] among others.

Free flaps in particular, however, were accepted reluctantly by surgeons because of several reasons namely: 1) length of operative time, 2) need for a well trained microsurgery team, 3) complicated surgical instrumentation, 4) high cost and 5) donor site morbidiity.

It is clear from the preceding discusion that diversity of method and opinion regarding mandibular reconstruction is great. There appears to be no absolute indication for each technique as long as the basic principles for reconstruction are followed.

At the Philippine General Hospital, following ablative surgery alloplastic materials like Kirschner wires, tantalum, vitallium mesh have all been used[5]. The most commonly used method, however, is the clavicle with sternocleidomastoid pedicle flap[25]. Results obtained have been satisfactory as reported previously. However, the involvement of the mentum has posed a special problem. The clavicle can hardly provide the proper shape of bone needed to reconstruct the mentum. For this reason the use of horizontal sliding osteotomy was conceptualized. The outcome of such grafting procedure will be considered as satisfactory if the mandibular arch remains rigid, of planned shape even though some reduction in bone volume may have occurred. Prosthetic rehabilitation with provision of denture to afford normal mastication will also be a goal.

Any new procedure, however, has to have a sound physiologic basis. A brief discussion of recent studies regarding bone healing in osteotomy procedures will be presented in order to better understand the physiologic correlates using this technique. Wilson[26] studied the circulatory and skeletal damage following vertical osteotomy of the mandible in rats. Microangiography using tetracycline and lead acetate labelling showed that resorption of the compact bone occurs in the central part of the compact bone, in the lower border of the mandible and in the incisal part of the alveolar bone. Remodelling processes in the compact bone follows from vascular channels and on the surface of bone trabeculae 10 days after osteotomy. Microangiography revealed that there is a collateral vascular system existing across the midline via the symphysis region, via the submucosal tissue, via the mucoperiosteal pedicle to the inferior border of the mandible and via the network of small vessels in the periodontal membrane. From this study, it was concluded that circulation to the peripheral parts of the mandible could be kept up by a retrograde flow in the collateral system when the main circulation had ceased. Lanigan[27] observed that significant aseptic necrosis occurs less frequent in the mandible than that following maxillary osteotomies. Significant necrosis is prevented when the surgeon follows the basic principle of stripping the minimal amount of mucoperiosteum and muscle attachement from the osteotomized segments commensurate with the successful completion of the osteotomies. This principle was adhered to in the two cases presented and suprahyoid muscles were carefully apposed and attached to the remaining periosteum following bone graft positioning. As regards activity of the suprahyoid musculature, Ellis[28] investigated changes following advancement of the mandible and the use of rigid and non-rigid fixation. Results of this study showed no differences in suprahyoid EMG activity with different types of fixation. A comparative study of screw and wire fixation as it affects stability of mandibular advancement following sagittal osteotomy was done by Watzke in 70 patients[29]. In the first 6 weeks postsurgery, screw fixation group was more stable horizontally and vertically than the wire group but

TABLE 1. Materials Used for Mandibular Reconstruction

Free Autogenous Bone Grafts cortical
cancellous and cortical
cancellous (bone chips)
Alloplastic Materials
Kirschner wires
tantalum, vitallium, titanium prosthesis
metal or Dacron prosthesis combined with cancellous bone
Allografts/Homografts
irradiated bone
freeze dried bone
Vascularized Bone Flaps
pedicled (composite osteomyocutaneous flap)
free (osteocutaneous or osteomyocutaneous flap)

between 6 weeks and 1 year the wire group showed recovery and mean difference all but disappeared. In the present report, interosseous wiring was done in addition to wedging of bony edge for added stability in the midline. In addition, about 1.5 cm overlap of cancellous bone is maintained on each side to ensure maximal contact of regenerative segments. An occlusal splint, designed in closed cooperation with a prosthodontist, was circumferentially wired to the lower mandible. Maxillomandibular fixation using the previous upper denture of the edentulous (Case 1) or the natural dentition (Case 2) also contribute to supporting bone regeneration and healing during the critical post-operative period (6 weeks), where any form of motion may produce stress especially to the symphysis.

The two cases presented no untoward post-operative morbidity except for hematoma in one case which was promptly evacuated. The use of the technique may be particularly applicable in selected cases where the mentum is primarily involved as in case 1 or where a large segment of the mandible is involved such that a combined technique is necessary (case 2). This technique offers the following advantages:

1) procedure is relatively safe and simple
2) short operative time
3) morbidity from a separate donor site is avoided
4) contour match relative to defect is very satisfactory
5) prosthetic rehabilitation is possible especially in a non-edentulous patient
6) cost related to more expensive surgical materials and complicated surgical instrumentation is dispensed with

Limitations in using this technique are as follows:

1) size of the defect should not be more than 8 cm to maintain a 1.5 cm contact on each side; a combined technique is recommended for larger lesions
2) contraindicated in cases where surrounding bone is diseased e.g. osteoporosis
3) not advised in patients with previous history of irradiation to the mandible because of compromise to regional vascular bed.

In summary, preliminary experience using horizontal sliding osteotomy as a technique for reconstructing the anterior mandibular arch in two cases of ameloblastoma is reported. The surgical technique provides a relatively safe, simple and practical approach whether used alone or in combination with another technique with satisfactory aesthetic and functional results. A longitudinal study with more cases and longer follow-up period is recommended for critical appraisal of this technique as it may well add to the surgical armamentarium of the head and neck surgeon especially in the local setting.

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AN OBTUSE-ANGLE TONGUE DEPRESSOR WITH ILLUMINATOR*

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ABSTRACT

This modified tongue depressor, adaptable to both Davis and McIvor mouth gag frames, crafted from stainless steel, provides two important features that are highly practical and superior to the standard model which is presently used for oral surgery. It has an obtuse angle that has clinically proven its physiologic advantages and a bulb that provides vivid oral illumination. Its adaptability to both alternate current (AC) and direct current (DC) electricity makes this instrument useful even with power failure. Its use has likewise been shown in the out-patient setting in the examination of the oral cavity, oropharynx and on mirror examination of the nasopharynx. With its practical benefits, minimal maintenance cost and ease in handling, this instrument has poven to be advantageous for both patient and otorinolaryngologist.

INTRODUCTION

Never in the past have surgical procedures become more technical and scientific as today. Developments of the past have undergone much improvement and have likewise become more functional. The individual using all these new instruments himself has become innovative. It is clear that today's instruments are becoming more compact, more scientific and more practical.

The cost, however, of medical and surgical instruments these days has definitely become so prohibitive for many medical practitioners. The need, however, for these gadgets for proper diagnosis has only made the striving practitioner seek out alternative solutions to this problem.

The objectives of this paper are as follows:

1. to present an instrument that could allow a wider opening of the oral cavity for a greater surgical work area.
2. to devise an instrument with a built-in light that could adequately illuminate the operative field.
3. to provide the oral surgeon with a basic oral surgery instrument that is of very low cost yet of competitive quality and craftsmanship.

MATERIALS AND METHODS

CHOICE OF MATERIALS:

All the materials used for this instrument have been carefully selected with regards to their durability, availability, and cost-efficiency.

Metal Selection

For this instrument, Series 300 stainless was used. This was properly measured, cut and bent, with locking grooves etched at its rear side to adapt perfectly to both Davis and MacIvor mouth gag frames (Figure 10).

Being a Steel-Nickel-Chromium alloy, this metal is highly resistant to rust and corrosion.[1] Its high steel content gives its characteristic hardness, and thus, does not easily bend on tension.[2]

This metal, likewise, possesses a very low heat-conducting capacity (Table 6) thus making thermal injury on the tongue, from the heat of the bulb, improbable.

Furthermore, it is easily available from most metals dealers at a very affordable cost.

Bulb Selection

The proper choice of bulb is one of the key facets to this instrument. The Welch-Allyn 2.5 volts halogen bulb was chosen because of its size, and illumination. Besides, its lighting quality and capacity is far better than the incandescent bulb.[3]

Bulb Carriage and Tubing

A 3 mm diameter x 15 cm long stainless tube was used as the carriage for the attachment of the halogen bulb on the tongue blade. This also serves as the housing for the electrical wires from the bulb's pole up to the distal end of the tongue blade.

Energy Source

Efficient electrical energy for bulb illumination is derived from any 3-volts power source. Direct current (DC) electricity is derived from any two 1.5 volts batteries arranged in series, giving a total of 3 volts to light up the bulb. In instances where alternating current (AC) is available, the instrument can be attached to a 220 volts-to-3 volts converter-adaptor (Figure 11).

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* Presented at the 34th Annual Convention of PSO-HNS, Instrument Innovation Conntest, Century Park Sheraton, Manila, Dec. 7-8, 1990.

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INSTRUMENT DESCRIPTION

This obtuse-angle tongue depressor with built-in light along wih mouth gag frame is a very handy and light-weight instrument (Figure 6). It has five main parts, namely, the tongue blade, bulb carriage, halogen bulb, circuit switch and energy source.

The stainless steel tongue blade alone weighs150 grams with an over-all length of 23 cm. It is bent at an angle of 110 degrees, 9 cm from its proximal end. This proximal end (tongue part) is flared and curved inward at its tip, with its widest dimension measuring 3 cm. It has a thickness of 2 m. Its distal portion is multi-notched at its dorsal side for the mouth gag frame's locking mechanism.

The 15 cm x 3 mm diameter stainless steel tube rests on a groove etched on the top of the tongue part. The remainder of the tube passes down the ventral side of the tongue blade's distal portion through a hole drilled near the angle. The tube's proximal tip is threaded to enable the halogen bulb to be screwed in place. Prior to this, two insulated electric wires are passed through the tube, one soldered onto the inner surface of the tube, and the other approximated to the bulb's pole. Insulation with rubber and Fisch paper makes the tube air and water tight upon placement of the bulb.

The wires are then connected to a circuit switch before being attached to the energy source. Figure 5 illustrates the instrument's simple circuitry.

INSTRUMENT SAFETY DESIGN

Safety is always the prime factor for every instrument designed and made for general use. The dangers posed by thermal and electrical injuries, among others, make proper measures for product safety mandatory.

A halogen bulb placed at close range to any subject will definitely provide good illumination (Table 5). However, electrical conduction and heat production through the metal oral appliance may only prove harmful to both patient and surgeon.

Proper electrical insulation using rubber and Fisch paper was fitted at the bulb end for adequate insulation.

To further ensure an electrically safe device, water conduction tests were carried out using an Allison AS-1200 Multi-Tester. This test was carried out by: 1) direct determination of voltage output from the power source (Figure 7A), then, 2) determining the potential for water conduction by testing on two exposed wire ends from the energy source immersed in the water (Figure 7B), and 3) immersion of the instrument in water and assessment of any current displacement (Figure 7C).

Thermal injury from heating up of the halogen bulb was likewise studied and eliminated by the use of stainless steel. This metal has a very low heat conductivity (Table 6), and on actual testing, absorbed only a maximum of 32 degrees C after two hours of testing (Figures 8 & 9). Furthermore, stainless steel is metal that is non-corrosive, and is thus, highly rust ressistant.[1]

Finally, all edges of the instrument were likewise smoothened out to eliminate any chance of mucosal injury.

DISCUSSION

In order to establish an adequate opening of the oral cavity in oral surgery, an appreciation of the anatomy of the mandible and its dynamics is necessary.

The movement of the jaw rests upon the temporomandibular joint (TMJ).4 This is a freely movable synovial joint between the auricular tubercle, mandibular fossa and postglenoid tubercle of the temporal bone above, and the head of the mandible below.

Several ligaments and muscles tend to limit the movement of the joint. The lateral (temporomandibular) ligament extends from the zygomatic arch to the lateral surface of the neck of the mandible. The sphenomandibular ligament extends from the spine of the sphenoid to the lingula. The stylomandibular ligament spans the styloid process and the angle of the mandible. These ligaments function to limit jaw movements at maximum open and protruded positions.

Movement of the articular disc is controlled by the attachment of the lateral pterygoid muscles which insert through the capsule into its anterior edge. The hinge, rotating and gliding movements of the TMJ are controlled by muscles attached to the mandible.

The ideal instrument, therefore, for opening the mouth is one that follows and conforms to the mentioned anatomic patterns. The obtuse-angle tongue depressor with illuminator is that oral surgery tool that simplifies the oral opening and lighting procedures.

This instrument is angulated to 110 degrees, simulating the angle produced upon full opening of the jaw. This angle is formed by a line drawn parallel to the inferior margin of the mandible, transecting another line running along the vertical plane.

As compared with the conventional right-angle tongue depressor, a wider mouth opening was obtained with the use of this innovative tongue depressor-illuminator. Table 1 shows the study done to compare these two instruments. The mouth was opened to almost twice as much using the obtuse-angle tongue depressor-illuminator, without even having to exert much effort on retraction of the instrument. Using the student's T-Test for statistical analysis, the results were highly significant, thus, a better instrument is shown of the obtuse angulation puts less effort anywhere on the tongue so that the tonsils are relaxed and dissection is made easier. The tongue is positioned forward, giving a better exposure of the lower pole of the tonsils. There is obviously less pressure exerted on the temporomandibular joint.

Futhermore, the bright illumination from its halogen bulb is enough for visualization of the operative field throughout an entire procedure. The amount of light from this instrument was compared to that of the halogen and incandescent headlights respectively (Table 5). To test its actual illumination, a light meter (Sekonic Model L-398) was placed at a distance of 5 centimeters from the tongue depressor's halogen bulb. This simulated the actual distance from the bulb to the operative field in the surgical set-up. The light remained bright throughout each procedure which averaged one hour (Table 1). This replaces the headlight as the light source. To visualize the operative field and the procedure, the assistant would no longer have to depend on the surgeon to focus his head light. This even serves as a good substitute for the floor lamp and head mirror for out-patient examination of the oral cavity and oropharynx and on posterior rhinoscopy.

Battery life, generating 2880 to 5760 ft-candles, was measured by allowing the light to remain continuously on while in front of the light meter. This showed that size "D" batteries lasted 30% longer than size "C", and 68% more than size "AA" batteries (Table 4).

The halogen bulb's lifespan on the other hand was 39 hours. This was determined by connecting the unit to the 220-to-3 volts converter-adaptor. The bulb was left on until it failed.

Heat intensity, produced by the halogen bulb and conducted onto the tongue depressor was likewise determined by fixing a thermometer onto the lingual surface of the tongue depressor (Figure 8). A maximum temperature reading of 32°C was recorded after two continuous hours of testing, with a maintained light intensity of 5760 foot-candles. It was noted that after nine minutes, the temperature level reached its highest and no longer increased from this level (Figure 9). This low temperature can be explained by the low thermal conductivity of stainless steel (Table 6).

Sterilizing the instrument is simple. The entire instrument can be soaked for 30 munites in 1:1000 aqueous solution of zephiran or in 70% alcohol. The instrument can also be sterilized by placing it in a closed container with formaldehyde crystals for at least one day.

Furthermore, the instrument cost is very affordable (Tables 2 & 3). Its total cost of P522.50 (including the mouth gag frame) is way below the price tag of those manufactured abroad which cost between P3800.00 to P5500.00, not to mention the need for a headlight which costs between P6000.00 to P8000.00. Its low price, however, should not be equated with low quality. Its fine finish is definitely at par or even better than the imported model.

CONCLUSION

The obtuse-angle tongue depressor is an innovative oral surgery instrument that is useful and easy to use. Based on the results gathered, this locally manufactured instrument has proven to be better, more practical, more efficient and much cheaper than the conventional and commercially available models.

TABLE 1. PRACTICAL INSTRUMENT TRIALS

CASE #	SEX/AGE	DIAGNOSIS	OPERATION	*	**	***
1	27/F	Chr Hyp Tonsillitis	Tonsillectomy	95	3.0	5.4
2	67/F	Mass, Base of Tongue	Biopsy	15	3.5	6.0
3	21/M	Chr Hyp Tonsillitis	Tonsillectomy	75	3.5	5.3
4	23/F	Chr Hyp Tonsillitis	Tonsillectomy	90	3.4	5.7
5	20/F	Chr Hyp Tonsillitis	Tonsillectomy	47	3.8	6.2
6	34/M	Chr Hyp Tonsillitis	Tonsillectomy	63	3.1	5.9
7	28/M	Chr Hyp Tonsillitis	Tonsillectomy	40	3.2	6.1
8	25/F	Chr Hyp Tonsillitis	Tonsillectomy	50	3.0	5.2
9	19/F	Chr Hyp Tonsillitis	Tonsillectomy	55	3.2	5.5
10	26/F	Chr Hyp Tonsillitis	Tonsillectomy	45	3.1	5.8
11	26/M	Mass, Base of Tongue	Biopsy	45	3.1	5.7
12	22/F	Chr Hyp Tonsillitis	Tonsillectomy	55	3.5	5.9
13	34/F	Chr Hyp Tonsillitis	Tonsillectomy	105	3.5	6.0

* Length of time (minutes) instrument was used
** Mouth Opening in centimeters (Standard Tongue Depressor)
*** Mouth Opening in centimeters (Obtuse-Angle Tongue Depressor)

STATISTICAL ANALYSIS

Paired T-Test

Group 1: New Instrument
Group 2: Old Instrument

Hypothesized Difference	=	0.0
Mean	=	2.48
Standard Deviation	=	0.22
Standard Error	=	0.06
N	=	13.0
T	=	40.31 (prob.=2.50)

* Highly significant results (Reject Null Hypothesis)

= New instrument is better than old instrument

TABLE 2. INSTRUMENT COST (Tongue Depressor)

Stainless Steel (2 cm. x 20 cm. x 0.2 cm.)	P 25.00
Halogen Bulb (WA 2.5 volts)	220.00
Stainless Steel Tube (0.3 cm. diam. x 15 cm.)	10.00
Electric Wire (1.5 m.)	12.00
Batteries (Size "D" 1.5 volts x 2)	22.00
Male Phono Jack	8.50
Female Phono Jack	12.50
Circuit Switch	7.50
Converter-Adaptor (220 volts to 3 volts)	90.00
Electric Tape	5.00
Miscellaneous	10.00
TOTAL	**P 452.50**

TABLE 3. INSTRUMENT COST (MacIvor Type Mouth Gag Frame)

Stainless Steel (2 cm. x 20 cm. x 0.2 cm.)	P 25.00
Stainless Steel Rod (0.3 cm. x 15 cm.)	20.00
Miscellaneous (Welding Flux, Screws, etc.)	25.00
TOTAL	**P 70.00**

TABLE 4. BATTERY LIFE SPAN
(2 Batteries in series, enough to maintain 2880-5760 Foot-candles illumination)

BATTERY SIZE		LIFE SPAN
"D"	-	325 minutes
"C"	-	236 minutes
"AA"	-	110 minutes

TABLE 5. COMPARATIVE LIGHT INTENSITIES (Foot-Candles)

LIGHT SOURCE	INTENSITY (At 1 ft. Dist.)	(Working Dist.)
Halogen Bulb Head Light	160 Ft-Candles	90 Ft-Candles
Incandescent Head Light	80 Ft-Candles	45 Ft-Candles
*Obtuse-Angle Tongue Depressor-Illuminator	160 Ft-Candles	5760 Ft-Candles

TABLE 6. HEAT-CONDUCTIVITY OF COMMERCIALLY-USED METALS

METAL	HEAT CONDUCTIVITY (At 32*F)
Silver	241
Copper	223
Aluminum	132
Magnesium	97
Zinc	65
Nickel	54
Iron	42
Nickel-Chrome Steel (Stainless Steel)	8.1

GLOSSARY

Foot-Candle - illuminance at all points on the inner surfaceof a spherical shell of one foot radius.

Illuminance - the intensity of radiant energy on a surface whose wavelengths produce vision

Alternating current (AC) - a current which has one direction during part of the generating cycle and the opposite direction during the remainder of the cycle. (ex. house electricity)

Direct current (DC) - a current which is unidirectional throughout the cycle. (e. battery current)

FOOTNOTE REFERENCES

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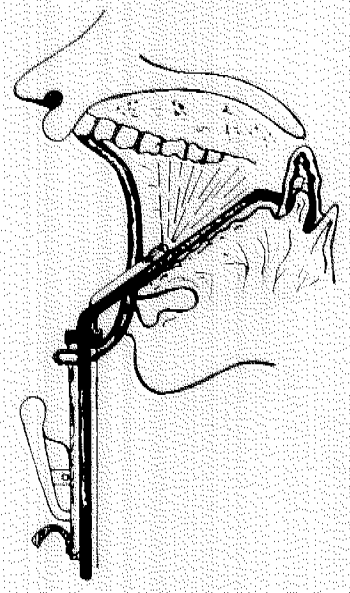


Figure 1. The Obtuse-Angle Tongue Depressor with Illuminator

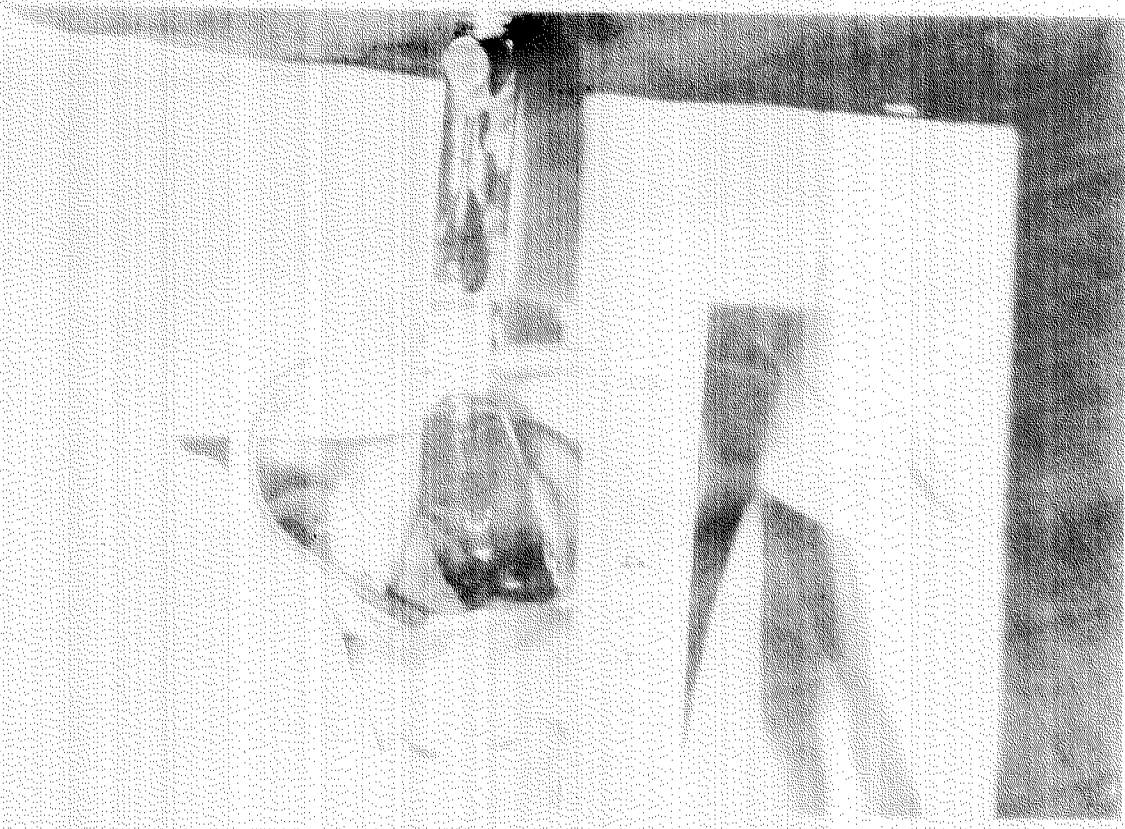


Figure 2. Actual Application Obtuse-Angle Tongue Depressor with Illuminator Measurements shown

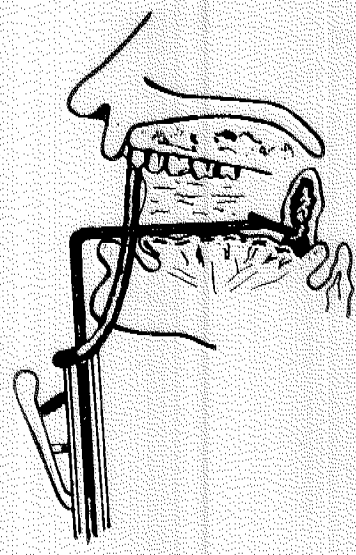


Figure 3. Conventional Tongue Depressor

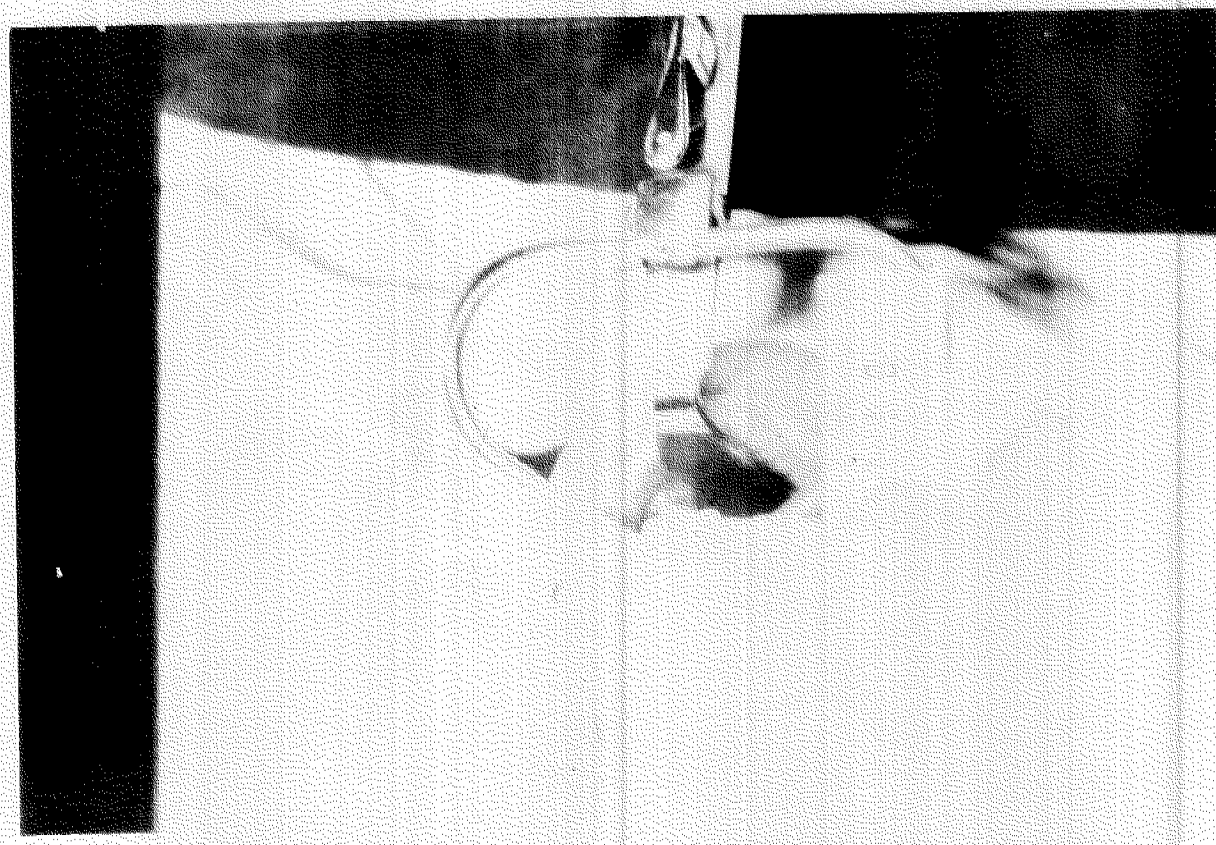


Figure 4. Actual Application Conventional Tongue Depressor
Measurement s shown

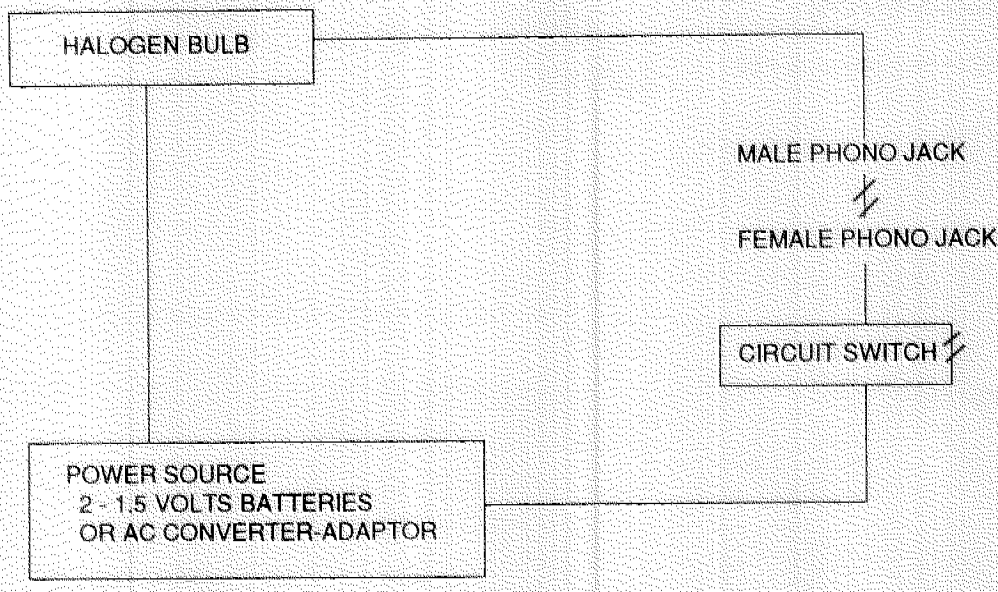


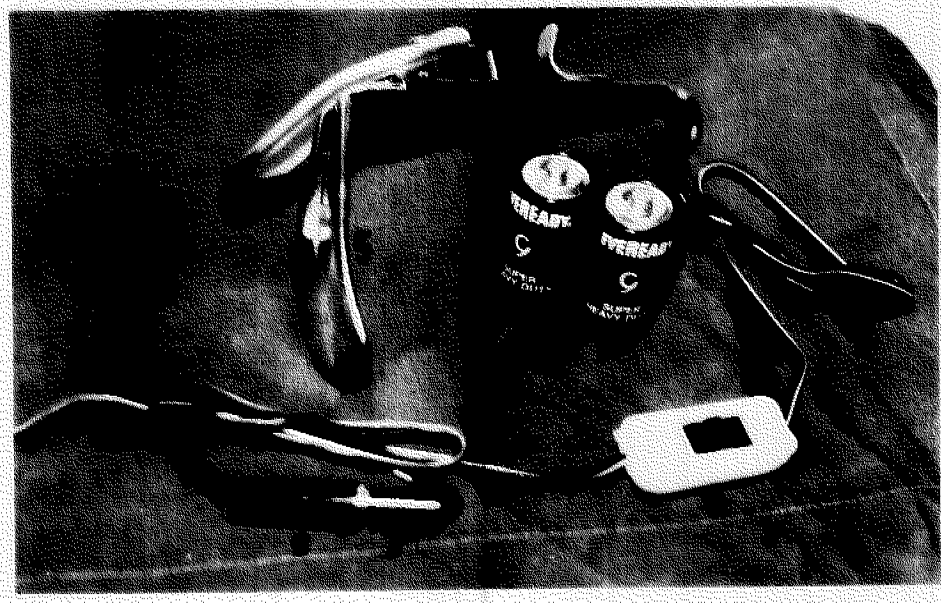
Figure 5. Instrument Circuitry

Figure 6. Instrument Set-up & Parts

Female Phono Jack * 1
Male Phono Jack * 2

4* MacIvor Type Mouthgag Frame

5* Obtuse-Angle Tongue Depressor - Illuminator

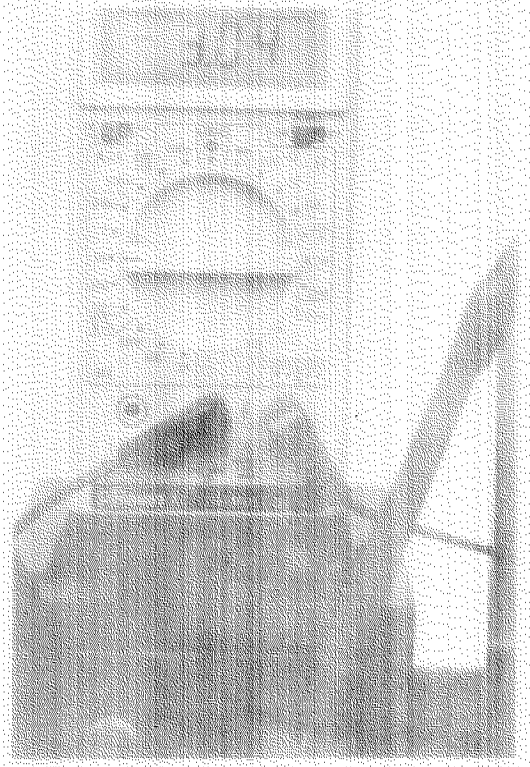


Power Source *3

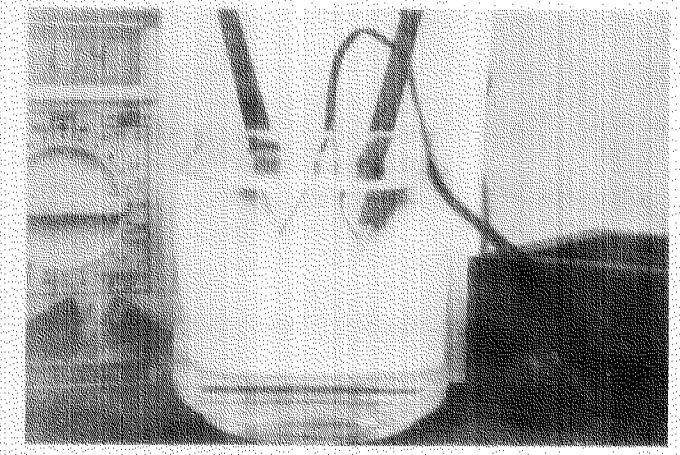
6* Circuit Switch

Figure 7. Electrical Insulation Testing

A. Testing voltage output from power source



B. Testing electrical water-conduction



C. Testing water-tight electrical insulation of tongue depressor

Figure 8. Halogen Bulb-to-Metal Heat Intensity Conduction Testing

Figure 9. Graph Showing: Bulb-to-Metal Heat Transfer Illumination Time

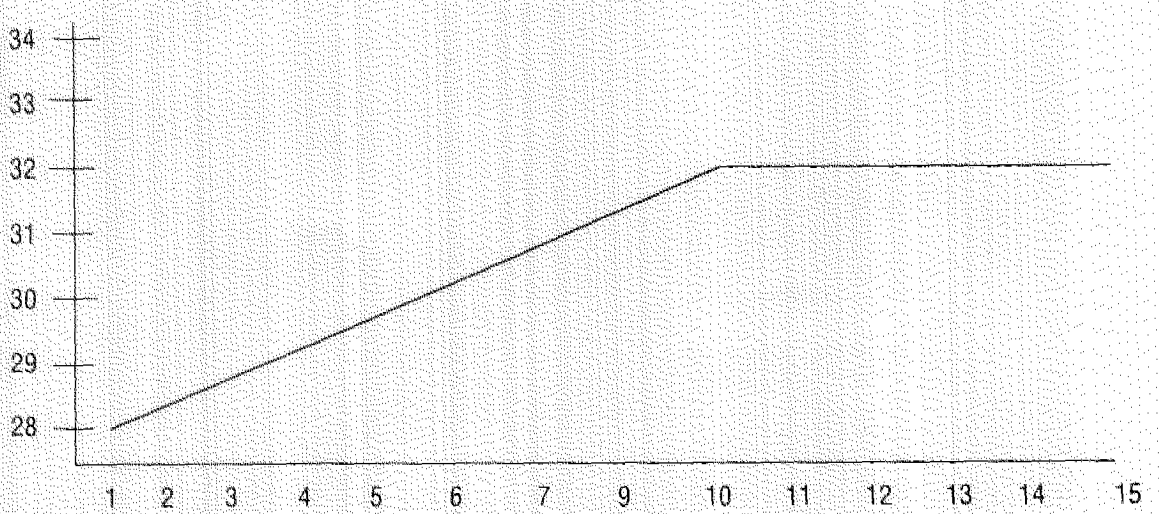


Figure 10. The Obtuse-Angle Tongue Depressor With Illuminator Applied on Davis and MacIvor mouth Gag Frames

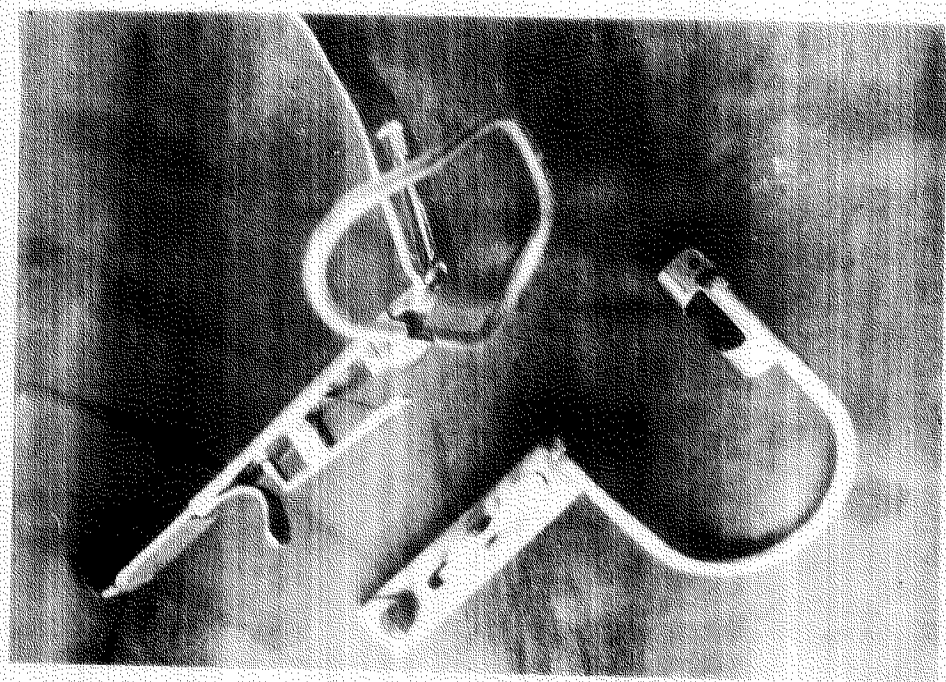
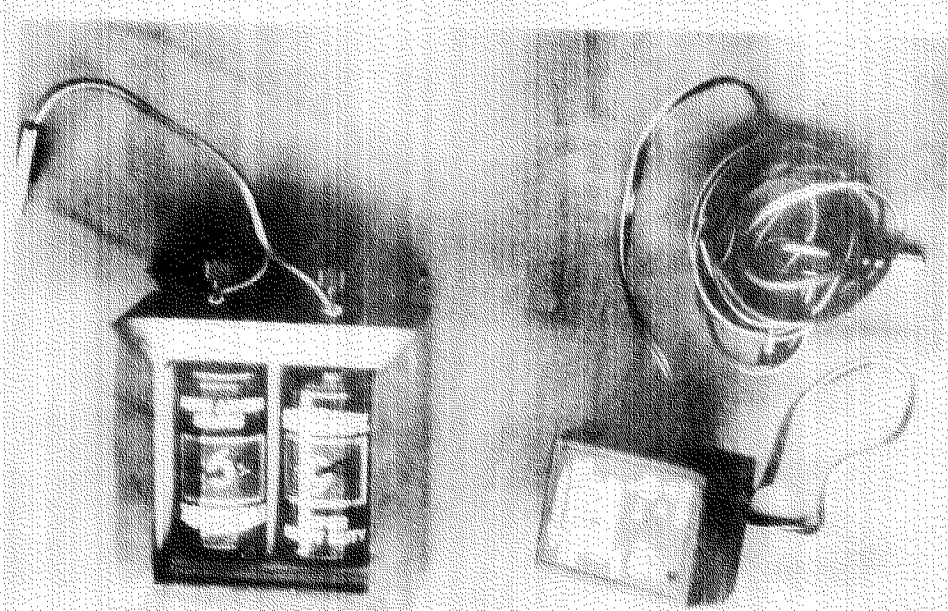


Figure 11. Power Source.
- 2 1.5 - Volts Batteries in Series
- 220 Volts-to-3 Volts Converter Adaptor



AN ALTERNATIVE POSTERIOR RHINOSCOPE*

RAMON V. ALCIRA, MD**
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INTRODUCTION

In the field of Otolaryngology-Head and Neck Surgery, as in all other fields of specialization, the importance of a thorough and accurate physical examination can never be overemphasized. Indeed, it is regarded as the cornerstone for the sound practice of an Otolaryngologist - Head an Neck Surgeon.

Included in this diagnostic battery is posterior rhinoscopy, wherein one indirectly assesses the integrity of the structures within, and the cavity of, the nasopharynx, using a mirror designed specifically for such a purpose.

In usual cases, this procedure is adequate. However, to properly carry it out, it requires skill and adeptness on the part of the physician and cooperation on the part of the patient. The former requisite is usually fulfilled as the physician will be able to hone this skill during his training. The latter, however, is less controllable. At times, one is forced to resort to topical anesthesia to get the job done. Still, there are patients when this may not suffice, most especially in anxious patients with overactive gag reflexes.

Furthermore, it goes without saying that a patient must be able to open his mouth adequately in order to allow the performance of the procedure. Again, this is highly unlikely among those patients who, for certain reasons beyond their control, are unable to do so. Another trivial but important requisite for posterior rhinoscopy is the setting. It is often difficult to do the examination bedside, since a light source and examining chair is needed.

Upon recognizing the limitations of conventional posterior rhinoscopy, necessity thus begot invention. Initially, endoscopists began using cystoscopes to obviate the need to fulfill the above requirements. By the mid-60's up to the 70's, refinement of the above basic principle brought about the development of improved instrumentation, intended solely for the examination of the upper aerodigestive tract. This period saw the birth of the nasopharyngeal indirect telesope as well as the flexible fiberoptic nasopharyngolaryngoscope. Even today, both types are still undergoing improvement.

Although these instruments will obviously enhance our endoscopic armamentarium, we also have to pay the price of technology. It is known that these instruments, especially nowadays, are quite costly. This is probably the main reason why they are not readily available in our setting. Therefore, in order to avail ourselves of this new technology and, at the same time, escape the problem of inflation, we must sharpen our resourcefulness and adaptability.

OBJECTIVE

The choanal telescope with retractor was born out of necessity as a result of the above factors just previously stated. The device to be produced had to be equal to the commercially available counterparts in terms of performance, and at the same time cheaper.

MATERIALS AND METHODS:

The choanal telescope with retractor was based on the basic design of the commercially available rigid posteriorhinoscope with uvula retractor. As a substitute for the telescope, the authors were able to obtain an old **110°** cystoscope while hunting for second-hand ENT instruments in Dau, Pampanga. The other necessary materials, we were able to secure from several stores in Sta. Cruz and Raon, in downtown Manila. Below is a complete list of the materials utilized to produce the instrument, with their corresponding prices.

1. Old 110° cystoscope	P 350
2. Brass Tubing, 3/16 in.	24
3. Brass Tubing, 1/8 in.	20
4. Brass Tubing, 1/2 in.	20
5. Brass Flat Bar, 1/2 x 6 in.	15
6. Batteries, size "D", #4	20
7. Battery Holder	10
8. Wire, stranded, 2 m.	6
9. Earphone jack, male	5
10. Earphone jack, female	5
11. Pilot lamp, 6v	3
12. Metal spring	5
TOTAL	**P 483**

* Presented at the 34th Annual Convention of the PSO-HNS, Intrument Innovation Contest, Century Park Sheraton, Manila, Dec. 7-8, 1991.
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Other needs included tools used to assemble the instrument. Fortunately, this did not entail any further expenses.

1. Soldering Iron & Lead
2. Hacksaw
3. Hand Drill
4. Bench Vise
5. Metal File
6. Chrome paint and spray

Below is an illustration of the completed instrument with its component parts labelled accordingly (Fig. 1).

RESULTS & DISCUSSION

After assembly, the instrument underwent trial in the hospital's outpatient and inpatient sections. Listed below are the following advantages derived from its use.

a. Its function and performance was found to be comparable with the commercially available counterpart.
b. It is lightweight, making manipulation easy.
c. It can be used with ease on patients who cannot tolerate the conventional mirror examination, or on those wherein mirror examination cannot be done for other reasons (ie. patients with limitation of mouth opening, non-ambulatory patients).
d. It may be used on patients at bedside, without the need for the usual clinic facilities.
e. It can be powered either by a 6v DC adaptor, if available, or by the battery pack provided in case of power failures. Battery life was found to last up to 15 hours of continuous use.
f. This local version is substantially cheaper than the commercially made brand.

As a disadvantage, the local version of the postrhinoscope cannot provide photographic documentation of the area being examined, as the authors, at this point cannot duplicate such a feature.

CONCLUSION

After having put the choanal telescope with retractor on trial, we have found it to be a substitute comparatively at par with the well-known commercial brands. Moreover, its cost makes it more practical for our setting. Although it may not be exactly equal to the hi-tech fiberoptic instruments in the market today, the valuable aid it can offer, and the price at which this aid is obtained, makes it cost-effective. With this instrument, the Otolaryngologist-Head and Neck Surgeon can get the job done with minimal investment. However, this instrument should be used only for what it is intended, namely in cases where conventional posterior rhinoscopy cannot be done. It was never intended to replace the basic mirror examination of the nasopharynx.

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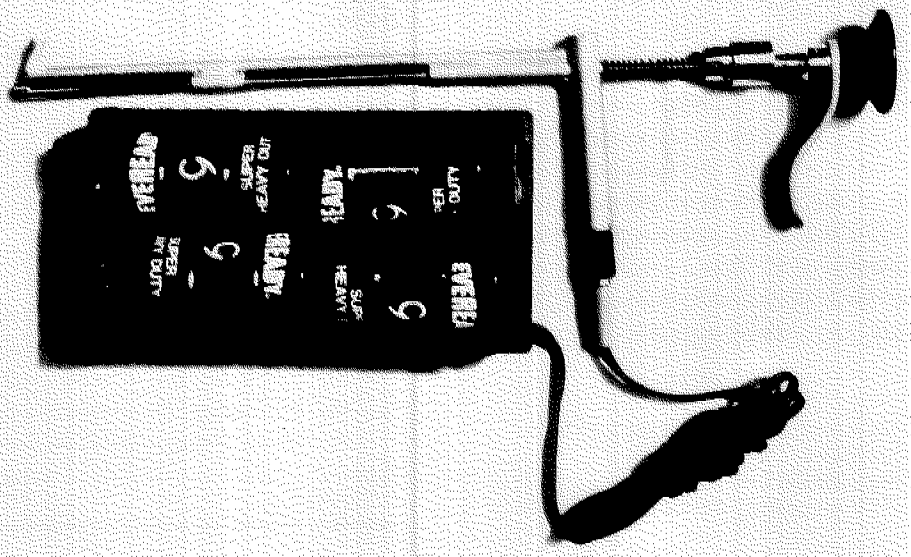

MODIFIED INTRANASAL APPROACH IN THE MANAGEMENT OF FAILED DACRYOCYSTORHINOSTOMY*

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ABSTRACT

Failed dacryocystorhinostomy requiring revision possesses a therapeutic challenge for many ophthalmologists. The external revision approach traditionally favored by most has major disadvantages, whereas the existing intranasal technique has its inherent problems. The study describes a simple, modified intranasal technique to remove occlusions secondary to scarring and fibrosis in the rhinostomy site. It introduces a fiber optic guided procedure and compares this to the tenting technique in localizing the previous rhinostoma. The advantages of the new procedure over the external technique are cited. By using a fiber optic probe and endoscopic nasal instruments, 17 of the 18 cases (95%) were relieved of persistent epiphora. Visible signs of tenting which would facilitate identification of the previous rhinostomy site was not seen in any of the 18 cases. With the fiber optic guided approach on the other hand, no difficulty was encountered in all subjects. The multidisciplinary approach in the treatment of patients with lacrimal system failure is recommended. Fiber optic guided revision of failed DCR using endoscopic nasal instruments is a useful adjunct in the management of patients with failure due to rhinostomy occlusions.

INTRODUCTION

Dacryocystorhinostomy (DCR) has become the prefeered procedure for treating chronic epiphora caused by lacrimal system failure. The operation entails dissection of structures which have a propensity to granulate and form cicatrical strictures, hence, failure requiring revision may run from 20-50%.[1,2,3] The popular external revision procedure which is the sine qua non for failed DCRs for many ophthalmologist has major disadvantages.[3] The intranasal revision procedure on the other hand, has not become popular because of the difficulty of locating the previous osteotomy site and the technical difficulty associated with the small confines of the nose. This study aims to introduce a simple intranasal approach to reopen the rhinostoma, to validate the intranasal tenting procedure in locating the osteotomy site against a new fiberoptic guided technique, and to compare this approach with the external revision technique.

MATERIALS AND METHODS

I. Patient Selection:

The study involves patients referred by the Division of Ophthalmology from October 1989 to May 1990 who have had previous DCR with complaints of persistent epiphora. The patency of the lacrimal system in all subjects were tested using a modified Jones dye test. [4] After topically decongesting and anesthetizing the nose with oxymethazoline and 4% lidocaine, a cotton applicator is introduced over the area of the ager nasi. The eye is anesthetized with Proparacaine HCl 0.5% and a lacrimal cannula introduced into the superior or inferior canaliculus. Flourescein dye is then flushed through the lacrimal system. If no dye is recovered in the nose, a diagnosis of failed DCR is given. Exclusion criteria consist of: 1) patients who will not be able to tolerate the procedure under LA, 2) failure of the dye to exit through the inferior punctum on irrigation of the superior canaliculus or vice versa, with negative probing to the lacrimal sac, 3) DCR performed less than 3 months from consult.

II. Localization of Previous Rhinostoma

A. Intranasal Tenting Procedure:

After topically decongesting and anesthetizing the nose, the area over the anterior attachment of the middle turbinate is visualized by anterior rhinoscopy followed by examination using a 30° Storz Hopkins Telescope. The eye is anesthetized and a lacrimal probe inserted until the general area of the previous rhinostoma is located. Probing is done until tenting of the nasal mucosa can be observed by an independent colleague. (Fig.1)

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* First Prize - 34th PSO-HNS Annual Convention, Surgical Innovation Research Contest, Century Park Sheraton, Manila, Dec. 7, 1990.

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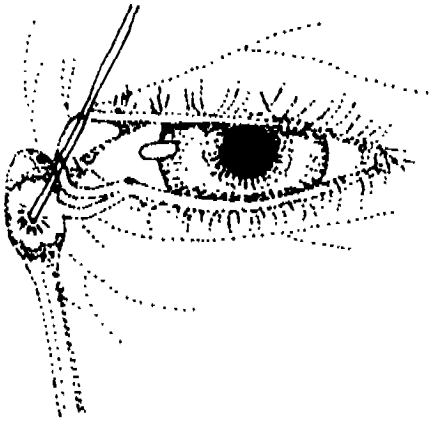

Figure 1. Tenting Procedure

B. Fiberoptic Guided Approach:

With the nose and the eye topically anesthetized a commercially available fiberoptic strand connected to a light source is inserted into the superior or inferior punctum. The fiberoptic strand is carefully threaded by an assistant along the canaliculus to the general area of the previous osteotomy site. The surgeon in turn, dims the endoscopic light to visualize the transilluminated tip of the fiberoptic probe in the nose. (Fig.2)

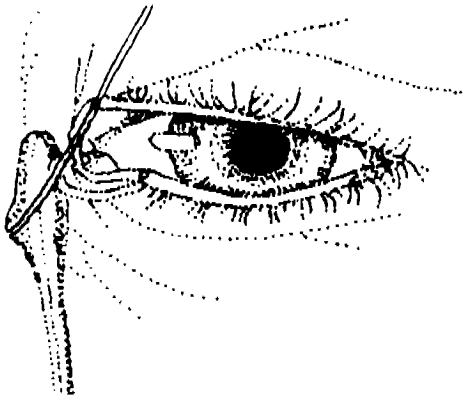

Figure 2. Fiber Optic Guided Approach

III. Surgical Intranasal Approach:

The area localized by the fiberoptic probe is then injected with a 1:100,000 Lidocaine-Epinephrine solution (Fig. 3-4) and a sickle knife used to lift the nasal mucosa over the reddish glow of the fiberoptic strand. (Fig. 5) Nasal biopsy forceps and small Blakesly ethmoidal forceps were used to enlarge the previous rhinostoma. (Fig. 6-7) A Bowman's probe or stainless steel wire connected to a silicone tube with an outer diameter of at least 1 mm was then introduced into both the superior and inferior canaliculi and the ends of the tube inserted together into the nose. (Fig. 8-10)

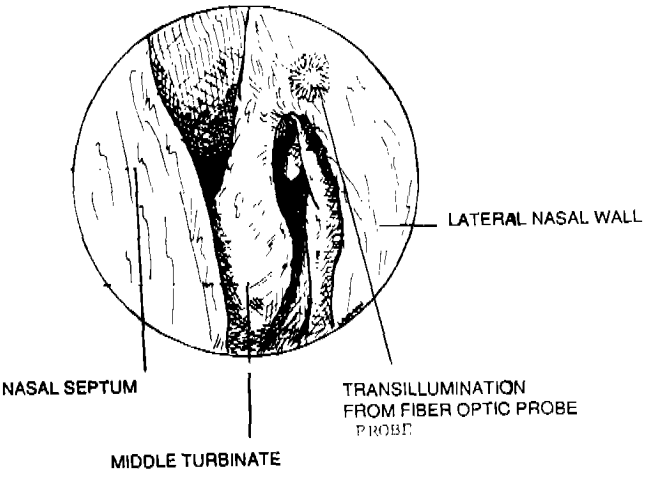

Figure 3. Transillumination of Fiber Optic Probe over previous Rhinostomy Site

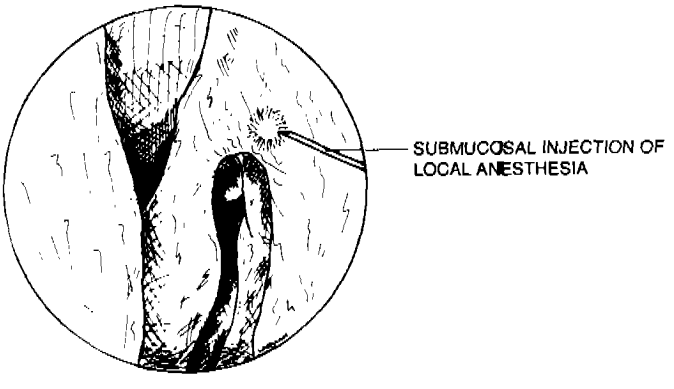

Figure 4. Infiltration of Anesthesia over Surgical Field

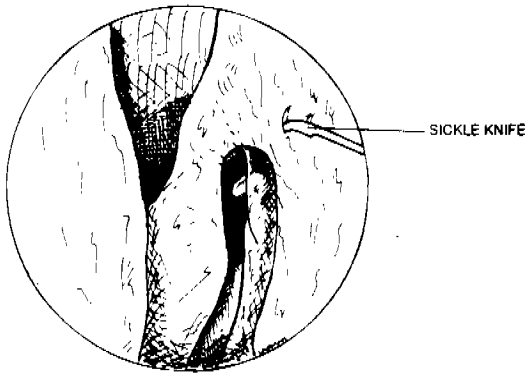

Figure 5. Sickle Knife Incising Nasal Mucosa

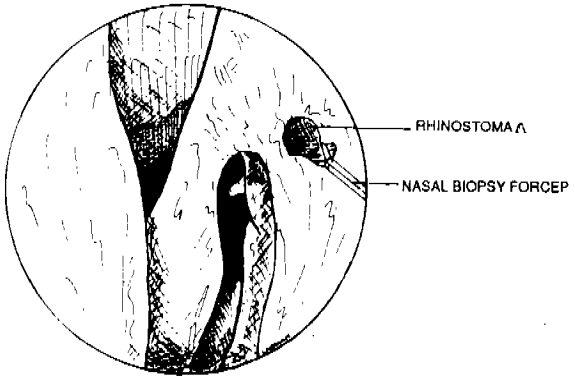

Figure 6. Enlarging the Rhinostoma with Nasal Biopsy Forceps

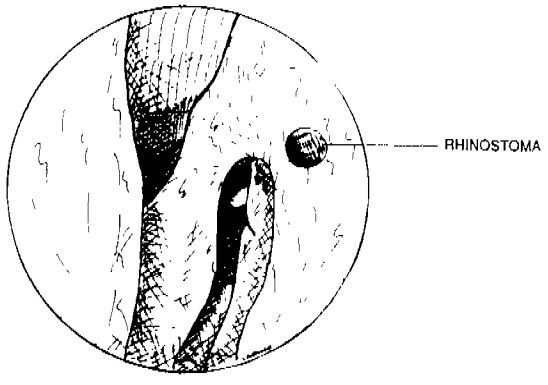

Figure 7. Surgically produced Rhinostoma

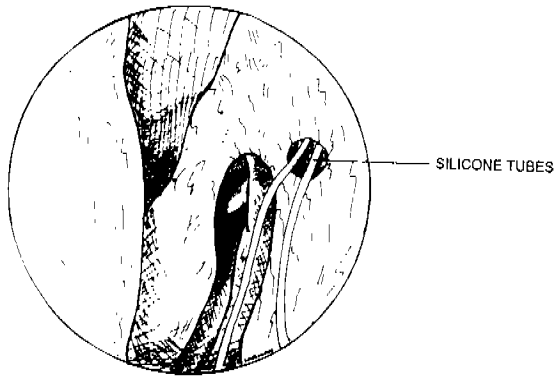

Figure 8. Silicone Tubes in Place

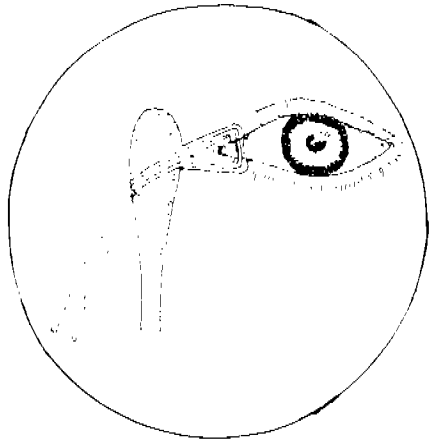

Figure 9. Silicone Tube Intubation of Lacrimal System

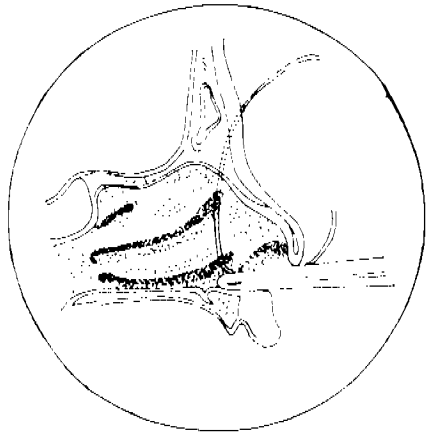

Figure 10. Lateral Nasal Wall showing Rhinostoma and Silicone Tube

Silicone tubes of lesser caliber do not provide cross sectional area for an adequate stent.[4] The tubes were removed after 3 months.

RESULTS

I. Patients Selection:

All 16 patients were females. Two patients had bilateral failed DCRs. Studied were 12 left eyes and 6 right eyes, comprising a total of 18 cases. The ages ranged from 30 to 60 years, with an average of 48 years.

II. Localization of Previous Rhinostoma:

A. Intranasal Tenting Procedure:

After vigorous probing, none of the 18 cases (0%) showed visible tenting in the nasal mucosa to indicate the previous rhinostoma on anterior rhinoscopy. With nasal endoscopy, 3 patients (16%) showed minimal indentations upon probing in the lateral nasal wall.

B. Fiberoptic Guided Approach:

No difficulty was encountered in locating the site of the previous rhinostoma in all 18 cases on both anterior rhinoscopy and endoscopic examination.

III. Surgical Intranasal Approach:

The interval from initial surgery to reoperation ranged from 3 months to 1 year with an average of 7 months. All patients were followed up postoperatively once a week for the first month, and every 2 weeks thereafter till the removal of the stents on the 3rd month, after which monthly examinations were made to monitor the rhinostoma. Of the 18 operations, 1 had granuloma formation over the nasal window requiring removal of the stent, excision of the granuloma, cauterization with silver nitrate and reintubation followed by intranasal steroid therapy. Two patients experienced mild conjunctival irritation caused by a loosely tied silicone tube which chronically rubbed the medial bulbar conjuctiva. Aside from these relatively mild complications, 18 out 18 patients (100%) had their silicone tubes removed with their rhinostoma patent. Postopertive primary Jones test showed 17 cases presenting with dye in the nose after instillation of flourescein into the conjunctival sac indicating normal tear outflows. One case showed a negative primary Jones test but a positive modified Jones test indicatiing some functional problem. (Table I) The longest follow-up after removal of the stent was 6 months, the shortest 1 month. All procedures were done within 15 minutes.

Table 1. Results of Surgery

Subjective Results (N=18)		Objective Results (N=18)
# of points		# of points
17 - asymptomatic	18 -	Patent fistulas by probing and direct visualization
1 - persistent ephiphora	17 -	(+)primary Jones test
	1 -	(-)primary Jones test (+)modified Jones test

DISCUSSION

Dacryocystorhinostomy (DCR) originally described by Toti in 1904, is a surgical correction of nasolacrimal duct obstruction. By resecting the lacrimal sac, underlying bone and nasal mucosa, an opening between the nose and the sac is created and a subsequent intranasal drainage is formed.[5]

The management of successful DCR creates a therapeutic problem for the ophthalmologists. A survey done among 50 ophthalmologists practicing in Metro Manila revealed failure rates ranging from 20-50%. For the management of unsuccessful cases only 2 of the 50 ophthalmologist surveyed (4%) would elect an intranasal revision approach, 2 out of 50 (4%) would not reoperate and 46 out of 50 (92%) preferred the external revision procedure.

In brief, the external revision technique is as follows: a skin incision is made through the original scar. The orbicularis is separated and the sac identified. Sharp and blunt dissection is used to separate the scars above and below the sac. By means of flaps, an anastomosis is created between the nasal mucosa and sac. Essential to the operation is the introduction of a tube to act as reinforcement around which patent passages will heal and drain tears.[4]

In the intranasal salvage procedure described by different authors, tenting or blind exploration to locate the ostium is done followed by creation of flaps in the sac and nasal mucosa with subsequent insertion of tubes. The intranasal revision procedures although mentioned in passing among many series has not gained popularity and no definitive study of the techniques has been made.[3,6,15]

The predominance of females undergoing revision DCR in this series reflects the common trend in primary DCR and concurs with the findings in other studies[6,9] Anatomists have pointed out that women generally have narrower osseous nasolacrimal canal, that may simply reflect the smaller stature of women.[10] Another study of patients with dacryocystitis revealed preponderance of brachycephalic skulls supposedly implying a longer and narrower nasolacrimal canal.[11] Idiopathic nasolacrimal tract obstruction is the most common etiology in females.[6]

Patients who had their primary DCRs less than 3 months

from consult were excluded from the study to ensure complete healing and fibrosis of the damaged structure. An interval should elapse before reentering the operative site. It is possible for function to return if the surgery was correctly performed and the failure was due to an unpredictable factor, such as hemorrhage into, or excessive trauma to the oblicularis muscles. Spontaneous resolution can follow.[4]

Patients with canalicular obstruction were excluded from the study because of the following reasons: first, a conduit between nose and lacrimal sac will only bypass the obstruction; secondly, the probe will not be able to go beyond the obstruction without traumatizing the canalicular route. Failure of the dye to regurgitate to the opposite punctum on forced irrigation together with negative probing to the lacrimal sac signifies obstruction in the upper excretory system and allows identification of patients with canalicular problems.[6]

In the intranasal tenting procedure, none of the patients showed visible signs of mucosal indentations on anterior rhinoscopy secondary to probing. This suggests, the difficulty of the tenting procedure to locate the previous rhinostoma. With fibrosis of the sac, the underlying periosteum and mucoperiosteum, together with a normally thickened nasal mucosa, and aggravated by a small osteotomy, tenting of the above structures may indeed be difficult if not impossible. With the aid of a nasal telescope, 3 out of 18 (16%) cases showed positive results. The nasal telescope with its advanced optical system greatly enhances the inspection of structures within the nasal cavity. It is so optically superior that minor changes within the nasal mucosa can be detected. Even with the use of this telescope, only a few patients showed positive tenting.

Lacrimal intubation with silicone tubes was first described in 1970 as an adjunctive treatment for lacrimal obstruction. It is an inert and non-irritating material. Since its introduction, intubating the lacrimal system with lacrimal tubes has been routinely used on patients with tear duct probing failures, canalicular stenosis, canalicular laceration repair, common punctal stenosis, partial nasal lacrimal duct obstruction and when performing dacryocystorhinostomy.[11,12]

Since the initial description of DCR in 1904, surgeons reporting on many large series have examined the reasons for failure. The most common cause in most of these series is simple closure of the dacryocystorhinostoma at the osteotomy site. In one large series by Welham R. et al, pure ostium problems were presumed to be the cause of failure in 52% of the cases. The recommended treatment for these osteotomy obstruction has been placement of a stent after surgically removing the obstruction. In a series of 70 procedures using silicone stents after external DCR, Older J. et al showed that the tubes were well tolerated and complications specific to the silicone stents were minimal. The tubes which act as scaffolding are left in place for 3-4 months, in which time, an epithelium line passage is produced along the fistulous tract.

No difficulty was encountered in the modified approach using the fiberoptic strand to locate the previous osteotomy site. The operation using endoscopic nasal surgery instruments showed 18 out of 18 (100%) objective success rate and 17 out of 18 (95%) subjetive success rate. (Table 1) This high success rate confirms the opinion of several authors that mucosal flaps do not need to be developed or sutured when performing DCR.[6] One patient has persistent epiphora despite the patent fistula suggesting a functional problem. The result was attributed to the failure of the lacrimal pump due to lid laxity, decreased support of the oblicularis muscle, tarsus and tarsal tendons may cause lacrimal pump failure.[4]

A similar study made by Burns et al on 10 patients with lower excretory system obstruction using an external revision technique showed 10 out of 10 (100%) objective success rate and 9 out of 10 (90%) subjective success rate.[6]

A large series by Welham et al on the external revision technique, sans a separation between upper and lower lacrimal apparatus obstruction, showed 89% subjective success rate.[13]

The time required for external primary DCR ranges from 1 to 2 hours. The external revision procedure, being technically more difficult has a longer operative time necessitating general anesthesia. Scarring over the skin incision is inevitable and there is a great risk of disrupting the normal lacrimal pump function due to postoperative fibrosis of the mobile lateral wall of the sac and adjoining muscle fibers.[3] The intranasal revision approach can be done on an out-patient besis. Therefore, it is more cost effective than the external procedure. In addition to this, the intranasal approach may be used in cases of acute dacryocystitis. One limitation of the new procedure is that only patients with lower excretory lacrimal apparatus problems can be managed. (Table 2) Common complications inherent in both external revision procedures and in this new technique are problems related to the insertion of tubes. One of the patients developed granulation tissues over the stoma requiring secondary revision. This has not been a problem with most studies using silicone tubes. However, granulation may occur due to irritation or infecion. This complications was subsequently treated with excision, cauterization and seroid therapy.[4,14] Two patients experienced conjunctival irritation due to the tubing tied loosely causing it to loop out excessively between the upper and lower puncta. This was managed by repositioning the tubes in the nose. All these complications are minor and preventable.

CONCLUSION

Dacryocystorhinostomy is a procedure more frequently performed by ophthalmologists than by otorhinolaryngologists because complaints of epiphora fall under diseases of the eye. However, since the anatomy of the

Table 2. Comparison between Intranasal and External Revision Approach

	INTRANASAL APPROACH	EXTERNAL APPROACH
Time required for surgery	< 15 min	> 1 hr.
External scar	(-)	(+)
Technical difficulty secondary to fibrosis	(-)	(+)
Disruption of lacrimal pump	(-)	(+)
Cost	(-)	(+)
Use in acute dacryocystitis	(+)	(-)
Use in upper lacrimal obstruction	(-)	(+)
Use in lower lacrimal obstruction	(+)	(+)
General anesthesia	(-)	(+)

orbit involves part of the facial skeleton and its walls are shared by sinuses and the nasal cavity, many surgical procedures are shared by the two surgical specialties. Three to four decades ago, surgeons were trained in the eye, ear, nose and throat surgery and performed procedures in all these areas.[15] Specialization brought about by the need for surgical refinement and increase in the scope of medical knowledge prompted the creation of two distinct sciences, Ophthalmology and Otorhinolaryngology. Because the most common cause of DCR failure involves the nasal side of the operation, the otorhinolaryngologist may have certain advantages in managing the re-operative procedure. Aside from being able to care for nasal complications, the rhinologist can best manage problems arising primarily from physiologic and anatomic confines of the nose. The rhinologist has a distinct advantage of being equipped and trained to work in the small confines of the nasal cavity, to prevent adhesions, remove granulation tissue, control post-operative hemorrhage, treat cicatrizations of the ostium and if necessary, reopen it. In addition, for every case of DCR, the nasal condition (presence of infection, allergy, hypertrophic middle turbinate, septal deviation) must be taken into account and the anatomic abnormalities corrected.[15] It is in this aspect that a multidisciplinary approach towards patients complaining of epiphora becomes essential.

A technique is described for reopening the previous rhinostomy site by excising the mucofibrous membrane and insertion of silicone tubes to ensure its patency. Fiberoptic guided revision of failed DCR using endoscopic nasal instruments is a useful adjunct in the management of patients with failure secondary to rhinostomy occlusion by fibrous tissues.

RECOMMENDATIONS

1. The primary dacryocystorhinostomy should include the placement and retention of silicone tubes from 3 to 4 months to ensure patency of the created rhinostoma.

2. Patients presenting with problems related to the lacrimal system should be evaluated by both ophthalmologist and otorhinolaryngologists.

3. In cases of failed DCRs, the fiberoptic guided intranasal approach can be utilized.

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Endoscopic Surgery: An Alternative Approach in Management of Sphenoid Sinus Mucocoele*

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INTRODUCTION

The rarity of sphenoid sinus mucocoele in actual practice brings about limited reports in the medical literature ever since they were first described by Berg in 1889.[1]

Mucocoele formation most commonly occurs in the frontal sinus, then in the ethmoids and lastly in the sphenoid. A causal factor to the formation is obstruction of the sinus ostium due to infection, allergy, or even a neoplastic process.

Signs and smptoms of sphenoid sinus mucocoele are non-specific and variable. Accurate diagnosis often times is delayed and the case is usually mismanaged.

Surgery offers the only effective treatment, aimed to provide adequate drainage and to remove diseased mucosa. Numerous techniques are used in sphenoid sinus surgery including those used in pituitary gland operations.

We, at the Department of Otorhinolaryngology - Head and Neck Surgery MCU-FDTMF Hospital., present our experience in managing a case of sphenoid sinus mucocoele via fiberoptic endoscopy.

CASE REPORT

I.L., a 65 year old female, single was admitted for the first time due to severe headache and left maxillary pain.

Condition started one month PTA as mucoid nasal discharge accompanied by dull headache localized in between the orbits with radiation to left maxillary area.

The pain graduallly increased in intensity and sometimes accompanied by nausea. No medications were taken nor consultations was made. Condition persisted and the patient was brought to MCU Hospital for evaluation and mannagement. Initial ENT examination revealed no significant findings. She was referred to Neurology section. Skull radiorgaphs and electroencephalogram were done which showed no abnormal findings. The patient was diagnosed and managed as a case of migraine headache.

Computerized tomography (CT Scan) was done and radiodense mass was noted occupying the left sphenoid sinus cavity. No gross evidence of extension to its adjacent structures were noted. The rest of CT Scan findings were within normal limits. Abnormal finding was consistent with the diagnosis of mucocoele of the sphenoid sinus.

Neurosurgical, ophthalmological, and cardio-pulmonary clearance were sought prior to the scheduled surgery. Post-operative course was uneventful and there was dramatic relief of the signs and symptoms. She was discharged on the third post-operative day.

Succeeding follow-up consultations revealed no recurrence of signs and symptoms.

DISCUSSION

The sphenoid sinus is located posterior to both the nasal cavity and the ethmoid labyrinth. It may be contained entirely on the sphenoid bone or it may extend to the adjacent pterygoid process, rostrum or the wing of the sphenoid, or to the basilar process of the occipital bone.

Development of sphenoid sinus occurs as early as the fourth month of fetal life. It continuously expands by pneumatization from front to back during childhood. Failure of pneumatization occurs in about 1% of cases.[2] Adult sphenoid sinus averages 14 x 12 mm and antero-posterior dimensions range from 4-44 mm.

The ostium of sphenoid sinus is located at the superior meatus and is hidden from view by the superior turbinate. The intersinus septum is usually displaced from the midline making the cavity asymetrical.

Important anatomic structures[3] are closely related to the sphenoid sinus (Figure 1 & Figure 2). Levine et al has noted 13 structures; dura. pituitary gland, optic nerve and chiasm, cavernous sinus, internal carotid artery, oculomotor nerve, trochlear nerve, abducens nerve, ophthalmic nerve, sphenopalatine ganglion and artery, and pterygoid canal and nerve.

Sphenoid sinus mucocoele enlarges and expands with tendency to extend to areas of least resistance causing pressure

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* Presented at the 34th PSO-HNS Annual Convention, Surgical Innovation Research Contest,
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effects. Majority of patients complain of constant headache described as severe and located on the center of the head which may radiate to the occipital and temporal region.

Nugent et al reported 71% of patients complaining of headache and 65% with visual impairment. Total blindness and exophthalmos[4] either unilateral or bilateral, are not uncommon findings since sphenoid sinus mucocoele expansion is usually towards the orbital and ethmoid areas producing pressure on the optic nerve. Endocrine disturbances secondary to involvement of pituitary gland may be manifested which further complicates the symptomatology.

Diagnosis of sphenoid sinus mucocoele is commonly made on plain skull radiographs or CT scan. The latter proves to be superior in delineating the extent of the disease process and enables a proper planning to surgical approach. Bone findings on radiologic studies exhibits expansile changes characteristic of mucocoele. Other ancillary diagnostic procedures include carotid angiography which determines the degree of involvement of the surrounding blood vessel.

Treatment of sphenoid sinus mucocoele should include surgical removal and drainage. Currently accepted surgical techniques to approach the sinus include the following:

1. Lynch External Ethmoidectomy Technique[3,5] with or without septoplasty (Figure 3 & Figure 4). The procedure is longer, bloody, and more structures are violated. External scarring is minimized by fine suture
2. Transseptal Technique (Figure 5) pioneered by Hirsch. It affords a direct but narrow exposure of the sphenoid sinus i.e. limited operative field, does not injure the anterior nasal spine or the premaxilla, and reduces operating time. The most common complication of this procedure is septal perforation.[5]
3. Transantral - transethmoid Technique (Figure 6) popularized by Hamberger[3], affords a considerable space for manipulation of instruments and less risk of causing nasal deformity and perforation, but the chance of infection is high due to a potentially septic oral route.

The advent of Functional Endoscopic Surgery (FES)[5,6] pioneered by Messerklinger and Wigand[3,9,10,11] has added an alternative and new dimension to sphenoid sinus surgery. The advantages of FES includes: 1. Avoidance of trauma thereby minimizing morbidity and shortening the recuperation period; 2. Improvement in diagnostic accuracy; 3. Direct visualization during surgery. These prompted us to remove the sphenoid sinus mucocoele by this approach.

SURGICAL TECHNIQUE:
Transnasal Endoscopic Surgery

The patient was placed under general anesthesia. Topical vasoconstrictor (Drixine) was applied to both nasal cavities for decongestion. A 0° (zero degree) 4.6 mm endoscope (Nagashima SFA-II-W) was inserted carefully to the left nasal cavity. Basic anatomic landmarks were identified for proper orientation (Figure 7). The middle turbinate was traced from antero-posterior direction locating the posterior tip of the middle turbinate. The anterior table of the sphenoid sinus was localized just lateral to the nasal septum (Figure 7). Sphenoid sinus was entered by removing the anterior wall and the diseased mucosa using ethmoid forceps and currette. Careful inspection of the sinus was carried out to determine active bleeding. Topical vasoconstrictor was used for hemostasis. Nasal stips impregnated with topical antibiotic were applied and removed three days later.

Possible limitation of sphenoid sinus surgery under endoscopic guidance includes: 1. In cases of very large mucocoele where the confines of the extension can not reached by the endoscope; 2. In cases of malignancy where a good exposure is necessary; 3. Inaccessibility of the sphenoid sinus due to anatomic abnormality of the nasal cavity.

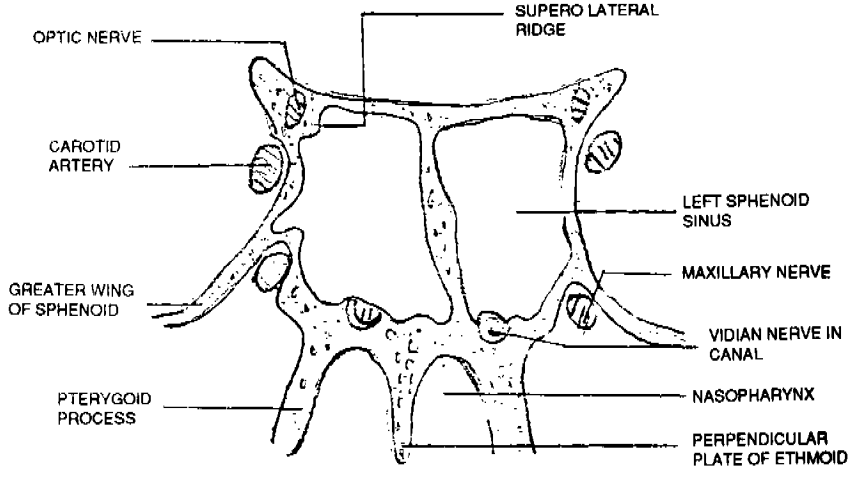

Figure 1. Coronal section through the mid-sphenoid sinus.

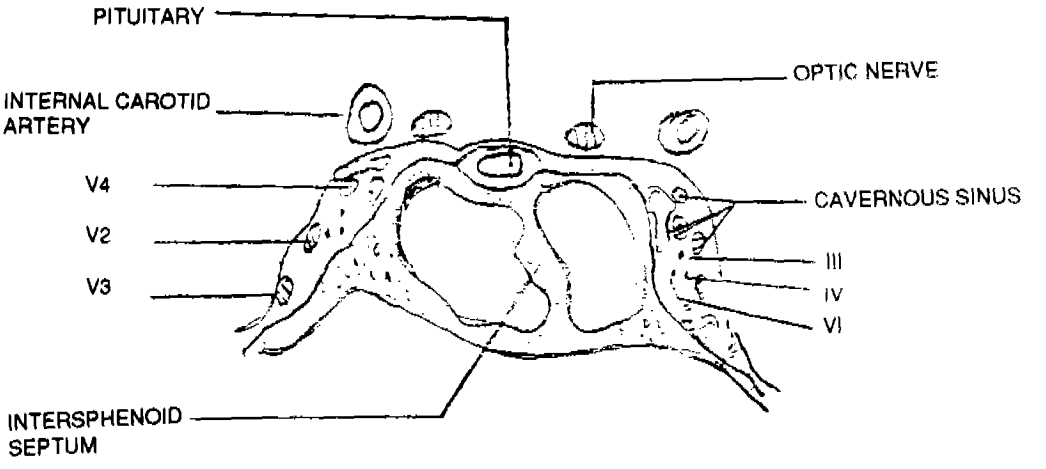

Figure 2. Coronal section of the posterior aspect of the sphenoid sinus and hypophyseal fossa.

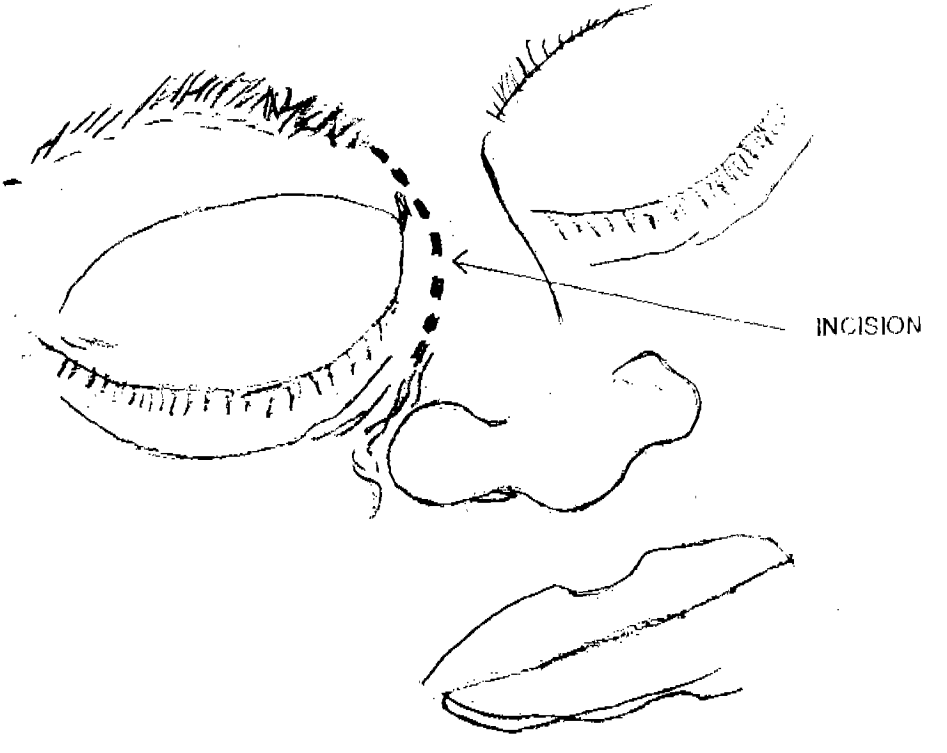

Figure 3. Lynch external ethmoidectomy technique

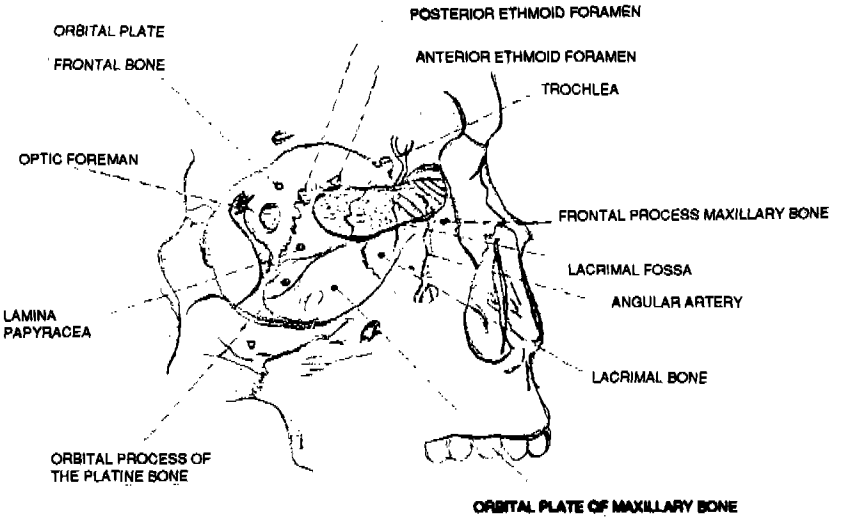

Figure 4. *Extent of osseous ressection*

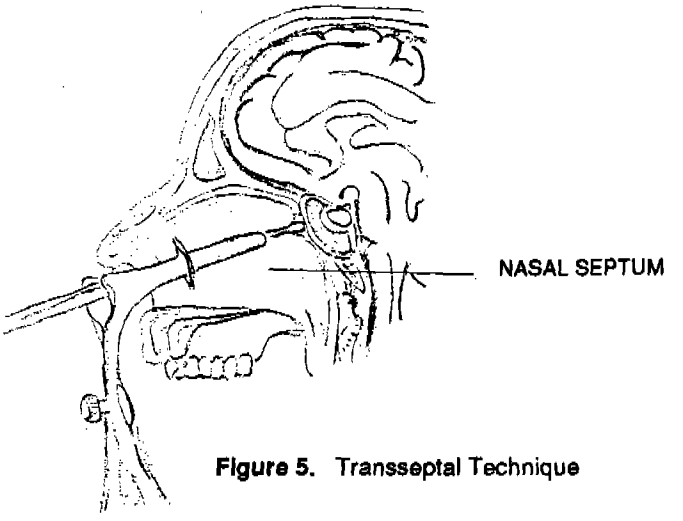

Figure 5. Transseptal Technique

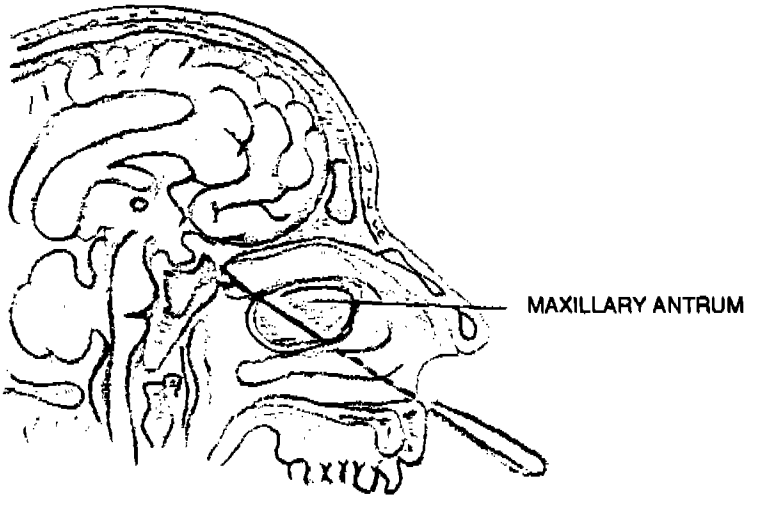

Figure 6. Transantral Transethmoid Technique

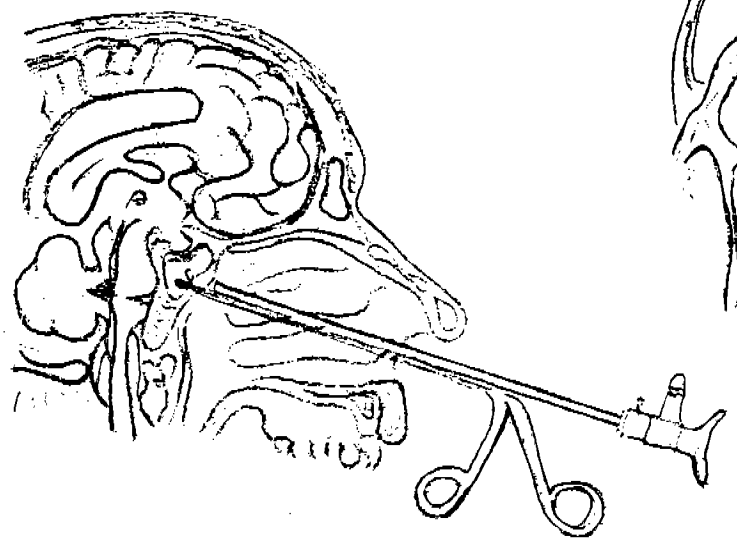

Figure 7. Transnasal Endoscopic Technique

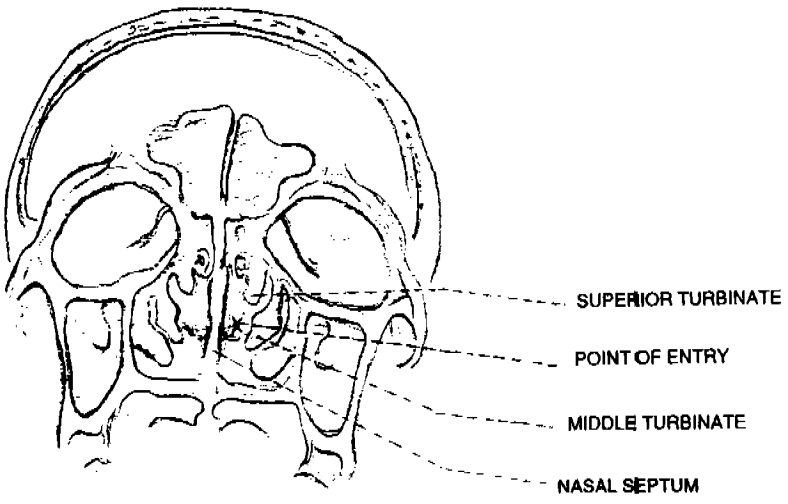

Figure 8. Area of anterior table of Sphenoid Sinus

CONCLUSION

A rare case of sphenoid sinus mucocoele confirmed by CT scan has been presented. Successful exploration of the sphenoid sinus mucocoele was done via Transnasal Endoscopic approach. This case report a method in approaching the sphenoid sinus for diagnostic and therapeutic indications.

We hope that other otolaryngologist would consider Endoscopic Surgery as a viable surgical technique in managing surgical disorders of the sphenoid sinus.

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CLINICAL PROFILE OF NASOPHARYNGEAL CARCINOMA IN FILIPINOS*

BENITO L. UY, MD**

Nasopharyngeal carcinoma is a relatively rare neoplasm among the Caucasians, but occurs with alarming frequency to certain Oriental groups. Though the etiology remains poorly understood, the racial distribution supports a genetic susceptibility to certain environmental factors.

The presenting complaints of patients with nasopharyngeal malignancy are related to the location of the primary tumors and the degree of spread. However, the array of subtle signs and symptoms sometimes prove to be much confusing to the otorhinolaryngologists until the disease process has reached an advanced stage. And this accounts for the poor outcome in many causes.

This paper was formulated in an effort to establish a local study on the clinical features with that of foreign literature.

MATERIALS AND METHOD

The medical records of 108 patients admitted at the Santo Tomas University Hospital from 1971 to 1983 were reviewed. Age, sex, family history, smoking habits, presenting symptoms, race, physical findings, stage of neoplasm at presentation and histologic diagnosis were included.

Biopsies were performed either under local or general anesthesia. There were no reported operative or postoperative complications.

The stage of the tumor was determined on the basis of the clinical data according to the American Joint Committee for Cancer Staging and End-Results Reporting.

RESULTS

Patient Profile:

Of the 108 patients included in the study, 82 were males and 26 were females. Their ages ranged from 17 to 73 with a mean average of 45. There was a broad age distribution with many young patients. Approximately one third (1/3) of the patients were 35 years old or younger.

Family history revealed positive for malignancies in 24 patients and negative for 84 patients. With regards to smoking habits, 32 were smokers while the rest were non-smokers. However, the frequency and duration of smoking were not reported. Of the total patients 23 or 21% were of Chinese descent.

Site of Primary Symptoms:

Neck mass was first noted in 47%, 15 or 14% have problems referrable to the throat, 11% have one or more symptoms in the ear and eye respectively. The nose accounts for 8% while the face constitute another 8%.

TABLE I SITE OF PRIMARY TUMOR

Site	No. of patients	% of 108
Neck	51	47
Eye	12	11
Ear	12	11
Nose	9	8
Face	9	8
Throat	15	14

Signs and Symptoms of Nasopharyngeal Carcinoma:

Nasopharyngeal problems consisting of obstruction and epistaxis is present in 64%. Otologic complaints ranging from serous discharge, tinnitus and decrease in hearing acuity

Table II Nasopharyngeal Carcinoma Complaints

Symptoms	No. of Patients	% of 108
Nasopharyngeal		
obstruction	42	39
bleeding	27	25
Otologic		
serous discharge	33	30
tinnitus	18	16
decrease hearing	15	14
Opthalmoneurologic		
blurring of vision	6	6
dilopia	27	25
drooping of the lids	3	3
Cervical		
mass	24	77
Pain		
head and neck	33	30
Face		
numbness	9	8
paralysis	3	3
Pharynx		
dysphagia	18	16
blood streak expectoration	24	22
hoarseness	9	8
loss of taste	6	6

* Presented at the 4th Asean Otorhinolaryngological Head and Neck Congress, Singapore

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account for about 60% Ophthalmoneurologic manifestations such as blurring of vision, diplopia and ptosis was found in 34%. About 77% have neck masses. Nuchal pain, pain on yawning and mastication were appreciated in another 30%. The rest of the features consisted of numbness and paralysis of the face and pharyngeal symptoms such as hoarseness, loss of taste, dysphagia and blood streaked expectoration.

Pathologic Findings:

Table III Types of Histopathologic Diagnosis

Pathologic finding	No. of patients	% of 108
Poorly differentiated epidermoid carcinoma48	44	
Moderately differentiated squamous cell carcinoma	27	25
Undifferentiated carcinoma	15	14
Epidermoid carcinoma	9	8
Transitional carcinoma	6	6
Anaplastic carcinoma	3	3

Table III shows the distribution and frequency of the patients by histopathologic diagnosis. The most common was poorly differentiated epidermoid carcinoma accounting for 44%, 27 patients or 25% had moderately differentiated squamous cell carcinoma, 14% had undifferentiated carcinoma. Epidermoid carcinoma manifested in 8% of the patients transitional cell carninoma in 6% of the patients and anaplastic type in 3%.

Classification of Malignancy:

All tumors were staged according to the TNM system of classification by the American Joint Committee for Cancer Staging and End-Results Reporting. Table IV lists the most recent classification.

Table IV TNM Classification according to the American Joint Commitee for Cancer Staging and End-Results Reporting

Primary Tumor (T)
- Tis Carcinoma in situ
- T1 Tumor confined to one site of the nasopharynx or no tumor visible
- T2 Tumor involving two sites (both posterosuperior and lateral walls)
- T3 Extension of tumor into nasal cavity or oropharynx
- T4 Tumor invasion of skull or cranial nerve involvement or both

Nodal involvement (N)
- N0 No clinically positive node
- N1 Single clinically positive homolateral node less than 3 cm in diameter
- N2 Single clinically positive homolateral node 3 to 6 cm in diameter or multiple clinically positive homolateral nodes, none over 6 cm in diameter
- N3 Massive homolateral node(s), bilateral nodes, or contralateral nodes

Metastasis (M)
- M0 No metastasis
- M1 with distant metastasis

The distribution and frequency of patients according to tumor site and nodal involvement is shown in Table V.

Table V Classification of Malignancies

Primary Site	No. of Patients	Nodal Involvement	No. of Patients
Tis	27	no nodes	16
T1	9	unilateral	66
T2	33	bilateral	27
T3	12	contralateral	0
T4	27		

On tumor primary site, 27 patients had Tis classification or carcinoma in situ. T1 or tumor limited to one site was present in 8%. T2 type where the tumor had involved both the superior wall or vault and the lateral wall was present in 33 patients. T3 or tumor extending to the nasal cavity, oropharynx or pterygoid space appeared in 11% while 27 patients or 25% showed tumor extending to the base of the skull as shown by evidences or cranial nerve invasion.

On nodal involvement, 15 patients or 14% exhibited no clinically positive nodes., 61% showed unilateral nodal involvement while 25% had bilateral involvement.

Table VI Stage of Malignancies

		No. of Patients	% of 108
Stage I	T1; N0; M0	6	6
Stage II	T2; N0; M0	3	3
Stage III	T3; N0; M0 T1 or T3; N1; M0	6	6
Stage IV	T4; N0 or N1; M0 any T; M2 or N3; M0 any T· any N; M1	93	85

Stage grouping distribution and frequency is shown in Table VI. Stage I and II diseases are limited to the nasopharynx while Stage III and IV reports extrusion beyond the nasopharynx or the presence of metastasis. Majority or 99 of the patients or 91% demonstrated tumor extending beyond the nasopharynx with bone involvement and/or cranial nerve impairment. Only 9 patients had tumors that remained confined to the nasopharynx.

DISCUSSION

Nasopharynx carcinoma represents a unique neoplasm of the head and neck area in that it is an undifferentiated, agressive, neoplastic carcinomatous process, anatomically situated in a small, surgically inaccessible area and plagued with a confusion of numerous designations that causes no end of problems in diagnosing and treating the disease.

Malignancy of the nasopharynx is commonly located in the lateral nasopharyngeal wall including the Fossa Rosenmuller. Its clinical manifestations are closely related to the anatomical peculiarities of the region, the knowledge of which is mandatory for a better understanding of the disease pattern.

The nasopharynx is that part of the airway extending from the sphenoid bone superiorly, from the posterior surface of the choana and palate anteriorly, and posteriorly is bordered by the basal process of the occipital bone and the cervical cetebrae and laterally through the opening of the Eustachian tube. Adjacent to the Fossa of Rosenmuller lies the foramen lacerum, providing a route of access to the cavernous sinus and the anterior cranial nerves. Lateral to this lies the jugular foramen and carotid and hypoglossal canals which contains the last four cranial nerve and the sympathetic trunk.

The node of Rouvier, which is the uppermost member of the lateral retropharyngeal nodes of Krause, lies in close proximity to the jugular foramen.

In our series, the symptomatology of nasopharyngeal malignancy revealed features worthy of note. Cervical neck mass was the most common presenting symptom suggesting that our patients were seen in a much later stage. This is further supported by the increased number of patients in Stage IV of Cancer Classification. This is in contrast to the review made by Hopping, et al wherein he reported serous otitis media as their earliest complain followed by nasopharyngeal obstruction and bleeding.

Nasopharyngeal complaints presenting as obstruction and bleeding comprised a substantial percentage of patients problem in this review. It would be then beneficial to the patient for us to remember that any history of epistaxis and bloody nasal discharge, correlated with clinical features might be a good indication of the presence of malignancy. Therefore, a good mirror examination and further work-up is necessary.

Serous aural discharge, especially in elderly individuals should not be taken lightly. While otitis media in children may be of a benign nature due to the characteristic anatomical features of the eustachian tube, this, however maybe a warning sign of malignancy in adults.

Carlin, et al in 1981 reported a case of sudden painless monocular blindness as the initial manifestation of NPCA. This was not observed in our series. Instead ophthalmoneurologic problem like diplopia due to involvement of the 6th cranial nerve was the most common feature.

While other features of NPCA observed in our review were of the non-classical type, they still merit our attention since they were seen in our documented cases.

SUMMARY

Filipino patients with nasopharyngeal malignancies were presented. Their clinical features were properly reviewed and evaluated. But because of their protean manifestation, many of the cases were diagnosed late thus adversely affecting the prognosis. What remains as the best safeguard against misdiagnosis is still the high index of suspicion. Clinical features suggestive of malignancy demand prompt and conclusive evaluation.

BLOOD BANK ROBBERY*
(Angiosarcoma of the Gingiva: A Case Report)

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CHERYLL B. BUMANGLAG, MD***
MAMERTO ALMELOR, MD****

ABSTRACT

Angiosarcoma, a rare malignant vasoformative tumor rapidly growing with an insidious onset and minimal symptoms is presented. A 28 year old male with a fast growing and bleeding gingival mass. Stage IV $T_4N_2M_0$, underwent wide resection of the tumor, hemimandibulectomy (en bloc), radical neck dissection with preservation of the spinal accessory nerve and primary repair with pectoralis major myocutaneous island flap were done. A review of the literature of angiosarcoma, its clinical presentation; etiologic and predisposing factors; age, sex and race predilection; gross and histologic appearance; treatment, survival and prognosis are discussed. For the past two decades review of foreign and local publications have no mention of angiosarcoma in the gingiva. This is the first reported case of angiosarcoma of the gingiva.

OBJECTIVES

1. To present the first reported case of angiosarcoma in East Avenue Medical Center involving the gingiva, a very rare and confusing entity in head and neck malignancy.

2. To review the literature on angiosarcoma, its clinical presentation; etiologic and predisposing factors; age sex and race predilection; gross and microscopic appearance; treatment, prognosis and survival rate.

3. To review the eleven cases of angiosarcoma treated at East Avenue Medical Center from 1970 - 1989.

CASE REPORT

A 28 year old male from Kalibo, Aklan was admitted at East Avenue Medical Center (EAMC) because of a rapidly growing and friable left gingival mass.

Nine (9) months prior to admission it started as 0.5 x 0.5 cm. which grew into 8 x 9 x 6 cm. Eight (8) months PTA biopsy was done upon the advise of a dentist. However, the result was not known. Another biopsy done seven (7) months PTA at the OPD of a well-known institution revealed "malignant hemangioendothelioma." In the succeeding

Pre-operation Angiosarcoma of the gingiva

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* Presented at the Scientific Symposium on Interesting Case helds at Manila Midtown Ramada Hotel on July 7, 1989.
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months, the bleeding episodes became more frequent and more profuse that admission was sought in one of the Medical Centers in Metro Manila. He was then referred to our institution for definitive management. The bleeding was so profuse that a total of 40 units of fresh whole blood have been transfused to the patient in the course of his illness.

On physical examination, there is marked swelling of the left cheek and mandibular areas. The overlying skin has neither discoloration nor ulceration and it slides over the mass. The fleshy, reddish, firm but friable mass has extended to the soft and hard palate and to the floor of the mouth displacing the tongue to the right. A 1 x 1 cm. neck node, movable, non-tender at the left posterior triangle was noted.

Admitting and working diagnosis was malignant vasoformative tumor Stage IV $T_4N_1N_0$. X-rays of the mandible revealed "lytic lesions with ill-defined borders involving the left side of the body of the mandible and soft tissue swelling in the adjacent region. No abnormal calcifications were noted. Impression was: suggestive of a soft tissue neoplasm with extension into the left side of the mandible." Chest X-ray was normal. Carotid angiography was not done due to financial constraint. External carotid artery ligation left was carried out under general anesthesia. The bleeding episodes became less frequent and less profuse. From a hemoglobin of 65 mg/l it gradually climbed to 100 and to 120. A week after the artery ligation, wide resection of the gingival mass and hemimandibulectomy (en bloc), left radical neck dissection and primary repair using the pectoralis major myocutaneous island flap were successfully done.

Operative findings confirmed the physical examination on admission except that the mass has grown to 9 x 10 x 4 cm. Surgical staging remains at Stage IV ($T_4N_1M_0$). However, histopathologic report gives a $T_4N_1M_0$ Stage IV. The enlarged lymph node was negative. Post-op was complicated by pseudomonas aeroginosa (confirmed by C&S) on the tracheostomy site and 2 cm. wound dehiscence on the RND incision. The infection was controlled in 2 weeks and the patient was discharged improved. Post-op cobalt therapy and chemotherapy are being contemplated.

DICUSSION

Angiosarcoma, a rare malignant vasoformative tumor of vascular origin, is rapidly growing with an insidious onset and minimal symptoms. Pain is rarely complained of so that the patient sometimes comes when the tumor has grown to almost unresectable size (majority is greater than 5 cm. on admission). Bleeding was not emphasized in all of the references reviewed. Our patient almost died of hypotension secondary to hypovolemia because of profuse bleeding, not of the neoplasm. Angiosarcoma believed to arise 'de novo' is collectively one of the rarest forms of soft tissue neoplasms. They account for a vanishingly small proportion of all vascular tumors and they comprise less than 1% of all sarcomas as estimated by a 20-year study at M.D. Anderson Hospital.[12] They may occur anywhere in the body but rarely do they arise from major blood vessels. One striking phenomenon which contrasts sharply with deep location of most soft tissue sarcomas is their predilection for skin and soft tissue.

Malignant hemangioendothelioma is another term which some pathologists use to differentiate it from the benign analogue hemangioendothelioma. Batsakis writes: "we decry the use of the term 'hemangioendothelioma' except for the peculiar and rare hepatic vascular lesions".[14]

INCIDENCE

The controversial and scanty literature on angiosarcoma from foreign journals include forty four (44) skin soft tissue tumors seen at M.D. Anderson Hospital (Houston) before 1976. None was mentioned affecting the gingiva. In London, seventy two (72) patients before 1986 with angiosarcoma of the face and scalp were analyzed with respect to various prognostic factors and effects of different treatment regimens. None was reported in the gums. It was only in 1986 onwards that case reports trickled in the different journals claiming to be the first reported case of a angiosarcoma in one site or another: angiosarcoma of the gall bladder,[3] adrenal gland,[4] tongue,[5] associated with foreign body material,[6] maxillary antrum associated with vinyl chloride exposure,[7] plexiform neurofibroma[9] and more recently, radiation induced angiosarcoma.[12]

Enzinger and Weiss gathered the data from Armed Forces Institute of Pathology (AFIP) of 336 cases of angiosarcoma as to their anatomical distribution (Table 1). Out of these, only thirteen (or 7%) were found in the head and neck without specifying the site. Sex and age distribution of cutaneous angiosarcoma without lymphedema (Tables 2 and 3); and anatomical distribution of cutaneous without lymphedema (Table 4); age distribution of angiosarcoma of soft tissue (Table 5); sex distribution of angiosarcoma of soft tissue (Table 6); and anatomical distribtion oof angiosarcoma soft tissue (Table 7)[12] were also described.

Reyna et. al. in the local scene reported in their study on Soft Tissue Sarcomas revealed three (3) of angiosarcoma in the head and neck with no specific site mentioned.[16]

EAMC pathology records from 1970 to 1989 show a total of eleven (11) angiosarcoma from different sites; three (3) in the head and neck, namely, one in the buccal mucosa, one in the oral cavity, and one in the neck. There was none mentioned in the gingiva.

Age, sex distribution of angiosarcoma of soft tissue (Table 6); and with peak incidence in the 6th to 7th decade of life

especially the cutaneous type. It has a male preponderance of 2.2:1. There is no radical predilection.[1]

Local studies by Reyna et. al.[16] shows 7:6 male predilection and peak incidence at 50-70 years. EAMC in its twenty (20) year history shows male preponderance at 1.75:1 and age peak at 50-60 years.

Predisposing & Etiologic factors have not been fully established. There was no evidence of consistent or significant predisposing factor.

Table 1. Anatomical distribution of angiosarcomas (366 cases) (AFIP, 1966 - 1976)

Location		No. of cases	Percentage
skin		121	33
without lymphedema	101		
with lymphedema	20		
soft tissue		89	24
breast		30	8
liver		31	8
bone		20	6
spleen		26	4
heart and great vessels		10	3
orbit		10	3
nose, oral cavity and nasal sinuses		13	4
others		26	7
TOTAL		**366**	**100**

Table 2. Anatomical distribution of angiosarcomas of soft tissue (89 cases) (AFIP, 1966 - 1976)

Location	No. of cases	Percentage
leg	34	38
arm	17	19
trunk	22	25
head and neck1	3	15
unknown	3	3
TOTAL	**89**	**100**

Table 3. Sex distribution of angiosarcomas of soft tissue (89 cases) (AFIP, 1966 - 1976)

Sex	No. of cases	Percentage
male	58	66
female	28	32
unknown	3	2
TOTAL	**89**	**100**

Table 4. Anatomical distribution of cutaneous angiosarcomas without lymphedema (101 cases) (AFIP, 1966 - 1976)

Location	No. of cases	Percentage
head and neck	52	52
leg	13	13
trunk	13	13
arm	8	8
generalized	2	1
most specified	13	13
TOTAL	**101**	**100**

Table 5. Age distribution of angiosarcomas of soft tissue (89 cases) (AFIP, 1966 - 1976)

Age Years	No. of cases	Percentage
0 - 10	12	12
11 - 20	14	16
21 - 30	16	18
31 - 40	12	13
41 - 50	8	10
51 - 60	11	12
61 above	16	19
TOTAL	**89**	**100**

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TOTAL	**89**	**100**

The factors implicated are:

1. Radiation induced angiosarcoma is a very uncommonly reported.[10]
2. Chronic lymphedema is the most widely recognized predisposing factor in angiosarcoma of skin and soft tissue. These patients have also received postmastectomy radiation.
3. Malignant change in a pre-existing benign vascular tumor is probably an unusual event. In one series of angiosarcomas three (3) arose in portwine stains, one in irradiated lymphangioma.[12] One unique case was a transformation of Von Recklinghausen's disease to angiosarcoma.[9]
4. Various substances like:
   a. Thorium dioxide (Thorotrast) used in cerebral angiography;[12]
   b. Vinyl chloride use in the production of synthetic rubber;[17]
   c. A_2O_3 containing insecticides;[12]
   d. Steroids.[12]

Gross Appearance

Angiosarcomas have posed many controversies to pathologists. Batsakis writes: "Angiosarcoma is more difficult to diagnose than to define". Three (3) main gross tumor configurations were noted: diffusely infiltrate papulonodular and ulcerated. Our patient does not fit ideally in any of the above. Tumors involving the dermis were typically red, blue or purple; those in the subcutis were usually colorless clinically, although there were some shade of red at operation. The texture is usually soft and spongy, but firm areas were often apparent.[12] In the gingiva, pyogenic granuloma, may be considered as a differential diagnosis.

Microscopic findings

The pattern of tumor growth show remarkable variation even within individual cases, but all cases showed some degree of vasoformative activity. There are areas of solid and non-solid growth.

The correct diagnosis is established by recognized microscopic and ultra structural pathologic criteria as clearly described by Gibbs et. al.[4] Proliferation of anaplastic endothelial cell is the underlying feature. At one extreme (Fig. 1) are irregularly outlined islands of these cells containing poorly defined vascular spaces, some of which filled with RBC; at the opposite extreme (Fig. 2) are well formed vascular spaces lined by single layers of neoplastic cells; with the endothelium in both extremes focally multilayered, with projections of these cells into the lumina.[11]

Presence of hemorrhages and necrosis on top of neoplastic vascular spaces supported by dense fibrous connective tissue; erythrocytosis and leukophagocytoses by neoplastic endothelial cells are present.

The non-committal diagnosis of our pathologist lingered for almost one month since the special stain to confirm the endothelial origin using peroxidase anti peroxidase staining using rabbit anti - human and anti - body for factor VIII - related antigen and election microscopy is not readily available in our setting. Differential diagnosis include hemangioendotheliome vegetant intravasculare originally

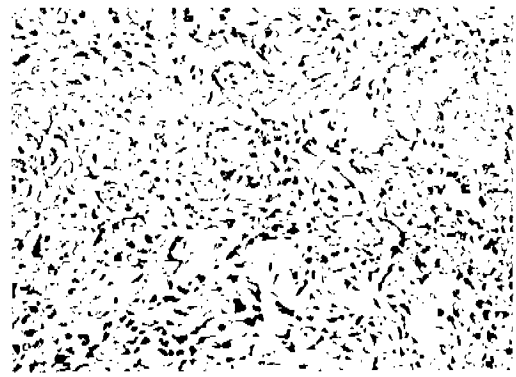


Fig. 1
Angiosarcoma in which the solid growth pattern predominates; poorly defined vascular spaces are present (hematoxylin and eosin stain; original magnification x 100)

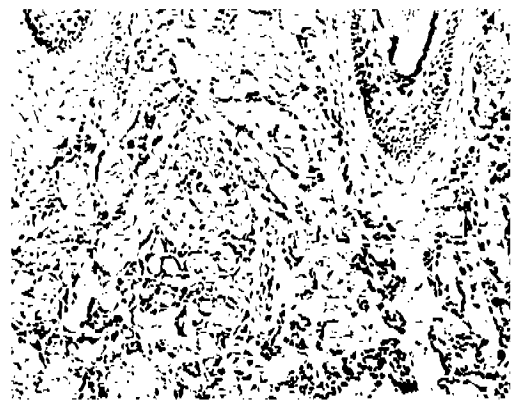


Fig. 2
Angiosarcoma composed of vascular spaces lined by anaplastic endothelial cells; the lumina of many or these spaces is partially or completely filled by masses of these cells (hematoxylin and eosin stain; original magnification x 50).

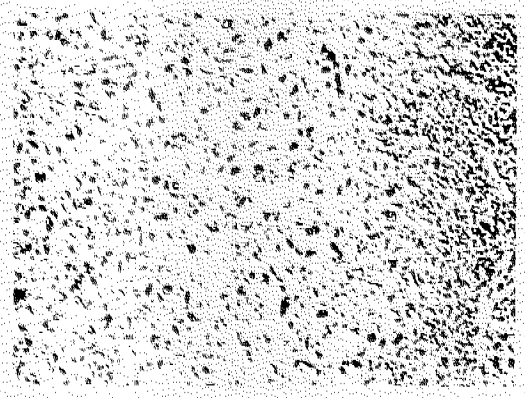


Fig. 3
Angiosarcoma in lymph node. As demonstrated, the metastases in lymph nodes are unusually composed of anaplastic cells whose endothelial origin is difficult to appreciate (hematoxylin and eosin stain; original magnification x 100).

called by Masson a rare lesion with easily defined and recognizable microscopic features of intravascular papillary endothelial hyperplasia with a central thrombus.[13] Angiosarcomas are rarely intravascular and rarely have a central thrombus. Other misdiagnoses from a pathologic standpoint includes: vascular leiomyoma, sclerosing hemangioma, infantile myofibromatosis and hemangiopericytoma.

Immuno-peroxidase staining should result in uniform granular golden-brown positivity in all neoplastic cells to confirm the diagnosis. Angiosarcomas reveal solid areas, necrosis, cellular pleomorphism, mitotic figures and, occasionally, invasion of the surrounding tissues.

Treatment, Survival, Prognosis

Complete surgical excision is the favored mode of treatment. Chemotherapy and radiation are not advocated because long-term results have not been encouraging in the latter and ineffective in the former. Reyna et. al.[16] mentions radiation therapy in angiosarcoma of the scalp with good response.

The clinical course is relatively a rapid one. The patient is either cured by primary surgical excision (about 50%) or he dies of the disease in three years time. Death is associated with regional lymph node and distant metastases or painful and ulcerohemorrhage local recurrence into fascial planes, bone and cartilage.[14]

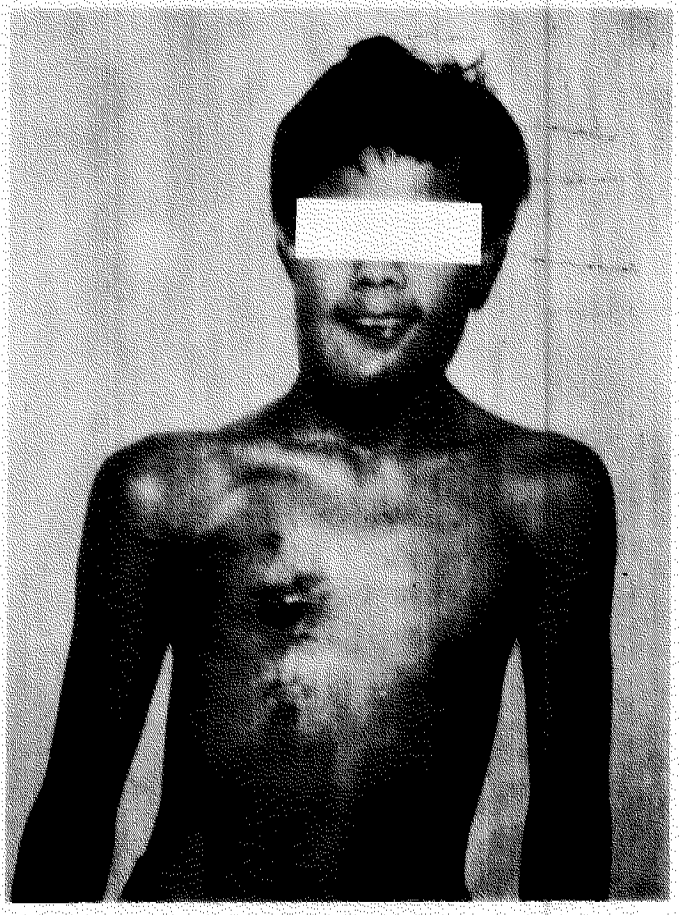
Recurrences, prognosis and response to treatment are dependent on the grade, size and location of the tumor rather than the histologic label.

Rosae et. al. advised surgical excision only for lesions that are solitary, and well-circumscribed. Radiation therapy reported by Spitle has also been effective.[15] However, the recent publication on radiation induced angiosarcoma will make one think twice. Rosemberg et al reports that there is a 5-year survival rate of 74% using adjuvant cyclophosphamide, doxorubicin (Adriamycin) and methotrexate compared with 41% in historical controls. Other reports have been quite disappointing.[15]

The survival rate of angiosarcoma of the head and neck is somewhat better than those not specifically limited to a specific region of the body. The main factor determining the rate of survival within and among all groups studied was the accessibility of the tumor to complete surgical resection. This, we believe, have been successfully resected in our patient with all the tumor margins free of malignant cells. Up to the present there is no evidence of recurrence.

SUMMARY

Angiosarcoma of the gingiva, a rare, malignant vasoformative tumor, involving a rare anatomic site, in a 28-year old male in Stage IV ($T_4N_0M_0$) who underwent wide resection, left hemimandibulectomy, left radical neck dissection with preservation of the spinal accessory nerve and primary repair with the pectoralis major myocutaneous flap was presented. The clinical course, incidence, age and race predilection, gross and microscopic appearance, treatment and prognosis are discussed. Foreign and local journals reviewed failed to show any angiosarcoma of the gingiva. This is the first reported case of angiosarcoma of the gingiva.



3 weeks post-cobalt radiation
(Angiosarcoma of the gingiva)

Table 8. Angiosarcoma (EAMC 1970 - 1989)

Anatomical Site	No. of Patients	Percentage
GIT	5	45
extremities	3	27
skin	1	9
head and neck	3	27
skin	1	
buccal mucosa	1	
oral cavity	1	
TOTAL	**11**	**100**

Table 9. Sex Distribution of Angiosarcoma (11 cases) (EAMC 1970 - 1989)

Sex	No. of cases	Percentage
Male	7	64
Female	4	36
TOTAL	**11**	**100**

Table 10. Age Distribution of Angiosarcoma (11 cases) (EAMC 1970 - 1989)

Age	No. of cases	Percentage
0 - 10	0	0
11 - 19	0	0
20 - 29	1	9
30 - 39	1	9
40 - 49	1	9
50 - 59	3	27
60 and above	3	27
unknown	2	19
TOTAL	**11**	**100**

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MIDLINE GRANULOMA: TWO FACES OF AN ENIGMA*

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MIDLINE GRANULOMA: TWO FACES OF AN ENIGMA

Introduction

Many disease entities encountered in our readings are so rare that we stop and read only for a while, out of curiosity perhaps, and then turn back to the topic we had in mind in the first place. For many of us, these curiosities will remain buried in our books, never to be seen in actual practice. Then one day, we come face to face with one such entity and that is when we realize that curiosity is indeed a virtue.

Herein are presented two cases of Midline Granuloma also known as a Lethal Granuloma of Idiopathic Midline Destructive Disease. Midline Granuloma is a rare disease entity, Fauci et al documented only 10 cases between 1960-1975. It manifest as a non-healing granuloma of the nose and upper respiratory tract. It is a relentlessly progressive, localized destructive process that predominantly involves the nose, paranasal sinuses, and palate with erosion of contiguous structures particularly the face.[1] Death may occur in a matter of months or after many years and is usually secondary to meningitis, pneumonia, debilitation and uncontrolled hemorrhage.

Case Reports

Case #1

M.Q., a 54 y/o male was admitted for the second time on February 9, 1989 because of swelling of the left cheek.

The condition started ten months PTA when the patient complained of a toothache over the second left upper molar.

Nine months PTA the patient developed left maxillary swelling associated with foul odor emanating from the nose. The patient consulted a physician and a biopsy was done intranasally in a private hospital which revealed acute and chronic inflammation.

Eight months PTA due to the persistence of the symptoms, several consultations were made at another hospital. A multiple punch biopsy was done showing "Granulation Tissue". An X-ray of the paranasal sinus was also done showing "Chronic Sinusitis".

Seven months PTA a left Caldwell-Luc operation was done and the histopath report revealed similar findings.

Five months PTA the patient again developed swelling of the left cheek associated with moderate to high grade fever and chills. A few days later, a pustule developed over the swelling which ruptured and drained a foul-smelling sanguino-purulent discharge. The patient consulted at our institution and was subsequently admitted for the first time.

On his first admission an initial impression of Chronic Sinusitis R/O Wegener's Granulomatosis, R/O Left Maxillary Carcinoma was given. Paranasal sinus X-ray done revealed "Chronic Pansinusitis". CBC revealed a hgb level of 10.0, culture and sensitivity of the wound discharge showed a moderate growth of Staphylococcus Aureus. Debridement of the face and biopsy was done on the third hospital day. Biopsy revealed acute and chronic inflammation with necrosis. The swelling gradually subsided. On the 8th hospital day, a repeat biopsy was done taking specimens from the nasal mass, nasopharynx, skin over the nasofacial area and the palatal mass. On the 9th hospital day, he was discharged slightly improved and was seen on an out-patient basis. The biopsy revealed Squamous Cell Carcinoma. Two weeks PTA the patient developed massive epistaxis and was rushed to another hospital. He was discharged stable a week later and was subsequently readmitted in our hospital.

On admission, the patient was febrile. Pertinent physical findings centered on the nasofacial area where the patient was found to have a 3 x 5 cm dirty, foul-smelling ulcer with black necrotic borders draining a sanguino-purulent discharged over the left medial maxillary area. Dirty grayish mucosal ulcers over the midline and left of the hard palate were also noted. The neck was supple with no palable mass.

A CT scan of the paranasal sinuses was done revealing "erosive changes of the antral mucosal wall of the left maxillary antrum suggested of tumor infiltration with no intracranial extension". The patient was scheduled for "Resection of Left Maxillary Tumor" when he developed massive epistaxis. Two hours later, the patient went into cardiorespiratory arrest.

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* Presented at the Scientific Symposium on Interesting Cases held at Manila Midtown Ramada Hotel on July 7, 1989.

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Case #2

F.D., a 56 year old female was admitted on March 7, 1989 because of pain in the nose. The condition started three months PTA when the patient complained of persistent watery nasal discharge. She also noted a small nodule in the right nostril which gradually enlarged. The mass was later associated with crusting of the nasal vestibule as well as pain in the nose. A paranasal sinus X-ray was done revealing "right maxillary sinusitis". Persistence of the symptoms prompted consultation.

Pertinent physical findings on admission centered on the nose where the nasal septum was found to be thickened, the medial portion of the alar cartilage was indurated and an intra-nasal mass was noted in the antero-inferior portion of the nasal septum with extension into the nasal floor bilaterally as well as the gingivobuccal sulcus anteriorly. The neck was supple with no palpable lymphadenopathy.

On admission, an impression of Intranasal mass, R/O malignancy was given. Laboratory work-ups done revealed an elevated ESR at 105.0. A biopsy of the intranasal mass was done which revealed acute and chronic inflammation. A repeat biopsy was done which revealed findings consistent with "Midline Granuloma".

The patient was discharged, stable and was referred for high dose radiotherapy. The patient returned for follow-up 5 weeks later, remarkably improved.

Table 2 Histopathologic Findings in our Patients

Patient	Histopathology
M.Q.	Biopsies from the nasal mass, nasopharynx, skin over the nasofacial area and palatal ulcers showing acute and chronic inflammation with necrosis. Granulation tissue Squamous Cell CA
F.D.	Biopsies of the nasal mass, septum and floor showing acute and chronic inflammation.

TABLE 1

Patient	Sex	Age of Onset Yrs.	Onset of symptoms to diagmosis Months	No. of Biopsies	Clinical Presentation At Admission
M.Q.	M	54	11	6	Chronic pansinusitis left intranasal mass destruction of the left maxillary sinus and nasal system,necrotic ulceration of the skin over the left nasofacial area and left side of the hard palate.
F.D.	F	56	3	3	Right maxillary sinusitis, right intranasal mass.

DISCUSSION

On admission both patients had sinusitis with necrotic destructive lesion of the nasal septum and an intranasal mass. The first patient had ulcerations of the nasofacial area and hard palate. (Table 1) Both were free of systemic signs and symptoms. Regional lymphadenopathy was not a feature in either of them. Despite treatment with antibiotics, relentless progression of disease continued.

The initial clinical consideration in both cases was on upper airway malignancy inspite of the initial biopsy findings. The concern at that time was that the inflammatory reaction may have been masking a malignancy and so multiple deeper biopsies were done. All biopsies were reviewed and compared. The typical finding was acute and chronic inflammation with necrosis (Table 2).

Arriving at a histopathologic diagnosis was not an easy task and one biopsy in the first case was even interpreted as squamous cell CA by a noted pathologist. He later withdrew his diagnosis and his reversal was a surprising development since it came when this case was reviewed in a mortality conference.

The disease activity was localized in the upper airway in both patients and there was no evidence of disseminated disease either inflammatory or neoplastic. Furthermore,

Table 3 MIDFACIAL NONHEALING LESIONS: DIFFERENTIAL FEATURES2

	Wegeners's Granulomatosis	Polymorphic Reticulosis	Idiopathic Midline Granuloma
Upper Airway	Diffuse in upper airway, predominantly sinuses; erosion of facial bones and soft tissue is rare.	Destructive localized or diffuse lesions; characteristic extension through palate and soft tissues.	Most destructive of group; bone and soft tissue extension progressive and common.
Systemic Involvement	Classically a systemic disease; kidneys, lungs & small vessels.	Localized or systemic; systemic manifestations are lymphoma like.	Localized to airways and upper aero-digestive tract
Association with Malignancy	No known association	Very likely to form lymphoma	May remain unspecific or evolve to polymorphic reticulosis.
Histopa-thologic Features	Necrotizing vasculitis, granulomas & giant cells, no atypical cells.	Atypical and polymorphic cells, angio-centric and angioinfil-trative growth pattern, lymphoma or lymphoma-like.	Non-specific acute and chronic inflammation usually no atypical cells.
Treatment	Cyclophosphamide with or without steroids.	Radiation Therapy	Radiation Therapy

biopsies consistently failed to show the presence of neoplastic cells. It was then felt that we were dealing with a disease process, other than a malignancy, with the same if not greater destructive intensity. At this point the Midfacial Necrotizing Disease; Wegener's Granulomatosis, Polymorphic Reticulosis, and Midline Granuloma were considered.

Both patients underwent work-ups to rule out other causes of their destructive upper airway lesions. Paranasal sinus X-ray showed sinus disease in both patients and a CT scan in the first patient revealed cartilaginous and bony destruction. Diagnostic work-ups specifically chest X-ray BUN and creatinine were normal. Culture and sensitivity, of the wound discharged in the first patient revealed a moderate growth of Staphylococcus aureus. ESR was found to be elevated at 105.0 in the second patient.

Because of the existence of some apparent as well as real similarities between Midline Granuloma, Wegener's Granulomatosis, and Polymorphic Reticulosis, it is necessary to set down comparative and distinguishing characteristics of these distinct entities. The major clinico-pathologic criteria of these diseases are shown in Table 3.

The lesions of Wegener's granulomatosis are the least destructive of the three disease entities. Unlike our first patient, they rarely, if ever, erode through the skin of the face.

On the basis of histologic criteria, the histopathologic hallmark in Wegener's granulomatosis is granulomatous vaculitis with many giant cells, although upper airway tissue may, at times, show only non-specific inflammation due to biopsy sampling. In our patients, biopsies revealed acute and chronic inflammation with necrosis; no giant cells were seen.

Wegener's granulomatosis is a generalized inflammatory disease characteristically involving the lungs in the form of a necrotizing vasculitis. At some point in the disease, the kidney is also involved with characteristic early focal glomerulitis, progressing to fulminant glomerulonephritis. Our patients presented with no such systemic problems and work-ups showed normal pulmonary and renal profiles.

Controversy still exists as to whether Midline Granuloma is a limited form of Polymorphic Reticulosis that is confined to the upper respiratory tract or whether these are distinct clinical entities. Both diseases present with similar upper respiratory tract lesions although Midline Granuloma is supposedly more destructive in this area. Furthermore, Polymorphic Reticulosis may present with systemic involvement particularly in the lungs. Histopathologically, Polymorphic Reticulosis shows atypical lymphoreticular cells giving it a lymphoma-like appearance. There are no such atypical cells in Midline Granuloma.

Since our patients presented with lesions localized in the upper respiratory tract and repeated biopsies failed to show the presence of atypical cells, we believe that Midline

Table 4 CLINICOPATHOLOGIC FEATURES OF MIDLINE GRANULOMA

1. Presence of locally destructive lesions which are always restricted to the upper respiratory tract.
2. Absence of systemic disease.
3. On examination of repeated biopsy specimens histopathologic picture consisted of acute and chronic inflammation with variable amounts of necrosis.
4. Inability to demonstrate an infectious origin by culture or special stains.
5. Favorable response to Radiation Therapy.

Table 5. PATIENTS WITH MIDLINE GRANULOMA WHO WERE STUDIED AT THE NATIONAL INSTITUTE OF HEALTH

Patient	Sex	Onset of Age of Onset	Symptoms to Diagnosis	Clinical Presentation at Admission
		Years	Months	
1	F	40	9	Facial ulceration in infraorbital region, with perforation into the maxillary sinus.
2	M	29	65	Bilateral maxillary sinus erosion; perforation of nasal septum
3	F	46	92	Destruction of right maxillary sinus, orbit, face and hard palate
4	M	42	13	Pansinusitis, nasal mass with perforation of septum
5	M	55	11	Necrosis and destruction of soft and hard palate
6	F	46	36	Necrosis and perforation of nasal septum and hard palate
7	F	59	4	Pansinusitis; destruction of left maxillary sinus and floor of orbit; ocular proptosis
8	F	18	2	Pansinusitis; perforation of soft palate
9	F	21	24	Nasal inflammation; pansinusitis with destruction of right maxillary sinus and orbit; displacement of eye
10	F	9	36	Pansinusitis; destruction of nasal septum and bridge of nose

Taken from "Radiation Therapy of Midline Granuloma, A.S. Fauci, MD; R.E. Johnson, MD and S.M. Wolff, MD

Table 6. HISTOPATHOLOGIC FINDINGS IN PATIENTS WITH MIDLINE GRANULOMA

Patient	Histopathology
1	Multiple biopsies of left maxillary antrum showing acute/chronic inflammation, necrosis, granulomata
2	Biopsies of nasal septum and hard palate showing acute/chronic inflammation, necrosis, and small vessel endarteritis obliterans; biopsies of left maxillary antrum and trachea showing chronic inflammation, biopsy of vocal cord showing granulation tissue
3	Biopsy of right maxillary sinus showing chronic inflammation
4	Biopsies of nasal turbinates and left maxillary sinus showing chronic inflammation with some atypical histiocytic infiltration
5	Biopsies of soft and hard palate showing acute/chronic inflammation, necrosis, granulomata, and small vessel vasculities
6	Biopsies of nasal septum and hard palate showing acute chronic inflammation with atypical histiocytic infiltration
7	Multiple biopsies of maxillary sinus, ethmoid and sphenoid sinuses, and posterior pharynx showing chronic inflammation and severe occlusive endarteritis
8	Biopsy of soft palate showing acute/chronic inflammation with necrosis
9	Biopsies of nasal mucosa and maxillary sinus showing acute/chronic inflammation, granulomata
10	Biopsy of nasal mucosa showing chronic inflammation with granulomata

* Taken from Radiation Therapy of Midline Granuloma, A.S. Fauci, M.D.; R. E. Johnson, M.D.; and S. M. Wolff, M.D.

Granuloma is the diagnosis that appropriately describes the condition of our patients (Table 4).

In the area of therapy, differentiating these disease entities is even more critical since it has been firmly established that cytotoxic therapy, particularly with cyclosphosphamide is highly effective in inducing and maintaining long term remissions in Wegener's Granulomatosis.[1,3] In Midline Granuloma and Polymorphic Reticulosis on the other hand such measures have not been effective but radiotherapy, particularly wide field high dose irradiation at 5000 to 6000 rad doses has been dramatic in controlling the disease and inducing long term remissions in majority of cases.[1,5,6]

The works of Fauci et al are presented because of the striking similarities that are immediately apparent between the 10 cases of documented midline granuloma in their study and the two cases presented herein (Tables 5 and 6).

Results of Therapy

As previously mentioned, one of the biopsies of the first patient was interpreted as squamous cell CA and the patient was scheduled for resection of the maxillary tumor. Unfortunately, the patient expired before any definitive management could be instituted.

For the second, the situation was markedly different. Faced with the similarity of her presenting symptoms with those of the previously mentioned patient, a high index of suspicion was present. Fewer biopsies were required to clinch the diagnosis. Furthermore, the diagnosis was arrived at in the earlier rather terminal phase of the disease process unlike the first patient. (Table 7) She was referred for radiotherapy at a tissue dose of 5000 rads. She returned for follow-up after completion of therapy remarkedly improved. The intranasal mass had nearly disappeared, the inflammation had all but completely subsided. Her face was the expression of elation and relief in very sharp contrast to the hideous destruction seen on the face of her unfortunate predecessor.

Table 7 STEWART'S CLASSIC PHASES OF MIDLINE GRANULOMA

1. **First or Prodromal Stage** - Nasal stuffiness occurs and may last for years. A watery or serosanguinous discharge is common. No gross nasal lesions are evident.

2. **Second or Active Stage** - A foul smelling purulent or sanguinous purulent discharge occurs with nasal obstruction. Ulceration leads to septal perforation and ulceration of the hard palate, usually about the center may occur. Painless swelling of the face is a result of the continuous spread of disease. Nasal crusting with epistaxis and sequestration of nasal bone and cartilage occur. Epistaxis may be difficult to manage in the presence of dehiscent nasal floor and septum. Temperature evaluations with abscess formation under the cheek are seen as the disease progresses. During this phase the relentless, massive destruction of tissue is a prominent feature. Granulation tissue advances into normal tissue leaving a path of destroyed tissue behind.

3. **Terminal Phase** - Patients remain febrile with repeated episodes of hemorrhage. The sloughing of the involved skin and contiguous structures, along with facial swelling results in a disfiguring facial appearance. Death occurs after a protracted illness, lasting 12 to 18 months after onset of the active phase. Death is usually the result of meningitis from continuous erosion, hemorrhage, sepsis or inanition.

POLYMORPHIC RETICULOSIS AS A SEQUELAE OF RHINOSCLEROMA: REPORT OF A CASE*

CHARLOTTE M. CHIONG, MD**
JOSE MARIA AVILA, MD***

ABSTRACT

Rhinoscleroma is a rare chronic granulomatous infection caused by Klebsiella rhinoscleromatis. Polymorphic reticulosis is a necrotizing atypical lymphoproliferative lesion predominantly affecting the upper airway. A patient previously diagnosed as having rhinoscleroma developed features diagnostic of polymorphic reticulosis after five months. Considering that rhinoscleroma is a chronic granulomatous lesion, theoretical consideration regarding a possible relationship between these two diseases is offered.

INTRODUCTION

Rhinoscleroma is rare chronic granulomatous infection caused by Klebsiella rhinoscleromatis. Sporadic cases and endemic foci of the disease have been reported in 68 countries[1] but never in the Philippines. Polymorphic reticulosis, also known as malignant midline reticulosis and previously as lethal midline granuloma, is a necrotizing lymphoproliferative lesion with atypical cellular infiltrates admixed with inflammatory cells. Some authors however consider this condition as a variant of lymphoma because of the local midfacial destructiveness, dissemination in the manner of lymphomas and the characteristics cellular appearance.[2]

The diagnosis of these lesions is often difficult. As both lesions can be mutilating and even life threatening, a diligent and aggresive approach to diagnosis and treatment is necessary.

The case to be presented was initially diagnosed to have rhinoscleroma but later developed histologic features indicative of polymorphic reticulosis. To our knowledge, this is the first case of rhinoscleroma preceding polymorphic reticulosis.

REPORT OF A CASE

A 65 years old Filipino female consulted for one year duration of progressive nasal swelling, rhinorrhea with nasal obstruction. On examination, there was an erythematous tender swelling of the nasal vestibules with non-foul mucopurulent discharge. The first biopsy was read as "acute and chronic inflammation" (Fig 1). Fungal cultures were negative. AFB stain was negative. Bacterial culture showed Klebsiella sp. A Water's X-ray showed thickened mucoperiosteal lining of the maxillary sinuses. Antrostomy with antral washing cytology and culture showed bacterial clumps and heavy growth of Klebsiella rhinoscleromatis respectively. The second biopsy showed the characteristic histologic picture of rhinoscleroma with prominent Mikulicz cells (large foamy histiocyte). Doxycycline, a tetracycline derivative ,was given at 100 mg single daily dose.

A repeat culture after two weeks showed moderate growth of K. rhinoscleromatis. The patient was, however, lost to follow up for several months until she came back with a lesion that had worsened. On admission, there was severe nasal swelling with foul purulent exudate, ulceration and necrosis (Fig 2). Bacterial culture at this time showed Pseudomonas aeruginosa. Other pertinent laboratory examinations showed marked leucocytosis with segmenter predominance, normal urinalysis and minimal PTB on chest x-ray. Anti-Koch's therapy was given as well as appropriate antibiotics with subsequent control of the infection. On suspicion of malignancy in the nasal lesion, surgical debridement with biopsy was done. Histologic section revealed atypical cells with prominent necrosis (Fig 3). Immunohistochemical studies registered a positive reaction against both kappa and lambda light chains indicating the polymorphic nature of the lesion as against an expected monoclonality in cases of lymphoma. Final diagnosis was "Polymorphic Reticulosis". Radiation therapy of 4000 rads delivered to the nasoethmoidal area produced regression of the lesion initially. However, on the 20th day after radiation was initiated, a submucosal left cheek mass appeared. Fine needle aspiration biopsy showed large lymphoid cells. Additional 2000 rads was given to the left cheek area but a similar mass appeared on the right cheek. Maculopapular skin lesions with ulcerated centers subsequently appeared especially on the face and anterior chest (Fig 4). Skin biopsy showed findings consistent with polymorphic reticulosis (Fig 5). Slides were sent to the NIH (Bethesda, MD) and AFIP (Washington D.C.) for consultation and a similar diagnosis was given. On the 70th day after initial radiotherapy, the patient requested dicharge with severe inanition and cachexia.

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* First Prize: Scientific Symposium on Interesting Cases held at Manila Midtown Hotel on July 7, 1989.

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*** Consultant, Dept. of Pathology, PGH

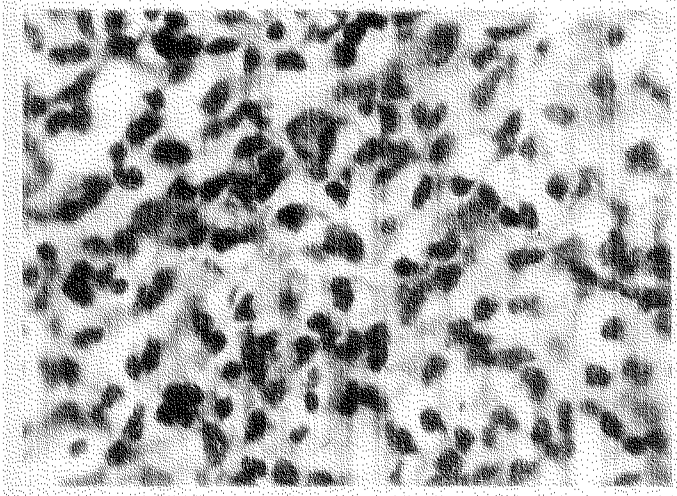

Figure 1. Biopsy of the initial lesion in the nasal septum read as acute and chronic inflammation.

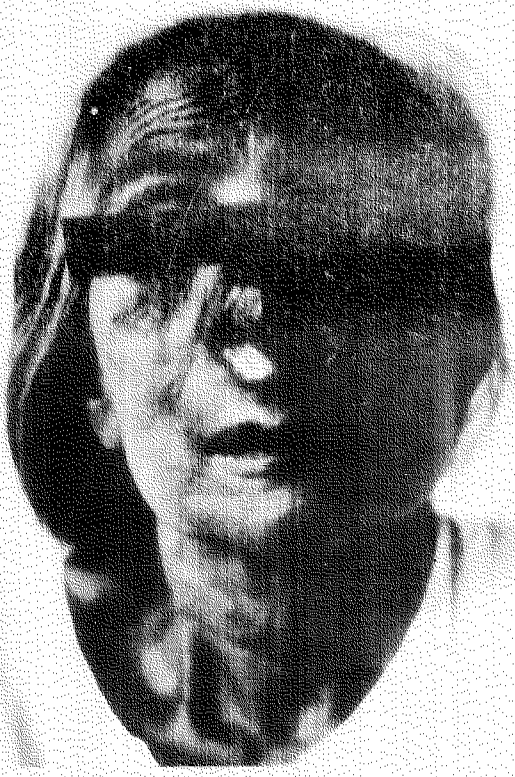

Figure 2. The patient on admission had severe nasal swelling with foul purulent exedate and ulceration with necrosis.

COMMENT

Necrotizing and apparently non-healing lesions of the midface of upper airway can be due to a host of underlying factors.[3] Specific bacterial, mycobacterial and fungal etiology must be ruled out by culture studies. A malignancy masquerading as a necrotizing lesion must also be consid-

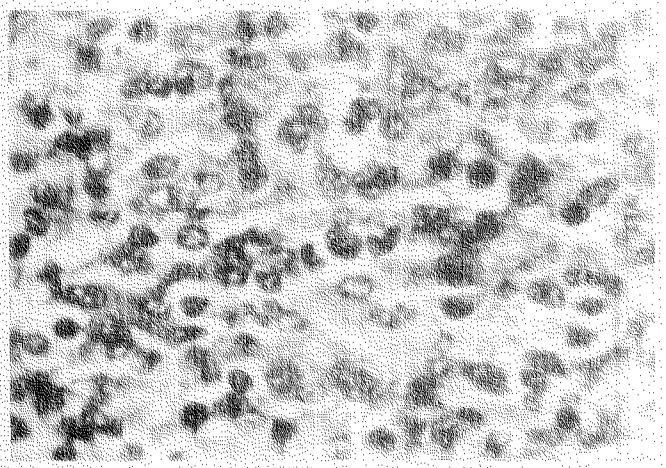

Figure 3. Nasal biopsy showing atypical lymphoid cells with necrosis - consistent with polymorphic reticulosis, five months after the initial biopsy.

Figure 4. The patient after surgery and the first course of radiotherapy.

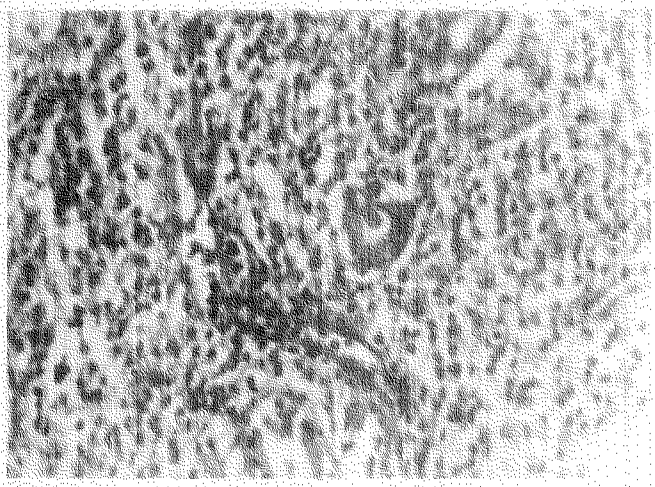

Figure 5. Skin biopsy showed the same atypical cells seen previously in the nasal lesion.

ered.[4] The emergence of highly effective but divergent treatment modalities for these conditions makes distinction among them of utmost importance. In this case, rhinoscleroma was initially diagnosed based on three consecutive cultures of K. rhinoscleromatis and histologic appearance of the characteristic Mikulicz cells and plasma cells. Five months after the last biopsy, with more tissue material available after surgical debridement, there was evidence of atypical cellular infiltrates with necrosis characteristic of polymorphic reticulosis.

Several studies have shown that K. rhinoscleromatis is not part of the normal flora of the upper airway.[5] Holinger stated the criteria for diagnosing rhinoscleroma. A cuture alone is diagnostic.[6]

Considering the difficulty of obtaining positive cultures especially at the early and late stages of the disease, demonstration of the characteristic histology even with a weak clinical cytology has a definite place in its diagnosis.[7]

In polymorphic reticulosis, it is the cellular infiltrate that is the key to the diagnosis. The infiltrate is polymorphic with variable zones of small lymphocytes, scattered immunoblasts, histiocytes, plasma cells and occasional eosinophils.

A clinical update on these two diseases is relevant for proper diagnosis and management.

RHINOSCLEROMA

Rhinoscleroma is more common in young adults with highest incidence in the 30-35 age group. It is more frequently found in the lower socioeconomic strata with poor nutrition and domestic hygiene. No sexual predilection is reported.[8]

Examination findings differ depending on the clinical stage of the disease.[9] The catarrhal stage shows inflammed mucous membranes with a mucopurulent discharge and nasal crusting. A granulomatous stage follows wherein nodular masses coalesce to form granulomatous masses. At this time biopsy is more likely to reveal the classical histopathology (Mikulicz cell with intracellular bacilli, Russel bodies or degenerated plasma cells) and cultures are more apt to be positive. The final stage is cicatrical where granulomas eventually fibrose forming scar tissue with nasal vestibule narrowing. Most patients seek medical attention after having symptoms for many years. Some, for as long as 10 years.

Symptoms are often mundane with nasal obstruction, rhinorrhea and nasal deformity as the most common complaints. Other symptoms relate to the site of anatomical involvement as in spread to the tracheobronchial tree, larynx or pharynx.[6]

Shehata reported 40% overall evidence of paranasal sinus involvement with the maxillary sinus most commonly affected.[10] Yassin described variable changes in this location such as mucosal thickening or polypoid lesions.[11]

There maybe proptosis and blindness with spread to the orbit and skull base. Lymphatic spread is said to be uncommon.

Recently, immunoperoxidase techniques described by Gumprecht[12] and Shum[8] have been used with the advantage of making a retrospective diagnosis of rhinoscleroma using stored tissue material and for positive case identification where histopathology is equivocal and cultures are negative. Serologic tests, on the other hand, are only of value when positive.

The mainstay of therapy have been antibiotics like streptomycin and tetracycline usually at 2 g/day dosage. While the use of the first is limited by its ototoxic complications, the latter poses problems with compliance because of its Q.I.D. regimen. The use of local acriflavine,[13] rifampicin,[14] cephalexin have been reported with variable results. Treatment is primarily medical with surgery reserved for airway obstruction in case of spread to the tracheobronchial tree and for cosmetic reconstruction in the cicatricial stage. Mallah, however, suggested early surgery to reduce the intracellular bacili content and improve treatment response.[16] Maher discussed cryosurgery as a new therapeutic modality.[17] Relapses have been known to occur and close observation is emphasized in these patients.

POLYMORPHIC RETICULOSIS

McBride (1897) first reported the occurence of idiopathic necrotizing granuloma of the midface.[18] Eichel coined the term "polymorphic reticulosis".[19] Kassel described "Midline Malignant Reticulosis" in referring to the same lesion. [20] In 1933, Stewart described the three stages of the disease.[21] The prodromal stage manifests non-specific nasal congestion associated with watery foul-smelling, purulent and blood-tinged discharge, mucosal ulceration, crusting with progressive swelling and induration of the surrounding facial tissues. The active and terminal phases last 12-18 months with striking mutilation. Death occurs due to hemorrhage, sepsis, meningitis, or severe cachexia and inanition.[22]

Upper airway involvement alone occurs in about 50% of cases.[23] Pulmonary involvement manifests with fever, cough, chest pain and hemoptysis but is distinguishable from pulmonary tuberculosis by the appearance in the lower lung lobes of pulmonary nodules with sparing of perihilar areas. Skin lesions, as in this patient appears as maculopapular rashes in the trunks and extremities with progression to punched out ulcers in the later stages. Rarely the GIT, CNS and kidneys maybe involved.

Harrison described the pathologic picture in polymorphic reticulosis with the term NACE or necrosis with atypical cellular exudates. Evidence is now accumulating that this is a form of lymphoma, Batsakis[25] presented a pathologic

spectrum by which polymorphic reticulosis eventually develops into malignant lymphoma. The time scale for such transition is unpredictable with little information given in short term studies. Dickson[26] first advocated the use of radiation therapy, presently the treatment of choice. A total dose of 4000-5000 rads is given over a period of 4-5 weeks. Prognosis is very good after irradiation of local disease with greater than 50% alive a year and a half after onset of therapy.[22] However, the dilemma occurs when there is multiregional involvement as steroids and immunosuppressive agents have been largely unsuccessful.[24]

This case is unique as the patient presented symptoms common to both diseases. The patient definitely satisfied diagnostic criteria required of rhinoscleroma. That has been well documented by the biopsy and tissue cultures. However, the patient did not respond to the usual therapeutic regimen. Considering that polymorphic reticulosis maybe considered as a type of malignant lymphoma, can a benign granulomatous process transform to a malignancy? A review of world literature yielded only three reports of malignant transformation of rhinoscleroma. Yasin[11] reported a case of scleroma which became a squamous cell carcinoma but the two other cases were unspecified[10] The pathologic spectrum where polymorphic reticulosis is said to give rise to lymphoma conceptualizes the response of the upper airway to an unknown antigenic insult. Is is possible that K. rhinoscleromatis is one of these antigenic insults? A study by Desasouza[27] demonstrated the "hypoactivity of T helper cells" responsible for cellular immune deficiency in scleroma patients. Yamanaka and co-workers using monoclonal antibodies cited the peripheral helper inducer T cells as the probable tumor cell origin in midline granuloma lesions.[28] Lastly, it is interesting to note that the histiocytes seem to play a major role in the pathogenesis of these two diseases. In rhinoscleroma, the Mikulicz cell contains the intracellular bacilli and is said to be responsible for intractability to treatment. On the other hand, electron microscopy has demonstrated the presence of ingested cellular debris in the histiocytes of T cells lymphomata or midline granuloma lesions.[30]

While it has been shown that this patient had both rhinoscleroma and polymorphic reticulosis, it can not be finally established that rhinoscleroma antedated the latter. Insufficiency of tissues in the first two biopsies may have rendered an already present polymorphic reticulosis undetected. Fechner stressed the problem of pathologic diagnosis in polymorphic reticulosis as small biopsies may only contain nondiagnostic foci.[31] Conclusive evidence that we are definitely dealing with a malignant transformation of rhinoscleroma is lacking. However, the unique case presented raises important questions that need further investigation. It also alerts the clinicians and the pathologists to a diligent search for a possible malignant transformation of a benign granulomatous lesion like rhinoscleroma, considering the therapeutic implications.

ACKNOWLEDGMENT

We wish to thank Elaine Jaffe, MD and Layla Al-Gwaiz, MD of the National Institute of Health, Bethesda, Maryland as well Dennis N. Haffner, MD and James C. Durham, MD of the Armed Forces Institute of Pathology, Washington D.C. for their opinion regarding the tissue slides in this case.

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SERIAL INTRALESIONAL BOILING WATER THERAPY:

AN INNOVATIVE ALTERNATIVE TO SURGERY OF JUVENILE NASOPHARYNGEAL ANGIOFIBROMA*

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ANGEL E. ENRIQUEZ, MD***

INTRODUCTION

Management of Juvenile Nasopharyngeal Angiofibroma is mostly surgical. There is no role for conservatism. Treatment remains to be a challenge specially with tumors extending beyond the confined of the nasopharynx. Recurrence rate due to residual tumors is over 50%, while hemorrhage during surgery remains formidable (Pressman et al).

OBJECTIVE

To report on the efficacy of serial intralesional boiling water injections as an alternative to surgery.

CASE REPORT

R.C., 15 year old male, from Pamplona Las Pinas, MM consulted at Ospital ng Maynila, Out-Patient-Department because of nasal stuffiness and recurrent epistaxis. He was admitted on May 25, 1990, with an impression of Intranasal Mass, R/O Juvenile Nasopharyngeal Angiofibroma.

May 29, 1990 — Punch biopsy of the mass found in the right nasal cavity was performed at the operating room under double set-up. Blood loss was minimal and controlled with anterior packing.

Histopath result — Angiofibroma Right Nasal Cavity

June 13, 1990 — CT scan was done at Jose Reyes Memorial Medical Center

Interpretation were as follows:

The axial C.T. image of the head and nasopharynx showed the presence of a heterogenously enhancing mixed density mass lesion seen in the right side of the nasopharynx starting at the level of C1 extending superiorly beyond the roof of the nasopharynx. Portion of the mass was extending superiorly into the right side of the sphenoid sinus producing destruction of the sphenoid bone as well as the posterior and lateral walls of the sphenoid sinus in the right side. Likewise there was anterior extension of the said mass completely filling the right nasal chamber and retromaxillary region in the right as well as the right ethmoid sinus with partial bone destruction of its posterior wall. Obliteration of the nasopharyngeal column was seen. The nasal septum was deviated to the left. No intracranial extension seen at this time.

Fluid levels were noted filling the sphenoid sinuses and the right maxillary sinus.

Enlarged lymph node was seen in the left paracervical region at C1 level.

No other findings of note:

Series of injections:

June 26, 1990 — 30 cc of boiling water injected in the mass found in the right nasal cavity, nasopharynx, and right retromaxillary area.

July 2, 1990 — Same amount of boiling water injected and procedure done

July 10, 1990 — Same amount of boiling water injected and procedure done.

July 24, 1990 — 15 cc of boiling water injected in the sites previously described.

July 31, 1990 — Same amount of boiling water injected and procedure applied.

Presented at the 34th PSO-HNS Annual Convention, Surgical Innovation
Research Contest at Century Park Sheraton, Manila, Dec. 7, 1990.
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Intra-op assessment of the intranasal and nasopharyngeal mass revealed reduction in size of about 70%. There was crusting noted in the right chamber.

Aug. 3, 1990 — Repeat CT Scan done at Jose Reyes Memorial Medical Center

Interpretation as follows:

The present CT scan was compared with the one done last July 3, 1990 and showed the following features:

There was marked decrease in the size of the previously noted mass lesion in the right nasopharyngeal area. Decrease by more than half of its size was noted. The mass though might still be seen in the right retro maxillary region have a lesser extent at this time since the nasopharynx at C1 level and the right nasal chamber were no longer completely filled up by the said mass. Bony destructive changes including the right sphenoid as well as the posterior and lateral wall of the right sphenoid sinuses were again noted with no further changes seen.

No intracranial extension seen at this time. Enlarged lymph node in the left paracervical region at C1 level were noted. No other findings of note.

Aug. 7, 1990 — 15 cc of intralesional boiling water applied to both intranasal and nasopharyngeal mass using the same procedure.

Aug. 14, 1990 — Excision via transpalatal approach combined with a Caldwell-Denker incision. Blood loss - 300 cc.

Aug. 24, 1990 — Histopath result: Angiofibroma

TECHNIQUE

Using the technique reported by Gupta, wherein he utilized boiling water intralesionally to treat hemangiomatous lesions in the other parts of the body, about 30 cc of boiling water was injected with a gauge 21 spinal needle intralesionally in the mass found inside the right nasal cavity, right retromaxillary area and likewise the one found in the nasopharynx guided by a posteriomasopharyngoscope. We also utilized 2 types of spinal needle, one straight and the other was curved about 90 degress. The curved needle was used when the mass was regressing in size and could not be visualized directly through the oral cavity. A stove was placed beside the operating table to ensure a steady supply of boiling water. At no point in the procedure did we use water from any other source than the one we had boiling beside us. The technique was repeated once a week for six consecutive weeks.

RESULT

Daily assessment and mapping of the tumor was done. Regression in the size of the tumor was noted to be progressive accompanied by sloughing off of necrotic tissues. No functional nor facial deformity was noted. No neurologic sequelae was seen. On the sixth week, a transpalatal approach, combined with Caldwell-Luc-Denker incision to extend into the right retromaxillary area was done to assess the effectivity of the intralesional boiling water technique. Intraoperatively, only a 3 x 2 cm mass as compared to the initial finding as described in the CT scan result was seen at the roof of the nasopharynx, which was removed by finger dissection, minimal bleeding of about 300 cc was noted. The nasal septum was noted to be pushed to the left, but no mass was noted in the right nasal chamber. The right retromaxillary area was explored, but no mass was appreciated.

On the seventh week, patient was discharged. Weekly follow-up, revealed no recurrence of the mass nor any episode of epistaxis.

DISCUSSION

The procedure and technique presented is not new. Several investigations were made by different authors authoritative in the field of the effects of thermal injury. The same methodology was first utilized by Dr. Angel E. Enriquez here in the Philippines based on an article with the treatment of macroglossia which appeared in the Philippine Scientific Journal. The same procedure was described by Lopez et al, at the Philippine General Hospital in November, 1981 but the indications were different. The objective is to minimize the bleeding intraoperatively and to control recurrences post-operatively. Vicente et al, utilized the intralesional boiling water preoperatively in 10 out of 22 patients seen at the Philippine General Hospital in a nine year period (1978-1986). He reported that there was less blood loss noted as compared to those where boiling water was not used. He attributed these findings as a result of vascular occlusion and fibrosis after injection of boiling water. The limitations cited by Lopez, et al, in their paper still holds which are to quote:

1. Lack of accurate mapping of the extent of the iatrogenic burn which may injure normal, vital adnexae;
2. Clumped red blood cells in a vascular mass could precipitate a thromboembolic phenomenon.

We present a case where thromboembolic surgery, radiation, stilbestrol, etc., may be advocated as methods of definitive treatment. But as mentioned in several studies of foreign and local authors, because of the rarity of this disease, it is the opinion of majority of the authors that this histo-

logically benign, yet clinically malignant tumor should not be treated conservatively.

Bremer, et al, in their paper updating the series of Mayo Clinic cited that from the year 1945 to 1955, treatment of JNA consisted primarily of radiation. From 1955 to 1971, treatment was surgical removal via the lateral rhinotomy approach. And from 1971 to 1983, with the introduction of CT scan, MRI, and advances in angiography, which helped improve the diagnostic capabilities and fully defined the extent of the tumor, more definitive resection of the tumor was made possible.

Further review of literatures revealed that the adjunctive forms of treatment such as hormonal therapy, cryosurgery, tumor embolization and radiotherapy provided inconclusive results. There was never any mention of the use of intralesional boiling water injection in the management of JNA in these foreign articles.

The present modes of treatment have their limitations because of the complex anatomy of the nasopharynx and the propensity of the lesion to extend beyond its confines. At Ospital ng Maynila, different techniques had been employed in the managemet of Juvenile Nasopharyngeal Angiofibroma, but none has amazed us more than the case we have just presented.

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COMBINED TRANSPALATAL AND MEDIAN LABIOMANDIBULO-GLOSSOTOMY APPROACH TO THE SKULL BASE: REPORT OF 2 CASES*

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

ABSTRACT

Surgical access to skull base tumors such as Clivus chordoma poses a problem to the head and neck surgeons. A transpalatal approach alone provides visualizations of clivus and atlanto occipital joint. Combined with median labiomandibuloglossotomy, the clivus up to the upper cervical vertebrae are exposed. Two (2) cases of patients operated on by this approach are presented. Other surgical approaches with their advantages and disadvantages are also described.

INTRODUCTION

Chordoma is a slow growing infiltrative tumor. There are 3 major groups based on anatomical predilection, namely cranial or sphenooccipital (35%), vertebral (15%) (with predilection for the second & third cervical vertebrae) and sacrococcygeal (50%)[1]. The surgical goal in primary cases should provide the best chance for a complete removal. Numerous surgical approaches have thus been tried to provide good visualization and adequate exposure of the operative field particularly for treatment of the craniovertebral group. Described here is a combined transpalatal and median labiomandibuloglossotomy to approach a clivus chordoma.

SURGICAL TECHNIQUE:

(COMBINED TRANSPALATAL AND MEDIAN LABIOMANDIBULOGLOSSOTOMY)

Transpalatal approach: A preliminary tracheostomy is done with induction of anesthesia thru the tracheostomy tube. A Davis mouth gag is inserted. An incision is made at the midline of the soft palate and curved laterally to one side. This through and through incision is extended behind the alveolar ridge, beyond the midline (fig 1a). The mucoperiosteal flap is then retracted laterally. Guhlkelch and Williams (1972) placed their mucosal incision immediately behind the line of the upper teeth creating a posteriorly based palatal flap. Depending on the required exposure, the posterior nasal spine and a variable amount of the posterior hard palate are removed using a Kerrison rongueur (fig 1b). The underlying mucoperiosteum of the nose is preserved. Incising the posterior pharyngeal wall at the midline cuts through a relatively avascular area which contains the pharyngeal mucosa, constrictor muscles and bucopharyngeal fascia, and the anterior longitudinal ligament. These structures are retracted laterally, thus exposing clivus, anterior arch of atlas, body of the axis as well as the atlantoaxial joints (fig 1c). There is a "gutter like" depression at the lateral margins of the clivus where the internal carotid artery and associated cranial nerves are located. Superiorly, one would encounter the foramen lacerum, the petrous apex and gasserian ganglion.

Median Labiomandibuloglossotomy: The lip and chin incision is made accordingly (fig 2a) and extended to the level of the hyoid bone. The periosteum of the mandible is incised and lifted laterally. Before mandibulotomy, four drill holes are made for wire fixation and immobilization of the mandibular segment to allow for later closure. A Gigli saw can be used to divide the mandible (fig 2b). Retention sutures are placed on either side of the tip of the tongue to retract it superiorly (fig 3a). using a cutting cautery apparatus, the tongue is incised along its median raphe to the glossoepiglottic fold. The incision is extended to the floor of the mouth in between the orifices of Wharton's duct. This approach exposes clearly the upper cervical vertebrae (fig 3b). At this point, tumor at the clivus and upper cervical vertebrae is exposed and can be excised.

When all visible tumor has been removed, the surgical defect can be subsequently packed with gelfoam. The posterior pharyngeal wall is then closed with absorbable sutures in 3 layers. A nasogastric tube (NGT) is inserted, after which the nasopharynx is firmly packed with gauze impregnated with oxytetracycline ointment. The palatal flap previously created is sutured back into place in a 2 layer

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* Presented at the 34th Annual Convention, Surgical Research Contest at Century Park Sheraton, Dec. 7, 1990, Manila.

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fashion (fig 4a). The pack is not removed until the 10th post-operative day.

The tongue is re-approximated in 3 layers in a posterior to anterior direction followed by closure of the floor of the mouth (fig 4b & c). The mandible is repositioned and held in place with steel wire (fig 4d). The soft tissue of the lip, chin and submental region are closed in layers (fig. 5).

Post-operative care:

Prophylactic antibiotic treatment is advisable prior to surgery and maintained for 10-14 days.

A Tracheostomy tube is placed for 1-2 weeks to allow subsidence of lingual edema. Decannulation is done if the patient can tolerate plugging of tube for 24-48 hours.

Feeding via NGT can be started 24 hours post-operatively.

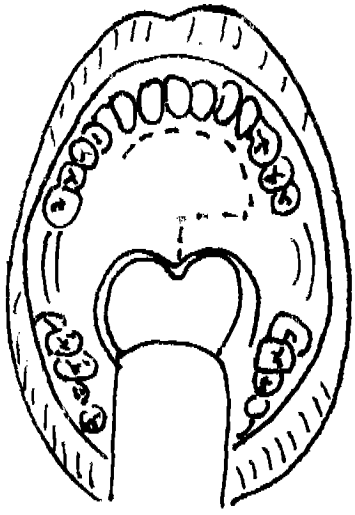

Figure 1a. Mucosal incision is illustrated (Transpalatal approach)

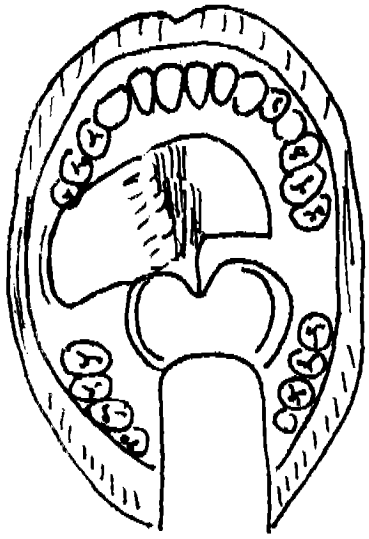

Figure 1b. Flap is retracted laterally to one side with posterior pharyngeal wall incised vertically at the midline.

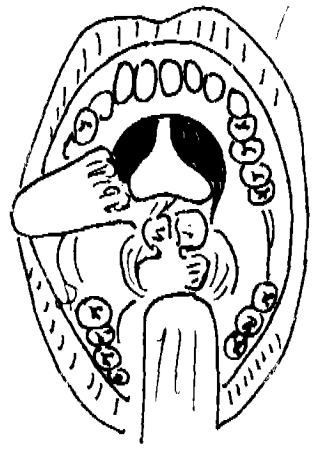

Figure 1c. The clivus, foramen magnum and anterior arch of c1 are exposed.

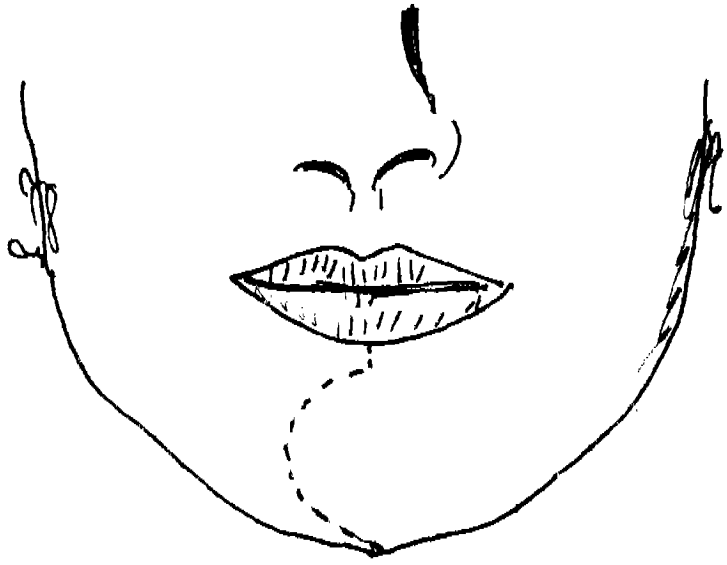

Figure 2a. Lip and chin incision.

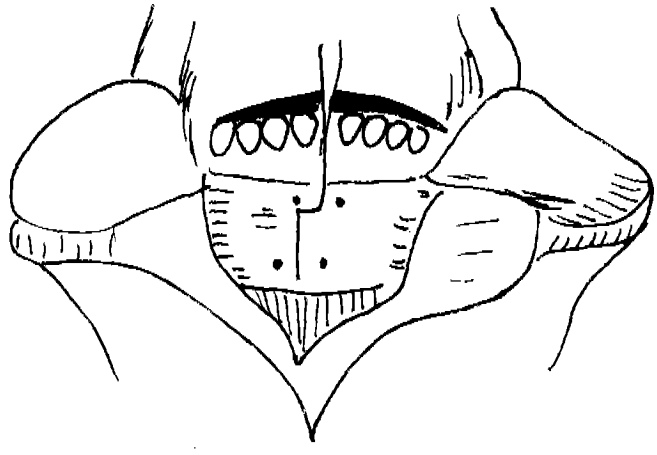

Figure 2b. Step-like mandibulotomy with 4 drill holes (Median Labiomandibuloglossotomy)

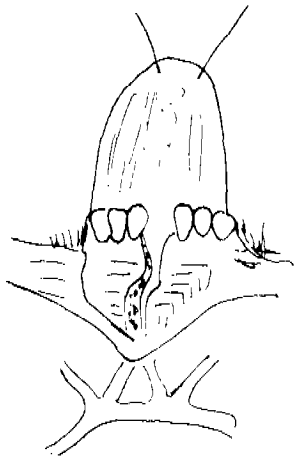

Figure 3a. Tongue retracted superiorly with retention sutures.

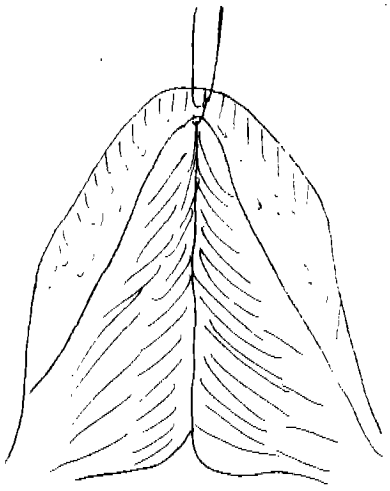

Figure 4b. Closure of muscles of tongue.

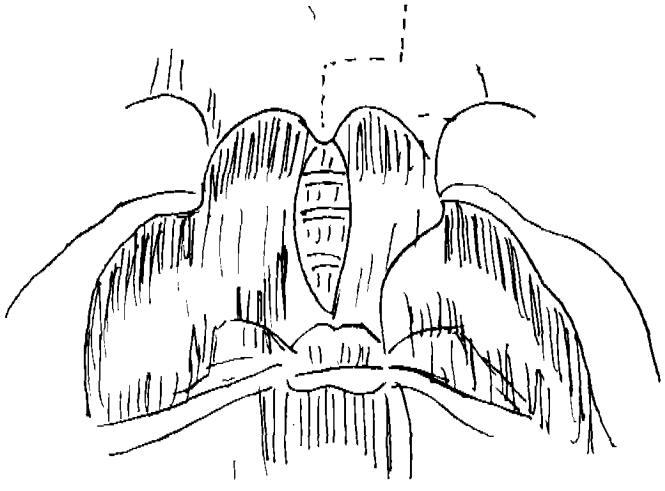

Figure 3b. Mandibular-lingual halves retracted laterally.

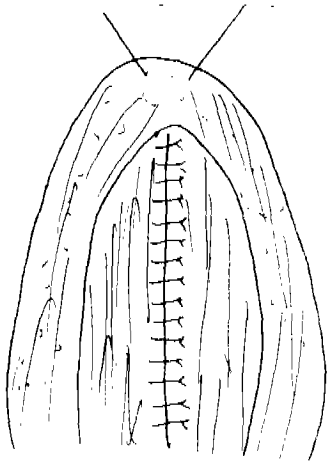

Figure 4c. Closure of muscles

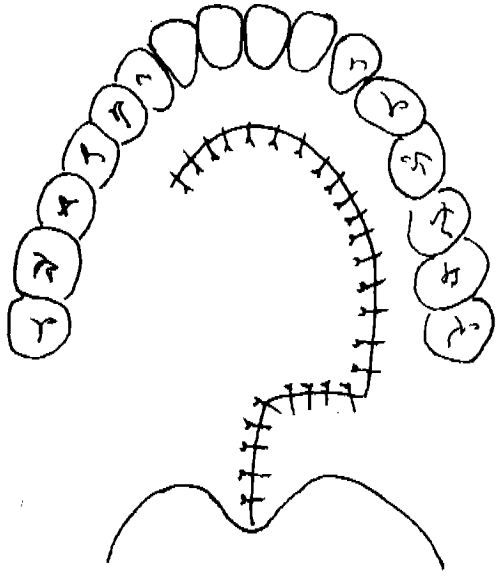

Figure 4a. Closure of palatal flap.

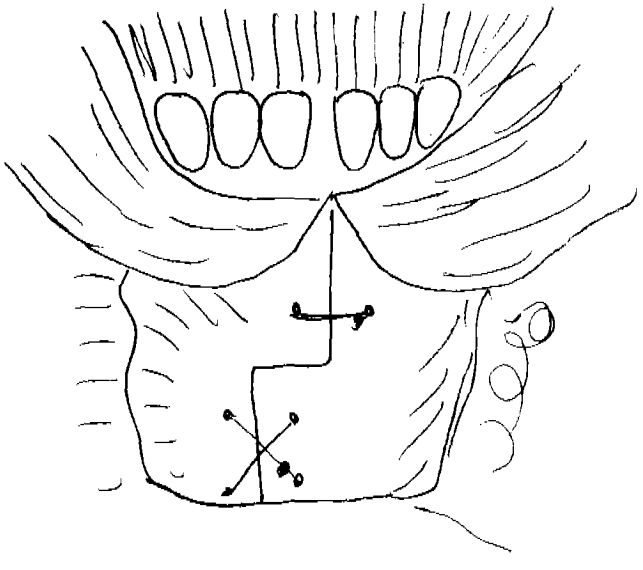

Figure 4d. Fixation of Mandibular Osteotomy.

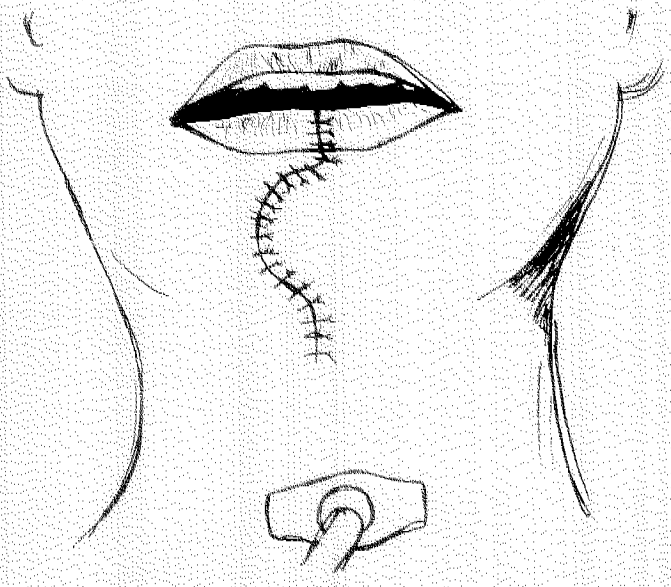

Figure 5 Lip and Chin Closure

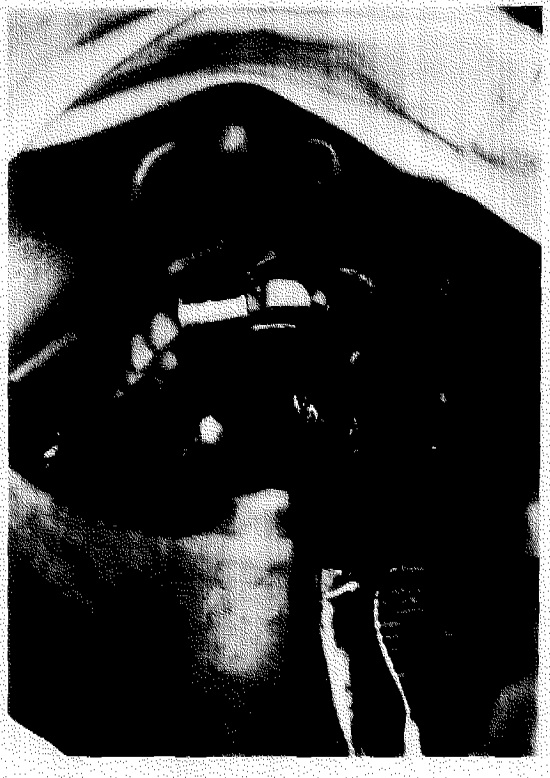

Figure 6. Palatal Bulge.

REPORT OF CASES

Case 1. A 34 year old female was admitted to our hospital in March 20, 1990 for a right palatal bulge. The above symptom was noted for 2 years. One and a half years prior to admission, right nasal obstruction was noted for which she consulted a provincial hospital. Here a naso-pharyngeal biopsy was done revealing myxofibroma. The mass was excised via lateral pharyngotomy.

One year after the operation, there was a recurrence of the palatal bulge with associated ear ache and hearing loss. There was no dysphagia or dyspnea. The patient consulted our hospital and a histopathologic review was done. The reading was revised to "chondroid sarcoma rule out chordoma". Oral examination revealed a 4x4 cm smooth surfaced mass behind the soft palate pushing the uvula to the left peritonsillar area. An examination of the neck revealed multiple bilateral cervical lymphadenopathy with a submandibular scar. Fine needle aspiration of neck nodes showed chronic inflammation. A week prior to admission, symptoms of dysphagia and dyspnea developed, so an emergency tracheostomy had to be done. The patient was subsequently admitted. CT scan demonstrated a nasopharyngeal mass with expansion and erosion of clivus. The patient was then operated on using the aforementioned technique. A 6 x 4 cm glistening partly encapsulated mass was located at the clivus extending inferioly in front of C1 and C2 vertebrae. There was infiltration of mucosa and muscle with bone erosion of the clivus. The atlas (C1) was not eroded. The inferior extent of the tumor was exposed. After the main mass was excised, the residual tumor overlying the dura was removed with ultrasonic dissector (Cavitron). Part of the dura was sacrificed with the tumor resulting in cerebrospinal fluid (CSF) leakage. Tensor fascia lata and muscle harvested from the right thigh were used to patch over the dural defect. The fascia with muscle was sutured to the surrounding mucosa with control of CSF leak (fig 6,7,8,9,10).

Post-operatively, the patient developed meningitis which was adequately controlled with intravenous ceftazidime and amikacin. After 90 days, she was discharge with minimal interference to swallowing and speech.

One month after the operation, a 1 x 3 cm firm right submandibular mass was noted. Cobalt therapy was instituted at 6000 rads (230 rads/day for 26 days). The mass did not respond and instead continued to enlarge. Repeat CT scan revealed a recurrent tumor involving the pharynx, vertebral body of C1 and clivus. A hyperdense area was noted to occupy the palate, more on the left side. The latter was considered to be due to fibrosis and scaring from the previous surgery. The patient was readmitted for surgery. Biopsy was first done to confirm the nature of the hyperdense area in the palate. This later turned out to be chronic inflammation. To approach the cervical area, a lazy S incision

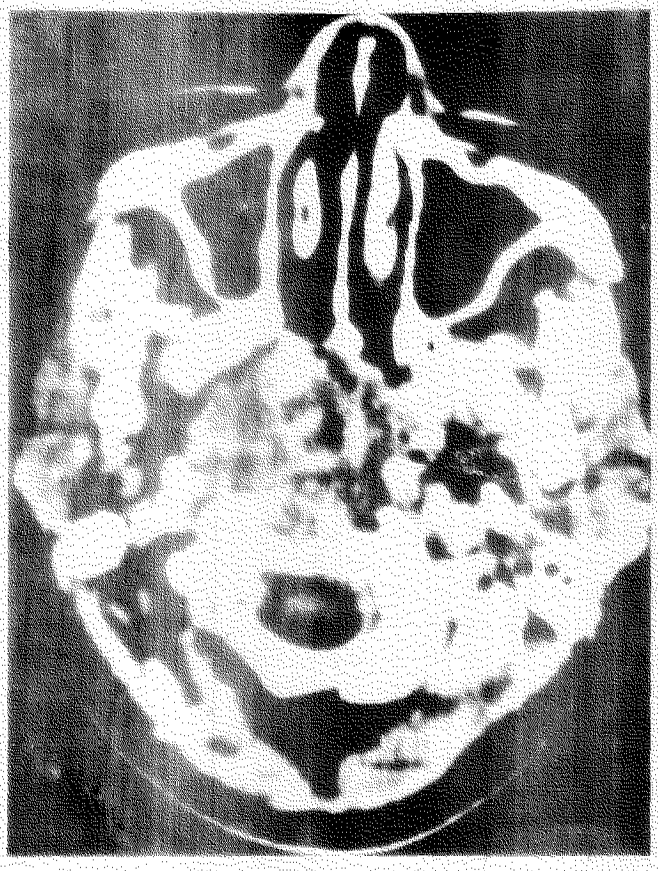

Figure 7. CT scan showing the mass eroding the clivus and extending to the nasopharynx.

with extension to the submandibular area was done. Skin flaps were developed. The mass measuring 7 x 6 x 4 cm was excised and noted to extend to the base of the skull, retromandibular space, pre-styloid space, prevertebral muscle and around the carotid artery and internal jugular vein. The latter was ligated as it was already completely collapsed by the tumor. Bleeding from the pterygoid plexus was controlled by gelfoam packing and suture ligature. Final histopath showed chordoma area.

Case 2. A 40 year old female developed difficulty in swallowing solid food for 8 months followed by symptoms of nasal obstruction, recurrent nasal discharge and hypernasality of speech. Physical examination revealed a nasopharyngeal mass. CT scan demonstrated a 7.0 x 4.6 x 3.4 cm nasopharyngeal mass without intracranial extension. Biopsy confirmed the presence of transpalatal approach described with the mucosal incision made at the posterior edge of the alveolar ridge creating an inverted "U" posteriorly based flap (fig 11). Within 3 months, there was note of recurrence. Repeat CT scan showed a nasopharyngeal mass measuring 6.4 x 5.8 cm. She underwent a second operation using the transpalatal approach described in case 1. The mass was noted to erode the clivus but the dura was intact. The post-operative course was uneventful.

DISCUSSION

Patient with clivus chordoma may consult the Otolaryngology specialist mainly because of nasopharyngeal extension presenting as a mass in the nasopharynx with symptoms of dysphagia, nasal obstruction or decreased hearing (fig 12). Stevenson in 1965 mentioned that the prognosis of these cases has generally been hopeless[3] owing to its inaccessible location, infiltrative nature, poor radiosensitivity and high recurrence rate. Both cases herein reported had at least one recurrence. Kamrin observed that this usually occurs within one year[4]. Kendal reported a 5 year survival rate without recurrence to be only 10% [5]. With

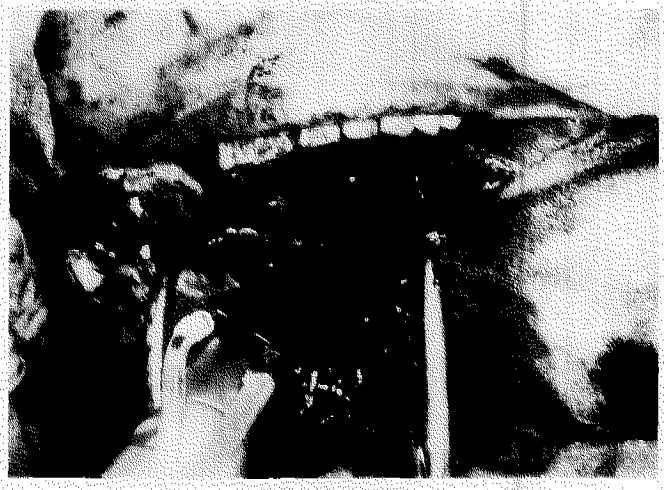

Figure 8. Mass being removed with Ultrasonic Dissector (Cavitron)

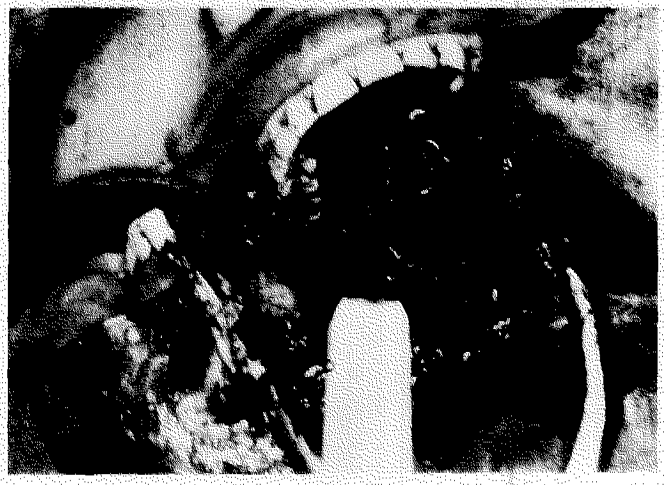

Figure 9. Surgical defect closed with Tensor fascia lata and muscle.

this to consider, the current recommended management is still surgical excision followed by irradiation.

The Departments of Otolaryngology and Neurosurgery have used a transpalatal approach combined with median labiomandibuloglossotomy in the resection of clivus chordoma. The transoral route described has been advocated by several authors[1,6,7,8]. The advantage of this approach is that it provides direct access to the skull base. The combined trans-palatal and median labiomandi-buloglossotomy results in an excellent exposure from the upper clivus to the 4th or 5th cervical vertebrae. Contiguity of structures is likewise more appreciated. Trotter in 1928 used the procedure of splitting the tongue to gain exposure to the base of tongue, epiglottis and posterior oropharyngeal wall[9]. Wood developed this approach as an access to the skull base[10]. A cited disadvantage of this procedure is the potential for secondary infection. However, Dr. Samuel James Crowe, late professor Laryngology and Otology at John Hopkin's Hospital explained the presence of local resistance of the tisues within the mouth to its own bacterial flora[8]. The use of tetracycline nasal and oral spray three times daily for three days before operation and dental clearance have been advised by Fang[6]. Dr. KW Johnson and Dr. SJ Crowe use local instillation of penicillin and streptomycin prior to closure of soft tissue of the posterior pharyngeal wall[8]. Like Fang,

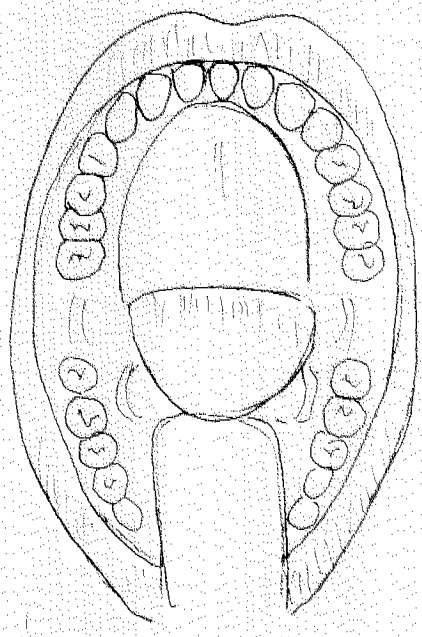

Figure 11. Inverted 'U' Posteriorly Based Palatal Flap.

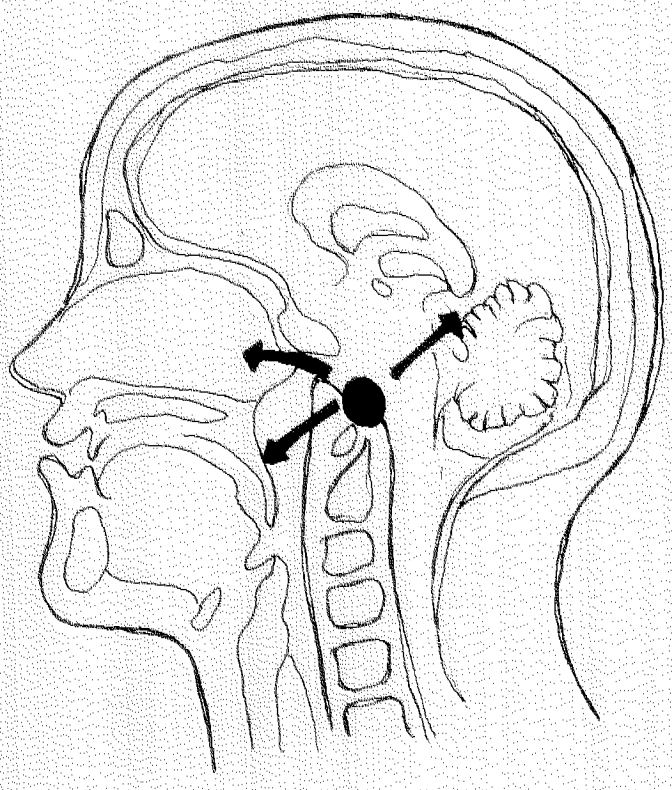

Figure 10. Lip and Chin Closure.

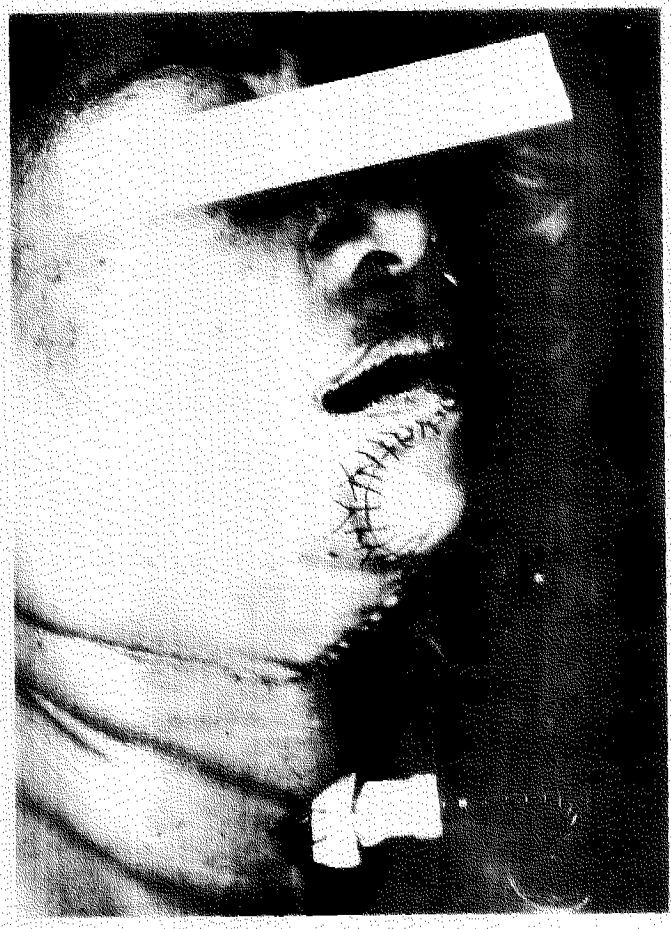

Figure 12. Possible routes of entension of Clivus Chordoma.

the authors believe that with adequate pre-operative and post-operative use of antibiotic and meticulous closure of the pharyngeal wall, infection is easily controlled. In the first case reported, the patient developed meningitis post-operatively but this was adequately treated.

Other surgical approaches to the skull base like transseptal-transphenoid, trans-antral, infratemporal and transcervical-transmandibular approaches are advocated by various authors. A brief discussion of each procedure will be described.

The trans-septal-transphenoidal approach provides limited exposure to this tumor. Laterally, one encounters the lateral wall of the sphenoid sinus, optic nerve and carotid artery. This procedure is used primarily for biopsy and confirmation of diagnosis and for decompression and palliation[9].

The trans-antral approach exposes the pterygomaxillary fossa and nasopharynx but also provides a limited exposure [5].

An infratemporal fossa approach described by Fisch et al has the disadvantage of causing temporary facial nerve paralysis, conductive hearing loss, anesthesia in the distribution of the mandibular nerve and a limited inferior exposure[11].

Stevenson et al in 1965 developed the transcervical transclival approach to avoid the oral cavity and contaminating the operative field[3]. This procedure entails a submandibular skin incision with a "T" extension carried down to the level of the 6th cervical vertebrae. The deep cervical fascia is incised along the anterior border of the sternocleidomastoid. The carotid sheath is identified and retracted laterally. The pharynx is retracted medially. This maneuver exposes the retropharyngeal space. This procedure also exposes the anterior rim of the foramen magnum down to the 3rd cervical vertebrae. However, meticulous and taxing dissection is required because of potential injury to vital nerovascular structures (carotid artery, jugular vein and the lower cranial nerves).

Most recently, a transcervical-transmandibular exposure was described by Biller and Krespi et al [12,13,14]. Anatomically, the skull base is divided into two lateral compartments and one midline compartment by extending an imaginary line anteroposteriorly passing thru the medial aspect of the internal carotid artery (fig 13). This procedure provides adequate exposure of the middle and one lateral compartment. The lip and mandible are split in the midline and the floor of the mouth is divided along the lateral border of the tongue. The eustachian tube is divided between the base of the skull and the Rosenmuller's fossa. The pharynx can then be detached from the skull base and retracted to the contralateral side exposing the pharyngeal space, infratemporal fossa (lateral compartment), clivus, nasopharynx and cervical spine (midline compartment). Functional deficit expected from this procedure is serous otitis media which can be managed with ventilation tube. This is a radical approach which entails extensive dissection of the submental and submaxillary triangle and cranial nerves IX thru XI on one side.

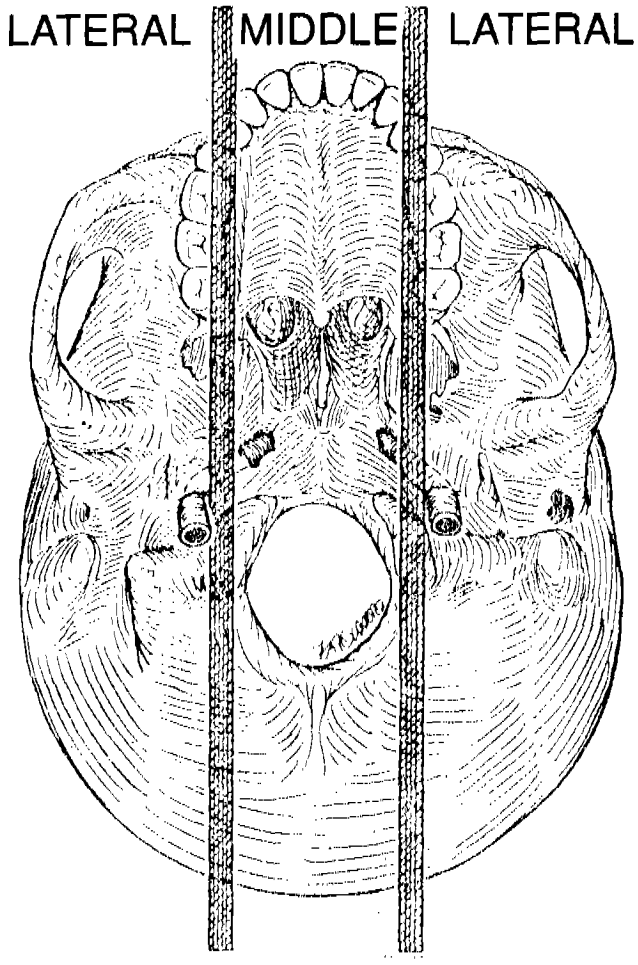

Figure 13. The skull base, divided into two lateral and one middle compartment by an imaginary line through the petrous part on the internal carotid artery.

CONCLUSION

Various methods of resection of clivus chordoma have been described. A transpalatal approach used alone provides excellent exposure to the clivus and atlantooccipital area. Combined with median labiomandibuloglossotomy, the upper cervical vertebrae (C1-C5) are further brought into view. The main drawback, however, is the limited lateral extent of dissection. With all this in mind, it is recommended that disease conditions amenable to surgery, confined to the middle compartment may be approached in this manner.

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EXPERIENCE ON THE MIDFACIAL DEGLOVING APPROACH A REPORT OF A CASE*

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INTRODUCTION

Beginning surgeons are taught that successful management of neoplasms depend mainly on adequate exposure and easy accessibility of the tumor in the operative field. We also have to limit cosmetic deformity in order to improve the quality of life of our patients. Achieving these conditions often poses a problem in removing tumors involving structures of the midface, for surgical access to these areas remain difficult and frequently inadequate. As a consequence, approaches that provide adequate exposure of the lesions often result in poor cosmesis.

Traditional approaches to the midface for removing benign as well as malignant lesions have been through the transpalatine approach, or through the paranasal sinuses via a sublabial transpalatine approach gives relatively poor exposure and provides a limited area for instrumentation.[1] It also complicates palatal functions. The sublabial approach avoids scars but restricts accessibility. This approach is limited only to tumors residing at the anterior portion of the midface and fails to expose the nasopharynx adequately. The external incisions, i.e, Weber-Fergusson or lateral rhinotomy, gives better exposure and provides easy access to all adjoining areas the tumor could invade. Exposure, however, is unilateral, thus access to tumors which have gone beyond the midline to the contralateral side becomes difficult. Also it provides a visible scar which is significantly depressing to most patients, especially children.

A new alternative is the midfacial degloving technique. This technique is a method of rhinoplastic release of the nasal soft tissues in combination with a bilateral sublabial incision. The first published report was by Caason, Bonnano and Converse in 1974.[2] In that report, the authors primary concern was the use of the approach in the treatment of midfacial fractures, in midfacial osteotomies with advancement and bone grafting for contour restoration. It was not utilized for excision of tumors involving the midface. Such application to the latter was first cited by Conley and Price in 1979,[3] when they reported 26 cases of tumors, mostly inverted papillomas and juvenile nasopharyngeal angiofibromas managed by this method. In 1984, Sachs et al[4] utilized the procedure for inverting papillomas in 46 cases. In 1986, Price[5] again described the midfacial technique this time as an alternative approach to the central skull base. Also, in that same year, Maniglia[6] published his 15-year experience in treating 30 patients with an assortment of tumors involving the midface. The latest reports came out in 1988, when Price[7] and Romo[8] in separate publications, described their experience with Price applying it in 48 patients with a variety of lesions and Romo utilizing the approach mainly to close nasal septal perforations in 24 patients.

Possibly many surgeons, foreign and local, are familiar with this approach but the number of publications in the literature is still scanty. In this paper, we report our experience with this technique in the treatment of the tumors of the midface. To our knowledge, this paper is the first on the subject locally.

The objectives of this paper are:

1. to describe the surgical technique of midfacial degloving;
2. to give an account of our seven (7) cases where the midfacial degloving approach was employed;
3. to cite the procedure's advantages and disadvantages over the conventional surgical approaches to tumors involving the midface.

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SURGICAL TECHNIQUE

General anesthesia is administered via oral intubation. A standard surgical scrub is carried out and the patient is properly prepped. Illumination with a headlight is essential. Bilateral tarsorrhaphy is first accomplished to protect the eyes, then both nasal cavities are decongested using cotton soaked in neosynephrine topical solution. Through the nose, a 1:100,000 dilution of Epinephrine with 1% Lidocaine solution is injected to both sides of the nasal bridge up to the root of the nose. The same solution is then infiltrated around both nasal vestibuli. The gingivobuccal sulcus and the canine fossa are similarly infiltrated. These infiltrations will minimize the amount of blood loss during dissection.

There are four basic incisions in this approach as shown in Figures 1-4. Similar to rhinoplasties, INTERCARTILAGINOUS incisions are utilized to separate the soft tissues of the nasal bridge from the upper lateral cartilages. The dissection is carried to the nasal bones where the periosteum overlying the bones is then elevated as far laterally as possible and superiorly to the root of the nose. A TRANSFIXION incision is now done to separate the cartilaginous septum from the medial crura of the lower lateral cartilages. Both intercartilaginous and transfixion incision are now connected to separate the nasal tip from the nasal dorsum. A CIRCUMVESTIBULAR incision is then accomplished by extending the first two incisions around the pyriform margins to complete a circumvestibular release. At this point, both nasal cavities are packed with cotton and one assistant presses on the nasal bridge to promote hemostasis. The upper lip is retracted superiorly. A SUBLABIAL incision is then done. It extends from an area just above the second and third molars on one side to the second and third molars of the contralateral side crossing the midline.

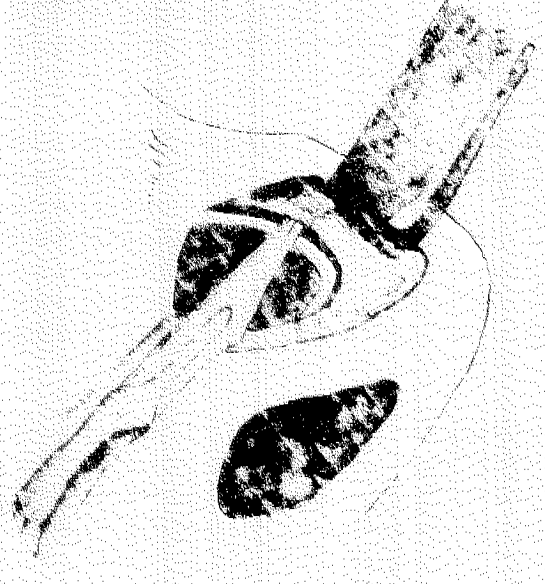

Figure 1. Intercartilaginous incision

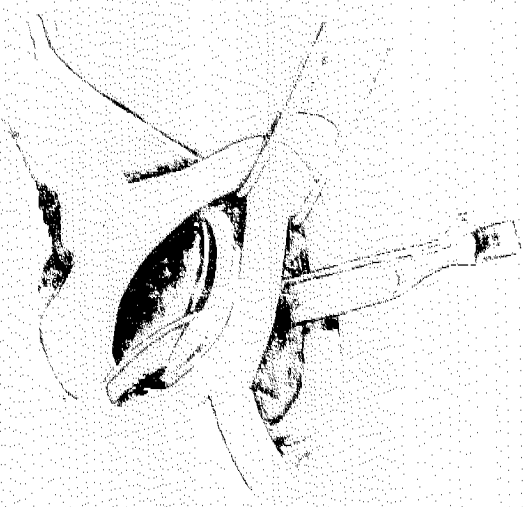

Figure 2. Transfixion Incision

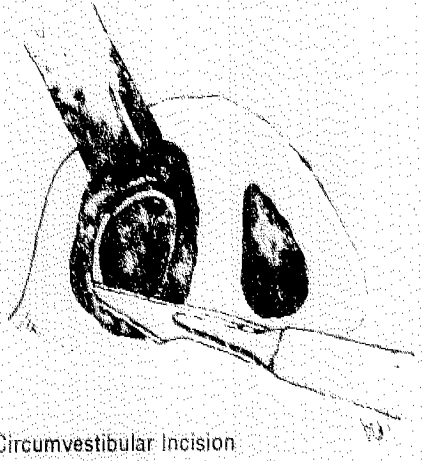

Figure 3. Circumvestibular Incision

Figure 4. Sublabial Incision

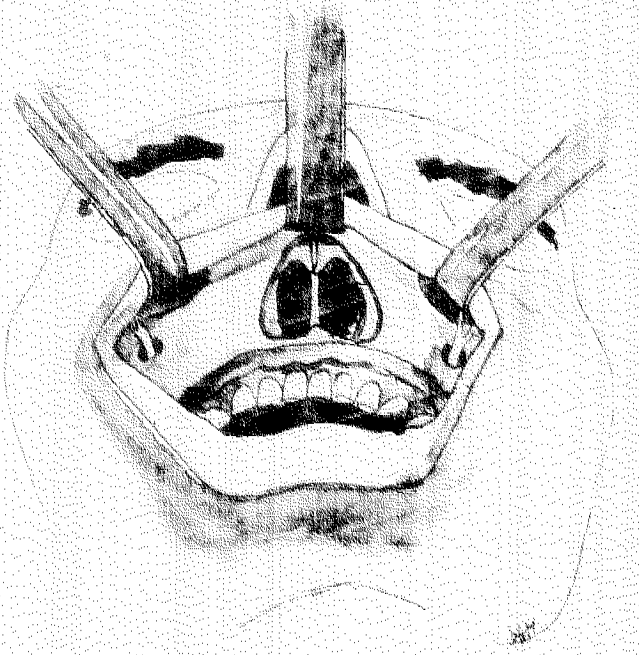

Figure 5. Completely Degloved Face

Through the sublabial incision, the lateral tissues of the face are now elevated over the anterior maxilla from the nasal bone medially to the lateral most extent exposing the zygoma and infratemporal fossa. Dissection is carried superiorly to expose the infraorbital rim with attention directed to the preservation of the infraorbital foramen contents. Subperiosteal dissection is also carried out on each side to expose the pyriform margins.

The nasal packing is then removed. Working through the nose, the remaining soft-tissue attachments of the nose are released from the columella and anterior maxillary spine. Finally, the nasal and sublabial incisions are connected. Using 2 wide Penrose drains placed through the nostrils, the upper lip, nasal tip, alar cartilages and nasal columella are retracted over the nose to the level of the glabella and orbits achieving a totally degloved face.

Visualization of the following area: infratemporal, inferior orbital rim, lateral nasal margins, anterior maxilla is excellent. Through osteotomies, access to the nasopharynx, ethmoidal and sphenoidal areas is adequately achieved. Removal of tumors found in the infratemporal region, maxilla, nasal region and nasopharynx are facilitated. Even tumors that have crossed the midline are removed without difficulty. After the lesion is totally removed, antibiotic packing is placed inside the surgical cavity. The nasal tip is then brought back to its normal position. The nasal incisions are approximated with 4-0 Vicryl sutures done in a continuous fashion. The sublabial incision is repaired with a few interrupted 3-0 Chromic catgut sutures. Light vestibular packing is placed to prevent stenosis and assume vestibular contour. A nasal splint made of Plaster of Paris is placed on the bridge of the nose to form the bridge, immobilize it and prevent hematoma formation.

RESULTS

From 1989-1990 at the UERM-Hospital, the midfacial degloving approach was utilized in seven (7) patients, three males and four females with ages ranging from 13-68 years. TABLE 1 summarizes the procedures done utilizing the degloving approach. TABLE 2 illustrates the pathology of the cases treated.

TABLE 1: PROCEDURES DONE THROUGH DEGLOVING APPROACH

Cases	No.
Inferior Maxillectomy, Bilateral	2
Medial Maxillectomy	1
Total Maxillectomy	
without orbital exenteration	1
with orbital exenteration	1
Partial Maxillectomy	1

TABLE 2: PATHOLOGY OF CASES TREATED WITH MIDFACIAL DEGLOVING

Case No.	Age	Sex	Pathology
1	63	F	Squamous Cell Carcinoma, Hard palate, T4
2	54	M	Inverted Papilloma
3	53	F	Malignant Melanoma, Hard palate, T3
4	13	M	Juvenile nasopharyngeal Angiofibroma
5	26	F	Chondrosarcoma, Maxilla, T4
6	46	M	Adenocarcinoma, Maxilla, T4
7	68	F	Sqamous Cell Carcinoma, Maxilla, T3

Our results show no major complications. Intra- operatively, bleeding encountered with this approach was easily controlled. Blood loss was determined from the first incision up to the period when the patient was fully degloved. Blood taken from the suction bottle was added to computed blood loss from the sponges used (total sponge count multiplied by 20). The average blood loss totaled approximately 340 cc.

Bleeding was particularly excessive only in Case 6. This was expected for the facial tissues of the patient were markedly inflammed prior to surgery. Intraoperatively, exposure of the tumors for all cases was adequate and accessibility was good.

TABLE 3: BLOOD LOSS PER CASE

Case	Blood Loss (cc)
1	300
2	275
3	425
4	400
5	200
6	550
7	200

The most common immediate post-operative complications were nasal crusting, wound discharge, facial swelling, facial numbness, subcutaneous hematoma and vestibular stenosis. Nasal crusting was noted in 100% of patients. This condition manifested during the first week after packing was removed. This was, however, controlled within a month with 3 times a day irrigations using a salt-water solution (1 tsp table salt in glassful of water). Foul-smelling wound discharge was also apparent in all cases evident after the packing was removed. This resolved in a week's time with 3 times a day irrigations of hydrogen peroxide (1:1 dilution with water) and a baking soda solution (1 tsp baking soda in 1 glassful of water). Facial swelling was also noted in 100% of patients. This was expected due to intense facial manipulation. Immediate ice packs applied on the face prevented further increase. Swelling resolved in about 4 days.

Facial numbness is a frequent complaint noted in 71% of patients. The patients spared were those who underwent bilateral inferior maxillectomies. In these procedures, there was not much traction and trauma to the infraorbital nerves. Of the patients who experienced facial numbness, only 40% regained sensation within 4-6 months.

Subcutaneous hematoma evident around the root of the nose and lateral nasal areas was noted only in 57% of patients. This was most likely due to injuries to the angular vessels and placing a nasal splint post-operatively. Vestibular stenosis was noted in 28% of patients and required no further treatment.

TABLE 4: SUMMARY OF COMPLICATIONS (N=7)

Nasal Crusting	7	100%
Wound Discharge	7	100%
Facial Swelling	7	100%
Facial Numbness	5	71%
Subcutaneous Hematoma	4	57%
Vestibular Stenosis	2	28%

DISCUSSION

Operative techniques on lesions involving the nasal, paranasal and nasopharyngeal areas have always been beset with problems on sufficient exposure, free accessibility and cosmetics. Several approaches have attempted to tackle these problems but all have their particular shortcomings. The transpalatal approach is only limited to tumors confined to the nasopharynx, sphenoids and posterior choanae. Accessibility is also restrained and palatal function compromised. Hence, the approach is not utilized singly for midfacial lesions. The sublabial approach, such as the Caldwell and Denker avoids scars but, because it fails to expose the nasopharynx adequately, there is not much indication for its use. The external facial incisions such as the Weber-Fergusson and Lateral Rhinotomy provides excellent exposure, easy accessibility but incurs surgical scars in the prominent focal areas of the midface.[3]

The sublabial transnasal degloving procedure provides extensive exposure for many operations on the maxilla, nasal skin and paranasal sinuses and this is accomplished without a skin incision. Traditionally the ideal pathologic indicator for the degloving approach are inverting papillomas and juvenile nasopharyngeal angiofibromas. But recent reports have established its versatility in almost any lesion of the midface. From infections involving the paranasal sinuses, to perforations of the nasal septum, to facial fractures, to a variety of midfacial tumors (benign or malignant) and even up to the lesions of the skull base, the midfacial approach has been applied.[1,8,3,5] Maniglia[6] (1986) has even done total maxillectomy with orbital exentaration, thereby adding to its versatility. With our series of patients, we have contributed to the list by using the approach in performing two bilateral inferior maxillectomies.

The advantages using the approach are numerous. FIRST, it allows wide exposure of the surgical field. It affords BILATERAL exposure of the infratemporal areas, zygomatic region, anterior maxilla, anterior nasal cavity, infraorbital rims and the nasal bones. Through osteotomies, one can achieve excellent exposure of the ethmoids, sphenoids and nasopharynx up to the clivus. This advantage allows the surgeon to have a complete overview of the whole lesion. As a result, one can intraoperatively extend and modify his plan to completely excise the tumor depending on the extent of the disease. SECOND, bleeding is easily controlled. With proper surgical technique and adequate hemostasis, the average blood loss is limited and comparable with our experiences using the traditional approaches. THIRD, access to the tumor and instrumentation is far superior to the transpalatal and sublabial incision. In all our cases, removal of the lesion was easily accomplished. A FOURTH advantage is that the sinonasal cavity established makes postoperative disease surveillance or any endoscopic ex-

amination easy. The FIFTH and last advantage of this approach is the absence of any visible scar. This is an important advantage, for avoidance of scars is a dominant consideration of the old and young patients, especially children. In all of our seven patients, the cosmetic results were excellent.

The disadvantages of the degloving technique are minor and mostly transient. Moderate nasal crusting, as reported by most authors and seen also in all our patients, still poses a problem. It presents early but responds quickly to meticulous cleaning and irrigation with saline solution. The problem resolves within a month. Wound discharge, like nasal crusting was another problem seen in all patients. Evident only when the packing was removed, the problem was transient and easily controlled with meticulous cleaning of the wound. Facial swelling secondary to extensive facial manipulation was also a transient disadvantage and resolved in a short period of time.

Price et al[7] (1988) reported his results on the degloving approach. The most frequent complaints reported by patients are infraorbital and dental numbness (100%). In our series, facial and dental numbness were also evident. This were most likely due to traction or injury to the nerves during exposure of the tumor. But just like Price's report, the complaint resolved with 3-6 months.

Vestibular stenosis is sometimes encountered postoperatively as noted in the reports of Sachs (1984) and Price (1988), and this was commonly associated with the phase of active collagen deposition between 6-12 weeks postoperatively. This stenosis or narrowing usually resolves even without treatment. Sachs suggested using an anterior mucosal bipedicle flap to prevent its development after doing a medial maxillectomy.

Reports of epiphoras (Price, 1988), oroantral fistulas, severe epistaxis (Meniglia, 1986), and possible disturbances on facial bone development were not evident in our series.

SUMMARY

The versatility of the midfacial degloving procedure is once more proven in this case series. In this report, we have described the technique in detail,enumerated its applications to lesions of the midface and discussed its advantages and disadvantages. It is our hope that most of our surgeons would not overlook its significance in the management of lesions affecting the nasal cavity, paranasal area and the nasopharynx.

REPORT OF CASES

CASE 1: L.S., a 63 year old female with a 43 year history of reverse smoking was admitted on February 1, 1989 for treatment of a progessively enlarging ulcer on her palate. The mass started as a half centimeter sized ulcer, 4 months back. On examination, a 2.5 cm ulcer was noted on the left anterior palate crossing the midline involving one-third of the right palate. The areas around the ulcer were grossly irregular. Radiographs of the paranasal sinuses revealed left maxillary sinusitis with no bony erosions on the maxilla. Biopsy of the borders of the mass revealed Squamous Cell Carcinoma, well-differentiated.

On February 10, 1989, surgery was performed. The patient was degloved,the tumor noted to be confined only to the hard palate. A bilateral inferior maxillectomy was done and the specimen totally removed. Vaselinized strips with antibiotic ointment were packed into the antrum. The degloved face was repaired and a palatal prosthesis placed. Packing was removed after 7 days. Final histopathologic report revealed specimen margins free of tumor invasion. Patient was still subjected to post-operative cobalt therapy. Presently, no recurrences were noted.

CASE 2: P.T., a 54 year old male was admitted on June 19, 1989 because of progressive left sided nasal obstruction for a period of six years. Associated signs and sympoms include headaches and persistent mucoid nasal discharge. On examination, the left nasal cavity contained pinkish, shiny, smooth masses which were non-tender and did not easily bleed when poked. X-rays of the paranasal sinuses showed left-sided sinusitis with no evidences of bony destruction. The impression was nasal polyps.

On June 24, 1989, the patient underwent a unilateral polypectomy, ethmoidectomy and antrostomy. The specimens sent to the Pathology section were read as Inverting papilloma. Patient was readmitted and underwent medial maxillectomy through a degloving approach. The whole tumor was removed and final histopathology report revealed tumor margin free of malignant invasion. Patient was subjected to post-operative cobalt treatment. No recurrences were noted on follow up.

CASE 3: M.M., a 53 year old female with a 40 pack year history of smoking was admitted on September 13, 1989 because of a progressively growing lesion on the hard palate of eight months duration. Associated signs and symptoms include pain and bleeding from the mass. Examination of the palate showed a darkly stained exophytic mass almost covering the entire hard palate. X-ray of the paranasal sinuses was unremarkable. Biopsy of the borders revealed Malignant Melanoma.

On September 27, 1989, the patient was operated on. The middle third of the face was uncovered via the midfacial degloving procedure. Using an osteotome, a bilateral inferior maxillectomy was performed. Portions of the soft palate and uvula were included in the specimen. Split thickness skin graft was taken from the right antero-lateral thigh area and placed on the raw maxillary wound. The cavities were

packed and the degloved face sutured back. The palatal prosthesis was then put into place. Removal of packing was carried out by the seventh post-operative day. Final histopathological report revealed margins free of tumor.

CASE 4: D.C., a 13 year old boy, admitted last Oct. 28, 1989 because of mild to moderate episodes of epistaxis for four months, progressive nasal obstruction and an enlarging facial mass of ten months. Anterior rhinoscopic findings revealed a reddish regular mass completely occluding the right nasal cavity. Angiogram showed a vascular tumor situated at the right nasal cavity, extending to the ethmoids, nasopharynx, maxillary antrum, infratemporal and pterygomaxillary region. CT scan findings showed the same extensions. Biopsy of the mass revealed juvenile nasopharyngeal angiofibroma. On Novemebr 10, 1989, surgery was performed. The tumor was exposed via a degloving approach. Intraoperative findings showed the anterior, lateral and posterior walls of the antrum already eroded by the mass. Using bone rongeurs and an osteotome, a medial maxillectomy was completed to expose the ethmoid, sphenoid and nasopharyngeal portions of the tumor. The entire tumor was then removed. The cavity was packed with medicated vaselinized strips and the degloved face repaired. Packing was removed after 7 days. The patient remained free of gross recurrence until 4 months later. This was however, easily removed intranasally. He has had no recurrence since then.

CASE 5: D.M, a 26 year old female was admitted on November 21, 1989 because of a left maxillary mass of 2 1/2 years duration. Physical examination showed a firm, nontender, fixed maxillary mass 4 x 3.5 cm in diameter. Anterior rhinoscopy showed the left lateral nasal wall pushed medially. Oral inspection revealed a bulge at the left palatal area. CT scans revealed a large nonhomogenous maxillary mass with areas of relative hypodensity and calcification. Biopsy of the mass revealed Chondrosarcoma.

On December 8, 1989, a left partial maxillectomy was performed on the patient utilizing the midfacial approach. The mass was totally removed. The sinus cavity was packed with medicated gauze and the prosthesis placed. Packing was removed after 6 days. Final histopathology report revealed chondrosarcoma with negative margins.

CASE 6: C.L., a 46 year old male was admitted on March 26, 1990 because of a left maxillary mass of 7 months duration. Associated signs and symptoms include left sided foul-smelling nasal discharge of 3 months and left maxillary and periorbital swelling of 2 weeks. Physical examination revealed a diffusely swollen left maxillary area extending to the left periorbital region. Swelling was reddened and tender. Anterior rhinoscopy showed a mass obstructing the left nasal cavity. CT scan showed a non-enhancing homogenous density contained in the left maxillary sinus eroding its roof and extending to the left nasal cavity. Biopsy of the mass - Adenocarcinoma.

On March 29, 1990, the patient was operated on. The tumor was exposed via the degloving approach. Intraoperative findings revealed the mass to erode the floor of the orbit and extend to the periorbita. A total maxillectomy with orbital exenteration was then accomplished. A split thickness skin graft taken from the left thigh was placed on the raw maxillary wound. Packing was then placed inside the surgical cavity and the palatal prosthesis sutured to the soft palate and inner lip. Packing was removed after 7 days. Final histopathology report revealed Adenocarcinoma with tumor free margins.

CASE 7: D.H., a 68 year old female reverse smoker was admitted on September 6, 1990 because of a right palatal ulcer of one month duration. Associated signs and symptoms were pain and bleeding at the mass site. Inspection of the oral cavity revealed a 3 x 4 cm. ulceration of the right hard palate posteriorly. The ulceration was surrounded by areas of leukoplakia. Paranasal sinus radiographs revealed right maxillary sinusitis. Biopsy of the mass revealed Squamous Cell Carcinoma, well differentiated.

On September 28, 1990, the patient was operated on. Exposure was carried out through the degloving approach. Intraoperative findings showed the palatal mass extending to the maxillary antrum eroding the anterior and lateral wall of the antrum. The roof of the antrum was, however, intact. A total maxillectomy was carried out. A soft silicone strip was put in place for the orbital floor. A split thickness skin graft from the right thigh was taken and sutured to the raw maxillary wound. Packing of the surgical cavity was accomplished and the palatal prosthesis placed. The packing was removed after 7 days. Final histopathology report read Squamous Cell Carcinoma with negative tumor margins. Cobalt therapy was instituted after 4 weeks. No recurrence was noted on follow up.

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LARYNGEAL FIBROSARCOMA: A REPORT OF A CASE*

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INTRODUCTION

Laryngeal sarcomas in general are rare lesions constituting only 0.3% of all malignancies of the larynx. Majority of these neoplasms are fibrosarcomas with the chondrosarcomas coming in next frequency. Other sarcomas considered exotic due to their extreme rarity but occasionally finding themselves in the literature are: osteosarcoma, rhabdomyosarcoma, leiomyosarcoma, hemangiosarcoma and malignant schwannoma.[1]

Here, a case of laryngeal fibrosarcoma in a 7 year old girl is presented.

CASE REPORT

A girl aged 7 years was referred to the ENT department of St. Luke's Medical Center for management of an obstructive subglottic mass. She was a normal and healthy child till about 4 months previously when she began to have noisy breathing at sleep, sometimes waking her up gasping for breath. This was soon followed by occurence of dyspneic episodes of gradually increasing frequency and severity. Two months before consultation, she was rushed to our hospital severely dyspneic. A tracheostomy was done. Bronchoscopy was attempted by a pulmonary specialist but failed due to marked laryngeal edema. The chest roentgenogram showed segmental pneumonitis at the left paracardiac region. This resolved after a few days with antibiotics. A tracheal tomogram disclosed an obstructive soft tissue density in the right subglottis. She was subsequently referred to the ENT department. The examination showed a fairly developed, afebrile 7 year old girl with a weak voice but not dyspneic. The general ENT examination was unremarkable. She was uncooperative on mirror laryngoscopy. There was nothing contributory in her medical or surgical history. She had two successive direct laryngoscopies which yielded no significant findings. The larynx was just too edematous in both examinations and a bronchoscope could not be advanced beyond the swollen false cords. A subsequent combined rigid and flexible fiberoptic laryngoscopy showed a subglottic mass almost totally occluding the lumen. The mass was pinkish and very friable. The pathological report was a moderately differentiated fibrosarcoma. A computerized tomographic scan, however, failed to show the tumor. Her chest X-ray at this time was normal. Total laryngectomy was performed without vocal reconstruction. Grossly, the specimen showed a firm, nodular subglottic mass arising on the right side. The mass measured 1.5 x 1 cm and about 1 cm thick and it totally occluded the lumen. Microscopically, it was a moderately differentiated fibrosarcoma exhibiting invasion of and in between the underlying cartilages and part of the overlying cord. The distal line of resection was free of tumor. Today, four months postoperatively, the patient is clinically free of disease and doing fine.

DISCUSSION

Fibrosarcoma of the larynx is quite a rare lesion. By 1969, there were only 32 confirmed cases, majority occuring in the older age group (70% over 50 years) with marked male predominance (male/female ratio of 4:1).[2] Gorenstein and associates, in a report on sarcomas of the larynx in 1980, have 5 cases of fibrosarcomas with a mean age of 68 years. Eight cases from Turkey were reported by Hacihanefioglu in 1983, with a mean age of 42 years and with a male/female ratio of 5:3. Clinically, the most common initial presenting symptoms are: hoarseness, dyspnea and an externally appreciable mass. Majority of the tumors arise from the anterior commisure or anterior part of the vocal cords.[3,4,11] Grossly, the tumors appear as pinkish, nodular or pedunculated masses, usually covered by mucosa. Ulcerations may be present in some cases. The microscopic picture is that of masses of anaplastic spindle cells arranged in bands or bundles or in "herringbone" pattern with varying amounts of collagen surrounding the tumor cells. There are 3 histological grades recognized, each one characterized by certain degree of cellularity, amount of interstitial collagen, and abundance of mitosis and pleomorphism. The graph below shows the comparative histological features of the 3 grades of fibrosarcoma.

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	WD	MD	PD
Cellularity	+	++	+++
Collagen	+++	++	+
Mitoses and pleomorphism	+	++	+++

(WD, MD, PD - well, moderately, poorly differentiated)

Eggston and Wolff have stated several years earlier that fibrosarcoma arise from the perichondrium of the cartilaginous structure which constitute the surrounding supportive framework of the larynx.[5] Gorenstein believed that fibrosarcoma of the larynx arise from fibroblasts of the laryngeal support structures.[3]

Difficulties in histopathologic diagnosis sometimes present especially in two instances. Highly aggressive fibromatosis can be confused with low grade fibrosarcoma.[6] Stout in 1960 had stated that the diagnosis of well-differentiated fibrosarcoma should be made only on the basis of the following criteria: presence of mitotic activity, nuclear pleomorphism, and vascular invasion.[7] But the diagnostic dilemma could not be resolved in all cases. Pleomorphic rhabdomyosarcoma frequently appears identical to the undifferentiated form of fibrosarcoma on the light microscope. The distinction becomes clear when Z band materials and specific myofilaments are exhibited in tumor cells of rhabdomyosarcoma through the electron microscope.

The histologic grade, to a significant degree, determines the biologic behavior of fibrosarcoma. [3,10] The poorly differentiated form is known to spread both locally by infiltration along fascial planes or muscles in the environs of the larynx, and to distant areas via the hematogenous route. Well-differentiated fibrosarcomas, although not metastasizing, are noted for their aggressive local growth and recurrences after excision. Batsakis had noted a high 30-60% recurrence rate after local excision.[11] Swain et al, reporting on 40 cases of head and neck fibrosarcoma showed a 25% rate of metastasis. [12] Soule and Pritchard in another study divided 110 cases into 2 age groups. They have found a 7.3% chance to develop metastasis in the 5 years old and below group while a high 50% chance was noted in those 10 years and older.[8] Regional lymph node involvement is rare.

Presently, management of fibrosarcoma is mainly surgical. Conservative surgery via laryngoscopic resection, laryngosfissure or partial laryngectomy is acceptable for small, well-differentiated tumors. For widely, locally infiltrative undifferentiated fibrosarcoma, a wide field laryngectomy is recommended.[11] Batsakis had succinctly put the aggressive surgical treatment on pragmatic basis. He stated "the patients with fibrosarcoma of the head and neck do the best when their initial treatment has been wide field surgical excision. Local recurrences is associated with inadequate resection and this recurrences may be so bulky as to negate curative resection."[11] Most authors believe that radiotherapy is of little benefit. Metastatic disease is best managed with combination chemotherapy. Vincristine, Actinomycin-D, cyclophosphamide, doxorubicin and 5 - flouro-uracil in various combinations are occasionally successful.[6]

The Mayo clinic experience showed a 50% 5 year survival rate for well-differentiated tumors. A low 5% 5 year survival rate for the poorly differentiated ones was noted.[3] The prognosis in children is, fortunately, more favorable compared to those in adults with a 5 year survival rate of as high as 80%.[8,9]

COMMENTS

This is probably the first ever reported case of laryngeal fibrosarcoma in the Philippines. Based on literature reports, this tumor of the larynx is indeed a rarity. There are only 45 confirmed cases ever reported to date, with an overall incidence of about 0.28% of all laryngeal malignancies. Majority of the tumors occur in the older age group, with the highest incidence in the 5th and 6th decades of life. In our case, the patient is rather young at 7 years old and besides, her tumor was found in a somewhat uncommon location (subglottis) for a fibrosarcoma to occur. Before the operation, a lot of discussions were made regarding the probable options in surgical management. Limited resection surely would invite recurrences but doing a total laryngectomy in a child just 7 years of age, seemed too drastic and too mutilating both physically and psychologically. But we believed we could make her live much longer with the more aggressive surgery so it prevailed upon us to do a total laryngectomy. It was the first ever in our institution in a child this age for a rare laryngeal tumor we have never seen before.

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ETIOLOGY OF BILATERAL VOCAL CORD PARALYSIS — A PIN IN A HAYSTACK*

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INTRODUCTION

Bilateral abductor vocal cord paralysis is a distressing, often life-threatening condition that can be the direct cause of asphyxial death. The characteristic signs and symptoms include normal or near normal phonation with inspiratory stridor that may progress to complete respiratory obstruction. This paradox of a normal voice paralyzed vocal cords is frequently responsible for a failure or delay in diagnosis. The etiology of partial or complete bilateral abductor vocal cord paralysis has been determined and classified but the predominant causes have changed as medical care has become more sophisticated and as society has become more mechanized.

This unique case is presented to project the awareness that every case of paralysis or paresis of one or both vocal cords required extensive evaluation and work-up in the search for the etiology.

CASE REPORT

J.A., a 38 year old male factory worker from Caloocan City was referred to us for endoscopic examination with an impression of bilateral vocal cord paralysis, rule out subglottic pathology.

The condition started two years ago when the patient would suddenly be awakened because of shortness of breath for about 5 minutes occuring approximately three times a week.

Two months PTA he developed moderate grade fever, cough, and slight dyspnea, for which he was confined for three days with a diagnosis of bronchial asthma.

Six days later, dyspnea recurred, this time severe. He was rushed to a hospital and brought directly to the operating room for emergency tracheostomy. Intra-operatively, the patient went into cardio-respiratory arrest; resuscitation was done and the patient was revived. Chest x-ray taken revealed bilateral patches of pneumonic infiltrates in both lung fields. CBC showed leucocytosis with neutrophilia. ECG was interpreted as tall and peaked T waves probably secondary to hyperkalemia and occasional SA block. Admitting impression then was laryngeal obstruction. Repeat chest x-ray on the 6th hospital day showed immobile vocal cords at the midline with a one millimeter opening on deep inspiration. He was then referred to our institution for further evaluation.

The patient was first seen at the UST-OPD one and one half months post-tracheostomy, asymptomatic with a size 6 metal tracheostomy tube in place. He would communicate to us by covering the tube and the voice was good. Indirect and flexible laryngoscopy showed both vocal cords to be immobile and midline in position.

He was finally admitted two weeks later. The patient was noted to be hyposthenic and denied any history of previous trauma, previous surgery, dysphagia or prolonged drug intake. He consumed about 12 bottles of beer and 6 bottles of gin per week for the last 15 years.

With the previous ECG interpretation of tall T waves a repeat tracing was requested. Since there was no change in the tracing, serum electrolytes were requested which revealed a low K level at 2.7 meq/l. Internal medicine recommended postponement of the procedure while the patient's potassium was being replaced per IV. Repeat serum K after 110 meq incorporation was 4.2. Direct laryngoscopy was done on the 5th hospital day, and much to our surprise the vocal cords were mobile with an 8 mm opening. Triple endoscopy was completed including flexible laryngoscopy. The patient was weaned from the tracheostomy tube the following day.

An intensive investigation was done to probe into the etiology which included Neurology consultation, T3, T4, BUN, Creatinine, FBS, CPK, and VDRL. He was discharged improved and was advised to take high potassium diet. He has been asymptomatic since then.

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DISCUSSION

We are confronted here with a 38 year old hypothenic, heavy drinker male who had a two year history of episodic attacks of being awakened from sleep to discover shortness of breath. He developed severe difficulty of breathing for which tracheostomy was done. Laryngoscopy showed bilaterally immobile vocal cords at the midline position. He was referred for endoscopic examination but, prior to the procedure, tall T waves were noted on the ECG. Serum K was eventually found to be 2.7. On the other hand, subsequent official reading of the ECG was sinus bradycardia with early repolarization. After intravenous correction of potassium, direct laryngoscopy on the 5th hospital day revealed the cords to be mobile with an 8 mm opening. Removal of the tracheostomy tube the following day was uneventful.

Holinger, in a review of 240 adult cases of bilateral vocal cord paralysis found that the causes for such were: thyroidectomy in 58%, neurologic in 22%, miscellaneous in 14% and neck malignancy in 6%. (Table I) Cummings in a more recent article, considered trauma a major case with the automobile assuming preeminence over the scalpel. Diabetes was included in his neurologic category. Idiopathic laryngeal paralysis were cases wherein no etiologic agent or disease can be found after extensive medical, neurologic laboratory, endoscopic and radiologic evaluation. (Table II)

The more common causes of bilateral vocal cord immobility like trauma, poliomelitis, Parkinson's disease, Guillain-Barre syndrome, diabetes and neoplastic diseases have been ruled out because of the normal findings in the history, physical and neurologic examinations and laboratory and endoscopic procedures. These diseases usually present with obvious accompanying signs and symptoms. The only likely considerations that could be entertained would be one of idiopathic nature.

Ward et al made a study of 39 patients with idiopathic paralysis. Eighteen had a history of a previous upper respiratory tract infection which suggests a viral etiology. In our patient, however, the evident concurrence of hypokalemia and bilateral vocal cord immobility, and the even glaring temporal relationship between resolution of the symptomatology and potassium replacement indeed make hypokalemia the cause of the paralysis. Therefore, the consideration of hypokalemia should take precedence over the more improbable and less specific viral etiology.

The most prominent features of hypokalemia are neuromuscular. Electrocardiographic alterations are not well correlated with the severity of the disturbance in postassium metabolism and cannot be relied on as indices of the clinical significance of a potassium deficit.

The causes of hypokalemia are classified into: decrease in input, increase in output, and shift of potassium from

TABLE I

ETIOLOGY OF BILATERAL ABDUCTOR VOCAL CORD PARALYSIS IN ADULTS (Holinger et al., 1976)

Thyroidectomy		**138**	**(58%)**
Neurologic			
Poliomyelitis	14		
Parkinson's disease	4		
Cerebrovascular accident	4		
Guillain-Barre syndrome	3		
Multiple Sclerosis	3		
CNS neoplasm	3		
CNS infection	2		
Charcot-Marie Tooth	2		
Other	17	52	(22%)
Malignancy of the Neck		**16**	**(6%)**
Miscellaneous			
Foreign bodies	2		
Bilateral neck dissection	3		
Infection	3		
Congenital	3		
Trauma	2		
Substernal thyroid	2		
Idiopathic	8		
Other	3		
Undetermined	8	34	(14%)
TOTAL		**240**	**(100%)**

TABLE II

CONVENTIONAL WORK-UP OF PARALYZED VOCAL CORD (Ward and Berci, 1982)

- History
- Physical
- Laboratory studies
  - Chest x-ray
  - Barium swallow
  - T3, T4, TSH scan and uptake
  - CBC, ESR, Hct,
  - FAT, FBS
- Laryngoscopy
- Bronchoscopy
- Esophagocopy
- Mediastinoscopy (when indicated)

TABLE III

CAUSE OF HYPOKALEMIA (Elms, J.J., 1982)

a) Decrease in input

1. Dietary deficiency
   - Alcoholism
   - Poverty
   - Anorexia
   - Dieting

b) Increase in output

1. Excessive renal loss
   - Hyperaldosteronism
   - Excessive use of diuretics
   - Obligated potassium diuresis
2. Excessive gastrointestinal loss
   - Diarrhea
   - Laxative abuse

c) Shift of potassium from serum to ICF

1. HCO3 Thereapy
2. Increased insulin level
3. Hypokalemic periodic paralysis

serum to the intracel[illegible] compartment. (Table III) We have ruled out all the other possible causes except for hypokalemic periodic paralysis and a purely dietary cause.

In the classic picture of episodic hypokalemic paralysis there is a strong heredo-familial incidence in three fourths of all cases. The typical attack comes on during sleep or after a day of unusually strenuous exercise; a meal rich in carbohydrate favors its development. Usually the patient awakens to discover a mild to severe weakness of the limbs. The distribution of paralysis varies. Limbs are affected earlier and more severly than trunk muscles. Diagnosis rests on the finding of a low serum potassium concentration in a spontaneous attack.

Our patient may be having an atypical form of episodic hypokalemic paralysis affecting solely the laryngeal muscles. The diagnosis can be confirmed by the precipitation of a paralytic attack by intravenous infusion of glucose followed later by insulin. This was not performed on our patient because we feel that it is a risk that is too much to take solely for academic satisfaction.

A more plausible explanation for the patient's hypokalemia is a decrease in potassium intake. The patient is now on a high potassium diet and has not had attacks since then. Serum potassium taken a month later was 4.1. Flexible laryngoscopy showed the vocal cords to be mobile with a 10 mm opening.

This case has opened our eyes to the fact that hypokalemia may indeed present as a myriad of rare clinical manifestations. It is certain that serum potassium determination will always be included in the work-up of patients who present with similar complaints. At the UST Hospital, we have learned not to underestimate the powerful capabilities of what was thought to be the lowly potassium ion.

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THE LADY WITH THE MYSTERIOUS VOICE* (THYMIC DYSPHONIA)

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INTRODUCTION

An incompetent palate, whether secondary to nerve palsy, a cleft or excessive scarring, results in inadequate closure of the nasophrynx during speech giving rise to rhinolalia aperta. On the other hand, speech without enough air existing through the nose is referred to as rhinolalia clausa.

This author wishes to present a case which somehow resembles the latter but with a difference.

CASE REPORT

This is a case of a 46 year old female whose main complaint since Dec. 1988 was that of change in the quality of her voice after a few seconds of talking.

Perhaps it went unnoticed that this patient's voice gradually changes from normal to nasal. Please take note. It sounds normal at the start as to set it apart from rhinolalia clausa.

Initial EENT consultation revealed an enlarged thyroid which was soft, non-tender, nodular and moves with deglutition. This was accompanied by drooping of eyelids after prolonged upward gaze. Rhinoscopy, both anterior and posterior, was essentially non-revealing. Both nasal passages were clear and her nasopharynx free. Radiographically, the paranasal sinuses are normal. Mirror examinations of her larynx was unremarkable. Both true vocal cords move and approximate properly. She was then subsequently treated for glaucoma in which case ophthalmic eyedrops (meds unrecalled) was prescribed. This, however, did not relieve the condition. Instead the drooping became more marked especially on the right.

The patient was then referred to an endocrinologist and a thyroid work-up was done. The results obtained were as follows:

FT3RIA = 4.4 pmoles/L (4.2-12.0 pmoles/L)
ULTRASOUND: THYROID
= Both lobes are minimally enlarged. There is a solid nodule at the inferior pole of the right thyroid measuring 2.4 x 1.7 x 1.6 cm. A solid nodule is also noted in the lower portion of the left lobe measuring 2.4 x 1.8 x 1.5 cm.
= CONCLUSION: minimally enlarged thyroid gland with solid nodules at both lower portions of both lobes

With the persistence of the patient's nasal voice and an obvious thyroid enlargement, the patient was referred to an ENT specialist who noted some weakness of the right palatal muscles and slight weakness of the right vocal cord. He then considered a right recurrent laryngeal nerve involvement that maybe due to the thyroid mass. Although Central Nervous System involvement cannot be ruled out, he then suggested a neurologic evaluation.

However, with an evident thyroid enlargement, the patient proceeded to seek an opinion from a surgeon who advised the patient to have her thyroid removed - this being the only obvious abnormally noted. At this point in time, a second opinion was sought and this was how she came under our care. At the outset, we failed to see how thyroidectomy would solve her problem (nasal voice). If it was secondary to tracheal compression, her breathing would somehow be affected. On the other hand, when the recurrent laryngeal nerves are involved, the motility of the cords would be impaired or even paralyzed. Again, PE findings showed no significant abnormality except for the enlarged anterior neck mass.

Blood examinations revealed a slightly elevated fasting blood sugar (7.2 mmoles/L NV= 4.4 - 6.6 mmoles/L). Other blood chemistry examinations were essentially normal. Chest PA revealed fibrocalcific densities at the left hilar region

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with well delineated margins measuring about 7 x 3 cm. in its widest diameter. The said density blends with the cardiac shadow but cavitations noted within the opacity. The radiologist then concluded fibrocalcific density left upper lung, more likely old PTB foci.

On account of the above findings, repeated examinations were done and, true enough, a slight deviation towards one side of the soft palate was noticeable and repeat indirect laryngoscopy also showed limited mobility of the right cord after instructing the patient to keep saying "E". Both upper eyelids are now discernibly ptosed, if only slightly.

Biased as these findings maybe, but that was how it turned out. Consultations with a neurologist was made and more tests were recommended. A left lateral view of the chest on x-ray disclosed an anterior mediastinal substernal mass measuring about 7x5 cm. In correlation with the prior chest PA, thymic mass, germinal cell neoplasms, lymph nodes and to a lesser probability, thyroid extension were considered. Computed tomography revealed an anterior superior mediastinal mass that is consistent with thymoma. Only then did her problem appeared less formidable. The thymus which should have regressed completely during infancy persisted. No wonder, this patient's plethora of complaints like ptosis can now be explained on the basis of thymoma with myasthenia gravis.

The primary event in the development of myasthenia gravis is the appearance of myogenic cells in the thymus with subsequent autosensitization against membrane AchR (acethylcholine receptor) by intrathymically developing T-cells. The T-helper cells then migrate to the periphery and cooperate with the thymus-derived sensitized B cells which are responsible for AchR antibody synthesis. The thymus of Myasthenia Gravis patients contain all the necessary ingredients of AchR antibody production, namely, the antigen (AchR), T-helper cells and sensitized B cells.

The disease maybe identified on the basis of the clinical features alone but more often ancillary procedures are required for definitive diagnosis. Pharmacologic tests using Edrophonium chloride (Tensilon) was performed. Repetitive nerve stimulation of the left facial nerve showed a significant decrement of 21% which disappeared and, in fact, showed an increment of 20% after 8 mg of tensilon. The patient positively responded with transient improvement from her symptoms.

A rare disease (myasthenia gravis) affecting only 1.18/ 20,000, is characterized by easy fatigability of the striated muscles. The cause of this disease has not yet been discovered, although its pathogenesis is well known. For reasons which are, as yet, unknown, in myasthenic patients, antibodies are formed against acethylcholine receptors situated on the muscle thereby producing the signs and symptoms of our patients.

A perplexing problem, no doubt this is, but what could or rather how is this brought about? Many answers have been brought forward but the most plausible explanation appears to be that this is an autoimmune process where acethylcholine receptor antibodies at the neuromuscular junction are believed to produce decreased concentration of functional acethylcholine receptors in the motor endplates of skeletal muscles by one or the following methods:

a) blocking the access of acethylcholine to the receptors
b) accelerating acethylocholine receptor degradation
c) complement-mediated post synaptic membrane lysis

This patient has been shunted from one doctor to another with so many laboratory tests done - some necessary, some uncalled for, so much so that after spending so much money, its hard to blame her for uttering "You have emerged from their clinics with the same problem unresolved. And suddenly, they discovered you have something there and they don't know what to do with it."

For reasons of her own, this patient was lost to follow-up and who can blame her? Its no wonder, as we learned later and inspite of her educational background, that she allowed herself to be under the care of divine healer, whom she saw in Tacloban. True to her expectations, after just one touch by this healer, her enlarged thyroid is now hardly noticeable. She claims that she feels a lot better than before. Her swallowing is back to normal. Ptosis has just about disappeared.

It is this unorthodox approach that had us mesmerized. Whatever, these developments are, in themselves, perplexing as to be interesting as the methods utilized are unorthodox, well beyond the realm of Western medicine.

It will be worthwhile to repeat some of the tests she had, particularly the tensilon test for mysthenia gravis but for reasons already stated, this lady has persistently refused. All told, her voice has remained as is, except that it sounds better on waking up and sounds nasal late in the day, otherwise she is asymptomatic.

FINAL DIAGNOSIS: Thymic Dysphonia

THE ELUSIVE LARYNGEAL ANOMALY: THE DYSPNEA DILEMMA*

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INTRODUCTION

Dyspnea of whatever form of presentation poses a great challenge to the diagnostic acumen of a physician. Since early diagnosis is necessary to initiate proper treatment and delay may lead to serious impairment of airway, all physicians should be aware of the potential severity and extent of the problem. To the otolaryngologist concerned with the upper airway, the larynx is a valuable segment of human anatomy where localization of the lesion could test the limit of his knowledge. Anomalies of the larynx, whether congenital or acquired, produce symptoms ranging from minimal to life threatening. Obstruction of the larynx, therefore, requires immediate attention. In the hands of an amateur, identification and localization of the lesion may be long and tedious. But even to the able care of an experienced otolaryngologist, the same dilemma may happen.

CASE REPORT:

A previously asymptomatic 24 y/o female was seen at the Emergency Section of JRRMMC last February 5, 1988 because of hoarseness, stridor, and dyspnea. One month prior to admission, above symptoms were preceded by choking sensation, and a feeling of constriction in the neck. She occasionally regurgitated previously taken in food. Two weeks prior to admission, she experienced cough productive of whitish phlegm, bearable dyspnea, easy fatigability and weight loss. Due to the increasing severity of symptoms, she sought consultation at our hospital. Immediate tracheostomy was done.

She denies external neck trauma nor previous illnesses. She does not smoke nor drink alcoholic beverages.

Mother claimed that at 4 months AOG, a diagnosis of "Intrauterine Growth Retardation" was entertained at St. Luke's Hospital.

Patient was born full term spontaneous vaginal delivery at home assisted by a registered midwife. Her birth weight was 5 lbs.

At the Emergency Section, a hyposthenic female in respiratory distress presented with suprasternal, supraclavicular retractions but with clear sounds. Inspiratory stridor was also noted. Examination of the oral cavity showed a small stumped uvula. No obstructing mass lesion was seen. Indirect laryngoscopy revealed a constricted hypopharynx. The leaf-like epiglottis was not visualized, and a small constricted supraglottic inlet was noted. The vocal cord region and the glottic aperture were not seen. The rest of the organ systems were unremarkable.

Initially, indirect laryngoscopic examination was done to guide us in our diagnosis. However, no familiar anatomic landmarks were seen. In the hope of enlightening us of the etiopathogenesis of the condition, lateral x-ray of the neck was requested and done. However, this showed no apparent obstruction to explain the symptoms. The tracheal air column was noted to be patent. However, Chest X-ray showed minimal pulmonary tuberculosis. Furthermore, CT Scan of the neck which is supposed to help us visualize the lesion showed essentially normal findings.

Our patient then underwent direct laryngoscopy. Findings were: the epiglottis was not discernible, the supraglottic inlet was contricted and further insertion of the laryngoscope was unsuccessful. The vocal cord region and the glottic aperture were not visualized. A "bulge" was seen at the supraglottic area. Biopsy of "bulge" showed chronic inflammation.

To settle the controversy, the patient underwent exploration of the larynx by midline thyrotomy approach. On opening up, the hypopharynx was constricted by a circular band of fibrous tissue. The epiglottis was noted to be indeed absent. The true vocal cord, glottic aperture and the subglottic region were grossly normal. However, a 2 mm thick fibrous structure was seen 1 cm above the glottis located at the anterior aspect of the supraglottis. This membrane blocks the passage of air from the utside to the glottis and possibly explaining the dyspnea. Biopsy of this membrane showed fibrofatty tissue with no evidence of malignancy. The rest of the laboratory results showed the following:

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CBC: Hgb - 12 g/dl WBC - 12.85 x 10/L Segs - 67% Stabs - 2% Lymphos - 31% Platelet - adequate

VDRL - nonreactive
Mantoux test - +
ESR - 20 mm/hr

DISCUSSION

A laryngeal anomaly can be diagnosed by history. Many times, doing a good endoscopy clinches the diagnosis. But sometimes, because of some anatomical anomalies, localization of the pathology may be hard to establish. In this situation, the final diagnosis and confirmationn is made only by means of direct visual examination and exploration of the anomally. Since a laryngeal anomaly may present with a life threatening situation such as dyspnea, early diagnosis, therefore, is necessary in initiating treatment.

Presented with a dyspneic patient at the Emergency Room, the otolaryngologist has several differential diagnosis to consider: Is this an acute asthmatic attack? Is this a severe form of Pneumonia? Is this just a plain and simple functional problem or malingering? Or is it an upper airway obstruction?

History may not eliminate all of our differential diagnoses. A good physical examination of the ENT part may not be done because of an apprehensive patient. Hence, in this situation, the status of the larynx may not be easily examined. X-ray of the chest may not give us a definite diagnosis. Initial treatment for this kind of patient is, therefore, a dilemma.

By eliminating lower airway problem in our differential diagnoses, the concentration is on the upper airway. In this patient the most logical thing to do is to perform a tracheostomy. The tracheostomy which we performed had dramatically relieved the patient with distress. And once relieved of dyspnea, a good examination of the larynx was in order. But then the dilemma did not end here because laryngoscopic examinations did not help us establish the diagnosis right away. Our findings showed no familiar anatomic lanndmarks and, therefore, no definite diagnosis is made. Not until an exploration was finally done.

In our investigation, we found two distinct anomalies - an absent epiglottis and a supraglottic web. A congenital web of the larynx is a result of the failure of normal splitting of the vocal cord primordium at 10 weeks in utero. Therefore, the patency of the laryngeal lumen is deficient and respiration is maintained through a small posterior chink. the supraglottic web is much less common than the glottic web. McHugh & Loch reviewed 133 cases of which 75.2% were glottic, 7.5% subglottic, 1.5% supraglottic. In a series of 32 webs reported by Hollinger & Brown, 24 were glottic, 4 subglottic and 4 supraglottic. Fearon & Ellis described 9 laryngeal webs of which 3 were glottic and 6 were subglottic. An absent epiglottis is another associated anomally see in our patient. This is the rarest laryngeal anomaly. Only two cases were reported by Hollinger & Brown, both of which had severe subglottic stenosis.

Indeed supraglottic web ent epiglottis anomaly is a rare combination of a congenital laryngeal disorder. No such combination was reported in foreign literatures. No such documented case was reported locally.

As vanguards of medical science, deductive reasoning dictates us to answer this question: Is this really a congenital or an acquired type of laryngeal anomally? In our patient, there is no history of trauma nor any diseases in the past. This fact, plus a small stumped uvula and webbing of the hypopharyngeal area, provides significant clues to the congenital nature of the lesion.

This congenital nature is further enhanced by the direct visualization of the larynx. There were no granulation tissue formation and no area of ulceration which may point to an existing acquired disease. But what would explain the onset of the dyspnea in the second decade of our patient's life?

At this juncture, several theories are advanced.

Theory No. 1 - This could be a supraglottic web, congenital in nature with a superimposed acquired infection.

Theory No. 2 - This could be a supraglottic cicatrization probably acquired, gradually blocking the airway. The nature of this supraglottic cicatrization could be secondary to granulomatous infection such as tuberculosis, syphilis and leprosy. It could be a fibrous lesion of the larynx.

Theory No. 3 - This could be a congenital supraglottic web which is increasing gradually in size and dimension and gradually blocking the airway.

The third theory is unlikely. Congenital webs usually are present at birth and grow only concomittantly with the growth of the laryngeal structures which usually stops at the early decades of life.

If there is such a thing as expanding congenital web, what would trigger its sudden growth? Any search regarding this nature is difficult to document.

The second theory is possible. An acquired disease can easily block the airway. The group of granulomatous lesions, tuberculosis, sarcoidosis, and leprosy can present as such but the predilection to such an area is very unlikely. TB and leprosy have been documented to affect the epiglottis but not in the area just above the glottis.

Chronic granulomatous infection like syphillis, tuberculosis and fungal infections can produce endolaryngeal damage. Pulmonary tuberculosis being prevalent in our country can affect the larynx in direct line of mucociliary clearance. Laryngeal tuberculosis which is highly entertained in our patient invariably occurs in the presence of an active pulmonary tuberculosis, usually advanced. The commonest symptoms associated with laryngeal tuberculosis

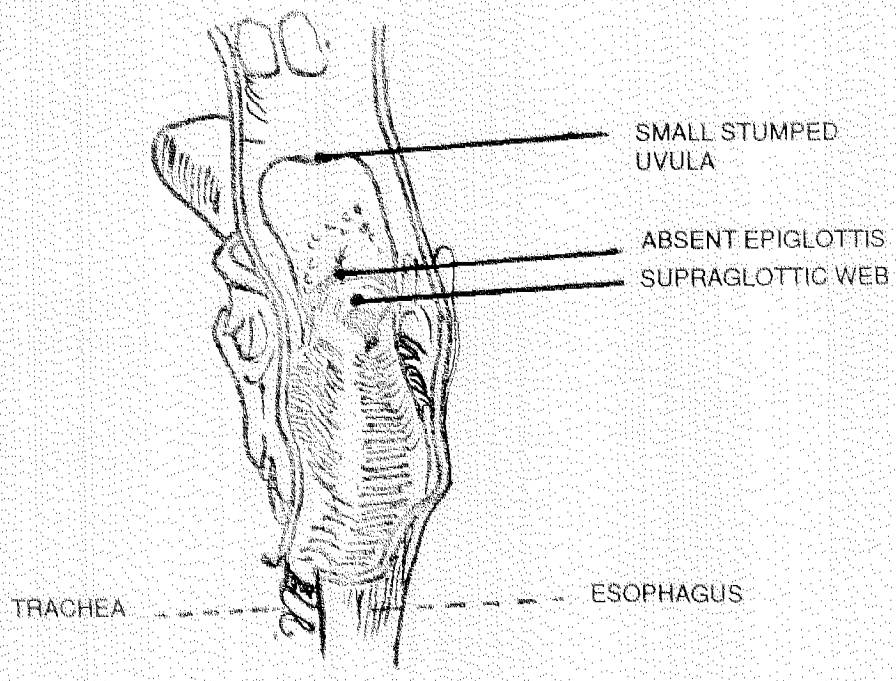
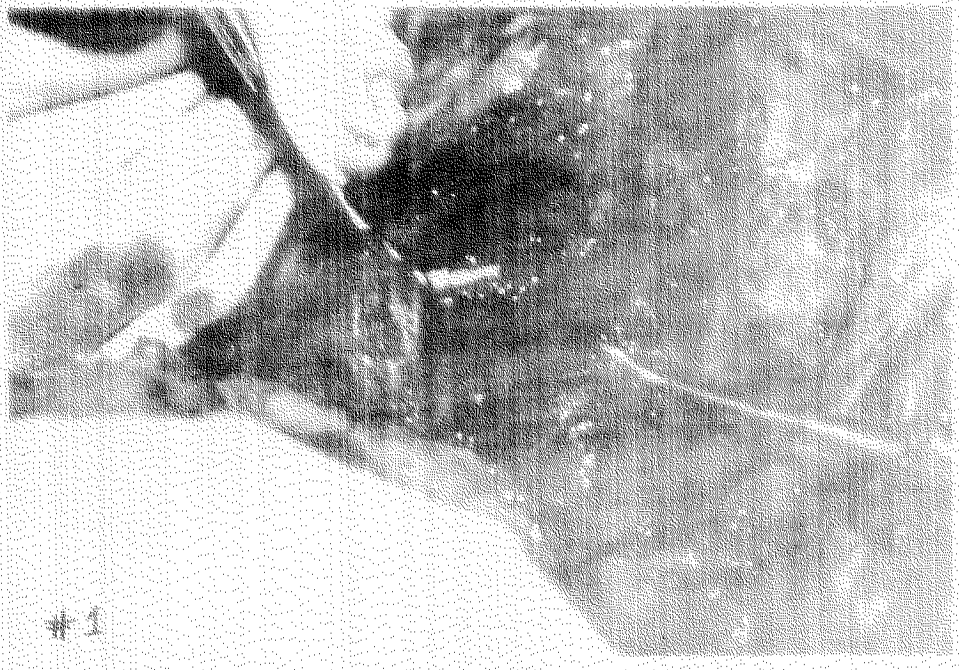


Figure 1. Graphical representation of the combined congenital Laryngeal anomally.



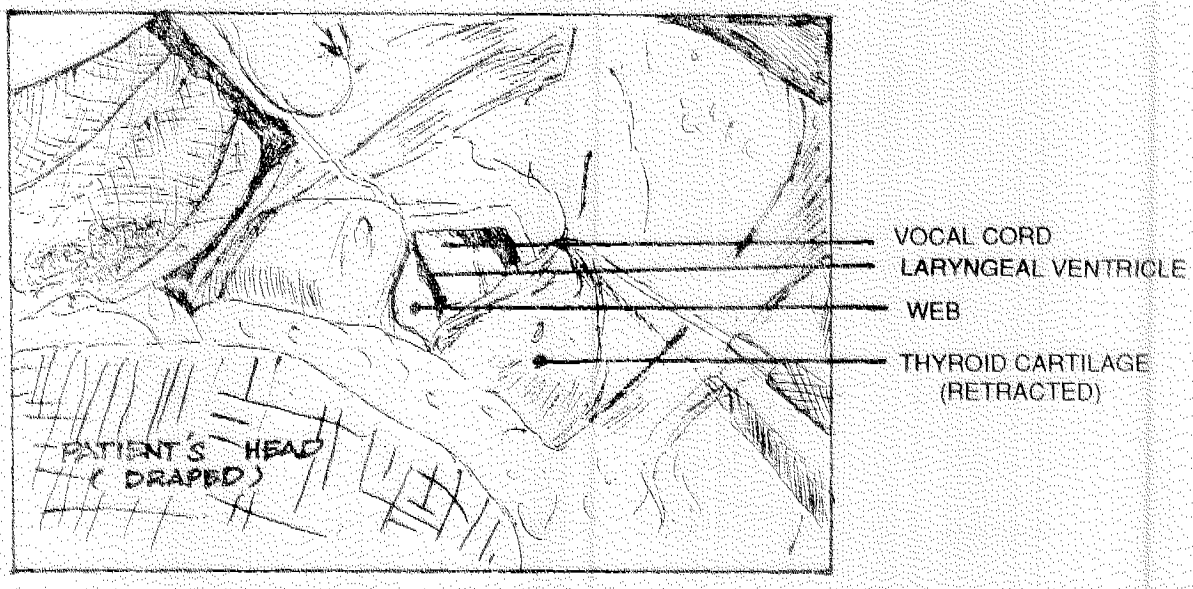
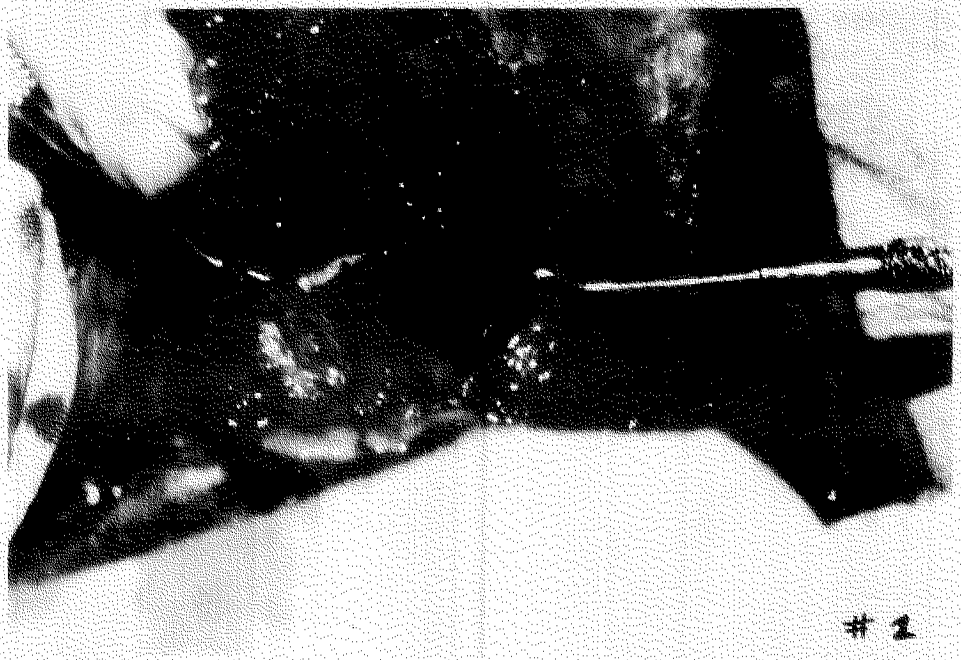


Figure 2. Graphical representation of color print #1



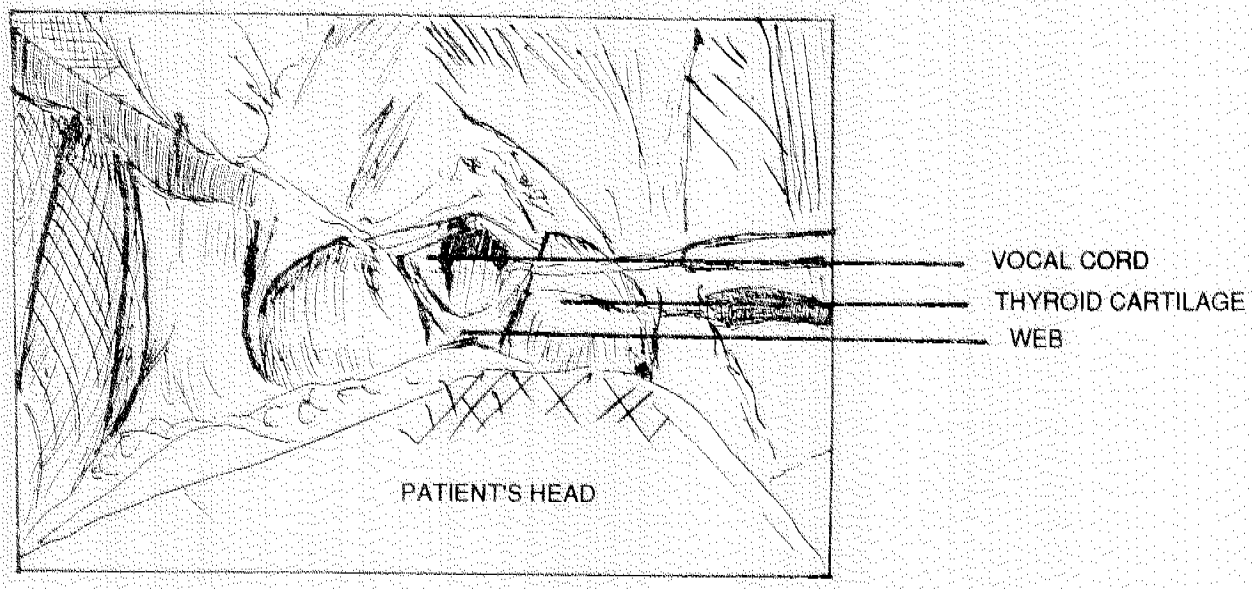


Figure 3. Graphical representation of color print **#2**

are hoarseness and odynophagia. Surprisingly, however, significant uppper airway obstruction in tuberculous laryngitis is rarely seen in sharp contrast with our patient who initially presented with dyspnea. Histopathologic diagnosis of tuberculosis is based on findings of central granular caseation and epitheloid giant cells. Biopsy of the excised fibrous tissue in our patient did not confirm the presence of laryngeal tuberculosis nor any other granulomatous disease.

Syphillis is a distant possibility. The lack of systemic manifestations and absence of history of promiscuity rule this out. Fungal diseases are also unlikely.

Any fibrous lesion of the larynx like fibromatosis and pseudosarcomatous lesions were also entertained but the gross and histopathologic picture do not confirm their existence.

The first theory is most likely. The supraglottic web is already present at birth. All the while, respiration is maintained by a posterior supraglottic inlet which remained undisturbed until the advent of a superimposed infectious process. Therefore, the recent development of signs and symptoms presented by our patient can be due to any non-specific infection of the larynx sufficient enough to exaggerate the clinical picture and, thus, produce dyspnea.

CONCLUSION

The case presented is an interesting discussion of the etio- pathogenesis of a dyspnea dilemma. The elusive search and the ultimate discovery of an absent epiglottis and suraglottic web combination is a product of a thorough and systemic approach to the problem.

The theories on the congenital or acquired nature provide a springboard for intellectual discussion.

With this case, we have contributed to medical science a well-documented case of a dyspneic patient the cause of which eluded us for some time. But through the rigors of inferential thinking, the ultimate answer came to being.

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LUMENAL AUGMENTATION USING THE PEDICLED HYOID BONE GRAFT IN LARYNGOTRACHEAL COMPLEX STENOSIS EAST AVENUE MEDICAL CENTER EXPERIENCE (A PRELIMINARY REPORT)

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MILAGROS LOPEZ, MD****
REMIGIO JARIN, MD****

INTRODUCTION

The field of reconstructive surgery of the laryngotracheal complex has been the object of considerable enthusiasm in recent years. New surgical techniques, better surgical tools, and improved diagnostic skills all have contributed to a more confident approach to severe tracheal stenosis.

Treatment can be as many and varied but may be categorized into four main basic types:

1. Dilation with or without injection of corticosteroid.
2. Dilation and prolonged stenting.
3. Lumenal augmentation.
4. Resection of the stenosis and primary reanastomosis.

The use of hyoid interposition for cases of laryngeal, subglottic and upper tracheal stenois is recognized to be a satisfactory method. First described by **Looper** in 1938 it has gained little attention until 3 decades later when it was used by **Bennet** (1960) in the repair of a chronic subglottic stenosis reporting partial success. Various animal studies including those of **Lapidot** and **Delahunty** proved experimental success of this technique.

At East Avenue Medical Center, Department of Otorhinolaryngology - Head and Neck Surgery, we have encountered cases of stenosis involving the laryngo tracheal complex. Of these, 3 cases have been managed using the pedicled hyoid bone graft.

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OBJECTIVES

The objectives of this study are:

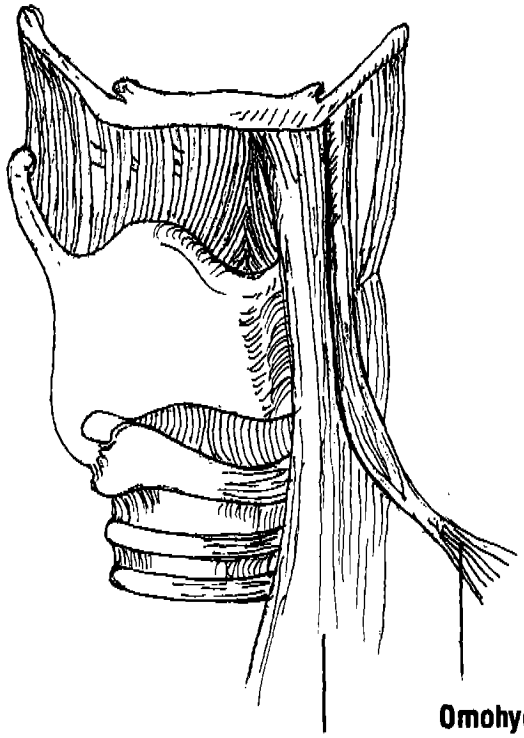
1. To use a simpe but effective surgical procedure in the treatment of stenosis of the laryngotracheal complex.
2. To determine the effectivity of the surgical procedure with the result of decannulation.
3. To identify cases which would benefit from such surgical procedure.
4. And to describe the limitations and complications of said surgical technique.

MATERIALS AND METHODS

A. Evaluation

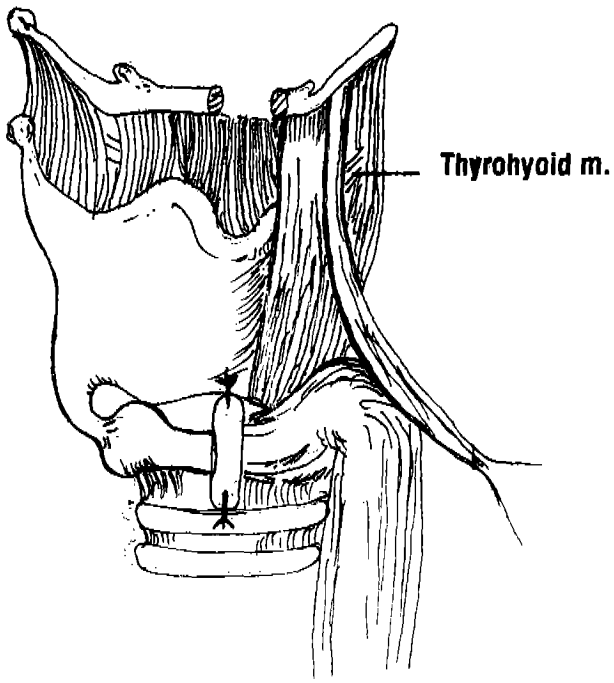
1. A thorough evaluation of the upper annd lower airways is a must. The value of direct laryngoscopy and bronchoscopy cannot be over emphasized.
2. A laryngotracheogram is requested in order to define the length and severity of the stenosis. This may either be:
   a. Air laryngotracheogram or
   b. Contrast laryngotracheogram
3. An examination of the distal trachea must not be overlooked. The possibility of tracheal stenois or malacia exist in patient with long term tracheotomies.

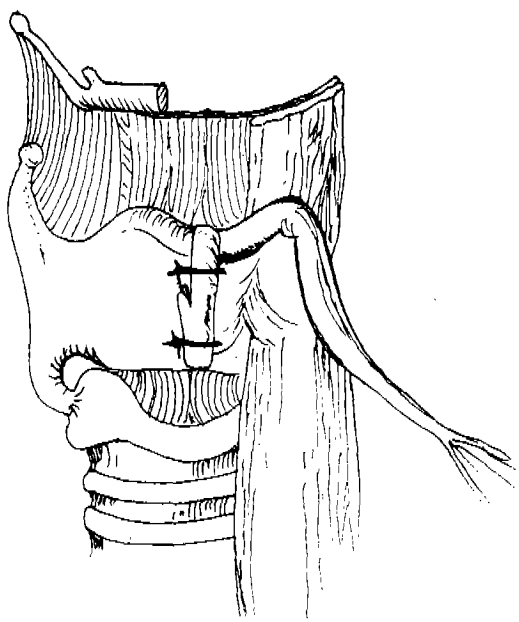
Subglottic Stenosis



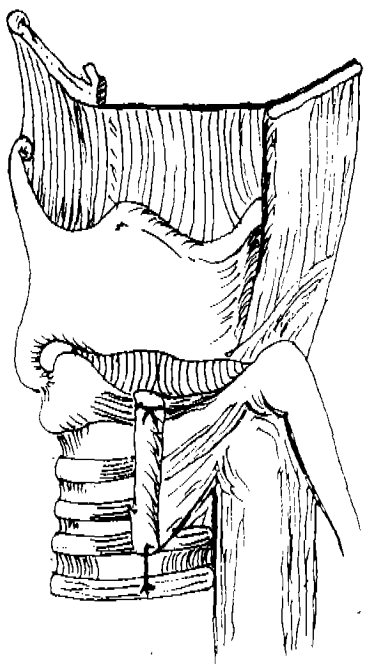
Omohyoid m.

Sternohyoid m.

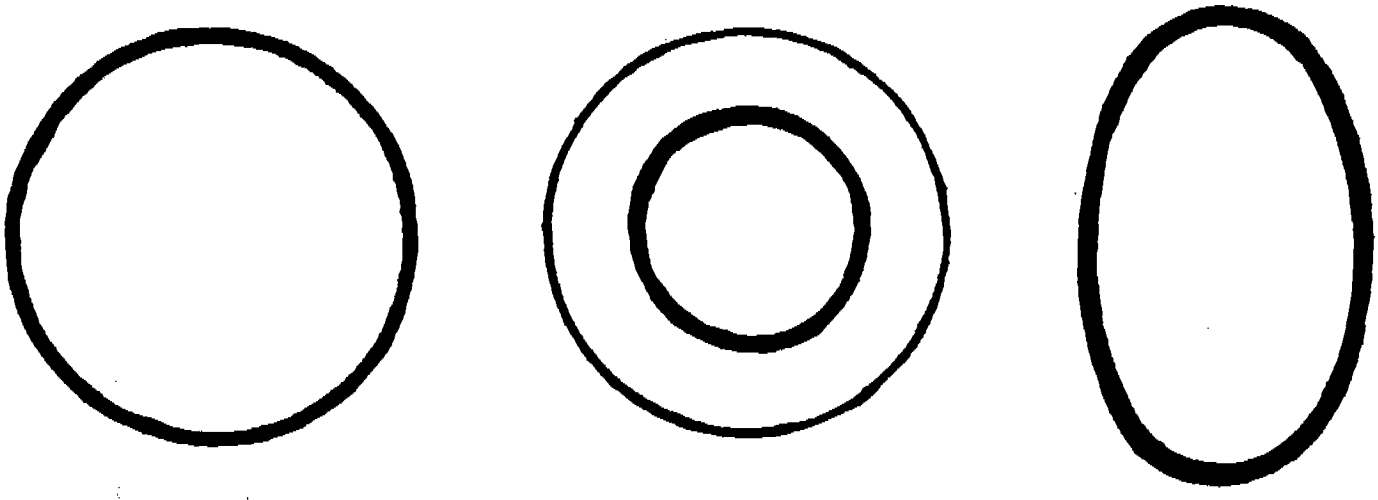




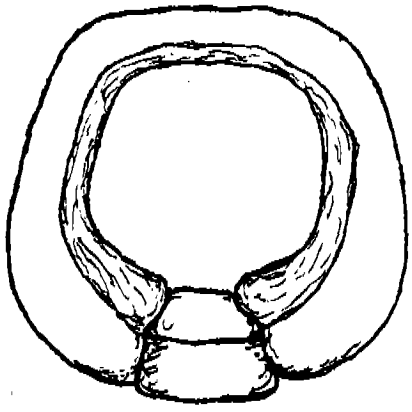
Glottic Stenosis



Tracheal Stenosis



Cross section of the subglottic lumen before and after repair due to a subglottic stenosis.



Cross section of cricoid cartillage showing the hyoid bone graft interposed in the anterior portion in order to augment the stenotic subglottic area.

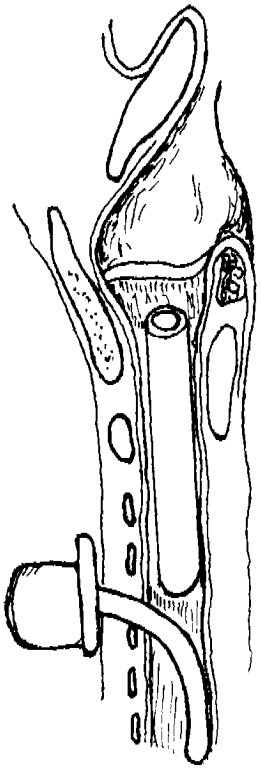
4. A pulmonary function test was done to determine if the patient is a good candidate for surgery or not.
5. C-T scan, for better definition of the size and extent of the stenosis.

EQUIPMENTS

1. Neck surgery set
2. Tracheostomy set
3. Bone cutter
4. Perforating burrs
5. Fine wires (no. 30) or microfilament sutures

B. Surgical Technique

1. Done under general anesthesia.
2. Tracheostomy, if not yet present, is performed
3. The neck of the patient is placed in a hyperextended position.
4. A transverse incision is made at the level of the cricoid.
5. The incision is carried down beneath the platysma.
6. The flaps are then elevated:
   a. Superiorly - 2 cm above the hyoid.
   b. Inferiorly - to the level of the upper tracheal segment or may be carried down to the stomal site for those with upper tracheal stenosis.
   c. Laterally - to the anterior borders of the sternocleidomastoid muscles.
   An adequate eposure of the strap muscles is necessary.
7. A vertical incision is made in the median raphe between the strap muscles, thus exposing the larynx, cricoid and trachea.
8. The thyroid isthmus is likewise transected and ligated for better exposure.
9. A midline incision passing through the thyroid alar cartilage, cricoid and upper tracheal rings is done. (Laryngofissure). A selective midline incision can be done depending on the length of the stenotic area. For example, the cricoid along with 2 tracheal rings may be transected in cases of subglottic stenosis only.
10. After evaluating the length of the area to be corrected, the surgeon can determine the length of the hyoid bone to be used for augmentation.
11. The suprahyoid muscle are freed from their attachments to the hyoid bone depending on the length of bone to be used.
12. The thyrohyoid is carefully freed from the other strap muscles eg. omohyoid and thyroihyoid.
13. The section of hyoid bone to be used is freed using a bone cutter.
14. The hyoid bone graft along with its inferiorly based sternohyoid pedicle is then rotated and wedged in place vertically on the transected stenotic segment with its concave portion facing the lumen. The procedure is done carefully to avoid injury to the superior laryngeal nerve.
15. With the use of perforating burrs or hand drill, holes are carefully drilled on four corners of the hyoid bone.
16. Corresponding holes are then drilled in the cricoid and tracheal areas.
17. The graft is wired using fine wires or microfilament sutures.



Stent held in place by external skin neck buttons

STENTING

In East Avenue Medical Center, due to the unavailability of the Montgomery stent, a stent using different sizes of endotracheal tubes as seem fit for the patient was devised; the ends of which are cut off to form a cylinder. This stent is held in place by means of external neck buttons. Another alternative stent devised use the finger of a rubber glove and fill this with foam or sponge. Again, this is held in place by means of neck buttons.

Stents were allowed to remain in place for 3 months after which it is removed under endoscopic guidance.

DECANNULATION

Through endoscopy, the laryngotracheal complex is evaluated thoroughly to determine if the patient is ready for decannulation. The vocal cords are evaluated, the glottic chink measured, the area of repair noted for adequacy, the hyoid bone is inspected for resorption or displacement, and presence of epithelialization or mucosal regeneration. Any granulation tissue is removed. Furthermore, a retrograde endoscopy through the tracheal stoma is done to evaluate the patency of the airway.

Patients are deemed ready for decannulation if the cords are mobile (relative indication); if the glottic opening is at least 60-70% of the normal and if the area of repair is likewise at least 60-70% and there is no bone resorption or displacement of the graft.

The patient is then weaned off from the tracheostomy tube, shifting to a smaller size tube. The tube is then plugged using an obturator and the patient is observed for any respiratory difficulty. If the patient is able to tolerate the procedure for 48 hours then we decannulate the patient.

CASE PRESENTATION

Case 1 is a 34 year old male who developed difficulty of breathing due to prolonged intubation secondary to cerebral malaria. History reveals patient underwent tracheostomy, laryngofissure, and right arytenoidectomy because of vocal cord paralysis. Despite the procedure done, there was difficulty in decannulating the patient.

The patient was then referred to our institution for evaluation and management. A laryngotracheogram was requested which showed laryngeal and subglottic stenosis. This was confirmed by our endoscopic evaluation with the following findings: the glottic opening was about 3-4 mm, the vocal cords were immobile bilaterally, the subglottic area was stenosed circumferentially by about 50-60% (4-5 mm) and there were granulation tissue around the stomal area. Subsequently the patient underwent laryngofissure, excision of the stenosis, removal of the granulation tissue and lumenal augmentation using the pedicled hyoid bone graft flap. A stent was used, held in place by means of external neck skin buttons.

Post-operatively, the patient developed stomal infection and granulation tissue formation at the site of the neck buttons after 3 weeks.

The stent was removed 3 months later under endoscopic guidance. Findings this time showed a widened glottic opening (9-10 mm), wider subglotic area about 70-80% (6-7mm) of the normal and granulation tissue formation on the area of attachment of the graft. Likewise granulation tissues were noted to have formed around the peristomal area.

The patient was gradually weaned from the tracheostomy tube and 6 months post-op, after serial endoscopies and repeated removal of granulation tissues. Patient still complains of dyspnea on physical exertion. However, he claims this to be tolerable. The voice, although hoarse, is understandable.

CASE 2 is an 8 year old male child referred to our department because of difficulty in decannulation. History reveals prolonged intubation because of bronchopneumonia. A tracheostomy was done after removal of the endotracheal tube because the child was noted to be dyspneic.

A laryngotracheogram was requested showing subglottic stenosis. Again this was confirmed by our endoscopic findings which showed a glottic opening of about 2-3 mm, mobile true cords, and a subglottic area with a stenosis of about 70-80% (3-4 mm).

The patient underwent laryngofissure, excision of the stenosis and lumenal augmentation using the pedicled hyoid bone graft. A stent was likewise used and secured by means of neck buttons.

Post-operative complications included stomal infection and granulation tissue formation at the neck button site and aspiration.

The stent was removed after 2 months and patient was weaned from the tracheostomy tbe. This, however, proved unsuccessful.

Repeated serial endoscopies and attempts to decannulate this patient proved futile, despite a glottic opening of 6-7 mm and subglottic space of 5-6 mm which to our judgement is adequate for airway maintenance.

Presently the child is still being followed up and it is our hope to decannulate this patient in the future.

CASE 3 is a 28 year old male soldier who developed subglottic stenosis secondary to an injury in the laryngotracheal area sustained because of a mortar blast. This was further aggavated by a tracheostomy tube inserted in the cricothyroid area and retained for a period of one week. Patient was then referred to our institution because of difficulty in decannulation.

Endoscopy done revealed immobile left cord in the paramedian position and a glottic opening of about 5-6 mm, subglottic stenosis of about 50-60% (4-5 mm) with some granulation tissues on the anterior aspect.

After transferring the tracheostomy tube to the standard tracheostomy site, a laryngofissure was done which revealed an avulsion of the inferior aspect of the left thyroid lamina and confirming our endoscopic findings. The patients subsequently underwent removal of granulation tissue, laminoplasty and luminal augmentation by means of pedicled hyoid bone graft. A stent was used and held in place by means of external neck skin buttons.

Postoperatively, the patient developed infection on the neck button sites and subsequently, granulation tissue. Endoscopy by this time showed a widened glottic chink of about 7-8 mm, and a subglottic space of about 80% (7-8 mm) that of the normal.

Patient was weaned from the tracheostomy tube and was finally decannulated after 4 months.

DISCUSSION

In presenting this surgical procedure, we are in no way saying that it is the procedure of choice for all types of laryngotracheal complex stenosis. Like all procedures, it has its advantages and limitations as well as possible complications.

The causes of laryngeal and tracheal stenosis are numerous, among which prolonged intubation is a leading factor. Others to be included are congenital stenosis, blunt or penetrating neck trauma, high tracheostomy, caustic injuries, sarcoidosis, Wegener's granulomatosis, and relapsing perichondritis.

The management of tracheal stenosis has evolved to the point where resection with end to end anstomosis is considered the treatment of choice. However, as the stenosis problem increases in severity, more elaborate procedures have been advocated. The approach decided upon is a function of location and the extent of the injury.

Tracheal resection is useful for upper tracheal stenosis stenosis which does not involve the immediate subglottic area. The resection of subglottic stenosis and thyrotracheal anastomosis is a method of repair for immediate subglottic stenosis. Reconstruction of a long segment of subglottic and upper tracheal stenosis is not feasible by this technique. Furthermore, the likelihood of recurrent laryngeal nerve injury is enhanced.

Many surgeons would shy away from an external approach to solve the stenosis. Conservative management may come in the form of repeated dilatation with or without corticosteroid injection. Of courses one could not discount the complications arising from steroid therapy specially with the younger age group. Indeed, too, dilatations are traumatic and may even increase the scarring and stenosis.

Prolonged stenting on the other hand has its drawbacks. It can result in persistent tracheocutaneous fistula and the maintenance of the laryngeal stent with external neck skin buttons has the attendant risk of infection with granulation tissue formation on the neck skin. The major problem, however, is determining the appropriate time for the stent removal.

The use of graft for lumenal augmentation is well documented. Surgical success have been reported using rib cartilage, iliac crest, septal cartilage, auricular cartilage and composite bone-muscle skin flap.

The rationale of using a graft with persistent vascular supply is self evident:

1. The rate of reaabsorption and remodelling is gradual and thereby the replacement process is altered in favor of maintaining continuous structural support.
2. The blood supply aids in the diminution of infection and favors healing.
3. The attached muscles help in the stabilization and fixation of the graft.

In addition the vital vascularized hyoid bone-muscle graft provides structural support while widening the lumen and supplying a suprastructure over which skin or mucosal graft or the respiratory epithelium may regenerate. Whether this procedure will be as good, or equal to, or better in treating infants and children with subglottic stenosis awaits additional experience. The potential for success in experimental animals affecting the growth of the larynx and cricoid has not been borne out experimentally or clinically.

A review of published materials regarding the pedicled hyoid bone graft has confirmed the satisfactory results of the procedure both clinically and experimentally.

A report by Wong, Kashima and Finnegan from the Department of ORL-HNS, University of Colorado Medical Center and John Hopkins Hospital reported successful decannulation of 8 out of 9 patients with subglottic stenosis of the different sites of the laryngotracheal complex.

Ward et al from the University of California-ORL-HNS Department reported 3 cases of successful management of stenosis using the pedicled hyoid bone graft. Two of the patients were children with subglottic stenois.

K K Ramalingam, professor of Otolaryngology at the Unviersity of Madras, India reported in the last ASEAN CONGRESS OF ORL-HNS in Singapore 55 cases of laryngotracheal stenosis, 30 of which were managed using the pedicled hyoid bone graft with exceptional results.

Local publications up to date fail to mention experiences with such a technique.

At the East Avenue Medical Center, Dept. of ORL-HNS a total of 6 cases of laryngotracheal stenosis have been seen

and managed in the past 2 years. Of these:

3 were managed using the pedicled hyoid bone graft

2 were managed by prolonged stenting and

1 by the East Avenue interdigitating technique which we hope to present in the future

Of the 3 patients managed using the pedicled hyoid bone graft, 2 have been decannulated and are being followed up in the out-patient department with regular endoscopic evaluation.

The single case of delayed decannulation is that of the 8 year old child with subglottic stenosis secondary to prolonged intubation, who despite endoscopic finding of adequate airway, seems to have developed tube dependence.

The common complications encountered were those of stomal infection and granulation tissue formation on the neck button site and superior peristomal area. Likewise, granulation tissue were frequently observed in the area of attachment of the graft. These were solved by proper antibiotics and meticulous removal of granulation tissue. Foreign literature reports bone resorption and displacement of the graft towards the lumen as other complications which we did not encounter.

CONCLUSION

The pedicled hyoid bone graft in selected cases of laryngotracheal stenosis has proven to be a safe and effective surgical technique. It provides a stable and permanent suprastructural support and at the same time widening the lumen. It is less likely to damage the superior and inferior laryngeal nerves. The greatest single advantage, however, according to Ward, is the availability of a one stage procedure that uses immediately available autogenous material with attached blood supply to correct one of the most difficult of problems encountered by the otolaryngologist.

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VOCAL CORD MEDIALIZATION FOR CORD PARALYSIS (ISSHIKI THYROPLASTY TECHNIQUE) A CASE REPORT*

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INTRODUCTION

Paralysis of the human vocal fold is a problem frequently encountered by Otolaryngologists. Majority of cases are caused by injury to the vagus or recurrent laryngeal nerve or an adjacent tumor.

It is recognized that the paralyzed vocal cord may change position over a period of time. A vocal cord in the intermediate position after recurrent nerve paralysis may gradually shift to a paramedian or median position. These changes are due to continued function of cricoarytenoid muscle and fibrosis and contracture of the thyroarytenoid muscle. The shift of a paralyzed cord from median or paramedian position to a more lateral position is uncommon and is dependent upon paralysis of the superior laryngeal nerve.

Symptoms of unilateral vocal cord paralysis include breathy voice, hoarseness, shortened phonation time, decreased volume and pitch range.[1] There is lack of breath control as air escapes during phonation. The mobile cord over a period of time may compensate by crossing the midline allowing resumption of acceptable communication. In some cases, however, compensation remains incomplete with persistence of symptoms for which surgical intervention is recommended.

Several treatment of paralysis in abducted position have been described.[1,2] These include 1) intrachordal injection using teflon, liquid silicone or glycerine 2) cartilage implantation between thyroid ala and the internal perichondrium 3) reverse arytenoidopexy 4) muscle and tendom implantation and 5) thyroplasty which medializes the vocal cord through a window made in the thyroid ala.

We at the Department of Otolaryngology - Head and Neck Surgery, MCU-FDTMF Hospital would like to share our experience in managing a case of medialization of vocal cord using the thyroplasty technique described by Isshiki.

CASE REPORT

R.C. 29 years old, male, admitted because of dysphonia. Condition started 24 years prior to admission when the patient underwent open heart surgery for congenital heart disease. After his operation, his voice became progressively weaker and breathy.

Otolaryngologic examination showed the left vocal cord fixed at intermediate position with the left arytenoid higher than right by 2 mm. Rest of physical examination findings were normal.

A preoperative voice recording was done and patient underwent vocal cord medialization using the tecnique of Isshiki.

SURGICAL TECHNIQUE:
(As described by Isshiki)

1. Patient placed under general anesthesia, supine position.
2. A 4 cm midline horizontal skin crease incision is made midway between the upper and lower borders of the thyroid cartilage. (Figure 3)
3. Superior and inferior flaps developed and strap muscles separated.
4. The level of the vocal cord is aproximated using the following formula. (Figure 4)

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* Presented at the 34th PSO-HNS Annual Convention, Surgical Innovation Reseacrh Contest at Century Park Sheraton, Manila, December 7, 1990.

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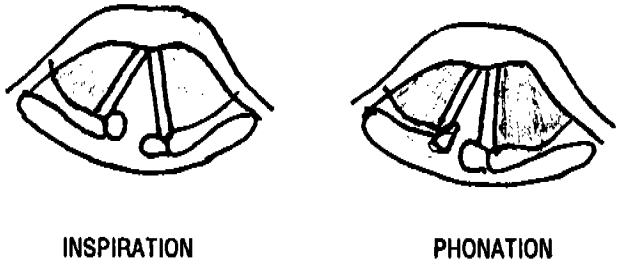

Figure 1. Vocal Cord Appearance Prior to Operation
POST-OPERATIVE COURSE: Uneventful, voice was recorded two weeks after surgery. Patient's voice was noted to be less breathy, stronger, with longer phonation time. No aspiration noted with effective cough reflex.

The left vocal cord was noted at midline but the left arytenoid remains slightly higher than right.

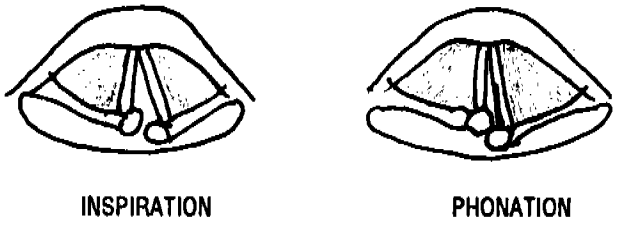

Figure 2. Vocal Cord Appearance After Medialization

$$\frac{\text{Height of thyroid cartilage}}{2} - 1$$

5. The inferior perichondrium is elevated from the medial surface of the thyroid cartilage by passing a periosteal elevator from a 1 cm incision made at the inferior edge of the thyroid cartilage. The internal perichondrium should be elevated to create a pocket at the level of the vocal cord. Dissection should not be carried above the midthyroid alar level nor should the pocket be too large since implant stabilization depends upon a reasonably snug fit. (Figure 5)
6. Thyroid cartilage window outlined to approximate level of the vocal cord 2 mm away from midline. 4 mm in height and 6 mm in length. (Figure 6)
7. Outlined window cartilage cut. Care must be taken to avoid perforating or tearing the inner thyroid perichondrium. The safest method is to cut 80% to 90% of the entire thickness leaving a paper thin layer for the final cut with a very fine chisel or fine raspatory. The last thin layer maybe cracked with a bone hemostatic chisel that is hammered gently at the window.
8. The medialization implants are created out of silastic block. The thickness of the implant is determined by the required amount of medial displacement. Since overcorrection seems to be desirable, the implant should be about the same thickness as the glottic gap to be narrowed. The optimal implant size must be determined during surgery by repeated trimmings or enlarging of the implant.
9. Silastic plug inserted into the thyroid cartilage window with overmedialization.
10. Anesthesia lightened until the patient have spontaneous respiration, endotracheal tube removed and direct laryngoscopy carried out to asses the adequacy of the medialization of the left vocal cord.
11. Closure layer by layer.

DISCUSSION

Surgical treatment of paralysis in abducted position is indicated to improve the voice after maximum compensation by the normal cord or to prevent aspiration or both. The timing of surgical intervention is variable, generally, early treatment of aspiration is indicated. The treatment of dysphonia should be delayed longer,[1,10] at least 6 months to allow for spontaneous recovery, stabilization of cord position and maximum compensation.

Several treatment have been developed. Arnold[1] described a technique of cordal injection using teflon paste and silicone. Results are good but determination of the amount to be given, the precise site of injection, the availability of material and the irreversibility of overcorrection poses a problem. In 1983, Lewy[8] reported 33% complication rate with teflon. The complications were: 1) development of granulomas when the paste extrudes through the cricothyroid membrane, 2) draining sinus tract, and 3) different levels of cord margin.

The use of autogenous tissues[1,7] like costal, thyroid, and epiglottic cartilages and hyoid bone inserted between thyroid ala and internal perichondrium via thyrotomy approach produces excellent result but necessitates additional surgery required for the donor site (Meurman Operation)[1]. Con-

siderable edema producing laryngeal obstruction often occur with this procedure such that elective tracheostomy is advised.

The reverse arytenoidopexy approach described by Morrison[1,4] mobilized the arytenoid to a more medial position via an external incision and extralaryngeal dissectino. This technique, however, is not useful in cases of atrophy of the cord.

The nerve to nerve anastomosis and neuromuscular pedicle transplantation[11] to remobilize the paralyzed cord focus on providing a neural cricoarytenoid muscle. Although these techniques have potential for reinnervating the larynx, they have not gained widespread acceptance.

In 1974, Isshiki et al[3,4] described a new technique of lateral compression of vocal cords with the use of silicone shim through a window made on the thyroid ala resulting in medial shifting of the paralyzed cord. The technique is simple and easy to perform, no thyrotomy is needed and can be done under local anesthesia. Since 1974, patients have good results. A slight reversion of voice, however, was noted in some patient. This was due to subsidence of edema by surgery. Overcorrection is recommended to avoid reversion. The current technique[3] for determining the proper slight corection is first to achieve a clear, almost normal voice, then to push the implant further medialward until the voice become slightly rough in quality.

CONCLUSION

The Isshiki Technique of vocal cord medialization is much simpler and easy to perform. Ideally, it should be done under local anesthesia to achieve the optimal result for the patient can be intructed and overcorrection can be properly evaluated. This technique is an excellent alternative to the conventional method of cordal injection and should be considered in managing paralyzed vocal cord in abducted position.

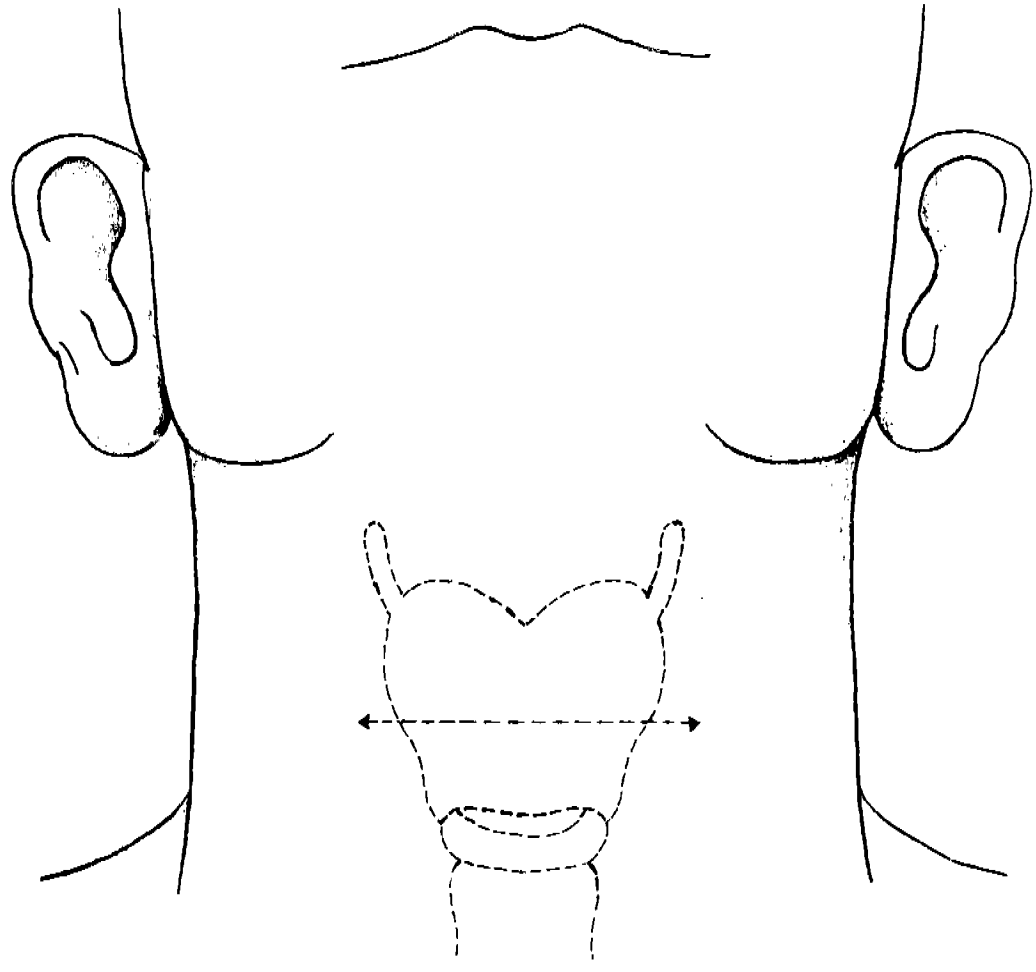

Figure 3. Midline skin crease incision

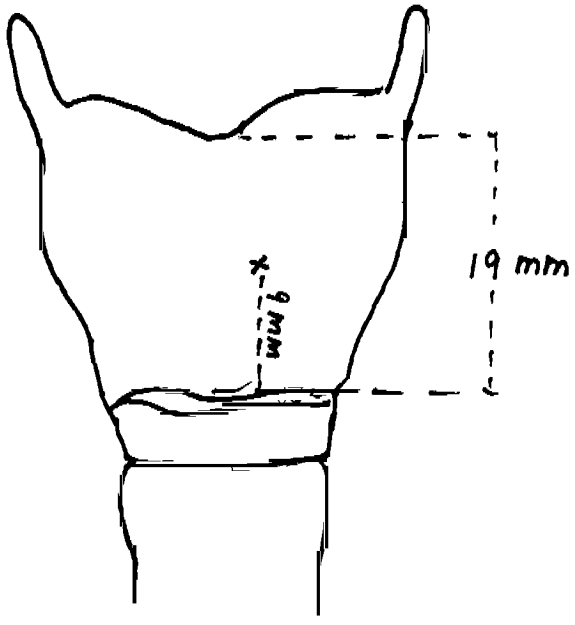

Figure 4. Approximation of Vocal Cord Level

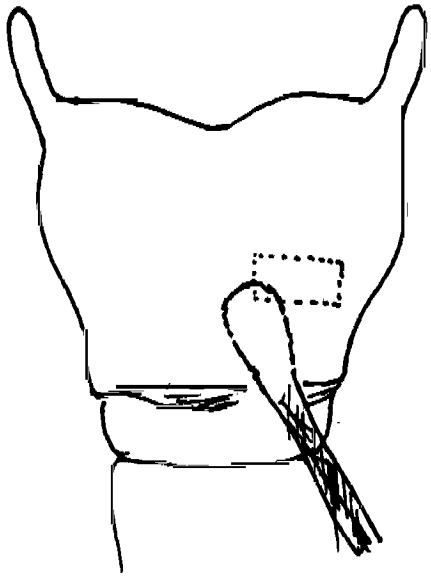

Figure 5. Elevation of Inner Perichondrium

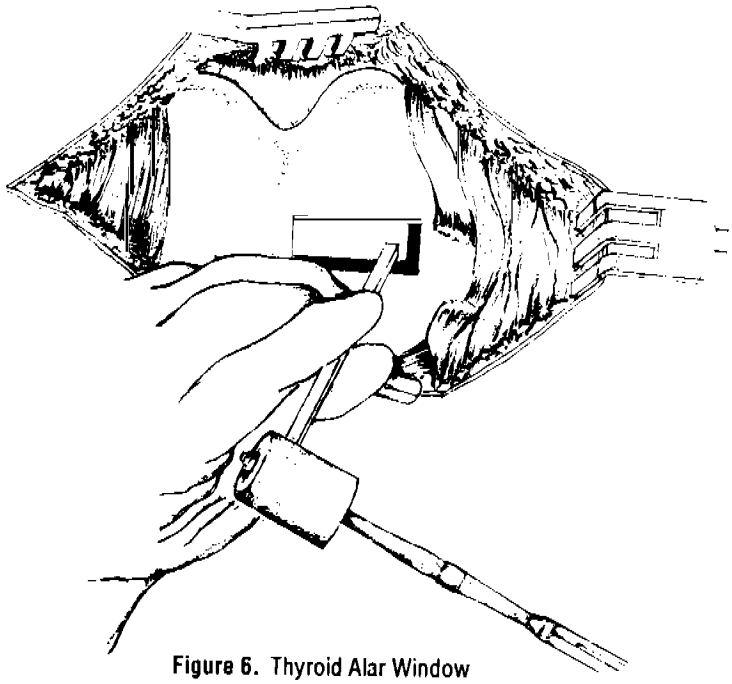

Figure 6. Thyroid Alar Window

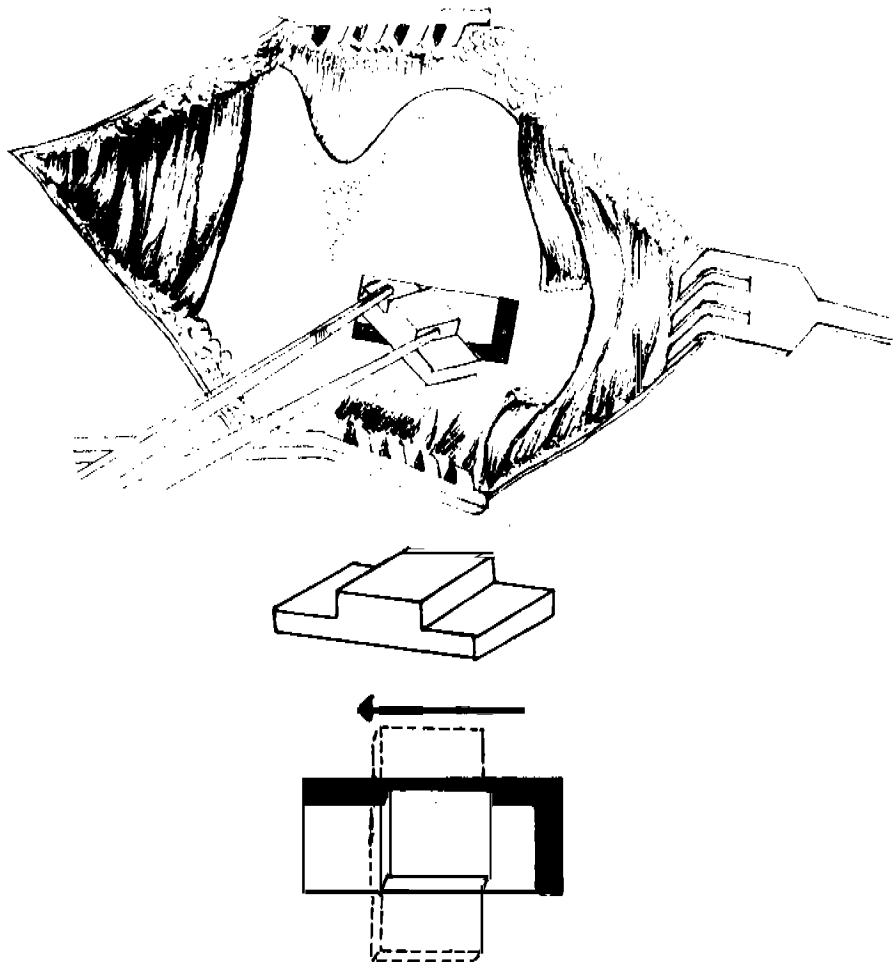

Figure 7. Insertion of Silastic Implant

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PERCUTANEOUS TRANSTRACHEAL JET VENTILATION DEVICES
Simple Solutions for Difficult Upper Airway Problems*

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MERCEDES SAN GABRIEL-GONZALEZ, MD****

ABSTRACT

This study describes a modified percutaneous transtracheal jet ventilation device assembled from inexpensive and readily available components. It is simpler and easier to handle than its predecessors. The efficacy of this device was tested in anesthesized and paralyzed dogs. The tests showed that this device not only delivered adequate but more than adequate ventilation as documented by serial arterial blood gas determinations. This device is presented as an alternative and not as a replacement for standard ventilation and tracheostomy. It would be most applicable for situations where the latter may be technically difficult or impossible to perform.

INTRODUCTION

Upper airway obstruction is a life-threatening emergency that must be dealt with rapidly and efficiently. Immediate restoration of an adequate airway is of critical importance since irreversible brain damage and death can occur in a matter of minutes.

Securing an adequate airway and providing appropriate ventilation is a constant challenge faced by every trained physician, particularly the otolaryngologist and anesthesiologist. Emergency ventilation techniques including mask-bag ventilation, endotracheal intubation, tracheostomy, and cricothyroidotomy have remained unchanged for many years. Occasionaly, however, an airway emergency will occur in a patient in whom endotracheal intubation may be technically impossible and a tracheostomy cannot be quickly or safely performed even by an experienced otolaryngologist for anatomic or pathologic reasons, or simply because the necessary instruments for a safe tracheostomy are not immediately available.

Since there is a great need for a safe, rapid, easily inserted device that can satisfy this need, an instrument was designed which can be easily inserted into the trachea by any trained physician, nurse, or technician in less than 10 seconds. This assures immediate and adequate ventilation until an endotracheal tube is inserted or a tracheostomy is performed. Furthermore, this device itself may serve as an alternative method of ventilation in the situation described above.

The objectives of this study are: to describe a modified Percutaneous Transtracheal Jet Ventilation (PTJV) device that is easily assembled using inexpensive and readily available components; to outline the technique for its use; to discuss its features and applications; and to test the effectiveness of the device on experimental animal models.

Description of Devices and Technique:

Assembly of this instrument we shall call PTJV device #1 requires four basic components: a 14-gauge IV teflon catheter, a 2.5 or 3 cc syringe barrel, a 7 mm endotracheal tube connector and oxygen tubing (Fig. 1). The authors have found these components fit into each other precisely, providing a leak-proof device (Fig. 2).

Safe placement is accomplished with the patient in supine position. The chin is elevated, and the head and neck extended. The trachea is palpated and fixed between the thumb and index finger of one hand, and the cricothyroid membrane is identified. Two to three cc sterile saline is aspirated into a 10 cc syringe that is then attached to the catheter unit. The syringe-catheter unit is introduced percutaneously at an angle of 45° to 60° into either the cricothyroid membrane or into the trachea, through any of the intercartilagenous spaces between the cricoid cartilage and the third tracheal ring, depending on the clinical situation. Negative pressure is exerted via the plunger of the syringe in aspiration. Cricothyroid membrane or tracheal penetration is confirmed the moment air bubbles are seen flowing freely

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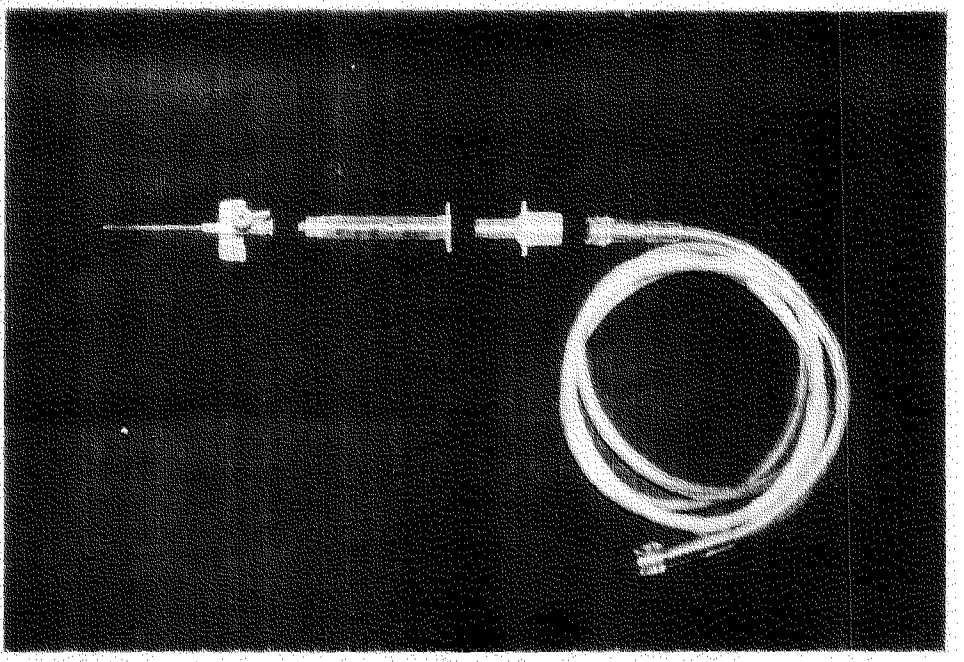

Figure 1. Components fro PTJV device #1. From right to left: A 14-gauge Venflon catheter, 3 cc syringe barrel, 7.0 mm endotracheal tube connector, oxygen tubing.

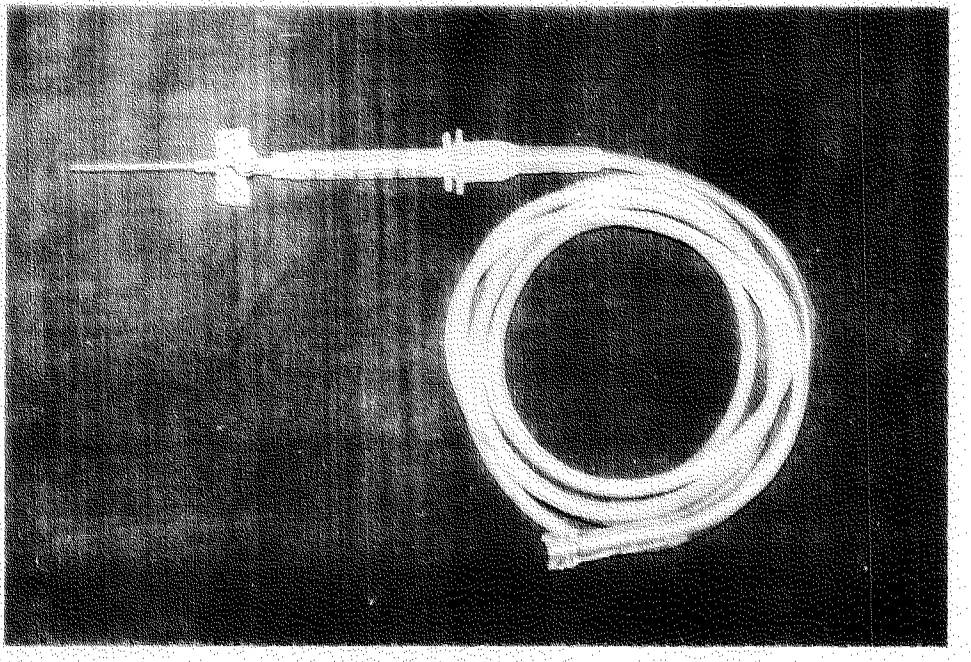

Figure 2. Proper assembly of PTJV device #1. Note 4 mm hole on the syringe barrel.

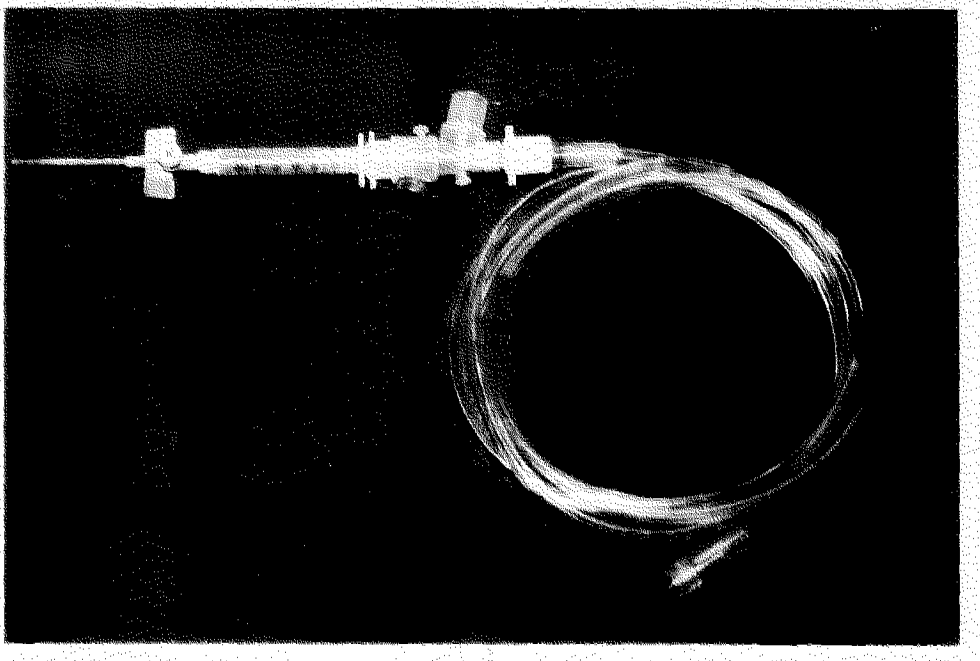

Figure 3. Components fro PTJV device #2. From right to left: A 14-gauge Venflon catheter, 3 cc syringe barrel, 7.0 mm endotracheal tube connector, Portex swivel adaptor, 8 mm endotracheal tube connector, oxygen tubing.

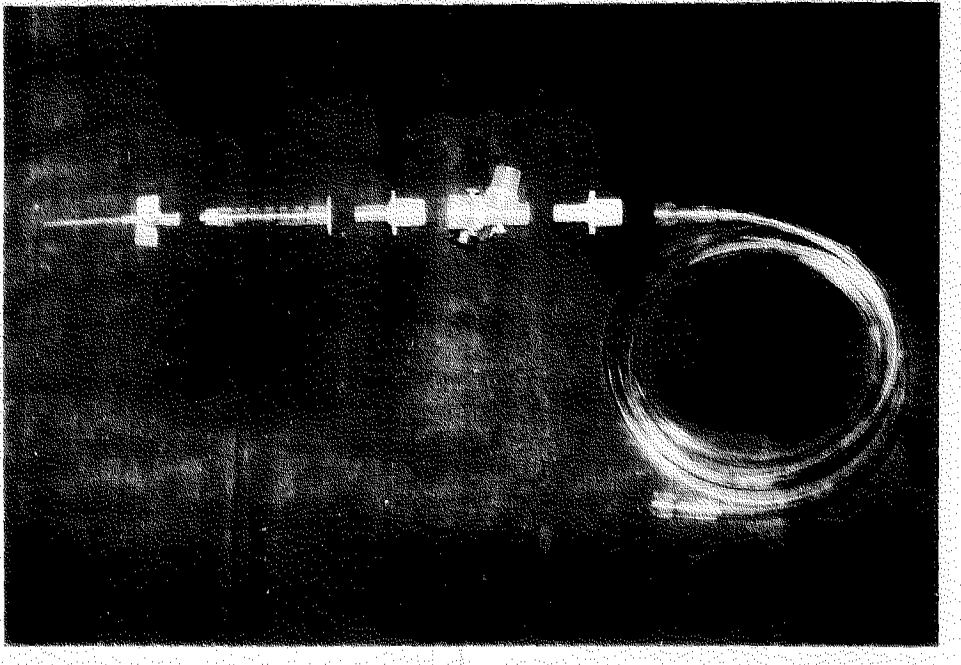

Figure 4. Proper assembly of PTJV device #2.

from the tracheal lumen into the syringe. The teflon sheath is advanced until the catheter hub rests on the skin. The metal inner needle attached to the 10 cc syringe is withdrawn and disposed. The catheter is stabilized by hand or the wings anchored to the skin. A 4 mm hole is made on the syringe barrel portion of the device that is attached to the hub of the catheter. The oxygen tubing may be hooked up to a high pressure oxygen source such as an oxygen tank or wall oxygen outlet that delivers 100% oxygen at 50 psi. The 4 mm hole on the syringe barrel provides an exhaust by which intermittent ventilation may be delivered by intermittent digital occlusion. Ventilation is delivered at a rate of 10-12 per minute and inspiratory to expiratory (I:E) ratios of 1:1.5-1:2.

After effective ventilation has been established, the chest is observed for expansion and the lungs auscultated. The oral cavity is examined for audible expiratory flow.

The above procedure applies very well when the larynx is not completely occluded. The absence of an audible expiratory flow on examining the oral cavity while ventilation is in progress can lead one to suspect that a complete upper airway obstruction exists. Although complete upper airway obstruction is an extremely rare occurence, one must be prepared to deal with it accordingly. Using the above ventilation method, in the presence of a complete obstruction, the intrathoraic pressures may continuously rise to dangerous levels. At pressures above 10 to 15 mm Hg, venous return to the heart may be compromised. To avoid this, a second 14-gauge catheter is inserted adjacent to the first, to act as a safety valve preventing the rise of intrathoracic pressures.

Prolonged ventilation may be sustained by attaching the universal end of the device to a Bennet's respirator. In this situation a hole need not made on the syringe barrel because cycled volume ventilation is provided. In the operating room setting, a similar device may be attached to an anesthesia machine, to provide both oxygen and anesthesia.

A more convenient instrument is PTJV device #2 (Fig. 3 and 4). This device is almost identical to the first except that it makes use of a swivel adaptor of a Portex blue line tracheostomy tube. Although this component is not always available, it allows great flexibility for the device. The superior opening functions as the manual interruptor for intermittent ventilation.

This device bears no distinct advantage or disadvantage as far as O_2 delivery is concerned. Its only additional features are the convenience and flexibility permited by the moving parts of the swivel adaptor which may be rotated to the desired position, as well as the relative ease with which one can switch from one O_2 source to another without having to physically alter the device.

MATERIALS AND METHODS

To test the ability of the PTJV device to deliver adequate ventilation, 1 second tidal volume measurements were done using a Wright's respirometer. Animal model experiments were conducted to test the device in a living system.

Two mongrel dogs, a 10 kg female and a 12 kg male were used in three separate occasions. The female dog was used in two experiments three weeks apart. In each experiment, a femoral artery cut-down was performed and the artery cannulated with a 16-gauge catheter to permit sampling of arterial blood as well as to monitor blood pressure and heart rate. This was accomplished by means of an arterial line with a three-way stopcock attached to a Statham transducer (model# P23 AC). Baseline ABG was taken. Respiration and respiratory rates were monitored with a pneumograph attached to a Grass force displacement transducer (model# FT-10). A 14-gauge catheter was inserted percutaneously through the cricotracheal membrane and advanced until the hub rested on the skin. Intratracheal pressures were monitored through this catheter with a Gould transducer (model# P23 ID). Baseline blood pressure, heart rate, respiration and intratracheal pressure were monitored simultaneously and recorded on a Grass model 7C polygraph. After the above had been accomplished, the dog was anesthesized with ketamine hydrochloride (1 mg/kg IV) and midazolam (0.2 mg/kg IV). A second 14-gauge catheter was inserted percutaneously through the cricothyroid membrane into the trachea as describe under "Description of Devices and Technique." Total respiratory paralysis was induced with pancuronium bromide (0.1 mg/kg IV). Percutaneous transtracheal jet ventilation was then started via the second catheter. Uniform ventilation (rate approximately 10-12 ventilations per minute at 1:1.5 to 1:2 inspiratory to expiratory ratios) was provided by observing the polygraph tracing, as well as chest expansion and deflation. Serial arterial blood samples were drawn at 15 minute intervals during the next 1 1/2 hours.

To test the ability of the device to reverse rapidly acute hypercapnea and hypoxemia, each animal was allowed to remain apneic to allow respiratory acidosis to develop. This was done by cessation of ventilation for a period of 3 minutes. Arterial blood was sampled after this period. Transtracheal ventilation was resumed at a rate of 15-20 per minute. Arterial blood was again sampled after a 10 minute period.

To test the effects of sustained insufflation, four successive 10 second periods of maintaining a constant O_2 flush through the PTJV catheter were performed. Arterial blood samplings were drawn a few minutes later. The dog was then maintained on transtracheal ventilation, which was adjusted based on ABG measurements, until recovery.

Table 1. Blood Gas Results

		pO_2	pCO_2	pH	HCO_3
Dog #1	Control	102.0	34.8	7.348	18.5
8 kg.	15	110.6	33.0	7.383	19.0
Expt. 1	30	114.3	32.3	7.397	19.2
Dog #2	Control	98.7	36.5	7.335	18.8
12 kg.	15	106.6	35.0	7.368	19.5
	30	104.4	35.7	7.339	18.6
Dog #1	Control	102.2	34.3	7.324	17.4
10 kg.	15	109.9	31.9	7.357	17.6
Expt. 2	30	112.0	30.7	7.391	18.0

Table 2. Apneic Phase

	Apneic 3 minutes			10 min. post-PTJV resumption		
	pO_2	pCO_2	pH	pO_2	pCO_2	pH
Dog #1 Expt. 1	67.2	49.8	7.204	108.2	38.7	7.363
Dog #2	68.5	48.5	7.227	104.4	39.4	7.337
Dog #1	64.4	50.5	7.209	106.7	37.5	7.345

Table 3. Sustained Insufflaton Phase

	pO_2	pCO_2	pH	HCO_3
Dog #1 Expt. 1	471.7	37.0	7.305	18.0
Dog #2	512.2	39.0	7.236	16.0
Dog #1	492.5	39.0	7.272	17.8

RESULTS

One second tidal volume measurements of 425 to 510 ml. were observed. A respiratory rate of 10-12 per minute was maintained. Throughout this period, normocarbia was maintained and hypoxia avoided. Blood gas samples even showed an improvement of gasseous exchange over baseline, with the production annd maintenance of relative hypocapnea and respiratory alkalosis (Table 1). Blood pressure and heart rate remained at baseline levels throughout the ventilation period. Intratracheal pressures of 10-12.5 mm Hg. were noted during PTJV.

The PTJV device reversed the hypercapnea and hypoxemia that developed during the apneic period effectively. Normocarbia was observed in the blood gas sample taken 10 minutes after ventilation was resumed (Table 2). Heart rate and blood pressure remained unchanged during the apneic period as well as the succeeding period of hyperventilation.

During the period of sustained insufflation, a dramatic rise in pO_2 was noted. CO_2 retention, however, also occurred (Table 3). Maximum intratracheal pressure of 22.5 mm Hg was recorded. Blood pressures dropped by an average of 15-25 mm Hg during the periods of sustained insufflation but rapidy returned to baseline levels during passive exhalation.

DISCUSSION

Transtracheal positive pressure ventilation is a relatively old concept. It was introduced in the 1950's by Jacoby et al[1] and Reed et al.[2] Its foundations, however, date as far back as 1667, when Robert Hooke demonstrated a procedure of oxygen insufflation in dogs, and in 1909, Meltzer maintained the life of paralyzed dogs by insufflating air through the trachea.[10]

Since then the effectivenes of emergency transtracheal ventilation for patients with difficult upper airway problems has been well documented in the literature.[1,4,6,8,9,10,15] The effectiveness of a transtracheal jet ventilation catheter placed distal to a laryngoscope for endoscopic surgical access to the larynx has also been demonstrated.[5,7] Its use in laser endoscopic procedures in infants and small children has been reported.[18]

Percutaneous transtracheal jet ventilation (PTJV) has been described as a quick, relatively atraumatic, and effective method of emergency airway access that requires relatively simple equipment.[15,16] Several authors have developed their own devices for transtracheal ventilation.[1,4,6,9,11,12,14,15] The problems of previously developed devices, however, are the following: the inability to deliver intermittent ventilation or the need for a manual interruptor to do so; the need for prior assembly and/or purchase of special articles and equipment; the need for too many connectors, tubings and adaptors, and the often less than ideal fit of the components with one another.

The device described in this study overcomes these drawbacks. A simple, lightweight, easy to handle device, made from a few, inexpensive and readily available components, that fit precisely with one another, is prepared. Additional features are the provision of an exhaust opening for intermittent ventilation, allowing single-handed operation of the device, leaving the other hand free for other uses. Furthermore, this device is adaptable fo use with a Bird's or Bennet's respirator or anesthesia machine. It is, to our knowledge, the first and only one of its kind and design locally.

Although PTJV has been thoroughly investigated in several animal models described in the literature,[2,3,12,13] the authors felt the need to test the device in animals to confirm its effectiveness. Our animal experiments were most rewarding. Both dogs recovered remarkably well after nearly 2 hours of total respiratory paralysis, dependent solely on this device for ventilation. One dog, the female, was even used twice, recovering well both times.

The benefits and applications of this method of ventilation have yet to be exploited. To our knowledge, local practice of this method has been rare, and experience with its use, anecdotal. This is unfortunate, since a large proportion of operating and emergency room deaths are attributed to respiratory difficulty. The majority of these deaths probably are preventable.[1]

It is worthwhile to mention a few clinical situations where this method would be most beneficial. In foreign body aspiration in children and even adults ("cafe coronary") for example, the high pressure jet stream may even dislodge the foreign body if it has been impacted on the glottic aperture,[10] obviating the need for more invasive procedures. In situations where endotracheal intubation may be technically impossible such as large tongue base, oropharyngeal, or laryngeal tumors, acute inflammatory conditions such as acute epiglottitis, retropharygeal abscess, acute allergic edema of the tongue and larynx, to name a few,[16] transtracheal ventilation would be an excellent method of immediate airway access. Once the airway is controlled, tracheostomy can be performed in a more relaxed, less tense atmosphere. Its use in laser endoscopic procedures in infants and small children for conditions such as a subglottic hemangioma, laryngea synechiae or webs and other congenital or acquired causes of laryngeal obstruction is also noteworthy. The advantages of this technique during laser surgery are: clear vision of the operative field; good gas exchange; elimination of airway trauma from intubation; reduction of the hazard of airway fires, and decreased risk of aspiration of blood and debris. In addition, this method of providing oxygen and/or mechanical ventilation may be extended into the postoperative period. In certain situations, this technique can be an attractive alternative to tracheostomy with its

potentially dangerous and incapacitating complications in infants and small children.[18]

COMPLICATIONS

Although both dogs in our experiments made excellent recovery, review of the literature cites some problems that may occur. A hazardous rise in intrathoracic pressure may occcur in total airway obstruction.[10,13,16] This problem may be avoided by placing a second catheter adjacent to the first to serve as a safety valve.[13,16] Other complications such as a kinked or displaced catheter, incoordination of respiratory effort, and distal secretions have been reported.[16] These may be avoided by careful technique and diligent patient observation. It is important to remember, that the use of electrocautery is contraindicated during transtracheal ventilation with 100% oxygen, because the gas system is not closed, and there is, therefore, a risk of gas ignition and fire.[17] Reducing the 0_2 content does not reduce this risk.

CONCLUSION

A practical device for PTJV that provides rapid, safe, relatively painless access and control of the airway has been described. Animal models have demonstrated the adequacy of ventilation delivered by this device. Its usefulness particularly in the management of head and neck cancer patients with airway problems, as well as patients with acutely evolving airway obstruction has been discussed. It must be considered as an alternative and not a replacement for intubation or tracheostomy. It should be remembered that no matter how experienced the surgeon is, the length of time it may take to perform a tracheostomy is very unpredictable. He is more likely to make mistakes and delay airway access the more hurried and tense he is. Desperate situations require intelligent measures. Every good physician must be able to adapt and improvise in order to overcome.

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