The Philippine Journal of

OTOLARYNGOLOGY - HEAD & NECK SURGERY

1982

THE PHILIPPINE JOURNAL OF OTOLARYNGOLOGY-
HEAD & NECK SURGERY

All manuscripts and other editorial matter should be addressed to Angel Enriquez, M.D., Editor-in-Chief The Philippine Journal of Otolaryngology -- Head & Neck Surgery, Dept. of Otolaryngology, Philippine General Hospital -- Ward 3, Taft Avenue Manila.

1982

In this Issue

ACKNOWLEDGEMENT

The publisher and the editorial staff would like to give due recognition to the Manila Hearing Aid Center for its support & assistance, without which this would not have been possible.

OTOLARYNGOLOGY AS A SEPARATE SPECIALTY

The Board of Editors of this journal opted to publish an editorial on this subject, which appeared in the October 1970 (Vol. 46, No. 10) issue of the Journal of the Philippine Medical Association, to wit:

JPMA Vol. 46, No. 10, Oct., 1970

Otolaryngology as a Separate Specialty

Competent otolaryngologic practice can best be enhanced by complete separation of and restriction to this specialty fully apart from its traditional combination with ophthalmology.

While otolaryngologists and the ophthalmologists agree on fundamental motivations for public service, nevertheless it would be futile and wasteful not to recognize their irreconcilable differences in fundamental approaches. This is one reason for the existence of specialty societies and specialty boards – to protect the public against the incompetence of self-styled specialists. And while they were not formed for the purpose of dividing up the human body into areas where only certain physicians can operate, still it is obvious that the performance of operations or the treatment of diseases or trauma should properly belong or should be the exclusive prerogative of one who is competent.

Competency in Otolaryngology can only be had by actual training in all its phases like – Bronchoesophagology, Maxillo-facial Surgery, Head and Neck Surgery, Reconstructive and Cosmetic Surgery, Allergy, Audiology, Neuro-otology, Micro-surgery for the ear, etc. To some of our well meaning colleagues doing combined practice in E.E.N.T. and to a number of Ophthalmologists, who do E.N.T. on the side, Otolaryngology may constitute a minor part of their practice as to be neglected or ignored entirely, but to the average laryngologists by virtue of his training in the anatomy, physiology, embryology and pathology of these parts – happily or otherwise – he will have to do his best to satisfy his patients as well as his conscience. Even our foremost national hero – Dr. Jose Rizal – an ophthalmologist, never included E.N.T. in his practice.

This unhappy combination of eye with ears, nose and throat was brought about by the dearth of qualified doctors then obtaining in the early part of this century. Today, with our medical schools graduating an adequate number of physicians every year, even a little surplus for export, and with the return of more and more otolaryngologists trained from centers abroad, it is deplorable that we in the Philippines have not made as much headway in this specialty as our colleagues in other countries. –

A.E.E.

As an addendum, the editorial of the April-June 1978 (Vol. 10, No. 2) issue of the Philippine Journal of Ophthalmology entitled "Is There an EENT Specialty" partly supports the above commentary. To

that question its unequivocal answer was "there has never been an EENT specialty in the Philippines. It was always ophthalmology or otolaryngology." However, the same editorial does not consider ophthalmologists, who practiced otolaryngology as being "immoral, unethical or unprofessional," as he has a "right as a physician to practice medicine and one or more of its specialties" -- "especially if he has the REQUIRED training." (Capitalization and underlining ours.)

What is the required training in Otolaryngology? To repeat, it includes, among others, training in Peroral Endoscopy, Maxillo-facial Surgery, Head & Neck Surgery, Reconstructive & Aesthetic Plastic Surgery, Allergy & Immunology, Communicative Disorders, Neuro-otology, Audiology, Microsurgery of the Ear, Larynx, etc. over a period of four (4) years in an accredited institution. How many among the combined practitioners possess the above qualifications? Truth to tell, a great many do not. If so, how can we expect them to deliver quality health care? Is this not "immoral, unethical or unprofessional?

angel enriquez, m.d.

PRESIDENT'S PAGE

A DREAM COMES TRUE

Last February I opened my heart to the society with all my dreams and wishes. Hardly a week passed when these came true.

We had a meeting on "Current Trends in Antibiotic Therapy" by K.H. Spitzy, head of the University Clinic for Chemotherapy, Vienna, Austria with the cooperation of Sandoz Philippines. There is a little delay in the receipt of his paper so it will have to wait until the next issue of this journal.

The scientific meetings have been regular; as this was followed by a meeting last May with the local experts in diagnostic technique of radiography and C.T. Scan for ENT. Tumors of the paranasal sinuses -- its diagnosis and treatment were also discussed. This was thru the cooperation of Leo Pharmaceuticals with the Danish Manager giving a short talk about their contributions to pharmaceutical research. The attendance was beyond expectation with the members and the training residents from the different Centers and Colleges.

The best wish that came true is the publication of the Philippine Journal of Otolaryngology Head & Neck Surgery which is coming out for the second time ahead of schedule. This can be attributed only to the wide acceptance of the members who are energetically contributing their articles and to the hard work of our Editors especially Dr. Angel Enriquez. For this, I salute them.

The criteria for accreditation of the training hospital for Otolaryngology was revised and the Hospital ng Maynila will be the first institution to be visited under this criteria. Presently there are only two hospitals recognized as training centers. We hope that there will be more in the future.

Not to be outdone the textbook committee is busy planning the format and the coverage of our projected textbook in which various chapters will be assigned to members to write.

Let me take this opportunity to give my sincerest thanks to the officers, to the different committees for their help especially the scientific committee, journal publications and to Sandoz Philippines and Leo Pharmaceutical for their sponsorship of the scientific meetings.

I would like to ask for your continuous support of the society's activities, with all the enthusiasm you have shown. According to Abbe Pire "What matters today is not the difference between those who believe and those who do not believe, but the difference between those who care and those who don't."

I thank you all for your support and help.

DR. ABELARDO B. PEREZ

The Phil.
Jour of Oto.
Head & Neck Surgery

MYRINGOTOMY: Clinical Findings in 100 Cases

Manuel G. Lim, M.D., M.Sc., F.P.C.S. *
Sylvia S. Tan, M.T. **

INTRODUCTION

Aside from the acute suppurative process in the middle ear, so much has been written about serous otitis media in children since 1878 when Politzer wrote about the subject of "middle ear effusion". Hoople in 1950 gave the term "glue ear" to the condition known as chronic serous otitis media which he called as "the greatest problem facing the otolaryngologist today". It was a big problem then and it is still a huge problem today which remains to be solved. In 1954, Armstrong introduced surgical treatment of secretory otitis media with in-dwelling polyethylene tubes. Since then, serous otitis media became a great challenge to all otolaryngologists not only for the interest in the subject itself but also for the concern about the proper treatment of this condition.

* Chief, Section of Otology & Asst. Professor – Dept. of Otolaryngology, U.P.-P.G.H. Medical Center
** Audiometrist, Medical Center, Manila

In serous otitis media, two kinds of fluid are encountered: the glue-like fluid and the thin serous fluid. The glue-like fluid is attributed to high contents of glycoproteins and nucleoproteins; the thin serous fluid has also high contents of proteins but not glycoproteins. Both kinds of fluid contain polymorphonuclears, macrophages, lymphocytes and cell debris.

It has been demonstrated (Sade, 1966; Lim, et al, 1967) that the middle ear is partially lined with a mucosa, bearing cilia and containing mucus secreting globlet cells. This was confirmed by biopsies. The clinical, chemical and histological evidence indicates that the middle ear effusions are secondary, most probably, to an inflammatory process, and are in essence an exudate of one form or another.

The exact cause of middle ear effusion has not yet been settled. Even though it is inflammatory in nature, it may be initiated by allergy, bacterial infection or viral infection. However, none of these has been confirmed. Allergy may be a precipitating factor; in fact, middle ear effusions occur in many patients with respiratory allergies. Bacterial infection has been implicated, but culture from the fluid fails to obtain any pathogen or organism. In some patients, it is presumed that the arrest of the acute suppurative otitis media by antibiotics may lead to serous otitis media. However, serous otitis media also occur in patients without history of acute otitis media. The possibility of viral infection as a cause of serous otitis media was dismissed by Adlington and Davies because no virus has ever been isolated from the middle ear effusion in their virus laboratory. However, they feel that viruses may still have a part to play in precipitating the condition.

Failure of all these studies to determine an inflammatory cause common to all cases of serous otitis media gives support to the possibility that this condition arises from a poorly functioning Eustachian tube. This contention is likewise supported by the relief obtained from the treatment with in-dwelling collar buttons. Many patients whose Eustachian tubes are closed before

the operation become patent by tubal insufflation after the operation. Silverstein et al in 1966 tested the tubal function by manometric method after inserting the grommets in 75 ears. In all these cases, the function of the Eustachian tube was found to be abnormal.

Some authors attributed the cause to hypertrophy of the adenoids and tonsils. Other authors disagreed because many patients developed middle ear effusion long after tonsillectomy and adenoidectomy.

Purpose

The purpose of this study is to show some of the indications for myringotomy and evaluate the clinical findings and the findings will be analyzed to determine the possible cause of middle ear effusion.

Materials and Methods

The present study consists of 100 selected patients in the past 5 years who had myringotomies either with or without a drainage tube. Actually, there are 169 ears in this series. Few of these cases had repeated myringotomies. All of these cases underwent complete ear, nose and throat examination after a careful history was obtained. Pure tone audiometric study was performed in most of the patients except in younger children when the cooperation was not available or in patients audiogram could not be done for one reason or another. Tubal insufflation with the Politzer bag was tried on all patients with the diagnosis of serous otitis media; this procedure was omitted in acute suppurative otitis media with bulging eardrums. The present series is divided into 3 groups. All of them were operated under general anesthesia with the use of the surgical microscope. In group A cases, only simple myringotomies were done; in group B cases, myringotomies with insertion of polyethylene tubes were performed; in group C cases, myringotomies with insertions of collar buttons were carried out. Cultures were taken right after the myringotomy. A small blunt round curette was used to take the specimen and to plant it directly to the culture media. Thorough aspiration of the fluid in the middle ears was accomplished before the insertion of the drainage tubes. Some patients were unilateral, and others were bilateral. Audiogram was repeated when the eardrum appeared normal after a simple myringtomy, or when the eardrum looked clear with the patent drainage tube in place, or when the tympanic membrane returned to almost normal after the drainage tube was removed.

The polyethylene tube has only one flanged end. This is used in acute suppurative otitis media to delay the closing of the myringotomy opening and to promote drainage in this condition. Polyethylene tubes were used also in a few cases of serous otitis media in young children where difficult problems were anticipated during the removal of the tubes. Polyethylene tube can be removed easily without hurting the patient. Collar buttons have flanged ends on both sides. The lumen is slightly bigger and will stay patent for much longer period of time. It is constructed in such a way that it can be removed without much difficulty except for some discomfort to the patient.

Results

Table I

Age Distribution

Age	No. of Patients	Percent
1-5	8	8%
6-10	24	24%
11-20	20	20%
21-30	14	14%
31-40	10	10%
41-50	10	10%
51-60	8	8%
61-70	2	2%
71-80	3	3%
above 80	1	1%

Table II

Sex Incidence

Sex	No. of Patients	Percent
Males	47	47%
Females	53	53%

The youngest was 5 years old (8 of them), and the oldest was 83 years of age. Thirty-two percent (32%) of this series was under the age of 10. Fifty-two percent (52%) was under the age of 20.

The difference between the sex incidence was not significant.

Table III
Cases of Myringotomy and the Findings

Diagnosis	Fluids Obtained				No. of Cases
	Pus	Serous	Mucoid-Glue	Thick Glue	
Acute Suppurative Otitis Media	30	5	–	–	35
Serous Otitis Media	–	43	9	13	65
				Total	100

Table IV
Mean Duration of Symptoms in Days before Myringotomy

Diagnosis	Pus	Serous	Mucoid-Glue	Thick Glue
Acute Suppurative Otitis Media	4.5	24.4	–	–
Serous Otitis Media		40.4	22.1	423.2

There were 35 cases of acute suppurative otitis media and 65 cases of serous otitis media in this series. Among the 35 cases of acute suppurative otitis media, 5 cases had serous fluid in the middle ear during the surgical procedure. These 5 cases had complete course of antibiotics before the operation.

The difference in the mean duration of symptoms, in days, between the serous fluid and the mucoid-thin glue fluid was not significant because the number of cases with mucoid-thin glue was very much less than the cases with thin serous fluid. However, the difference between the mean duration of symptoms in days in serous fluid and in thick glue is very significant.

Table V
Number of Ears in Present Series of Myringotomy and the Findings

Diagnosis	Fluids Obtained			No. of Ears
	Pus	Serous	Glue	
Acute Suppurative Otitis Media	40	5	–	45
Serous Otitis Media	–	89	35	124
			Total	169 Ears

There were 100 cases, but representing 169 ears. Fifty cases were unilateral, and fifty cases were bilateral. There were 7 cases who had more than one operation; one had 5 myringotomies in a period of 5 years (two of these were done in the States); two had four myringotomies in 3-4 years; others had 2-3 myringotomies.

TABLE VI

Sample Cases with Repeated Myringotomies

Case No.	Diagnosis	Hearing Level	Date of Operation	Operation	Fluid Obtained	Tube in Situ	Results	Recurrence
S. H. (29) (R)	Serous O.M.*	C.H.L. *** 20 db	Nov. 6, 1973	Simple Myringotomy	Serous	–	Normal Hearing	after 2 months
	Serous O.M.*	–	Jan. 7, 1974	– –	–	–	–	after 1 month
	Serous O.M.*	–	Feb. 6, 1974	Myringotomy w/ Collar Button	Serous	11 mos.	Normal Hearing	after 15 months
	Serous O.M.*	–	June 1976	done in U.S.A.	–	–	–	after 1 year
	Serous O.M.*	–	Aug. 25, 1977	Myringotomy w/ Collar Button	Serous	Still in Situ	Normal Hearing	None yet
C. D. (58) (L)	Serous O.M.*	Mixed H.L.**** C.H.L-35db	June 4, 1975	Myringotomy w/ Collar Button	Serous	8 weeks	Complete closure of air-bone gap	after 4 months
	Serous O.M.*	–	Nov. 29, 1975	Myringotomy w/ collar Button	Serous	18 mos.	Same	1 week after tube was extruded
	Serous O.M.*	–	May 24, 1977	Myringotomy w/ Collar Button	Serous	7 mos. sponta-neously extruded	Very Good	2 weeks after tube was extruded
	Serous O.M.*	–	Dec. 23, 1977	Myringotomy w/ Collar Button	Serous	Still in Situ	Very Good	None yet
Dr. L.E. (46) (L)	Serous O.M.*	C.H.L. *** 45 db	Feb. 2, 1974	Myringotomy w/ P.E. tube*****	Glue	2 weeks	Normal Hearing	after 2 years

(Cont' Table VI)

Case No.	Diagnosis	Hearing Level	Date of Operation	Operation	Fluid Obtained	Tube in Situ	Results	Recurrence
	Serous O.M.*	–	Jan. 3, 1976	Myringotomy w/ Collar Button	Glue	Tube extruded spontaneously after few months	Normal Hearing	after 12 months
	Serous O.M.*	–	Jan. 7, 1977	Myringotomy w/ Collar Button	Serous	Tube extruded after 6 mos.	Normal Hearing	after 11 months
	Serous O.M.*	–	Dec. 6, 1977	Myringotomy w/ Collar Button	Serous	Tube extruded after 9 mos.	Normal Hearing	None yet
J.A.R. (6) (Bil)	Serous O.M.*	C.H.L. *** 40 db-R 45 db-L	Sept. 9, 1972	Myringotomy w/ P.E. Tubes *****	Thick Glue	2 weeks	Normal Hearing	after 3½ years
	Serous O.M.*	C.H.L.*** 50 db-R 35 db-L	Jan. 6, 1976	Myringotomy w/ Collar Button	Thick Glue (R) Thin Serous (L)	3½months	Normal Hearing	after 17 months
	Serous O.M.*	–	June 7, 1977	Myringotomy w/ Collar Button	Glue (R) Serous (L)	4 months	Normal Hearing	None yet
M.M.T.	Acute Supp. O.M.**	not done	Jan. 23, 1977	Simple Myringotomy	Pus under pressure	–	Normal Hearing	after 2½years
	Acute Supp. O.M.**	not done	July 7, 1976	Myringotomy w/ P.E. Tube *****	Pus under Pressure	10 days	Normal Hearing	None so far

* Serous Otitis Media
** Acute Suppurative Otitis Media
*** Conductive Hearing Loss
**** Mixed Hearing Loss with Conductive Hearing Loss
***** Myringotomy with Polyethylene Tube

Six of these 7 patients with repeated myringotomies had serous otitis media and one had acute suppurative otitis media (see Table VI). In some patients with bilateral myringotomies, thick glue fluid was found in one ear and thin serous fluid was obtained from the other ear. Most of these patients complained of hearing impairment on and off in the thick glue ear for very much longer duration than in the thin serous ear.

Table VII
Surgical Procedures Performed

Condition	Simple Myringotomy	Myringotomy with Polyethylene tube	Myringotomy with Collar Button
Acute Suppurative Otitis Media	18	15	12
Serous Otitis Media	1	15	108
No. of Ears	19	30	120
Total No. of Ears = 169			

In acute suppurative otitis media, usually simple myringotomy was performed if the pus was thin and profuse. However, when the pus was thick and creamy, a polyethylene tube or a collar button was inserted to delay the closure of the myringotomy opening and to promote drainage of the middle ear. Collar buttons were used in 5 cases with the diagnosis of acute suppurative otitis media who had adequate conservative treatment for period of 19-32 days before surgery; in these 5 cases, serous fluid was obtained. Apparently, the serous fluid was merely the sequela of a non-resolved acute suppurative otitis media. The cultures from these cases were likewise sterile.

In serous otitis media, 87% or 108 ears had myringotomy with the insertion of collar buttons. The results with the use of collar buttons, specially Sheehy's collar button where the lumen is slightly bigger than others, were very good. Myringotomy with the insertion of polyethylene tube was performed in 15 ears (12%) with serous otitis media. The polyethylene tubes were selected because of the age of the patients (children) when some difficulties were anticipated during the removal of tubes. Simple myringotomy was performed in one case with serous otitis media at the request of the patient. This patient had several recurrences after the first myringotomy.

Table VIII
Precipitating Factors

Diagnosis	No. of Cases			
	Acute Infection of Nose and Sinuses	Positive Allergy History and Positive Skin Tests	Malignancy of Nasopharynx	Swimming
Acute Suppurative Otitis Media	33 (94%)	18 (51%)	–	2 (6%)
Serous Otitis Media	44 (67%)	49 (75%)	2 (3%)	– –

The precepitating or predisposing factors in acute suppurative otitis media and in serous or secretory otitis media were almost alike except that in acute suppurative otitis media, 94% (33 cases out of 35) was due to acute infections of the nose and/or sinuses, and 2 cases were due to swimming. Among the 35 cases of acute suppurative otitis media, 51% of the cases (18 out of 35 cases) had positive allergy history with positive allergy skin tests.

In serous otitis media, allergy played a very major role; it was present in 75% of cases (49 out of 65 cases). Acute infections of the nose and paranasal sinuses contributed or precipitated to the onset of serous otitis media in 67% of the cases (44 out of 65 cases). Two of the 65 cases of serous otitis media were due to malignancies of the nasopharynx; one was due to malignant hemangiopericytoma, and the other one was due to undifferentiated carcinoma of the nasopharynx with intracranial extension.

Table IX
Duration of Collar Buttons in Situ

No. of Ears											
1 wk:	2 wks:	3 wks:	1 mo:	2 mos:	3 mos:	4 mos:	5 mos:	6 mos:	7 mos:	9 mos:	12 mos:	above
3	1	1	10	27	14	31	8	3	6	10	4	2

The shortest duration of the collar button in situ was 6-7 days before it was removed. This was done to cases of acute suppurative otitis media just to delay the closure of the myringotomy opening. Usually, a simple myringotomy opening would close in 24-72 hours (1-3 days). The longest duration of the collar button in situ was 18 months before it was removed, because it got clogged up with wax and epithelial debris. The mean or average duration of collar button in situ was 4.1 months. Out of the 120 collar buttons inserted, 4 were extruded spontaneously after 4 months, 2 after 5 months, 3 after 7 months, 2 after 9 months, 2 after 12 months. In other words, the possibility of spontaneous extrusion of the collar button after 4 months was very great.

The mean duration of the polyethylene tubes in situ was 22.2 days. The main purpose of the polyethylene tubes was to prolong the drainage from the middle ear by delaying the closure of the myringotomy opening in acute suppurative otitis media and in children when some problems in removal were anticipated.

The average conductive hearing loss in acute suppurative otitis media was 25 db, and the average conductive hearing loss in serous otitis media was 27 db. After the operation, the hearing either returned to normal or the air-bone gap was almost completely closed. In some cases (in younger children) the hearing test was omitted because of lack of cooperation from the patients.

Case Reports

Case No. 1. J.A.R. This 12-year-old boy (1978) had been under my professional care since he was 3 years old (1969) for allergic rhinitis and repeated episodes of acute rhinosinusitis. In August, 1972, at the age of 6, he was noted by the teacher to have hearing impairment for some time because his grades were going down.

On examination, both eardrums were dull, thickened and full, and his adenoids were very much enlarged. Audiogram revealed conductive hearing loss of 40 db in the right ear and 45 db in the left ear (see Fig. 1).

Bilateral myringotomy with insertion of polyethylene tubes, using the surgical microscope, and adenoidectomy were performed under general anesthesia on September 9, 1972. Profuse amount of very viscid glue-like fluid was obtained from both middle ears. He could hear very well right after the operation. The polyethylene tubes were removed on September 21, 1972. A repeat audiogram on September 21, 1972

revealed perfectly normal hearing in both ears (see Fig. 2). He was fine as far as the ears were concerned, although he still had frequent episodes of acute suppurative rhinosinusitis precipitated by his nasal allergy and bronchial asthma.

In January, 1976 he again complained of bilateral hearing loss, worse in the right ear. On examination, the right eardrum was slightly retracted with yellowish fluid behind the eardrum; the left tympanic membrane was slightly retracted. Pure tone audiometric study showed a conductive hearing loss of 52 db in the right ear and 30 db in the left ear (see Fig. 3).

Bilateral myringotomy with insertion of collar buttons with the use of the operating microscope was performed under general anesthesia on January 6, 1976. A lot of thick glue was obtained from the right middle ear, and a lot of thin serous fluid was obtained from the left middle ear. He was able to hear very well again. The tubes were removed on April 20, 1976. A repeat audiogram on April 29, 1976 revealed perfectly normal hearing in both ears (see Fig. 4).

He was noted to have poor hearing again and was back to the office on May 31, 1977. Repeat audiogram showed conductive hearing loss of 50 db in the right ear and 35 db in the left ear. Bilateral myringotomy with insertion of collar buttons was performed under general anesthesia on June 7, 1977. Thick glue was obtained from the left middle ear. His bearing returned dramatically right after the operation. The collar buttons were removed after 4 months. So far, he has no problem yet.

Case No. 2. S.M.S. This 58-year-old male happened to be the father of one of my secretaries. He was brought to see me on September 16, 1978 with the complaint of hearing loss in both ears of 3 months' duration. He had no colds prior to the onset of hearing impairment. There was no history of allergy.

On examination, both tympanic membranes were dull, thick, and slightly retracted with yellowish discoloration in the middle ear; no air fluid level was observed. Other findings were not remarkable. Pure tone audiogram showed a mixed type of hearing loss at 43 db in the right ear and 45 db in left ear with a conductive component of 32 db in the right ear and 29 db in the left ear (see Fig. 5). A diagnosis of bilateral serous otitis media with mild presbycusis was made.

Bilateral myringotomy, employing the surgical microscope, and insertion of collar buttons were performed. Profuse amount of thin serous fluid was obtained. His hearing was dramatically returned to almost normal right after the operation. The postoperative course was uneventful. A repeat audiogram was done on October 14, 1978 which showed complete closure of the air-bone gap (see Fig. 6). The collar buttons were still in situ.

Case No. 3. G.N. This 69-year-old male was referred to me on August 12, 1977 for bilateral hearing loss of 3 years' duration. He had also frequent sneezing in the mornings, watery running nose and bronchial asthma.

On examination, his eardrums were dull, very much thickened, and moderately retracted without any fluid-level observable. Hearing test revealed a mixed type of hearing loss at 45 db in the right ear with a conductive component of 17 db and 55 db in the left ear with a conductive component of 27 db (see Fig. 7).

Bilateral myringotomy, employing the operating microscope, with insertion of collar buttons was performed under general anesthesia on August 15, 1977. Profuse amount of very viscid glue-like fluid was obtained from both middle ears. His bearing improved remarkably after the operation. He was seen again in my office on December 5, 1977. Both ears were clear, and the drainage tubes or collar buttons were properly in place. Tubal inflation was done; both collar buttons were patent. Repeat audiogram on December 5, 1977 revealed very much improved hearing in both ears; the air-bone gap was almost closed (see Fig. 8). The tubes were removed on March 21, 1978. So far, he had no complaints.

Case No. 4. T.P.N. This 16-year-old boy was seen in my office on June 13, 1975 because of a very bad cold of 5 days' duration and severe right earache since the night before consultation.

On examination, he was slightly febrile. He had inflamed nasal mucosa with profuse amount of thick mucopus in both middle meati and both inferior meati. His right tympanic membrane was congested and bulging. The left ear was clear. Myringotomy was advised, but he preferred to try conservative therapy. He was seen 3 days later. His right earache had improved, but he developed slight right facial palsy. The right eardrum was still full and congested. Pure tone audiogram revealed slight conductive hearing loss in the right ear (see Fig. 9). Emergency myringotomy was performed under general anesthesia with the use of the surgical microscope on June 16, 1975. Profuse amount of pus under pressure was obtained. A collar button was inserted to delay the closure of the myringotomy opening and to promote drainage of the middle ear. A culture was done from the purulent discharge after the myringotomy. This revealed heavy growth of staphylococcus aureus, coagulase positive. High dosage of Cephalexin Monohydrate (Keflex) was given. The right ear became clear after 10 days. The collar button was removed on June 23, 1975. The right facial palsy had improved but not fully recovered. He was seen on August 18, 1975. The right facial palsy had completely recovered. The right ear looked normal. His bearing was perfectly normal. He underwent submucous resection of nasal septum on January 12, 1976. He was last seen on February 5, 1977. He had no more ear problems since the myringotomy and the submucous resection of the deflected nasal septum.

Case No. 5. A.V.C. This 50-year-old lady was seen in my office on December 26, 1973 because of severe right earache and fever since the night before consultation. She had a severe cold for a week prior to the present onset of illness. On examination, the right tympanic membrane was markedly congested and very much bulging. Her nasal mucosa was acutely inflamed; profuse amount of pus was seen in the middle meati and the inferior meati of both nasal cavities. There was a lot of purulent post-nasal drip. Because of the emergency nature, audiogram was not done. Complete blood count showed 17.6 gms.% of hemoglobin, 50 vol.% of hematocrit, 14,200/cu.mm. of white blood cells with the following differential count: 70% of segmenters, 4% of stab cells, 25% of lymphocytes, and 1% of monocyte. The routing urinalysis was not remarkable. A diagnosis of severe acute suppurative otitis media secondary to acute suppurative rhinosinusitis was made.

She was brought to the operating room. An emergency simple myringotomy was performed in the right ear. A lot of pus under pressure was obtained. A culture was taken. This revealed staphylococcus aureus, coagulase positive, and sensitive to Keflex, Prostaphlin, Kantrex, Diclocil, Ilosone, Pyopen, Rifadin and Loridine, She was placed under Keflex after the operation. Her condition deteriorated. She became very restless and stuporous and developed high fever with neck rigidity and positive Brudzinski's and Babinski's signs. She was immediately referred to a neurologist. The diagnosis of meningitis was confirmed. A spinal tap was done; the cerebro-spinal fluid was very cloudy and revealed 3,100 WBC per cu. mm. with 79% of segmenters and 21% of lymphocytes; the protein was 119 mg. % and sugar was 78 mg.%. Culture from the spinal fluid revealed pseudomonas aeruginosa. She was placed under intramuscular gentamicin and intravenous chloramphenicol therapy. She improved with this regimen but the discharging ear and earache got worse. X-ray of mastoids on January 2, 1974 revealed coalescent mastoiditis. On January 5, 1974 she was brought back to the operating room, a complete simple mastoidectomy through a post-auricular approach was performed. The mastoid air cells were necrotic and filled with granulation tissues. The lateral sinus plate was intact. There was a large dehiscence of the tegmen antri. A lot of reddish brown discharge or fluid in the epidurial space around this dehiscent tegmen was uncovered; this was evacuated with the suction. The dura was congested, dull and rough

but intact; there were no granulation tissues on the dura. The histopathological examination confirmed the necrotic bones and granulation tissues in the mastoid air cells. The post-operative course was uneventful. She felt perfectly fine 3 days after the operation. She was discharged from the hospital on January 14, 1974 in good condition. She had follow-up treatment in the office two times a week for a period of one month. When she was seen on February 8, 1974 she was perfectly all right. She was last seen in my office on March 6, 1975 in fairly good health.

Discussion

In acute suppurative otitis media, usually the fluid obtained during surgery was pus under pressure except in those cases when myringotomy was performed after the patients had received a complete course of antibiotics which varied from 19-32 days prior to surgery. In the latter group, serous fluid was obtained. Culture from the serous fluid failed to show any pathogen which was also the finding in serous otitis media. Therefore, it was possible that in some patients, serous otitis media might be the result of non-resolved acute suppurative otitis media.

It was regretable that chemical analysis of the thin serous fluid and the thick glue was not done. However, the clinical experience in this series the fluid in serous otitis media varied in viscosity as to the duration of the fluid retained in the middle ear. If the fluid was retained in the middle ear for a shorter period of time, it was usually thin in nature and could be removed easily with the suction, and if the fluid was retained for a longer period of time, it was very viscid in character which might be resistant or difficult to remove with the suction. In the present series, the shortest duration from the onset of symptoms to the time of the operation for the patients with thick glue middle ear was 60 days, and the longest duration was 1095 days or 3 years. The mean duration for thick glue was 423 days. The mean duration of symptoms for thin serous fluid was 40 days. In between these 2 extremes were a variety of fluids varying from slightly mucoid-glue to thicker mucoid-glue in character.

The present series shows that acute infections in the nose and sinuses play a major role in the causation of acute suppurative otitis media. Allergy may predispose them to the acute infections. In serous otitis media, allergy and acute infections of the nose and sinuses do contribute significantly, but these are not really the main causes. They are probably the predisposing factors in serous otitis media. In fact, in all serous otitis media the fluid is sterile. Allergy is not present at all in 25% of cases of serous otitis media. Two of these cases were caused by malignancies of the nasopharynx. Adenoidal hypertrophy does not seem to contribute to the causation of serous otitis media in this series. It was found in one case, and after the removal of the adenoids he still had several recurrences. In most of the cases below 20 years of age, either the adenoids were removed or were not enlarged at all.

From these findings, it is evident that the most important cause of serous otitis media or acute suppurative otitis media is the dysfunction of the eustachian tube. With the closure of the eustachian tube, fluid is retained in the middle ear which may be secondarily infected in case of acute suppurative otitis media. The glue-like fluid is due to retention of fluid for a prolonged period of time.

In simple myringotomies, the incision closes very quickly; usually, it takes 1-3 days before it is completely healed. In myringotomies with insertion of polyethylene tubes, these tubes will prevent the early closure of the myringotomy opening. However, very often the polyethylene tubes get clogged with the secretions and have to be removed early. Collar buttons have much larger lumens. These will stay patent much longer, and it will help establish the patency of the eustachian tubes by insufflation. Tubal insufflation is done 3-4 days after surgery to avoid displacement of the collar button. Collar button may prolong or prevent the recurrence of serous otitis media. It may stay in situ for several months. The longest duration it

survives is 18 months. Frequently, the collar button may be extruded spontaneously after 4 months.

Conclusion

1. Myringotomy will relieve the acute symptoms in acute suppurative otitis media. It may be sufficient to prevent the complications of acute suppurative otitis media such as facial nerve palsy or mastoiditis. However, with increasing earache and more profuse amount of suppuration in the affected ear in spite of the myringotomy, acute coalescent mastoiditis should be considered. Intracranial complication may likewise develop.
2. Simple myringotomy may not be sufficient for acute suppurative otitis media, it is wiser to insert a collar button or polyethylene tube to delay the closure of the myringotomy opening and to promote drainage.
3. The difference between the fluid in serous otitis media and acute suppurative otitis media is that the fluid retained in acute suppurative otitis media gets secondarily infected.
4. The difference between thin serous fluid and thick glue in serous otitis media is the duration of the fluid retained in the middle ear.
5. Collar button (grommet) seems to be the best choice for the time being to relieve serous otitis media. However, it is temporary in nature; the possibility of spontaneous extrusion after 4 months is very great.
6. The most likely cause of serous otitis media and acute suppurative otitis media is the dysfunction of the eustachian tube which can be brought about by acute infection of the nose and sinuses, allergy, malignancies of the nasopharynx, swimming, adenoid hypertrophy with nasopharyngitis and others.
7. Serous otitis media is not confined in young patients. The oldest in this series is 83. Hearing was improved in all cases. In the elderly patients, the air-bone gap was almost completely closed.

References

1 Hoople, G.D.: Otitis media with effusion – challenge to otolaryngology. Laryngoscope, 60:315-329, 1950.

2 Armstrong, B.W.: A new treatment for chronic secretory otitis media. Arch. Otolaryngol., 59:653-654, 1954.

3 Sade, V.: Pathology and pathogenesis of serous otitis media. Arch. Otolaryngol., 84: 297-305, 1966.

4 Sade, V.: Middle ear mucosa. Arch. Otolaryngol., 84:137-143, 1966.

5 Lim, D.J., Paparella, M.M. and Kimura, R.S.: Ultra-structure of the eustachian tube and middle ear mucosa in the guinea pig. Acta Otolaryng. (Stockholm), 63:425-444, 1967.

6 Adlington, P. and Davies, Jr.: Virus studies in secretory otitis media. J. Laryng., 83:161-173, 1969.

7 Silverstein, H., Muler, G.F., Jr. and Lindeman, R.C.: Eustachian tube dysfunction as a cause for chronic secretory otitis in children. Laryngoscope, 76:259-273, 1966.

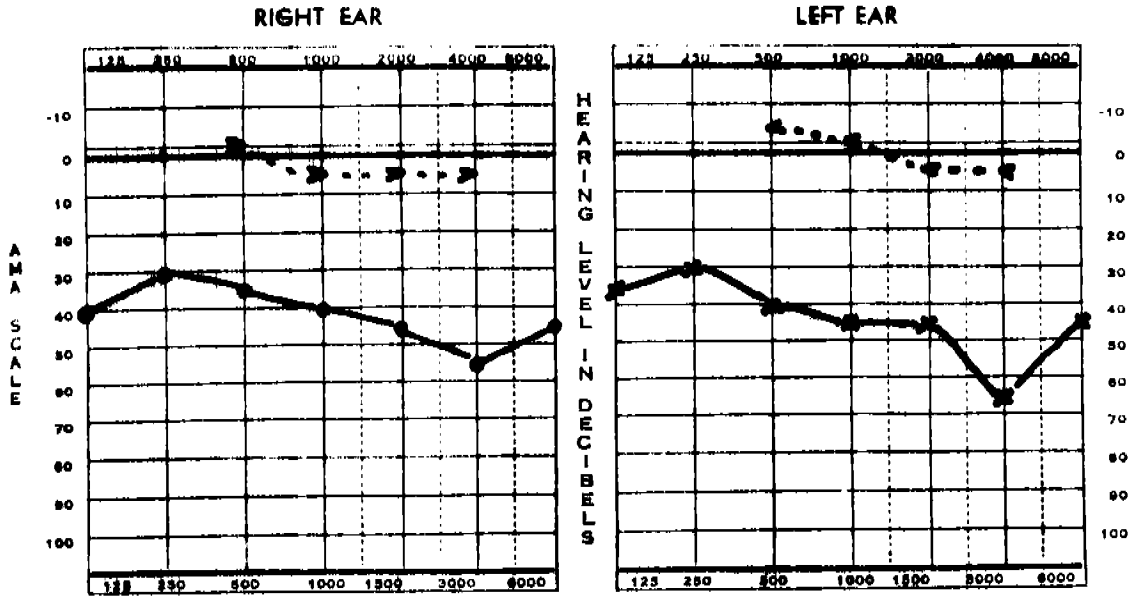


Figure 1

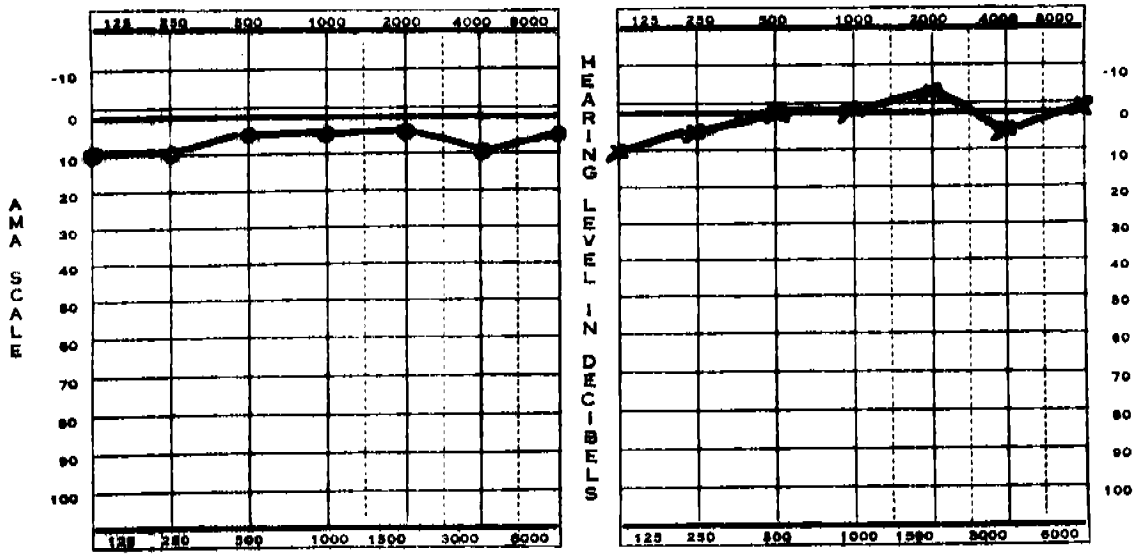


Figure 2

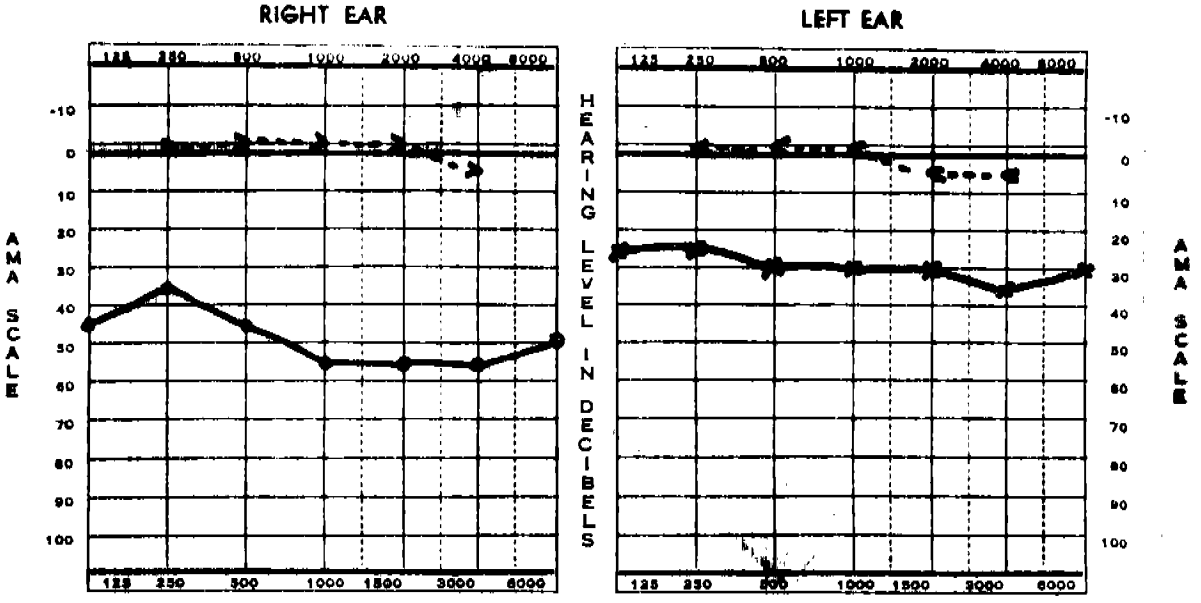


Figure 3

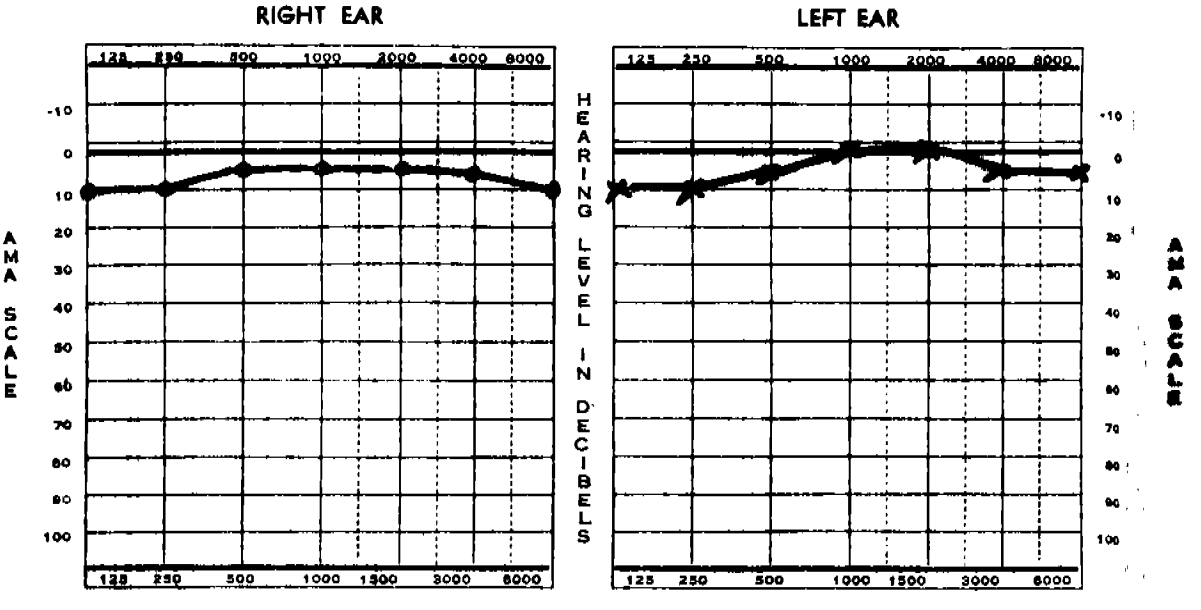


Figure 4

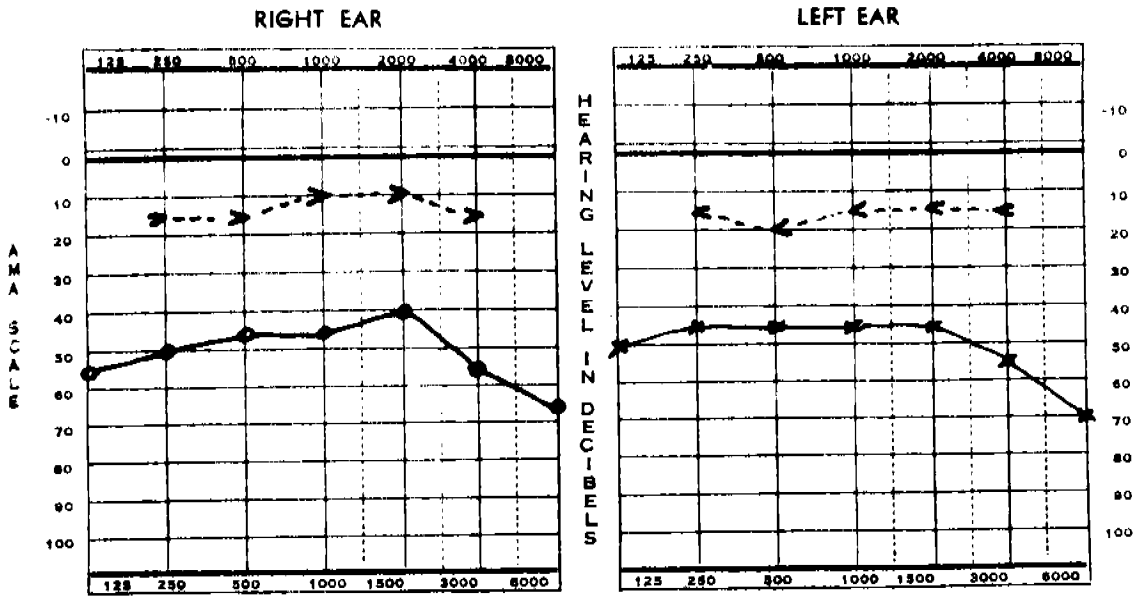


Figure 5

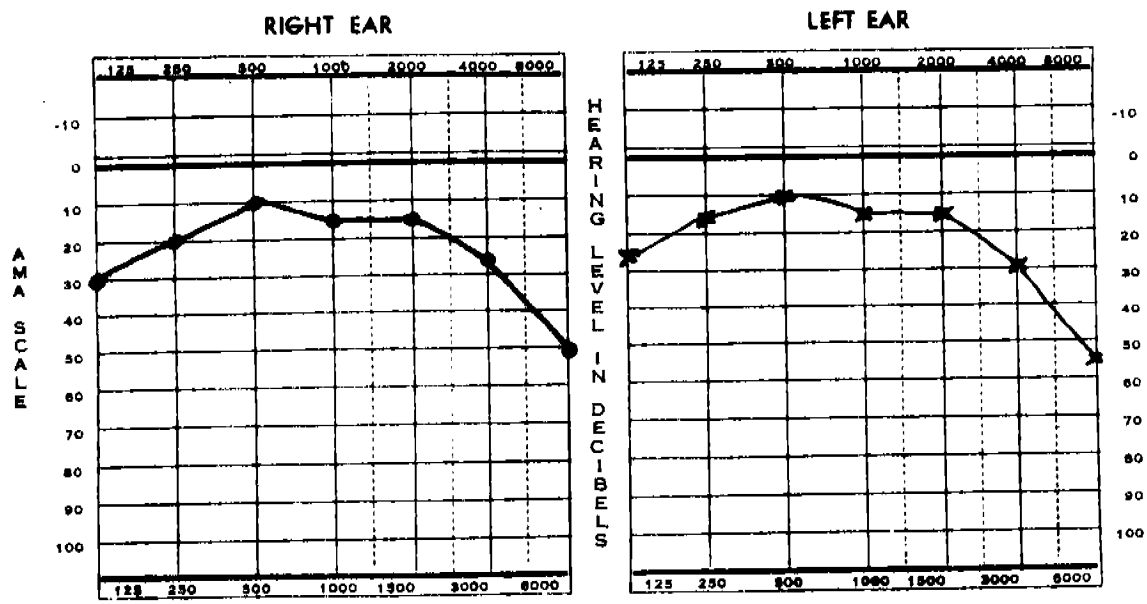


Figure 6

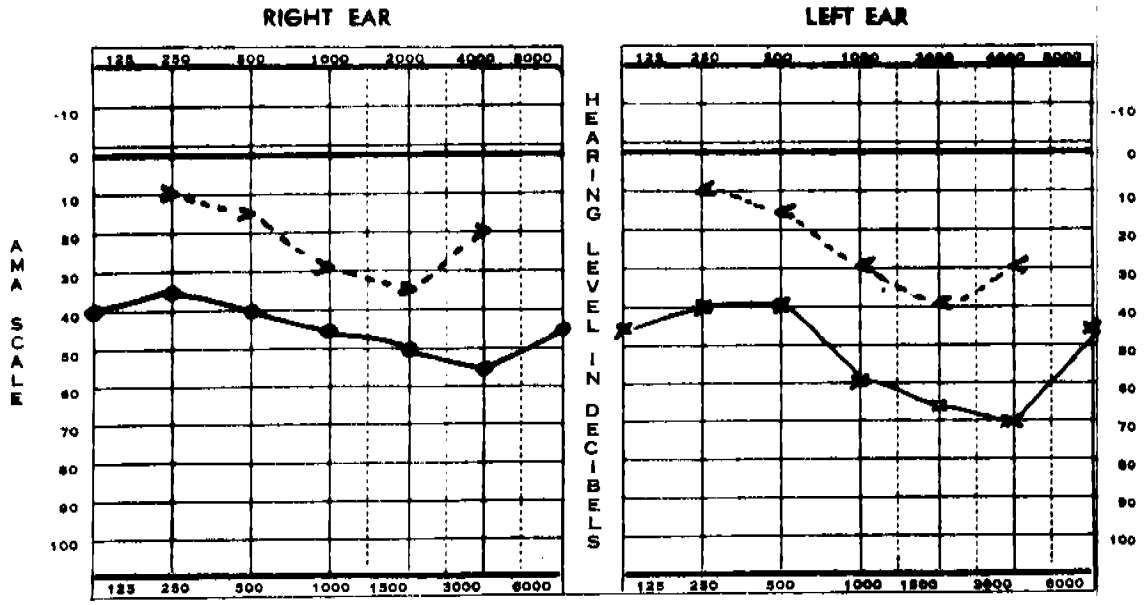


Figure 7

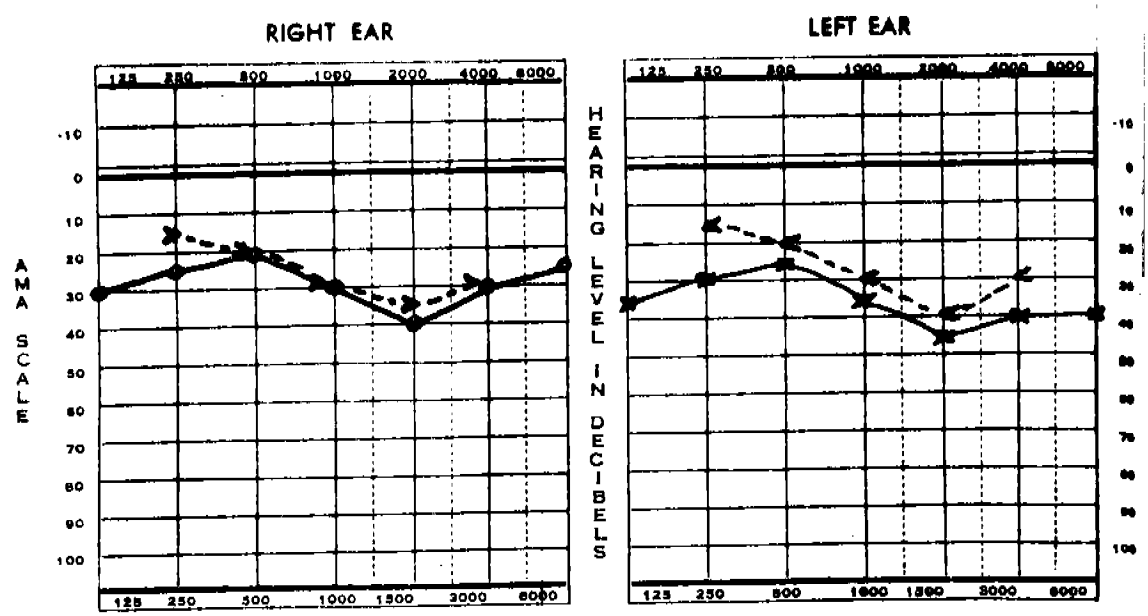


Figure 8

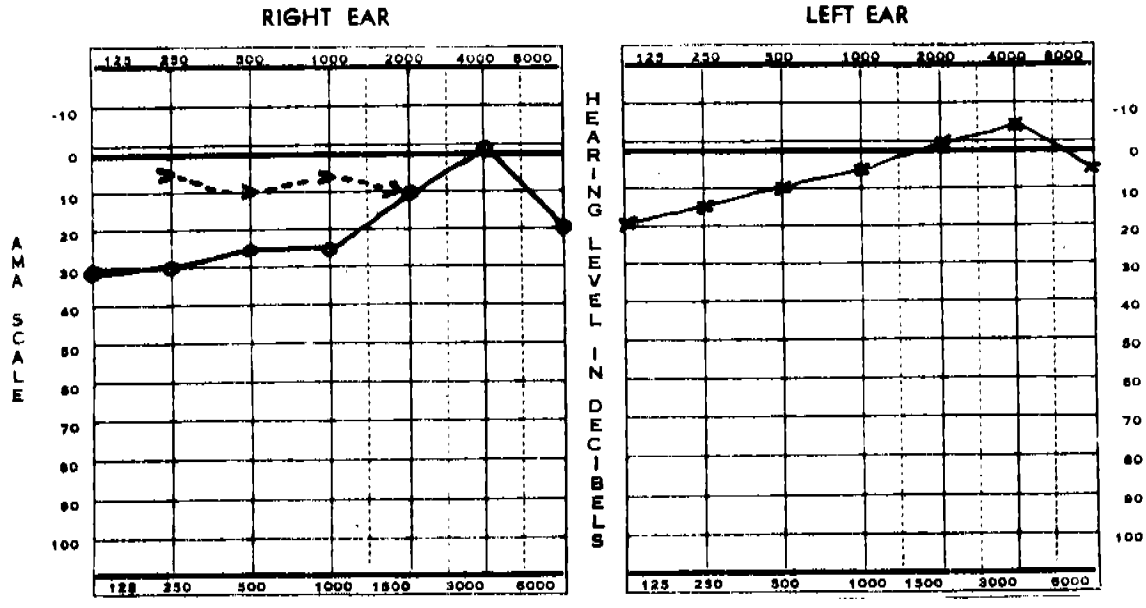

RIGHT EAR
LEFT EAR
AMA SCALE
HEARING LEVEL IN DECIBELS
125 250 500 1000 2000 4000 8000
-10 0 10 20 30 40 50 60 70 80 90 100
125 250 500 1000 1500 3000 6000

Figure 9

The Phil.
Jour. of Oto.
Head & Neck Surgery

OBLIQUE FACIAL CLEFT*

Armando T. Chiong, M.D;**
Eutrapio S. Guevarra Jr., M.D.***
Robie V. Zantua, M.D. ****

Oblique facial clefts are extremely rare, with about 78 cases reported in the world literature to this time. The American Association of Cleft Palate Rehabilitation has proposed a classification of rare facial clefts into the major groups of (1) mandibular process clefts, (2) naso-ocular clefts, (3) oro-ocular clefts, and (4) oro-aural clefts.[3] The naso-ocular clefts extend from the alar region toward the medial canthus. [2,3] Clefts of the oro-ocular group connect the oral aperture to the palpebral fissure.

Paul Tessier, MD, in 1973, proposed a new classification through a numbering system, which integrates the findings of clinical examination with the underlying facial bone deformity seen at the time of reconstructive repair. It is numbered from 0 to 14, following constant lines through the eyebrows, eyelids, maxilla, nose, and lip[1] as illustrated in Fig 1.

PATHOGENESIS and EMBROYOLOGY

The first of two leading existing theories is that of a defect of fusion as proposed by Dursy, which states that failure to achieve contact or fusion of the free ends of the facial processes leads to the formation of facial clefts.[1]

The second theory is that of mesodermal migration and penetration as proposed by Warbrick et al, who do not exclude the existence of free-end facial processes in the central portion of the face. They believe that the craniofacial mesoderm is augmented by neuroectroderm brought in by the neural crest cells and that the facial bones originate principally from this embryological origin. Failure of the neuroectoderm to penetrate the unsupported epithelial wall leads to disintegration and formation of a facial cleft.

McKenzie and Craig relate these defects to inadequate arterial blood supply occurring at a time of rapid growth and development.[1]

REPORT OF CASES

CASE 1. —A 15-year-old boy was seen because of a right-sided, incomplete congenital facial cleft. There were no apparent unusual prenatal, consanguinity, or hereditary factors. Two years previously he had undergone, a cleft lip repair. As shown in Fig 2. the vermilion-lined cleft extended from the upper lip to a coloboma of the medial portion of the right lower eyelid. There was a deformity of the lower lacrimal canaliculus, and the lid was retracted inferiorly. The cleft bypassed the nasal ala, which appeared normal but was slightly rotated toward the medial canthus. There was no cleft alveolar process nor cleft palate present, but there was slight malpo-

* Reprinted from Arch. of Otolaryngology 107; 59 – 62 1981 with permission from senior author; Copyright, 1981, A.M.A.

** Chief, Section of Plastic Reconstructive Service, and Assoc. Professor Dept. of Otolaryngology, U.P.-P.G.H. Medical Center

*** Consultant (on leave), Dept. of Otolaryngology, U.P. – P.G.H. Medical Center

**** Resident, Dept. of Otolaryngology U.P.-P.G.H. – Medical Center

sition of the lateral incisor and canine teeth. The underlying bone was dehiscent from the canine fossa area to the region of the infraorbital foramen, and the anterior medial wall of the maxilla was hypoplastic.

Management. — The previous operation was a repair of the cleft lip defect using a square flap similar to the Le Mesurier technique (Fig 2). A second operation was performed in which the lower lid was rotated superiorly and medially to the inner canthus as a flap, and the hypoplastic portion of the coloboma was partially excised and undermined and then used to form a palpebral conjunctiva by suturing it to the lower eyelid. The decrease in vertical dimension between the upper lid and the lower eyelid was corrected using a local interdigitating flap. The closure of the cheek defect was accomplished as shown in Fig 3 using a modification of the Tessier technique. This enabled us to bring the nasal alar base inferiorly and to place the closure line along the lateral rim of the nose. Medical-grade silicone was carved and implanted to correct the depressed bony portion of the maxilla. No complications were noted during the surgical follow-up period of four months (Fig 4).

CASE 2. — A 17-year-old girl was seen because of a unilateral, incomplete, left-sided, oro-ocular cleft, type I (Fig 5). There was no unusual prenatal or hereditary history or consanguinity. The nasolacrimal system was disrupted by the cleft, and the nasolacrimal duct was completely obstructed. The lower canaliculus was malformed and beyond repair. There was an inferior displacement of the ipsilateral orbital floor and globe.

Management. — A carved silicone implant was used to correct the problems associated with the hypoplastic maxilla (Fig 6 to 9). A local interdigitating flap was used to reconstruct the lower eyelid. The lip was closed using the rotation-advancement flap technique of Millard. The left nasal alar base was repositioned more inferiorly. A transposition flap from the upper eyelid was used to elevate the lower lid medially. One month later, dacryocystitis developed, and the *Pseudomonas* infection responded to the topical administration of gentamicin sulfate. Total removal of the lacrimal sac and duct remnants and removal of the silicone implant of the orbital floor were performed to prevent reinfection. One month later, a new silicone implant was replaced in the orbital floor region. No other complications were noted in the follow-up period of eight months (Fig 10 and 11).

LITERATURE REVIEW

Boo-Chai credited the first recorded case to von Kulmus in 1732. He also reported 23 cases of oblique facial clefts involving infants who survived, and his article contains an excellent review of the subject,[4] as does the article by Dey.[5] The subject is also reviewed nicely by Mladick et al.[6]

Oro-ocular cleft begins in the area lateral to the cupid's bow and moves onto the cheek in the direction of the eye. Using the infraorbital foramen as a reference point, these clefts are divided into two types.[4] In type I, the cleft of the upper lip courses laterally to the nasal ala and then turns superiorly to end in the region of the medial canthus. The defect of the facial skeleton extends from the lateral incisor or canine teeth to the region of the infraorbital foramen. The type II oro-ocular cleft begins near the corner of the mouth and terminates in a coloboma in the midportion of the lower eyelid or near the lateral canthus. The dehiscence of the anterior face of the maxilla begins between the canine and first molar teeth and extends superiorly to the infraorbital rim, lying lateral to the infraorbital foramen.

COMMENT

Surgical management of this congenital anomaly has been described using a modification of Tessier's technique along with silicone implants to correct the deformities associated with the hypoplastic maxilla. The nasolacrimal duct and sac must be evaluated and considered in the reconstructive repair. Nasal alar deformities may require correction.

The treatment of oblique facial clefts cannot be standardized. However, some guidelines in the surgical management include the following: (1) repair of the cleft

must include accurate approximation of each tissue layer, (2) failure to obtain meticulous layer closure will result in a loss of anatomical continuity and a depressed scar along the site of the operative procedure, and (3) when the repair crosses lines of minimal skin tension or when there is loss of length, multiple Z-plasty (interdigitating flaps) can be used to advantage.

Nonproprietary Name and Trademark of Drug

Gentamicin sulfate – *Geramycin.*

References:

1. Kawamoto H Jr, Wang M, Macomber W: Rare craniofacial clefts, in Converse JM (ed): *Reconstructive and Plastic Surgery. Philadelphia,* WB Saunders Co, 1977, vol 4, chap 46.
2. Ortega J, Flor E: Incomplete naso-ocular cleft, *J Plast Reconstr Surg* 43:630-632, 1969.
3. Gunter G: Nasomaxillary cleft. *J Plast Reconstr Surg* 32:637-645, 1963.
4. Boo-Chai K: The oblique facial cleft. *Br J Plast Surg* 23:352-359, 1970.
5. Dey D: Oblique facial clefts. *J Plast Reconstr Surg 52:258-263, 1973.*
6. Mladick RA, Horton CE, Adamson JE, et al: Medial, lateral, and transverse clefts, in Georgiade NG, Hagerty RF (eds): *Symposium on Management of Cleft Lip and Palate and Associated Deformities.* St Louis, CV Mosby Co, 1974, vol 8, chap 36.

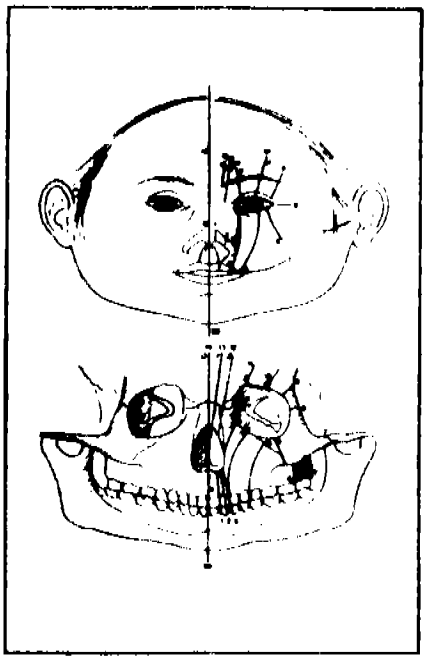


Fig 1. — Tessier's classification of facial clefts. Top, Location of clefts on face. Bottom, Skeletal pathways of clefts (courtesy of Paul Tessier, MD).

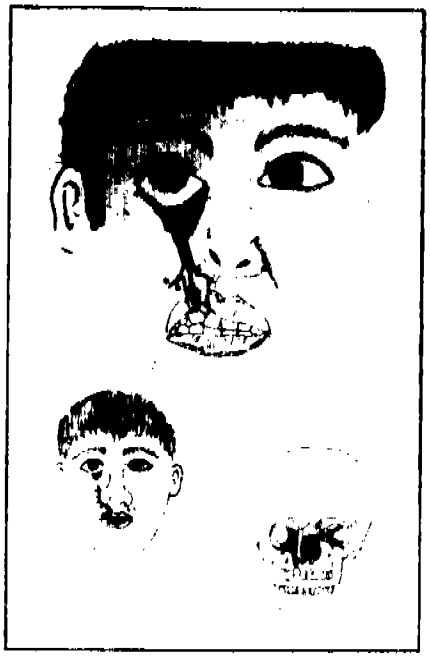


Fig 2. — Drawing of patient 1 shows complete facial cleft before closure of lip defect.

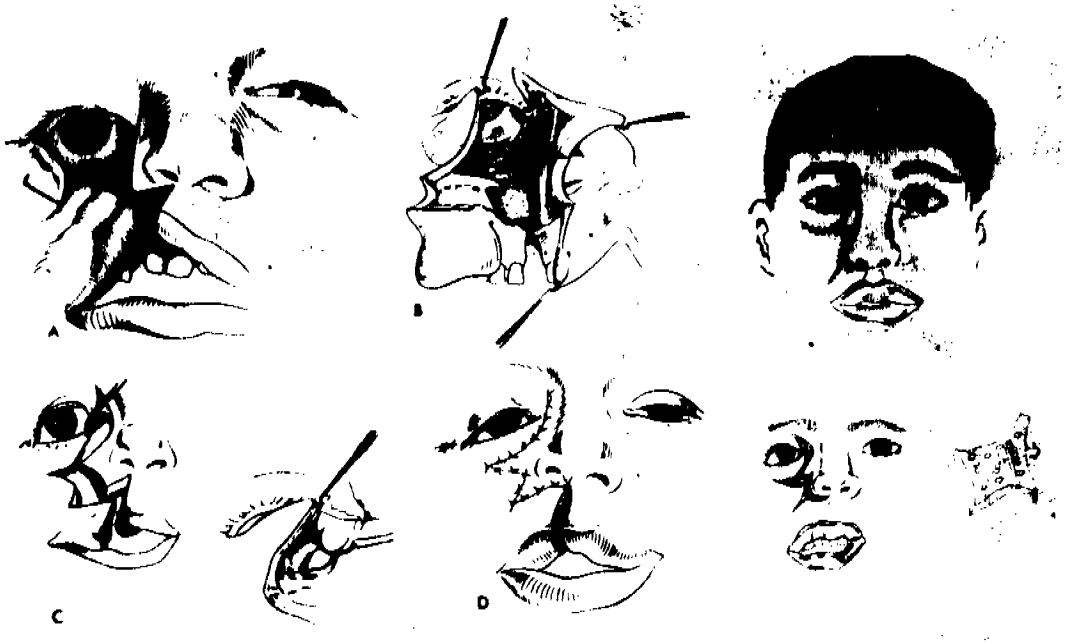


Fig. 3 — Left, Original Tessier technique for closure of oro-ocular cleft. A, Outline of skin flaps; B, bone graft in place to restore facial skeleton; C, transposition of flaps and closure of conjunctiva; D, closure of skin (courtesy of Paul Tessier, MD). In two cases reported here, silicone elastomer implant was used instead of bone graft to restore facial skeleton. Right, Drawing of patient 1 depicts incision and closure of cheek defect. At lower right, carved silicone elastomer was used to elevate hypoplastic maxilla.

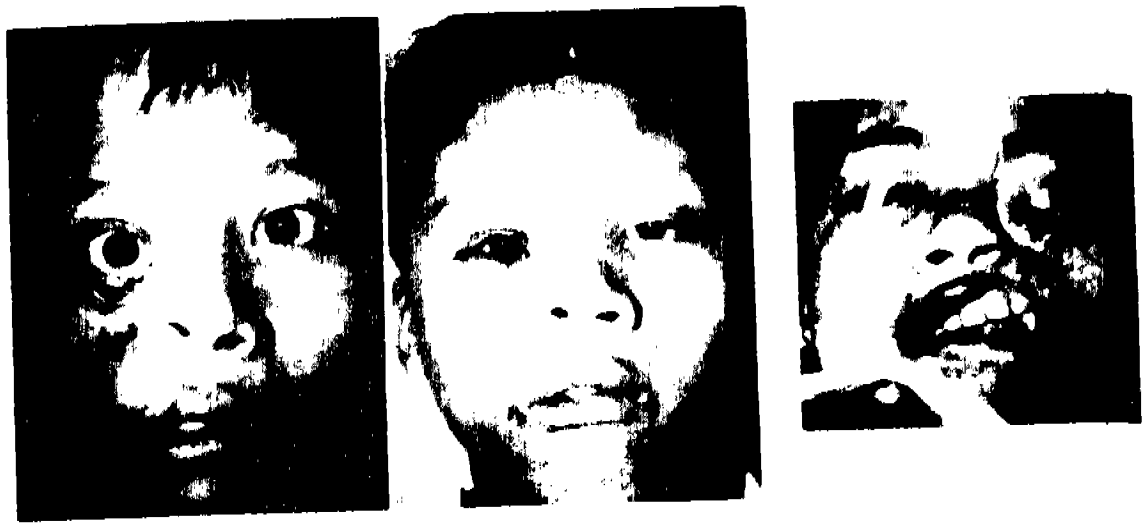


Fig 4. – Patient 1 at 15 years of age after repair of lip shows ectropion and cheek defect. Right, Four months after repair of cheek and lid defects.

Fig 5. – Patient 2 before surgery. Note incomplete, unilateral, left-sided oro-ocular cleft.

Fig. 6. – Drawing of patient 2 illustrates incision of skin flaps; at bottom right is skeletal defect of this patient.

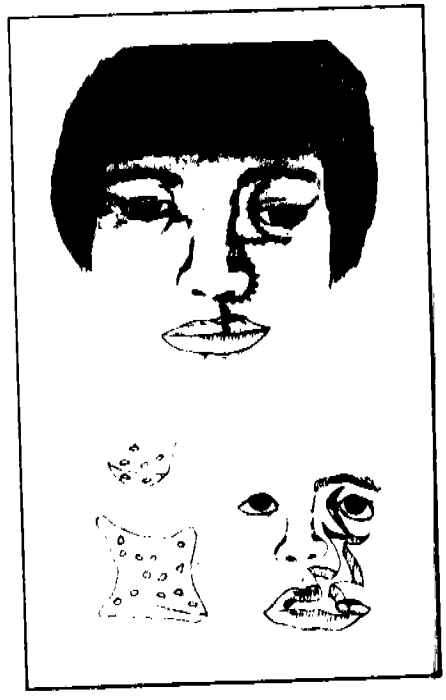


Fig 7. – Drawing of patient 2 shows skin closure and carved silicone elastomer used for repair of floor of orbit and maxillary defect.

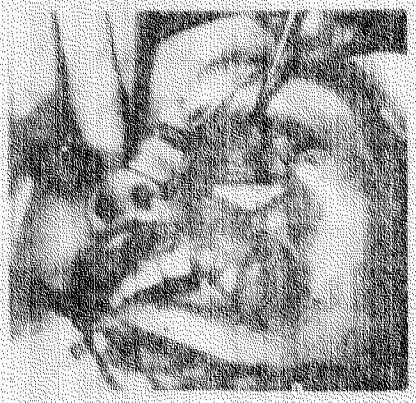


Fig. 8. – Silicone elastomer in place at floor of orbit (case 2).

Fig. 9. Silicone implant over hypoplastic maxilla (case 2).

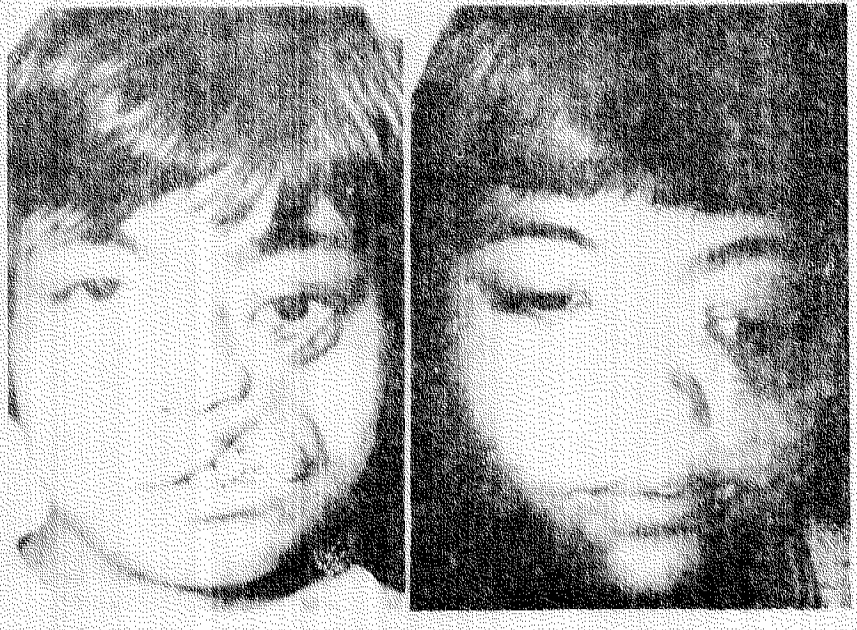


Fig. 10. – Preoperative and postoperative pictures of patient 2.

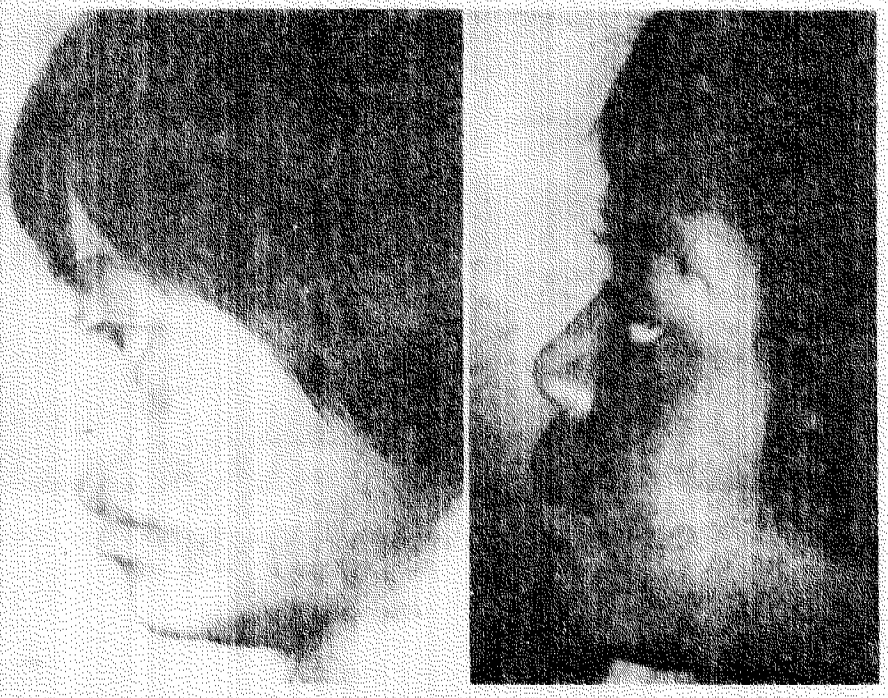


Fig. 11. — Left, Preoperative and right, postoperative profiles of patient 2.

NRCP-SSF I.C.-58 RESEARCH PROJECT

on

ESSENTIAL TRACE ELEMENTS (ZINC) STUDIES IN RELATION TO TASTE AND SMELL ABNORMALITIES AMONG RP POPULATION SEGMENTS

FINAL REPORTS

PART I ; TASTE AND SMELL THRESHOLD MEASUREMENTS AND BLOOD ZINC LEVEL STUDIES IN REPRESENTATIVE RP POPULATION GROUPS

PART 2 : TASTE AND SMELL THRESHOLD AND BLOOD ZINC LEVEL MEASUREMENTS ON ATROPHIC RHINITIS PATIENTS BEFORE AND AFTER TREATMENT

PART 3: PROPOSED SIMPLE QUANTITTATIVE PROCEDURES FOR MEASURING TASTE AND SMELL FUNCTIONS ON CONSCIOUS HUMAN SUBJECTS

BY

PROF. IRINEO L. LAWAS AND STAFF

MEDICAL DIVISION

FROM

PHILIPPINE GENERAL HOSPITAL AND COLLEGE OF MEDICINE
PHILIPPINE CENTER FOR THE HEALTH SCIENCES

1980

NATIONAL RESEARCH COUNCIL OF THE PHILIPPINES
NRCP-SSF I.C. -58 RESEARCH PROJECT

ON

ESSENTIAL TRACE ELEMENTS (ZINC) STUDIES IN RELATION TO TASTE AND SMELL ABNORMALITIES AMONG RP POPULATION SEGMENTS

FINAL REPORTS

PART I

TASTE AND SMELL THRESHOLD MEASUREMENTS AND BLOOD ZINC LEVEL STUDIES IN REPRESENTATIVE RP POPULATION GROUPS

By

PROF. IRINEO L. LAWAS, DR. BENJAMIN C. CRUZ, DR. GENEROSO T. ABES
JOSE RIZAL R. DELA CRUZ AND HERMELINO A. ANDRADA

MEDICAL DIVISION

FROM

PHILIPPINE GENERAL HOSPITAL AND COLLEGE OF MEDICINE
PHILIPPINE CENTER FOR THE HEALTH SCIENCES

1980

The Phil.
Jour. of Oto.
Head & Neck Surgery

TASTE AND SMELL THRESHOLD MEASUREMENT AND BLOOD ZINC LEVEL STUDIES IN REPRESENTATIVE RP POPULATION GROUPS

Irineo L. Lawas, B.S. Ch[1], Benjamin C. Cruz, M.D.[2], Generoso T. Abes, M.D.[3], Jose Rizal R. dela Cruz, B.S.M.T.[4], and Hermelino A. Andrada, B.S.M.T.[4]

INTRODUCTION

The two identified world priority problems are population and food. With the exponential population growth, the available resources from nature in their native form are being felt to be inadequate to meet the basic needs of men for a comfortable survival. More effort has to be exerted and special dealings with nature has to be accomplished so that tremendous man-nature interaction will result. In short, rapid modification of the environment should be affected.

While desirable environmental changes are accomplished by men, unknowingly, adverse changes also occur, which may give immediate or delayed effect to men. These delayed and prolonged adverse effects have pose serious threat to the life span and the enjoyable "third age" of men. The analysis of our present spectrum of diseases will support the existence of these threats of delayed hazards.

Our area of concern are first, the trace materials from nature and environment that find their way into the human body by food and water intake and thru the air, or by direct contact from our surroundings. To be more specific, these are the trace metals which may be physiologically or biochemically needed by the human body (termed as "essential trace metals"), or they may be unphysiological or non-biochemical trace metals which are usually of high molecular weight, are not needed by the body, and are often toxic to men. The former are sometimes referred to as "Mineral Micro-nutrients" while the latter are called "Pollution Trace Elements." Our present studies deal with the mineral micronutrient Zinc (Zn) metal.

Our second area of concern is the assessment of two vital senses of men, the senses of taste and smell. These sensory systems are vital mechanisms for voluntary and involuntary reflexes which dictate some physiological and biochemical responses of men to its environment. Responses are tolerable and beneficial, geared towards acceptable self preservation, diminished or accentuated taste (hypogensia or dysgensia and smell (hyposmia or dysosmia) are often also bearable and within the adaptive capability of men. Thus, little concern is given to this health area, causing it to be more or less neglected. However, there are reports of severe taste and smell derangements with definite threat to health, causing patients

*Supported by the National Research Council of the Philippines, under the NRCP-SSF LC-58 research grant: "Essential Trace Element (Zinc) Studies in Relation to Taste and Smell Abnormalities Among RP Population Groups."

[1] Professor of Medicine, Consultant, Dept. of Medicine, UP-PGH Medical Center.

[2] Consultant, Dept. of Otorhinolaryngology, and Asst. Professor (PT), College of Medicine, UP-PGH Medical Center

[3] Consultant, Dept. of Otorhinolaryngology, UP-PGH Medical Center.

[4] Research Assistants, Clinical Chemistry & Biomedical Computer Section, Medical Research Laboratory, Dept. of Medicine, UP-PGH Medical Center.

to seek consultations with their physicians. There are also reports that these derangements can be corrected by supplementary intake of Zinc, an essential body mineral. With these observations, we have investigated the taste and smell acuity of some representative population groups in the Philippines, particularly the agro-industrial workers, while at the same time measuring their body zinc levels to see if there is any correlation between taste and smell and zinc levels.

The objective of this research study is to measure the taste and smell threshold and zinc body levels among these workers to appreciate if there is any group variation as may be dictated by their economic and environmental working conditions.

MATERIALS AND METHODS

A total of two hundred sixty four (264) selected subjects from four representative population groups were included in this study. These were grouped as follows:

1. Farm workers (87) from Pagbilao, Quezon Province, in Southern Luzon.
2. Fishermen (60) from Lobo, Batangas, also from the southern part of Luzon.
3. Car factory workers (67) involved in metal body finish. The factory where they work is located in Metro Manila.
4. Paint factory workers (50) handling chemicals and paint materials. Site of factory is also within Metro Manila area.

The health status of each individual subject was evaluated by our examining physician. Generally, of all the population groups, the Pagbilao farmers were the least healthy. The Lobo fishermen on the other hand were healthier from the standpoint of physical build. A sizable number, though, were alcoholic. The factory workers (car and paint factory groups), compared to the farm workers and fishermen, were the healthiest. This may be explained by the observation that the latter groups are from urban areas where medical facilities are readily available in time of illness.

Methods of quantitative measurements of taste and smell capabilities utilizing various solutions of pure chemicals are described separately in PART 3 of these Reports. For taste measurement, the relative value of the logarithm of the concentration of the four types of taste are noted and statistically treated. However, for smell measurement, the relative value of the exponent of 10 of the concentrations of two pure chemicals with characteristic smell are the ones noted and statistically analyzed. *Detection thresholds*, to appreciate the taste and smell to be different from the solvent, and *Recognition thresholds*, appreciate the specific quality or chemical, are noted and treated statistically separately.

The blood Zinc level is accomplished on each subject utilizing the Atomic Absorption Spectrophotometric method. This technique has been previously established and employed in earlier related research studies on trace metals by the principal proponent. This method involves the processing of the plasma in duplicate sample, and the addition of double internal standard of zinc: one part Zn is added to the 1st sample, and three parts Zn to the 2nd similar sample. The duplicate samples are further diluted 1:3 with distilled water to bring the Zn level within the optimum range of the Atomic Absorption Spectrophotometer. Readings are computed together with the blank and control samples.

RESULTS

The statistical analyses of the relative taste and smell thresholds and blood zinc levels of the 4 population groups studied are shown in the following tables and graphical illustrations:

Table 1: Taste values for Sucrose (to represent "sweet").
Table 2: Taste values for Sodium Chloride (to represent "salty").
Table 3: Taste values for Urea (to represent "bitter").
Table 4: Taste values for Hydrochloric acid (to represent "sour.")
Table 5: Smell values for Pyridine (to represent "ammonia-like").
Table 6: Smell values for Nitrobenzene (to represent "vanilla-like").
Table 7: Blood Zinc values (ug.% and log values).

Fig. 1: Group comparison of the mean and + 1 standard deviation range of the relative detection and recognition taste values for sucrose and sodium chloride, together with the corresponding millimole concentrations.

Fig. 2: Group comparison of the mean and + 1 standard deviation range of the relative detection and recognition taste values for urea and hydrochloric acid, together with the corresponding millimole concentrations.

Fig. 3: Group comparison of the mean and + 1 standard deviation range of the relative detection and recognition smell values for pyridine and nitrobenzene, with the corresponding milliliter concentration, and of the blood zinc levels in micrograms percent (ug .%).

DISCUSSION

In any health study particularly that which concerns environmental and economic factors, the search for "normal" values will be difficult. This is because parameters of perfect or real normal will be hard to satisfy. However in the practice of medicine, there is a strong need for reference value for any biochemical or physiologic parameter to differentiate normal from abnormal individual.

While in our studies we have been dealing with non-hospitalized subjects, it is obvious that, as expected, low economic state of some population would have at least substandard or non acceptable health conditions. Biochemical and physiologic finding on these groups would not be of help to differentiate between health & disease except when there is gross difference.

Our findings on the four population working groups having differ 1). activities, 2). economic level, and geographic location, significant differences in taste and smell capabilities and in blood zinc levels between groups. This is shown by the t-values in our statistical analysis in Table 1-3, and graphically presented in Figures 1-3.

Although the institutional working groups from the two factories grossly show adequate health while the non-institutional groups of farmers and fishermen show marginal or poor health status, there are a definite trends of differences in the findings of these taste, smell and zinc values among these groups. This is due to the fact that we can not quantify the contribution of the various factors such as environmental, biologic, and economic parameters. Further studies, in this direction would be in order.

CONCLUSION

The physiologic senses of taste and smell, and the biochemical blood level of the essential trace mineral zinc among the working population groups with different group activities, economic state, and geographic location, are significantly different from group to group.

TABLE 1: STATISTICAL ANALYSIS OF THE RELATIVE TASTE MEASUREMENT VALUES OF SUCROSE (Sweet)

	DETECTION						RECOGNITION				
POPULATION GROUP	N	X	S.D.	X-1 S.D.	X 1 S.D.	t-Value Vs	X	S.D.	X-1 S.D.	X 1 S.D.	t-Value Vs:
1. Pagbilao Farmers	88	7.68	1.95	9.63	5.73	6.6677 (2) 3.9930 (3) 5.3808 (4)	4.94	1.75	6.69	3.19	4.9213 (2) 1.9039 (3) 0.9661 (4)
2. Lobo Fishermen	61	5.74	1.59	7.33	4.15	-2.2750 (3) - 1.0733 (4)	3.95	1.06	5.01	2.89	-2.7177 (3) -3.5225 (4)
3. Car Factory Workers	65	6.44	1.54	7.60	4.52	1.1977 (4)	4.49	1.17	5.66	3.32	-0.9587 (4)
4. Paint Factory Workers	50	6.06	1.54	7.60	4.52		4.70	1.16	5.86	3.54	
TOTAL	264	6.62	0.78	7.41	5.83		4.56	0.73	4.93	4.18	

TABLE 2: STATISTICAL ANALYSIS OF THE RELATIVE TASTE MEASUREMENT VALUES OF SODIUM CHLORIDE (Salty)

	DETECTION						RECOGNITION				
POPULATION GROUP	N	X	S.D.	X-1 S.D.	X 1 S.D.	t-Value Vs	X	S.D.	X-1 S.D.	X 1 S.D.	t-Value (Vs)
1. Pagbilao Farmers	88	7.19	2.08	9.27	5.11	4.5759 (2) 1,6709 (3) 0.0491 (4)	4.65	1.52	6.17	3.13	2.5982 (2) 0.7898 (3) -0.0394 (4)
2. Lobo Fishermen	61	5.84	1.52	7.36	4.32	- 3.0386 (3) - 2.001 (4)	4.09	1.11	5.20	2.98	- 2.1388 (3) - 2.3609 (4)
3. Car Factory Workers	65	6.69	1.62	8.31	5.07	0.9175 (4)	4.49	0.98	5.47	3.51	- 0.7393 (4)
4. Paint Factory Workers	50	6.42	1.52	7.94	4.90		4.66	1.38	6.04	3.28	
TOTAL	264	6.61	0.51	7.12	6.10		4.48	0.23	4.71	4.26	

TABLE 3: STATISTICAL ANALYSIS OF THE RELATIVE TASTE MEASUREMENT VALUES OF UREA (Bitter)

		DETECTION					RECOGNITION				
	POPULATION GROUP	N	X	S.D.	X+1 S.D.	X-1 S.D.	t-Value Vs	X	S.D.	X+1 S.D.	X-1 S.D.	t-Value Vs
1.	Pagbilao Farmers	88	7.09	2.41	9.50	4.69	0.1335 (2) 3.4521 (3) 0.0660 (4)	4.68	1.52	6.17	3.13	0.0262 (2) 5.6768 (3) 1.7520 (4)
2.	Lobo Fishermen	61	5.04	2.03	7.07	3.01	-1.5597 (3) -0.6943 (4)	3.13	1.51	4.64	1.62	-0.4876 (3) -3.2621 (4)
3.	Car Factory Workers	65	5.68	2.56	8.24	3.12	0.8134 (4)	3.26	1.48	4.74	1.78	0.3036 (4)
4.	Paint Factory Workers	50	5.32	2.18	7.50	3.14		4.14	1.71	5.85	2.42	
	TOTAL	264	5.93	0.85	6.78	5.09		3.86	0.66	4.52	3.20	

TABLE 4: STATISTICAL ANALYSIS OF THE RELATIVE TASTE MEASUREMENT VALUES OF HYDROCHLORIC ACID (Sour)

		DETECTION					RECOGNITION				
	POPULATION GROUP	N	X	S. D.	X-1 S.D.	X 1 S.D.	t-Value Vs	X	S.D.	X-1 S.D.	X 1 S.D.	t-values (Vs)
1.	Pagbilao Farmers	88	7.77	0.05	7.82	7.72	8.0739 (2) 5.4641 (3) 0.2804 (4)	3.92	1.56	5.48	2.36	5.4768 (2) 2.7856 (3) 7.8530 (4)
2.	Lobo Fishermen	61	5.64	2.08	7.70	3.58	-1.9514 (3) -6.5345 (4)	2.68	1.20	3.88	1.48	-2.2975 (3) 12.257 (4)
3.	Car Factory Workers	65	6.36	2.08	8.44	4.28	-4.3374 (4)	3.23	1.48	4.71	1.75	-9.8256 (4)
4.	Paint Factory Workers	50	7.72	1.26	8.98	6.64		6.28	1.77	8.05	4.51	
	TOTAL	264	6.92	0.90	7.83	6.02		3.91	1.24	5.15	2.67	

TABLE 5. STATISTICAL ANALYSIS OF THE RELATIVE SMELL MEASUREMENT VALUES OF PYRIDINE (Ammonia-Like)

		DETECTION						RECOGNITION					
	POPULATION GROUP	N	X	S.D.	X+1 S.D.	X-1 S.D.	t-Value Vs	X	S.D.	X+1 S.D.	X-1 S.D.	t-Value Vs
1.	Pagbilao Farmers	87	5.18	0.81	5.99	4.37	0.1572 (2) 5.8237 (3) 1.5729 (4)	4.07	1.15	5.22	3.92	0.0273 (2) 3.7500 (3) 2.8564 (4)
2.	Lobo Fishermen	60	5.16	0.72	5.88	4.44	4.9012 (3) 1.4591 (4)	4.07	1.28	5.35	3.79	3.1311 (3) 2.5210 (4)
3.	Car Factory Workers	65	4.41	0.98	5.39	3.43	-2.3888 (4)	3.44	0.92	4.36	3.52	-0.1988 (4)
4.	Paint Factory Workers	49	4.41	1.12	6.01	4.77		3.48	1.16	4.64	3.32	
	TOTAL	261	4.84	0.38	5.22	4.46		3.80	0.30	4.11	3.50	

TABLE 6: STATISTICAL ANALYSIS OF THE RELATIVE SMELL MEASUREMENT VALUES OF NITROBENZENE (Vanilla-Like)

		DETECTION						RECOGNITION					
	POPULATION GROUP	N	X	S.D.	X+1 S.D.	X-1 S.D.	t-Value Vs	X	S.D.	X+1 S.D.	X-1 S.D.	t-Value Vs
1.	Pagbilao Farmers	87	5.41	0.86	5.37	4.55	6.0683 (2) 7.7069 (3) 2.9287 (4)	3.88	0.64	4.52	3.24	2.7088 (2) 1.6851 (3) -0.2076 (4)
2.	Lobo Fishermen	60	4.46	0.98	5.44	3.48	0.5022 (3) -2.0803 (4)	3.63	0.56	4.17	3.05	-0.8240 (3) -2.0511 (4)
3.	Car Factory Workers	65	4.38	0.78	5.16	3.60	2.7274 (4)	3.70	0.66	4.36	3.04	1.3887 (4)
4.	Paint Factory Workers	49	4.88	1.09	5.97	3.79		3.91	0.89	4.80	3.02	
	TOTAL	261	4.84	0.44	5.28	4.39		3,78	0.12	3.90	3.67	

TABLE 7: STATISTICAL ANALYSIS OF THE BLOOD ZINC LEVELS (ug.% and Log-Value) OF THE FOUR (4) POPULATION GROUPS.

	POPULATION GROUP:	N	X		S.D.	X+1 S.D.		X-1 S. D.		T–VALUE	VS.
			ug.%	Log		ug.%	Log	ug.%	Log		
1.	Pagbilao Farmers	87	70.75	1.84	19.85	90.59	1.96	50.91	1.71	-5.557	(2)
										-4.844	(3)
										-1.325	(4)
2.	Lobo Fishermen	60	124.85	2.10	72.38	197.23	2.27	52.47	1.72	1.586	(3)
										4.667	(4)
3.	Car Factory Workers	67	106.31	2.00	57.51	163.82	2.23	48.80	1.69	3.538	(4)
4.	Paint Factory Workers	50	77.01	1.88	29.81	106.82	2.03	47.20	1.67		
	OVER ALL	264	93.26	1.97	22.07	115.32	2.06	71.19	1.85		

TABLE 8: STATISTICAL ANALYSIS OF THE RELATIVE TASTE AND SMELL VALUES AND BLOOD ZINC LEVEL (UG.%) OF 13 RHINITIS PATIENTS BEFORE AND AFTER TREATMENT.

		DETECTION					RECOGNITION				
(A) TASTE	N	X	S.D.	X+1 S.D.	X-1 S.D.	$X_a - X_b$	X	S.D.	X+1 S.D.	X-1 S.D.	$X_a - X_b$
1. SUGAR a) Before	13	6.08	1.44	7.52	4.64	+ 0.70	3.84	0.98	4.82	2.86	+0.28
b) After	13	6.78	1.24	8.02	5.54		4.08	0.28	4.36	3.80	
2. SODIUM CHLORIDE											
a) Before	13	5.84	1.82	7.66	4.02	+ 0.47	3.69	1.38	5.07	2.31	+0.15
b) After	13	6.31	1.32	7.63	4.99		3.84	1.06	4.90	2.78	
3. UREA											
a) Before	13	5.23	1.96	7.19	3.27	+ 0.23	3.46	1.12	4.58	3.34	+0.38
b) After	13	5.46	1.94	7.40	3.52		3.84	1.41	5.25	2.43	
4. HYDROCHLORIC ACID											
a) Before	13	5.76	1.64	7.40	4.12	− 0.53	2.76	1.48	4.24	1.28	- 0.22
b) After	13	5.23	1.30	6.53	3.93		2.54	0.96	3.50	1.58	
(B) S M E L L											
1. PYRIDINE											
a) Before	13	3.50	0.96	4.46	2.54	+ 0.34	2.69	0.85	3.54	1.84	+0.39
b) After	13	3.84	0.89	4.73	2.95		3.08	0.64	3.72	2.44	
2. NITROBENZENE											
a) Before	13	3.44	1.22	4.66	2.22	+ 0.19	2.82	1.14	3.96	1.68	+0.24
b) After	13	3.64	1.21	4.84	2.42		3.06	1.03	4.09	2.03	
(C) BLOOD ZINC LEVEL (UG.%)											
a) Before	13	117.61	49.64	167.25	67.97	-23.27					
b) After	13	94.34	49.79	144.13	44.55						

FIG.1 : Group Comparison of the Mean and ±1 Standard Deviation Range of the Relative Detection and Recognition Taste Values of Sucrose and Sodium Chloride (NaCl).

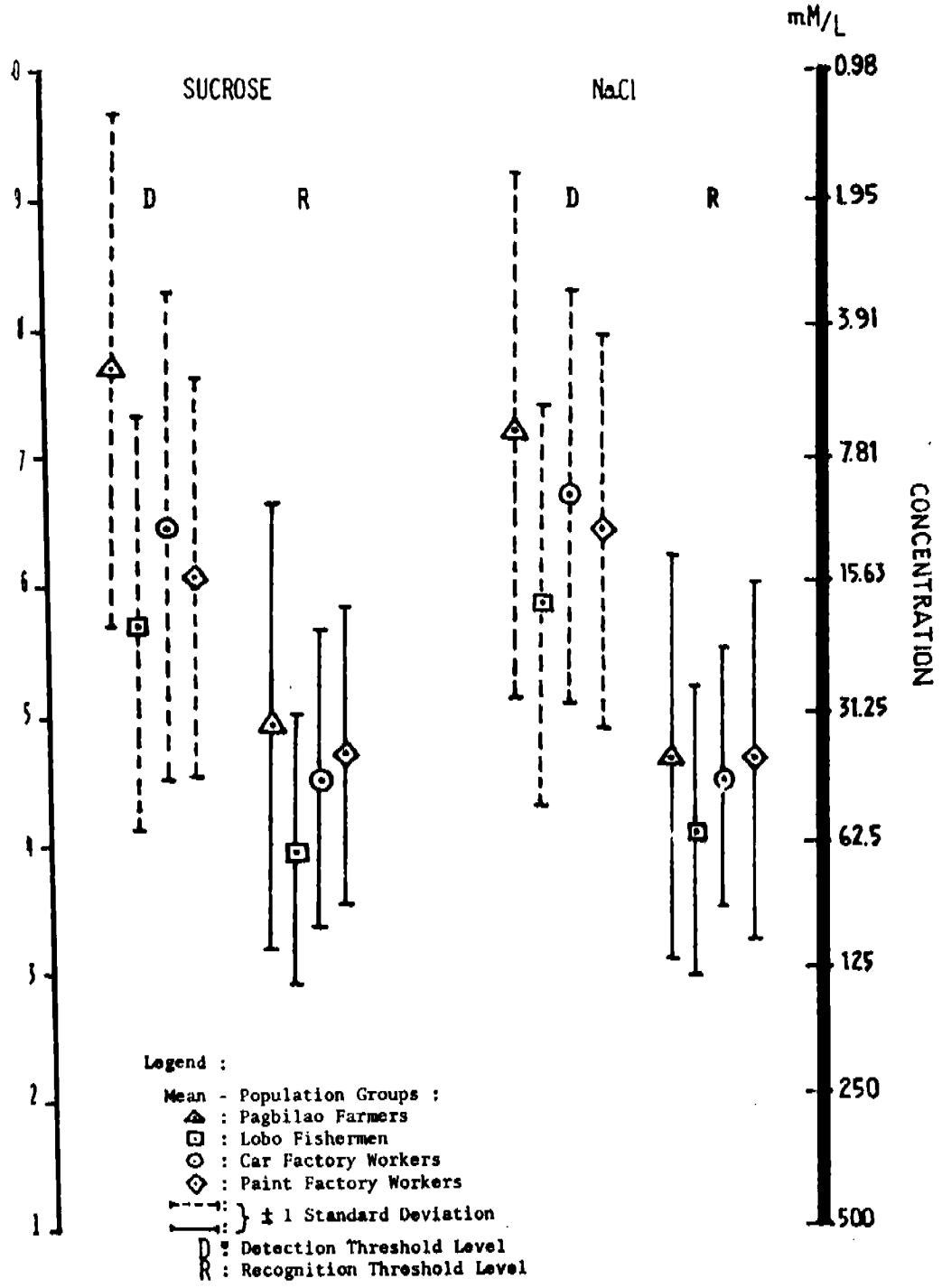


FIG.2 : Group Comparison of the Mean and ± 1 Standard Deviation Range of the Relative Detection and Recognition Taste Values of Urea and Hydrochloric Acid (HCl).

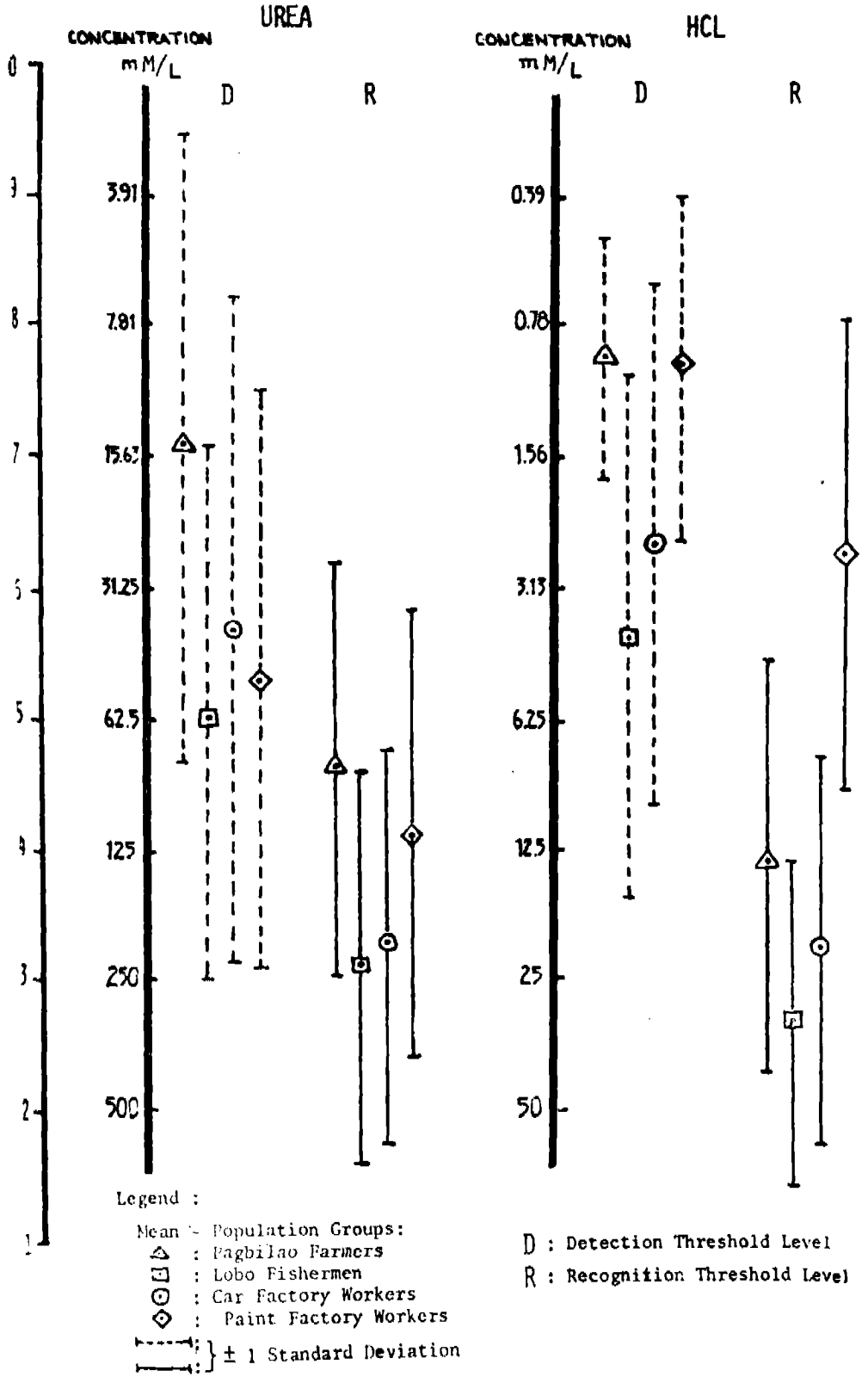


FIG 3 : Group Comparison of the Mean and ± 1 Standard Deviation Range of the Relative Detection and Recognition Smell Values of Pyridine and Nitrobenzene, and of the Blood Zinc (Zn) Levels.

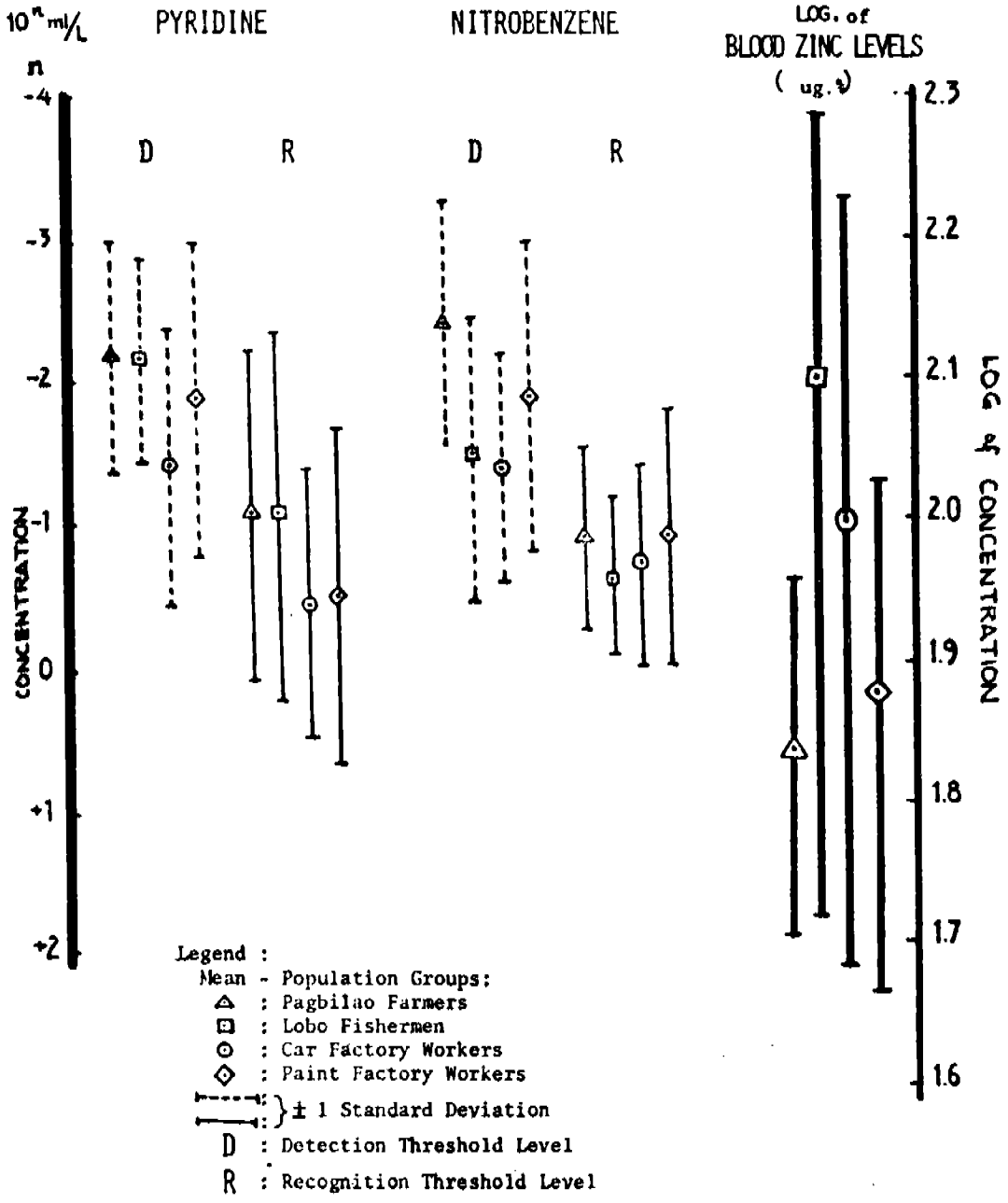


FIG.4 : Comparison of the Mean and ± 1 Standard Deviation Range of the Relative Detection and Recognition Taste Values for Sucrose, Sodium Chloride (NaCl), Urea, and Hydrochloric Acid (HCl) of Selected Rhinitis Patients Before and After Treatment.

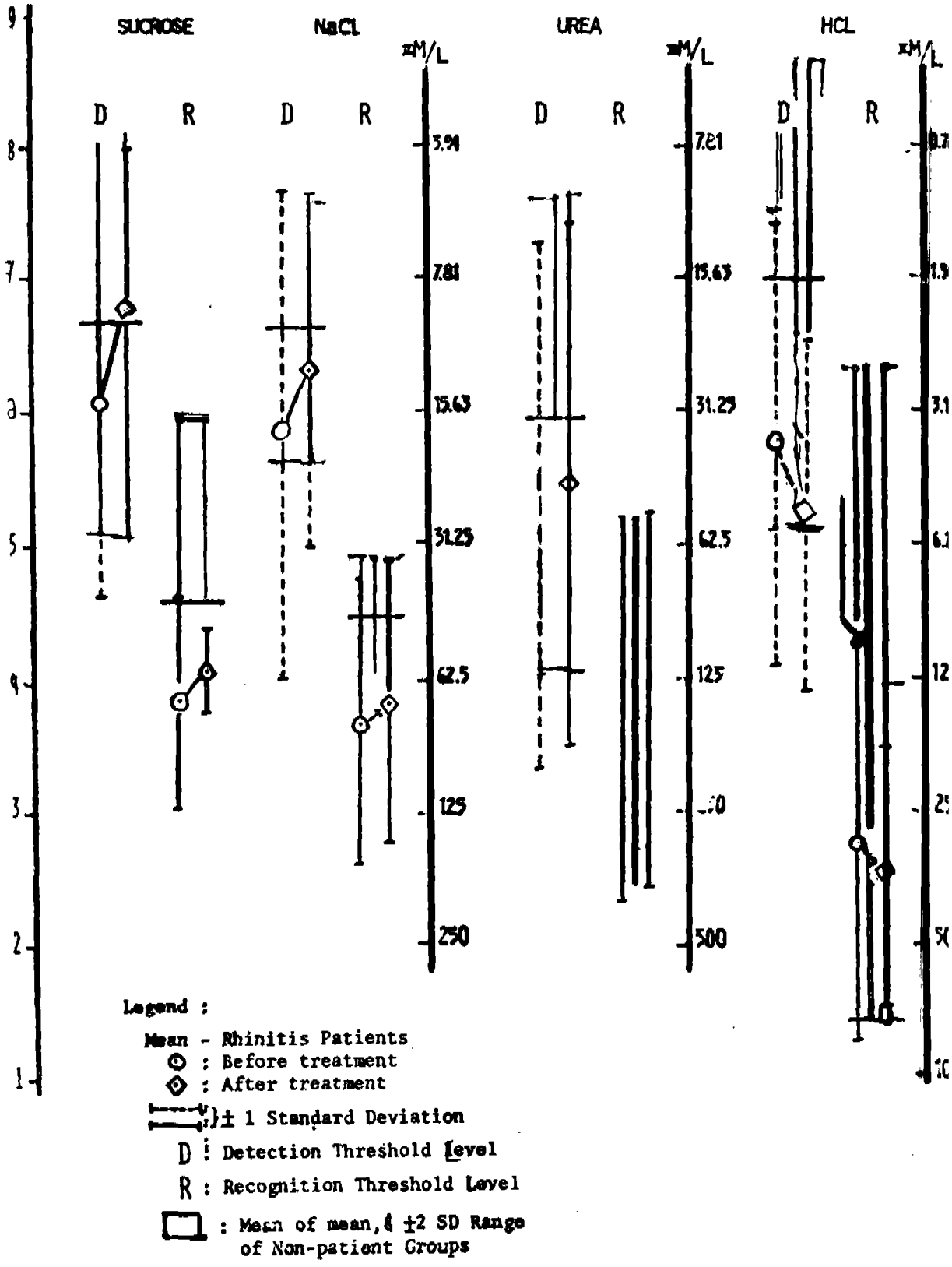
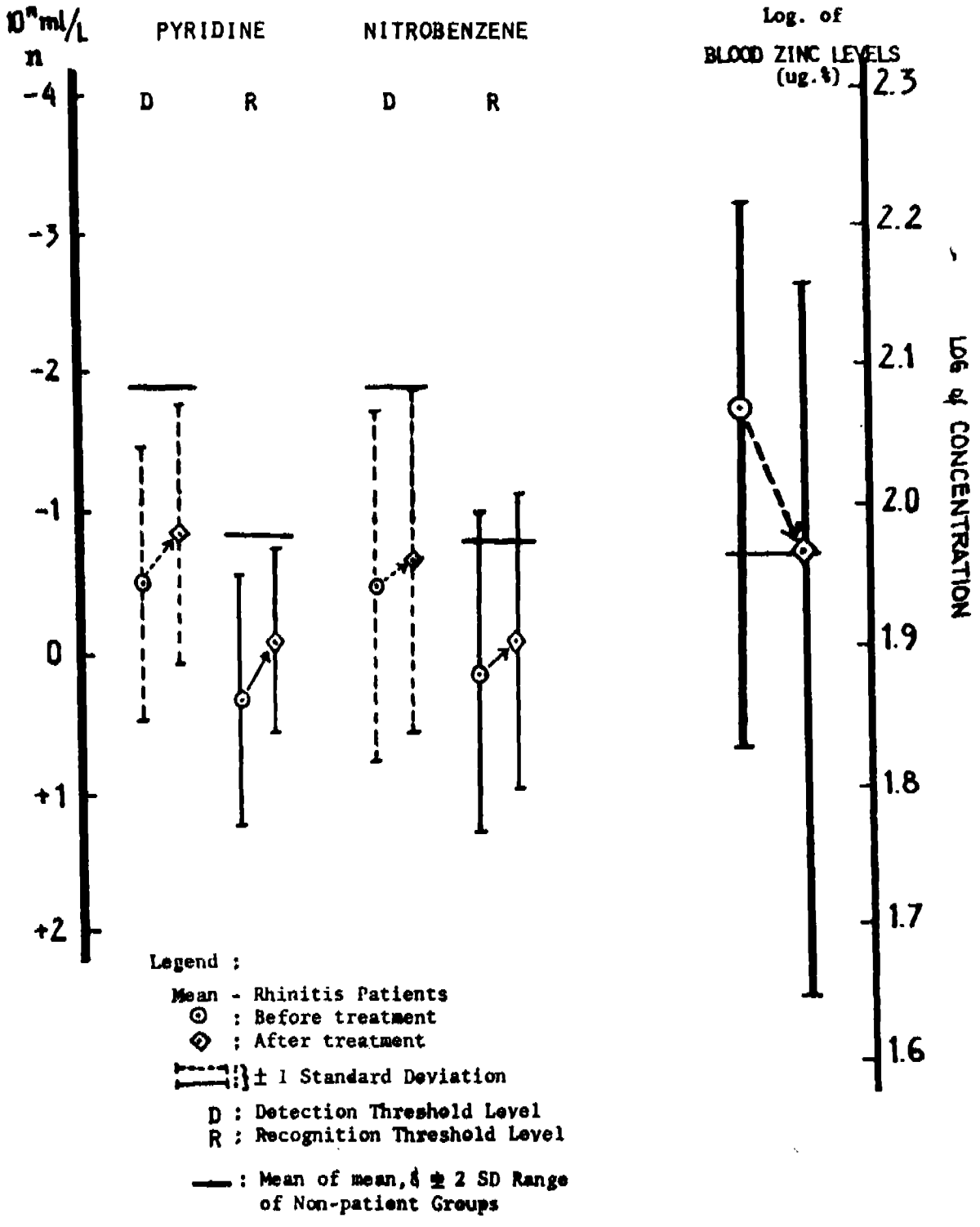


FIG.5 ; Comparison of the Mean and ± 1 Standard Deviation Range of the Relative Detection and Recognition Smell Values for Pyridine and Nitrobenzene, and of the Blood Zinc(Zn) Levels (ug.%) of Selected Rhinitis Patients Before and After Treatment.



NATIONAL RESEARCH COUNCIL OF THE PHILIPPINES
NRCP-SSF I. C. – 58 RESEARCH PROJECT

ON

ESSENTIAL TRACE ELEMENTS (ZINC) STUDIES IN RELATION TO TASTE AND SMELL ABNORMALITIES AMONG RP POPULATION SEGMENTS

F I N A L R E P O R T S

PART 2

TASTE AND SMELL THRESHOLD AND BLOOD ZINC LEVEL MEASUREMENTS ON ATROPHIC RHINITIS PATIENTS BEFORE AND AFTER TREATMENT

By

DR. GENEROSO T. ABES, DR. VICENTE L. SANTOS, DR. BENJAMIN C. CRUZ,
PROF. IRINEO L. LAWAS, JOSE RIZAL R. DELA CRUZ, AND
HERMELINO A. ANDRADA

MEDICAL DIVISION

FROM

PHILIPPINE GENERAL HOSPITAL AND COLLEGE OF MEDICINE
PHILIPPINE CENTER FOR THE HEALTH SCIENCES

1980

The Phil. Jour. of Oto. Head & Neck Surgery

TASTE AND SMELL THRESHOLD AND BLOOD ZINC LEVEL MEASUREMENTS ON ATROPHIC RHINITIS PATIENTS BEFORE AND AFTER TREATMENT*

Generoso T. Abes, M.D.[1], Vicente L. Santos, M.D.[2], Benjamin C. Cruz, M.D.[3], Irineo L. Lawas, B.S.Ch.[4], Jose Rizal R. dela Cruz, B.S.M.T. and Hermelino A. Andrada, B.S.M.T.[5]

INTRODUCTION

Atrophic rhinitis is a chronic nasal inflammation that was first described by Fraenkel (1876). The exact etiology of this disease which is known to be prevalent among poor and malnourished individuals is still not definitely known. Several characteristic features of atrophic rhinitis are, however, well established:

1. Atrophy of the nasal mucous membrane associated with foul odor crust formation.
2. Metaplasia of the normal pseudo-stratified columnar ciliated respiratory epithelium to stratified squamous respiratory epithelium.
3. Diminution of olfaction.

It is noted that although a patient with atrophic rhinitis has a nauseating smell in his nose, mercifully he does not smell it himself. This is because of the atrophic changes in the olfactory area and also the partial blockage of the nose by the middle turbinate crust.[1]

Little is presently known regarding the objective measurements of taste and smell functions among patients with atrophic rhinitis. Subjective improvement of these sensory modalities have been noted with effective therapy although no objective evidence of the fact have yet been presented.

In recent years, studies have been made regarding the possible role of trace metals in olfaction. Some investigators claim a correlation between blood zinc (Zn) level and hyposmia or anosmia.[2] In this study, we have attempted to determine whether we can establish a correlation between the clinical picture of atrophic rhinitis with smell and taste threshold and blood Zn levels.

MATERIALS AND METHODS

Thirteen patients from the out-patient clinic of the Department of Otolaryngology, Philippine General Hospital were included in this study. Each case was diagnosed as having atrophic rhinitis on the basis of the following criteria:

1. Chronic nasal disease.
2. Triad of nasal crust, foul odor and atrophied turbinates.
3. Histologic picture of stratified squamous instead of the normal pseudo-stratified columnar epithelium, as revealed by biopsy of the inferior tur-

* Financial support of this research study under the grant-in-aid of the National Research Council of the Philippines (NRCP-SSF LC-58 res. project) is gratefully acknowledged.

1 Consultant, Dept. of Otorhinolaryngology, UP-PGH Medical Center.

2 Consultant, Dept. of Otorhinolaryngology, UP-PGH Medical Center and Assoc. Professor (PT), College of Medicine, University of the Philippines.

3 Consultant, Dept. of Otorhinolaryngology, and Asst. Professor (PT), College of Medicine, UP-PGH Medical Center.

4 Consultant, and Professor of Medicine, College of Medicine, Dept. of Medicine, UP-PGH Medical Center.

5 Research Assistants, Medical Research Laboratory, UP-PGH Medical Center.

binate mucosal lining.

Taste thresholds were determined by a three (3) drops forced-choice method as described by Henkin[3] and modified by Lawas et. al.[4] Smell thresholds were measured by the sniff method adapted by the same authors. Ten milliliters of blood were extracted for blood plasma Zn determinations and were analysed using the atomic absorption spectrophotometric methods utilized by Lawas et. al in earlier research studies on trace metals.

Under local anesthesia using 10% xylocaine spray, punch biopsy of the middle part of the inferior turbinate was done. The specimen is then fixed in 10% neutral buffered formalin and stained with hematoxylin and eosin.

Each patient was given free medication for two weeks consisting of the following:

1. Oral antibiotics (Erythromycin) 500 mg. tablet twice a day.
2. Oral Vit. A (Arovit) two tablets (50,000 I.U./tab.) three times a day.
3. Parenteral Vitamin A (300,000 I.U.) injected intramuscularly on the deltoid muscle every three days for four doses.
4. Daily $NaHCO_3$ nasal irrigation (10 grams in one liter) 500 ml. per nostril.

To ensure that the medications were properly taken, each patient was told to come for follow-up after one week.

At the end of the two week therapy, a relevant history and physical examination were again undertaken. Subjective changes were particularly noted especially changes in the taste and smell of the patient. Taste and smell thresholds and blood plasma Zn levels were again determined using the same procedures utilized before therapy.

RESULTS

The statistical analysis of the relative taste and smell threshold and blood Zn levels of the atrophic rhinitis patients studied before and after their treatment are shown as follows:

Table 8: Statistical analysis of the relative taste and smell values and blood zinc levels (ug.%) of 13 atrophic rhinitis patients before and after treatment.

Table 4: Comparison of the mean and + 1 standard deviation range of the relative detection and recognition taste values for sucrose, sodium chloride, urea, and hydrochloric acid of selected rhinitis patients before and after treatment.

Fig. 5: Comparison of the mean and + 1 standard deviation range of the relative detection and recognition smell values for pyridine and nitrobenzene, and of the blood zinc levels (ug.%) of selected rhinitis patients before and after treatment.

Clinically, all patients showed varying degrees of improvement after treatment. Change in the physical appearance of the mucosa from dry to moist and disappearance of nasal crusts were the most frequent signs of clinical improvement. Fifty percent noted subjective improvement of smell sensation.

There was a noticeable reversion of the stratified squamous epithelium to normal pseudostratified columnar type after treatment in all cases. The transformation of the dry mucosa into the wet type was corroborated by the histologic finding of mucosa blanket in some of the cases.

As far as the taste and smell thresholds and the blood zinc levels are concerned, as can be appreciated in Table 8 and Figures 4 & 5, the following observations are noted:

1. The detection and recognition thresholds of all patients both before and after therapy fall within the range of normal among Filipino subjects.
2. There is an improvement in both the smell and taste capabilities as far as the mean detection and recognition thresholds are concerned after therapy, except for hydrochloric acid.

3. The improvement in both detection and recognition threshold after treatment is not statistically significant.
4. The overall findings in the smell and taste thresholds tend to conform with the general clinical improvement of the patients as a group after therapy.
5. The pre-treatment zinc levels were comparatively higher and became identical to the mean zinc level values of the non-patient population groups after therapy.

DISCUSSION

It is universally known that the olfactory sense of patients with atrophic rhinitis is impaired. It is also known that indirectly, the sense of taste is also affected. This is obviously so because of the presence of crust which mechanically blocks the ingress of odoriferous substances into the olfactory area which is located high up in the cribriform plate. Others believe that the lack of moisture resulting from atrophic changes in the epithelium and which is necessary in the normal physiology of olfaction causes the impairment of olfaction. Whether there is also an actual atrophy of the olfactory cells is still a question. Nevertheless, we can presume that after an effective therapy, the impaired olfaction of patients with atrophic rhinitis should improve.

As was mentioned earlier, the pre-treatment and post-treatment detection and recognition thresholds of the patients included in this study fall within the range of normal among Filipinos, although they tend to be in the lower bracket.[5] This is explained by the fact that the range of normal is so wide and the reason for this is still not definitely known. If we compare these values with the four groups of non-patients which were studied and is being reported in PART I of these Reports[5], the taste and smell capabilities of these atrophic rhinitis patients are still comparatively diminished even after therapy. But what is important is that there is a general tendency towards improvement of taste and smell capabilities after treatment which is in consonance with the clinical and histologic findings.

On the other hand, taste testing with hydrochloric acid showed a picture exactly opposite that of the other test substances. The reason for this is that sodium bicarbonate solution used as daily nasal irrigation as part of the treatment neutralized the hydrochloric acid during the testing procedures, hence, requiring more acid before the patient could detect or recognize the acidic taste.

The pre-treatment zinc levels of these patients were comparatively higher than the post-treatment levels. After treatment, there was a reduction of these values and they became identical with the mean zinc level values of the non-patient groups. Smith noted that zinc is important in Vitamin A metabolism and that effective metabolism of Vit. A causes an actual lowering of detectable zinc in the blood.[6]

CONCLUSION

In conclusion therefore, we can say that objective determinations of smell and taste as well as the blood zinc levels tally well with the status of the clinical picture in atrophic rhinitis. However, it must be noted that these values taken alone can not be considered as a measure of improvement after therapy.

References:

1. Abd El-Salam El Barbary, et. al.: Histopathological and Histochemical studies on atrophic rhinitis. J Laryngology and Otology 84: Oct. 1970.
2. Henkin RI, Schecter PJ, Hoye RM, et. al. Idiopathic hypogeusia with dysgeusia, hyposmia, and dysosmia. JAMA 217: 434-440, 1971.
3. Henkin RI, Schecter PJ, Friedewald W, Demets D, Raff M.: A double blind study of the effects of zinc sulfate on taste and smell dysfunction. Am J Med Sci 272: 285-299, 1976.
4. Lawas IL, Dela Cruz JRR: *Part 3:* Proposed Simple Quantitative Procedures for measuring taste and smell functions on conscious human subjects (Part 3 of terminal Reports on: "Essential Trace Element (Zn) Studies in Relation to taste and smell abnormalities on RP popu-

lation groups"). Report submitted to NRCP for publication. 1980.

5. Lawas IL, et.al. *Part I*: Taste and smell threshold measurements and blood zinc level studies in representative RP population groups (Part I of terminal Reports on: "Essential Trace Element (Zn) studies-n relation to taste and smell abnormalities among RP population segments"). Report submitted to NRCP for publication. 1980.
6. Smith JC. et.al.: Zinc: A trace element essential in Vitamin A metabolism. Science 181: 954-955. Sept. 1973.

NATIONAL RESEARCH COUNCIL OF THE PHILIPPINES
NRCP-SSF I.C.-58 RESEARCH PROJECT

ON

ESSENTIAL TRACE ELEMENTS (ZINC) STUDIES IN RELATION TO TASTE AND SMELL ABNORMALITIES AMONG RP POPULATION SEGMENTS

FINAL REPORTS

PART 3

PROPOSED SIMPLE QUANTITATIVE PROCEDURES FOR MEASURING TASTE AND SMELL FUNCTIONS ON CONSCIOUS HUMAN SUBJECTS

By

PROF. IRINEO L. LAWAS AND JOSE RIZAL R. DELA CRUZ

MEDICAL DIVISION

FROM

PHILIPPINE GENERAL HOSPITAL AND COLLEGE OF MEDICINE
PHILIPPINE CENTER FOR THE HEALTH SCIENCES

1980

The Phil.
Jour. of Oto.
Head & Neck Surgery

PROPOSED SIMPLE QUANTITATIVE PROCEDURES FOR MEASURING TASTE AND SMELL FUNCTIONS ON CONSCIOUS HUMAN SUBJECTS*

Ireneo L. Lawas, B.S.Ch.[1]. and Jose Rizal R. dela Cruz B.S.M.T.[2]

INTRODUCTION

Our five senses are vital sensory terminals of our body to enable us to deal or react with our environment. Whereas our present health system has fairly adequate concern with our senses of sight and hearing, little interest has been given for our senses of touch, taste, and smell. This is due to the fact that derangement of these last three senses do not usually incapacitate us and often times, we succeed in adapting to the changes especially if these changes take place gradually. As a consequence, therefore, these three areas have not been fully explored up to now.

To enable us to investigate the sensory capabilities of taste and smell, we are presenting a detailed methodology for quantitative measurement of:

1. Taste: for sweet, salty, bitter, and sour assessment.
2. Smell: for 2 characteristic odors (ammonia-like, and vanilla-like) using solutions of pure chemicals.

We have used these procedures on our studies of:

1. Four groups of workers under different environmental conditions and economic levels.

2. Patients with atrophic rhinitis before and after their treatment.

We hope that these procedures will be simple enough and convenient to follow so that they may be adapted in future studies on taste and smell functions. Although the methods described here are subjective, comparative differences are easy to appreciate.

MATERIALS AND METHODS

I. OBJECTIVE MEASUREMENT OF TAST

Reagents and materials preparation

A. Reagents
   1. Sucrose (Saccharose, AR)
   2. Sodium Chloride (AR)
   3. Urea (AR)
   4. Hydrochloric Acid (12 N HCl)

B. Materials: Vials (10 ml. capacity) with dropper

C. Preparation of Solutions

   1. Stock Solutions: See Appendix 1
   2. Test solutions:

Test solutions for the 4 solutes are prepared from the stock solutions in 10 different dilutions corresponding to 10 different test concentrations per solute as outlined in Appendix 2 A to 2 D. Each solute is prepared in a set of 10 droppervials arbitrarily numbered from 1 to 10 which is also utilized as the Relative Test Value (RTV) for the Detection and Recognition

* Supported by the National Research Council of the Philippines, under the NRCP-SSF I.C.-58 research grant entitled: "Essential Trace Element (Zinc) Studies in Relation to Taste and Smell Abnormalities Among RP Population Groups".

[1] Professor of Medicine, College of Medicine, Consultant, Dept. of Medicine, and Section Head, Clinical Chemistry and Biomedical Computer Section, Medical Research Laboratory, UP-PGH Medical Center.

[2] Research Assistant, Medical Research Laboratory, UP-PGH Medical Center

Threshold levels. Thus, the higher the number of the vial, the lower the corresponding equivalent concentration; or the higher the RTV, the lower is his taste capability. The RTV is directly proportional to the negative log of the concentration as has been utilized in our statistical analyses.

Taste Measurement procedures

With these prepared test solutions in dropper vials, taste measurement of the subject is accomplished by presenting drops of 10 different concentrations of solute for each of the 4 taste qualities succesively, along with distilled water as control, on the surface of the subject's tongue. In process, for every tastant solution tested, the subject is given 3 drops of solution: the first drop is water (control): the second is the tastant test solution; and the third is again water (as a re-check and to wash off the remaining test solutions on the tongue.) It is suggested that prior to dropping the solutions, the subject should be informed that the first and the third drops he is given is water, and the second drop alone being the test solution which is to be compared with the first and last drops. We have found that such prior information facilitates the judgement of the subject regarding the comparison of tastes.

Evaluation of taste threshold level

To determine the threshold of each taste quality objectively, the subject is asked to taste each drop applied to his tongue and to note responses: first, whether the 2nd drop (tastant test solution) applied is similar or different from the 1st and 3rd drops (water as control); and second, if it is different, what is its characteristic taste: sweet?, salty?, bitter?, or sour?, In general, from the 10 different concentrations of each test solute applied, the lowest concentration of the solute which the subject can consistently distinguish as having a taste different from water is noted as the *Detection threshold level*. After obtaining the detection threshold, the lowest concentration of the solute which the subject can consistently recognize or correctly identify as either sweet, salty, bitter, or sour, is noted as the Recognition threshold level.

It should be noted that in evaluating the detection and recognition threshold levels of the subject, it is the *vial numbers* of the test solutions which are recorded as the *Relative Taste Values* (RTV) and not the corresponding equivalent concentrations. Thus, the highest vial number of test solution that the subject detects or recognizes is the arbitrary measure of his taste capability. Without the subject being so informed, testing for each test set begins with the vial of test solution having the lowest concentration and increased stepwise until he reaches his recognition threshold. Threshold levels are determined in one taste quality before proceeding to the next set of test solutions.

II OBJECTIVE MEASUREMENT OF SMELL

Reagents and materials preparation

A. Reagents

1. Pyridine (Stock, AR, with concentration of 12.36 mM/l).
2. Nitrobenzene (Stock, LAB, with concentration of 9.75 mM/l).
3. Mineral oil

B. Materials: Screw capped tubes (30 ml. capacity).

C. Preparation of solutions: See Appendix 3A and 3B.

1. Pyridine test solutions are prepared in 10 different concentrations ranging from 100 ml/l to 0.0001 separately in 10 screw capped tubes numbered 1 to 7 as outlined in Appendix 3A. Distilled water is used as diluent.
2. Nitrobenzene test solutions are prepared in 10 different test concentrations ranging from 100 ml/l to 0.0001 ml /l. separately in 10 screw capped tubes numbered 1 to 7 as outlined in Appendix 3B. Mineral oil is used as the diluent.

To measure the smell threshold levels, the *tube numbers* are utilized to represent the *Relative Smell Values (RSV)*. In order to obtain sufficient vapor for testing, the tubes should be half-filled with the test

solutions and should be shaken vigorously before every test.

Smell measurement procedures.

With these prepared test vapor solutions of pyridine and nitrobenzene, smell measurement of the subject is accomplished by the standard stimulus sniff technique in a sequence similar to that used for taste threshold measurement. Here, the subject is asked to sniff the vapors of pyridine and of nitrobenzene test solutions and to compare the odor of the test solution presented with the vapors above each of 2 control solutions, namely distilled water for pyridine and mineral oil for nitrobenzene. Thus, for every test solution tested, the subject is presented 3 vapor solutions: first, the control solution, second, the test vapor solution, and third is again the control solution. It is recommended that prior to presenting the smell test solutions, the tubes should be first shaken to obtain sufficient vapor for sniffing, and should be about half an inch away from the nasal passage of the subject while sniffing. Testing begins with the tube of test solution with the lowest concentration, followed with the next tubes in increasing concentrations until the subject reaches his recognition threshold.

Evaluation of smell threshold levels

Detection and recognition responses are noted in the manner similar to that used for measuring taste thresholds. From the 10 different test concentrations of pyridine or of nitrobenzene, the lowest concentration which the subject can consistently distinguish as having a smell different from the control solution is noted as the *Detection threshold level*, and similarly, the lowest concentration which he can consistently and correctly recognize or identify as having an odor that is characteristic of pyridine, or of nitrobenzene is noted as his *Recognition threshold level*. To recognize pyridine smell quality, the characteristic odor is similar to that given by ammonia, onion, or garlic. A bitter-almond or vanilla-like odor is characteristic of nitrobenzene. In the same manner as that used for evaluating taste thresholds, smell threshold levels are evaluated by utilizing the *tube numbers* of the test solutions to represent the RSV. These RSV are determined in one smell quality before proceeding to the next.

RESULTS

The relative values (RTV and RSV) for taste and smell threshold levels are shown in Tables 1 and 2. These are the mean values from four population groups composed of two hundred sixty one (261) subjects. Plus and minus 2 standard deviation range (+ 2 SD) are also given for the recognition and detection capability for each test substance.

Table 1: Suggested relative taste values (RTV) for Filipino population (mean and +2 SD range values).

Table 2: Suggested relative smell values (RSV) for Filipino population (mean and +2 SD range values).

A detailed report of our studies on the 4 population groups mentioned is presented in a separate paper, as PART I of these Reports (see Reference 4). Likewise, our findings on our studies of taste and smell threshold levels atrophic rhinitis patients is discussed in PART 2 (see Reference 1).

DISCUSSION

I. TASTE THRESHOLD

We are aware of the complexity of the sensory mechanism of taste in the oral cavity. We are also aware that there are many qualities of taste, the mechanism of their detection varying from one quality to the other. We also know that the sensory nerve endings for taste are not only confined on the surface and tip of the tongue but also on other surface areas of the mouth especially the palate. Without a detailed discussion of this point, we are limiting our proposed procedure for taste measurement to 4 taste qualities. Two of these are recognized by the sensory nerve endings more or less concentrated on the tongue and the other bisensory ending located on the palate. Because of this observation, we require the subject to remove detachable dental prosthesis prior to taste testing.

It will be noted in the tabulations of the different taste test solutions (Appendix 2 A to D) that the concentration of each test solution in a vial is half the concentration of the preceding vial. To simplify the comparison of the taste capability from individual to individual or between population groups, we are suggesting the utilization of the vial number of the test solution to represent the *Relative Taste value* (RTV) instead of the corresponding equivalent concentration of the test solution. In our statistical analysis as shown in Table 1, it will be noted that the figures presented for the relative threshold values for Filipinos are the vial numbers of the test solutions instead of the equivalent concentrations. These vial number are utilized as the taste test scales or the RTV. The +2 SD range may be considered as the overall normal range of our population.

II. SMELL THRESHOLD

Similarly, without going into detail to the physiology of smell, the procedure we are presenting covers the use of 2 different chemical substances, pyridine and nitrobenzene. As will be noted in Appendix 3A and Appendix 3B, the test solutions of these 2 chemical substances are prepared in such a way that the consecutive tube number of the test solution is one tenth (1/10) of the preceding tube. Unlike in taste measurement where test taste solutions come in contact directly with the sensory system, in smell measurement, the test solutions produces vapors of the test substances which interact with the sensory system. The concentration of the test vapor in the gas phase is related to the concentration of the chemical substance in the test solution. This justify the use of tube numbers of the test solution as the relative expression of the smell threshold level.

Weak subjects, as well as those who have breathing problems are not subjected to this test. Aside from the fact that there is no immediate justifiable value to such subject, the result expected to be inaccurate. The effort exerted to smell will be abnormal.

For simplicity of the comparison of smell capability from individual to individual or between population groups, we are also suggesting the utilization of the *tube number* of the test solutions, similar to taste measurement. Table 2 shows the relative threshold values (RSV) for smell measurement for Filipinos expressed in terms of the tube numbers of the test solutions.

CONCLUSIONS

1.) The proposed taste and smell quantitative measurements, with RTV and RSV units, offer a simplified procedure to assess variations of these sensory capabilities in health and disease.

2.) The test solutions, with their concentrations directly related to RTV and RSV, are convenient and simple to prepare and reproduce.

REFERENCES

1. Abes GT, Santos VL, Cruz BC, Lawas IL, De-la Cruz JRR, Andrada HA: Part 2: Taste and Smell Threshold and Blood Zinc level measurements on atrophic rhinitis patients before and after treatment (as part of *Terminal Reports* on: "Essential Trace Elements (Zn) Studies in relation to taste and smell abnormalities among RP population groups"). Report submitted to NRCP for publication, 1980.
2. Henkin RI, Schecter PH Hoye RM, et.al.: Idiopathic hypogeusia with dysgeusia, hyposmia, JAMA 217: 434-440, 1971.
3. Lawas IL, et.al.: Blood Zinc levels, taste and smell threshold measurements on normal subjects (Preliminary Report). Acta Medica Philippina 15: 43-50, 1979.
4. Lawas IL, et.al.: Part I Taste and smell thresholds measurements and blood zinc level studies in representative RP population groups. (as part of *Terminal Reports on:* "Essential trace element (Zn) studies in relation to taste and smell abnormalities among RP population groups"). Report submitted to NRCP for publication, 1980.

APPENDIX I – AN OUTLINED PROCEDURE FOR PREPARING STOCK SOLUTIONS FOR TASTE MEASUREMENT

A. SUCROSE STOCK (Concentration: 2,023mM/L.)

1. Weigh 75 grams sucrose (Saccharose).
2. Dilute with distilled water up to

100 ml.

3. Warm solution at 60-70°C for 1-2 hours.
4. Leave solution at room temperature with occasional shaking.
5. Let solution stand overnight at room temperature.
6. Use supernate for preparing sucrose working taste test solutions..
7. Concentration of the prepared sucrose stock solution is 2.023 mM/L.

B. SODIUM CHLORIDE STOCK (Concentration: 3,000 mM/L.)

1. Weight 17.4 grams dried NaCl (AR).
2. Dissolve in distilled water to make 100 ml. volume.
3. Shake solution before taking aliquot volume for preparing NaCl working taste test solutions.
4. Concentration of the prepared NaCl stock solution is 3,000 mM/L.

C. UREA STOCK (Concentration: 5,000 mM/L.)

1. Weigh 30 grams dried Urea.
2. Dissolve in distilled water to make 100 ml. volume
3. Shake solution before taking aliquot volume for preparing Urea working taste test solutions.
4. Concentration of the prepared Urea stock solution is 5,000 mM/L.

D HYDROCHLORIC ACID STOCK (Concentration: 500 mM/L., or 0.5 NHCl).

1. Measure 92 ml. distilled water.
2. Add 4 ml. concentrated Hydrochloric Acid (12 N HCl).
3. Shake solution before taking aliquot volume for preparing HCl working taste test solutions.
4. Concentration of the prepared HCl stock solution is 500 mM/L. or 0.5 N HCl

Note:

*mM/L. denotes concentration in Millimoles/Liter

APPENDIX 2 A – AN OUTLINED PROCEDURE FOR PREPARING SUCROSE TASTE TEST SOLUTION

Sucrose Stock Solution: Saturated sucrose solution in water with concentration solution in water with concentration of 2,023 mM/L., or 69.2%.

Diluents: Distilled water.

Preparation: From the prepared saturated stock solution of Sucrose, take aliquot volumes of the supernate to make 10 different sucrose tastant solutions, each with a different concentration ranging from the highest tastant concentration of 500 mM/L. to the lowest tastant concentration of 0.98 mM/L. in 10 separate vials marked 1-10.

Vial Number	OUTLINED PREPARATION		Equivalent Concentration (mM/L.)
	Distilled water	Add	
1	3.75 ml.	1.25 ml. from saturated Stock Solution	500 mM/L.
2	2.50 "	2.50 ml. from vial No. 1	250.00
3	2.50 ml.	2.50 ml. from vial No. 2	125.00
4	2.50 ml.	2.50 ml. from vial No. 3	62.50
5	2.50 ml.	2.50 ml. from vial No. 4	31.25
6	2.50 ml.	2.50 ml. from vial No. 5	15.625
7	2.50 ml.	2.50 ml. from vial No. 6	7.81
8	2.50 ml.	2.50 ml. from vial No. 7	3.90
9	2.50 ml.	2.50 ml from vial No. 8	1.95
10	2.50 ml.	2.50 ml from vial No. 9	0.98

APPENDIX 2 B – AN OUTLINED PROCEDURE FOR PREPARING SODIUM CHLORIDE TASTE TEST SOLUTIONS

Sodium Chloride Stock Solution with concentration of 3,000 mM/L.
Diluent: Distilled water
Preparation: From the prepared NaCl stock solution, take aliquot volumes to make 10 different NaCl tastant solutions, each with a different concentration ranging from the highest concentration of 500 mM/L. to the lowest concentration of 0.98 mM/l. in 10 different or separate vials marked 1-10.

VIAL Number	Distilled water	OUTLINED PREPARATION Add	Equivalent concentration (mM/L.)
1	5.0 ml.	1.0 ml. from stock solution	500.00
2	2.5 ml.	2.5 ml. from vial no. 1	250.00
3	2.5 ml.	2.5 ml. from vial No. 2	125.00
4	2.5 ml.	2.5 ml. from vial No. 3	62.50
5	2.5 ml.	2.5 ml. from vial No. 4	31.25
6	2.5 ml'	2.5 ml. from vial No. 5	15.625
7	2.5 ml.	2.5 ml. from vial No. 6	7.81
8	2.5 ml.	2.5 ml. from vial No. 7	3.90
9.	2.5 ml.	2.5 ml. from vial No. 8	1.95
10	2.5 ml.	2.5 ml. from vial No. 9	0.98

APPENDIX 2 C – AN OUTLINED PROCEDURE FOR PREPARING UREA TASTE TEST SOLUTIONS

Urea Stock Solution: Prepared solution with concentration of 5,000 mM/L.
Diluent: Distilled water
Preparation: From the prepared Urea stock solution, take aliquot volume to make 10 different urea tastant solutions, each with a different concentration ranging from the highest concentration of 1,000 mM/L. to the lowest concentration of 1.95 mM/L. in 10 separate vials marked 1-10.

Vial Number	Distilled water	OUTLINED PREPARATION Add	Equivalent concentration (mM/L.)
1	4.0 ml.	1.0 ml. from Urea stock solution	1,000.00
2	2.5 ml.	2.5 ml. from vial No. 1	500.00
3	2.5 ml.	2.5 ml. from vial No. 2	250.00
4	2.5 ml.	2.5 ml. from vial No. 3	125.00
5	2.5 ml.	2.5 ml. from vial No. 4	62.50
6	2.5 ml.	2.5 ml. from vial No. 5	31.25
7	2.5 ml.	2.5 ml. from vial No. 6	15.625
8	2.5 ml.	2.5 ml. from vial No. 7	7.8125
9	2.5 ml.	2.5 ml. from vial No. 8	3.90
10	2.5 ml.	2.5 ml. from vial No. 9	1.95

APPENDIX 2 D – AN OUTLINED PROCEDURE FOR PREPARING HYDROCHLORIC ACID TASTE TEST SOLUTIONS

Hydrochloric Acid Stock Solution: HCl prepared solution with concentration of 500 mM/L or 0.5 N H CL.

Diluent: Distilled water

Preparation: From the prepared HCl stock solution, take aliquot volumes to make 10 different HCl tastant solutions, each with a different tastant concentration ranging from the highest concentration of 100 mM/L. to the lowest concentration of 0.195 mM/L. in 10 separate vials marked 1-10.

Vial Number	Distilled water	OUTLINED PREPARATION Add	Equivalent Concentration (mM/L.)
1	4.0 ml.	1.0 ml. from HCL stock solution	100.00
2	2.5 ml.	2.5 ml. from vial No. 1	50.00
3	2.5 ml.	2.5 ml. from vial No. 2	25.00
4	2.5 ml.	2.5 ml. from vial No. 3	12.50
5	2.5 ml.	2.5 ml. from vial No. 4	6.25
6	2.5 ml.	2.5 ml. from vial No. 5	3.125
7	2.5 ml.	2.5 ml. from vial No. 6	1.5625
8	2.5 ml.	2.5 ml. from vial No. 7	0.78
9	2.5 ml.	2.5 ml. from vial No. 8	0.39
10	2.5 ml.	2.5 ml. from vial No. 9	0.195

APPENDIX 3 A – OUTLINED PROCEDURE FOR PREPARING PYRIDINE WORKING TEST SOLUTIONS FOR SMELL THRESHOLD MEASUREMENT

Pyridine Stock Solution: Pyridine (AR) with concentration of 12.36 mM/L. (Mol. Wt=79.10).

Diluent: Distilled water

Preparation: Take aliquot volumes of pyridine reagent to make 10 different pyridine working test solutions, each with a different concentration ranging from the highest concentration of 10^{-2} ml/L. or 100 ml/L. to the lowest concentration of 10^{-4} ml/L. or 0.0001 ml/L. in 10 separate tubes marked 1-7.

TUBE Number	Distilles water	OUTLINED PREPARATION Add	EQUIVALENT CONCENTRATION (10^n ml/L.) or	(ml/L.)
1	9.0 ml.	1.0 ml. pyridine stock soln	n = 2	100
2	9.0 ml.	1.0 ml. from tube No. 1	n = 1	10
3	9.0 ml.	1.0 ml. from tube No. 2	n = 0	1
4	9.0 ml.	1.0 ml. from tube No. 3	n = -1	.1
5	18.0 ml.	2.0 ml. from tube No. 4	n = -2	.01
5.25	4.4 ml.	5.6 ml. from tube No. 5	n = -2.25	.0056
5.50	6.8 ml	3.2 ml. from tube No. 5	n = 2.50	.0032
5.75	8.2 ml.	1.8 ml. from tube No. 5	n = 2.75	.00178
6	9.0 ml.	1.0 ml. from tube No. 5	n = -3	.001000
7	1.0 ml.	1.0 ml. from tube No. 9	n = -4	.0001000

9								
2								
78								
000								
1000								

ENTRATION

5								
25								
5								

M/L.

TABLE 1: SUGGESTED RELATIVE TASTE VALUES (RTV) FOR I (N = 261)

ATION*

TASTE SOLUTION	X + SE	SD	DETECTION X+2 SD	X-2 SD	X+SI	NITION X+2 SD	X -2 SD
SUCROSE	6.62 + .19	0.78	8.18	5.06	4.56	6.02	3.10
SODIUM CHLORIDE	6.61 + .19	0.51	7.63	5.59	4.48	4.94	4.02
UREA	5.93 + .21	0.85	7.63	4.23	3.86	5.18	2.54
HYDROCHLORIC ACID	6.92 + .19	0.90	8.72	5.12	3.91	6.39	1.43

TABLE 2: SUGGESTED RELATIVE SMELL VALUES (RSV) FOR FI (N = 261)

TION*

SMELL SOLUTION	X + SE	SD	DETECTION X +2 SD	X-2 SD	X +	NITION X-2 SD	X-2
PYRIDINE	4.84 + .15	0.38	5.60	4.08	3.80	4.40	3.20
NITROBENZENE	4.84 + .15	0.44	5.72	3.96	3.78	4.02	3.50

nd: * Figures denotes the vial or tube numbers of the test solutions which are expres
These numbers are also utilized to represent the relative threshold levels (RTV
lation.

Mean Values SE: Standard Error of the Mean SD: Standard Devia

values.
no popu-

ber of subjects
analysed

APPENDIX 3 – B – OUTLINED PROCEDURE FOR PREPARING NITROBENZENE WORKING TEST SOLUTIONS FOR SMELL THRESHOLD MEASUREMENT

Nitrobenzene Stock Solution: Nitrobenzene (LAB) with concentration of 9.75 mM/L (Mol. Wt = 123.11)

Diluent: Mineral oil

Preparation: Take aliquot volumes of nitrobenzene reagent to make 10 different concentrations ranging from the highest concentration of 10^{-2} ml/L or 100 ml/L to the lowest concentration of 10^{-4} ml/L or 0.0001 ml/L, in 10 separate tubes marked 1-7.

Tube	OUTLINED PREPARATION		EQUIVALENT CONCENTRATION	
Number	Mineral Oil	A d d	(10^n ml/L) or	(ml/L.)
1	9.0 ml	1.0 ml. Nitrobenzene Stock Soln	n = 2	. 100
2	9.0 ml	1.0 ml. from tube No. 1	n = 1	. 10
3	18.0 ml	2.0 ml. from tube No. 2	n = 0	. 1
3.25	4.4 ml.	5.6 ml. from tube No. 1	n = -0.25	. 562
3.50	6.8 ml.	3.2 ml. from tube No. 1	n = -0.5	. 316
3.75	8.2 ml.	1.8 ml. from tube No. 1	n = -0.75	. 178
4	9.0 ml.	1.0 ml. from tube No. 3	n = -1.0	. 1
5	9.0 ml.	1.0 ml. from tube No. 7	n = -2.0	. 01
6	9.0 ml.	1.0 ml. from tube No. 8	n = -3.0	. 001
7	9.0 ml.	1.0 ml. from tube No. 9	n = -4.0	. 0001

The Phil.
Jour. of Oto.
Head & Neck Surgery

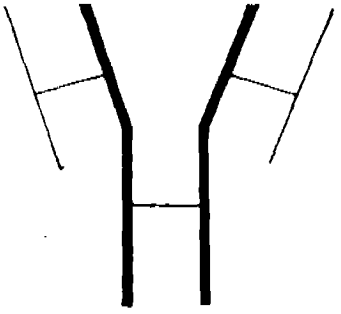
IMMUNOLOGIC ASPECTS OF ALLERGIC RHINITIS: AN UPDATE*

Ma. Fita Pascual-Guzman, M.D.**

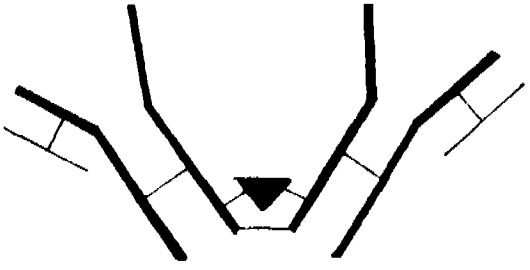
Nasal allergy can be defined as a form of deranged immune defense characterized by exaggerated reactivity of the nasal mucosa to "non-self" agents as brought about by antigen-antibody reaction. This exaggerated response would otherwise not be elicited adversely among normal subjects. For an individual to be sensitized to these "non-self" agents, several factors are involved, namely:

1. "Genetic" factors (atopic predisposition)
2. Environmental factors, which refer to all allergen exposures
3. Local factors in the actual tissue.

The first step in sensitization is penetration of the antigen through mucosal surfaces. There have been studies particularly by Salvaggio, Buckle and Cohen (1975) that showed those with nasal allergies had abnormally increased mucosal permeability for albumin. In a different study, Rudolf et al showed that a group of asthmatics with allergic rhinitis had decreased trypsin inhibitor. Trypsin is one of the components of leukocyte enzyme which if not inhibited will wreak havoc by destroying the mucosa. Furthermore, the order of trypsin inhibitor deficiency in that study showed those with bronchial asthma with allergic rhinitis had the least trypsin inhibitor, followed by those with allergic rhinitis, then by normals.



IgG
IgE
Serum IgA



Secretory IgA
SIgA

Fig. 1

DIAGRAMS OF COMPARATIVE STRUCTURES OF IgG, IgE, SERUM IgA AS MONOMERS WITH 2 LIGHT AND 2 HEAVY CHAINS WHILE SIgA IS A DIMER WITH SECRETORY COMPONENT

* Presented before the Wednesday Conference – Dept. of Otolaryngology – U.P. P.G.H. Medical Center.

** Resident Physician, Department of Ear, Nose, and Throat, U.P.-P.G.H. Medical Center

Aside from the mucosal barriers, the predominant immunoglobulin in the nasal secretion is Immunoglobulin A (IgA) (Fig. 1). The latter maybe of importance for surface elimination of antigens (microorganisms as well as allergens). In allergy, secretory IgA (SIgA) antibodies have been shown to decrease intestinal uptake of allergenic macromolecules (ie. albumin) in rats. Soothill has suggested that the fundamental abnormality of atopic individuals is an IgA deficiency so that the allergens could not adequately be eliminated from the mucous membrane. Thus, they persist and accumulate and stimulate the IgE immune system. However, this hypothesis is not consistent with the fact that allergic patients have normal levels of IgA in the serum, sputum and nasal secretions (Salvaggio). Neither have hay fever patients with less SIgA to pollen than controls. But an IgA deficiency may be transitory. Some investigators though support the latter. Taylor, for instance, demonstrated that children of atopic parents who develop allergy early in life had a significantly lower level of serum and salivary IgA at an age of three months compared to those who did not. Another postulate is that the IgA deficiency maybe qualitative (e.g. low affinity or avidity for the antigen).

The antigens once they have crossed the mucosal barriers are processed by the macrophages which stimulate or pass on the information thus gained to the immunocompetent lymphocytes (Fig. 2). As a result, the B-lymphocytes are stimulated. They multiply and are transformed into plasma cells. Since B-lymphocytes are under the control of T-cells (helper and suppressor cells), nasal allergy is said to be due to decreased activity of the suppressor cells or increased activity of the helper cells. The

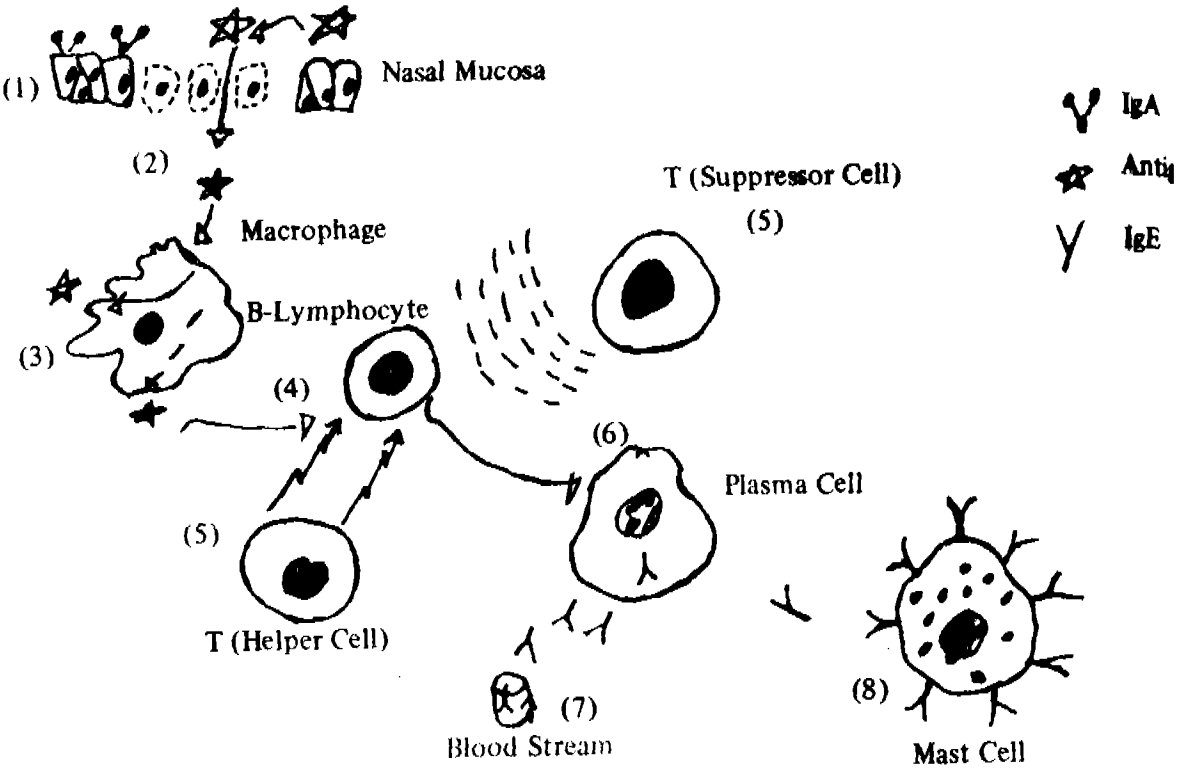


Fig. 2 – SEQUENTIAL STEPS IN THE SENSITIZATION PROCESS

plasma cells synthesize IgE antibody which reach the mast cells and the basophils via the blood and tissue fluid.

IgE Antibody Formation

IgE is synthesized by the human fetus from the eleventh week of gestation. This means that the fetus is provided with the potential for developing active sensitization to allergens that may cross the materno-fetal barrier. The serum IgE level steadily increases after birth until school age, remains fairly steady from 5-15 years but during puberty decreases rapidly to adult level. Therefore, IgE levels are higher in children than adults and maybe related to the fact that certain childhood allergies maybe outgrown.

During sensitization, specific IgE antibodies become detectable and the level of total IgE increases. In patients with allergic rhinitis, the levels are maximum about 1 month after the end of the pollen season. They decrease slowly and reach a minimum before the next pollen season.

Tada and Ishikaza investigated the distribution of IgE-forming cells in lymphoid tissue of man and monkeys. They noted the IgE-forming plasma cells primarily in the respiratory and gastrointestinal mucosa and the regional lymph nodes. Few IgE plasma cells were seem in the spleen or in the subcutaneous lymph node. Consequently, IgE antibodies detectable in the plasma and the skin are considered to result from overactivity of local synthesis. It follows then that sensitization of the skin to inhalant allergen without concurrent sensitization of airway mucosa does not occur, while sensitization especially of the upper airways without demonstrable antibodies in the plasma or the skin is a great possibility.

Mast Cell and Basophil Degranulation

In Type I hypersensitivity reaction, the degranulation of mast cells is the mediator mechanism. Degranulation is actually the liberation of chemical mediators which are also known as **autacoids** (Fig. 3). Morphologically and functionally, similarities between mast cells and basophils were shown to exist. However, it has been impossible to isolate human mast cells for experimental work. Most of the information on the latter was obtained from rat peritoneal mast cell.

Degranulation is brought about by reaction between allergen and IgE on the cell membrane. The IgE molecules are bound to the cell by the F_c fragment so that the F_{ab} fragment, capable of reaction with the allergen are free. The average number of IgE molecules/basophil has been determined to be between 10,000-40,000 and is in the same magnitude in allergic and non-allergic individuals though slightly higher in allergic subjects. The total number of receptors for IgE on the cell surface appears to be in the range of 30,000-90,000 (Ishizaka). In normal individuals, IgE has no known allergen specificity (reagin property); its function being unknown. On a mast cell from an allergic person, IgE molecules vary in allergen specificity to form a heterogeneous population.

Fig. 3 – Chemical Mediators in Mast Cell/Basophil

Histamine
Slow Reacting Substance of Anaphylaxis (SRS-A)
Eosinophil Chemotactic Factors of Anaphylaxis (ECF-A)
Prostaglandins
Serotonins
Kinins
Intracellular Regulators
Cyclic AMP
Cyclic GMP

The sequence of events involved in the mast cell/ basophil degranulation includes:

1. Allergen bridges 2 IgE molecules
2. Structural transformation of IgE molecules
3. Activation of the enzyme system
4. Change in the cell membrane permeability to calcium.
5. Fusion of perigranular membrane with cell membranes probably via the activation of microfilament which act as muscle of the cell.
6. Influx of extracellular calcium.
7. Release of chemical mediators.

BIBLIOGRAPHY;

Buckle FG & Cohen AB. Nasal mucosal hyper–permeability to macro-molecules in atrophic rhinitis and bronchial asthma J. Allergy 55, 213.

Ishizaka K. Function of IgE antibody response. Stein M (ed.) *New Directions in Asthma.* American College of Chest Physicians, Park Ridge, Illinois.

Leskowitz S. Salvaggio JE & Schwartz HJ. An hypothesis for the development of atopic allergy in man. Clin. Allergy 2,237.

Mygind N. *Nasal Allergy* (1979). Blackwell Scientific, Oxford, England.

Salvaggio JE, Lopez M. Arquembourg PC, Wald–man RH & Sly M. Salivary, nasal wash and sputum IgA concentrations in atopic and non-atopic individuals. J. Allergy 51,335.

Soothill JF. Immunodeficiency and Allergy. Clin. Allergy suppl. 1,21.

Tada T. & Ishizada. Distribution of IgE-forming cells in lymphoid tissues of the human and monkey. J. Immunology 111,952.

Taylor B. Norman AP, Orgel HA, Stokes CR et al. Transient IgA deficiency and pathogenesis of infantile atopy. Lancet (1973) 2,111.

The Phil
Jour. of Oto.
Head & Neck Surgery

TUMORS OF THE MAJOR SALIVARY GLANDS: A Clinicopathologic Review of 203 Cases

Dr. Napoleon Ejercito *
Dr. Teodoro Jardeleza **
Dr. Alfredo Pontejos, Jr. ***

Tumors of the major salivary glands pose a lot of challenge to the clinician. For one, it is difficult to distinguish, clinically, a benign from a malignant tumor. Secondly, it is difficult to predict consistently the clinical behavior of the tumor because of a wide array of histopathologic conditions.

The purpose of this paper is to establish a clinical distinction between benign and malignant conditions and to come up with a diagnostic and treatment planning scheme.

Clinical Material

The clinical records of 203 cases of major salivary gland tumors seen and treated at the Philippine General Hospital were reviewed.

The parotid gland was involved in 70% of all cases and the submandibular gland in 30%. Thirty six percent of the parotid gland tumors were malignant.

Unlike other series, we only had 16% of the submandibular gland tumor which were malignant. Skolnik reports of 50% malignancy while others report of even higher percentage (Spiro, 56%; Rafla, 63%).

There is no sex predilection noted here for major salivary gland tumors, although we had slight predominance of the males in the malignant parotid group (1.5:1) and more females in the submandibular CA, (1:1.5).

The age range at the time of consultation was from 4 months to 85 years old. The average age was significantly lower for benign than that of malignant cases. Forty eight percent of the benign parotids were in the 3rd – 5th decade of life, while 56% of the malignant cases were in the 5th-7th decade of life.

The average age for benign parotid and benign submandibular is 39 and 35 years old respectively, while it is 50 and 54 for the malignant group.

The duration of symptoms were as early as 2 weeks to as long as 30 years. The average duration as symptoms is shorter for benign than that of the malignant. This is explained by the fact that 30 of our cases (15%) had their symptoms 10 years or longer. Sixteen percent of these were malignant parotid and 30% were malignant submandibular.

As to the rapidity of growth, however, 50% of the submandibular CA and 34% of the parotid CA had rapid growths as contrasted to the benign which had only 19% and 21%, respectively.

At the time of consultation the average size of the benign lesions, both parotid and submandibular were 4 cm, while that of the malignant group were 5.3 and 6.2 cm, respectively.

Pain as a symptom was significantly more often complained of in the malignant cases than in the benign. Twenty eight

* Professor 1 and former Chairman, Dept. of Otolaryngology, U.P.-P.G.H. Medical Center
** Former Chief Resident, Dept. of Otolaryngology, U.P.-P.G.H. Medical Center
*** Senior Resident, Dept. of Otolaryngology, U.P.–P.G.H. Medical Center

percent of the parotids and 50% of the submandibulars presented with pain, while only 18% and 15% of the benign lesions presented with pain.

Physical Findings

It is rather difficult to distinguish benign from malignant neoplasm on physical examination. However, we can safely say that a firm mass is benign while a hard mass is probably malignant until proven otherwise.

Fixation of the mass is rather reliable as an index of malignancy considering the fact that 74% of the parotid CA had fixation. This, however, was not borne out by the submandibulars . We should take into account though that we only have 10 cases of this and is therefore not conclusive. Benign tumors whether parotid or submandibular has less tendency to become fixed.

As to the so called "stigmas" of malignancy, only 14.2% of the malignant lesions presented with it. A small 1.1% of the benign had it, too.

Note, however, that the benign parotids with skin changes were hemangiomatous lesions and the skin changes were those of discoloration. The 2 cases with neck nodes were not palpably suggestive of malignancy. Those with tenderness were submandibulars and probably had a concomittant infection in the area.

Of the malignant lesions, 5 presented with tenderness, 2 had definite infection and the other 3 had skin breaks and in all probability had superinfection.

Three had distant metastasis, all being lung metastasis, (2 parotid and 1 submandibular). The first one was a mucoepidermoid CA, with a regional neck metastasis also. The other 2 were adenoidcystic CA. Distant metastasis in adenoidcystic CA is a very late manifestation and carries with it a poor prognosis.

Histopathologic Classification

Benign

Eighty two point four percent (82.4%) of all benign tumors are mixed tumors. The average aeg is 43 years old and females slightly predominate. Majority of the mixed tumor cases were firm and movable.

Warthin's tumor is the second most common, accounting for 5.9% of all parotid and 4.6% of all benign major salivary gland tumors. It is worthy to note that we had no adenolymphomas in the submandibular glands. This is explained by the fact that there are no lymph nodes within the substance of the submandibular gland. All 5 cases were movable and firm on palpation.

Malignant

Twenty nine point five percent (29.5%) of all major salivary gland tumors were malignant, 36% of parotid gland lesions and 16% of submandibular gland lesions were malignant.

Twenty six point four percent of all malignancy are of the mucoepidermoid type. Of the 14 cases, 13 were of parotid origin. There is a slight predominance of females over the males (9:5) with an average age of 41. Almost all of these cases presented as a painless, hard fixed mass. Two had regional neck nodes and two more had lung metastasis. It was reported by Foote and Frazel that 66% of high grade mucoepidermoid CA are associated with local lymph node metastasis while 33% had multiple cutaneous, osseous, pulmonary and cerebral metastasis. (In our series, we were not able to establish which cases were of the high grade type.)

The adenocarcinoma is 26.1% of all parotid CA and 22.6% of all major salivary gland CA. There is no sex predilection in this group. The average age is 44, the youngest being 15 and the oldest, 60 years old. These tumors are large, firm/hard and fixed, 41.7% had regional node metastasis.

Ten point nine percent (10.9%) of all parotid gland lesions were squamous cell CA and another 10.9% were of the acinic cell variety, 8.7% were malignant mixed type.

In the submandibular gland, adenoidcystic CA is the most common malignant lesion accounting for 28.6% of the submandibular malignancy.

Diagnosis

The diagnosis of salivary gland tumors is based on the history and clinical findings. A parotid tumor, for example, can be suspected if there is swelling in front or below the ear. The first thing we should do is to rule out an acute sialadenitis. This is easily ruled out because inflammatory lesions present as a diffused, tender enlargement of the gland, acute in onset and usually associated with fever and purulent discharge from the duct. It usually responds with a one week course of antibiotics with supportive measures

If this is ruled out we do sialography to note whether the swelling is intra-or extraglandular. If it is extraglandular, we have to rule out sialolithiasis, which usually presents with calcification on plain films and extravasation of the dye or signs of obstruction on sialography. The other condition which has to be ruled out is chronic sialadenitis. This is characterized by a history of recurrent mildly painful gland enlargement associated with eating and is almost always associated with sialolithiasis. Sialography may demonstrate duct ectasis or dilatation with atrophy of the acinar elements. This, however, is not a monopoly of this condition. Tumors can also present with such. Biopsy will definitely rule this out.

After having ruled out the non-neoplastic conditions, we then differentiate a benign from a malignant tumor. The benign lesions usually occur in the younger age group (3rd-5th decade of life), is smaller in size, slow growing and is mobile and firm. A malignant tumor, on the other hand, occurs in the older age group (5th-7th decade) and is usually larger, fast growing and is hard and fixed and may have the stigmas of malignancy. The definitive diagnosis is then arrived at by histologic examination of the mass after surgical excision or frozen section. Frozen section is resorted to only in patients where the gross finding on surgery is highly suspicious of malignancy. If not, we just proceed with superficial parotidectomy or excision and submit the specimen for histopathologic examination.

Frozen section was done in 19 cases and 11 turned out to be benign and 7 malignant. A definitive histopathologic diagnosis was established in 78.9% of cases. There was only one instance wherein no histologic diagnosis could be made. This was because the tissue submitted was insufficient for diagnosis.

The accuracy of frozen section depends on the surgeon's ability to get a good amount of tissue representative of the lesion and the skill and patience of the pathologist.

Needle biopsy was used in one patient. This was a case of parotid tumor with skin infiltration and regional neck nodes. The result was chronic inflammation which on section biopsy turned out to be undifferentiated CA. At the moment this procedure is not part of our diagnostic armamentarium, however, an on-going study* is being done in the department regarding its accuracy and efficacy.

Incisional or section biopsy prior to surgery is condemned by most centers. However, we do make exceptions. We do this in cases wherein there is already skin infiltration.

Treatment

The treatment of parotid tumor is primarily surgical and this can be of a very complex nature. Surgical treatment ranges from local excision, usually enucleation without identification of the facial nerve for extremely small lesions situated on the surface or the lower edge of the gland, to total parotidectomy with sacrifice of the facial nerve in continuity with a neck dissection for highly malignant tumors.

Parotid neoplasm should never be removed by local excision or enucleation because they recur frequently. Vandenberg in 1964 has shown that benign tumors treated by enucleation or excision have a higher recurrence rate than those treated with partial or total lobectomy. Most often the primary lesion is inadequately removed because of 1) fear of injury to the facial nerve and 2) lack of knowledge in dissecting the nerve from the parotid tissue.

* See p 55 - The Philippine Journal of Otolaryngology-Head & Neck Surgery-1981.

The lesions are approached by a Y-shaped incision or a lazy S incision from the preauricular area extending to the neck. This allows adequate exposure for exploration. When benign lesion is confined to the superficial lobe, this is excised completely to include an adequate amount of normal tissue. When the lesion involves the deep lobe, the whole gland is removed with the facial nerve preserved.

In our series, 62 cases had superficial parotidectomy, 16 had total parotidectomy with preservation of the facial nerve. Four had total parotidectomy with VII nerve sacrifice. One was a cyst wherein the cervicofacial branch cannot be separated. Another was a hemangioma and the other two were mixed tumors, with intimate involvement of the nerve. (All were partial nerve sacrifice). Four underwent excision, three were hemangiomas and one was a mixed tumor. (This mixed tumor case was mistaken for an extraparotid lesion)

For malignant lesions, the ultimate extent of surgery depends on the histopathologic result of the frozen section. For low malignant tumors, namely mucoepidermoid CA, Grades I & II, acinic cell CA and adenoidcystic CA, superficial parotidectomy can be done if it is confined to the superficial lobe. Rankow reports of 90% survival rate in his cases of mucoepidermoid CA treated in this manner. If the lesion is confined to the deep lobe, total parotidectomy with facial nerve preservation is done. The facial nerve is sacrificed only when infiltration or when it is intimately involved by the tumor. When the skin is involved, wide resection is done with primary closure using a regional sliding flap.

Radical neck dissection is done only when primary tumor is resectable with proven cervical node metastasis and without distant metastasis. We do not believe in prophylactic neck dissection even for highly malignant tumors without palpable neck nodes. Bardwill, in a study of 34 patients wherein prophylactic neck dissection was done, showed only one patient to be positive for metastasis. Boles has advocated the use of frozen section of neck nodes. If positive, he does neck dissection.

Irradiation has its own place in the treatment of parotid malignancy. Mustard and Anderson have shown that conservative parotidectomy plus post-operative radiation has improved the 5-year survival rates of his patients (94.4%). In our center, we do irradiation when the primary or recurrent tumor is surgically not resectable or when there is incomplete resection of the tumor mass.

In our series, 26 cases had surgery alone ranging from superficial parotidectomy to total parotidectomy with RND. Ten had irradiation alone and 12 had both surgery and irradiation.

The principles in the treatment of submandibular newgrowth is basically the same. For benign lesions, the minimum surgical management and perhaps the only management is the excision of the gland.

For malignancy, a large neck flap is raised and total dissection of the submandibular triangle is performed. If the mass is attached to the mandible, a portion of the mandible is resected. Frozen section is made. If the tumor is of the low grade type, no further surgery is made. If the tumor is of highly malignant type with involvement of the mandible, a COMMANDO operation is done. The indications for irradiation is the same as in parotid CA.

In our series, 7 had surgery alone, 1 underwent COMMANDO, 2 had excision with RND and 4 had excision. Two were beyond surgery so they underwent irradiation.

Complications

Post-operative complications were present in 12.8% of all cases and 18.4% of all parotid cases.

Of the benign parotids, 7 (7.7%) had facial nerve paralysis, 4 of which were incomplete, meaning the terminal branches were involved. These were the cases wherein VIIth nerve sacrifice were done as it cannot be separated from the tumor mass. Three (3.3%) has transient facial nerve paresis which disappeared after 3-4 months.

We had one mortality (1.1%) and this was the 9 month old baby with hemangioma. This was due to blood transfusion.

Of the malignancies, 6 (12%) cases developed facial nerve palsy, and one had tranient nerve weakness. This is explained by the fact that the surgery is too extensive that edema post operatively could have caused pressure effect on the nerve or probably failure of the surgeon to identify the facial nerve because of distorted anatomy. Frey's syndrome or gustatory sweating was noted in one patient (2%).

No complications were noted in the submandibular gland tumors.

Summary

To conclude, we would like to stress the following points:

1. Clinical distinction between benign and malignant salivary gland tumors can be safely made using the presumptive signs as guidelines.

2. The stigmas of malignancy is not usually present in malignant tumors but when present almost always point to a malignancy.

3. Mixed tumor is the most common benign lesion in the major salivary glands.

Mucoepidermoid CA and adeno CA are the two most common malignant neoplasms of the major salivary gland accounting for 49% of all malignant lesions.

4. Definitive diagnosis is made by doing excision biopsy or frozen section.

5. The minimum surgical procedure advocated is superficial parotidectomy for parotids and total excision for submandibulars.

6. The facial nerve is preserved irregardless of histologic diagnosis unless it is intimately involved in the tumor mass.

7. Radical Neck Dissection is done only in proven cases of neck node metastasis without distant metastasis.

8. Radiotherapy is given to patients where the primary tumor is not surgically resectable or when there is incomplete resection of the tumor mass.

Bibliography

1. Boles, Roger, *Parotid Neoplasms: Surgical Treatment and Complications*, OCNA, Vol. 10 No. 2, June '77, pp. 413-420
2. Byers, Robert, Jesse, R., Guillamondegui, O., Luna, M. *Malignant Tumors of the Sumaxillary Glands*, Am J of Surg., Vol. 126, Oct '73, pp 458-463
3. Conley, John, Myer, E., Cole, R.: *Analysis of 115 Patients with Tumors of the Submandibular Gland*, Ann Otol, 81, 1972, pp. 323-330
4. Fayos, Juan: *The Role of Radiotherapy in Salivary Gland Neoplasms*, OCNA, 10:2, June '77, pp. 431-436
5. Hanna, Dwight & Clairmont, Albert; *Submandibular Gland Tumors* 61:2, Plastic and Rec. Surg., Feb. '78, pp. 198-203.
6. Johns, Michael & Coulthard: *Survival and Follow-up in Malignant Tumors of the Salivary Glands*, OCNA, 10:2, June '77, pp. 455-460.
7. Rankow, Robin: *Surgical Decisions in the Treatment of Major Salivary Gland Tumors*, 51:5, Plastic and Rec. Surg., May '73, pp. 514-523.
8. Regezi, Joseph & Batsakis, John: *Histogenesis of Salivary Gland Neoplasms*, OCNA 10:2 June '77, pp. 297-308.
9. Skolnik, E., Friedman, M., Becker, S., Sisson, G. & Keye, G.: *Tumors of the Major Salivary Gland*, LXXXVII: 6, Laryngoscope, June '77, pp. 843-859.
10. VandenBerg, H., Kambouris, A., Pryzbylski, T & Rachmaninoff, N.: *Salivary Tumors*, Am J of Surg, 108, Oct '64.
11. Work, Walter and Batsakis, John: *Classification of Salivary Gland Diseases*, OCNA 10:2, June '77, pp. 287-296

TRIPOD FRACTURE
Review of the Literature and Report of a Case

Amando Alfonso, M.D.*
Eli Paz, M.D.**
Potenciana Dilag**

INTRODUCTION

An average of 165 persons die and another 4,860 are injured daily in traffic accidents in any country in the world today.[1] The number of fatalities is even more than deaths brought about by any human disease during the same period.[1] Indeed, this is a foolish loss of healthy, productive men, women, and children. To the fatalities, medicine has nothing more to offer but to the injured — many can be saved and restored to a normal, useful life.

According to the Automotive Crash Injury Research of Cornell University (1961), 72.1 per cent of victims of automobile volved only soft tissue, many include fractures of the facial skeleton.[2]

Braunstein (1957), in a study of 1,000 injury-producing accidents involving 2,25[illegible] occupants, found that 72.3 percent of 1,21[illegible] injured persons suffered head injury. In 7.2 percent of these patients, at least one facial was fractured.[2]

According to Matsunaga, of the 1,900 cases of the major maxillofacial trauma treated at the Maxillofacial and Plastic Reconstructive Division of the Department of Otolaryngology at the Los Angeles Country, University of Southern California (USC) Medical Center, approximately 1,200 were malar fractures equivalent to 61.1 percent of the total.[3]

It is for this purpose that the authors wish to present a few basic principles in the management of malar fractures encountered in vehicular collisions as well as accidents in industry, hoping that such injuries or trauma of lesser extent can be managed properly utilizing the same basic principles.

But first a few words about Tripod fracture – definition, symptomatology and management.

Tripod fracture, or otherwise known as malar fracture, zygomatic complex fracture or zygomaticomaxillary fracture, is of a tripartite nature, usually involving fractures of the orbital rim, zygomatic arch and zygomaticofrontal suture line.[4,5,6] To arrive at a diagnosis, a detailed history, an accurate clinical evaluation and radiologic studies are the important things needed.

Symptomatology

The signs and symptoms are referrable to the anatomy.

FACIAL DEFORMITY. In fracture-displacement of the zygomatic compound, a step-like deformity may be palpable through the skin along the inferior orbital margin. The lateral palpebral ligament is attached to the orbital rim and displacement of the bone carries with it the lateral palpebral attachment producing a dramatic visible deformity.[7,8]

* Postgraduate Trainee II, Dept. of Otolaryngology, MCU-FDT Medical Foundation
** Consultants, Dept. of Otolaryngology, MCU-FDT Medical Foundation.

PAIN AND TRISMUS. Pain in motion of the mandible and trismus are suggestive of fracture involving the zygomatic arch since the displaced segments interfere with the forward and downward movement of the coronoid process of the mandible when the patient attempts to open his mouth.[7,8]

UNILATERAL EPISTAXIS, HEMATOMA, CONJUNCTIVAL HEMORRHAGE AND ECCHYMOSIS

In fractures involving the infraorbital rim, portions of the zygoma are being forced into the maxillary sinus. Tearing of the lining of the sinus causes hematoma or the extravasation of blood in the sinus and into the tissue underlying the cheek and lateral canthus of the eye.[7, 8]

ANESTHESIA. Anesthesia in the distribution of the infraorbital nerve (that is, the upper lip, the lower eyelid and the lateral nasal area) indicates fracture of the adjacent maxilla and injury to the infraorbital nerve.[7, 8]

Radiology

The most useful roentgenographic view for evaluating malar bone fractures is the postero-anterior oblique projection of the face known as the Water's position. This view shows the structure of the bone and outlines the irregular contour of the zygoma with minimal superimposition of other structures. Another useful view is the submental-vertical or axial projection which demonstrates the zygomatic arches.

The usual radiologic findings are deformity at the infraorbital margin and separation at the zygomatico-frontal suture. Irregularities of the lateral wall of the maxilla and opacity or clouding of the maxillary sinus, from blood, are seen in almost all zygomatico-maxillary fractures.

Treatment

Before proceeding with the actual surgical management, the more immediate life-threatening problems must be attended to-like shock, obstruction of airway and hemorrhage. Since tripod fractures are not surgical emergencies, management of other injuries of a more serious nature should be dealt with first. While the plan of treatment is based mainly on the clinical and radiologic findings, the basic objectives are essentially as follows:

1. to replace the fragments in their normal position, and
2. to provide active support during the course of healing.

The most common approach to these fractures in the current literature is the method in which direct incisions are made at the brow for the zygomatico-frontal fracture line and in the infraorbital region for the zygomaticomaxillary fracture line. Gillies in 1927 approached fractures of the zygomatic arch through a vertical temporal incision about 2 cm. long above and behind the hairline.

Case Report

Mr. R.B., 43 years old, male, a boat captain, was hospitalized for the second time with the chief complaint of a depressed left cheek prominence. History revealed that a month prior to admission, a steel cable of his boat gave way and hit the left side of his face causing abrasion and swelling, pain and tenderness over the same side, unilateral epistaxis, conjunctival hemorrhage and limitation of jaw movement. He was then brought to a Dagupan hospital where radiographic studies were done but due to lack of proper awareness, X-ray films failed to demonstrate evidence of any fracture. Unsatisfied with the results, he sought admission at MCU Hospital.

On examination, a facial deformity was obvious on the left. Ecchymosis, left side was also present. Palpation revealed a step-ladder deformity of the left inferior orbital margin which was confirmed radiologically. (See X-rays after summary). Haziness of the maxillary antrum, displaced fracture of the zygomaticofrontal suture line and depressed fracture of the zygomatic arch were also revealed radiologically.

An open reduction and interosseous wire fixation under general anesthesia were contemplated.

Technique of Operation

The zygomaticomaxillary fracture line was exposed via the canine fossa and lid incision while the zygomaticofrontal and zygomatic arch fractures were exposed via the brow incision. Refracturing and reduction were done freeing the infraorbital nerve. Fixation was accomplished by means of interosseous wiring and external traction. A 26 gauge stainless steel wire was used for the interosseous wiring which was inserted through burr holes created by the use of a motor driven drill at the zygomaticofrontal and zygomaticomaxillary areas. A wire attached to an inflated Foley bag catheter in the maxillary antrum was inserted thru a small burr hole over the zygoma and attached by a rubber band to an old head mirror band incorporated into a plaster headcap for skeletal fixation and traction.

Discussion

The diagnosis and proper management of tripod fractures is of great importance. There are numerous methods for open reduction and stabilization of zygomatic fractures. Complex and comminuted fractures may require open, direct interosseous wire fixation of the fragments. Unstable fractures may require additional stabilization to maintain reduction and to achieve maximal cosmetic results among which include antral or temporal fossa packing and wire suspension from a plaster skull cap.

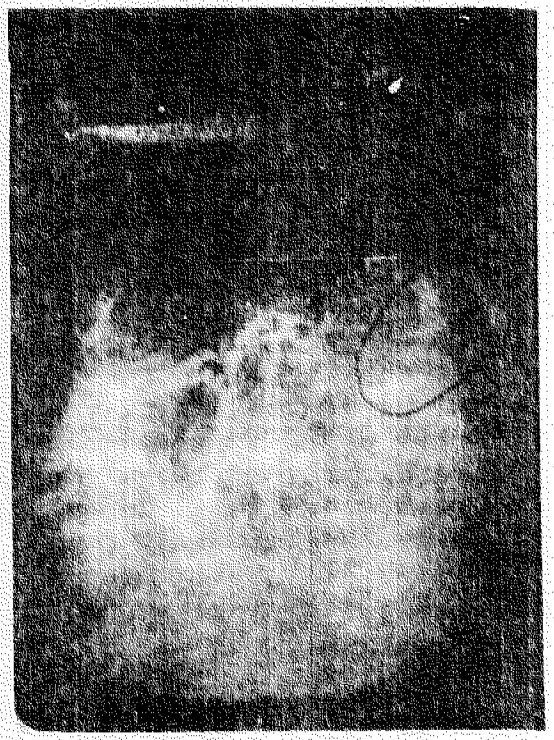
Understandably, this intricate procedure is not for the ill-equipped emergency hospitals or even the slightly better provincial and small private general hospitals in the rural areas. Neither will there be, in most instances, the specialists who can attend to such cases but what we wish to emphasize are the basic principles which the practitioners in secondary hospitals or of those in lesser categories need to bear in mind in way of instituting first aid measures.

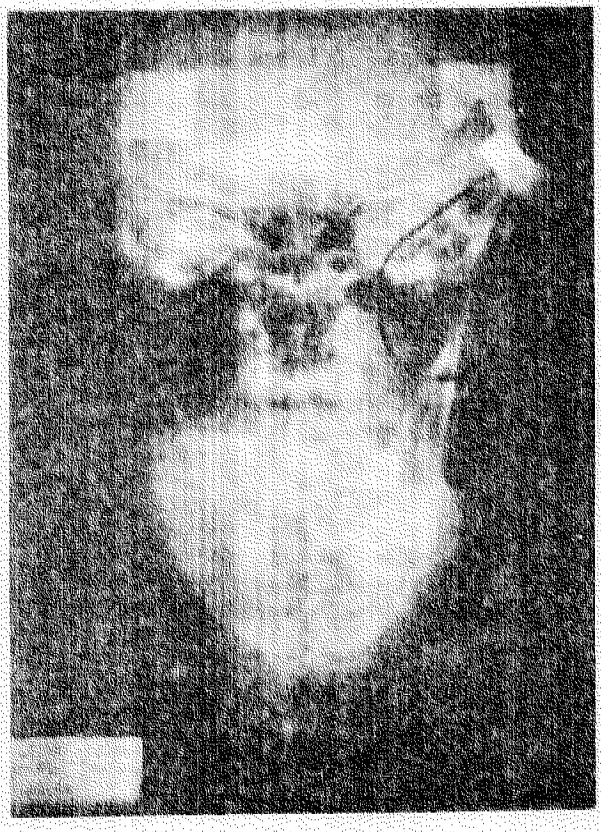
Summary

The literature on the anatomic, clinical, surgical and radiologic correlation of tripod fractures was reviewed. An illustrative case was presented and the surgical management discussed.

BIBLIOGRAPHY

1. Digman and Natvig, Surgery of Facial Fractures p. 45
2. Ronald Matsunaga, Arch Otolaryngology – Vol. 103 Sept. 1977 p. 535
3. Amil James Gerlock and Douglas P. Sinn, Am J Roentgenol, 128-138 February 1977 p. 234, 237
4. John Jacog Ballenger, Diseases of the Nose, Throat and Ear, 12th Edition p. 26
5. Paparella and Shumrick, Otolaryngology Vol. 3 Head and Neck, 1973 p. 416
6. Russell Hopkins, Ann, Roy. Coll. Surg. Engl. 1971, Vol. 49 p. 404-406
7. Reed O. Dingman – Paul Natvig, Surgery of Facial Fractures, 1966 p. 56-57, 213, 217, 218-219.
8. Enriquez, Angel – Personal communication.





ABSTRACTS

PAROTOLYMPHATIC BACKFLOW: A NEW SIGN OF MALIGNANCY

P.M. Som, J.M.A. Shugar: The Annals of Otology, Rhinology & Laryngology, Vol. 90 – Jan-Feb. 1981.

Current sialographic criteria for malignancy are:

1. Abrupt ductal cutoff
2. Lack of parenchymal filling
3. Irregular pooling of contrast material

New additional criterion –

4. Parotolymphatic backflow

Although the parotid gland is the first to form among the major salavary glands, it is the submaxillary and sublingual glands that first become arranged into encapsulated organ. Since the capsule of the parotid gland forms late in ontogeny, the developing lymph nodes in the adjacent area become entrapped within its substance as well as on its surface under the capsule.

In case of malignancy, the neoplasm may destroy sufficient tissue as to allow parotolymphatic communication to occur. This is also true of nodal metastasis which breaks out to invade the parotid gland. In both cases, clinically there is a non-tender hard mass and indications for a sialogram is justified. According to the authors, if an open pathway exists between the ductal system and the lymphatics, then the low resistance lymphatic ducts could fill via the parotid ducts. The roentgen appearance is unlike in instances of extravasation but is the same as seen in cervical lymphagiographic early filling films.

Inflammatory conditions which can simulate a malignancy radiographically are:

1. Acute suppurative nodal necrosis
2. Parotid gland abscess

In both cases, the clinical findings are characteristic and a sialogram is contraindicated.

angel enriquez, m.d.

SAGITTAL OSTECTOMY OF THE MANDIBLE FOR FLOOR OF MOUTH CANCER

I. A. Mazzarella, Jr., M.D. & A.A. Friedlander, D.D.S.: Archives of Otolaryngology, Vol. 107 – April 1981.

Mandibular resection for cancer today seems to have become more conservative both in indication and extent. The reason for this is the concept that the mandibular periosteum is involved only by direct tumor extension and not by lymphatic spread.

Anterior sagittal ostectomy of the mandible is a surgical technique that can be used for treatment of carcinoma of the floor of the mouth. It is a modification of the marginal resection of the mandible or the "pull-through" procedure. The difference lies in the bony cuts in that the sagittal ostectomy allows the full height of the medial, lingual cortex to be split from the lateral, buccal cortex of the mandible.

The following criteria are used for patient selection:

1. Recognition of at least 1 cm. of grossly normal mucosa between the alveolar process and the tumor;

2. The ability to palpate as little as a few millimeters of normal tissue along the lingual aspect of the mandible, and
3. The mobility of the primary tumor, as related to the mandible, being an indication that the tumor has not invaded the periosteum.

Contraindications:

1. Tumoral involvement of the mucosa of the alveolar ridge.
2. Adherence of tumor to periosteum, and
3. Infiltration of the mandible itself.

leonardo mangahas, m.d.

PEDIATRIC FLEXIBLE BRONCHOSCOPY

R.E. Wood, PhD., M.D. and James M. Sherman, M.D: The Annals of Otology, Rhinology & Laryngology, Vol. 89 – Sept-Oct. 1980.

According to the authors, when the flexible bronchoscope was introduced in 1970 it led to a veritable explosion in its applications in pulmonary endoscopy. This was not true in pediatrics mainly due to the lack of adequate suction capability.

In the late 1978, the Olympus Corporation developed an experimental prototype of a pediatric bronchoscope (BF3CA), which since then has been in use. The instrument has an outside diameter of 3.5 mm and a 1.2 mm suction channel.

The availability of this new instrument promises to have as great an impact on pediatric pulmonology as the standard flexible bronchoscope did on adult pulmonology.

angel enriquez, m.d.

SURGERY FOR BELL'S PALSY

Prof. Dr. Ugo Fisch: Archives of Otolaryngology, Vol. 107 – Jan. 1981, pp. 1-11.

Rationale for surgery in Bell's palsy stems from the observation that:

1. The facial nerve is compressed within the Fallopian canal and that
2. Its release from compression improves the recovery of facial movements.

Compression occurs in 94% of cases at the meatal foramen as proven by intraoperative evoked electromyography (IEEMG). This physiological "bottleneck" located at the fundus of the internal auditory meatus, measures 0.61 mm on the average and is by far the narrowest part of the entire Fallopian Canal.

Surgery is indicated –

1. When the chance of a satisfactory spontaneous return of facial function is reduced under an acceptable minimum and
2. When the majority of endoneural tubes, not of the axons, are still intact.

Electroneuronography is important in detecting the destiny of the facial nerve in Bell's palsy during the first two to three weeks after onset. All patients having less than 90% maximal degeneration of fibers within three weeks of onset reach a satisfactory return of facial movements without any form of treatment. On the other hand, 50% of patients with 95% to 100% maximal degeneration within two weeks of onset have permanent unsatisfactory recovery of facial function.

It is therefore strongly proposed that immediate surgical decompression be done as soon as 90% maximal degeneration occurs within two weeks of onset.

Surgery begins with exposure of the meatal labyrinthine and proximal tympanic segments through a middle cranial fossa approach. IEEMG is then used to localize the lesion and as stated previously, 94% of cases will be decompressed at this stage. The other 6% will need decompression distal to the geniculate ganglion and a transmastoid/posterior tympanotony approach is done from the stylomastoid foramen to the area of superior decompression.

This intratemporal decompression of the facial nerve is a delicate surgical procedure that should be performed by surgeons specially trained in micro-surgery of the temporal bone and in the use of special instruments as the neurectomy knives and scissors.

leonardo mangahas, m.d

MYRINGOPLASTY

J.L. Sheehy. M.D. & R.G. Anderson, M.D.: The Annals of Otology, Rhinology & Laryngology, Vol. 89 – July-Aug. 1980

The authors reviewed 472 cases done over a period of 11 years. Criteria used for patients undergoing myringoplasty were as follows:

1. Intact and mobile ossicular chain
2. Absence of middle ear disease
3. Not recommended for patients below 7 years

Summary of results:

1. There was a statistically significant relationship between the size of the perforation and degree of hearing loss.
2. No relationship between degree of hearing impairment and the complaint of tinnitus.
3. Of the 168 operations done postauricularly – successful in over 97% of the cases and reduced the conductive deficit to 10 db or less in 88%.
4. No total sensorineural impairments.
5. Canal skin graft take results and hearing improvement were less favorable than the fascia.
6. In fascia graft cases there was no difference between the graft take results in cases with or without tympanosclerosis in the membrane.
7. Results of take from lateral (onlay or medical underlay) grafting techniques were almost identical.
8. The incidence of healing problems (blunting, lateral healing) with lateral surface fascia grafting is low.

angel enriquez, m.d.

SURGICAL LANDMARK FOR THE FACIAL NERVE IN THE EPITYMPANUM

Richard R. Gucek, M.D.: The Annals of Otology, Rhinology & Laryngology, Vol. 89 – May June, 1980.

A reliable bony surgical landmark for the identification of the facial nerve canal in the anterior epitympanum is described – a landmark which is useful where the middle ear anatomy is obscured by disease or where the nerve must be identified in order to carry out a decompression procedure.

This landmark is the bony partition between the epitympanum and the anterior epitympanic cell – the 7th nerve being located at its base. This partition is present in all temporal bones. It extends from the tegmen tympani plate superiorly to the chochleaformis process and the tensor tympani tendon inferiorly and anterior to the head of the malleus in the epitympanum. These features are demonstrated in photographs of a horizontal cut through a temporal bone specimen at the level of the superior semicircular canal and through the facial nerve genu.

angel enriquez, m.d.

BRAINSTEM AUDITORY EVOKED POTENTIALS FOR DETECTION OF RETROCOCHLEAR PATHOLOGY

Sam E. Kinney, M.D. & Richard H. Nodar: The Annals of Otology, Rhinology & Laryngology Vol. 89 – July-August, 1980

Although it is believed that this technique (BAEP) is useful in evaluating patients with suspected retrocochlear pathology, the authors were concerned that the test was not as specific for detecting acoustic tumors as had been reported by others.

Specifically this is because of too many false positives. The BAEP test results identified a large percentage of patients with abnormal BAEP recordings who were not found to have an eighth nerve lesion.

Of the 408 patients who were tested for suspected VIIIth nerve lesion, the BAEP test was found extremely useful if the result was normal for no patient with an VIIIth nerve lesion had a normal BAEP test result. Unfortunately, abnormal BAEP test results were noted in 34% of patients whose myelogram was normal.

angel enriquez, m.d.

USE OF THE CO_2 LASER IN OTOLOGY

D.J. Williams, M.B., I.M. Hunter-Duvar, Ph.D., D.P. Mitchell, M.D. The Annals of Otology, Rhinology & Laryngology, Vol. 90 – Jan.-Feb. 1981.

CO_2 laser is still experimental in otologic surgery. In early experiments the laser was able to destroy the stria vascularis or sensory epithelium of the cochlea by transmitting energy through the otic capsule without perforating it. However, more recent studies gave conflicting results.

According to Lyons et al, even the lowest available intensities and duration (0.4 W, 50 msec) resulted in damage to the inner ear of guinea pigs. Studies by Williams et al, on the other hand, gave results which are totally contradictory. According to Williams, CO_2 laser appears to be safe to the inner ear during middle ear surgery; however, further investigation and experimentation are necessary to determine its role in clinical otology.

Note: CO_2 laser produces an intense, focused, coherent, highly callimated, highly monochromatic beam of infrared radiation which can destroy biological tissue. The infrared waves heat materials which absorb it but do not ionize the molecules of these substances.

angel enriquez, m.d.

KERATOACANTHOMA OF THE HEAD AND NECK

R.E. Goodwin, M.D. & G.H. Fisher, M.D.: The Annals of Otology, Rhinology & Laryngology, Vol. 89 – Jan-Feb. 1980.

Keratoacanthoma is a benign, dome-shaped, raised, generally painless lesion, that appears and grows rapidly, most often on an exposed surface of the body. If left untreated, some will slowly decrease in size, lose the central core, and finally disappear. Malignant transformation and malignant metastasizing keratoacanthomas have been reported, although these are rare and may represent lesions which were initially malignant but misdiagnosed.

Eighty percent occur in the head and neck region, particularly in the cheek, nose and lip.

Because of the occurrence of spontaneous regression and the benign nature of many keratoacanthomas, some recommend conservative treatment. However, due to considerable overlap between it and squamous cell carcinoma, the authors recommend surgical excision.

angel enriquez, m.d.

ANNOUNCEMENTS

THE PHILIPPINE SOCIETY OF OTOLARYNGOLOGY AND BRONCHOESOPHAGOLOGY, INC.

OFFICERS
1981-82

Abelardo B. Perez, M.D.	President
Jesus Co, M.D.	Vice President
Teodoro P. Llamanzares, M.D.	Secretary
Milagros Santos-Lopez, M.D.	Treasurer
Napoleon C. Ejercito, M.D.	Director
Remigio Jarin, M.D.	Director
Eusebio E. Llamas, M.D.	Director
Manuel G. Lim, M.D.	Director

U.P.-P.G.H. Medical Center
DEPARTMENT OF OTORHINOLARYNGOLOGY
Section of Audiology

Complete pediatric and adult audiological and neuro-otological examinations are now available to charity and private patients at Ward 3, Philippine General Hospital. Services include full diagnostic work-up and rehabilitation program.

Referrals may be sent to the clinic c/o Dr. Ernesto A. Nueva Espana, Section Head, Monday to Friday, 8:00 A.M. to 4:00 P.M.

FOUNDING FELLOWS

Philippine Society of Otolaryngology & Bronchoesophagology, Inc.

Tierry F. Garcia, M.D.
Macario Tan, M.D.
Cesar F. Villafuerte, M.D.
Antonio Rexas, M.D.
Ariston Bautista, M.D.
Angel Enriquez, M.D.
Napoleon Ejercito, M.D.
Vicente Songco, M.D.
Antonio Vicencio, M.D.

THE PHILIPPINE BOARD OF OTOLARYNGOLOGY–HEAD & NECK SURGERY

ANNOUNCEMENT

Napoleon Ejercito, M.D.	President
Mariano Caparas, M.D.	Secretary-Treasurer
Armando Chiong, M.D.	Director
Angel Enriquez, M.D.	Director
Siu Chuan Leh, M.D.	Director
Manuel Lim, M.D.	Director
Abelardo Perez, M.D.	Director
Milagros Santos-Lopez, M.D.	Director
Vicente Santos, M.D.	Director

The next certifying examination (written and oral) in Otolaryngology will be given October 1982. Inquiries may be made through Dr. Mariano Caparas c/o Dept of Otolaryngology, Ward 3, Philippine General Hospital, Taft Avenue, Manila.

REQUIREMENTS FOR ACCREDITATION

I. **General Requirements:**

1. The Hospital should have its own LIBRARY. Subscription to at least one Otolaryngologic Journal (Laryngoscope, Archives, Annals, etc.), local or foreign.

2. Beds should be available for otolaryngologic cases.
   Minimum requirement: 1 bed : 1 resident
   4 beds : 4 residents
   Four residents at a single time at different level.

3. Instruments/Equipment:
   a. Basic instruments for the following:
      1. otologic surgery
      2. rhinopharyngology surgery
      3. plastic & reconstructive surgery
      4. maxillo-facial surgery
      5. head and neck tumor surgery
      6. endoscopy
   b. Specific basic diagnostic instruments/equipment:
      1. clinical audiometer
      2. transilluminator
      3. endoscopic instruments
      4. tuning fork, otoscope, head mirror

4. Ancillary Services:
   a. Laboratory for routine examinations
   b. Anesthesiology service equipment

II. **Specific Requirements:**

1. Consultantship:
   Minimum requirement: 1 consultant: 2 residents
   At the start, at least one faculty is a diplomate of the Philippine Board of Otolaryngology. After five years, the majority of the faculty should be diplomates of the Philippine Board of Otolaryngology.

2. A separate and independent Department of Otorhinolaryngology with autonomic policy making body and adheres to a 4-year residency training program in general otolaryngology.

3. The department is committed to teach the following subspecialties:
   a. otology
   b. rhinopharyngology
   c. endoscopy (esophagus, bronchus & trachea)
   d. head and neck tumor
      1. parotid
      2. mandible
      3. larynx
   e. acute maxillo-facial
   f. cosmetic and reconstructive surgery
      1. cheiloplasty
      2. uranoplasty
      3. rhinoplasty

Committee on Accreditation
Philippine Society of Otolaryngology
& Bronchoesophagology

DEPARTMENT OF OTORHINOLARYNGOLOGY
U.P.-P.G.H. Medical Center
CHAIRMAN: Dr. Mariano Caparas

Otology Service

Chief	Dr. M. Lim
Members . . .	Dr. V. Santos
	Dr. C. Reyes
	Dr. E. Nueva España
	Dr. G. Abes

Audiology Service

Chief	Dr. E. Nueva España
Members . . .	Dr. M. Lim
	Dr. V. Santos
	Dr. C. Reyes
	Dr. G. Abes
Audiologist . .	Mrs. H. Nueva España
Technician . .	Miss Belle Henson

Head and Neck Tumor Service

Chief	Dr. N. Ejercito
Members. . . .	Dr. E. Jose
	Dr. A. Enriquez (Tumor Immunology)
	Dr. A. Chiong
	Dr. B. Cruz

Plastic & Reconstructive Service

Chief	Dr. A. Chiong
Members . . .	Dr. N. Ejercito
	Dr. E. Jose
	Dr. E. Guevara (abroad)

Maxillofacial Service

Chief	Dr. E. Jose
Members . . .	Dr. N. Ejercito
	Dr. A. Chiong
	Dr. E. Guevara (abroad)

Rhinopharyngology & Allergy Service

Chief	Dr. B. Cruz
Members . . .	Dr. J. Jamir
	Dr. G. Abes
	Dr. C. Reyes
	Dr. Nueva España

Bronchoesophagology Service

Chief	Dr. A. Enriquez
Members . . .	Dr. B. Cruz
	Dr. N. Ejercito
	Dr. M. Lim
	Dr. J. Jamir (abroad)

Temporal Bone Laboratory

Chief	Dr. C. Reyes
Members . . .	Dr. V. Santos
	Dr. M. Lim
	Dr. G. Abes
	Dr. Nueva España

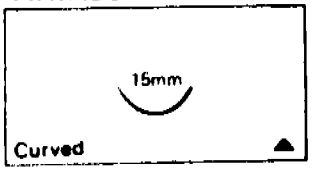
ETHILON*
PROLENE*
SILK
PLAIN GUT

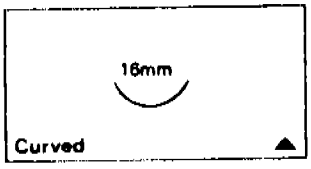
ETHICON*

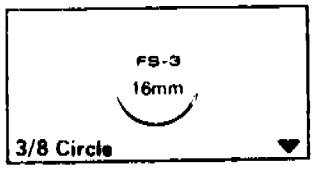
Innovators in wound closure

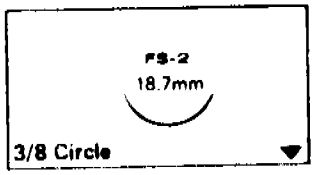
CUTICULAR

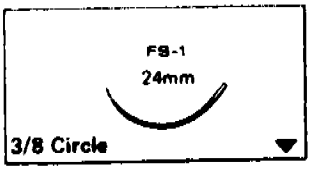
ATRALOC* NEEDLES

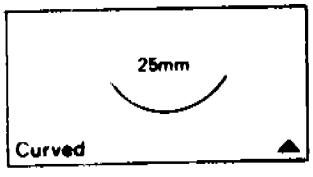


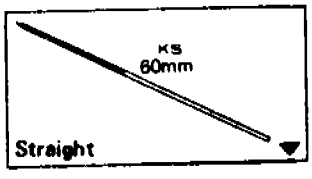












MATERIAL	LENGTH CM	7-0	6-0	5-0	4-0	3-0	2-0
Blue Mono. ETHILON*	50			W526			
Blue Mono. PROLENE*	45			W527			
Blk. Mono. ETHILON*	35		W506				
Blk. Braided SILK	45		681H	1681G			
Blk. Mono. ETHILON*	45		660H	1628G			
[redacted]	75					H822H	
Blk. Braided SILK	45			682H	683H		
Blk. Mono. ETHILON*	45			661H	662H		
Blue Mono. PROLENE*	45				8683H		
Blk. Braided SILK	45					684H	
Blk. Mono. ETHILON*	45					663H	
Blue Mono. PROLENE*	45					8684H	
Blk. Braided SILK	50				W536	W537	
Blk. Braided SILK	75				621H	622H	
Blk. Mono. ETHILON*	75				626H	627H	

Needles shown actual size

▲ Denotes CONVENTIONAL CUTTING

▼ Denotes REVERSE CUTTING

Suffix "G" - 1 doz in a box
Suffix "H" - 3 doz in a box

*TRADEMARK

STATISTICS ON ADMISSIONS & OPERATIONS
DEPARTMENT OF OTOLARYNGOLOGY, U.P.–P.G.H. MEDICAL CENTER

1979 By Dr. T. Jardaleza *
1980 By Dr. B. R. Ferrolino **
Dr. Mariano Caparas
Chairman

The following figures lifted from the Annual Reports of the Dept. of Otolaryngology, U.P.-P.G.H. Medical Center for the years 1979 and 1980 are invaluable to anyone or group contemplating putting into print a Filipino textbook of Otolaryngology – Head & Neck Surgery not to mention its impact on local medical statistics. – Ed.

*Chief Resident – 1979
**Chief Resident – 1980

IN-PATIENT CASES, NUMBER OF DAYS HOSPITALIZED AND POST-OP STAY
1979

CASE	no. of cases	total hosp. stay	average stay	no. of cases	total post-op	average
Radical mastoidectomy	123	2,153	17.5	123	569	4.6
Excision	53	1,129	21.3	49	274	5.6
Tonsillectomy and adenoidectomy	19	211	11.1	17	33	1.9
Polypectomy, ethmoidectomy and antrostomy	7	118	16.8	7	128	.4
Caldwell-Luc surgery	25	55	18.2	25	140	5.6
Submucous resection	1	9	9	1	2	2
Cheiloplasty	22	468	21.3	21	76	3.6
Intact canal wall mastoidectomy	6	100	16.6	4	25	6,2
Tympanoplasty/myringoplasty	9	192	21.3	9	32	3.5
Esophagoscopy with foreign body extraction	23	117	5.1	23	79	3.4
Bronchoscopy with foreign body extraction	2	7	3.5	2	8	4
Vocal cord stripping	5	69	13.8	5	20	4
Parotidectomy	21	638	30.4	19	112	5.8
Laryngectomy	11	315	28.6	7	98	14.0
Thyroidectomy	11	166	15.1	10	33	3.3
Wide excision	18	461	25.6	17	128	7.5
Excision, angiofibroma	5	278	55.6	4	86	21.5
Hemi-mandibulectomy	8	326	40.7	8	71	8.8
Commando	16	686	42.9	12	185	15.4
Maxillectomy	22	669	30.4	20	202	10.1
Incision and curettage	9	128	14.2	8	38	4.7
Fracture, mandible	24	254	10.6	25	98	3.9
Naso-frontal fracture	14	200	14.3	13	65	5
Arytenoidectomy	3	57	19.0	3	10	3.3
Lateral rhinotomy	4	124	31.0	4	29	7.2
Uranoplasty	9	184	20.4	8	39	4.8
TOTAL	470	9,114		444	2,480	

Ave. total hospital stay = 19.84 days
Ave. post-op stay = 5.58 (minus)
Ave. pre-op stay 14.26

CASES	QUARTER				
	1	2	3	4	TOTAL
incision and drainage	3	3	5	3	14
tracheostomy	7	7	9	4	27
esophagoscopy & removal of foreign body	11	18		4	33
direct laryngoscopy, biopsy	5	20	7	7	39
bronchoscopy	1		4		5
bronchoscopy +bronchial washing	2	3		1	6
esophagoscopy + biopsy	1	1	1	2	5
bronchoscopy + removal of f.b.	1	1	1	2	4
radical mastoidectomy	32	35	29	29	125
intact canal wall mastoidectomy	2	4	2	1	9
tympanoplasty				1	1
myringoplasty	2	1		3	6
exploratory tympanotomy	1	2		2	5
Caldwell-Luc surgery	7	9	8	12	36
polypectomy, ethmoidectomy and antrostomy	5	5	6		16
submucous resection	3	2	1		6
open reduction tripod fracturee	4		5	4	13
open reduction, mandibular fracture	4	4	4	7	19
open reduction, nasal bone fracture	3		2	2	7
open reduction, frontal bone fracture		1	2	1	4
incision and curettage	2	2	4	1	9
tonsillectomy & adenoidectomy	11	22	6	11	50
cheiloplasty	5	8	6	11	30
uranoplasty	3	5	5	3	16
reconstructive surgery		2	4	7	13
total laryngectomy		2	3	2	7
superficial parotidectomy	1	5	6	10	22
hemimandibulectomy	2	4	3	5	14
maxillectomy	3	4	6	7	20
wide excision with Abbe-Estlander	1	1	1		3
thyroidectomy	6	3	4	5	18
wide excision	6	9	15	18	48
commando	4		3	4	11
nasopharyngeal biopsy	3	2	1	1	7
excision angiofibroma		1	1		2
excision, thyroglossal duct cyst (branchial cyst)		2	2	3	7
removal of Kirshner wire				1	1
frontal sinusotomy			2		2
extraction foreign body mandible			1		1
facial nerve decompression			2		2
esophagoscopy with dilatation			2		2
Lynde, approach, removal f.b.			1	1	2
exploration and ligation of Stensen's duct				1	1
TOTAL/QUARTER	141	188	164	176	668

OUT-PATIENT SURGICAL CASES – 1979

CASES	QUARTER 1	2	3	4	TOTAL
excision biopsy	22	31	21	24	98
wedge biopsy	7	7	4	12	30
section biopsy	16	20	20	16	72
neck node biopsy	49	15	51	14	170
excision	53	85	42	54	234
excision pre-auricular sinus	1	2	2	4	9
Caldwell-Luc surgery	21	14	28	33	96
antrostomy	36	41	28	25	130
polypectomy, ethmoidectomy and antrostomy	51	64	42	71	238
submucous resection	39	43	44	33	159
release turbino-septal adhesion	5	3		3	11
tonsillectomy	37	52	32	47	168
vocal cord stripping	4	15	2	1	22
aural polypectomy			1	12	13
tracheotomy	2		2	1	5
tube myringotomy	4	6	6	4	19
release tongue-tie		3	4	1	8
nasal bone fracture	3		1	3	7
mandibular fracture		3	12	6	21
tri-maxillary fracture				1	1
zygomatic bone fracture	1		3	1	5
rhinoplasty	2	1	1	2	6
removal f.b. ear	1		2	1	4
lip widening (2nd stage)	3				3
polypectomy	4	1			5
ethmoidectomy	3	3	2		8
widening tracheostome	1		2		3
repair of ear lobe		5		2	7
repair of tongue laceration			1	4	5
tympanoplasty				2	2
TOTAL/QUARTER	365	414	353	377	1,559

MISCELLANEOUS CASES	QUARTER				TOTAL
	1	2	3	4	
excision thyroglossal duct cyst	1		1		2
aspiration biopsy	1		1		2
incision and drainage septal abscess		1			1
peritonsillar abscess	1		1		2
excision, ranula		1			1
excision with reconstruction	1				1
repair of ala & lip laceration	1				1
removal of silastic (nose)	1				1
repair of ala nasi	1		2		3
evacuation of hematoma		1			1
needle biopsy				2	2
open reduction nasal bone				2	2
tonsillar bleeding ligation			1		1
closure of parotid fistula			1		1
mentoplasty			1		1
dento-alveolar abscess			1		1
removal of stent (larynx)			1		1
salivary calculi removal			1		1
myringoplasty			1		1
TOTAL/QUARTER	7	3	12	4	26
Total no. of OPD cases/quarter	394	444	397	443	1,678

IN-Patient Cases (by service) no. of days stay & post-op stay – 1980

1. Tumor Service	No. of cases	Total hospital stay	Ave.	Total post-op.	Ave.
Ca, palate	17	435	25.59	167	9.82
Ca, tongue	11	303	27.54	112	10.18
Ca, esophagus	2	23	11.5	15	7.5
Ca, ethmoid	2	39	19.5	20	10
Ca (basal cell), nose	6	128	21.33	35	7
Ca, larynx	12	408	34	177	14.75
Lower lip reconstruction	2	70	35	35	17.5
Adenoid cystic Ca	3	156	52	72	24
Ca, gingiva	9	245	27.22	89	9.89
Ca, floor of mouth & buccal mucosa	4	77	19	20	5
Ca, maxilla	5	96	19.2	46	9.2
Ca, parotid	2	54	27	46	13
Ca, mastoid & middle ear	1	15	15	6	6
Ca, nasopharynx	3	56	18.67	20	6.67
Fibrosarcoma, maxilla	4	53	13.25	13	3.25
Fibrosarcoma, mandible	2	159	79.5	88	44
Chondrosarcoma	3	75	25	28	9.33
Benign parotid newgrowth	25	408	16.32	95	3.8
Adamantinoma	7	301	43	137	19.57
Hemangioma, tongue	5	86	17.2	27	5.4
NNTG	23	345	15.0	64	2.78
Angiofibroma	6	213	35.5	63	10.5
Hemangioma, nose	2	10	5	2	1
Hemangioma, face	10	205	10.5	73	7.3
Thyroglossal duct cyst	6	59	9.83	20	3.33
Lymphangioma	7	148	21.14	34	4.86
Cystic hygroma	6	138	23	35	7
Mixed tumor, uvula	1	5	5	1	1
Pseudoepithelial hyperplasia	2	67	33.5	16	8
Mixed tumor, hard palate	1	10	10	2	2
Submandibular gland tumor	1	10	10	2	2
Benign newgrowth gingiva	1	22	22	8	8
Dermoid cyst, neck	1	6	6	2	2
Lipoma	1	13	13	5	5
Fibrous dysplasia	4	81	20.25	15	3.75
Meningoencephalocele	1	25	25	10	10
Neurofibroma	2	49	24.5	20	10

2.	**Otology Service**					
	CTM (Rad. mastoidectomy)	196	3,086	15.74	800	4.08
	Pre-auricular sinus	1	9	9	1	1
	Myringoplasty	3	22	7.33	7	2.33
	Tympanosclerosis	3	53	17.66	16	5.33
	Stapedectomy	1	28	28	5	5
3.	**Rhinopharyngology Service**					
	Tonsillectomy	40	409	10.22	88	2.2
	Osteomyelitis (mandible)	13	231	17.77	82	6.31
	Dentigerous cyst	6	102	17	37	6.17
	Fronto-ethmoid mucocoele	2	50	25	10	5
	Antrochoanal polyp	7	100	14.28	31	4.42
	Nasal polyp	26	303	11.65	79	3.03
	Ranula	1	7	7	3	3
	Oro-antral fistula	1	30	30	13	13
	Epiglottic cyst	2	17	8.5	3	1.5
	Hypopharyngeal benign newgrowth	1	21	21	3	3
	Branchial cleft cyst	2	22	11	10	5
	Palatopharyngeal adhesions	1	47	47	12	12
	Granuloma pyogenicum	1	11	11	2	2
4.	**Bronchoesophagology Service**					
	Laryngomalacia	2	25	12.5	4	2
	Vocal cord paralysis	2	10	5	2	1
	Foreign body, trachea	6	24	6	22	5.67
	Foreign body, esophagus	18	76	4.22	59	3.28
	Glottic stenosis	2	51	25.5	11	5.5
	Vocal cord polyp	1	6	6	2	2
	Laryngeal TB	1	1 1	1 1	6	6
5.	Infectious					
	Ludwig's angina	4	26	6.5	26	6.5
	Perichondritis	3	10	3.3	10	3.3
	Submandibular abscess	1	2	2	2	2
	Dentoalveolar abscess	3	15	5	15	5
	Cellulitis, face	4	16	4	16	4
	Noma	1	6	6	6	6
	Retropharyngeal abscess	3	17	5.67	15	5
	Thyroid abscess	1	3	3	3	3
	Epiglottitis	1	2	2	2	2

6.	Plastic-Reconstructive Service					
	Cleft palate	29	444	15.31	124	4.28
	Cleft lip/palate	30	429	14.3	73	2.43
	Blast injury	1	30	30	14	14
	Gingivo-buccal adhesion	2	46	13	16	8
	Lip reconstruction	3	89	29.67	23	7.67
7.	Maxillo-Facial Trauma Service					
	Fracture, mandible	13	103	7.92	64	4.92
	Fracture, maxilla	5	45	9	17	3.4
	Fracture, frontal bone	4	85	21.25	15	3.75
	Fracture, tripod	16	183	11.43	74	4.62
	Fracture, blow out	4	48	12	12	3
	Fracture, nasal bone	4	61	12.2	44	8.8
	Fracture, temporal bone	2	34	17	2	1
	Gunshot, cheek	8	125	15.62	66	8.25
	Dart wound face	1	11	11	11	11
	Stab wound	2	12	6	12	6
	Avulsion, pinna	3	37	12.33	36	12
	Hacking wound, cheek	1	15	15	8	8

SUMMARY

	Service	no. of patients	total hosp. stay	ave. hosp. stay	total post-op stay	average post-op stay
1.	Tumor service	202	4,598	22.76	1,618	8.0
2.	Otology service	204	3,198	15.68	829	4.06
3.	Rhinopharyngology	119	1,378	11.58	386	3.24
4.	Bronchoesophagology	32	203	6.34	106	3.31
5.	Infectious	21	97	4.62	95	4.52
6.	Plastic and reconstructive	66	1,098	16.63	283	4.28
7.	Trauma (maxillofacial)	62	774	12.48	375	6.04
	TOTAL	706	11,246	16.09	3,692	5.24

REMARKS:

From the above table, we can observe that there is a significant difference between the average hospital stay and the average post-operative stay. The average post-operative stay includes cases with post-operative complications and thus we can infer that this comparesfavorably considering the variety of cases admitted. What is striking in this figure is the great disparity between hospital stay and post-operative stay. We can surmise that there is a lot of unwarranted stay and wasted occupancy which can be explained by the fact that patients have to be cleared before surgery and also the inability of some to secure the needs (blood, sutures, blades, etc.) for the operation.

OUT-PATIENT CASES PER QUARTER – 1980

	EAR	QUARTER 1	2	3	4	TOTAL
A.	Primary					
	impacted cerumen	142	154	144	144	584
	otitis externa	116	113	122	130	481
	furunculosis	12	11	10	7	40
	cellulitis, pinna	6	6	3	3	18
	otalgia	6	6	3	6	21
						1,144
B.	Secondary					
	otitis media, acute	103	125	126	117	471
	otitis media, chronic	132	107	106	96	441
	foreign body	30	38	43	34	145
	otitis media, bil.	37	37	35	39	148
	Eustachian tube dysfunction	20	27	24	19	90
						1,295
C.	Tertiary					
	chronic tympanomastoiditis	24	30	38	28	120
	perforated eardrum	18	21	23	23	85
	hearing loss, nerve	4	3	1	1	9
	hearing loss, conductive	5	3	2	3	13
	hearing loss, mixed	8	6	3	2	19
	aural polyp	24	40	35	35	134
	post-auricular abscess	14	23	31	34	102
	presbycusis	10	6	1	1	18
	Total: 1,245					500
	NOSE					
A.	Primary					
	acute rhinitis	79	72	80	81	312
	chronic rhinitis	97	83	89	88	357
	allergic rhinitis	113	102	127	128	470
	vasomotor rhinitis	8	4	6	5	23
	furunculosis	18	20	26	19	83
						1,245
B.	Secondary					
	foreign body	96	103	94	89	382
	acute sinusitis	96	107	105	103	411
	maxillary sinusitis	73	95	68	67	303
	chronic sinusitis	69	76	99	89	333

	frontal sinusitis	40	61	63	55	219
	epistaxis	19	18	12	13	62
						1,610
C.	Tertiary					
	atrophic rhinitis	24	26	22	15	87
	nasal polyp	79	84	68	65	296
	septal deviation	34	46	44	33	157
	Total: 3,439					540
	MOUTH, THROAT AND NECK					
A.	Primary					
	acute pharyngitis	49	56	41	28	174
	chronic pharyngitis	38	42	33	26	139
	follicular tonsillitis	13	18	14	14	59
	tonsillitis	19	24	37	30	110
	tonsillo-pharyngitis	24	38	30	32	124
	Koch's adenitis	19	24	24	17	84
	lymphadenitis	13	24	20	19	76
	acute tonsillo-pharyngitis	14	23	21	25	83
						849
B.	Secondary					
	chronic laryngitis	20	36	38	39	133
	dento-alveolar abscess	11	25	27	24	87
	foreign body	18	30	27	20	95
						315
C.	Tertiary					
	peritonsillar abscess	13	20	21	12	66
	cleft lip	7	3	2	0	12
	cleft lip & palate	1	2	1	1	5
	vocal cord nodule	4	2	2	2	10
	Total: 1,264					93
	Grand total: 5,948					

II. F. OPERATIONS (1980) PER QUARTER

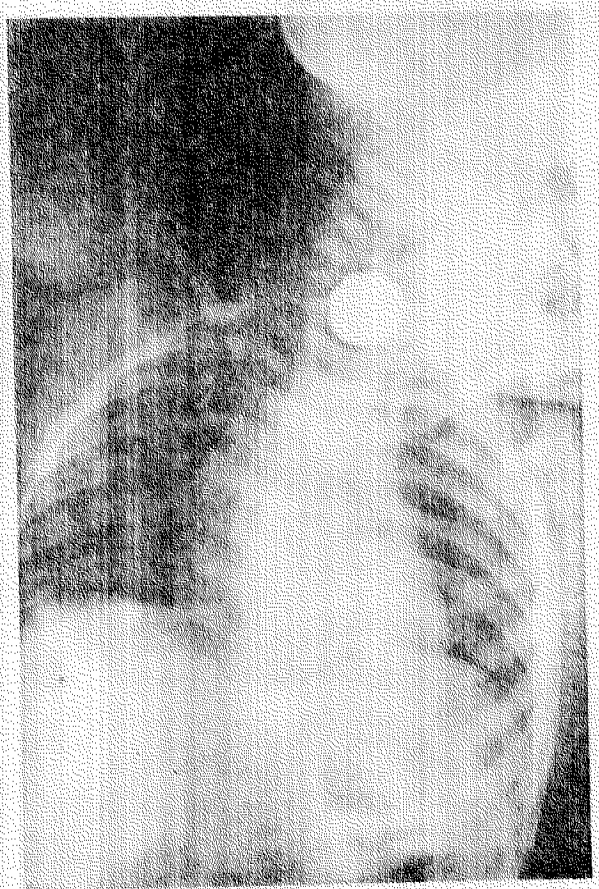
A. OUT-PATIENT BASIS (Local Anesthesia)

	QUARTER 1	2	3	4	TOTAL
polypectomy, ethmoidectomy, antrostomy	62	49	54	59	224
submuccous resection	35	26	45	52	158
tonsillectomy	31	42	40	28	141
excision biopsy	49	44	35	35	163
section biopsy	38	23	27	40	128
Caldwell-Luc surgery	22	14	24	18	78
SMR & PEA	1	4	10	16	31
punch biopsy	26	31	20	11	88
needle biopsy	6	0	6	20	32
N-P biopsy	33	29	36	38	136
antrostomy	22	62	38	21	143
biopsy via Caldwell-Luc	7	4	4	5	20
aural polypectomy	4	6	5	2	17
excision pre-auricular sinus	4	11	6	5	26
cheiloplasty	5	10	8	4	27
Z-plasty	2	6	0	1	9
repair ear lobule	2	4	7	1	14
transfer tube flap	1	0	0	0	1
removal of silastic implant	1	1	0	0	2
lobectomy	2	1	1	2	6
revision mastoidectomy	2	0	2	0	4
I & D	1	0	2	3	6
myringoplasty	1	3	5	3	12
removal bullet	1	2	5	0	8
I & C	0	2	1	0	3
Derlache's procedure	0	2	1	1	4
removal of foreign body, ear	4	3	1	3	11
removal of foreign body, nose	1	2	0	2	5
release of tongue tie	2	5	2	4	13
release of adhesions	1	2	1	0	4
rhinoplasty	0	0	4	3	7
tube myringotomy	0	0	2	9	11
control of epistaxis	0	1	1	1	3
scalene node biopsy	0	7	4	5	16
Emergency Room Patients					
Gelle's operation	6	0	8	3	17
I & D abscess	5	8	6	12	31
fracture, mandible	8	1	4	6	19
fracture, maxilla	6	1	0	2	9
nasal bone fracture	12	8	6	10	36

suture, laceration	8	6	6	6	26
alveolar ridge fracture	0	6	3	1	10
control of tonsil bleeding	0	1	0	1	2
C. In-Patients					
tonsillectomy and adenoidectomy	20	26	18	16	80
hemiglossectomy	2	0	1	0	3
radical mastoidectomy	51	47	43	67	208
osteoplastic approach of frontal sinus	2	0	0	0	2
wide excision and mandibulectomy	5	1	4	3	13
Caldwell-luc for sinus disease	13	12	5	4	34
excision hemangioma	3	3	5	9	20
thyroidectomy	7	11	12	14	44
uranoplasty	3	3	4	8	18
wedge biopsy	1	1	0	1	3
reconstructive surgery	6	6	5	3	20
staphylorrhaphy	4	8	4	1	17
partial maxillectomy	4	5	3	1	13
reduction fracture mandible	1	1	5	0	7
superficial parotidectomy	8	5	4	5	22
wide excision palate	3	0	1	2	6
cheiloplasty	9	7	3	5	24
hemimandibulectomy	3	2	4	1	10
excision	10	7	8	3	28
Caldwell-luc for tripod fracture	4	2	5	8	19
PEA	2	10	13	8	33
total laryngectomy	4	1	2	3	10
total maxillectomy with orbital exenteration	4	0	2	4	10
rhinoplasty	2	0	0	1	3
modified radical mastoidectomy and tympanoplasty	2	5	2	3	12
release of gingivo-buccal adhesions	2	0	1	0	3
Commando	3	3	1	3	10
facial nerve decompression	1	0	1	0	2
total parotidectomy	4	3	3	1	11
tooth extraction	1	0	1	0	2
pushback-cheiloplasty	0	3	2	0	5
Sistrunk operation	2	7	2	1	12
tympanoplasty	7	0	1	0	8
SMR with or without PEA	3	6	5	10	24
removal of dart	0	1	0	0	1

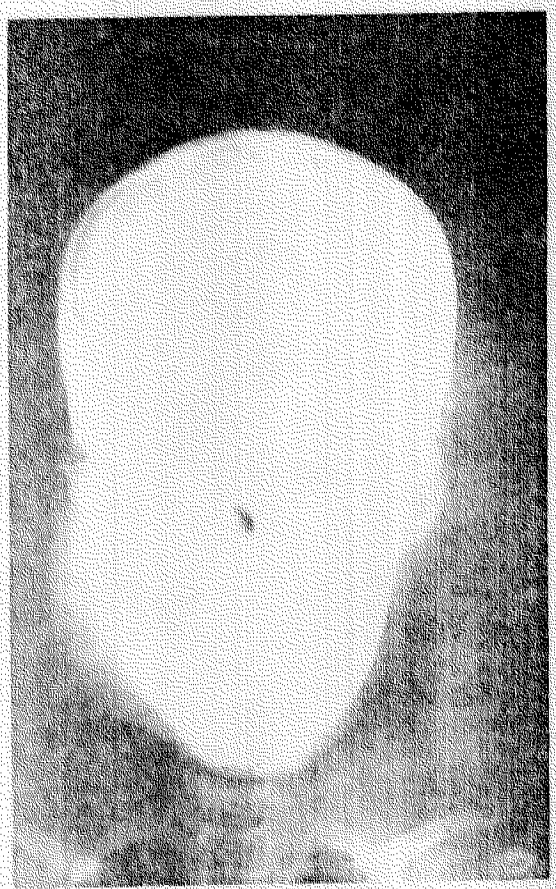
excision pre-auricular sinus	1	0	0	0	1
angiofibroma	0	2	3	1	6
I & C, tooth extraction	1	4	4	4	13
stapedectomy	1	1	0	0	2
wide excision basal cell Ca	1	2	3	1	7
ranula	1	0	2	1	4
radical neck dissection	0	2	1	1	4
cystic hygroma	0	1	3	0	4
Lynch incision	0	2	1	1	4
maxillectomy, mandibulectomy, radical neck dissection	0	1	0	0	1
transhyoid approach	0	0	2	0	2
total maxillectomy with radical neck dissection	0	0	2	1	3
multiple facial fracture	0	0	1	0	1
debridement	0	0	1	0	1
aspiration biopsy	3	2	1	1	7
punch biopsy	3	0	4	1	8
NP biopsy	3	3	1	9	16
section biopsy	5	8	5	2	20
excision biopsy	2	0	1	2	5
tracheostomy	3	10	3	11	27
gunshot	5	0	0	1	6
Bronchoesophagology					
direct laryngoscopy	7	4	8	14	33
direct laryngoscopy & biopsy	7	7	10	19	43
vocal cord stripping	1	7	4	4	16
suspension laryngoscopy for epiglottic cyst	1	2	3	1	7
bronchoscopy & washing	1	0	2	0	3
bronchoscopy for foreign body	2	0	0	3	5
esophagoscopy	1	1	2	5	9
esophagoscopy & bouginage	3	1	0	3	7
esophagoscopy & biopsy	1	1	4	0	6
esophagoscopy for foreign body	7	14	12	17	50
TOTAL	692	769	740	746	2,947

PICTORIALS

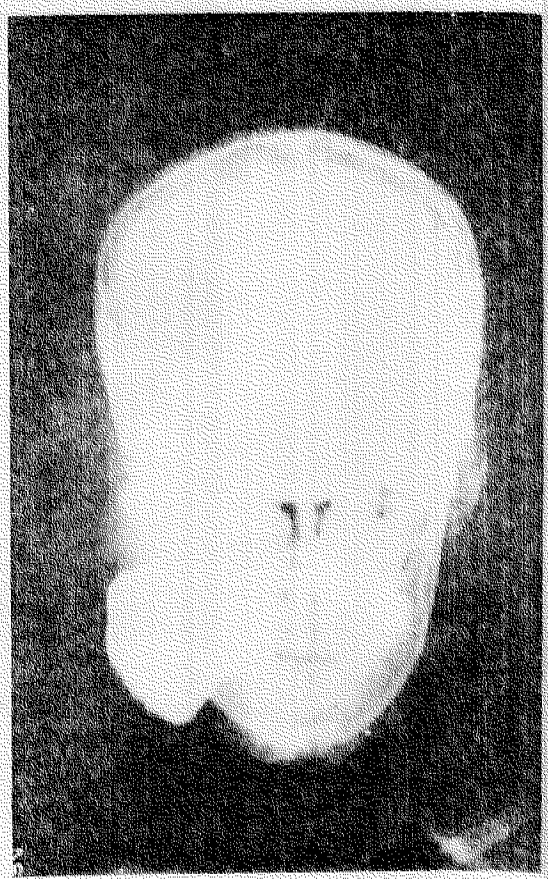


Give your complete diagnosis. Ans. (See last page under Pictorial.)

:2:a



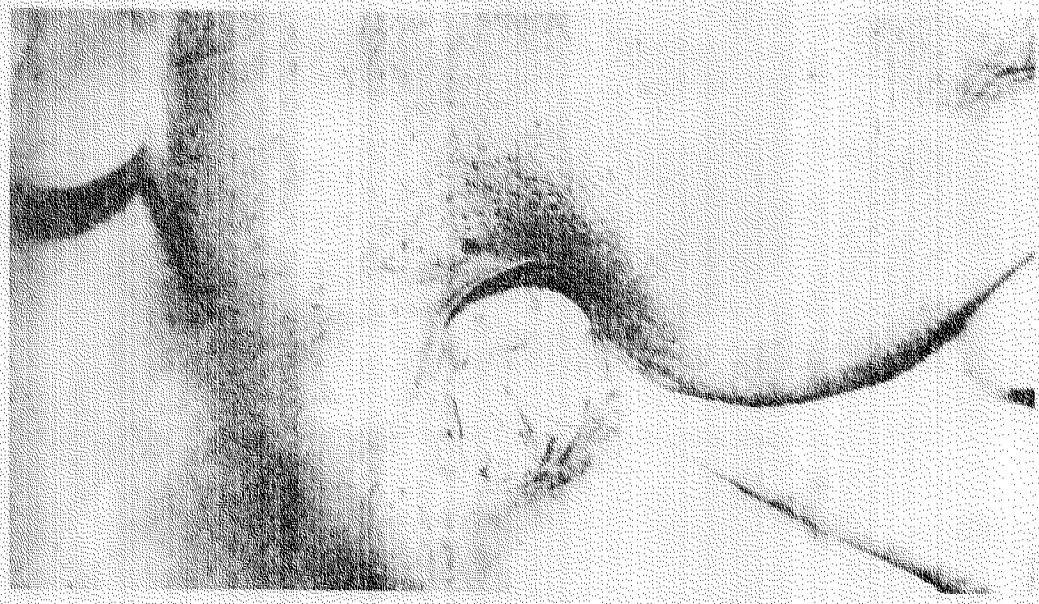
:2:b



Slow growing (since birth), fluctuant with ill-defined borders – right lateral neck. Straw colored aspirate (1.5cc) replaced with contrast medium 2:b. What is your impression? [(Ans. last page.)]

STERNOCLEIDOMASTOID FLAP IN RECONSTRUCTION OF OSTEOMYELITIS OF THE MANDIBLE WITH SKIN DEFECT

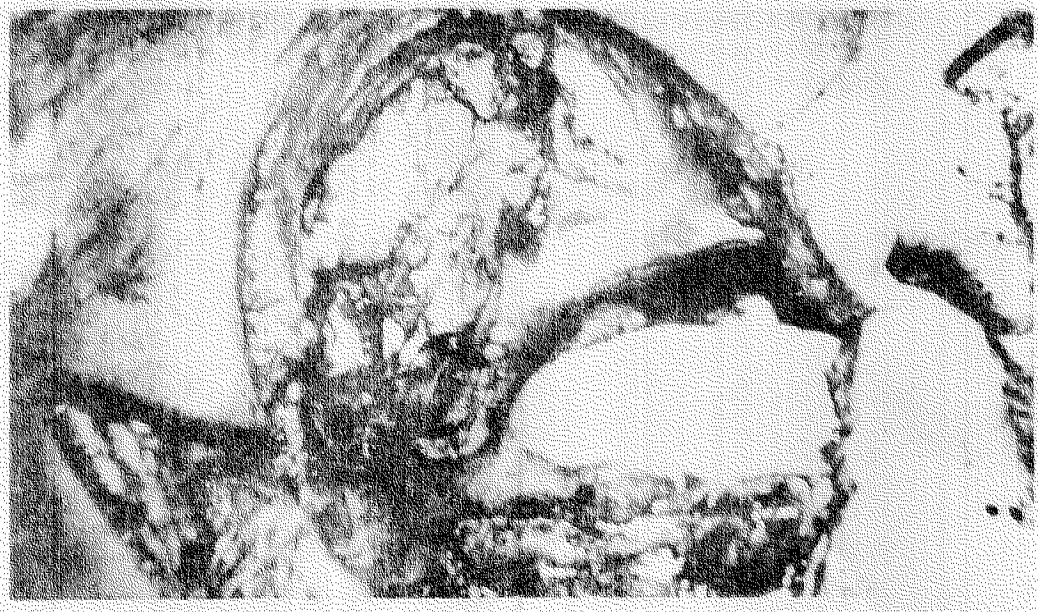
Jaime F. Flor, M.D.*
Alexander Cukingnan, M.D. *



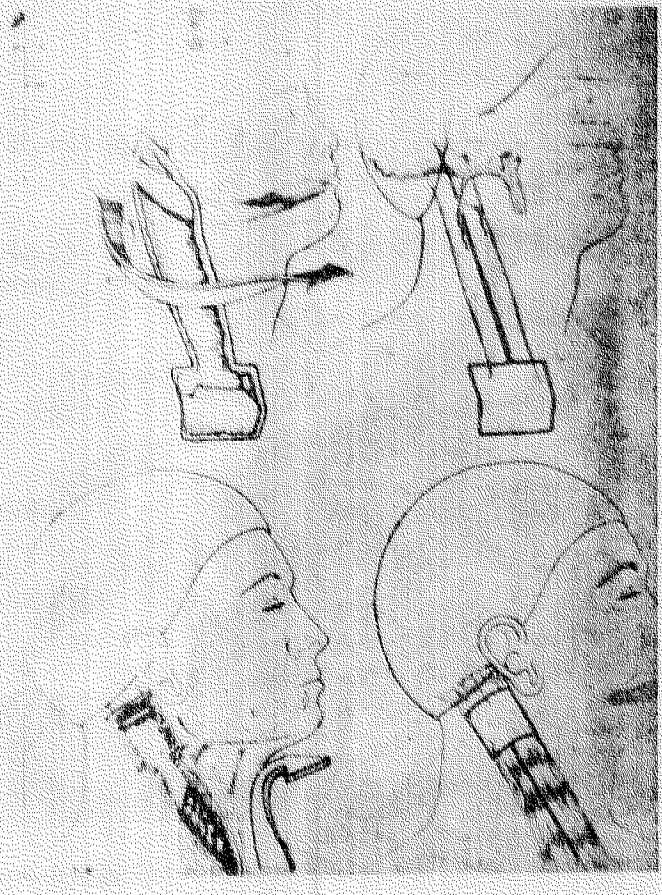
1. Pre-op picture showing skin defect, osteomyelitic bone & tongue, right side.

2. Excision of the defect with 1 cm normal skin around hemimandibulectomy (osteomyelitis involved the condyle.)

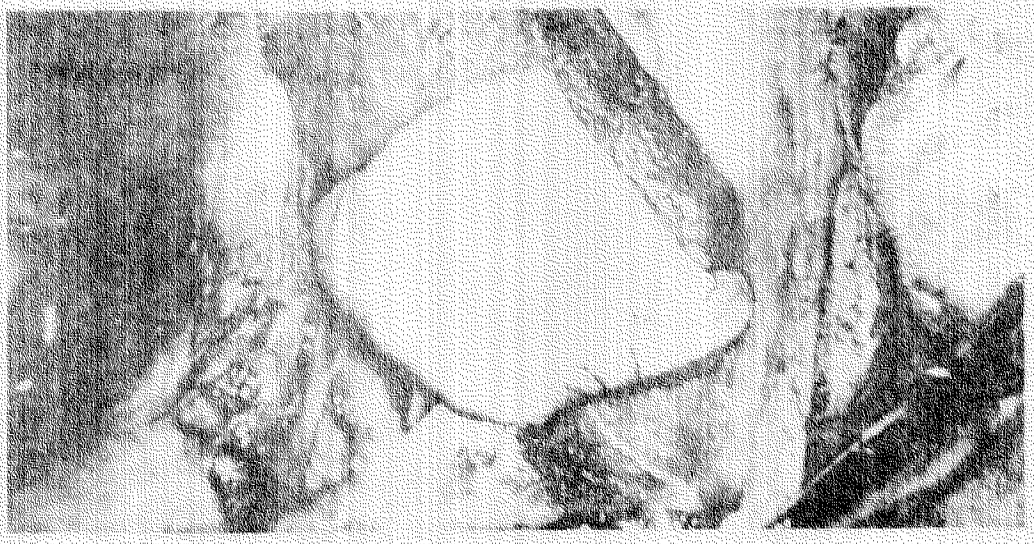
* Residents, Dept. of Otolaryngology, U.P.-P.G.H. Medical Center



3. Defect after wide excision & hemimandibulectomy.

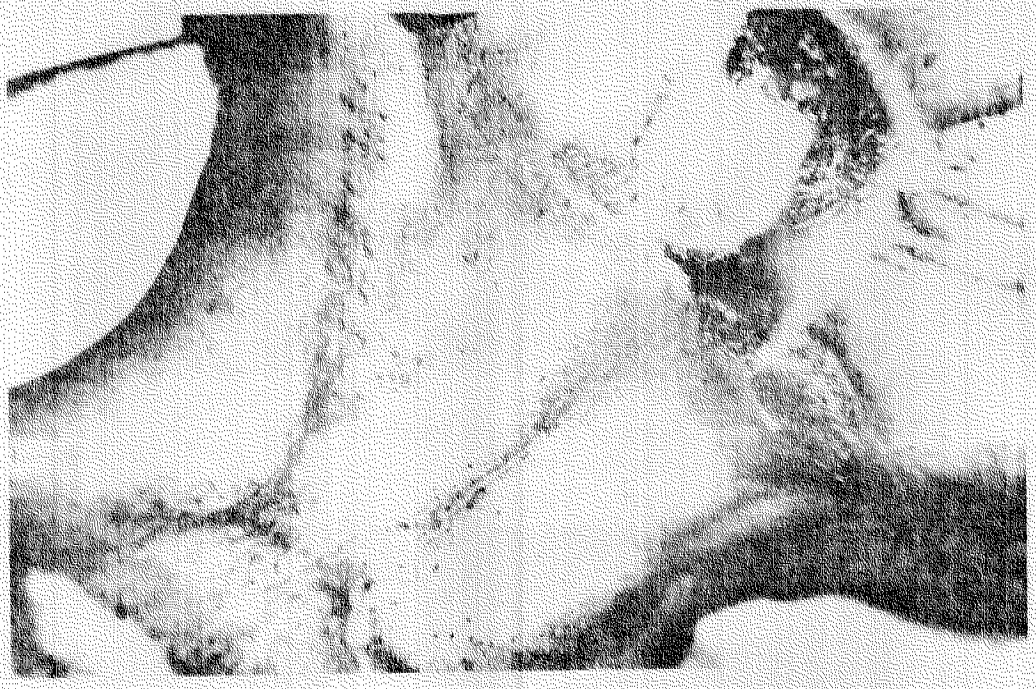


4. Method of reconstruction using superiorly based sternocleidomastoid flap with a paddle of skin overlying it.



5. Sternocleidomastoid flap with paddle of skin raised and ready for transfer.

6. STNM flap with its paddle of skin sutured — subcutaneous & skin by means of silk 5-0.



7. 2 wks. post-op. showing good take.

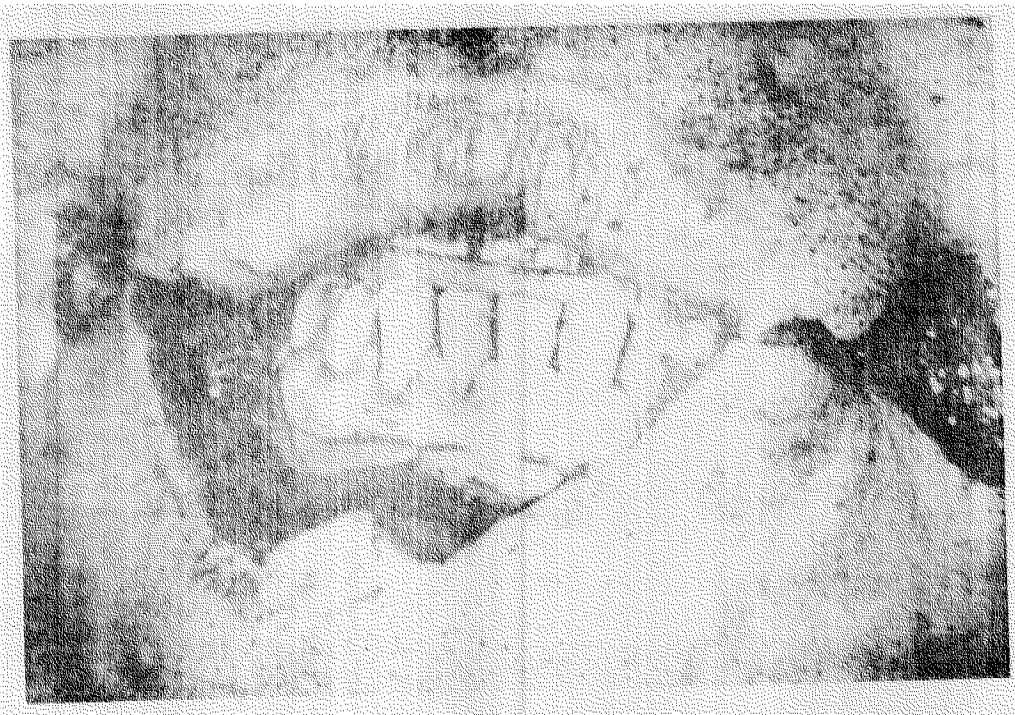
W-plasty with bilateral Burrow's triangle in reconstruction of Sq Cell Ca 1/3 to 2/3 lower lip.

Dr. Jaime F. Flor, M.D.*

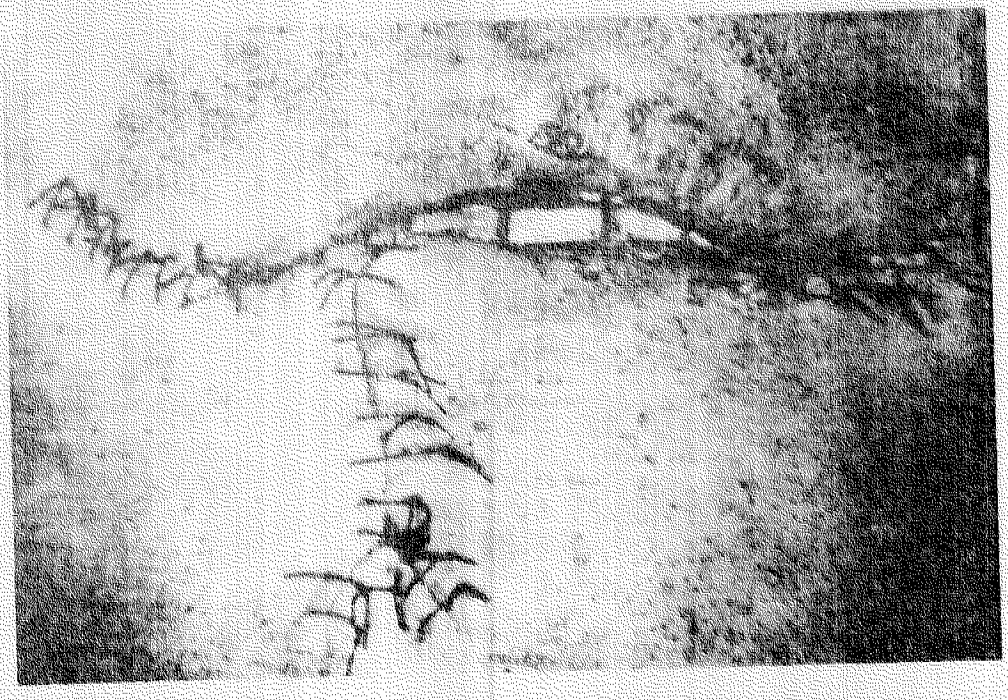
1. Sq Cell Ca 1/2 lower lip.

2. W-plasty with bilateral Burrow's triangle.

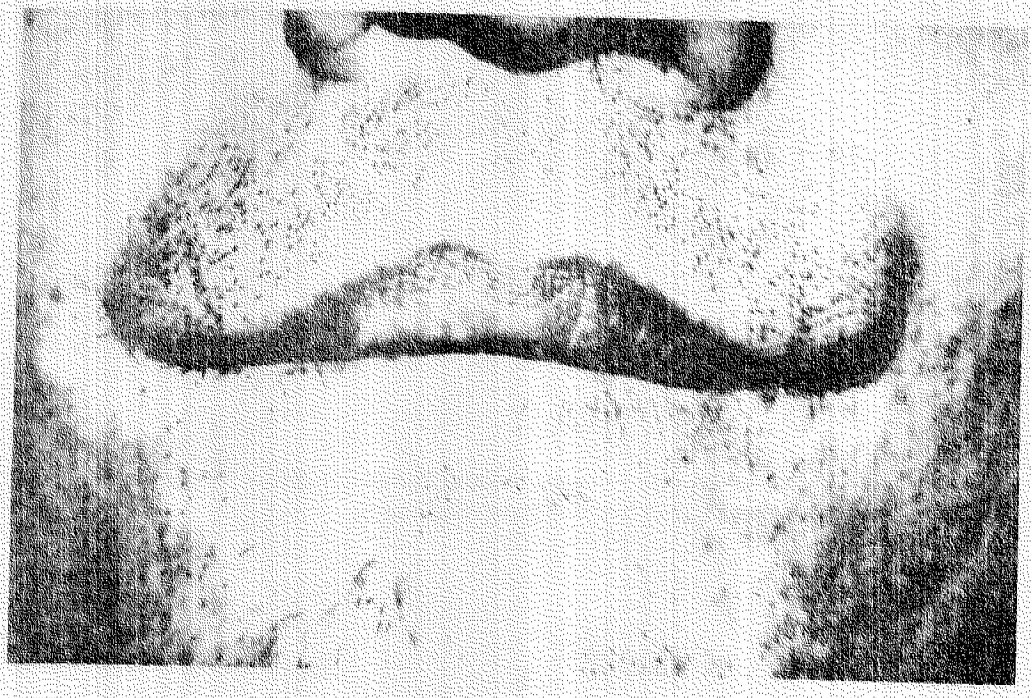
* Senior Resident, Dept. of Otolaryngology, U.P.–P.G.H. Medical Center



3. Excision of mass with 0.5cm margin of normal tissue all around. (—) line of resection by frozen section . Under local anesthesia.



4. Closure by layers. Outward flap of buccal mucosa to serve as mucosa of lower lip.

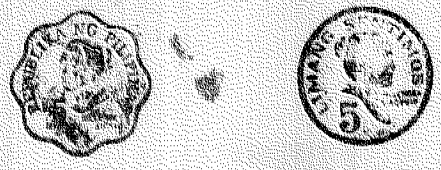


5. 1 month post-op.

6. 1 month post-op. Reconstruction imparts smiling face.

ANSWERS

1. Two 5-centavo coins – one new and the other old – one on top of the other – inside esophagus.



2. Cystic hygroma