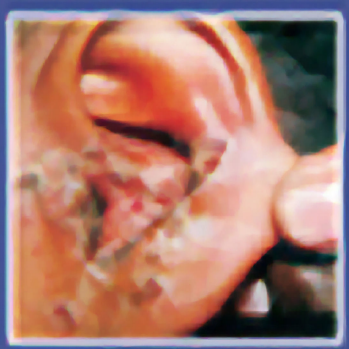
Clinical Methods in ENT



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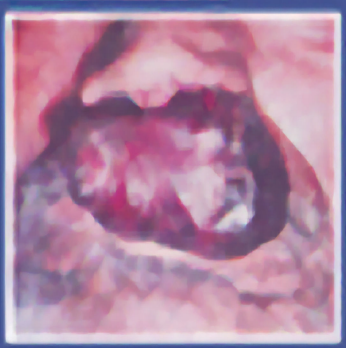

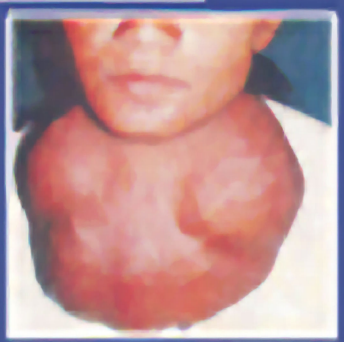

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Clinical Methods in ENT

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preface

It would not be an exaggeration if I say that otolaryngology is the specialty, which has grown spell and bound, in the last 25 years. Few years' back ENT was supposed to be a branch of surgery for tonsil and submucous resection of septum. This is no longer true. ENT has made inroads, which comprise from dura to pleura. With the advent of newer technologies like micro ear surgery, laser surgery and functional endoscopic sinus surgery, otolaryngology is usurping the newer records of state of art. A medical student who is going to treat the patients in 21st century can't afford to lag behind.

While teaching undergraduate students I always felt the necessity of a book based on clinical teaching in ENT. There are large many textbooks on ENT written by senior authors. But they do not satisfy the need of students as to " How to examine an ENT patient?" Books to this effect are written for General Surgery and Medicine. Even though the basic principles of examining the patient remain the same, the specialty of otolaryngology differs in many respects. There was a gap between a novice student and field of otolaryngology. It was my desire to fill up this gap.

I am sure that this book would be immensely useful to the undergraduate students who are doing clinical posting in ENT. It would give them insight to patient examination. The book would be equally useful to residents who are working in ENT. The book is illustrated nicely with 163 coloured photographs of various clinical conditions. Diagrams and charts given in the book should be useful to the students in clinical learning. An attempt is also made to teach the relevant radiology to the student.

I owe beyond words to my wife Mrs Bharati Wakode who could tolerate my masterly inactivity in household matters due to pre-occupation in this book. Dr Surendra Gawarle, Associate Professor, in ENT has all the time helped me in giving positive criticism on various aspects of the book. Dr Samir Joshi, Lecturer in my department was always ready to help me in preparing the photographs, text and any other help needed to me from time to time. Dr Dilip Sarate, a Pathologist has drawn beautiful diagrams for the book and definitely needs to be mentioned. Dr Pawan Tekade, my House Officer has given his co-operation in digital photography.

It would be my pleasure to see this book in the hands of students attending the ENT clinics.

PT Wakode

foreword

It is a great delight for me to write a brief introduction to Professor Wakode's excellent textbook *Clinical Methods in ENT*. It was my great pleasure in 1988 to welcome Professor Wakode to Southampton on a Commonwealth Medical Fellowship sponsored by the British Council and Association of Commonwealth Universities. My particular expertise is in medical laser applications in ENT and certain other specialties and I very much enjoyed teaching him "all I know about lasers" and he was also a most valuable member of our Clinical Department. I have followed his career since his return to India and I am delighted to know of his appointment as Professor of ENT in Yavatmal.

This textbook is designed for undergraduate students and will also be of great value to any doctor in any grade wishing to improve his knowledge of clinical methods in otolaryngology. I wish this book every success.

John Carruth MA MB PhD FRCS
Southampton, UK

contents

Part I

Part II

Part III

Part IV

Section A

Section B

Section C

Part V

Clinical Methods in ENT

Distinguishing Features:

- Designed for undergraduate students and practitioners wishing to improve knowledge of clinical methods in otolaryngology.
- Gives insight to patient examination 'How to examine an ENT patient'.
- Beautifully illustrated with 163 coloured photographs of various clinical conditions.
- Quite a good number of diagrams and charts for the benefit of students in clinical learning.
- Helpful in learning relevant radiology to the students.

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PART I

one
introduction

Dear students by the time you are posted in ENT you have already completed your clinical posting in General Surgery and General Medicine. So you are well acquainted with patient's history taking. Let me tell you that though basic principles remain the same, the clinical examination in ENT is a bit different from what you have learnt so far. And this is so because Ear, Nose and Throat are small darker cavities in the human body. They are partially hidden and to examine them you need good illumination. Not only that but these are very sensitive parts of the body and while examining them one has to have a " feathery touch" and some patience also. Because many a times even with utmost care, patient does not co-operate in the examination. One more difference is that the teacher can teach you how to examine a tumor on hand, foot or even abdomen and more than one student can see it simultaneously. But this is not the case in ENT. It is very difficult to examine the patient by two people simultaneously because of small and relatively inaccessible anatomical areas. And hence one has to put more efforts to be proficient in the ENT examinations. Let me say that it is a scientific art.

So before we actually embark on the clinical examination it is better, if we get acquainted with various instruments commonly needed to examine a patient.

Bull's Eye Lamp

This is the most important instrument for proper illumination of the relatively darker cavities like ear, nose and throat. It consists of a heavy base, stand and a cylindrical box. This box contains an electrical bulb and a powerful convex lens. Electrical bulb should be milky white so that you get a good circular focus.

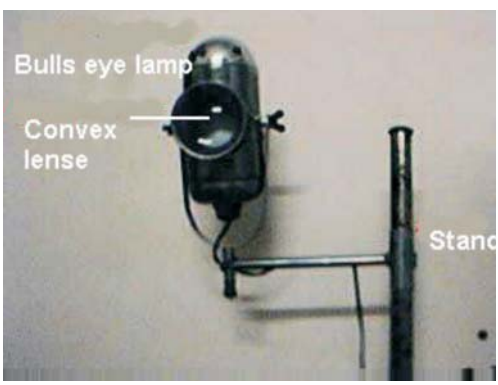


Figure 1.1: Bull's eye lamp

Head Mirror

This is another important equipment needed. It has a circular concave mirror and a headband attached to it. It has a central hole of diametre of approximately 2 cm through which examiner can see. The concave mirror has focal length of approximately 23.6 cm. The headband is fixed to the head and then the concave mirror is held close to the right eye completely covering it. Examiner closes his left

eye and focuses the light on the patient's body. Then he sees with his right eye through the central hole. Once he gets a good focus he opens his left eye and examines the patient by keeping both eyes open. With little practice this becomes a routine. Light coming from the Bull's eye lamp is reflected from the head mirror on the patient's body. As the rays focussed on the patient are parallel to visual axis you get the very good illumination. Your both hands are free for various manipulations like syringing or removal of foreign body, etc. This illumination system is best in the present circumstances. Torch, or otoscopes are in the use but these instruments keep your hand engaged and manipulations like removal of wax, FB, etc. are not possible. Hence this lighting system is popular all over the world.

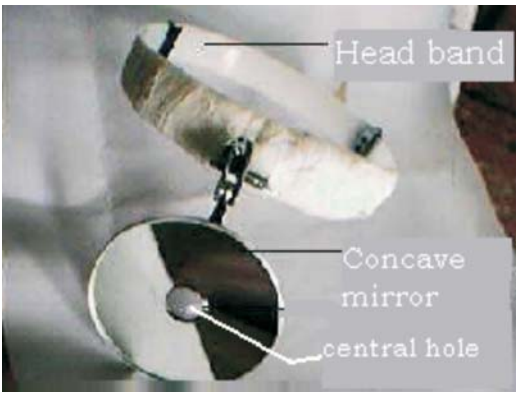


Figure 1.2: Head mirror

Aural Speculum

This instrument is used to examine the ear canal and tympanic membrane. They are polished from outside but having dull finish inside so that they do not reflect much light to cause glare. Black finish ear speculums are used in operation theatre for the same reason. Aural speculum of appropriate size should be chosen and negotiated in the ear canal. It should pass easily the junction of bone and cartilage. It should be snugly fitting, not too large or too small for the ear under examination.

Figure 1.3: Aural speculum

Nasal Speculum

Thudicum's nasal speculum is in the common use. It has blades and a U shaped metallic strip to hold the instrument. Nasal speculum of appropriate size should be chosen. It should be always held in the left hand with the blades of the instrument facing the patient. Left index finger and thumb hold the instrument and left middle and ring finger controls the movements of blades.

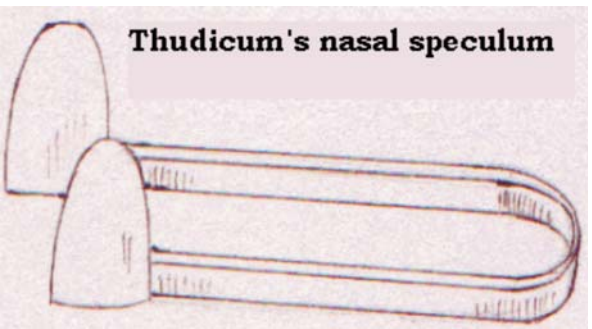


Figure 1.4: Nasal speculum

Slowly it is negotiated in the patient's nostril without hurting the patient. You can examine nasal septum, turbinates and any abnormality in the nose with the help of this instrument. Long bladed instrument may be painful and should not be used without anaesthesia.

Laryngeal Mirrors

Figure 1.5: Laryngeal mirror

These are small plane mirrors fixed in a circular metallic bracket. They are used to examine the larynx and pharynx, which is other wise inaccessible for examination. They have a small handle to hold the instrument. The mirror is gently heated before doing the examination. This is to prevent condensation of patient's breath on the mirror. As you don't see the actual larynx but a mirror image the procedure is known as Indirect Laryngoscopy.

Postnasal Mirrors

These mirrors are similar to laryngeal mirrors but smaller in size and the handle is not straight. It is having two bends in it. This is to suit the instrument in the postnasal space and to keep the hand of clinician away from the visual field while examining. This examination is called as Posterior Rhinoscopy popularly known as PR examination.

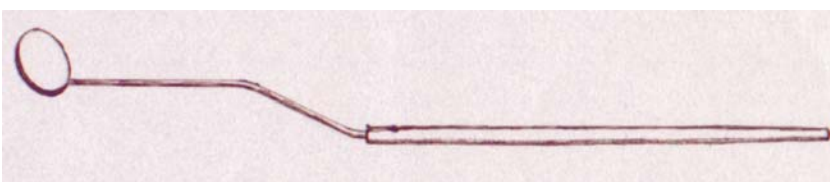


Figure 1.6: Postnasal mirrors

Siegle's Speculum

This instrument is having a rubber bulb, rubber tubing and an adapter that can be attached to an ear speculum. The adapter has fitted in it a convex lens having a magnification of 2X.

Figure 1.7: Siegle's speculum

Uses

1. To see a magnified view of the tympanic membrane.
2. To elicit the mobility of tympanic membrane.
3. To elicit fistula test.

Tuning Forks

Tuning forks of 256, 512 and 1024 Hertz are used in ENT practice. They are different from the tuning forks used by physicist. Medical tuning forks have a strong metallic base, stem and prongs. They are used to perform hearing tests like Rinnie test, Weber test, etc.

Figure 1.8: Tuning forks

Wire Vectis with Cerumen Spud

This instrument is used for removal of FB/wax in clinical practice.

Figure 1.9: Wire vectis

Tongue Depressor

This is used to depress the tongue during oral cavity and oropharynx examination. It is also used during posterior rhinoscopy. Cold spatula test is also possible with it.

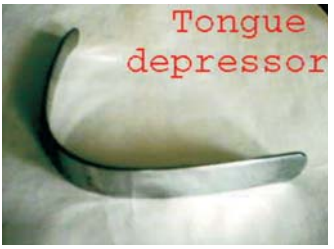


Figure 1.10: Tongue depressor

Cotton Wool Carrier

This instrument is used to clean the cavity if it is full of discharge, wax or pus. It has serration at one end. Surgical cotton is wrapped to that end and the instrument is negotiated in the nose or ear to wipe out the secretions. This is superior over various buds available in the market. Ring end can be used to remove foreign bodies also.

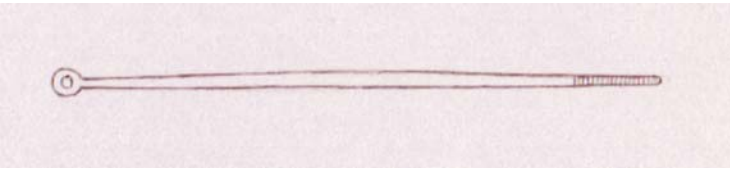


Figure 1.11: Cotton wool carrier

Nasal Packing Forceps

It is used for the nasal/aural packing, removal of FB or crusts.

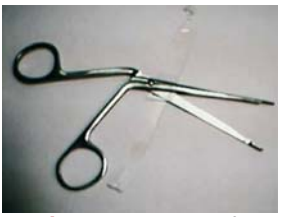


Figure 1.12: Nasal packing forceps

Suction Cannula

To clear the secretions from the ear nose or throat.

Spirit Lamp

It is used to warm the mirror in indirect laryngoscopy and posterior rhinoscopy. Few people also use hot air blasts instead of spirit lamps.

Sitting Arrangement

Figure 1.13: Sitting arrangement

It is better to have a small cubicle arrangement rather than a big hall for examination. Patient is sitting on a revolving stool or a chair at a distance of approximately 1.5 feet away from the clinician. Patient's head and neck and clinician's eyes should preferably come in same horizontal plane. Bull's eye lamp is kept on the left side of the patient approximately one foot away and behind, at a little higher level so that the heat generated does not cause discomfort to patient. Clinician should sit on a chair with an instrument trolley available on his right hand side. Parallel rays coming from the Bull's eye lamp are reflected from the concave mirror, on the patient's body and we get a good circular focus. With the help of this illumination, examination of relatively darker cavities of nose, ear and throat becomes easier.

Otoscope

This is one more useful instrument in ENT. It is used to examine the ear. It has disposable black coloured ear speculum, magnifying lens having magnification power X 2. It is battery or electrically operated. It gives bright-magnified view of the tympanic membrane. Some of the otoscopes have facility for changing ear canal pressure. This helps to test mobility of tympanic membrane and fistula test. However removal of wax, FB is not possible when the instrument is in ear canal and clinician's one hand gets engaged in holding the instrument.

Figure 1.14: Otoscope

two

history taking

The importance of good history taking is beyond doubt. With a careful history taking you can help yourself to come to more accurate diagnosis which at times may not be possible even with sophisticated investigation. You have already learnt this art during your posting in General Medicine and General surgery. Here I would narrate few points related to ENT. Otherwise it is more or less same as taught to you in medicine/surgery.

Name

It is a good practice to call the patient by name. This gives a feeling of closeness to the patient. This may at times help you to know the religion of the patient without asking him. For example-you can guess the religion of a person having name Yussuf Khan or George De'silva.

Age

There are few problems, which are age related. Tonsil, adenoid hypertrophy is commonly seen in younger patients. Nasopharyngeal angiofibroma is usually seen in puberty age. Congenital anomalies are usually seen in early childhood. Cancer is usually seen after the age of 40 however no age is immune from it.

Sex

Naso-pharyngeal angiofibroma is exclusively seen in males in puberty age group. It is almost non existent in female. Atrophic rhinitis is more common in young female. Otosclerosis is more commonly seen in female. Carcinoma of larynx is more common in male while postcricoid malignancy is more common in female. This information is necessary to avoid certain blunders that can be made in the beginning of one's carrier.

Occupation

It is very important to know the exact nature of work the patient does. This not only helps in the diagnosis but also gives an idea about his socio-economical status. The job he is doing may itself be directly or indirectly responsible for his present problem. *For examples*-teachers, preachers, hawkers, singers who use their voice

to the maximum are likely to suffer from chronic laryngitis, vocal nodule, etc. People working in wood industry, petroleum refineries are prone to develop malignancy of nose and paranasal sinuses. People working in noisy industry may develop noise induced hearing loss after prolong exposure.

Similarly the treatment policy may have to be changed taking into account the occupation of the patient. *For example*-a person whose bread and butter depends upon his voice may be advised radiotherapy instead of total laryngectomy in case of carcinoma larynx.

Residence

Rhinosporidiosis is common in some pockets of Madhya Pradesh, Chhattisgarh and along the coastal border of our country. But it is very rare in the European community to develop it without visiting the Southeast Asia. People living in damply atmosphere are prone to develop otitis externa or otomycosis frequently. Proper record of postal address helps us to trace out the patient when needed for follow-up.

COMPLAINTS

Majorities of the patients do not know what exactly the clinician needs, and they beat round the bush. It is equally true even for educated patients. Hence clinician has to have a patient hearing towards the patient's complaints and give some hints to the patient to extract proper history. All the complaints should be noted down in chronological order.

For examples:

Otorrhoea right ear	2 years
Hearing loss same ear	1 year
Headache	7 days
Fever	2 days

If the complaints arise at the same time then more severe complaint should be written first.

History of Present Illness

As far as possible this should be narrated in *patient's own language* or style. Each and every complaint should be properly analysed. The mode of onset, severity of the complaint and laterality should be asked. *For example* if the patient complains of otorrhoea he should be asked as to *How it started* or what made it to start, because it may be an attack of acute otitis media to begin with or a history of trauma. Severity of the complaint should always be asked as it gives you an information whether it needs urgent intervention or not.

God has given us bilateral organs to compare. Hence always compare the diseased ear with normal one, if only one is diseased.

- *Leading questions should be avoided*
- *Negative history* may be very helpful at times. *For example,* perforation in nasal septum with no history of surgery on septum suggests some heavy metal poisoning or chronic granulomatous condition.

Past History

The diseases patient suffered prior to the present problem should be narrated in this history in chronological order. The doctors who have treated, duration and details of the treatment received should be asked for. Same is true for operative procedures. Chronological record of operative procedures with details of operation may be mentioned. This may have some bearing on the present problem. *For example,* a hypertensive patient on methyldopa may have stuffy nose and instead of trying a nasal decongestant, it is better to change the antihypertensive if possible. A large number of drugs like streptomycin, diuretics, anti-inflammatory drugs and antimalarial drugs are ototoxic. This history in a patient of deafness may give clue in the diagnosis.

Personal History

Patient may be asked about his habits, like smoking, tobacco chewing, intake of alcohol, etc. in details. His life style, food habits, bowel habits be enquired. Marital status and obstetrical history in case of female patient is important.

Family History

Certain diseases do run in families. And few diseases even if they are not genetic in origin, run in families. Hence family history should be asked particularly in case of deafness in early childhood, epistaxis, nasal allergy, etc.

PHYSICAL EXAMINATION

Surgeon thinks locally, acts locally. Physician thinks globally and forgets locally. A good clinician finds a golden median of the two.

After adequate history, physical examination should be carried out. This includes:

1. General examination
2. Local examination
3. Systemic examination.

1. In the general examination vital parameters like pulse, blood pressure, temperature, respiration are noted down. In addition to this pallor, clubbing, icterus, hydration, built and nutrition, height and weight, mental status, oedema over feet if any, and condition of lymph nodes in neck, axillae, groin are noted down.
2. Local examination is the most important examination. On the basis of this examination clinician can come to a definitive diagnosis. Affected part should be examined thoroughly. The opposite side should also be examined.
3. Systemic examination includes physical examination of cardiorespiratory system, gastrointestinal system, and nervous system. This examination is essential to know fitness for anaesthesia, any associated disease and systemic involvement of various ENT diseases.

three

examination of swelling, ulcer and fistula

You must have learnt by heart the methods of examining a swelling, ulcer and fistula during your posting in General Surgery. In ENT the basic pattern remains the same, with little modifications here and there. Examination of these lesions is so important that even with the charge of repetition I would like to discuss it.

HISTORY

Duration

Patient should be asked, *How long he is having the swelling*. The swelling may be there since long but the patient may not have noticed it or being painless might have neglected it. Swellings of acute onset may be inflammatory or post-traumatic in origin. Swellings of very long duration are usually benign in nature.

Mode of Onset

Ask the patient *how the swelling progressed?* A swelling may progress very fast in traumatic condition or may progress very slowly in benign condition. Certain swellings are slow in progress for a long period and then suddenly they increase in size or initiate pain. This is usually seen with malignant change in mixed parotid tumour or sudden haemorrhage in thyroid.

Associated Symptoms

Swellings in head and neck region due to their anatomical location may cause change in voice. A peritonsillar abscess may give rise to plummy voice. A large tumour over neck may compress the vessels and nerves of the neck and may cause loss of function of the nerves involved. Say *for example,* there may be 9,10,11 or 12th cranial nerve palsy when a large tumour compresses over the nerve trunk, giving rise to various symptoms. Compression over cervical sympathetic chain may result into *Horner's syndrome*. Compression over trachea/oesophagus may cause respiratory distress or dysphagia. Dysphagia of long duration may cause weight loss in a patient. All these symptoms need to be analysed properly. Swelling may be associated with pain. In that case details of pain like nature of pain, site, time of onset, severity, spread, aggravating factors, ameliorating factors all should be asked

in details. At times it may be fever with or without rigors. And details of it should be taken.

At times patients main concern is swelling in the neck. But he may have primary malignancy somewhere in nose/nasopharynx or laryngopharynx. And this possibility should always be kept in mind while examining a patient and relevant symptoms should be asked.

Exact Site

To begin with, swelling may be very small arising from one site and then gradually enlarges to cover up a large area. Patient should be asked the exact site where from the swelling started. This may give information about the tissue of origin of the swelling.

Other Swellings over Body

Patient may be asked that whether there is any swelling elsewhere on body. *Examples*, Multiple neurofibroma, Hodgkin's disease, etc.

GENERAL EXAMINATION

The built, attitude and look of the patient may be given proper attention in addition to vital parameters like pulse, BP, pallor, oedema feet, etc.

LOCAL EXAMINATION

Local examination of swelling is very important and it helps the clinician to come to a clinical diagnosis. Hence this part of examination should be done very carefully and meticulously. The pattern of examining a swelling is universal and is followed here with relevance to otolaryngology.

Examination of swelling is done in the following manner.

A. Inspection
B. Palpation
C. Percussion
D. Auscultation.

INSPECTION

Site

Site of the swelling may give you clue about its origin and hence careful inspection about exact location of the swelling is must.

Size

Size of the swelling should be noted down in vertical and horizontal directions. Say for example the swelling is 4 cm × 4 cm located between tragus and angle of mouth in horizontal direction and between zygomatic arch to lower alveolus in vertical direction.

Shape

The swelling may be spherical, ovoid or irregular. Shape may not be clear in some swellings where it is called as diffuse.

Surface

Surface of the swelling may be smooth, globular or irregular.

Margins

Margins of a swelling may be well defined or poorly defined.

Skin over Swelling

The skin overlying the swelling may be red, oedematous in inflammatory swellings. It may be tense glossy with prominent blood vessels over it, in case of sarcoma. A punctum may be seen on skin in sebaceous cyst. Scar mark over the swelling indicates previous operation or application of irritants to the swelling.

Pulsations

Swellings that arise from arteries may be pulsatile. The swelling that is in close vicinity of blood vessel may transmit the vascular pulsations.

Colour

Haemangiomas give a reddish colour to the tumour mass and black colour may be imparted by melanoma.

Change in Size of Swelling on Coughing/Straining or Valsalva

Few swelling do change in size on coughing/straining or after performing a Valsalva manoeuvre. *Examples,* Meningocoele, Laryngocoele.

PALPATION

In palpation, the findings noted down in inspection are confirmed and additional findings are searched, if any.

- *Local temperature:* this is the first thing to be noted in palpation of swelling. It should be done by dorsum of the hand. Local temperature is raised in inflammatory swellings.
- *Tenderness:* when a patient experiences pain on pressing the swelling gently it is known as tenderness. It is usually seen in inflammatory swellings.
- *Size:* size of the swelling observed in inspection is confirmed by palpation and dimensions in vertical and horizontal direction are noted down.
- *Shape:* shape can be better delineated by palpation.
- *Surface:* surface of a swelling may be smooth (e.g.cyst) lobular (e.g. lipoma) or nodular (multinodular goitre) or irregular (malignancy). Pulp of fingers /palm is used to know the surface of swelling.
- *Margins:* margins of a swelling may be well defined or poorly defined and should be palpated with tips or margins of fingers. Inflammatory and neoplastic swellings may have poorly defined margins.
- *Consistency:* the consistency of a swelling is:
  Soft: when it is comparable to consistency of your lips.
  Firm: when it is comparable to consistency of tip of nose.
  Hard: when it is comparable to consistency of your forehead.
  Cystic: when it is comparable with water filled balloon.

The consistency of a swelling may be homogenous through out the swelling or may change at different places. This variable consistency may be seen in malignancy.

Fixity to Skin

Some of the swellings do arise from skin appendages itself, like sebaceous cyst. One can't move the overlying skin in such lesions. But overlying skin can be moved when the swelling is deeply situated. If the overlying skin is involved in malignant process, it can't be moved.

Mobility of Swelling

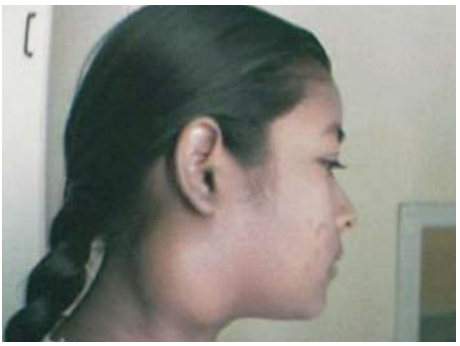
Swelling should be grasped in the hand and moved in vertical and horizontal direction to see whether it is mobile or fixed to deeper structures. Fixity is an important feature of advanced malignancy, which may contraindicate surgical intervention.

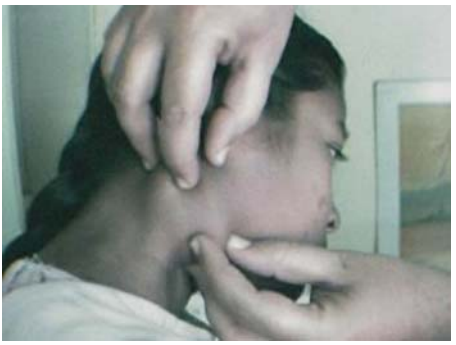
Then there are certain signs, which can be elicited to get additional information about the swelling. These signs are-

Fluctuation

Sign of fluctuation is an important clinical sign, which can be elicited as follows.

Fix both the poles of the swelling between thumb and fingers of both the hands and press one pole of swelling by index finger. The fingers used to fix the swelling





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Figures 3.1A and B: (A) Showing swelling on right side of neck, and (B) Showing how to to elicit fluctuation

appreciate the change in the pressure. In case of a very small swelling, it is pressed at the centre and pressure changes are felt at the periphery of the swelling. *Example*, Neck abscess, or any swelling containing fluid.

Transillumination Test

Figure 3.2: Showing how to elicit transillumination test

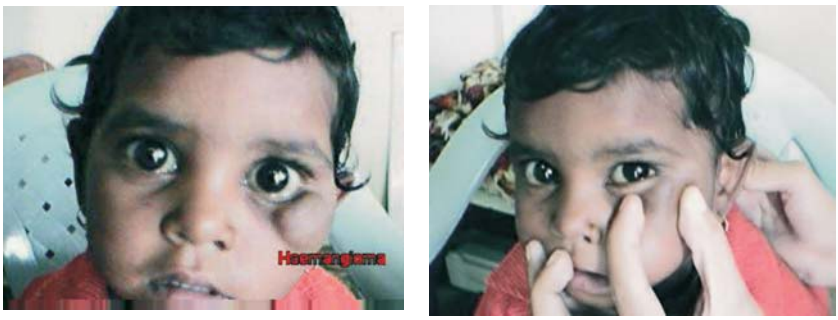
This test can be carried out when you suspect fluid in the swelling. It should preferably be done in a dark room. Clinician should sit in the dark room with his eyes closed for 10 minutes to get 'dark adaptation'. A small pencil torch is applied close to the swelling at one end and swelling is observed through a paper roll at other end. If the swelling contains clear fluid it would be brightly transilluminant. If the fluid inside the swelling is turbid or thick, the swelling may be translucent or opaque. *Swellings in head and neck region that are brilliantly transilluminent are cystic hygroma and ranula.*

Reducibility

The reducible swelling disappears completely or partly on compression. This happens because the swelling has a connection with the body cavity. And on compression swelling gets pushed in the cavity. *Examples,* External Laryngocoele, Meningocoele.

Compressibility

Swellings, which decrease in size on firm pressure or compression, are called compressible swellings. *Example,* Lymphangioma/haemangioma.



A B

Figures 3.3A and B: Compressibility in haemangioma

Pulsatile Swelling

A swelling in close vicinity of artery or arising from wall of the artery may transmit pulsations of the underlying vessel or may itself be expansible. If you keep two fingers on such a swelling as wide apart as possible, the fingers are lifted up with every stroke of pulse (e.g. carotid body tumour). When the swelling is expansible the fingers are not only lifted up but they are also separated from each other with every stroke of pulse (e.g. aneurysm)

PERCUSSION

This may not be that useful in examination of swellings.

AUSCULTATION

Bruit may be heard over the swellings arising from a blood vessel or a highly vascular lesion or when the swelling compresses the blood vessel. *Example*, Thyroid nodule.

Regional Lymph Nodes

In any head and neck swelling the regional lymph nodes should be palpated to know whether they are enlarged, tender or other wise. If one group of lymph node is affected the other groups of nodes should also be examined.

Examination of Sinus or Fistula

Sinus

A blind tract lined by the epithelium that communicates the inner tissues with skin. *Example*, Tuberculous neck sinus.

Fistula

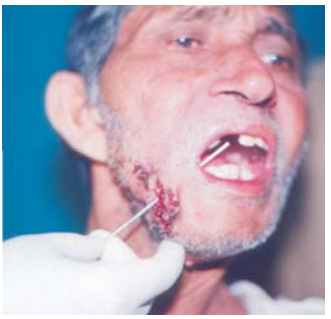


Figure 3.4: Showing multiple sinuses over face. A probe entering in oral cavity through sinus

A fistula is an open tract communicating two epithelial surfaces, e.g. oro-antral fistula.

While examining a Fistula or Sinus following aspects do need attention:

A. *Position*: Many sinuses or fistulas have a typical position and thus help in diagnosis.
- *Branchial fistula* is usually situated at lower third of the neck in front of sternomastoid muscle.
- *Thyroglossal fistula* is located in midline.
- *Preauricular sinus* is located at the root of helix.

B. *Number:* Usually fistula is single in number. But may be multiple in tuberculosis and actinomycosis.

C. *Discharge*: Character of the discharge may be noted. It may be thin whitish discharge in tuberculosis, frank pus in osteomylitis, 'sulphur granules' in case of actinomycosis.

D. *Surrounding skin:* may show scarring in case of tuberculous fistula. Repeated infections in the sinus may cause scarring and thinning of surrounding skin.

E. The sinus or fistula should be palpated for tenderness. Thickness of wall should be noted down. *Probing* of the sinus/fistula may be done to know the depth and direction of tract.

Fistulography: Radiopaque dye may be injected in the fistula and X-rayed to delineate the tract.

At times the opening of sinus may be closed and form a cystic swelling.

Examination of Ulcer

Definition: Ulcer is a breach in the continuity of skin or mucous membrane.

History

Ask the patient *How the ulcer started*? Is there any history of trauma or surgery or it developed spontaneously?

Is there history of local pain, fever prior to ulcer formation?

Are there patches of hyposthesia over body?

Is there H/O diabetes, tuberculosis or malnutrition?

How long the ulcer is there? This would tell you whether the ulcer is acute or chronic in nature. Aphthous ulcer, traumatic ulcer is an example of acute ulcer. However ulcer due to tuberculosis and malignancy may be chronic in nature.

Is the ulcer painful? Aphthous ulcers are highly painful, while malignant ulcers may not be painful.

Is ulcer discharging? The nature of discharge should be enquired.

"Are the ulcers increasing in number or size?"

"Are there ulcers over other parts of body, e.g. genitals."

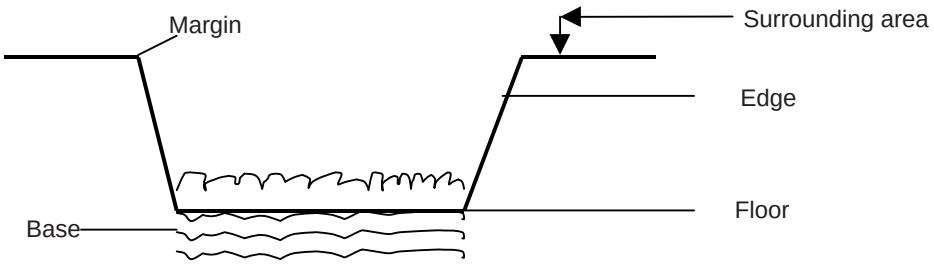
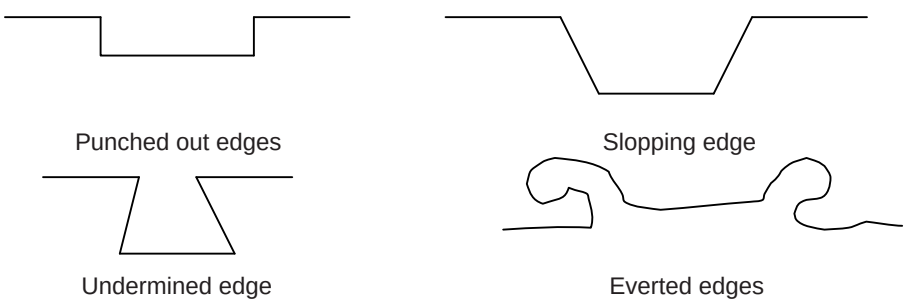


Figure 3.5: A diagrammatic representation of an ulcer

Examination of Ulcer

A. Inspection:

1. *Number*—note whether the ulcer is single or multiple.
2. *Site*—note down where the ulcer is located? It would give you idea about the tissue of origin.
3. *Size*—note down the vertical and horizontal dimensions of the ulcer.
4. *Shape*—aphthous ulcers are oval or round. Syphilitic ulcers are serpiginous and malignant ulcers are irregular.
5. *Discharge:*
   i. Serous—discharge may be seen in non-healing ulcer.
   ii. Serosanguinous—discharge may be seen in healing ulcer or at times in malignant ulcer.
   iii. Purulent—discharge may be seen in spreading ulcer.
   iv. 'Sulphur granules' discharge may be seen in actinomycotic ulcer.
6. *Floor*—this part of ulcer contains granulation tissue, discharge and/or slough. Granulation tissue may be pink (pinhead size) in healing ulcer. Pale flat granulation tissue in chronic non-healing ulcer and unhealthy granulation tissue with slough in spreading ulcer.
7. *Edges*—edge is the type of union between floor and margin of ulcer.



- Punched out edges, e.g. syphilitic ulcers.
- Undermined edges, e.g. tuberculous ulcers.
- Everted edges, e.g. malignant ulcer.
- Slopping edges, e.g. healing ulcer.

8. *Margin:*
   - *Healing margin:* This may show outer white zone of epithelisation. Middle blue zone of regenerating epithelium and inner red zone of healthy granulation tissue.
   - *Inflamed margin:* It shows signs of inflammation and seen in spreading ulcer.
   - *Fibrotic margin:* This ulcer shows evidence of fibrotic tissue in the margin. It is seen in chronic non-healing ulcer.
9. *Surrounding area:* Area surrounding the ulcer should be inspected for any scar, excoriation of skin, oedema, sinus formation, dilated blood vessels, etc.

B. Palpation: Palpation of the ulcer should be done carefully for-
   - Local temperature
   - Tenderness
   - Edges of the ulcer should be palpated and findings of inspection are confirmed.
   - Base of the ulcer should be palpated for any induration. It should be noted whether ulcer bleeds on touch or not? And fixity of the ulcer to the structures down below may be tested by *mobility test*. Moving the base of ulcer in two directions checks the mobility of the ulcer. One along the direction of underlying muscle and one perpendicular to it. This mobility may be tested by contracting the underlying muscle against resistance and without contracting the muscle.

NB: If the ulcer moves freely before and after the contracting the underlying muscle, it is superficial. If the mobility is reduced after contracting the muscle, ulcer has infiltrated the muscle. If the ulcer is immobile even without contracting the muscle, it is fixed to underlying bone.

PART II

four

examination of ear

Before we actually start clinical examination of ear it is quite in order if we understand the various symptoms related to ear diseases. Ear disease may cause one or more than one of the following symptoms.

1. Ear discharge (otorrhoea)
2. Hearing loss (deafness)
3. Ringing in ear (tinnitus)
4. Pain in ear (otalgia)
5. Giddiness/vertigo
6. Itching in ear
7. Blocking/wooly or FB sensation in ear
8. Autophony/hyperacusis
9. Swelling in pre and post-auricular area
10. Bleeding from ear.

Some of the symptoms are not dedicated to ear diseases, but they may be closely associated. They are:

- Nausea
- Vomiting
- Light headedness
- Headache
- Fever
- Retro-orbital pain
- Diplopia
- Inability to close the eye
- Deviation of angle of mouth.

A patient may have one or more than one symptoms mentioned above. Each symptom should be analysed minutely to get more insight into the patient's problem. It is usually observed that a relative accompanying the patient starts giving information which many of the times is not accurate. Hence it is always better to elicit the history from the patient himself unless he is a child or unable to give history due to illness.

Otorrhoea

Duration

Patient should be asked *How long he is suffering from the present complaint?* This gives you clue whether disease is of acute onset or chronic or acute exacerbation of chronic disease. Patient should be asked whether he recalls the first attack of otorrhoea? How and when it started? What were the preceding or associated symptoms that time. Usually upper respiratory tract infection, either bacterial or viral precedes first attack of acute otitis media and patient may develop fever, pain in ear. As soon as discharge starts, the pain disappears. This initial otorrhoea may be blood stained.

Severity

Patient should be asked *What way it [symptom] disturbs you and / or your work?* It would give an idea as to how much troublesome it is, to the patient. Discharge may be so profuse that it may not be possible for the patient to work.

Laterality

Patient should be asked *Is ear discharge unilateral or bilateral?* Many of the times patient has bilateral disease. But the disease on one side is quiescent or inactive and patient is concerned with the ear that is troubling him at present (active ear) and hence may not mention about inactive ear.

Periodicity

Patient may be asked *Is this complaint constant or intermittent?* If it is intermittent, how much is the time duration between two episodes. *Is it seasonal?* Some patients develop upper respiratory tract infection with every change in season and this is followed by otorrhoea. Such a relationship—if existing- should be noted down.

Character of the Discharge

Colour, quantity, consistency and smell of the discharge should be noted.

Otorrhoea may be *watery*, *mucoid*, *mucopurulent*, *purulent*, *thick inspissated*, *cheesy or blood stained*.

i. *Watery:* Watery discharge is colourless, thin, and transparent. It may be seen after head injury [CSF *otorrhoea*] or in the beginning of viral myringitis.
ii. *Mucoid:* This is colourless but not thin. It is tenacious mucous gland secretion, coming from middle ear. May be seen in acute otitis media after drum is perforated, or in chronic otitis media.

iii. *Mucopurulent:* Mucopurulent ear discharge is a coloured ear discharge. It may be whitish, yellowish or greenish or mixture of the three. It is tenacious and usually seen in acute or chronic otitis media.
iv. *Purulent:* Here the discharge is thick, but less tenacious. Usually it is scanty, and may be foul smelling. A scanty foul smelling ear discharge is usually due to Pseudomonas infection. The underlying pathology of bone necrosis or cholesteatoma may be responsible for foul smelling ear discharge. Discharge in furunculosis is thick purulent but without tenacious character.
v. *Blood stained:* At times the ear discharge shows frank blood. This may be seen after trauma, or in cases of baro-otitis media, haemangioma or glomus jugular tumour. In skull base # there can be bleeding from both the ears. But sometimes it is only blood stained (dirty red colour fluid). This may be seen in aural myiasis or bullous myringitis or in cases of CSOM associated with ear granulation. Acute otitis media patients may present with serosanguinous discharge in its stage of suppuration.

NB: Yellowish whitish blackish discharge may be seen in fungal infection of ear canal (Otomycosis). At times discharge may show a soaked blotting paper appearance due to 'Candida' infection.

Hearing Loss

This complaint should also be analysed in the same pattern. Duration, severity, laterality and periodicity may be asked. History suggestive of suppurative otitis media, exanthema, consumption of ototoxic drugs or trauma to head, history of familial deafness should be asked. In case of deafness since childhood detailed history of antenatal, perinatal and postnatal causes like TORCH group of infection in ANC period should be ruled out. Exposure to loud sounds should be taken into account.

Duration

This may give information whether the problem is acute or chronic in nature. Patient may be asked *When he noticed it first?* Hearing loss due to congenital malformation in hearing apparatus may be there since birth. Post-traumatic hearing loss like exposure to bomb blast may have very short history.

Severity

Patient may be asked *What way it disturbs you or your work*? Significance of hearing loss may be different in different ages, occupations and also depends upon sensitivity of an individual. Mild hearing loss to a manual labour may not matter much but it matters a lot for a telephone operator or cardiologist. So while analysing this complaint age, sex, occupation may be taken into account.

Laterality

Localisation of sound source is best when both the ears are functioning normally. Moderate hearing loss in one ear may be less troublesome than mild hearing loss in both ears.

Periodicity

Patient may be asked *Is your hearing loss constant or intermittent?*
Hearing loss due to congenital defects in ear like fixed malleus syndrome, canal atresias remain constant. If it is intermittent how often it is? Has it any relationship with change of season, URI, pain in ear or otorrhoea? *Is it static or progressive?*
In degenerative heredofamilial deafness, otosclerosis and Meniere's disease deafness is progressive. Hearing loss due to secretory otitis media or chronic Eustachian tube block may be intermittent and usually seen during change of season or attack of URI.

Nature of Deafness

Patients having conductive type of deafness may get improvement in speech perception on amplification of sound. However patients having sensory neural type of deafness may not get any improvement in speech perception on amplification as speech discrimination is poor in these patients.

Tinnitus

Tinnitus means ringing in ear. It may be tickling, whistling, fussing or roaring. It may be soft or very harsh. The exact mechanism of tinnitus is not clear. But any pathology in ear starting from wax to acoustic neuroma can give rise to tinnitus. It may be subjective, i.e. patient only perceives it. It may be objective, i.e. it is heard by other person also. Enquire about duration, laterality, severity, periodicity and associated symptoms.

Duration: Tells you, how long the patient is suffering?

Laterality: Unilateral tinnitus usually indicates local pathology. Bilateral tinnitus may be due to central pathology.

Severity: Tinnitus may be of mild nature and patient may neglect it. Or it may be so severe that patient is unable to sleep in the night or unable to concentrate on his work. Usually tinnitus is more felt during quiet hours of night-time.

Periodicity: Tinnitus may be continuous or intermittent. Tinnitus due to Meniere's disease is aggravated at the time of attack. Associated symptoms like hearing loss /vertigo should be asked and analysed.

Otalgia

Duration

Patient should be asked *How long he is having pain in ear*? *Is it constant or intermittent? How it is aggravated and how it is ameliorated*? *How long it lasts?* Pain due to otitis externa usually aggravates by chewing movements or touching the pinna may be painful.

Character

Whether it is dull aching, stabbing, cutting or pinpricking should be asked.

Severity

Pain due to furuncle in external auditory canal is usually severe. This is because skin is tightly adherent to underlying perichondrium and perichondrium is stretched during inflammation and compresses over the nerve endings. Pain in AOM is very severe in stage of suppuration.

Uncomplicated Chronic Otitis media is usually painless.

Laterality

Bilateral pain in ear may be due to wax impaction, Eustachian tube block or after tonsillectomy.

Periodicity

Pain due to chronic Eustachian tube block may be experienced during winter or rains as exposure to cold may cause spasm of the tensor tympani muscle.

Following nerves supply external auditory canal:
1. Auriculo temporal nerve (Vth)
2. Auricular branch of vagus nerve (Xth)
3. Great auricular nerve (C2,C3)
4. Branch of glassopharyngeal nerve (IX)
5. Lesser occipital nerve (C2)

When there is pain in the ear the cause usually lies in the ear. However at times, it may not be so. Tonsillitis, adenoiditis, sinusitis, impacted tooth, cervical spondylosis, nasopharyngitis, malignancy of larynx and laryngopharynx may present with pain in ear. And ear examination may be normal. This is known as *referred otalgia*. This occurs due to common nerve supply to the ear and the organs mentioned above. Treatment of the primary cause should be contemplated in such cases.

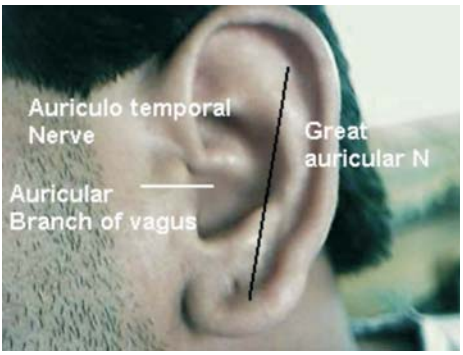


Figure 4.1A: Nerve supply of pinna (lateral part)

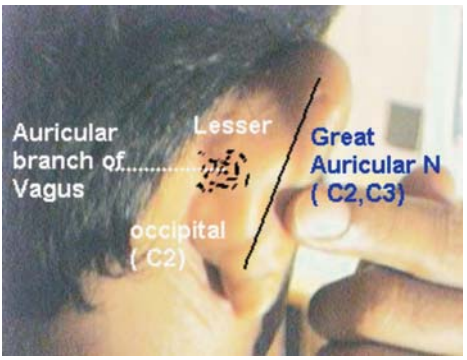


Figure 4.1B: Nerve supply of pinna (medial part)

Giddiness

This symptom should be screened very carefully because the terminology used by the patient may be very vague and interpreted wrongly. Sense of unsteadiness is termed as giddiness. This may be experienced in 'postural hypotension' while standing from lying down position, in cervical spondylosis or mild ischaemia of the brain. *Vertigo is a hallucination of movement of body or surrounding*. Inner ear pathology may give rise to true vertigo. In true vertigo patient may feel that he is moving in relation to his surrounding or his surrounding is moving around him. This sensation of whirling is very unpleasant, and patient may even vomit during the attack of vertigo. *Example*, Labyrinthitis or Meniere's disease.

Patient should be asked to recall his first attack of giddiness. How and when it started? How long it lasted? What was the severity? Is this symptom recurrent and how frequently? Are there some associated symptoms like tinnitus, hearing loss, heaviness in ear or vomiting? Meniere's disease is a triad of symptoms consisting of vertigo, deafness and tinnitus. Vertigo is severe, recurrent and disabling and, may be followed by vomiting. Hearing may reduce with every attack. In contrast vestibular neuronitis presents with vertigo and vomiting without hearing loss.

Positional vertigo: Some patients do complain of vertigo/ giddiness on particular neck position or change of posture. This may be seen after head trauma.

Itching in the Ear

This symptom may be seen in patients having wax, Otomycosis or some dermatological conditions affecting canal skin.

Blocking/wooly or FB Sensation in Ear

This is usually a vague complaint and patient is unable to describe it properly. It may be a blocking sensation or wooly sensation or FB sensation in ear canal. It

may be experienced in cases of secretory otitis media, ET block or in early phase of acute otitis media. Details of the complaint are noted down.

Autophony and Hyperacusis

Autophony: This is a very peculiar symptom in which the patient experiences his own voice, as if he is speaking in his ears. This can happen when there is abnormal patency of Eustachian tube. Or when there is fluid in middle ear.

Hyperacusis: Here patient has undue sensitivity of loud sounds. This is also known as phonophobia. Seen after stapedial nerve paralysis [facial nerve paralysis]. In normal situation loud sounds are not allowed to enter the inner ear by reflex contraction of stapedius muscle. This protective function of stapedius muscle is lost in facial nerve paralysis. And hence patient experiences loud sounds more severely.

Swelling in pre-post-auricular Area

Preauricular area: The most common swelling in this area is viral lymphadenopathy. But mixed parotid tumours or diseases of temporomandibular joint may present in this area as swelling.

Postauricular area: Most of the time it is a subperiosteal mastoid abscess. But tumours of muscles and bone may be rarely seen in the post-aural area.

Bleeding from Ear

This is an important clinical symptom. It may be seen after trauma or as a consequence of disease. Any injury to external ear, temporomandibular joint, barotrauma may cause bleeding from ear. Particularly head injury may cause bleeding from both the ears and is an important sign of middle cranial fossa #. Diseases like haemangioma, glomus jugular tumour can cause significant bleeding from ear. While aural myiasis, bullous myringitis results into serosanguineous discharge.

There are few symptoms, which are not dedicated to ear disease. But they may be closely associated with ear diseases. And enquiry to that effect should always be made. These symptoms are:

i. *Nausea:* This symptom may be associated with motion sickness or labyrinthitis, Meniere's disease or vestibular neuronitis.
ii. *Vomiting:* Vomiting is associated with acute labyrinthitis. It is non-projectile and copious in amount. Patient is usually unable to walk during the attack. However one should be suspicious because vomiting may be a symptom of raised intracranial tension.
iii. *Light headedness:* Patients of Meniere's disease may have this vague complaint.
iv. *Headache:* May be caused in ear diseases when there is intracranial complication like meningitis, extradural abscess, subdural abscess, brain abscess

and otitic hydrocephalous. Hence the symptom of headache in patients of CSOM should not be taken lightly.

v. *Fever:* Acute otitis media may give rise to high-grade fever in children but not in adults. Fever due to lateral sinus thrombophlebitis may be associated with rigors. Fever with severe headache, vomiting, papilloedema suggest raised intracranial tension.

vi. *Retro-orbital pain:* This is a peculiar complaint seen in patients who have developed 'petrositis' as a complication of SOM.

vii. Inability to close the eye.

viii. *Deviation of angle of mouth*: These two complaints are seen in any patient of facial nerve palsy and hence may be seen in patient who has developed 7th nerve palsy as a complication of SOM.

PAST HISTORY (HISTORY OF MAJOR ILLNESSES)

History of tuberculosis/ diabetes/ hypertension/ trauma/ allergy should be asked. A patient of tuberculosis might have used ototoxic drugs for the treatment, resulting into hearing loss. Diabetes and hypertension do have an impact in the management of the patient and also cause changes in inner ear. Patients who had contracted enteric fever in the past may develop hearing loss. Similarly previous history of ear surgery, trauma or head injury may cause vertigo or hearing loss.

FAMILY HISTORY

CSOM is not a hereditary disease. Still, more than one member in the family may be having CSOM. And this is because the same environmental and social factors are operating. Poverty, crowding and malnutrition is the basic triad in the genesis of CSOM. And hence history of ear disease in other members of family should always be asked. Few heredo- familial degenerative disorders run in families.

PERSONAL HISTORY

People working in noisy industry are likely to develop noise induced hearing loss. People having reduced immune response, cleft palate are notorious to develop SOM. Patients with allergic diasthesis like allergic rhinitis are prone to develop ET block which acts as precursor for all sorts of otitis media. People having renal problem or patients on anti TB treatment may develop ototoxicity.

GENERAL EXAMINATION

In general examination, apart from vital signs, look of the patient, general built, icterus, pallor, lymphadenopathy, oedema feet (if any) are noted down. Patient with serious intracranial complications or severe headache may not co-operate in the history taking and/or examination. Patient having labyrinthine affection may

have 'nystagmus' and may not be able to walk properly. They may tend to fall on one side while walking.

BP should be taken in supine and standing position.

LOCAL EXAMINATION

Examination of Ear

The following pattern may be followed:

1. Examination of pinna, pre and post-aural area.
2. Examination of external auditory canal.
3. Examination of tympanic membrane.
4. Fistula test.
5. Tuning fork tests.
6. Examination of nose, nasopharynx PNS and throat. — Though this is not a part of ear examination, it should be carried out after ear examination.
7. Examination of facial nerve.
8. Examination of other cranial nerves. — Described elsewhere

Examination of Pinna, Pre- and Post-aural Area

Pinna: should be examined for any obvious abnormality in size, shape or position.

Size: may be small and located at lower position, e.g. Down's syndrome.

Shape: may be abnormal since birth or after surgery/trauma.

Movements of pinna and tragus are very painful in cases of otitis externa.

Microtia: is a poorly developed pinna since birth.

Anotia: is absence of pinna since birth.

Accessory tragus, lop ear, pre-auricular sinus are other congenital malformations seen in clinical practice.

Post-aural area: should be examined without fail.

It may show swelling [e.g.mastoid abscess], scar of previous mastoid surgery or mastoid fistula. Tenderness should be elicited in post-aural area, by giving firm pressure over mastoid tip or mastoid bone corresponding to cymba conchii, which corresponds to McEven's triangle a—bony landmark for mastoid antrum. Tenderness at this area suggests infection in mastoid bone. Normally when you move your finger along the mastoid bone the bony unevenness is palpated. However in some cases of CSOM with mastoiditis and emissary vein thrombosis palpation of post-aural area gives a very smooth 'cat's fur' feel. When pitting oedema is extending to occipital area it is known as "Griesinger's sign".

Pre-auricular area: may show a sinus, swelling due to cyst, accessory tragii or lymphadenitis.

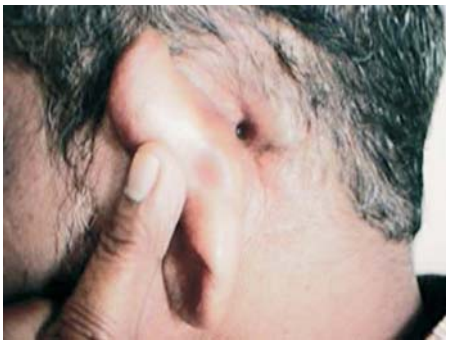


Figure 4.2: Showing mastoid fistula

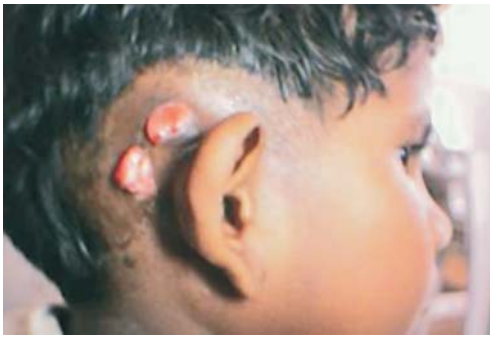


Figure 4.3: Showing post aural granulation

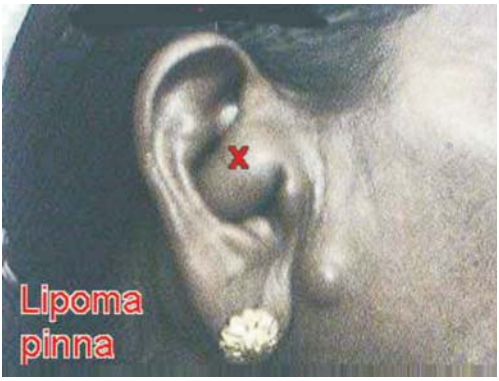


Figure 4.4: Showing lipoma in incisura terminalis

Examination of External Auditory Canal

External auditory canal is not a straight canal. It is sigma shaped. It is 24 mm in length. Outer 8 mm part is cartilaginous and inner 16 mm is bony. Cartilaginous part contains hair preventing proper visualisation of drum. Pinna is pulled upwards, backwards and outwards to make this sigma shaped canal straight. Roof, floor, anterior and posterior walls of EAC are examined for any deviation from normality. Pus, foreign body, wax, debris are the common findings in ear canal. Polyps, granulation, furuncle, osteoma and laceration may be found at times. There may be stenosis of EAC due to disease or trauma or the EAC might not have developed since birth [atresia]. Pus in the canal should be cleaned with the help of cotton wool carrier. Wax should be removed carefully with cerumen spud, so that drumhead can be examined. Wide EAC can be examined without the help of ear speculum. But in case of narrow EAC or in presence of excessive hair, ear speculum examination becomes necessary.

Examination of Ear with Aural Speculum

Proper size ear speculum is chosen. It should not be too large or too small for the ear under examination. Speculum is gently negotiated in the ear canal with rotatory movements and passed just beyond the junction of bony and cartilaginous ear canal, and eardrum is examined.

Figure 4.5: Showing method of holding ear speculum during ear examination

Examination of Tympanic Membrane

Tympanic membrane is located at the medial end of ear canal. It is pearly gray in colour. The most prominent part of the drum that attracts the attention is handle of malleus. The terminal part of which ends in a knob like structure called as 'umbo'. Running down antero-inferiorly from the umbo is 'cone of light'. This is a triangular area—a reflection of light with its base towards periphery. From the annular rim to the handle of malleus runs anterior malleolar fold and similar fold posteriorly called posterior malleolar fold. The part of the tympanic membrane above these two folds is called "pars flaccida" and part below this is known as "pars tensa". One or two blood vessels running along the handle of malleus may be seen even in normal drumhead. In some patients having thin tympanic membrane long process of incus may be visible. Short process of malleus is seen projecting laterally.

For the purpose of understanding and description, tympanic membrane is divided into four unequal quadrants by drawing a line along the long axis of handle of malleus and other line passing through umbo perpendicular to the previous one. This divides pars tensa into 4 quadrants. Antero-superior quadrant [ASQ], antero-inferior quadrant [AIQ], postero-superior quadrant [PSQ], and postero-inferior quadrant [PIQ]. These quadrants have clinical significance.

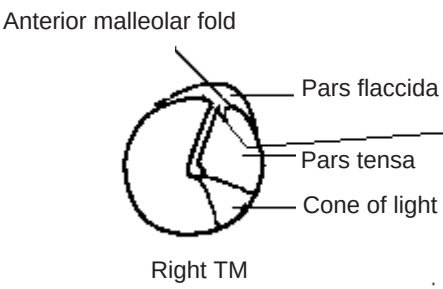


Figure 4.6: Right TM

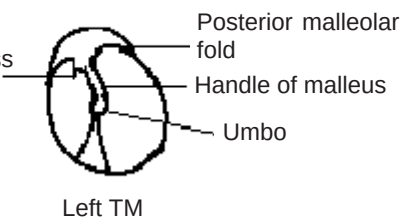


Figure 4.7: Left TM

Mobility of TM

Mobility of TM should be elicited as follows:

- *Siegalization*: In this test Siegle's speculum is snugly fitted to ear speculum and negotiated in ear canal. Air pressure in EAC is increased/decreased alternately

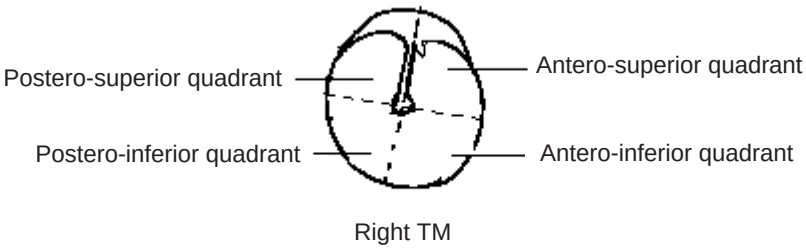


Figure 4.8: Division of Pars tensa

with the help of inflatable bulb. This causes movement of the tympanic membrane. If the tympanic membrane is normal and middle ear pressure is normal the drum is fully mobile. In ET block, secretory OM, tympanosclerosis, atelectasis, adhesive otitis media mobility of TM may get hampered or lost totally.

- *Valsalva manoeuvre*: It also tests the mobility of TM. Patient is asked to close his mouth and nose and inflate cheek. While patient is doing this maneuver his eardrums are observed otoscopically. If the eardrum moves laterally it is said that TM is mobile and ET is patent. These movements may be restricted or absent in middle ear dysfunction.

Valsalva manoeuvre raises the pressure in nasopharynx, which is transmitted via ET to middle ear cavity and causes movement of TM.

Note: TM mobility cannot be tested when it is perforated. Some patients cannot perform valsalva even if their middle ear function is normal.

Abnormalities of Tympanic Membrane

1. *Colour*
   i. *Pink:* Seen in acute otitis media or active stage of otosclerosis [flamingo tint]. "Rising sun" appearance seen in glomus jugular tumour. Warm water irrigation may impart pink colour to the drumhead. In small children even crying can cause pink colouration and may be mistaken as a sign of inflammation.
   ii. *Red:* In acute otitis media, bullous myringitis, baro-otitis media.
   iii. *Bluish*: When there is collection of blood in middle ear after trauma/head injury or baro-otitis media and known as Haemotympanum.
   iv. Chalky white patches: Seen in tympanosclerosis.
2. *Cone of light:* Distortion or loss of cone of light is the earliest sign of middle ear pathology. Hence drum is called face of middle ear. Cone of light is distorted/lost in acute/chronic Eustachian tube block and atelectasis. It occurs due to displacement of drum from its normal position or due to inflammation of drum.
3. *Pars tensa:* Pars tensa may show retraction, granulation tissue, blebs, tympanosclerotic patches or perforation.
   a. *Retraction:* Most common and important cause of retracted tympanic membrane is acute or chronic Eustachian tube block. The whole drum or a small

quadrant of the drumhead may be retracted. Retracted drum looks dull, lusterless. There may be distortion of cone of light, even it may be completely lost. The drumhead is displaced medially towards middle ear, resulting into foreshortening of handle of malleus and prominence of lateral process of malleus. Retracted tympanic membrane moves poorly or doesn't move at all on Siegalisation. At times the retraction pocket may be confused with a perforation in drumhead.

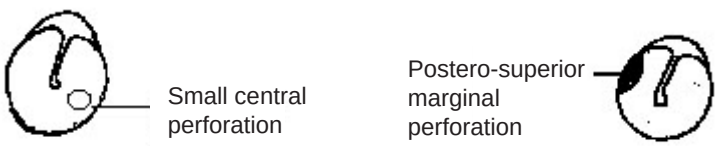
Some times otoscopy may show dull tympanic membrane, fluid level and few air bubbles behind intact tympanic membrane. This is a classical picture of otitis media with effusion also called as Secretory otitis media.

b. Perforation in TM

It is a breech in the continuity of drumhead.

It is a sign of recent or past suppurative otitis media. Perforation should be described taking into account type, location, size, shape, margins, residual drum and structures seen through perforation.

i. *Type:* Perforations in pars tensa may be:
   a. *Central:* A perforation, which shows residual drum on all sides of perforation, is a central perforation.
   b. *Margin:* A perforation, which does not show residual drum on all sides, but is deficient at some place, is a marginal perforation.



Figures 4.9 and 4.10: Diagrammatic representation of central and marginal perforation in TM

ii. *Location:* Perforation may be situated in one of the quadrants of the tympanic membrane, for example, antero-superior, postero-inferior. At times it may occupy more than one quadrant and it should be described accordingly.

iii. *Size:* Size of the perforation may be described as small, moderate or large. You need not tell it in millimetres or centimetres. There are no specific guidelines to call a perforation as small, moderate or large. It is a clinical judgement. However, grossly you can label a perforation as small if it occupies less than one quadrant of the drumhead. Moderate- if it occupies area equivalent to two quadrants of the drumhead. If the perforation is occupying 3/4 of drum surface, it may be called large. And when a small rim of drum is left behind and rest is perforation, it can be labeled as subtotal perforation. Total loss of pars tensa or very large marginal perforation is called as "total perforation".

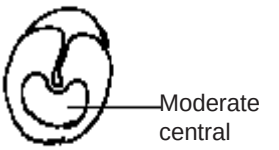


Figure 4.11: Diagrammatic representation of moderate central perforation

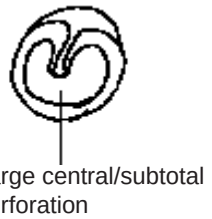


Figure 4.12: Figure showing large central/subtotal perforation

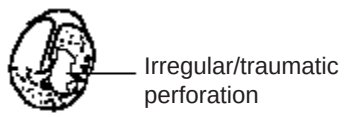


Figure 4.13: Showing irregular perforation due to trauma

iv. *Shape:* It is usually oval, round or at times kidney shaped. Irregular perforation is seen in traumatic lesion.

v. *Margins:* Margins of the perforation may be regular in chronic otitis media but irregular and red in traumatic perforation.

vi. *Edge:* Edge of the perforation may be thick in CSOM and thin in ASOM. Edge may be red in active state of disease.

vii. *Residual drum:* A comment on *residual drum* is must. Condition of residual drum may be congested, atrophic or having tympanosclerotic patches. It may also contain granulation tissue.

viii. *Structures seen through perforation:* Structures of middle ear may be seen through perforation. In case of anterior perforation it is the Eustachian tube crater that may be visible. Promontory is visible in most of the perforations. In posterior perforations round window niche, oval window, incudo-stapedial joint or stapedius tendon may be visible. Middle ear mucosa needs to be mentioned. It may be normal, congested or edematous. There may be a polyp or granulation seen through perforation.

Condition of ossicles seen, should be commented. There can be erosion of handle of malleus or destruction of incudo-stapedial (I-S) joint or other ossicles.

ix. *Postero-superior retraction pouch with cholesteatoma:* At times there is no perforation in the tympanic membrane. But postero-superior quadrant shows retraction pocket in which there is collection of whitish, foul smelling debri, which is difficult to remove. This may be a case of retraction pocket with cholesteatoma. And needs proper examination under operating microscope.

x. *Granulation:* They are dark red in colour, bleed on touch. They develop as a part of healing process. They may arise from middle ear or drumhead.

xi. *Polyps:* They are pale in colour, arise from middle ear mucosa and do not bleed on touch. They are lined by respiratory epithelium.

xii. *Tympano-sclerotic patches:* They are small, chalky white patches seen on the drum. They may be of any size and shape. They are suggestive of old healed middle ear pathology. And are caused by hyaline degeneration of

collagen tissue with deposition of calcium salts in it. Similar patches may be there in middle ear resulting into ossicular fixation.

4. *Pars flaccida:* This part of tympanic membrane is also known as 'Attic' or shrapnell's membrane. It may show retraction pouch with accumulation of whitish foul smelling debris,[Cholesteatoma] which is difficult to remove. At times perforation or granulation may be seen. Attic perforation is a dangerous perforation.

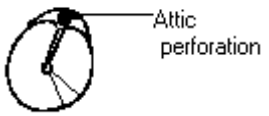


Figure 4.14: Diagrammatic representation of attic perforation

NB: Central perforation is 'safe' while marginal/attic perforation is 'unsafe'.

Marginal perforation is usually seen in postero-superior quadrant.

Mobility of the tympanic membrane is then tested as already described.

Fistula Test

This is an important clinical test to diagnose a fistula in the labyrinth.(Horizontal semicircular canal). Cholesteatoma may cause this fistula.

Procedure: Patient is explained the test and tragus is pressed repeatedly against ear canal. Or pressure in EAC is alternately increased/decreased by siegalisation.

Interpretation: If a patient has fistula in horizontal semicircular canal, the air currents by repeated tragus pressure or siegalisation would stimulate the labyrinth and patient would experience giddiness, vertigo, nausea or vomiting. This is a fistula test +ve. It indicates that surgical exploration of mastoid should be done at the earliest.

Fallacy

1. False -ve test: There can be a fistula without fistula test positive. This happens in dead labyrinth, or when fistula is temporarily blocked by cholesteatoma flakes.
2. False + test: There can be fistula test positive without actually having a fistula. This happens when thinning of bony labyrinth occurs. This may happen in syphilis, cholesteatoma.

Tips

1. Examination of the other ear should be done on similar lines. It is preferable that you examine a normal ear first. This helps the clinician and patient both. If you examine the diseased ear first, it may be painful and may hurt the patient and he may loose confidence in you. Secondly it is possible that you may transfer the infection from diseased ear to normal ear. Hence it is a good practice to examine the normal ear first.

2. While examining or cleaning the ear canal one should be very gentle lest patient can develop vaso-vagal attack due to stimulation of vagus nerve.
3. Examination of ear is never considered complete unless you perform posterior rhinoscopy.
4. Examination of ear is never complete unless you examine the facial nerve.
5. If you suspect hearing loss in a patient, cover your face with a mask so that patient can't make 'lip reading'. And you get correct assessment of his conversational level.
6. The room in which you examine a suspected deaf patient should be relatively quiet.

Tuning Fork Tests

Tuning fork tests assess type and amount of the hearing loss a patient is having. There is a long list of various TF tests given in textbooks however there are mainly three tests that are in common use:

- Rinnie's test
- Weber's test
- Absolute bone conduction test [ABC test].

All these tests need medical type of tunning forks, which are different from the one used by physicists. Medical tunning forks have foot piece, stem and prongs. Tunning forks of 256, 512 and 1024 cps are used. It is better if you start the test from 512 cps as this tuning fork has less decay rate.

Rinnie's Test

It is a commonly performed tuning fork test based on the fact that in a normal individual air conduction is better than a bone conduction and the ratio of air: bone is 2:1.

Procedure: Test is explained to the patient. A tuning fork of 512 cps is taken. It is set into vibration by striking against a surface like thinner eminence or elbow joint, and vibrating fork is placed lateral to ear canal approximately at a distance of 2 cm. Hold the fork in such a way that axis of sound waves should be parallel to axis of ear canal. Patient is asked to listen the sound. Foot piece of the fork is then immediately kept over mastoid process or its tip. Patient listens the same fork by bone and again it is transferred in front of ear canal. This is continued till patient stops listening at one place. Here we are testing duration of sound heard. But we can test loudness of sound also by asking the patient which sound (air or bone) is louder. The test is repeated by using 256 and 1024 Hz. Similar testing is done on opposite ear. And findings are noted down.

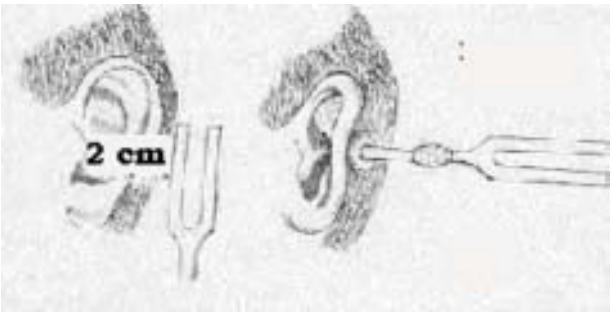


Figure 4.15: Diagrammatic representation of Rinnie's test

Table 4.1: Rinnie's test and its interpretation

Test details	*Result*	*Interpretation*
AC > BC	Rinnie +ve	Normal or SN loss
BC > AC	Rinnie -ve	Conductive deafness
AC = BC	Rinnie =	Mild conductive deafness
BC > AC?	Rinnie false negative	This is seen when a patient has severe SN deafness on test side and normal hearing on non-test side. On application of vibrating tuning fork to deaf side the sound is transmitted to the non-test ear by bone and patient perceives this bone conduction and presumes that it is perceived by test ear, thus interpreting it as BC > AC. Bone conduction level should be confirmed by Weber test.

You can also quantify the hearing loss with the help of Rinnie's test.

Table 4.2: Quantification of HL using Rinnie's test

256 cps	*512 cps*	*1024 cps*	*Interpretation*
-	+	+	Mild conductive deafness
-	-	+	Moderate conductive deafness
-	-	-	Severe conductive deafness

Weber Test

Tuning fork is set into vibration and kept either on vertex, forehead, chin or upper incisor teeth and patient is asked to hear the fork sound by both ears. Patient may listen it on both sides with equal loudness or not at all, on either side. This is a normal response. And the side to which patient listens the sound more loudly is labeled as *'lateralisation'* to that side.

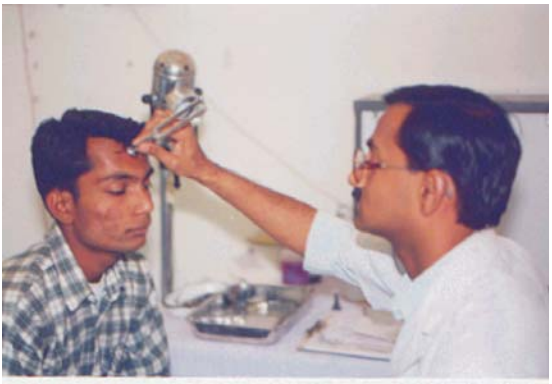


Figure 4.16: Photograph showing method of performing weber test

Right Left

Normal or equal hearing on both sides

No lateralisation /Central Weber

Left conductive deafness/or (R) SND

Lateralised to Left

Right conductive deafness/or (L) SND

Lateralised to Right

Weber is a sensitive test and a difference of even 5 dB is sufficient to lateralise the Weber.

Absolute Bone Conduction (ABC) Test

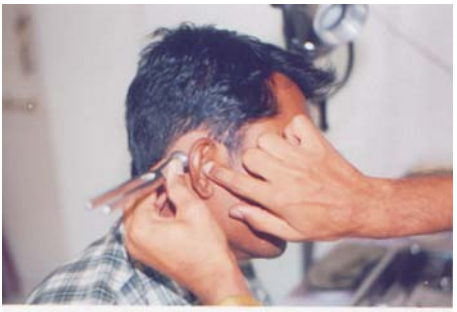


Figure 4.17: Showing—Absolute bone conduction test

In this test the bone conduction level of the patient is compared to that of clinician. During test ambient noise in the surrounding is reduced by pressing the tragus of the EAC. This is a modification of ' Swabach's Test'

Pre-requisite: Clinician should have normal bone conduction level or at least he should know his bone conduction level.

Procedure:

- Patient is explained the test.
- Test ear is closed by gently pressing the tragus against ear canal.
- Foot piece of vibrating tuning fork is kept over mastoid bone and patient listens to the fork till sound disappears completely.

- Immediately same fork is transferred over mastoid bone of the clinician and simultaneously ear canal is closed by pressing the tragus. Clinician listens whether he can appreciate the sound stimulus or not. If the clinician doesn't listen the sound after transferring it from mastoid of the patient., the procedure may be reversed, i.e. clinician listens the vibrating Tuning fork and the moment the sound disappears it is transferred to the mastoid of the patient to know whether patient can still listen it. And thus the bone conduction level of the patient is determined.

Table 4.3: Showing interpretation of ABC test

Test details	*Result*	*Interpretation*
Clinician listens longer than patient	ABC reduced	SN deafness
Clinician listens equal to that of patient	ABC normal	Normal
Patient listens longer than clinician.	ABC lengthened	Conductive deafness

Tuning fork test done carefully can give you a sufficiently reliable information about the hearing loss. It is a qualitative and quantitative test comparable to audiometry.

NB: After you complete the ear examination, nose, throat, nasopharynx and neck examination should be completed. Facial nerve and other cranial nerve examination should be carried out.

SYSTEMIC EXAMINATION

CVS, RS, CNS and abdominal examination should be carried out as usual. And evidence of any systemic disorder is noted.

Majority of ear conditions can be diagnosed on the basis of history and clinical examination. However you may need few investigations to confirm the diagnosis or to have additional assessment of patient for management.

A large number of sophisticated investigations are available now a days but all are not needed in every case. More over it is beyond the scope of this book to give all the possible details of each test. And hence only important investigations would be discussed.

The investigations commonly needed for ear diseases are:

1. Microbiology of pus discharge
2. Radiology of mastoid and PNS
3. Pure tone audiometry
4. Impedance audiometry
5. Caloric testing.

Other investigations that may be needed in specific case are:

a. High resolution CT scan
b. Fundoscopy when you suspect intracranial extension of disease
c. Evoked response audiometry
d. Electro nystagmography
e. Cranio corpography.

RADIOLOGICAL EXAMINATION OF THE EAR

Views advised for temporal bone study are:

1. Laws position
2. Schuller's position
1. Mayer's position
2. Stenver's position
3. Chausse III position.

Out of these Schuller's view is most commonly advised view.

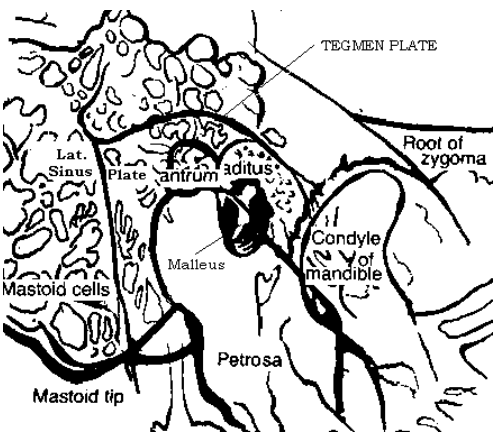


Figure 4.18: Showing sketch diagram of Schuller's view

Position: Patient's head is placed in lateral position. The beam is directed 30-35° caudally and film is taken.

This view gives adequate information about mastoid air cells, lateral sinus plate, dural plate and aditus ad antrum. On the basis of pneumatisation mastoids are divided into:

Cellular: If cells are plenty, hexagonal and arranged in honeycomb pattern. This is a normal mastoid.

Sclerotic: If no cells are visible and radiopaque shadow covers the air cell area. This is considered as diseased mastoid particularly when the X-ray of opposite mastoid is penumatised. Bilateral non-development of mastoid air cells is seen in 4 percent of otologically normal individuals.

Diploeic: Cells are present but few in numbers and smaller in size. This is usually seen in poorly developed mastoid.

Apart from air cells, dural plate (tegmen antri) and lateral sinus plate may be visible in Schuller's view. It is more visible when the mastoid cells become sclerotic. Angle formed between lateral sinus plate and tegmen plate is known as 'sinodural angle'.

- In acute mastoiditis the disease may destroy the intervening bony walls of the mastoid air cells and this gives a picture called "clouding" of air cells.
- Low lying dura and forward lying sinus may be seen in some cases and this alerts the surgeon and prevents intraoperative catastrophe.
- Cholesteatoma may cause erosion, and destruction in attic/antrum area. It may also erode the lateral sinus plate or dural plate.

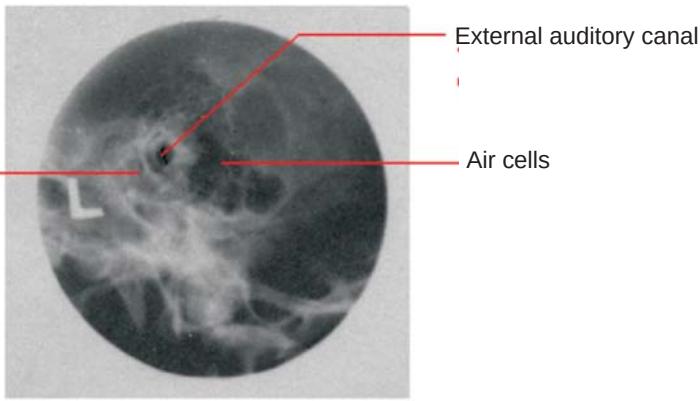


Figure 4.19: X-ray mastoid Schuller's view. Showing well pneumatised mastoid

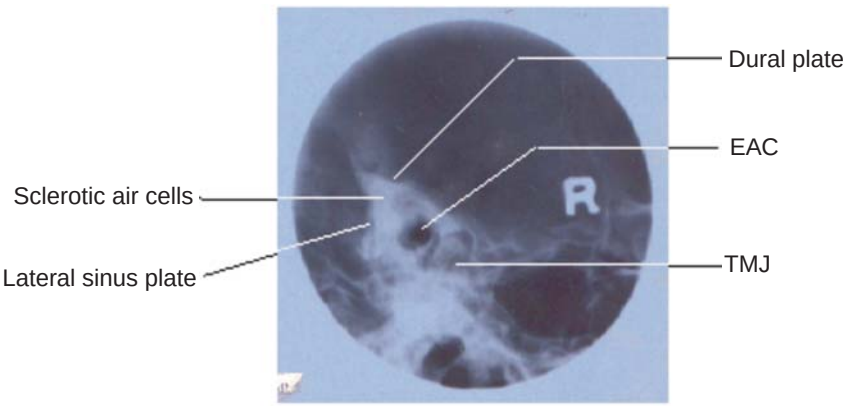


Figure 4.20: X-ray mastoid Schuller's view. Showing sclerotic mastoid

A. AUDIOMETRY

Audios = Hearing
Metrios= Measuring

It is a sophisticated way to measure the hearing. Today different types of audiometries are available. They can be subdivided as:

Subjective	Pure tone audiometry
	Speech audiometry
Objective	Impedance audiometry
	Brainstem evoked response audiometry
	Bekesy audiometry
	Electrocochleography.

Out of all the above pure tone audiometry is in common use. With the help of PTA we can find out the exact hearing threshold as well as type of the hearing loss.

Pure Tone Audiometry (PTA)

It is performed in sound treated room. Speech frequencies ranging from 250 to 8000 Hz are measured. The audiometer is adjusted in such a way that in an audiologically normal individual sound stimulus at O dB level should be just audible in all frequencies.

Procedure: Patient is sitting in a sound treated room. Test is explained to him. Headphones are applied and sound is fed. Level of sound that is just audible for each frequency is measured and plotted on a graph called 'audiogram.'

Advantages:

1. Easy and reliable method.
2. Permanent record is maintained.

Disadvantages:

Subjective test and hence not of much help in unco-operative children and malingerer.

Audiograms of common conditions may be as follows:

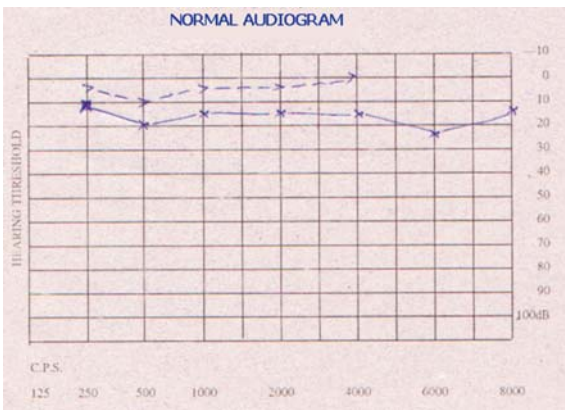


Figure 4.21: Showing air and bone conduction in left ear

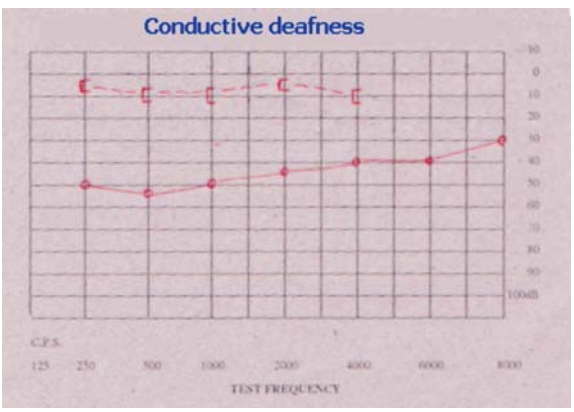


Figure 4.22: Audiogram showing A-B gap

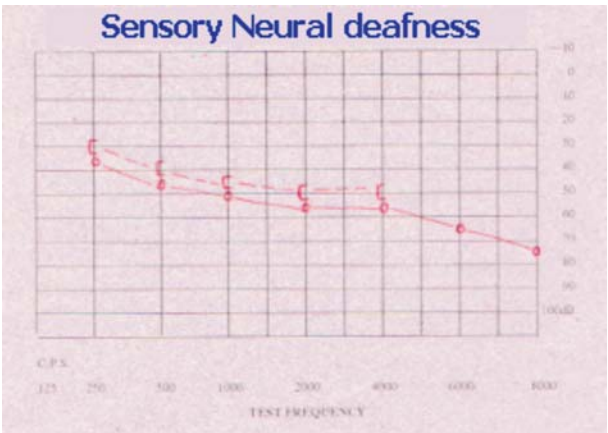


Figure 4.23: PTA showing SN deafness

Figure 4.24: Showing deep at 4000 Hz seen in acoustic trauma

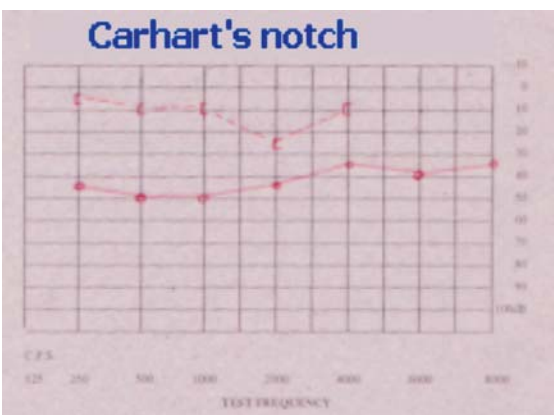


Figure 4.25: Showing deep at 2 kHz in BC seen in otosclerosis

Table 4.4: Symbols used in audiometry

Ear	Air conduction		Bone conduction		Colour code
	Masked	Unmasked	Masked	Unmasked	
Left	△	X	⊐	>	Blue
Right	□	○	⊏	<	Red
No response	below respective symbol				

FEW EAR CONDITIONS

Conditions of external ear may be divided into:

1. Congenital
   - Absence of pinna(anotia)
   - Small poorly developed pinna (microtia)
   - Darwin's tubercle
   - Low set and small pinna (Down's syndrome)
   - Atresia of EAC
   - Pre-auricular sinus
   - Treacher Collin's syndrome
   - Dermoid cyst
   - Accessory tragus
2. Traumatic
   - Laceration, haematoma auris
3. Infective
   - Bacterial: Furunculosis; Diffuse otitis externa; Impetigo contagiosa; Retroauricular intertrigo; Cellulitis of auricle; Malignant otitis externa
   - Fungal: Otomycosis
   - Viral: Herpes simplex; Herpes zoster (Ramsay Hunt syndrome); Otitis externa haemorrhagic
3. Reactive
   - Eczema
   - Seborrhoeic dermatitis
   - Keratosis obturans
   - Neurodermatitis
   - Psoriasis.
4. Neoplastic—osteoma, haemangioma, squamous cell carcinoma
5. Miscellaneous—FB in ear, keloid, aural myiasis, dermoid cyst, etc.

Congenital

Anotia

It is complete absence of pinna on one or both sides. It is associated with severe conductive deafness. Usually associated with atresia of EAC. Middle ear defects may be there. Severe hearing loss needs fitting of hearing aid and correction of defect by plastic surgery. Middle ear abnormality may need various middle ear reconstructive procedures.

Microtia

Here few appendages of pinna are developed but poorly. It may be unilateral or bilateral condition. It may be associated with atresia of EAC. It can be surgically corrected, but primary aim is to give useful hearing to the child at the earliest possible, by prescribing suitable hearing aids. Reconstruction of ear canal and middle ear should be contemplated later on.

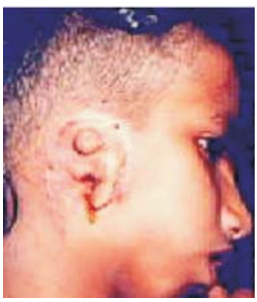


Figure 4.26: Showing—poorly developed pinna. Absence of ear canal operation scan seen

Meatal Atresia

1st branchial groove deepens to form primitive external auditory meatus. At the same time evagination from pharynx [1st pharyngeal pouch] starts pressing outward in the direction of branchial groove. At the end of 2nd foetal month a solid core of epithelial cells grows inwards from primitive funnel shaped meatus towards pharyngeal pouch. This core of epithelial cells remains solid upto 7th month of foetal life. And then starts dissolving. Failure of this dissolution results into atresia of external auditory canal. Treatment is canalisation of EAC after hearing assessment.

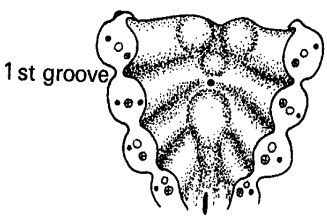


Figure 4.27: Showing development of ear

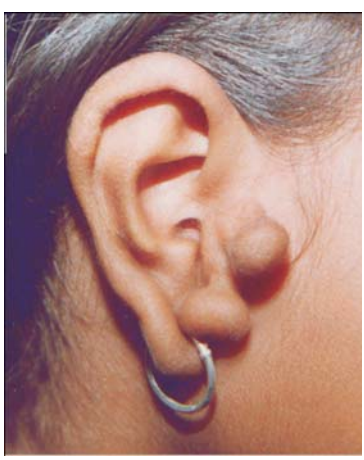


Figure 28: Showing accessory tragii + atresia of EAC

Treacher Collin's Syndrome (mandibulo-facial dysostosis)

Occurs due to maldevelopement of 1st and 2nd branchial arches.

Features

- Hypoplasia of mandible
- Hypoplasia of middle part of face

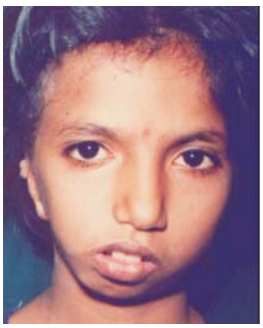


Figure 4.29: Showing treacher Collin's syndrome

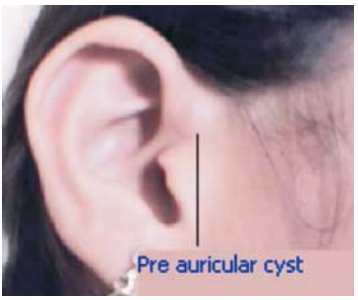


Figure 4.30: Showing preauricular cyst

- Microtia and atresia of EAC
- Notching of lower eyelid,
- Antimongoloid palpabral fissures

Treatment: Correction of anatomical defect for functional improvement.

Pre-auricular Sinus

The auricle develops around first branchial groove from six knob like outgrowths from first and second branchial arch which appears in 6th week of embryonic life then gradually fuse by 3rd month to form an adult auricle. If this fusion is not proper a sinus persists infront and above meatus. This is known as 'pre-auricular sinus'.

Treatment: Surgical excision.

Dermoid Cyst

Dermoid cysts may be congenital or acquired. In congenital variety cysts develop at the site of embryological fusion such as root of the nose, external angular dermoid or at the root of helix.

Treatment: Surgical excision

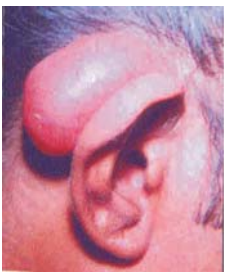


Figure 4.31: A case of postaural dermoid

Traumatic

Traumatic conditions are quite common and it is beyond the scope of this book to mention them in details.

Infective

Perichondritis, furunculosis, diffuse otitis externa, otomycosis, dermatitis are common.

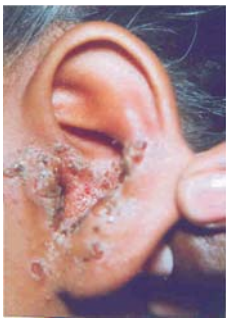


Figure 4.32: A case of diffuse otitis externa

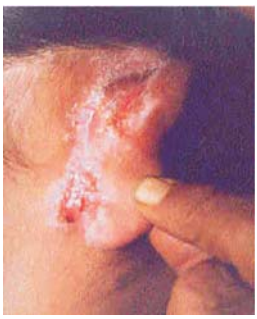


Figure 4.33: A case of postaural intertrigo

Diffuse Otitis Externa

Common in all climatic conditions but heat, humidity and trauma aggravates. *Staphylococcus aureus, Pseudomonas aeruginosa* and *Bacillus proteus* are common invaders. It is non-specific inflammatory reaction with oedema and polymorph infiltration in dermis.

Treatment: Avoid swimming, keep ear dry, care of dandruff, meticulous cleaning of ear, local antibiotics.

Post-aural Intertrigo

Retroauricular sulcus is site of predilection for occurrence of fissures. If these fissures get infected with *Staphylococcus aureus* or *Streptococcus pyogenes*, a form of impetigo contagiosa develops accompanied with weeping and crusting

Otomycosis

It is fungal infection of EAC, caused by, *Aspergillus fumigatus, Aspergillus niger* and *Candida albicans*. Peak incidence seen in rainy season when atmosphere is humid. Diabetics, patients on prolong antibiotics and debilated are more susceptible. Ear discharge, itching, discomfort and hearing loss are common symptoms. On examination whitish, blackish, yellowish discharge may be seen in ear canal. Some times whitish sheets like soaked blotting paper due to *Candida* infection may be seen.

Treatment: Aural toilet, gentian violet application, candid ear drops.

Malignant Otitis Externa

Seen in elderly, debilated or diabetic people. Caused by *Pseudomonas* infection. Condition is characterised by destruction of surrounding tissues like pre and post-auricular area, facial nerve and even base of skull.

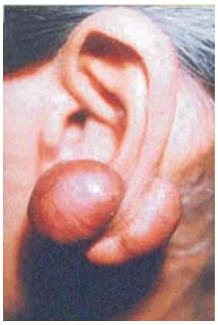


Figure 4.34: Showing keloid at ear piercing site

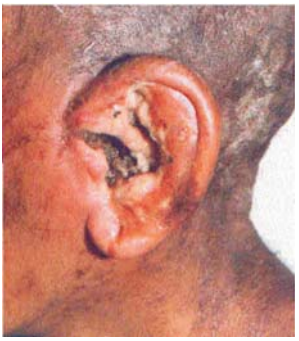


Figure 4.35: Case of 'Aural myiasis'

Treatment: Control of infection by heavy antibiotics, control of diabetes. Local cleaning. If not treated promptly may prove fatal.

FB ear: Foreign bodies in ear are quite common. They may be metallic, non-metallic, vegetative, non-vegetative, living-non living. Common in children due to their basic nature of inquisiveness. Beads, stones, pencils, buttons, insects and other house hold things commonly seen.

Symptoms: Pain in ear, bleeding, blocking/FB sensation in ear.

Treatment

- Living insects—instill edible oil in ear canal and suffocate the insect. Then it can be removed by syringing or manually.
- Non-living things—can be removed either by syringing or with the help of wire vectis or with the help of micro-ear forceps. All care should be taken not to injure the ear canal and tympanic membrane.

Keloids

Keloids: Are benign fibrous proliferation developing in predisposed persons, at the sites of cutaneous injury. Ear lobe piercing can give rise to Keloid formation.

Treatment: Core excision and steroid injection

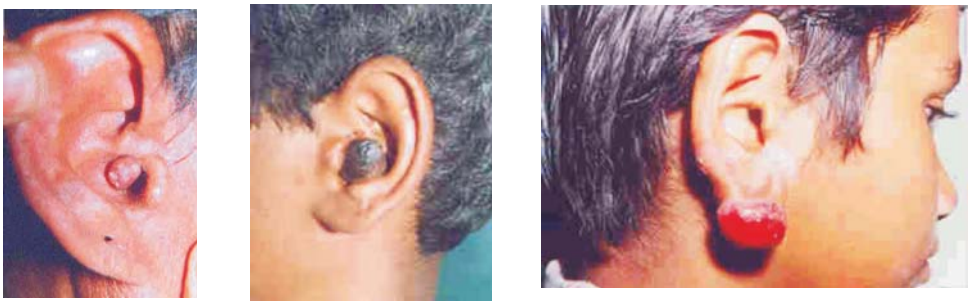
Aural myiasis

Patients having uncontrolled diabetes, Hensen's disease, or debilitated patients or those who do not care properly the chronically discharging ear may develop maggots in the ear. Flies enter the ear, lay eggs. Larval stage of housefly is called maggots.

Treatment: Manual removal after suffocating the maggots by putting in liquid paraffin. Hygiene care of the discharging ear and treatment of underlying disease like, Hensen, diabetes, etc.

Viral infection

Herpes zoster may affect external and middle ear at times. Usually it shows shingles as cutaneous lesions, which may be seen on pinna or in post-aural area. Zoster has



A B C

Figures 4.36A to C: Few benign tumours of external ear: (a) osteoma EAC, (b) haemangioma EAC, and (c) pyogenic granuloma

predilection for neural tissue and so it may affect the geniculate ganglion resulting into facial nerve palsy. This condition is called as "Ramsay Hunt syndrome" .

Treatment: Antiviral agents and supportive therapy for facial nerve.

Figure 4.37: Ramsay Hunt syndrome

COMMON CONDITIONS OF MIDDLE EAR

1 Suppurative otitis media
   a. Acute
   b. Chronic
2. Non-suppurative otitis media
   a. Acute
   b. Chronic
      1. Adhesive otitis media
      2. Tympanosclerosis
      3. Otosclerosis
      4. Traumatic conditions (Baro-otitis, bomb blast, slapping the ear, etc.)

Suppurative Otitis Media

Acute

A very common ear condition in children. Follows upper respiratory tract infection. Infection enters through Eustachian tube. Pain in ear may be followed by discharge and pain disappears after discharge. B. hemolytic *Streptococcus* or *H. influenzae* are common invaders.

Treatment: Antibiotics, analgesics, decongestants, steam inhalation. Myringotomy, if no response to medical treatment.

NB: Rarely ASOM may culminate into acute mastoiditis and also facial nerve palsy if it is uncovered. Such patient needs urgent intervention.

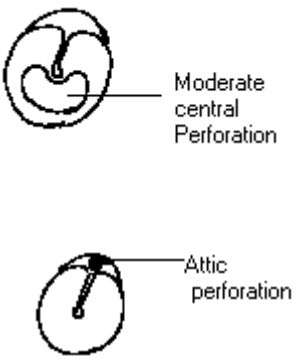
Chronic Suppurative Otitis Media

Common condition in India and developing countries.
Pus discharge from ear and hearing loss are presenting symptoms. A painless condition unless complicated. Hence patient comes late to clinician. Pus in external auditory canal and perforation of drum are common findings. Depending upon its characteristics it may be divided into 'safe' and 'unsafe' varieties.

1. *Safe ear* (Tubo-tympanic disease)
   Criteria:
   1. Drum perforation is central
   2. ET usually diseased
   3. Mastoid is usually healthy

   **Complications are rare.*
2. *Unsafe ear* (Attico-antral disease)
   Criteria:
   1. Drum perforation marginal/attic
   2. ET may be normal
   3. Disease [Cholesteatoma/granulation] may extend to attic-aditus and antrum.

   * *Intracranial complications common.*



Safe ear (Tubo-tympanic disease)

Symptoms:
1. Otorrhoea
2. Hearing loss

Signs:
- Pus discharge in EAC must be present
- Central perforation in pars tensa
- Conductive deafness on tunning fork tests

Depending upon the disease activity the safe CSOM can be further subdivided into:
- Active ear
- Quiescent ear
- Inactive ear.

Active ear: Characterisitis
1. Profusely discharging ear.
2. Polyp/granulation in middle ear.
3. Congested drum margins or middle ear mucosa.

Quiescent ear
1. Ear discharge intermittent. Not profuse.
2. Otorrhoea has recently stopped.

Inactive ear: No ear discharge since last 6 months.

Investigations:
Pus culture may be done to know organisms and sensitivity to drugs.
X-ray mastoids to know the condition of mastoid air cells.

Treatment:
Objectives
- To stop ear discharge
- To make ear infection free
- To improve hearing by reconstrictive procedures like tympanoplasty/myringoplasty.

This can be achieved by:
- Aural toilet—dry/wet
- Antibiotics to control infection
- Control to allergy in nose if existing
- Eliminating the source of infection in nose/nasopharynx/sinuses/tonsil.

Prerequisites for tympanoplasty
1. Ear should be dry.
2. Good air—bone gap on PTA.
3. ET should be patent.
4. Good cochlear reserve.

Unsafe ear (attico-antral disease)
It is usually associated with cholesteatoma.

Cholesteatoma
Cholesteatoma is most common condition in chronic suppurative otitis media of unsafe variety.

Definition: It is a bag like cystic structure lined by keratinising stratified squamous epithelium containing desquamated epithelium having erosive property and mostly seen in temporal bone.

Aetiology: Exact aetiology not known.

Varieties:	Congenital	Due to embryonic cell rests
	Acquired	Primary
		Secondary

Pathology: Columnar ciliated epithelium in the middle ear is replaced by stratified squamous epithelium which may have migrated from the external ear or caused by metaplasia of middle ear mucosa due to repeated infection. Persistently blocked ET results into a retraction pocket formation, which may act as a precursor for cholesteatoma formation. Cholesteatoma causes destruction of bone or whatever structure comes in its way eroding aditus and or antrum. Horizontal semicircular canal, facial nerve may be similarly injured. It may erode lateral sinus plate resulting into lateral sinus thrombosis. If the dural plate is eroded the disease may travel

intracranially resulting into extradural abscess, subdural abscess, brain abscess, meningitis and otitic hydrocephalus.

Symptoms:
1. Otorrhoea—usually scanty and foul smelling
2. Hearing loss
3. Symptoms due to complications.

Signs:
1. Attic or postero-superior. Marginal perforation or retraction pocket with cholesteatoma debri.
2. Fistula test may be positive, if disease erodes Lateral semicircular canal.

Investigations:
1. Pus culture may be positive for *Pseudomonas pyocynes.*
2. X-ray mastoid may show sclerosis in mastoid bone with erosion.

Treatment:
Objectives
1. To make ear disease free and prevent intracranial spread of disease.
2. To conserve/improve residual hearing.

Medical: Not useful.
Surgical: Aim of the surgical treatment is to make the ear, disease free, prevent complications and to give useful hearing if possible. Depending upon extent of the disease, simple/modified or radical mastoidectomy may be done.

Non-Suppurative Otitis Media

Synonyms: (serous otitis media, secretory otitis media, glue ear, otitis media with effusion)
Patient may have history of URI in recent past, which is not resolved completely or may have recurrent attacks. Upper respiratory allergy may be pre-disposing factor.

Complains of wooly sensation in ear, discomfort in ear or blocking sensation or hard of hearing. School going children may have poor language acquisition or poor performance in school due to hearing loss.

On examination: EAC may be normal.

TM-lustreless, cone of light distorted or lost. Mobility of TM may be reduced or lost. Fluid level may be seen on otoscopy as 'hair line' with air bubbles in middle ear. Tympanometry may show -ve middle ear pressure.

Treatment:
i. Opening up of ET by valsalva, nasal and systemic decongestants.
ii. Antibiotics and antihistaminic.
iii. Myringotomy and insertion of grommet if conservative line fails.
iv. Enlarged adenoids or infection in throat or sinuses needs treatment.

Adhesive otitis media and tympanosclerosis may be considered as different end results of the same underlying pathology and, i.e. chronic ET block. In adhesive otitis media adhesions develop between medial wall of middle ear and tympanic membrane due to chronic retraction. In tympanosclerosis the hyaline degeneration of collagen fibres is followed by calcium salt deposition in the fibrous layer of drum. And also in other tissues of middle ear.

Otosclerosis

- A condition common in Caucasians, rare in Negroes.
- Females are more commonly affected.
- Exact aetiology not known.
- Remnants of endochondral bone thought to be responsible.
- Deficiency of alpha1-antitripsin seen in few.
- Tinnitus, hearing loss [Progressive] are presenting symptoms.
- Flamingo-tint (pink hue of drum) may be seen in 1 percent patients.
- T-F tests often show—conductive hearing loss, which may later on go worse and land up into SN loss.
- Audiogram may show a dip at 2K Hz in bone conduction. This is known as "Carhart's notch".
- Impedance audiometry may help in diagnosis.
- Stapedectomy is the treatment of choice. Hearing aids when patient not willing for surgery or unfit for surgery.

Table 4.5: DD of conductive deafness with intact TM

Disease	*EAC*	*TM* *General*	*TM* *Cone o' light*	*Mobility*	*PTA*	*Impedance* *MEP*	*Audiometry curve*
ET block	Normal	Retracted Lustreless	Distorted lost	Reduced	Conductive deafness +	Negative	' C' type
Secretory OM	Normal	Lustreless Retracted	Distorted lost	Reduced Absent	Conductive deafness +/++	Negative	'B' type
Adhesive OM	Normal	Dull Retracted	Distorted lost	Absent	Conductive deafness+++	Negative	'B' type
Tympano-sclerosis	Normal	Chalky Patches	Distorted lost	Normal Absent	Conductive deafness	Normal/ Negative	Variable
Otosclerosis	Normal	Normal flamingo-tint +/-	Normal	Normal	Conductive/ SN deafness	Normal	'As' type

Common Conditions of Inner Ear

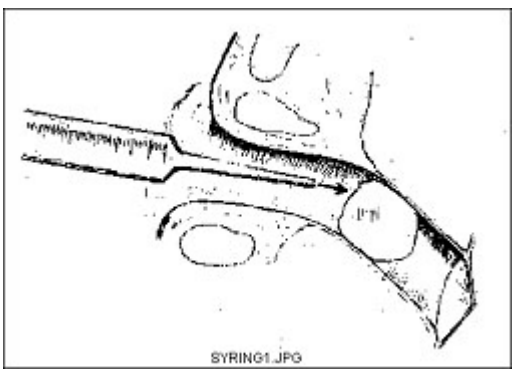
1. Meniere's disease
2. Labyrinthitis
3. Presbycusis

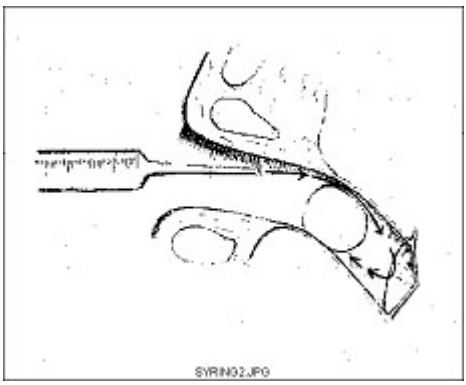
4. Acoustic neuroma
5. Noise induced hearing loss.

FEW COMMON PROCEDURES

Syringing

Wax is brown/black collection of ceruminous and sebaceous gland secretion, along with desquamated canal skin epithelium. In normal process this wax is extruded from ear canal. It is considered abnormal only when it gets accumulated and causes symptoms (impacted wax). It may cause pain in ear and hearing loss. It can be removed by cerumen spud manually or by syringing. Impacted wax needs wax solvents before attempting syringing.





Figures 4.38A and B: Showing method of syringing of ear

Requirement:
1. 20 ml glass syringe with rubber nozzle
2. Kidney tray and bowl
3. Luke warm water/saline.

Procedure: Patient is in sitting position. Luke warm water is taken in 20 ml glass syringe and forced in the ear canal in the anterosuperior direction. The fluid strikes the drum and returns back. While returning back it brings with it the softened wax.

Complications:
1. Vaso-vagal attack: When auricular branch of vagus gets stimulated. To prevent this complication force of fluid should be directed towards anterosuperior canal wall.
2. Perforation of drum: If the force of fluid is more, it may perforate the drum.
3. Spread of infection: If the drum is perforated the fluid may carry infection in the middle ear and hence syringing should not be done in perforated drum.
4. Caloric stimulation: If the water temperature is very much above or below body temperature labyrinth may get stimulated resulting into vertigo and vomiting.

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PART III

five

examination of nose and paranasal sinuses

Let us first consider the symptoms related to nose and paranasal sinuses. Symptoms of nose and symptoms of paranasal sinuses are many of the times inseparable.

Nasal and PNS Symptoms

1. Nasal obstruction
2. Nasal discharge (rhinorrhoea)
3. Bleeding per nose (epistaxis)
4. Sneezing
5. Nasal mass
6. Crusting
7. Disturbances of smell
8. Itching in nose
9. Nasal regurgitation
10. FB in nose
11. Swelling over nose/face
12. Pain in or around nose.

Some of the symptoms are not nasal symptoms as such but may be closely associated with nasal diseases. They are:

- Headache
- Eye symptoms like watering from eye (epiphora), itching, diplopia, proptosis, etc.
- Alteration in voice
- Snoring
- Fever.

Your patient may have one or more than one of the above symptoms. Let us analyse these symptoms one by one.

NASAL OBSTRUCTION

Duration

Ask the patient *How long you are suffering from nasal obstruction?* This would tell you whether the disease is acute or chronic.

Laterality

Ask the patient *Whether the nasal obstruction is unilateral or bilateral or changes side?* Unilateral nasal obstruction may be due to deviated nasal septum, nasal foreign body, or some mass in nose like polyp. Bilateral nasal obstruction may be due to conditions like nasal allergy, septal haematoma or ethmoidal polyposis.

Latency

It should be asked whether the symptom is constant or intermittent, nasal obstruction, which is constant, may be due to some nasal mass. Intermittent nasal obstruction may be seen in allergic rhinitis.

Severity

Patient should be asked, *How severe the obstruction is?* It may be just noticeable or severe enough to prevent routine work of the patient. It may be even progressive in case of a polyp or malignancy.

Character

It should be asked whether nasal obstruction is during inspiration or expiration. In Antro-choanal polyp nasal obstruction may be more during expiration. This is because the polyp allows air to breathe in but at the time of expiration it corks the posterior choana and hence patient experiences obstruction more during expiration.

In allergic rhinitis patient may experience nasal obstruction on one side at a time. And then changes to other side. This is so because even in the normal individual, only one nostril is patent at a time. After a period, other nostril opens and the previous one blocks. This is a normal process called as *Nasal cycle* and it is under autonomic control. A person with allergic rhinitis has swelled turbinates and hence he becomes aware of this nasal cycle.

In allergic rhinitis if a patient lies on a bed in lateral position with blocked nostril on upper side, the obstruction disappears. This is because the blood collected in the cavernous tissue of nasal turbinates drains away as soon as turbinate occupies the position above the heart level.

Factors aggravating and ameliorating the nasal obstruction should be asked, particularly the seasonal variation, emotional stress, food or drugs.

NASAL DISCHARGE (RHINORRHOEA)

Duration

Ask the patient *How long he is suffering from nasal discharge*. Short duration rhinitis may be due to simple disease like acute viral rhinitis. Long standing nasal discharge may be seen in allergic rhinitis, sinusitis, atrophic rhinitis, etc.

Laterality

Ask the patient *is nasal discharge unilateral or bilateral*. Unilateral nasal discharge may be seen in case of foreign body in the nose or some mass in the nose like polyp, malignancy.

NB: Unilateral foul smelling nasal discharge in a child is almost diagnostic of retained foreign body in the nose.

Severity

Nasal discharge may be scanty, moderate or copious so much so that it may not be possible for a person to work.

Latency

It should be asked whether the symptom is constant or intermittent. Perennial nasal allergy manifests round the clock while seasonal allergy manifests in particular season when allergen is predominant in the environment.

Character

Character of nasal discharge should be asked in details. The nasal discharge may be watery, mucoid, mucopurulent, purulent, or blood stained.

Watery

Watery nasal discharge is seen in viral rhinitis. It may be confused with CSF rhinorrhoea.

Mucoid

The discharge is tenacious but transparent. This is seen in early rhinitis or allergic rhinitis.

Mucopurulent

Here the discharge is coloured and tenacious. It is seen in chronic rhinitis, sinusitis and any nasal mass or in malignancy.

Purulent

This is thick coloured nasal discharge, which is less tenacious. It may be seen in chronic sinusitis or atrophic rhinitis.

Blood Stained Discharge

This may be seen in infected nasal mass, nasal myiasis or in malignancy.

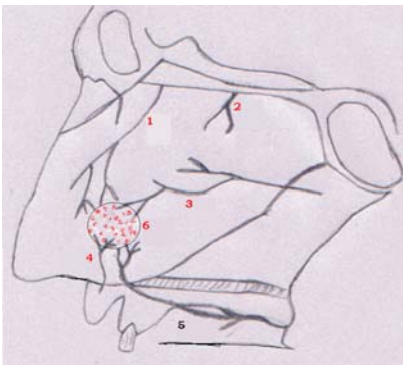
BLEEDING PER NOSE [EPISTAXIS]

It should be confirmed whether it is a fresh blood, clotted blood or blood stained discharge.

- Amount of blood loss may be enquired.
- History of trauma should be excluded/confirmed.
- History of taking any drugs particularly anticoagulants should be taken.
- History of bleeding from any other site should be asked.
- History of bleeding disorder in the family should be asked.
- History of similar episodes in the past may be asked.

Cause of epistaxis may be local or systemic.

- *Local:* Trauma, acute rhinitis, acute sinusitis, angiofibroma, haemangioma, rhinosporidiosis, malignancy, etc.
- *Systemic:* Severe hypertension, bleeding disorder, leukemia, uremia, and vitamin K deficiency or some physiological causes like pregnancy, etc.
- Most common site for bleeding in nose is *little's area*.



1. Anterior ethmoidal artery
2. Posterior ethmoidal artery
3. Septal branch of sphenopalatine artery
4. Septal branch of superior labial
5. Great palatine artery
6. Little's area

Figure 5.1: Showing blood supply of nasal septum

Children have a tendency to scratch the nose, which causes bleeding from Little's area. This is commonly known as "epistaxis digitorum". In case of profuse epistaxis angiofibroma, haemangioma, bleeding disorders and hypertension should be preferably kept in mind.

SNEEZING

Sneezing as such is a protective reflex. It prevents entry of any obnoxious material into the nose. Sneezing is also elicited during nasal mucosal irritation. Hence in

allergic rhinitis when patient gets up from bed he gets a cascade of sneezing which amounts in tens. Occasional sneezing is normal. However more than 8 to 10 sneezing at a time without any obvious provocation should be seen carefully.

NASAL MASS

Any abnormal tissue in the nose is called as nasal mass.

Many of the times patient looks into the mirror and confuses his inferior turbinate as a nasal mass. Antrochoanal polyp, rhinosporidiosis, angiofibroma, nasal glioma, malignancy may present as nasal mass. Patient should be asked.

1. *When he has noticed this nasal mass?*
2. *Is it unilateral / bilateral*?
3. *Does it cause nasal obstruction?*
   - If the answer is yes*, how severe it is?*
   - *Is it more during inspiration / expiration or both.*
4. *Is the mass enlarging, static or regressing?*
5. *Are there some associated symptoms like headache, fever, epistaxis, hyposmia, etc*.

CRUSTING

It is usually due to drying up of nasal secretions. Seen in atrophic rhinitis, rhinitis sicca and in nasal scleroma. Roomy nostril, DNS or dry weather may also predispose to excessive crusting in nose.

DISTURBANCES OF SMELL

Anosmia—Total loss of sense of smell (e.g. head injury, functional)
Hyposmia—Reduced sense of smell (e.g. rhinitis, nasal polyp, nasal allergy)
Parosmia—Altered sense of smell (e.g. allergic rhinitis)
Cacosmia – Any smell is experienced as foul (e.g. chronic sinusitis).

ITCHING IN NOSE

Nasal allergy, beginning of viral rhinitis can cause itching in and around nose.

NASAL REGURGITATION

It may be the first symptom in diphtheria. Palatal palsy, perforated palate due to any cause and velopharyngeal insufficiency can also result into nasal regurgitation.

FOREIGN BODY IN NOSE

A child is usually brought by parent with a history of FB in nose. However many a times there may not be any history and retained FB may be detected on clinical

examination accidentally. It may be seen in adults who are mentally retarded. Usual household articles like pencils, rubber, beads, needles, sponges, seeds are commonly seen. They may be classified as living and non-living, vegetative and non-vegetative, metallic and non-metallic, etc.

SWELLING OVER NOSE AND FACE

Ask the patient *When he noticed swelling over nose/face for first time?* Ask about history of trauma. *Is the swelling static, progressive or regressive?* Associated nasal symptom like nasal obstruction, rhinorrhoea, anosmia, epistaxis should be enquired.

Swellings following trauma may be due to soft tissue injury or # nasal bone or facial bones. Swellings since birth may be dermoid or meningocoele. Inflammatory and neoplastic conditions can also give rise to swelling in this area.

PAIN IN AND AROUND NOSE

1. Ask the patient *When it started?*
2. *Has it started spontaneously or induced after trauma or any other way?*
3. *How long the pain lasts?*
4. *Are there any aggravating and/or ameliorating factors?*
5. *Is there associated fever?, e.g. furunculosis of nasal vestibule.*
6. *What is the nature of pain. Is it stabbing, cutting, dull aching, etc.*
7. *Does it spread any where?* e.g. neuralgias.
8. *Are there any associated symptoms like vomiting or coloured hallos infront of eye, nasal obstruction, etc.*
9. *Has it any postural or diurnal variation?*
10. Ask the patient about his dental hygiene.

Headache

Headache is very important and common symptom for large number of different disease conditions. Some of the causes for headache are beyond the scope of otolaryngology and this book. Upper respiratory infections, various types of facial neuralgias, migraine, refractory error, cervical spondylosis, severe anaemia, raised intracranial tension all can give rise to headache. Following questioner may give you a guideline.

1. *When he noticed it? And how it started?*
2. *Is it constant or intermittent?*
3. *What is the exact site?*
4. *How severe it is?*
5. *Does he have fever?*
6. *What is the character of pain? Is it sharp shooting, cutting or dull aching?*
7. *How it is aggravated?*

8. *How it is relieved?*
9. *Is there any diurnal variation?*
10. *Are there any associated nasal symptoms or nausea, vomiting or giddiness?*
11. *Are there any colour hallos infront of eyes*
12. *Does the patient have a normal vision? Or he uses glasses?*
13. *Does he have restricted painful neck movements*?

Patient may be referred to proper specialty to rule out causes other than ENT causes.

Headache may be sharp shooting during acute sinusitis and dull aching during chronic sinusitis. Headache due to particular sinus may have typical features, which help us to recognise the sinus involed in the patient. When all the sinuses are involved the condition is called as *Pan-sinusitis*.

Frontal sinusitis: Headache of frontal sinusitis is usually located in frontal area, superciliary area and looking down at the feet is not comfortable for the patient. The headache of frontal sinusitis is more when patient wakes up in the morning. Headache lasts for few minutes/hour and then gradually disappears. This is so because during sleep the secretions are accumulated in the sinus. When patient wakes up in the morning, retained secretions try to drain through the fronto- nasal duct. Stretching of this duct results into headache. Moment secretions are drained headache is relieved.

Maxillary sinusitis: Pain of maxillary sinusitis is more in the region of upper jaw teeth or spread over cheek. It may be experienced in temple area. Usually dull aching.

Ethmoidal sinusitis: It is more marked in small children. The upper and lower eyelids may be oedematous and eye movements may be painful. Pain is more in the region of medial canthus.

Sphenoid sinusitis: Malaise and bodyaches are the predominant features in sphnoidal sinusitis. The patient may experience headache on the vertex.

- Significant deviated nasal septum may cause pressure over turbinate and cause headache or pain over dorsum of nose. This is named as *anterior ethmoidal nerve syndrome.*

Epiphora (Watering from Eyes)

When there is obstruction to naso-lacrimal duct due to any big nasal mass or anterior nasal packing the tears cannot pass through naso-lacrimal duct and they overflow from eyes. This is known as epiphora.

Alteration in Voice

The nose and paranasal sinuses give timber to our voice. Hence whenever there is fluid collection in the sinuses or mass in the nose or sinuses, it alters the quality of

voice. *For example,* "flat voice" during rhinitis. Mass in nasopharynx may also alter the quality of voice. A big adenoid in the nasopharynx may give rise to "rhinolalia clausa". Similarly a perforated palate/cleft palate or removal of adenoid may result into alteration of voice called as Rhinolalia aperta.

Snoring

A partial obstruction to naso/oropharyngeal air passage during sleep resulting into a peculiar noise is called as snoring.

This symptom has a peculiarity that patient may never complain about it. It is usually the other family member who complains about it. The obstruction may be in nose, nasopharynx, oropharynx due to enlarged tonsils, adenoid, deviated nasal septum or due to lax/bulky oropharyngeal tissues in an obese individual. Elongated uvula, macroglossia, retrognathia may be contributory. During sleep these patients develop hypotonia of musculature maintaining airway. This leads to collapse of oropharyngeal airway and negative oropharyngeal pressure.

If this obstruction is prolong and severe it may result into sleep apnoea. This condition has deleterious effects over heart. When a patient develops 30 apnoeic spells of longer than 10 seconds duration in a 6 hours sleep, may be considered a case of *Sleep anpoea* and needs treatment.

CLINICAL EXAMINATION OF NOSE AND PNS

Instruments

1. Bull's eye lamp
2. Head mirror
3. Thudicum nasal speculum
4. Postnasal mirror
5. Jobson horne probe
6. Tongue depressor
7. Nasal dressing forceps.

Examination of nose and PNS may be done as follows:

a. Examination of external nose and face
b. Anterior rhinoscopy
c. Posterior rhinoscopy
d. Sinus tenderness
e. Cold spatula test (if needed)
f. Transillumination test
g. Examination of both ears, pharynx, larynx and neck

EXAMINATION OF EXTERNAL NOSE AND FACE

Inspection

Look whether the nose is appropriate for the face or not. Few noses are too small or too big for the face. Look for any obvious deformity like flattened dorsum of nose, bulbous nasal tip, columellar retraction, supra tip depression, nasal hump, crooked nasal tip, swelling in the region, increase in intercanthal distance, sinus, ulcer or any obvious scar mark on the nose due to previous injury or surgery.

Even by the smell, conditions like atrophic rhinitis and retained foreign body can be guessed, as both these conditions emit a very foul smell.

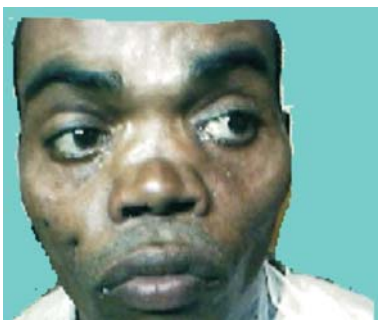


Figure 5.2A: Showing fall of nasal bridge

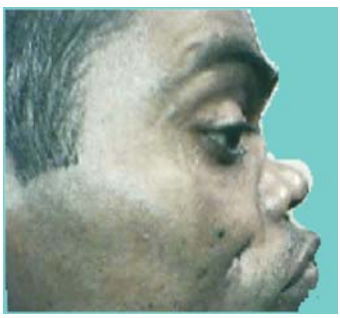


Figure 5.2B: Lateral view

Palpation

In case of swelling, ulcer, sinus findings of inspection are confirmed by palpation. In case of trauma nasal pyramid should be palpated for any tenderness and crepitus.

One should utilize this opportunity to examine rest of the face also. This may give good information about the sinus conditions. *For example,* expanding lesion in maxillary, frontal or ethmoidal sinus may result into swelling in the affected region or deviation, proptosis or even chemosis of eyeball, e.g. malignancy of paranasal sinuses.

ANTERIOR RHINOSCOPY

Support the head with left hand fingers and retract the nasal tip with the help of left thumb. This simple examination shows anterior part of nasal septum, nasal cavity and anterior end of inferior turbinate. It is particularly useful in children who get alarmed on seeing that some instrument is being put into their nose.

Take thudicum nasal speculum in left hand. Hold it with left index finger, supported by thumb, and press the fangs of the speculum by left middle finger and ring finger and slowly negotiate it in the nostril of the patient and release the blades. This should not cause any discomfort to the patient. You can see the nasal septum, inferior turbinate, inferior meatus, middle turbinate and middle meatus

in this examination. Superior turbinate and meatus are not seen in normal conditions.

Structures to be seen in A/R

- Nasal vestibule
- Nasal septum
- Colour of the mucosa
- Lateral nasal wall
  - Inferior turbinate
  - Middle turbinate
  - Inferior meatus
  - Middle meatus
- Nasal floor
- Nasal roof (usually not seen).

Figure 5.3: Clinical photograph showing how to hold nasal speculum. Anterior end of inferior turbinate seen in photograph

Findings of clinical examination should be drawn diagrammatically as follows.

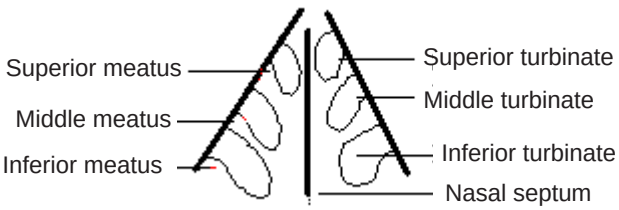


Figure 5.4: Diagrammatic representation of A/R

- *Nasal vestibule:* It is an anteriormost part of nasal cavity lined by skin, having vibrissae (hair). It can be easily examined without nasal speculum. It is the site for foreign body, fissures and furuncles. *Infection in the nasal vestibule is known as vestibulitis and may complicate as facial cellulitis, orbital cellulitis and cavernous sinus thrombophlebitis and hence infection in this area is considered as dangerous and treated promptly. This area of the face that corresponds to the area of mask is called danger zone of face.*
- *Nasal septum:* It is cartilaginous in the caudal segment and bony in the deep part. It divides the nose into two compartments. Mild deviations here and there are not clinically significant. Deviation of septum may be 'C' or 'S' shaped. When the anterior end of nasal septum juts out of nasal cavity on retraction of nasal tip, it is called as "caudal dislocation" of the nasal septum. Acute buckling of nasal septum over maxillary crest is called as 'spur'. There can be perforation in nasal septum due to disease or surgery. Trauma to nose may result into septal haematoma formation, which may lead to septal abscess if not treated. Benign tumours like haemangioma (bleeding polypus of septum) rhinosporidosis may be seen over septum. Little's area should be examined in a case of epistaxis.

- *Colour of nasal mucosa*
  Pink—Normal
  Bright red—Infection
  Bluish, wetty—Nasal allergy
- Lateral wall
  - *Inferior turbinate:* This is the largest turbinate which attracts attention of everyone including patients. Inferior turbinate is highly sensitive to touch and firm on touch. It may get hypertrophied in nasal and sinus infections. It may get enlarged, wetty and bluish in allergic nasal conditions.
  - *Inferior meatus*: This is not easily visible unless vasoconstrictor spray is used. It may be the site where a FB may be lodged. Naso-lacrimal duct opens into it.
  - *Middle turbinate:* This is the second largest turbinate in the nose and one has to extend the neck of the patient to have a better view of the turbinate.
  - *Middle meatus:* It lies below middle turbinate. All anterior group of sinuses, i.e. frontal, maxillary, anterior and middle ethmoidal open into the middle meatus and hence is the common site where from pus may be seen trickling down. Look for polyp in this area.
  - *Superior turbinate:* This is usually not seen in A/R examination. One should not attempt to see superior turbinate except when patient is under general anaesthesia.
- *Nasal floor*: It should be looked for secretions, FB, antrochoanal polyp or malignancy.
- *Nasal roof*: Examination of nasal roof is painful and hence should be done under GA if needed.

Abnormalities that are commonly encountered in anterior rhinoscopy are nasal secretions, nasal mass, foreign body, hypertrophy or atrophy of turbinates.

Secretions should be wiped out by cotton wool carrier or electrical suction. This would give you a clear vision of nasal cavities. After identifying normal nasal structures, abnormal findings should be identified.

If there is *abnormal mass* in nose its exact location, size and colour is noted down. It is touched with a cotton wool carrier to know whether it is sensitive to touch or not. Consistency of the mass is confirmed by pressing the swelling with the help of cotton wool carrier. Attachment of mass is assessed by passing the jobson horne probe on all sides of the swelling. Probe can't be passed from the side where it is attached to nasal structure. During this manipulation you can also decide whether the mass bleeds on touch or not.

Turbinates: Are pinkish in colour. Highly sensitive to touch and firm on probing.

Polyps: Polyps in nose are grayish masses, soft in consistency and poorly sensitive to touch. They do not bleed on touch.

FB: Foreign bodies are easily identified on A/R. However a retained FB may be difficult to identify due to deposition of calcium layer on it. The retained FB has a gritty sensation on probing and may bleed due to surrounding granulation tissue.

Malignancy: Malignant lesions are reddish masses, friable and bleed on touch.

- After visualising the nose in the manner described above findings are noted down diagrammatically.

POSTERIOR RHINOSCOPY

Examination of posterior nares and nasopharynx by a postnasal mirror is known as posterior rhinoscopy. It is very sensitive examination and lot of co-operation from the patient is needed. This examination is not possible in small children and anxious adults.

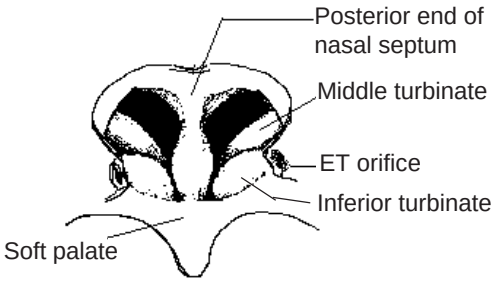


Figure 5.5: Diagramatic representation of posterior rhinoscopy examination

Procedure

The test should be explained to the patient. Then postnasal mirror is gently heated on spirit lamp to prevent condensation of patient's breath on the mirror. It is tested on our own body to see that it is not too hot to scald the patient. Tongue depressor is taken in left hand, tongue is depressed, and postnasal mirror is gently negotiated beyond the soft palate to visualise various structures in nasopharynx. Mirror is rotated in various angles without touching the posterior pharyngeal wall or base of tongue to prevent gag reflex.

One can see roof of the soft palate, posterior end of nasal septum, two posterior choanae, posterior ends of inferior and middle turbinates. You can't see superior turbinate in this examination. Roof of nasopharynx is seen and may show tuft of adenoid tissue in children. At the posterolateral wall of nasopharynx one can see nasopharyngeal end of Eustachian tube. This is also known as torus tubaris. There is a small gutter formed between posterior nasopharyngeal wall and torus, which is popularly known as fossa of rosenmuller.

In some patients it may not be possible to visualize all the structures in post. rhinoscopy. In such patients nasopharyngoscopy can be done by using fibreoptic flexible scope.

Clinical significance: The fossa of rosenmuller has a great clinical significance. Malignancy may be hidden in this area and not detected easily even after posterior rhinoscopy examination. But the secondaries from this site may develop in the neck in the form of enlarged lymph nodes. This situation is known as secondaries in neck with primary unknown. In such a situation it is customary to take biopsy from fossa of rosenmuller, empirically.

A B C

Figures 5.6Ato C: (A) Ethmoid sinus tenderness, (B) Frontal sinus tenderness, and (C) Maxillary sinus tenderness

SINUS TENDERNESS

Tenderness over sinuses may be elicited as follows:

1. Maxillary sinus: firm pressure is given over canine fossa.
2. Ethmoid sinus: pressure given medial to medial canthus.
3. Frontal sinus: pressure given at the roof of orbit, above medial canthus, in the floor of frontal sinus.
4. Sphenoid sinus: tenderness cannot be elicited. Sinus tenderness indicates infective pathology in affected sinus.

COLD SPATULA TEST

One can examine the patency of each nostril separately by *cold spatula test.* In this tongue depressor is held just below the anterior nares and patient is asked to blow gently on it. Two distinct areas on the tongue depressor would show fogging due to exhaled air. Absence or less fogging indicates obstruction on that side.

Figure 5.7: Showing cold spatula test

TRANSILLUMINATION TEST

This test is done to know the status of frontal and maxillary sinuses. The procedure is done in a dark room. Clinician gets himself dark adaptation by sitting in a dark room with eyes closed for 10 minutes. A small but bright light source is kept in oral cavity. In a normal sinus the light is transmitted through the maxillary sinus and seen as "pupillary glow" or "infra-orbital crescent". When there is fluid, mass or polyp in the sinus the Transillumination test would be negative. In the advent of recent investigative tools, this test has a very limited utility.

After examining the nose, PNS and postnasal space, ears, pharynx and neck examination should be done without fail.

After clinical examination one may need the help of investigations for confirmation of diagnosis. The most common investigation done for nose and PNS diseases is radiological examination.

Radiological Examination of Nose and Paranasal Sinuses

The radiological views commonly used to assess nose and PNS are:

1. Occipito-mental view (Water's view)
2. Occipito-frontal view (Caldwell view)
3. Base skull (Submento-vertical view)
4. Lateral view
5. X-ray for nasal bones.

Occipito-mental View (Water's View) (Figures 5.8 and 5.9)

This view is taken mainly to demonstrate maxillary sinuses. However it shows nasal cavity, septum, frontal sinuses, anterior ethmoid sinuses and sphenoid sinuses[when mouth is kept open]. Hence it is also known as 'screening view'.

Patient is facing the X-ray plate and X-rays are passed from occipital area directing to chin. This view avoids the superimposition of temporal bones over maxillary sinuses.

1. Frontal sinus
2. Orbit
3. Nasal cavity
4. Inferior turbinate
5. Maxillary antrum
6. Upper jaw
7. Lower jaw (not shown)
8. Nasal septum
9. Middle turbinate
10. Ethmoidal sinuses

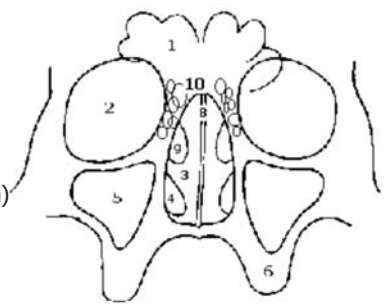


Figure 5.8: Diagrammatic representation of Water's view

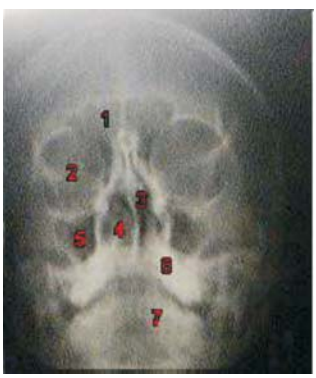


Figure 5.9: X- ray PNS Water's view

Occipito-frontal View (Caldwell View) (Figures 5.10 and 5.11)

This view focuses mainly on the frontal sinuses. Patient's forehead and nasal tip are kept in contact with X-ray film. This view shows frontal sinuses, part of maxillary antrum and nasal cavity.

X-ray Base Skull (Submento-vertical View) (Figures 5.12A and B)

The neck and head are fully extended so that vertex faces the film and rays are passed beneath the mandible. This view shows sphenoid sinus, ethmoid sinuses, nasopharynx and posterior wall of maxillary sinus.

Showing Caldwell view skull

1. Frontal sinus
2. Orbit
3. Nasal cavity
5. Maxillary sinus
10. Ethmoid sinuses
11. Petrous bone

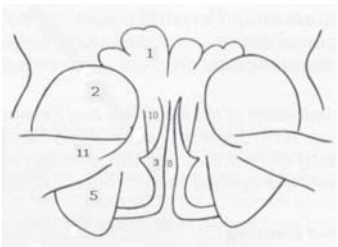


Figure 5.10: Occipito-frontal (Caldwell view): diagrammatic representation

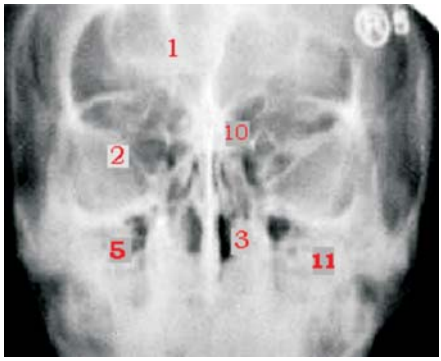
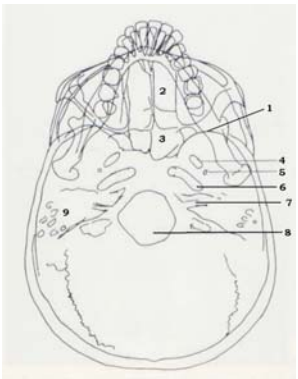
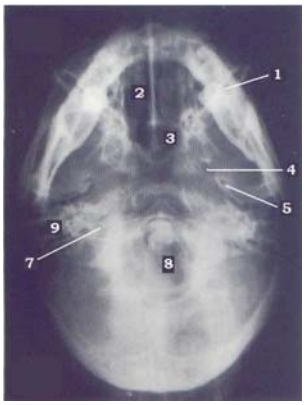


Figure 5.11: X-ray base skull (occipito-frontal view)

1. Greater wing of sphenoid
2. Ethmoid sinus
3. Sphenoid sinus
4. Foramen ovale
5. Foramen spinosum
6. Foramen lacerum
7. Internal auditory meatus
8. Foramen magnum
9. Mastoid bone





Figures 5.12A and B: (A) Skull submento-vertical view (Diagrammatic), (B) X-ray submento-vertical view

1. Cranial cavity
2. Frontal sinus
3. Orbit
4. Sphenoid sinus
5. Maxillary sinus
6. Upper jaw
7. Postnasal space

← 'White arrow'- posterior wall of maxilla.

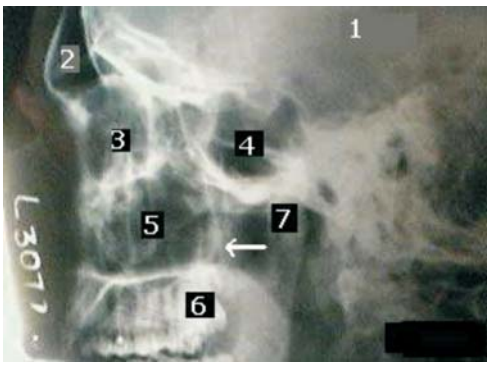


Figure 5.13: Lateral view skull showing

Lateral view: Patient's head is placed in lateral position against the film and the rays are directed behind the outer canthus of eye. This view is useful to show posterior table of frontal sinus, maxillary sinus, middle and posterior group of ethmoid sinuses. But for better visualisation of ethmoid sinuses lateral oblique view is preferred. To visualise adenoid tissue or nasopharyngeal mass soft tissue exposure is required.

Usually clinical examination and X-rays give sufficient clue to keep a clinical diagnosis in the nose and paranasal sinus diseases. However in some cases one may need specialised investigations like-

- *CT scan:* To know the extent of the disease and consistency of the lesion.
- *Carotid angiography*: Lesions like naso-pharyngeal angiofibroma do need carotid angiography to know the blood supply to the tumour particularly the intracranial blood supply, and may show beautiful "tumour blush" .
- *Biopsy / Cytology*: To confirm the diagnosis, e.g. malignancy.
- *Microbiological:* Investigations may prove useful to know type of organisms, e.g. fungal infections.

Few Conditions of Nose and Paranasal Sinuses

1. Congenital
   e.g. bifid nose, dermoid, meningocoele, choanal atresia.
2. Traumatic
   e.g. # nasal bone, # maxilla, septal haematoma, etc.
3. Inflammatory
   Rhinitis
   - *Acute*
     - Specific
     - Non-specific
   - *Chronic*
     - Specific—e.g. tuberculous rhinitis
     - Non-specific—atrophic rhinitis

   Sinusitis
   - Acute
   - Chronic
4. Miscellaneous
   - Deviated nasal septum,
   - Foreign bodies, rhinolith
   - Adenoiditis
   - Polyps
     - Antrochoanal polyp
     - Ethmoidal polyposis
   - Nasal myiasis
   - Cysts of nasal/dental origin
   - Granulomas—rhinosporidiosis, rhinoscleroma, leprosy, syphilis, midline granulomas, Wegener's granuloma.

5. Neoplastic
   Benign: fibroma, lipoma, neurofibroma, melanoma, angioma, angiofibroma, glioma, haemangioma, osteoma, chondroma, inverted papilloma (Ringertz's tumour).
   Malignant: malignant melanoma, neurofibrosarcoma, squamous cell carcinoma, adenoid cystic carcinoma, basal cell carcinoma, olfactory neuroblastoma, chondrosarcoma are few malignant lesions in nose and paranasal sinuses.

ATROPHIC RHINITIS

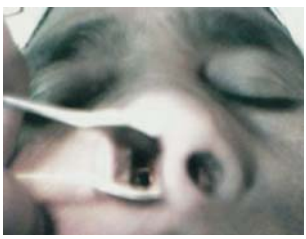


Figure 5.14: Showing a case of atrophic rhinitis

A condition characterised by nasal crusting, obstruction, foul smell, pale mucosa and roomy nostrils seen mostly in young girls.

- *Aetiology*: Endocrine, infective, nutritional deficiency and extensive nasal surgery are thought to be responsible factors.
- *Symptoms:* Nasal obstruction, headache, yellowish greenish nasal discharge crusting and occasional epistaxis.
- *On examination*: Nasal cavities are roomy, filled with yellowish greenish crusts, mucosa is pale and atrophic, and emits foul breath.
- *Treatment*:
  1. Nasal douching with soda bi-carb and salt solution.
  2. Correction of nutritional deficiencies like vitamin and iron deficiency.
  3. Surgical treatments like Young's operation, transplantation of Stenson's duct and submucosal implants.

NB: In some patients due to poor nasal hygiene and loss of sensations in nose Houseflies enter the nose and lay eggs. The eggs hatch and larvae are produced. This condition is called *Nasal Myiasis* and is quite common in developing countries. Underlying cause is usually atrophic rhinitis or Hensen's disease. Maggots are removed manually by suffocating them with instillation of liquid paraffin. After complete removal of maggots nasal douching and treatment of primary nasal disease is carried out.

RHINOLITH

Figure 5.15: X-ray PNS water's view showing FB in nasal cavity

FB retained in nose for a longer time may form a rhinolith. Seen commonly in children and mentally retarded people.

Pathology: FB in the nose of child may go undetected for a longer time resulting into deposition of calcium salts on the FB. This gives whitish/blackish discolouration and a gritty/ stony feel. As a part of mucosal reaction granulation tissue may be formed in close vicinity of FB which may cause occasional epistaxis.

Symptoms: Unilateral, foul smelling nasal discharge, nasal obstruction, and occassional epistaxis.

Signs: Foul smelling nasal discharge [unilateral]. Evidence of obstruction on affected side, whitish/blackish mass in nasal cavity having stony/gritty feel. On probing granulation tissue may bleed.

Investigations: X-ray PNS Water's view usually shows retained FB in nose.

Treatment: Surgical removal of retained FB under anaesthesia.

ADENOIDITIS

Adenoid is collection of lymphoid tissue in postnasal space. It may get infected and hypertrophied in school going age, resulting into a cascade of symptoms and signs.

1. Adenoid gland
2. Cervical vertebrae
3. Mastoid bone

' White arrow' showing narrowing of air way in nasopharynx.

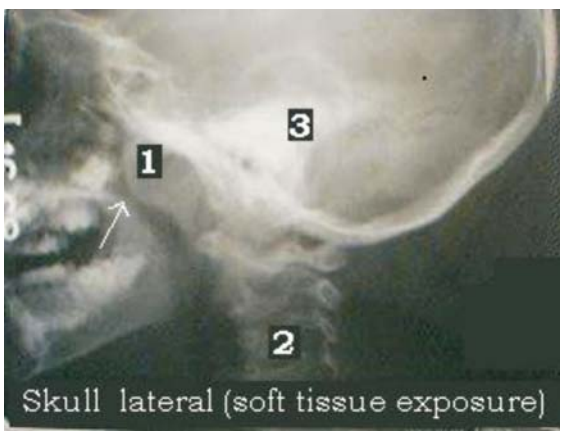


Figure 5.16: X-ray skull lateral view showing enlarged adenoid

Aetiology: As a result of chronic infection in nose and sinuses/allergy or it may be non-specific reaction of Waldeyer's ring to various infections in childhood.

Symptoms: Nasal obstruction, nasal discharge, mouth breathing, snoring.

Signs: High arch palate, crowding of teeth, pinched up nose, open mouth, loss of malar prominence and anxious look. These changes are called as 'adenoid facies'. Evidence of ET block/secretory otitis may be seen on otoscopy.

Diagnosis: By history, clinical examination and radiological examination.

X-ray nasopharynx lateral soft tissue exposure may show large amount of adenoid tissue in postnasal space.

Treatment

Conservative: Systemic and local decongestants, antiallergic drugs, and antibiotics

Surgical: Removal of adenoid tissue.

SINUSITIS

It is an inflammation of mucous lining of one or more paranasal sinuses. It may be
A. Acute
B. Chronic

- *Aetiology: Str. pneumonae, H. influenzae,* and *Sta. aureus.* And at times anaerobes like bacteroids.
- *Symptoms:* Nasal discharge, headache and nasal obstruction.
- *Signs:* A/R shows pus or crusting in the middle meatus. Oedema and congestion near natural osteum of the sinus seen. Tenderness on affected sinus may on firm pressure.
- *Investigation:* X-ray PNS may show haziness in the affected sinus. It may show even air fluid level, if X-ray is taken in standing position (in maxillary sinusitis).
- *Treatment*
  Acute: Antibiotics, steam inhalation, decongestants (local and systemic). Antral puncture is avoided as far as possible.
  Chronic:
  - *Medical:* Antibiotics, steam inhalation, mucolytics if secretions are thick.
  - *Other surgical:* Treatment of underlying cause like DNS, nasal polyp, and dental caries.
  - *Surgical:* If no relief after conservative treatment then, antral puncture, intranasal antrostomy or Caldwell-Luc operation may be done. Recently (FESS) functional endoscopic sinus surgery is usurping the role of Caldwell-Luc procedure.

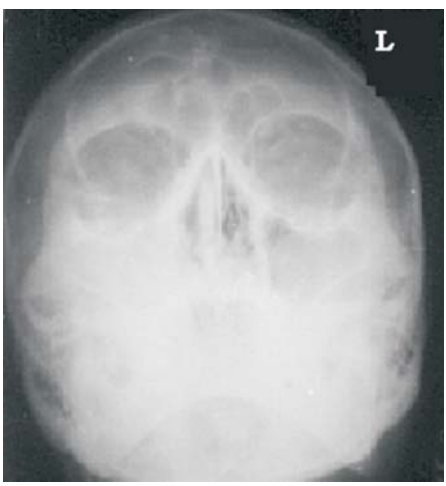
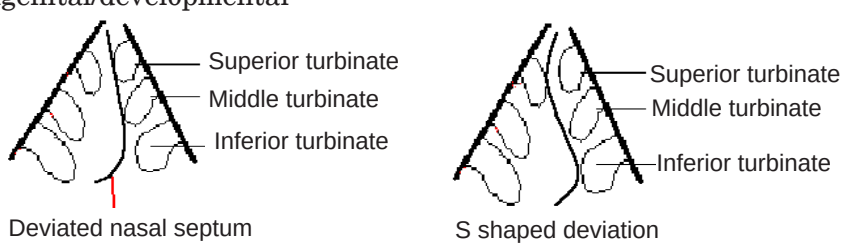


Figure 5.17: X-ray PNS Water's view showing right antral haziness

DEVIATED NASAL SEPTUM

Aetiology

- Traumatic
- Congenital/developmental



Figures 5.18A and B: Showing digrammatic representation of deviated nasal septum (A) C shaped, (B) S shaped

Symptoms: Unilateral/bilateral nasal obstruction, headache, crusting and nasal discharge may be there.

Signs: 'C' or 'S' shaped deviation of nasal septum/maxillary crest or spur/ caudal dislocation of septum may be present. As a consequence of DNS unilateral/bilateral sinusitis and even polyp formation may occur. Sinusitis so developed may predispose to secondary tonsillitis/pharyngitis or middle ear infection.

Treatment: Surgical correction. septoplasty/SMR.

NASAL POLYPS

a. Antrochoanal polyp
b. Ethmoidal polyposis

Antrochoanal Polyp

Aetiology: 1. Nasal allergy and or infection.
2. Faulty development of maxillary sinus osteum.

Pathology: *Polyp is a prolapsed oedematous respiratory mucosa*. Bernoulli principle might be operating in the genesis of polyp formation. It arises from maxillary osteum or antrum and comes out of osteum. Enters into middle meatus and goes posteriorly towards choana and hence it is called as antrochoanal polyp. It is trifoliate structure. Common in young adults.

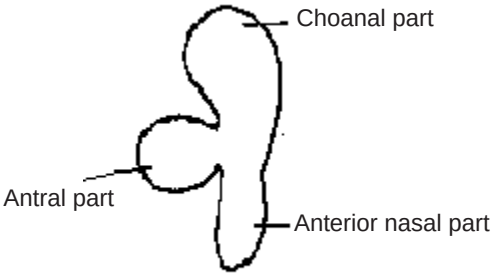


Figure 5.19: Diagrammatic representation of antrochoanal polyp

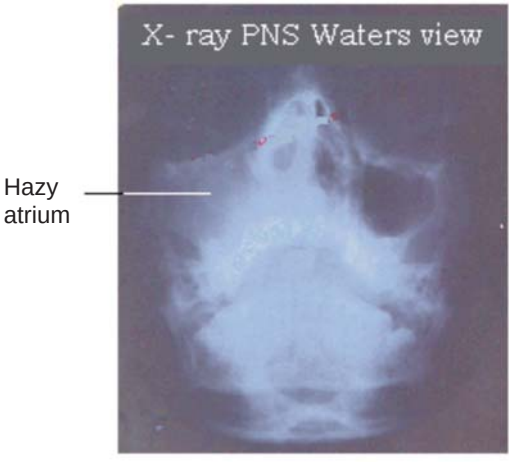


Figure 5.20: Showing hazy maxillary antrum

Symptoms: Nasal obstruction, more during expiration, nasal discharge, headache, change in voice if polyp is huge.

AR examination: AC polyp is a single, pearly gray, glistening mass, soft in consistency, insensitive to touch and attached to lateral wall of nose, i.e. coming from middle meatus. It doesn't bleed on touch.
PR examination: Same polypoidal mass may be seen in posterior rhinoscopy as a solitary glistening mass in choana.

Differential diagnosis:
- Nasal glioma
- Angiofibroma
- Inverted papilloma

Treatment:
1. Surgical excision (Polypectomy, Caldwell-Luc operation).
2. Treatment of underlying allergy.

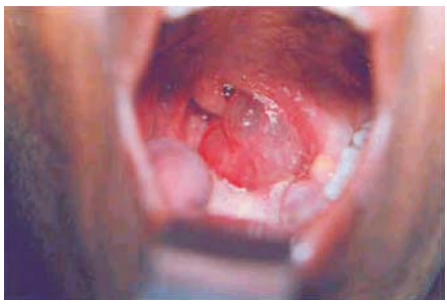


Figure 5.21: Photograph showing AC polyp protruding out of nasopharynx

Ethmoidal Polyposis

Bilateral condition, common in middle aged people. Allergic factor predominates.

Symptoms: Bilateral nasal obstruction, nasal discharge, sneezing, headache, nasal broadening, (in long standing cases).
AR: Small multiple grayish whitish masses, soft in consistency, do not bleed on touch, insensitive to touch and attached to lateral nasal wall.
PR: Polyps not seen in posterior rhinoscopy.

Treatment:
- *Medical:* Antihistaminic, steroids locally or systemically. Systemic steroids used cautiously.
- *Surgical:*
  - Intranasal polypectomy
  - Excision by functional endoscopic sinus surgery technique (FESS)
  - Ethmoidectomy- intranasal or external.

Rhinosporidiosis

- *Aetiology:* Fungal infestation by *Rhinosporidium seeberi and R kineyali*. Seen along the coastal border or ponds where source of drinking water for men and cattle is same. Balaghat district in Chattisgarh state is an endemic area.
- *Symptoms:* Commonly present as nasal mass, epistaxis, nasal discharge and headache. At times conjunctiva, skin, respiratory tract, genitals, bones may be involved.
- *AR:* Reddish fleshy mass, firm to touch, bleeds on touch, attached to floor, septum or lateral wall of nose. Under surface of mass studded with whitish yellowish sporangia.
- *Treatment:* Wide surgical excision and cauterisation of base. Recurrence is known.

Rhinoscleroma

It is less common nasal condition. Caused by *Klebsiella rhinoscleromatis*. Disease may spread to nasopharynx, trachea and bronchi. Histologically it shows Mikulicz cells and Russell bodies.

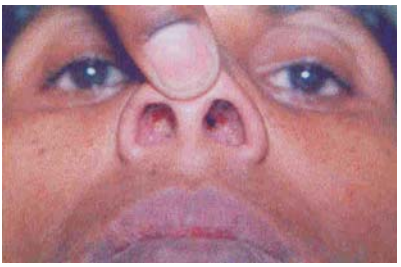


Figure 5.22: A case of rhinoscleroma

Stages

1. Catarrhal stage:
2. Atrophic stage: It simulates atrophic rhinitis in this stage.
3. *Nodular stage:* Nodules may be seen at muco-cutaneous junction.
4. *Cicatrizing stage:* Extensive fibrosis seen in affected part. Usually patient comes in last stage. The nasal tip has 'woody' feel. There is progressive narrowing of the nostril. Crusting may be present. Extensive cicatrisation may cause destruction of uvula and soft palate, which may get adhered to posterior pharyngeal wall. Lesion may spread to larynx, trachea and bronchi causing progressive narrowing of lumen.

Treatment: *Medical:* Streptomycin, tetracycline, rifampicin, etc.
Surgical: Recanalisation of blocked respiratory passage.

Juvenile Nasopharyngeal Angiofibroma

It is a benign highly vascular tumour arising from sphenopalatine foramen exclusively seen in puberty age males.

Aetiology: Not exactly known. Hormonal theory, haemartoma theory exists.

Pathology: After its origin it may spread to nasal cavity, sphenopalatine fossa, maxillary sinus, orbit, cheek and even intracranially.

Symptoms: Epistaxis, nasal obstruction, nasal mass, deformity of face, proptosis, headache, etc.

Signs: A firm pinkish mass in nose/nasopharynx, which bleeds on touch.

Investigations:

- *X-rays skull:* (Lateral view/Water's view/base skull) may show soft tissue shadow in nasopharynx, nasal cavity, maxillary sinus, ethmoid sinus and even sphenoid sinus. destruction of sinus wall may be there.
- *Carotid angiography:* It is confirmatory investigation. It may show typical "tumour blush" in nasopharynx. Feeders to the tumour are visualized.
- *CT scan:* This may show the extent of the disease. Particularly whether disease has spread intracranially or not.

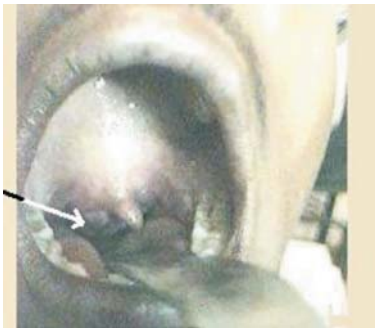


Figure 5.23: Photograph showing big mass in postnasal space hanging down in oropharynx (angiofibroma)

Diagnosis: Clinically and by carotid angiography. Biopsy not advised as it may bleed profusely.

Treatment: Wide surgical excision, by using lateral rhinotomy/transpalatine or Caldwell-Luc procedure or any other modification to remove mass completely. Sufficient amount of blood should be ready at the time of surgery.

Some Tumours Seen in Nose and PNS

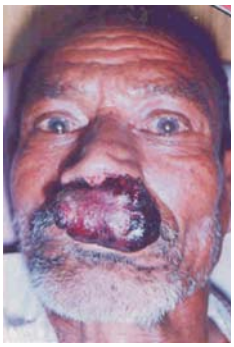


Figure 5.24: Nasal haemangioma

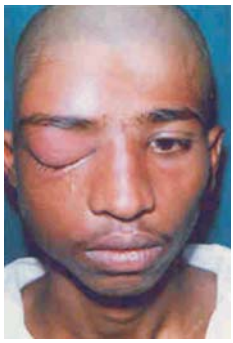


Figure 5.25: Right frontal osteoma with cellulitis

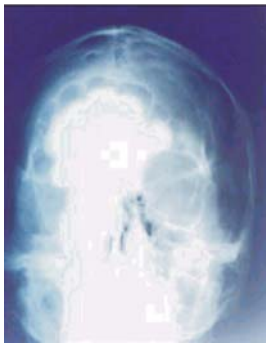


Figure 5.26: X-ray PNS Water's view showing osteoma R frontal sinus

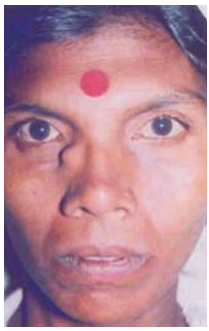


Figure 5.27: A case of chondroma nasal septum

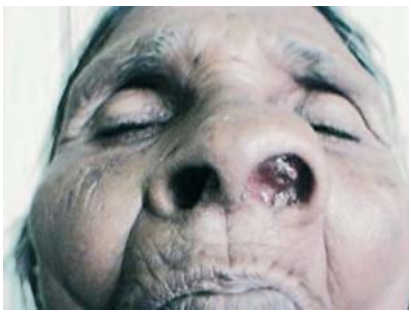


Figure 5.28: A photograph showing nasal malignancy

Carcinoma of Maxillary Antrum

This is relatively common malignant lesion of paranasal sinuses. Seen in middle aged people.

- *Aetiology*: Chronic mucosal irritation by:
  - Smoking
  - Air pollution
  - Workers in wood industry/nickel/mustard gas industry.
- *Pathology*: Squamous cell carcinoma is most common. Adenocarcinoma, adenoid cystic carcinoma muco-epidermoid carcinoma are the varieties seen.
- Maxillary antrum has 5 walls. Superior-inferior, anterolateral, medial, posterior. At a given time one or more than one wall may be involved symptoms and signs depend upon which wall is involved. For ease of understanding we would discuss it as per wall of involvement.
- *Symptoms and signs:* See Table 5.1.

Figure 5.29: A case of carcinoma of maxilla

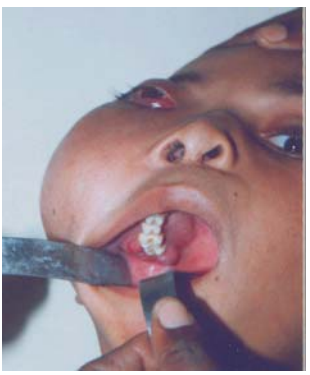


Figure 5.30: Clinical photograph showing lympho-reticular malignancy involving right maxilla

Investigations:
X-ray PNS
Water's view
Dead lateral view to visualize posterior wall of maxilla
Base skull
May give useful information

- Biopsy from most accessible site
- CT scan to know extent of disease.

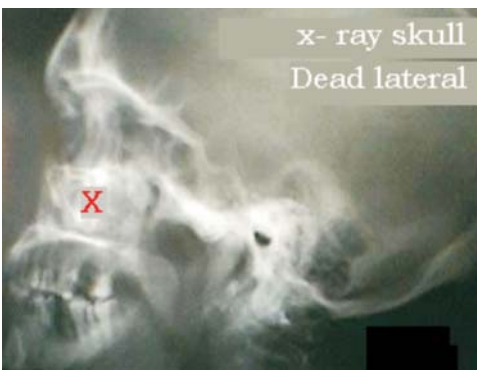


Figure 5.31: X showing mass in antrum and destruction of post wall of maxilla

Treatment:

1. *Surgery:* Total/partial maxillectomy. Radical surgery may be needed to remove disease from eye, ethomid sinus or sphenoid.

Table 5.1: Showing symptoms and signs depending upon involvement of wall of maxilla

Wall of max.sinus involved	*Symptoms*	*Signs*
Antero-lateral wall	Swelling over face, Pain	Swelling in maxillary area
Medial wall	• Nasal obstruction • Nasal mass • Nasal discharge/ Serosangious discharge • Hyposmia/Anosmia	• Lateral nasal wall pushed medially • Friable, fleshy, nasal mass which bleeds on touch • Serosangious discharge
Superior wall	• Blurring of vision • Pain in and around the eye • Inability to move eyeball • Double vision	• Blunting of inferior orbital margin • Eyeball pushed upwards and laterally • Eccentric proptosis • Chemosis, 3,4,6 cranial nerve palsy • Diplopia
Inferior wall	• Swelling over hard palate • Pain in tooth/teeth • Loosening /falling of teeth • Perforation of palate • Ill fitting denture	• Loosening /falling of teeth • Increase in inter-dental gap • Swelling in gingivo-labial sulcus • Swelling/ulceration over hard palate
Posterior wall	• Inability to open mouth • Difficulty in chewing	• Trismus • Sensations over hard palate may be reduced

2. Radiotherapy: 5000 to 6000 rads. 200 rads/day, 5 days a week regime.
3. Chemotherapy: As palliative therapy.

Some Common Procedures in Nasal Diseases

1. Antral puncture
2. Anterior nasal packing
3. Posterior nasal packing
4. FB removal.

Local Anaesthesia for Nasal Procedures

For detailed nasal examination in depth and also for minor surgical procedures one needs local anaesthesia in nose. It can be carried out by one or more ways given below:

- For surface anaesthesia one of the following is used
- Ten per cent lignocaine spray

- Five per cent lignox jelly
- Four per cent xylocaine (by cotton wool nasal packing)
- Xylocaine + Adrenaline (1: 100 000) used cautiously gives good visualisation and minimises bleeding during surgery.

Infiltration Anaesthesia

One or two per cent xylocaine with or without adrenaline used prior to surgery.

Antral Puncture (Antral lavage)

In this procedure maxillary antrum is approached through inferior meatus. It is diagnostic as well as therapeutic procedure to diagnose maxillary sinusitis, to know the causative organisms in the sinusitis, to diagnose early malignancy by aspirating the fluid in the sinus for malignant cells. And to treat maxillary sinusitis by repeated antral puncture.

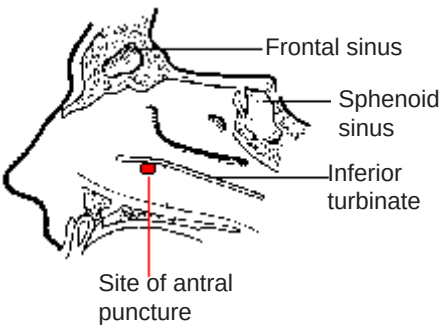


Figure 5.32: A diagrammatic representation showing site for antral puncture

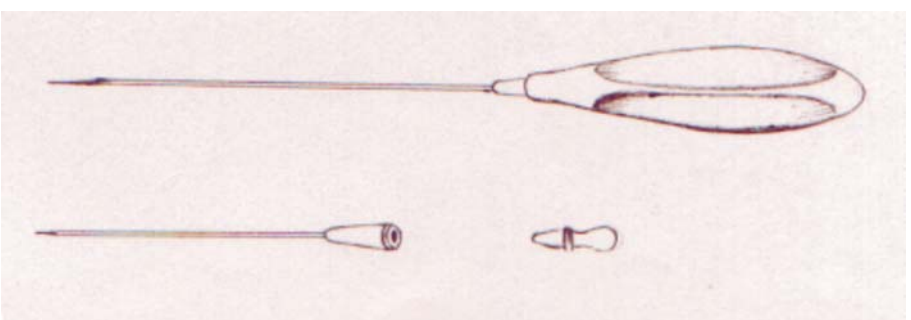


Figure 5.33: Lichtwitz trocar and cannula

Anaesthesia: Local anaesthesia (4% Xylocaine surface application).

Instruments: Tilley Lichtwitz trocar and cannula, kidney tray, Higginson's syringe, nasal speculum, nasal dressing forceps.

Procedure: Trocar and cannula is negotiated in the inferior meatus approximately 1 to 1.2 cm posteiorly from anterior end of inferior turbinate to reach genu. Then it is directed laterally and upwards towards tragus of the same side and pierced firmly to enter maxillary sinus. A 'click' is heard, a sensation of loss of resistance is felt and trocar/ cannula is in the antrum. Trocar is taken out keeping cannula *in situ.*

With the help of 5 ml syringe fluid if any is aspirated and sent for culture/sensitivity or cytology.

Patient is asked to lean forward. Then with the help of Higginson's syringe or ordinary glass syringe Luke warm saline is irrigated in the maxillary antrum which comes out of natural osteum of the maxillary sinus. Irrigation is continued till clear fluid returns.

The procedure may be repeated every week 2 to 3 times if needed. If the returning fluid is still turbid or shows pus flakes Caldwell-Luc operation may be advised. With the advent of FESS (functional endoscopic sinus surgery) need for Caldwell-Luc surgery has drastically reduced.

Complications

1. False passage
2. Bleeding
3. Vaso-vagal attack
4. Injury to eyeball
5. Air embolism.

NB: Antral puncture should be avoided in acute maxillary sinusitis. This may lead to osteomylitis. If the procedure is must, then IV antibiotics may be started 24 hours prior to procedure.

Anterior Nasal Packing

Indications: When epistaxis is not controlled by simple measures like pinching of nose, application of ice or cauterising the bleeder, etc. Nasal packing is also needed after nasal operations.

Instruments: Bull's eye lamp and head mirror or head light, nasal speculums, nasal packing forceps, liquid paraffin, tape ribbon gauze.

Procedure: Nasal cavity is inspected under good light and blood if any is sucked out. Only anterior 2/3 of nasal cavity is packed. Application of pack in posterior part causes gag reflex and soft palate movements may dislodge the pack in oral cavity.

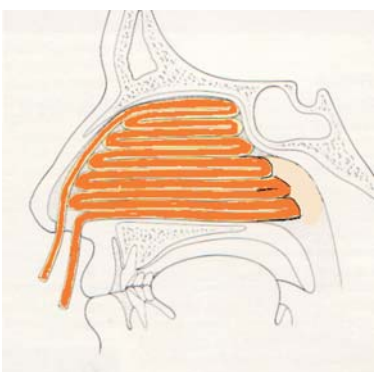


Figure 5.34: Showing anterior nasal packing

Ribbon gauze soaked in liquid paraffin is negotiated along the nasal floor and heaped up in the cavity layer by layer till nasal cavity is nicely packed as shown in the Figure 5.34. Packing is removed after 48 hours. During this period patient is given antibiotics to prevent infection.

Complications:

1. Infection
2. Adhesion formation
3. Acute otitis media.

Postnasal Packing

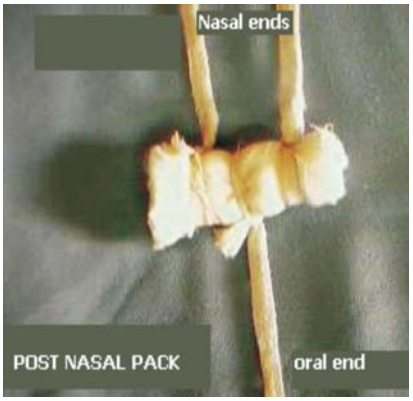


Figure 5.35: A postnasal pack

Indications: Severe bleeding from posterior part of nares or nasopharynx.

Instruments: Head light, mouth gag, long bladed nasal speculums, ribbon gauze, liquid paraffin, postnasal pack, fine rubber catheters, mouth gag, artery forceps, etc.

Procedure: It is preferably done under GA. Patient is put on oral endotracheal intubation with pharyngeal pack. Two small rubber catheters are introduced through nostrils. One end of catheter is taken out from oral cavity. Proper size postnasal pack (already sterilised) is taken and its tapes are tied to rubber catheters and catheters are pulled up through nose. As soon as postnasal pack enters into the nasopharynx it is adjusted by finger and snugly fitted in the area. Guide tapes are tied around the collumela lightly. Anterior nasal packing is done as described previously. Patient is put on antibiotics to prevent infection. Postnasal pack is removed after 48 hours.

Foley's catheter can also be used for postnasal packing.

Complications: Acute otitis media, sinusitis, drying up of mouth due to mouth breathing.

FB Removal

Figure 5.36: Showing how to hold a child for ENT examination and removal of FB

Usually they are small children who put foreign bodies in nose. If the child is small enough that can be held firmly then FB can be removed without anaesthesia. If the child can't be held firmly it is better to remove the foreign body under anaesthesia.

Instruments: Wire vectis, nasal speculum and illumination.

Procedure: Child is held firmly as seen in the photograph. Foreign body is inspected for its size, shape, consistency, location and lie in the nose. A wire vectis is negotiated in the nostril beyond the foreign body and FB is pulled along with it. It is a very simple procedure in expert hands.

Complications:

1. Injury to surrounding structures
2. Bleeding
3. FB may slip down into nasopharynx, oesophagus or bronchus.

PART IV

SECTION A

six

oral cavity and oropharynx

Its superior limit is the level of hard palate and where the soft palate touches the posterior pharyngeal wall. Inferior limit is at the level of tip of the epiglottis.

Oral cavity: It includes inner surface of lips, cheeks, teeth, gums, anterior 2/3 of tongue, upper jaw, lower jaw, upper and lower gingivo-labial and gingivo-buccal sulcui, retromolar area, hard palate, soft palate, and floor of mouth.

Oropharynx: It includes tongue posterior to vallate papillae, velleculae, lingual surface of epiglottis, anterior pillars, posterior pillars, faucial tonsils, posterior pharyngeal wall, free margin of soft palate and uvula.

The symptoms related to this part of the body are quite common and may be as follows:

1. Pain in throat (sore throat)
2. Difficulty in swallowing/chewing
3. Irritation in throat
4. Swelling/mass in throat
5. Ulcers in mouth
6. Trismus
7. Change in voice
8. Cough
9. Burning sensation
10. Foul breath
11. Foreign body
12. Dysarthria
13. Dental symptoms (excluded).

Associated symptoms:

14. Swelling over face
15. Painful/painless neck swelling
16. Nasal regurgitation
17. Fever with/without rigors.

It is usual observation that the symptoms related to throat are vaguely described by the patient and poorly understood by the clinician [if he is not careful enough]. Hence these symptoms should be asked in greater details to understand the exact problem of the patient. Each symptom should be analysed in proper manner so as to come to clinical conclusion.

Pain in Throat (Sore throat)

Patient should be asked, "Is it pain, or discomfort? Is it at rest or during movement of oral cavity or during chewing/swallowing. *How long he is suffering from this complaint? How it started? Is it progressive.* Is it a constant or intermittent. What is exact site of pain? How it starts, How it aggravates and how it gets relieved? How severe is the symptom. Is it just a discomfort or is it sufficient to disturb his work. Is it localised or spreads to the surrounding area. Is it sharp shooting or dull aching? Associated symptoms like fever, change in voice, swelling should be asked.

Common causes of pain in throat are pharyngitis, tonsillitis, quinsy, trauma, malignancy, neuralgias, etc. Pain of acute infection like tonsillitis starts suddenly. It is severe and constant in nature. Pain due to apthous ulcers is very severe and aggravated by taking solids or liquids. Pain may be initiated by the act of swallowing [odynophagia] in pharyngitis, tonsillitis, stylalgia, or malignancy. Pain due to salivary gland stone usually starts at the time of meals and shows swelling in the submandibular area, which gets relieved after sometime. Patients having quinsy may locate a specific site for pain.

Difficulty in Swallowing

This symptom needs proper evaluation. Ask the patient, *Is it pain during swallowing or food does not pass down below or is it both?*

Causes

- Congenital, e.g. cleft palate.
- Traumatic, e.g. injury to tongue and pharynx.
- Inflammatory, e.g. acute tonsillitis, pharyngitis, quinsy.
- Nutritional, e.g. cheilitis, glossitis.
- Neoplastic, e.g. malignancy of tongue, tonsil or pharyngeal wall.
- Miscellaneous, e.g. neurological affections of pharynx.

Difficulty in *chewing* may be experienced by the patient when he has painful lesion in oral cavity, trismus, temporomandibular pathologies and dental conditions.

Irritation/ itching in Throat

Some patients having allergic manifestation may particularly complain of irritation in throat. Exposure to dust or smoke can also cause irritation in throat. Postnasal drip may be responsible for irritation or itching.

Swelling/mass in Throat

Haemangioma, lymphangioma, lingual thyroid, ranula, ectopic salivary tumours, parapharyngeal/ peritonsillar abscess and malignancy are some of the swellings seen in the oral cavity. Proper history should be obtained by following the pattern described in 'examination of swelling'. Patient should be asked, "How long he has noticed the swelling?" It may be congenital like torus palatinus or may be acquired due to trauma, infection or malignancy. He should be asked *whether the swelling is constant or intermittent*. Swelling due to stone in submandibular gland duct or parotid gland duct may arise at the time of meals only and may disappear after some time. *Swelling may be painful or painless*. Peritonsillar abscess is very painful so much so that patient can't swallow his own saliva and may drool over cheek. Pain may be aggravated by the act of swallowing in malignant or inflammatory lesions. Radiation of pain to the ear may be seen in tonsillar malignancy.

Ulcers in Mouth

Mode of onset: Patient should be asked, *How the ulcer/s developed*. The ulcer may develop after trauma or spontaneously. Tongue bite may result into an ulcer, which heals within few days. However if the teeth are sharp and cause repeated trauma to tongue, may give rise to chronic non-healing ulcer and even granuloma. Aphthous ulcers develop suddenly and are very painful.

Duration: Ulcer of acute onset may heal spontaneously after few days. However chronic ulcer like tuberculous ulcer, syphilitic ulcer and malignant ulcer may not heal.

Pain: Syphilitic ulcers are painless while aphthous ulcers are highly painful. Malignant ulcers may be painless to begin with.

Discharge: History of any discharge associated with ulcer may be asked.

Associated diseases: Diseases like uncontrolled diabetes, tuberculosis may develop ulcers in the head and neck region. In Behcet syndrome oropharyngeal ulceration is associated with genital ulceration. Oral ulcerations are seen in pemphigus vulgaris and Stevens-Johnson syndrome. And these conditions should be kept at the back of mind while examining the oral ulcers.

Trismus: Trismus is Inability to Open the Mouth

It may be seen in a case of tetanus [lockjaw], oral submucous fibrosis, quinsy, cheek malignancy or lesions involving pterygopalatine fossa, muscles of mastication or temporomandibular joint. History of trauma to temporomandibular joint or history of chewing pan masala, tobacco, betel nut may be asked when you suspect oral submucous fibrosis.

Change in Voice

Oral cavity lesions like quinsy, cleft palate, palatal palsy or a big mass in oral cavity/oropharynx can cause change in voice.

Cough

Usually it is dry cough due to irritation of throat. Particularly postnasal drip may cause dry irritating cough. Allergen, elongated uvula, drying up of mucosa due to exposure to hot/dry air too can cause cough. Some patients do have acid regurgitation in the throat, which causes dry cough and irritation.

Burning Sensation

Commonly complained by the patient in oral submucous fibrosis or severe anaemia, glossitis, stomatitis, etc.

Foul Breath (Halitosis)

Bad oral/dental hygiene, chronic illness, patients who are nil by mouth for a long period can emit foul breath.

FB in Throat

FB is quiet common in oral cavity and oropharynx. Though children are commonly affected it is equally common in adults. Particularly fish bones, pins, clips (in female) needles (in tailors) and during influence of alcohol. Old age also predisposes for FB lodgement due to loose teeth and dentures.

Dysarthria

This is a disorder of articulation. Speech may be slurred and labored or it may be monotonus. Lesions of joints, muscles, ligaments of oral cavity and oropharynx may cause dysarthria, e.g. bilateral corticobulbar tract lesions. Lesions of 7th 10th and 12th cranial nerves. Myasthenia gravis, lesions of extrapyramidal system and cerebellar affections are known to cause affections of articulation.

Swelling over Face

lesions related to teeth like dental cyst, dentigerous cyst, adamantinoma, malignancies of cheek/alveolus may give rise to swelling over face.

Painful/painless Neck Swellings

Lesions in oral cavity and oropharynx may extend in neck, e.g. Ludwig's angina, parapharyngeal abscess/tumours, etc. In inflammatory conditions of oral cavity

and oropharynx the draining lymph nodes may become enlarged and tender. In malignant lesions it may be secondary deposits in neck nodes.

Nasal Regurgitation

Conditions like palatal palsy, perforated palate can cause nasal regurgitation.

EXAMINATION OF ORAL CAVITY AND OROPHARYNX

Inspection

In the examination of oral cavity one should examine lips, teeth, mucosa lining the cheeks, gingivo-labial gutters, gums, dorsum of tongue, under surface of tongue and floor of mouth for any obvious congenital defect, swelling, foreign body, ulcer or sinus. Later hard palate, soft palate, uvula, anterior pillars, posterior pillars, tonsils, posterior pharyngeal wall may be examined similarly. Movements of soft palate, uvula and tongue should be observed.

Lips should be looked for any fissures, clefts, angular stomatitis, etc.

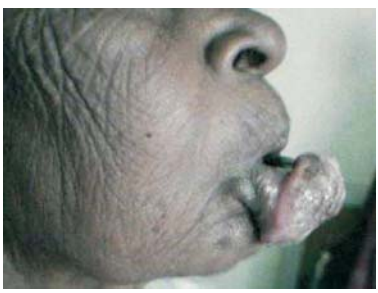


Figure 6.1A: Showing growth on vermilion surface of lip

Tongue

Patient is asked to open the mouth widely.

Anterior 1/3 of the tongue may be examined without using tongue depressor.

Size: Note the size of the tongue. It may be too large (macroglossia) due to lymphangioma or haemangioma or even congenitally and teeth marks may be seen on the margins of the tongue. In long-standing paralysis of tongue the affected side may show atrophy and wrinkling.

Appearance: Tongue is normally pink in colour. But may become pale in severe anaemia or may show white patch '*leucoplakia*' in patients having chronic tobacco/betel nut use. It is considered as pre-malignant condition. Black hairy tongue may be seen in few patients. Patients having B-complex deficiency may show red, smooth tongue with loss of normal papillae. Fissures may be seen over tongue in nutritional deficiencies.

Swelling: Note down the number, site, size, shape, surface and other features of the swelling.

Ulcer: Size, shape, number margins and base of the ulcer should be described in details.

Mobility: Ask the patient to protrude out his tongue. If the patient has 'tongue tie' he can't protrude out his tongue properly. In case of hypoglossal nerve injury or

malignancy, the affected side may show wrinkling due to fibrosis of the tongue on that side and may be deviated to the same side.

Ask the patient to touch the palate with his tip of tongue. This gives you an opportunity to examine undersurface of tongue and floor of mouth.

Floor of mouth is the part extending from innerside of arch of lower jaw to the attachment of tongue. Floor of mouth may have swelling, mass, ulcer or foreign body and should be carefully inspected. Wharton's duct openings should be seen. Posterior part of floor of mouth unto tonsillo lingual sulcus is not easily visible and you have to retract the side of the tongue with tongue depressor to see it.

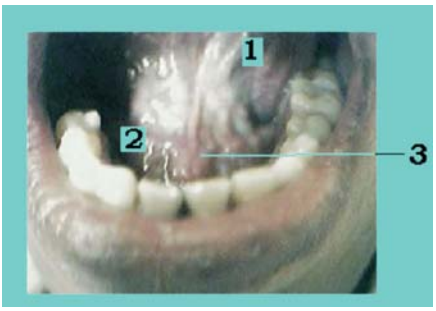


Figure 6.1B: Showing 'floor of mouth'. (1) Tongue, (2) Floor or mouth, and (3) Warton's duct

Teeth and Gums

While examining oral cavity a definite look at the teeth and gum condition do need mention. There may be carious teeth, loosening or absence of teeth. Patient may be using artificial teeth or dentures, which should be removed before examination. Diseases of teeth give rise to many oral cavity manifestations. Ulcers, epulis or growth in the vicinity of gums and teeth may be looked for.

Cheeks and Gingivo Labial Gutters

Patient is asked to open his mouth and cheeks are retracted with tongue depressor to see mucosal surface. Gingivo-labial and gingivo-buccal gutters on right and left side in upper and lower jaw are examined carefully with the help of tongue depressor upto the last molar tooth. Stenson's duct [parotid gland duct], which opens in the close vicinity of 2nd molar tooth, is carefully examined on both sides.

This part of oral cavity should be looked for any swelling, ulcer, congestion or foreign body. Mucosa lining the cheeks may show typical *Koplik's spots* in measles. Cheek mucosa may be stained dark due to chronic tobacco use. Or may show white patch (leucoplakia) red patch (erythroplakia). Upper gingivo-buccal sulcus may be obliterated in carcinoma maxilla.

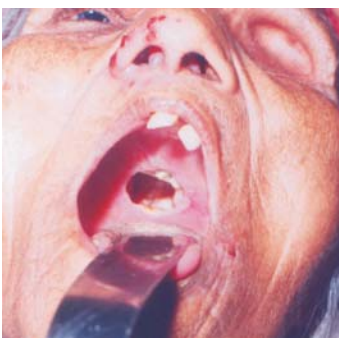
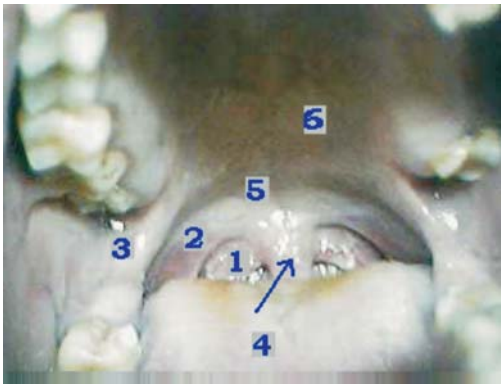


Figure 6.1C: Showing perforation in hard palate

Hard Palate, Soft Palate, Uvula

Patient is asked to open the mouth while his head is tilted back. Patient is asked to say "aha" to see palatal and uvula movements.



' Arrow' – Uvula
1. Posterior pillar
2. Anterior pillar
3. Trigone
4. Tongue
5. Soft palate
6. Hard palate

Figure 6.2: Photograph of oropharynx

Patient may have congenital cleft palate, bifid uvula, or fibrous swelling over palate called "torus palatinus". Chronic smokers may show prominent mouth of salivary glands over hard palate. In case of diphtheria or vagal palsy, movements of soft palate and uvula may be restricted or lost. Soft palate and uvula deviates to normal side on saying "aha".

Anterior Pillars, Tonsils and Posterior Pillars

Tongue depressor is taken in left hand and lateral surface of the tongue is depressed, to visualise tonsil and its pillars. Tongue depressor should not be put too posteriorly otherwise patient would get gag reflex. Neither it should be kept too anteriorly lest, middle part of the tongue would bump up preventing proper vision.

- *Anterior pillars:* These are basically muco-muscular folds covering the palato-glossus muscle. They cover the anterior surface of tonsil partly. In normal condition they are pink in colour. Congestion along anterior pillar suggests infection in tonsil.
- *Tonsils:* Colour—(normal) pink (infection) congested, red
  Size of the tonsil is graded by few as follows:
  Gr. I Medial surface of tonsil hidden behind anterior pillar
  Gr. II Medial surface of tonsil just at the level of anterior pillar
  Gr. III Size in between Gr. II and Gr. IV
  Gr. IV Tonsils touching each other (Kissing tonsils)
  Any other abnormality—like follicles, membrane, cyst, FB, etc. may be noted.
- *Post pillars:* They too are muco-muscular folds housing palato-pharyngius muscle. They may not be properly seen particularly when tonsils are enlarged.
- *Posterior pharyngeal wall:*
  It should be examined for any congestion, bulging, postnasal drip, granulations, Aphthous ulcer or malignant ulcer. Posterior pharyngeal wall may show bulge in cases of retrophayngeal abscess. Patients having chronic sinusitis may show prominent lymphoid tissue in lateral pharyngeal gutter.

NB: At times tonsils and post pharyngeal wall may show multiple whitish, yellowish horny outgrowth called as kertosis pharyngis. This is benign condition but may alarm the patient or novice clinician both.

- *Post 1/3 of tongue:*
  A small part of post 1/3 of tongue may be seen during this examination. But for complete vision of base tongue indirect laryngoscopy is needed.

Palpation

Surgical gloves should always be used while palpating the oral cavity.

Tongue

Tongue should be palpated if it shows ulcer or swelling. In suspected case of malignancy induration around and deep to lesion should be particularly palpated.

Floor of Mouth

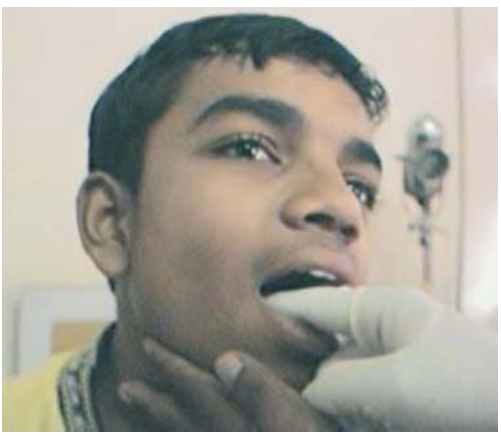


Figure 6.3: Showing method of palpating floor of mouth

Floor of mouth may be palpated if it shows ulcer or swelling. The submandibular gland should be palpated by keeping gloved finger in the mouth and fingers of other hand over the skin in submandibular triangle and the gland is bimanually palpated. Normally the gland is soft. But may become firm or hard in chronic infections and malignancy respectively. Similarly the submandibular gland duct (Wharton's duct) should be palpated for any stone in it. Finger palpation should be extended posteriorly upto tonsillo lingual sulcus and induration if any is noted. This area is considered as 'grave yard' for the surgeon as lesion in this area may be easily missed.

Tonsils and its Bed

In a suspected case of chronic tonsillitis the tonsil may be squeezed or compressed with the help of tongue depressor. A cheesy material may be expressed out from crypts. In a suspected case of styloid enlargement the styloid is palpated in the bed of the tonsil. Any unusual enlargement of tonsil, ulcer over tonsil should be palpated for induration, which may be a feature of malignancy.

Base of Tongue

Malignant lesion at the base of tongue may not be properly visualised in mirror examination and hence, in all suspected base tongue malignancies it should be

palpated for any induration. A small transparent fish bone that is not visualised may be detected by palpation method.

Swelling in Oral Cavity

Should be palpated using rubber gloves. And the findings of inspection, i.e. size, shape, surface should be confirmed. Consistency of the swelling should be examined. It may be soft, cystic, firm or hard. Mucosa over the swelling should be moved by finger to know whether it is free or fixed to the underlying mass. Expanding cystic lesion in maxilla and mandible cause thinning of bone cortex and this may be responsible for "egg shell crackling" on palpation. The feel of various swelling may be as follows:

Soft swellings, e.g. lipoma
Cystic swellings, e.g. dermoid cyst, cystic hygroma, ranula
Firm swellings, e.g. chronic siloadenitis, neurofibroma
Hard swellings, e.g. mixed parotid tumour
Compressible swelling, e.g. haemangioma.

Percussion and Auscultation

These do not contribute much in the examination of oral cavity. Except one that is tapping over teeth may be tender in dental and alveolar conditions.

Some common conditions:

1. Pharyngitis
2. Tonsillitis
2. Quinsy
3. Retropharyngeal abscess
4. Parapharyngeal abscess
5. Ludwig's angina
6. Aphthous stomatitis
7. Leucoplakia
8. Oral submucous fibrosis
9. Cleft palate
10. Malignancy
11. Submandibular siloadenitis
12. Foreign body.

Pharyngitis

Inflammation of mucosa lining the pharynx is known as pharyngitis. It may be acute or chronic in nature.

Acute pharyngitis:
Aetiology: Viral infection, smoking, exposure to dust, bacterial infection.

Symptoms: Sore throat, hawking cough, odynophagia.

Signs: Pharyngeal mucosa inflamed, congested. Prominent blood vessels may be seen on posterior pharyngeal wall.

Treatment: Soothing lozenges, saline gargles, antipyretics if needed. Stop smoking, avoid dusty environment. Antibiotics may be needed if bacterial infection sets in.

Chronic pharyngitis:
Aetiology: Smoking, alcohol, acid regurgitation in mouth, chronic infection in nose, sinuses or teeth.

Symptoms: Raw sensation in throat, odynophagia, desire to remove sticky secretions, cough/irritation

Signs: Diffuse congestion with prominent blood vessels over posterior pharyngeal wall. When prominent granulation tissue is seen over posterior pharyngeal wall, it is called as 'granular pharyngitis'.

Treatment: Avoid smoking/alcohol. Avoid dusty area. Infection in nose, sinuses may be treated. Acid peptic disease, Dental caries to be taken care of.

Tonsillitis

Inflammation of faucial tonsils proper is known as tonsillitis. Common in children below 10 years. May persist in some adults. Infection in nose, sinuses may give rise to secondary tonsillitis.

Aetiology: β haemolytic *Streptococci, Staphylococci, H. influenzae, Pneumococci* are common infecting organisms.

It may be acute or chronic in nature.

Acute tonsillitis:
Symptoms: Discomfort or pain in throat, pain during swallowing, painful neck glands, malaise, fever may be seen in children.

Signs: Tonsils enlarged, swollen, congested (acute parenchymatous) a membrane may be seen (membranous tonsillitis) or follicles may be seen (follicular tonsillitis). Jugulo-diagastric lymph nodes may be enlarged and tender. Patient may have high grade fever.

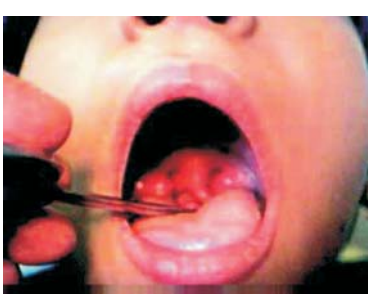


Figure 6.4: A case of acute tonsillitis

Treatment: Bed-rest, plenty of oral fluids, analgesics and antibiotics. Warm saline gargles are quite soothing.

Chronic tonsillitis:
When acute tonsillitis recurs frequently or symptoms are not controlled even after giving adequate antibiotics, chronic tonsillitis might have set in.

Symptoms: Discomfort in throat, unpleasant taste in mouth (cacagus), bad smell from mouth (halitosis), constant irritating cough, and desire to expectorate sticky throat secretions.

Signs: Tonsils may be enlarged. congestion along anterior pillars, on squeezing tonsils debri can be expressed out. Jugulo-diagastric lymph nodes are persistently enlarged.

Treatment: Usually don't respond to conservative treatment. Tonsillectomy should be considered. Source of infection in nose and /or sinuses may be cleared before thinking of tonsillectomy.

Quinsy (Synonyms- paratonsillar abscess, peritonsillar abscess)

Collection of pus between tonsillar capsule and its bed is known as quinsy.

It is usually a sequel of recurrent/chronic tonsillitis.

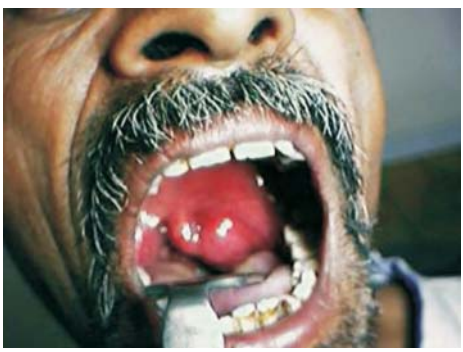


Figure 6.5: A case of peritonsillar abscess

Symptoms: Severe pain in throat, odynophagia, fever, inability to open mouth.

Signs: Patient may be febrile, toxic. He may have tachycardia, dry tongue, tonsil and its surrounding peritonsillar area is red congested and oedematous. Due to collection of pus in the potential space between tonsillar capsule and its bed, tonsil is pushed downwards and medially. Uvula shifted to opposite side and is congested. Due to pain and swelling in mouth patient may not be able to swallow his own saliva and may even cause drooling.

Treatment: Hospitalisation, bed-rest, IV fluids, antibiotics, incision and drainage of abscess. *Interval tonsillectomy* 6 weeks after the control of disease, to prevent recurrence.

Retropharyngeal Abscess

It is collection of pus between buccopharyngeal fascia, and prevertebral fascia.

Types: Acute and chronic.

Acute:
Common in children. Limited to one side of midline. Caused by suppuration of retropharyngeal lymph nodes. Infection in tonsils, adenoid or sinuses may cause it.

Symptoms: Fever, malaise, difficulty in swallowing, difficulty in breathing, cough and neck stiffness.

Signs: Patient is ill, toxic, torticollis may be seen, posterior pharyngeal wall may show bulging. X-ray lateral view neck may show increase in prevertebral space.

Treatment: Antibiotics, hydration, I and D of abscess, Tracheostomy if respiratory obstruction predominates.

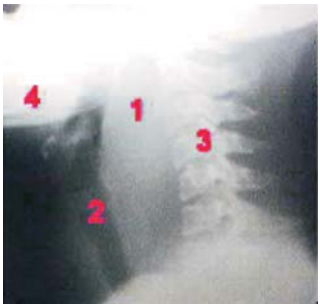


Figure 6.6: (1) Retropharyngeal abscess, (2) Air way, (3) Cervical vertebrae, and (4) Mandible

Chronic:
This is usually secondary to tubercular infection of retropharyngeal LN or caries of cervical spine. Common in adults.

Symptoms: Dysphagia, cough, sore throat.

Signs: Posterior pharyngeal wall may show bulging, cervical LN may be enlarged.

Treatment: I and D by neck route. Anti TB treatment.

Parapharyngeal Abscess

Infection from tonsil, wisdom tooth, or gums may spread to this area.

Symptoms: Fever, swelling in neck, pain in throat, dysphagia.

Signs: Patient may be toxic, lateral pharyngeal wall bulging, tonsils may be pushed medially. Trismus may be present.

Treatment: Antibiotics, I and D of abscess, anti-inflammatory drugs.

Ludwig's Angina

Cellulitis of the floor of mouth resulting into hard brawny swelling in submandibular area is known as Ludwig's angina. It may be due to spread of dental infection. Common in children and debilitated patients. Pushing of tongue posteriorly or spread of infection in superior mediastinum may result into respiratory distress. It is a potentially dangerous condition and should be handled enthusiastically.

Aphthous Stomatitis

Aetiology: Not known. Possibly it is an autoimmune disorder.

Symptoms: Painful ulcers in mouth.

Signs: Multiple ulcers are seen over tongue, cheek, floor of mouth, or anterior pillar.

Ulcers have sloughy base with marked hyperemia around the margin of ulcer. They are highly painful and usually take 7 to 10 days to heal completely.

Treatment: Steroid lozenges, local astringents, antiseptic mouth wash, treatment of underlying anaemia, cauterisation of ulcer.

Figure 6.7: Showing aphthous ulcer on tongue

Leucoplakia

Leucoplakia is a white patch in mouth commonly seen over cheek or tongue. In Indian subcontinent the habit of keeping tobacco mixed with lime in gingivo-buccal sulcus is an important cause for this condition to develop. This condition is considered to be pre-malignant. And hence every case of leucoplakia should be followed up carefully. Local irritants should be removed. And lesion should be biopsed. Histologically it may be simple keratosis, hyperkeratosis or acanthosis or classical dysplasia. This last variety may progress to carcinoma *in situ* in 5 per cent of the affected.

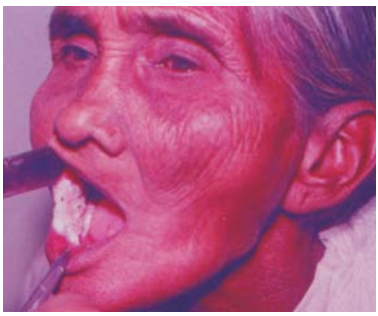


Figure 6.8: A case of leukoplakia

Treatment: Stop irritants, follow-up. Excision of patch if histologically dysplasia.

Cleft Palate

This is a congenital condition caused due to failure of fusion of primitive palate. A large defect is seen in hard and/or soft palate. Nasal structures may be seen through the defect. Patient has feeding and speech problems. It is also a precursor for chronic Eustachian tube dysfunction. It needs repair by plastic surgical procedures.

Malignancy

Malignancy in oral cavity is very common in India. Basic underlying cause is chronic mucosal irritation in the form of tobacco, alcohol, and repeated trauma by sharp tooth. Syphilis or sepsis was considered as important factors in the past. The common sites involving malignancy are cheek, gingivo-labial gutters, alveolus, tongue, floor of mouth, tonsil, etc. It may present as cauliflower growth, non-

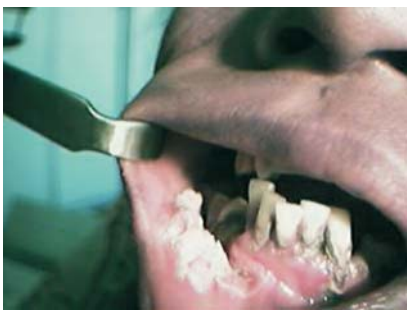


Figure 6.9: Malignant lesion of gingivolabial sulcus

healing ulcer or neck mass. Patient may have pain in throat, excessive salivation, fetor and even bleeding in advanced cases. Usually the patients come in a very late stage. All the patients need biopsy/ aspiration cytology to confirm the diagnosis. And depending upon the size, site, operability, morbidity and willingness of the patient, he may be submitted for surgery, radiotherapy, chemotherapy, or the combination of these.

Submandibular Siloadenitis

This is chronic inflammatory condition of submandibular salivary gland. It may be due to stone in the Wharton's duct or in gland proper.

Calculus in submandibular gland is more common than parotid gland because:

1. Submandibular duct has a long tortuous course.
2. It is wide, and it has to work against the gravity to expel its contents.
3. Quality of submandibular gland secretions is thicker as compared to parotid gland secretion. Hence stone formation is more common in submandibular gland.

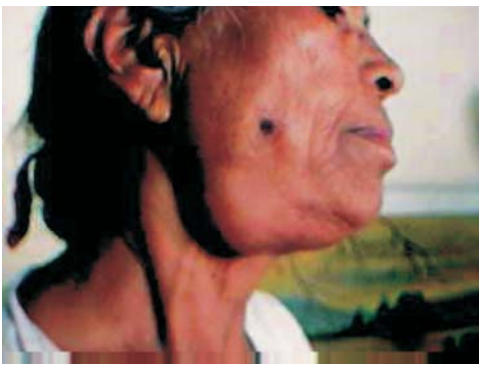


Figure 6.10: A case of chronic submandibular siloadenitis

Symptoms: Patient would complain of swelling in submandibular area particularly during taking meals.

Signs: On bi-manual palpation the gland is firm to hard in consistency and stone in the gland or duct may be palpated.

Treatment:

Stone present: Antibiotics, analgesics, anti-inflammatory drugs. Removal of stone either by milking the duct or opening the duct. If stones are multiple or in close vicinity of gland, excision of gland may be needed.

Stone absent: Antibiotics, analgesics, anti-inflammatory drugs. If there is no relief then siloadenectomy may be needed.

seven

examination of larynx and laryngopharynx

Larynx includes epiglottis, aryepiglottic folds, arytenoid cartilages, false cords, true cords, ventricles and subglottic area.

Laryngopharynx includes pyriform fossae, posterior pharyngeal wall and post-cricoid area.

Symptoms related to this part may be:

- Change in voice
- Difficulty in breathing
- Stridor
- Difficulty in swallowing
- Pain in throat
- FB inhalation/ingestion
- Cough
- Neck mass.

CHANGE IN VOICE

Patient should be asked, *what exactly has gone wrong with his voice*? Is it hoarse, is it feeble, is it crowing, is it husky, or is it throaty. And *when he noticed it first?* Was the first episode sudden in onset or gradual? Was it following some neck surgery? Is there history of trauma to neck? Is it following fever or exanthema? What is total duration of this symptom? Is it constant or intermittent? Has it any diurnal variation, i.e. is it more during fag end of the day or early in morning? Does it become hoarse after speaking for some time? If it is intermittent how much is the time duration between two attacks? *Is the symptom progressive?* Is it any way associated with other symptoms like rhinitis or catching of cold? Does the patient have any respiratory allergy or chronic sinus infection? Is the patient smoker? Few professions like teachers, hawkers, preachers, singers are more prone for change in voice due to vocal abuse. Enquiry should be done about the environment where patient is working. People working in industries where atmosphere is dry, hot or have irritating gas fumes are more prone for change in voice.

DIFFICULTY IN BREATHING

Difficulty in breathing may be caused by FB, infections like acute epiglottitis, acute laryngotracheobronchitis, mass in larynx, obstruction in airway due to congenital defects in larynx and by neurological affections of larynx. It may be sudden after trauma or progressive. It may be mild in nature or severe. It may be manifested during rest or only after exertion. It may land up in stridor. All these points should be noted.

STRIDOR

It is a noisy respiration produced due to obstruction in air passage. It may be inspiratory, expiratory, or mixed. Commonly seen in children. Patient or relatives accompanying the patient should be asked,

- "How long the patient has stridor"? "Is it since birth or acquired?"
- "How it started?"
- Is it associated with fever?
- Is it associated with dysphagia?
- Is there history of recent upper respiratory tract infection?
- Is there any history of aspiration or FB inhalation?
- Is there any history of injury to larynx or chest?
- Does it change with posture?
- Is it more after exertion or present even at rest?

Congenital conditions like laryngomalacia, bifid epiglottis, laryngeal web, subglottic stenosis or vallecular cyst can give rise to stridor. Trauma resulting into haematoma in laryngeal inlet or injury to vocal cord, injury to vagus nerve resulting into cord palsy can give rise to stridor. Acute laryngotracheobronchitis, laryngeal oedema too can cause stridor. FB inhalation in larynx proper or trachea/bronchi can also result into stridor. It may be following thyroid surgery due to injury to recurrent laryngeal nerve. Big masses in neck like malignancy or cystic hygroma may compress over trachea or recurrent laryngeal nerve resulting into stridor. Primary malignancy of larynx/laryngopharynx is the most common cause of stridor in adults in ENT practice.

DIFFICULTY IN SWALLOWING

Apart from other routine questions, patient should be asked, *Is it painful swallowing?* (Odynophagia) or, *is it inability to swallow due to obstruction down below (*Dysphagia*) or both*. Or *is it spill over of liquids and solids into respiratory tract,* due to which patient is unable to eat. Proper history should be asked.

Causes

- Congenital, e.g., tracheo-oesophageal fistula, stricture oesophagus.

- Traumatic, e.g. external injury to larynx/laryngopharynx may cause painful swallowing.
- Inflammatory, e.g. acute epiglottitis, tuberculous laryngitis, retro-pharyngeal abscess.
- Neurological, e.g. vocal cord palsy, and neurasthenia.
- Neoplastic, e.g. malignancy of larynx or laryngopharynx.
- Miscellaneous, e.g. Patterson Brown Kelly syndrome, globus hystericus, FB impaction.

PAIN IN THROAT

This may be a predominant symptom. Patient should be asked *when it started? How it started*, *Is there history of URI, trauma, fever or FB ingestion / inhalation? Is it constant or intermittent*? *How it is aggravated and ameliorated*.

Causes

- Traumatic: Injury to larynx/laryngopharynx, corrosive ingestion.
- Inflammatory: Laryngitis, retro-pharyngeal abscess, acute epiglottitis.
- Neurological: Glassopharyngeal neuralgia.
- Neoplastic: Carcinoma larynx, caricnoma pyriform fossa.
- Miscellaneous: FB in larynx/hypopharynx.

FOREIGN BODY (FB)

Any substance either exogenous or endogenous found in the body where it is not present anatomically may be considered as a foreign body

When a foreign body enters respiratory passage it is called as *FB inhalation* and when it enters in digestive tract it is known as *FB ingestion*. Treatment differs in both.

FB Inhalation

Ask the patient [if he can answer] or to relative *What is inhaled by the patient? When*? *Did the patient have cyanosis, choking spells after inhalation? Can relatives provide the duplicate of FB or details of FB? Is patient febrile? History of any attempt to remove FB should also be asked.*

Usually it is a small child who may be brought in a severe hypoxic state. He may have cyanosis, respiratory urge and urgent tracheostomy may be needed.

FB Ingestion

Patient or his relative should be asked the same array of questions that are mentioned above, as it is always better to rule out FB in larynx. Then he may be asked, *Whether*

patient had any vomiting after ingestion of FB? Can patient swallow solids or liquids? Is patient febrile?

Causes

In children: Routine household things like buttons, pencils, rubber, hairpins, safety pins, stones, coins may get lodged in laryngopharynx. They are more commonly stucked at C6 level in cricopharynx. However sharp, pointed objects can get lodged in mucosa in any place.

In adults: In adults it is more commonly seen in mentally weak people or while under the influence of alcohol. However in old people due to poor propelling capacity of oesophageal musculature, large food bolus, or inadvertent bone [fish bone or chicken bone] impaction in pyriform fossa or cricopharynx is possible. Professionals like tailors are habituated to keep needles in mouth, which may slip down in larynx or laryngopharynx.

COUGH

Cough is a protective reflex. It can be initiated whenever there is irritation in larynx, laryngopharynx, trachea or bronchi. Hence all the situations where irritation in larynx /hypopharynx occurs cough is the result.

NECK MASS

Details are given in Chapter 8 on Examination of Neck.

INDIRECT LARYNGOSCOPY

For the examination of larynx and laryngopharynx in OPD Bull's eye lamp, head mirror, laryngeal mirror, spirit lamp, gauze square pads are needed. In this procedure clinician doesn't see the larynx directly but a mirror image and hence this procedure is known as *Indirect laryngoscopy*.

Procedure: Patient is sitting on a revolving stool in front of clinician at a distance of approximately one foot. The procedure is explained to the patient to reduce his anxiety. Head mirror is adjusted and a good circular focus is obtained on the patient's face. Mirror part of laryngeal mirror is gently heated to prevent condensation of patient's breath on the mirror. Spirit lamp or air warmers may be used to warm the mirror. Then it is tested by the clinician himself to make sure that it is not too hot to scald the patient.

Patient is asked to lean forward a little and to pop out his tongue. It is held firmly with the help of gauze square pad in between left thumb and middle finger. With the help of left index finger upper lip is retracted. Warmed laryngeal mirror is hold like a pen in the right hand and it is negotiated in oral cavity and held at

base of uvula without touching posterior pharyngeal wall. Various parts of larynx are seen in the mirror. One has to change the position of laryngeal mirror in different directions and formulate a mental picture of the larynx and laryngopharynx.

Various structures that should be identified during indirect laryngoscopy, from above downward are:

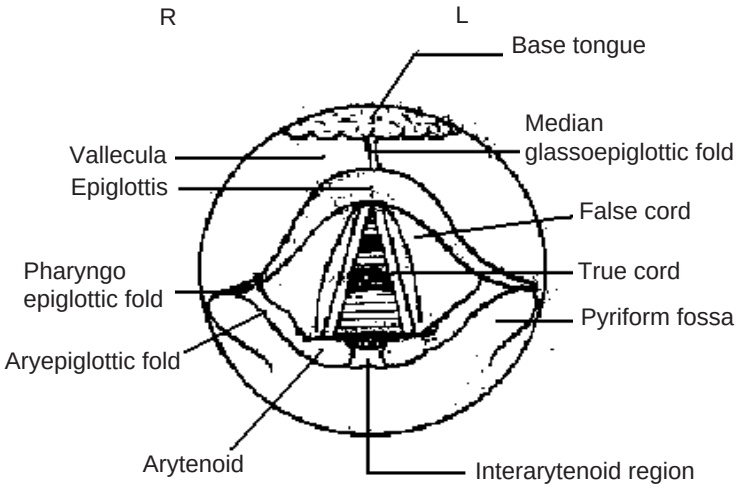


Figure 7.1: Diagrammatic representation of indirect laryngoscopy

All these structures should be seen carefully for any congestion, oedema, ulcer, growth, foreign body, loss of function or any other obvious lesion.

Later on patient is asked to say "EE". This visualises the glottic area and one can observe the movements of true vocal cords. Anterior commissure, posterior commissure, and sometimes part of subglottic area may be seen in co-operative patients.

I/L is technically difficult procedure and requires co-operation on the part of patient and experience on the part of clinician, to obtain maximum information. However in some unco-operative patients 4 per cent xylocaine may be spread over posterior pharyngeal wall and in the laryngeal inlet to blunt the gag reflex.

The structures that are not seen in the indirect laryngoscopy are:

- Laryngeal ventricles
- Subglottic area
- Post cricoid area.

In some sensitive or anxious patients it may not be possible to examine the larynx even after xylocaine spray. Such patients may require fiberoptic flexible laryngoscopy under local or direct laryngoscopy under general anaesthesia.

NB: Neck should always be examined after completing Indirect Laryngoscopy. Laryngeal crepitus should be elicited (See neck examination).

COMMON CONDITIONS INVOLVING LARYNX AND LARYNGOPHARYNX

1. Laryngotracheobronchitis
2. FB in larynx and laryngopharynx
3. Juvenile laryngeal papillomatosis
4. Laryngomalacia
5. Vocal nodules
6. Vocal cord palsy
7. Malignancy of larynx and laryngopharynx.

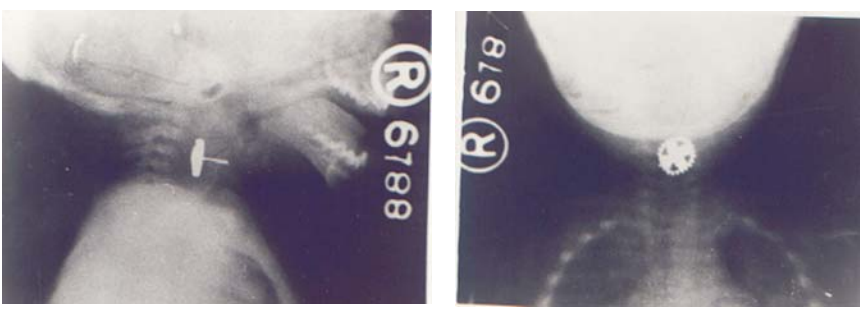
Laryngotracheobronchitis

Common in children below 3 years. Caused by parainfluenza virus 1 and then secondarily invaded by *Streptococci, Staphylococci, Pneumococci* and *H. influenzae.*

Symptoms: Child is febrile, toxic, hypoxic, inspiratory stridor +. This is due to oedema, congestion and narrowing in the subglottic area due to deposition of thick secretions, which results into respiratory distress.

Treatment: Hospitalisation, O_2 tent and humidification (if needed), IV fluids, antibiotics, endotracheal intubation or tracheostomy may be considered if obstructive element does not respond to conservative treatment. Child may die of asphyxia if not treated properly.

FB in Larynx and Laryngopharynx

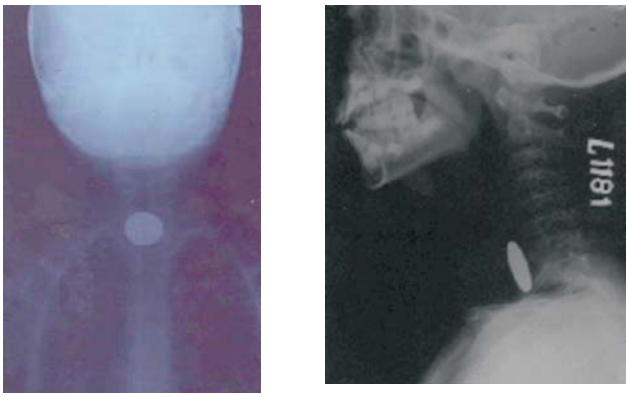


Figures 7.2A and B: X-rays showing FB in pharynx of a small child

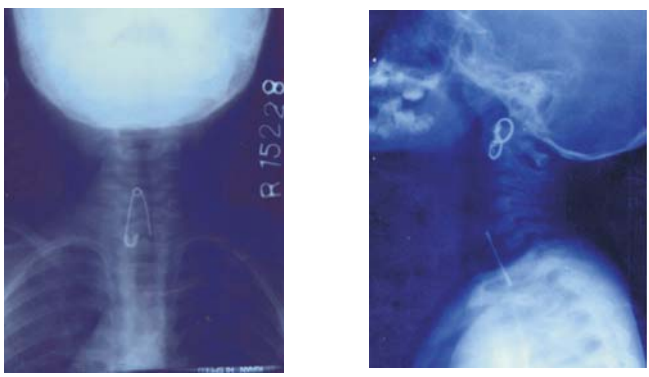
Symptoms and signs: Common symptoms of FB larynx and laryngopharynx may be pain in throat, difficulty in swallowing, pain in neck movements. However stridor is a predominant feature of laryngeal FB. At times patient may die due to laryngeal spasm.

Diagnosis: On history, clinical examination and radiological evidence.

Treatment: Removal of FB by direct laryngoscopy and FB forceps.



Figures 7.3A and B: (A) X-ray PA view neck and chest showing radiopaque shadow in coronal plane, (B) X-ray neck lateral view showing radiopaque FB in cricopharynx



Figures 7.3C and D: (C) X-ray neck PA view showing inverted safety pin in pharynx (D) X-ray neck lateral view showing pin in cricopharynx

NB: Prevention of FB inhalation is the best form of treatment

Juvenile Laryngeal Papillomatosis

Juvenile laryngeal papillomatosis is a disorder presenting with change in voice or huskiness, which may develop gradually. Patient may have difficulty in respiration so much so that some may need urgent tracheostomy. Indirect/direct laryngoscopy may show multiple papillomas studded in larynx over AEF, arytenoid, ventricles, cords and subglottic area.

Aetiology: Exact aetiology not known. It is closely associated with human papilloma virus (HPV) infection in mothers.

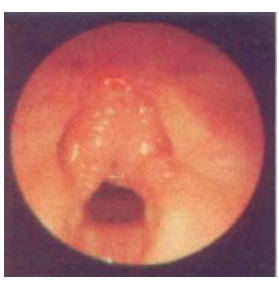


Figure 7.4: Endoscopic view of laryngeal papillomatosis

Treatment: Large number of treatment modalities are available.
1. CO_2 lasers
2. Photodynamic therapy
3. Surgical excision
4. Interferon therapy
5. Indole-3-carbinol
6. Endoscopic micro-debridment.

Laryngomalacia

Newborn and small children present with inspiratory stridor more so on exertion or during sleep. Flexible nasopharyngolaryngoscopy reveals that there is abnormal laxity of supraglottic structures resulting into, pulling of tissues, in inlet of larynx during every attempt of inspiration.

The condition is self-limiting. Laryngeal framework gets rigidity by 2 years of age. No specific treatment needed. Parent assurance essential. Still due care should be exercised during upper respiratory tract infection.

Vocal Nodule

These are hyperkeratotic nodules seen over both true cords at the junction of anterior 1/3 with posterior 2/3.

Aetiology: Vocal abuse, seen in voice users like hawkers, singers, teachers, preachers, and children who shout often.

Symptoms: Changes in voice, tiredness of voice, discomfort in throat.

Signs: I/Laryngoscopy shows- classical vocal nodules.

Treatment
1. Voice rest.
2. Remove source of infection in nose/sinuses if any.
3. Microlaryngeal surgery if conservative therapy fails.
4. Speech therapy to reduce the vocal strain.

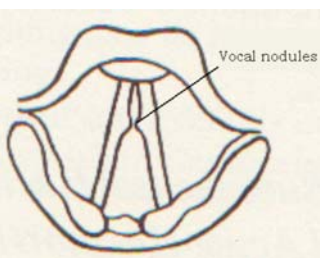


Figure 7.5: Diagrammatic representation of vocal nodule

Vocal Cord Palsy

It may be congenital or acquired. In acquired variety the causes may be:
- Trauma to neck.
- Surgery over thyroid gland.
- Viral infections.
- Tumour compressing over recurrent laryngeal nerve.
- Tumours of larynx, trachea, oesophagus or thyroid.

Paralysis of the cord may be complete/incomplete, unilateral/bilateral.

Symptoms: Change in voice, spill over of liquids, dysphagia, difficulty in respiration depending upon type of paralysis.

Signs: Indirect laryngoscopy would reveal unilateral or bilateral cord fixed in parmedian or cadaveric position. Glottic chink may be compromised.

Treatment:
Temporary cord paralysis: removal of cause, wait and watch.
Permanent cord palsy:
Resulting into airway obstruction: tracheostomy, lateralisation of cord, cordopexy, may be done.
Resulting into air waste: medialisation of cord, Teflon paste injection in cord.

Malignancy of Larynx

Carcinoma of larynx is a common condition in India.

Aetiology: Smoking, alcohol, irritating fumes in industry.

Pathology: Squamous cell carcinoma most common variety. Glottic malignancy has good prognosis as symptoms are early, diagnosis is early and no lymphatic spread, as compared to supraglottic and subglottic areas.

Symptoms: Change in voice, pain in throat, respiratory difficulty. Difficulty in swallowing, neck nodes, and rarely haemoptysis.

Signs: Exophytic or ulcerative lesion affecting either epiglottis, AEF, arytenoids, false cords or true cords. Cord movements may be restricted due to involvement of laryngeal muscles, cricoarytenoid joint or recurrent laryngeal nerve.

Investigations and diagnosis: Direct laryngoscopy to know extent of disease and to take biopsy. Radiology and CT scan to know extent and metastasis.

TNM classification of larynx:

Tumour status:

TiS	Carcinoma *in situ*
Ti0	No evidence of malignancy
T1	Tumour confined to the region with normal mobility
T1a	Tumour confined to one anatomical site
T1b	Tumour spreading to surrounding area but not crossing region
T2	Tumour extending to adjacent region but without fixation of cord and not extending beyond larynx
T3	Tumour confined to larynx but with evidence of cord fixation or deep invasion
T4	Tumour with direct extension beyond larynx
TX	Minimum requirement to assess the primary cannot be met with

Nodal status:

NO	No evidence of regional lymph node involvement
N1	Single, homolateral clinically + lymph node < 3 cm diameter
N2a	Single, homolateral, clinically + lymph node between 3 to 6 cm diameter
N2b	Multiple, homolateral clinically + lymph nodes none > 6 cm diameter
N3a	Single/multiple, homolateral clinically + lymph node/s one > 6 cm diameter
N3b	Bilateral clinically positive nodes. (Each side of neck should be staged separately)
N3c	Contralateral clinically + lymph nodes.

Distant metastasis:

MO	No evidence of distant metastasis
M1	Evidence of distant metastasis
MX	Minimum requirement to assess the presence of distant metastasis can't be met with.

Staging:

Stage I : T1 NO MO
Stage II : T2 NO MO
Stage III : T3 NO MO / Any T N1 MO
Stage IV : T4 NO MO / Any T N2 MO / Any T Any N M1

Treatment:

- Surgery, radiotherapy, chemotherapy and combinations are the treatment modalities available.
- Surgery offers better chance for elimination of disease. Treatment depends upon age, sex, occupation, extent of the disease, operability, facilities available and willingness of the patient.
- Total laryngectomy results into permanent loss of voice. Post-laryngectomy vocal rehabilitation is a ray of hope for 'a laryngeal' patients.
- In selected cases 'conservative laryngectomy' procedures which preserve voice are gaining popularity.
- Involvement of neck nodes requires radical neck dissection, along with total laryngectomy and partial pharyngecotmy.

SECTION B

eight

examination of neck

Some of the diseases are primarily diseases of neck organs. And majority of inflammatory and neoplastic diseases in oral cavity, oropharynx, larynx and laryngopharynx do manifest in neck, as the lymphatics from these areas ultimately drain in to neck nodes. Diseases originating in oral cavity, oropharynx, larynx or laryngopharynx may also extend to neck. Hence one has to examine the neck very carefully.

Anatomical Considerations

For better understanding of underlying structures and ease of description the neck is divided into various triangles. It is better to memorise them.

Anatomical Map of Neck (Cervical triangles)

1. *Muscular triangle:* Outlined anteriorly by midline of neck, superolaterally by superior belly of omohoid, inferolaterally by lower part of anterior border of sternomastoid.
2. *Carotid triangle:* Outlined by anterior border of sternomastoid, superior belly of omohyoid, and posterior belly of diagastric muscle.
3. *Diagastric triangle:* Upper boundary by lower border of mandible, anterior boundary by anterior belly of diagastric muscle, posteriorly by post. Belly of diagastric muscle.

Figures 8.1A and B: Showing cervical triangles. (1) Muscular triangle, (2) Carotid triangle, (3) Diagastric triangle, (4) Submental triangle, and (5) Posterior triangle

4. *Submental triangle:* Its base is formed by hyoid bone, sides by anterior bellies of diagastric muscles of either side, apex lies at symphysis menti.
5. *Posterior triangle:* It is formed by posterior border of sternomastoid, middle part of clavicle bone and anterior border of trapezius muscle.

Lymphatic drainage of neck
1. Pre-auricular LN
2. Retro-auricular LN
3. Suboccipital LN
4. Superficial cervical LN
5. Superior deep jugular
6. Middle deep jugular
7. Spinal accessory LN
8. Inferior deep jugular
9. Supraclavicular LN
10. Antereior scalene LN
11. Delphian LN
12. Submandibular LN
13. Submental LN
14. Facial LN

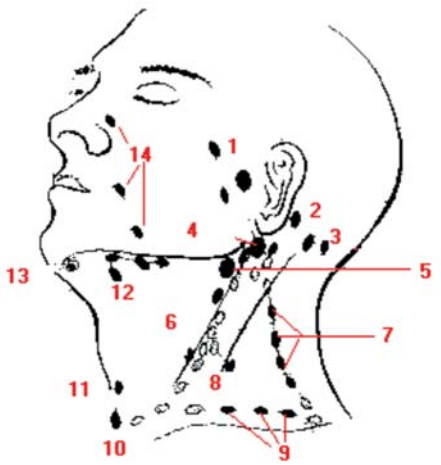


Figure 8.2: Diagrammatic representation of lymphatic chain of neck

The lymph nodes draining the neck are submental, submandibular, superficial cervical, retropharyngeal, paratracheal, spinal accessory, anterior scalene and supraclavicular and deep jugular chain.

- Submental—receive drainage from skin of the chin, mid portion of lower lip, tip of the tongue, anterior oral cavity, and the nasal vestibule.
- Submandibular nodes—receive drainage from submental area, lower nasal cavity, upper lip, lateral part of lower lip, anterior oral cavity and skin of mid face. They drain into superior djc.
- Superficial cervical—they are located along external jugular vein, receive cutaneous lymphatic from face, retro-auricular region, parotid nodes, and occipital nodes. They ultimately drain into superior djc.
- Retropharyngeal—nodes receive drainage from nasopharynx, posterior nasal cavity, paranasal sinuses, posterior oropharynx and hypopharynx and drain into djc.
- Paratracheal nodes—receive drainage from lower larynx, hypopharynx, cervical oesophagus, upper trachea, thyroid and drain into inferior djc.
- Spinal accessory—located along the spinal accessory nerve, and receives drainage from parietal and occipital regions of scalp, nape of the neck, upper retropharyngeal and parapharyngeal nodes. Upper spinal accessory nodes drain into upper djc and lower drain into supraclavicular nodes.
- Anterior scalene (Virchow's nodes) receive drainage from thoracic duct, and are situated at the junction of thoracic duct and left subclavian vein. They may get involved from infraclavicular malignancy.

- Supraclavicular nodes—receive drainage from spinal accessory and infraclavicular malignancy.

Deep jugular chain: This extends from base of skull to clavicle. And divided into superior, middle and inferior group.

Superior deep jugular chain: Receive primary drainage from soft palate, tonsils, tonsillar pillars, base of tongue, pyriform fossa and supraglottic larynx. And secondary drainage from retropharyngeal, spinal accessory, parotid, superficial cervical, and submandibular nodes.

Middle deep jugular chain: Receives primary drainage from supraglottic larynx, lower pyriform sinus and postcricoid area. They receive secondary drainage from superior deep jugular chain and lower retropharyngeal nodes.

Inferior deep jugular chain: Receives primary drainage from thyroid, trachea and cervical oesophagus. Secondary drainage from superior and middle deep jugular chain and paratracheal nodes.

Clinical Application

Malignancy in nose, sinuses, oral cavity, oropharynx, larynx and laryngopharynx ultimately drain into neck nodes as secondary deposits. Level of the involved neck node has a clinical significance.

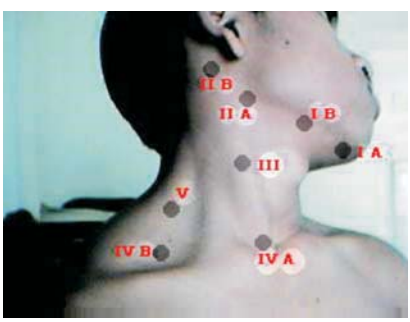


Figure 8.3: Classification of cervical lymph node levels (Modification from memorial sloan kettering cancer centre classification)

1.	Level I	A. Submental lymph nodes + ve for malignant deposits. B. Submandibular lymph nodes +
2.	Level II	A. Jugular lymph node + nodes upto carotid bifurcation + spinal accessory lymph node B. Upper posterior cervical triangle above entrance of spinal accessory nerve
3.	Level III	LN between carotid bifurcation to crossing of omohoid muscle + posterior margin of sternocleido mastoid muscle
4.	Level IV	A. Jugular nodes between omohoid muscle and clavicle and posterior border of sternocleido mastoid muscle B. Lymph node in supraclavicular space lateral posterior border of sternocleido mastoid muscle and caudal to omohoid
5.	Level V	Nodes in posterior cervical triangle created by posterior edge of sternocleido mastoid muscle, entrance of spinal accessory nerve, trapezius muscle and posterior belly of omohoid.

INSPECTION

NB: It is presumed that you have already carried out the detailed examination of nose, nasopharynx, oral cavity, oropharynx, larynx and laryngopharynx.

- Neck should be exposed upto the level of nipples for proper examination. Look for any swelling, ulcer, sinus, fistula or scar mark in the neck.
- *Location*: Note down the exact location of lesion as to which triangle/s the lesion is situated.
- Look for the size, shape, surface, margin and overlying skin in case of swelling. Look for appropriate findings in case of ulcer/fistula or sinus.

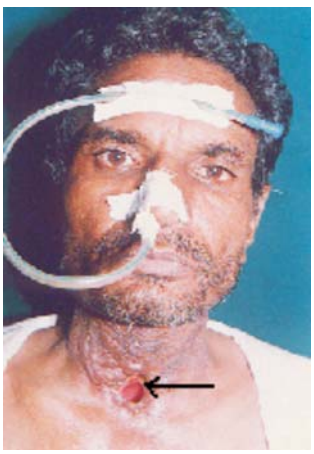


Figure 8.4A: Showing permanent tracheal stoma after total laryngectomy

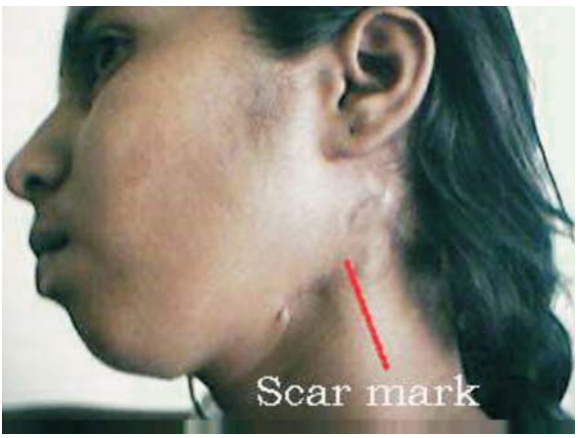


Figure 8.4B: Showing scar mark on neck due to old healed tuberculosis

*NB:*It should be noted whether swelling moves with deglutition or not. Swelling attached to larynx or trachea moves upward with the act of swallowing.

PALPATION

It is a fair practice to identify various normal landmarks in neck from above downwards like hyoid bone, thyroid notch, cornua of thyroid, cricoid cartilage, trachea, its position, tracheal rings, suprasternal notch, etc.

For proper palpation of neck clinician should stand behind the patient, flex the neck so that neck muscles are relaxed and fingers are slipped along various triangles of neck. This examination may notice any small swelling not observed during inspection.

- Look for local temperature and tenderness.
- Findings of inspection (size, shape, surface and margins) are confirmed on palpation.

- [In case of swelling] look for consistency, transillumination, mobility, fluctuation or other relevant sign.
- Examination of ulcer, fistula or sinus should be done in appropriate way as described elsewhere.

The deep cervical chain of lymph nodes lies below the sternomastoid and cannot be palpated without getting underneath the muscle:

1. Insert your fingers under the anterior edge of the sternomastoid muscle.
2. Ask the patient to bend his neck towards the side you are examining.
3. Move the muscle backward and palpate the deep nodes underneath.

Note the size and location of any palpable nodes and whether they are soft/ hard, tender/ non-tender, mobile or fixed.

In

Tuberculosis more than one lymph nodes may be affected, firm in consistency. The glands may be clustered together due to periadenitis. This is known as 'matting'.

Lymphoma lymph nodes may be small, multiple, discrete, mobile and rubbery in consistency.

Malignancy single or multiple, nodes are involved. They are hard in consistency or even fungated. They may be fixed to deeper structures.

Inflammatory lymphadenitis lymph nodes are enlarged and tender.

Tenderness over Laryngeal Cartilages

Laryngeal cartilages are held between the thumb and fingers and gentle pressure is given all over the cartilages to test the tenderness. This test may be positive if the cartilages are involved in inflammatory, traumatic, malignant or tuberculous process.

Laryngeal Widening

Alae of thyroid cartilage get wide open whenever there is expanding lesion in larynx, e.g. laryngeal malignancy.

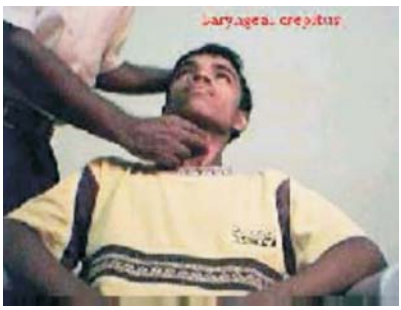


Figure 8.5: Showing how to elicit laryngeal crepitus

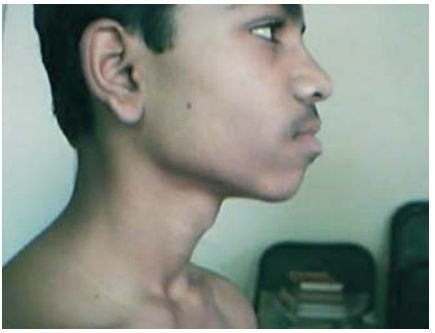
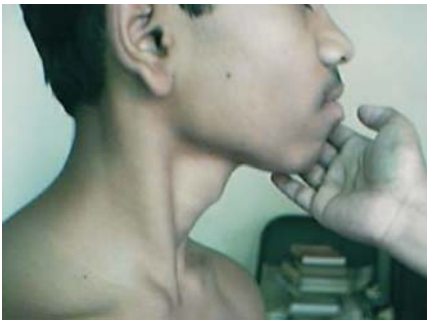
Laryngeal Crepitus

Laryngeal cartilages are held in between thumb and fingers and rubbed against vertebral column side to side. In a normal individual it gives a gritty sensation. This is known as Laryngeal Crepitus. It is lost in post cricoid growth or retropharyngeal abscess.

To Test Relationship of Swelling with Sternomastoid Muscle

It can be determined whether swelling is above or below the sternomastoid muscle as follows:

- Mobility of the swelling in vertical and horizontal direction is tested.
- Patient is asked to turn his neck opposite to the side of lesion.
- Firm pressure is applied to the chin of the patient with hand on opposite side.
- Patient is asked to counteract the pressure. This contracts the sternomastoid muscle. Mobility of the swelling is again tested in vertical and horizontal directions.

Figures 8.6A and B: Method to test relationship of swelling with sternomastoid

Interpretation

1. If the swelling is above the sternomastoid muscle, it becomes prominent on contracting the muscle. Mobility remains unaffected.
2. If the swelling is below the sternomastoid muscle, it disappears partly or completely. Mobility of the swelling would be reduced.
3. If the swelling is arising from muscle, the size may change and mobility restricted on contraction of muscle.

Neck swellings can be classified as:

1. Midline neck swellings.
2. Lateral neck swellings.

Midline neck swellings: e.g. dermoid cyst, thyroglossal duct cyst, sublingual dermoid, thyroid swelling, Ludwig's angina, pyramidal lobe goitre, enlarged lymph node.

Lateral neck swellings: e.g. branchial cyst, carotid body tumour, cystic hygroma, pharyngeal pouch, laryngocoele, lymphadenopathy of any aetiology in lateral part of neck, submandibular siloadenitis, benign and malignant tumours of submandibular gland, oral malignancy extending to neck. Parotid gland tumours, parapharyngeal space tumours and abscesses. Lateral thyroid swellings.

Ectopic Thyroid

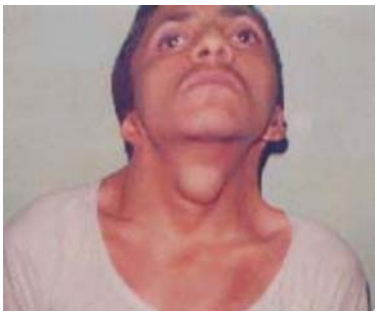


Figure 8.7: Photograph showing ectopic thyroid

- *Aetiology:* Developmental defect in descent of thyroid gland in the neck. It may remain at the lingual site or at any site from tongue to level of normal gland.
- Diagnosis may be done by ultrasound scanning, tomographic scanning and radionuclide thyroid scanning.
- *Treatment:*
  - Euthyroid/asymptomatic patient—No treatment.
  - Hypothyroid state + obstructive symptoms—Thyroid hormone replacement.
  - Euthyroid state + obstructive symptoms—Thyroid tissue transplant to neck, chest or abdomen.

Thyroglossal Duct Cyst

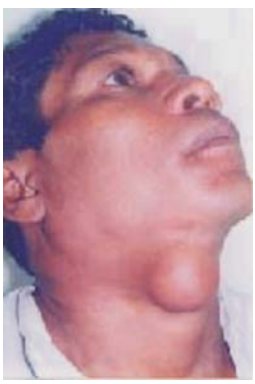


Figure 8.8: A case of thyroglossal duct cyst

Aetiology: The thyroid gland develops from epithelial proliferation in the floor of foregut between tuberculum impar and hypobranchial eminence during 3rd week of foetal development. The thyroid premordium forms a tubular structure the thyroglossal duct, which descends anteriorly infront of hyoid bone and larynx. The thyroglossal duct becomes bilobed distally to become thyroid gland. The duct solidifies and later atrophies.

Failure of the duct to close gives rise to thyroglossal duct cyst. Majorities of them are seen in midline just beneath the hyoid bone. Few are suprahyoid and rarely in suprasternal area.

Age: Noticed in second decade of life.

This is a midline cystic neck swelling which moves with act of deglutition and also on protrusion of tongue.

Treatment: Excision of the cyst, and duct along with middle part of hyoid bone and core of tongue tissue upto foramen caecum [Sistrunk operation]

Dermoid Cyst

This develops in the line of embryonic fusion. And hence may be seen in midline of the body or in the area where two embryonic processes meet each other.

Clinical Features

- Cystic swellings in the neck

- Margins well defined
- Fluctuation + ve
- Overlying skin can be lifted up
- No punctum.
- Transillumination may be –ve
- Not fixed to underlying structures.

Treatment: Surgical excision.

Thyroid Swelling

It is not possible to give a detailed description of thyroid swellings in this chapter. However thyroid swelling may present in neck as a small midline swelling, lateral swellings or as large swellings as shown in photograph. Thyroid swelling moves on deglutition but does not move on protrusion of tongue. One should look for signs and symptoms of thyrotoxicosis.

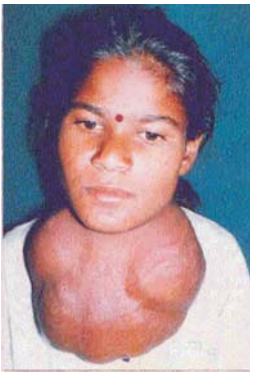


Figure 8.9: Photograph showing huge thyroid

Ludwig's Angina

This is an infection in the submandibular facial plane. Usually occurs secondary to dental infection. Children are commonly affected.

Symptoms

- Fever, malaise, difficulty in swallowing
- Swelling in submental and submandibular area
- Floor of mouth swollen and oedematous
- Due to elevated tongue child may develop respiratory obstruction.

Treatment

- Antibiotics, anti-inflammatory, and antipyretic drugs
- Incision and drainage of abscess
- Tracheostomy if respiratory distress develops.

Sebaceous Cyst

This arises due to obstruction of sebaceous gland in the skin.

Clinical Features

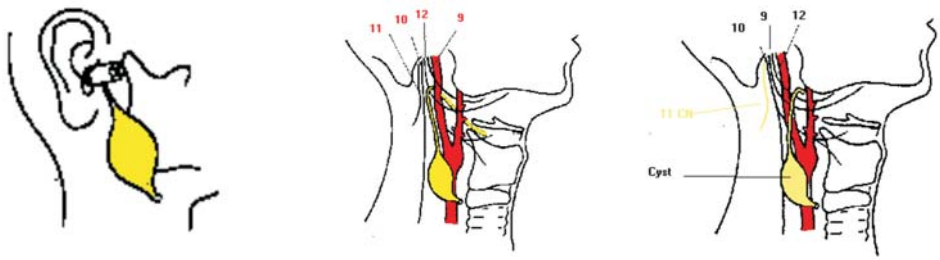
- A slowly growing, painless smooth cystic swelling

- Margins well defined.
- Overlying skin can't be lifted up
- Punctum [opening of the gland] seen over skin
- Not fixed to deeper structures.

Treatment: Surgical excision.

Branchial Cyst

Exact aetiology is not known. However branchial apparatus theory states that they represent fusion of remains of pharyngeal pouches and branchial clefts.



Figures 8.10A to C: Showing different position of branchial cysts

Cyst arising from:

- 1st pouch: Has an internal opening at junction of bony and cartilaginous external auditory canal.
- 2nd pouch: Internal opening at posterior pillar near base of tonsil.

1st branchial defect:
Cysts are lined by stratified squamous epithelium and have lymphoid tissue in the wall. They contain straw coloured fluid. Commonly seen in third decade. Two per cent are bilateral.

Symptoms: Cystic swelling in lateral part of neck

Treatment: Surgical excision.

Lipoma

It is a common benign subcutaneous tumour. May be seen over any part of body. Solitary or multiple. It is soft, nonflutuant, lobulated, freely mobile structure. The edge of the swelling slips under the finger. It usually has no symptom except for cosmetic purpose.

Treatment: Surgical excision.

Figure 8.11: A case of lipoma in neck

Cystic Hygroma (Lymphangioma)

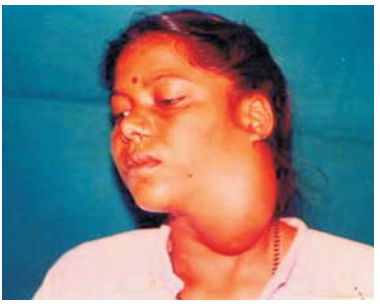


Figure 8.12: Photograph showing a case of cystic hygroma

Cystic hygroma is usually present at birth and presents as lobulated soft translucent swelling in the posterior triangle and may spread to other parts of neck. It is developed due to maldevelopment of jugular lymphatics. It may increase in size at the time of upper respiratory tract infection.

Symptoms: Cosmetic deformity or respiratory distress if the swelling compresses trachea.

Signs: It is soft, cystic, multilobulated, transilluminant swelling. Overlying skin is free.

Treatment: Surgical excision.

Carotid Body Tumour (Chemodectoma)

Figure 8.13: A case of carotid body tumour

The tumour arises from chemoreceptor cells of carotid bulb. There is usually a long history of slowly growing painless swelling in the region of carotid bulb.

On palpation they are small, firm, oval, pulsatile masses which refill on compression synchronous with pulse. A bruit may be heard over swelling. They can be moved in horizontal but not vertical direction.

Diagnosis: By carotid angiography and CT scan.

Treatment:

- If growth is slow and no symptoms wait and watch policy.
- Surgical excision if lesion extends in oral cavity and cause symptoms.

Lymphomas

Lymphoma is a term used to describe primary lymphoreticular malignancy. It can affect head and neck region.

Types:

1. Hodgkin
2. Non-Hodgkin lymphomas.

Patient may have weight loss, night sweats and other systemic symptoms.

Neck glands are multiple, discrete, firm, rubbery in consistency. Tonsils, liver/spleen may be enlarged.

Diagnosis: By aspiration cytology/ biopsy. Dorothy reed cells seen in Hodgkin lymphoma.

Treatment: Radiotherapy/chemotherapy.

Secondary Deposits in Neck

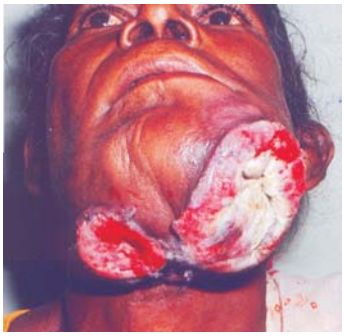


Figure 8.14: Showing fungated secondaries

They may arise from malignancy of any organ in head and neck region. They may present as solitary or multiple hard mass/es in neck, which may be mobile/ fixed to the deeper structures. Fungation is quite common in malignant lesion of neck. They may compress over trachea, oesophagus or cranial nerves and result into dyspnoea, dysphagia, or various types of cranial nerve palsies.

Diagnosis: By aspiration cytology/biopsy. Primary should be searched and diagnosed. If needed Pan-endoscopy is done. When primary in not detected, biopsy may be taken empirically from base of tongue, fossa of rosenmuller, pyriform sinus. If this too does not confirm the primary the case is labeled as 'occult primary' with secondaries in neck.

Treatment: Radical neck dissection if growth is resectable + excision of primary lesion.

Radiotherapy if growth is not operable.

Chemotherapy if the growth is fungating/inoperable.

Laryngocoele

- It is air containing sac arising from laryngeal ventricles.
- Usually bilateral.
- The air sac comes out of larynx through thyro-hyoid membrane.
- *Aetiology:* Not exactly known. More common in blowers.
- *Types:* Internal/external laryngocoele.
- *Symptoms*: Hoarseness, neck swelling, stridor or dysphagia if pressure symptoms develop.
- *Signs:* Air containing sac coming out of thyro-hyoid membrane may become prominent after performing valsalva. Sac can be emptied on compression. X-rays show air filled sac.
- *Treatment:* Surgical excision.

CLINICAL FEATURES OF COMMON NECK LESIONS

	Site	Shape	Edge	Pulsations	Moves with deglutition	Moves with protrusion of tongue	Overlying skin	Consistancy	Fluctuation	Transillumination	Impulse on cough	Reducibility	Compressibility	Any other
Dermoid	Midline	Spherical	Distinct	Ab	No	No	N	Cystic	P	No	Ab	No	No	
Sebaceous cyst	Any	Spherical	Distinct	Ab	No	No	Punctum+	Cystic	P	No	Ab	No	No	
Lipoma	Any	Any	Distinct	Ab	No	No	N	Soft	Ab	No	Ab	No	No	
Thyroglossal cyst	Midline	Spherical	Distinct	Ab	**Yes**	**Yes**	N	Cystic	P	**Yes**	Ab	No	No	
Siloadenitis	SM area			Ab	No	No	N	Firm	Ab	No	Ab	No	No	Bimanually palpable
Carotid body tumour	Carotid Tri	Spherical		Present	No	No	N	Firm	Ab	No	Ab	No	No	Moves vertically only
Cystic hygroma	Post. Tri			Ab	No	No	N	Soft/cystic	P	**Yes**	Possible	No	**Yes**	
Pharyngeal pouch	Post. Tri			Ab	No	No	N	Soft	Ab	No	Ab	**Yes**	No	Gurgling on pressure
Laryngocoele	Carotid Tri			Ab	No	No	N	Soft	Ab	No	**Yes**	**Yes**	No	Size ↑ on valsalva
Aneurysm	Post. Tri			Expansile	No	No	N	Variable	Ab	No	Ab	No	No	Bruit heard
Haemangioma	Any			Ab	No	No	Reddish	Soft	Ab	No	Ab	No	**Yes**	
Lymphangioma	Any			Ab	No	No	N	Soft	Ab	No	Ab	No	**Yes**	
Branchial cyst	Carotid Tri	Ovoid	Distinct	Ab	No	No	N	Soft/firm	P	No	Ab	No	No	

Abbreviations

Ab Absent

N Normal

P Present

nine

examination of salivary glands

PAROTID GLAND

Lesions in the region of parotid gland may be either swelling, ulcers, fistulas related to parotid itself, or lesions of temporomandibular joint, soft tissue tumours arising from skin, muscle, nerve, lymph node or blood vessel. Clinician has to use his knowledge to identify whether the lesion belongs to parotid gland itself or to other structures.

A swelling in the region of parotid gland, which is in the close vicinity of ear lobule and even lifts the ear lobule upwards, is likely to be due to parotid gland itself. Painless enlargement of parotid for a very long duration is a typical feature seen in pleomorphic adenoma of parotid.

Symptoms: Swelling in parotid region, pain in swelling, symptoms of facial nerve palsy (if present), fever, malaise, dry mouth are some of symptoms related to parotid gland.

Once you suspect that it is a parotid pathology, examination may be carried out as follows:

Inspection: Swelling should be examined in the same way other swellings in the body are examined, i.e. extent, size, shape, surface, etc.

Palpation: Findings of inspection are confirmed on palpation including local temperature and tenderness, consistency of the swelling. Mobility of the swelling should be seen in normal situation and with clenched teeth position. This would tell whether the gland is fixed to masseter muscle or not.

Figure 9.1: Testing mobility of parotid with clenched teeth

Deep lobe of the parotid may be palpated by bimanual palpation after keeping one finger in the mouth infront of anterior pillar pressing laterally and other finger externally behind the angle of mandible.

Opening of parotid duct (Stensen's duct) can be seen after retracting the cheek by tongue spatula. It lies in the cheek mucosa opposite the upper 2nd molar tooth.

It may be red congested in inflammatory conditions of parotid and may express few drops of pus in pyogenic conditions. The Stensen's duct can be palpated bimanually between thumb and index finger.

Examination of facial nerve: This should be carried out without fail in all swellings of parotid. Paralysis of facial nerve in presence of parotid swelling usually indicates malignant lesion in the gland.

Examination of lymph nodes: The parotid gland drains into pre-auricular, post-auricular and submandibular lymph nodes which ultimately drain into deep cervical group of lymph nodes. Hence in all cases of parotid disease the lymph node palpation in the above mentioned areas should be done.

Common conditions affecting parotid glands:

1. Acute parotitis
   - Viral (Mumps)
   - Bacterial (Suppurative parotitis)
2. Parotid tumours
   - Benign, e.g. pleomorphic adenoma (mixed parotid tumour), Warthin's tumour
   - Malignant, e.g. adenoid cystic carcinoma, adenocarcinoma, malignant pleomorphic adenoma, squamous cell carcinoma, etc.

Acute parotitis may be due to viral infection and is known as mumps. Common in children. There is a short history of swelling in parotid region usually bilateral. Pain may be associated. Symptoms and signs of toxemia, i.e. fever, tachycardia, dry coated tongue, malaise may be there. Mumps is self-limiting disease. It subsides within 7 to 10 days. Few males may develop orchitis.

Suppurative parotitis may be seen in elderly diabetic, chronically ill or immunocompromised patients. There may be swelling in parotid region with symptoms and signs of toxemia. Pus may be collected below the parotid fascia, but fluctuation is a late symptom as the fascia is very tough. *Treatment:* Antibiotics, anti-inflammatory drugs and I and D.

Pleomorphic Adenoma

This is a benign painless growth arising from myoepithelial cells in parotid gland. It may progress very slowly. It is a firm lobulated structure seen in parotid region. Malignant transformation is known. When parotid swelling changes its size suddenly or becomes painful or facial nerve palsy develops or gets fixed to the masseter muscle or skin, malignant change should be suspected.

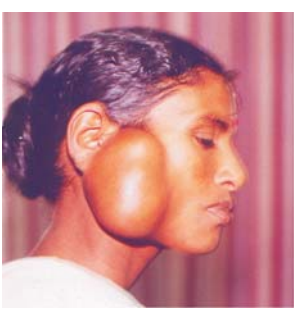


Figure 9.2: Showing pleomorphic adenoma of parotid

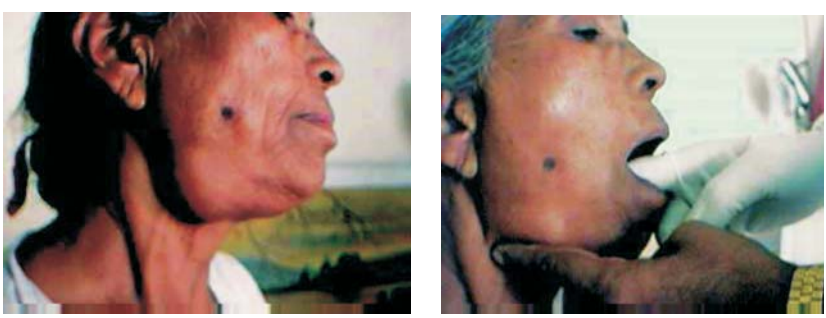
Treatment: No medical treatment. Superficial parotidectomy if tumour is in superficial lobe. Total parotidectomy if deep lobe is involved or facial nerve is involved. Few patients may develop recurrence after surgical removal.

Submandibular Gland

Submandibular gland lies in the submandibular triangle. Lesions that affect this gland may be acute and chronic siloadenitis, stone in the submandibular gland, malignancy or salivary fistula. Swelling in the submandibular area may be due to lymph node enlargement in that area or lesions of submandibular gland or other structures in that area. For proper diagnosis, examination of the submandibular gland should be done carefully.

Inspection: Submandibular area can be inspected by asking the patient to extend his neck. One can look for fistula, sinus or ulcer in this area. Then the patient is asked to open his mouth and lift his tongue towards the hard palate. This shows two openings of submandibular ducts along both the sides of frenulum lingue. In infective conditions the openings may show congestion and/or discharge. If you suspect a stone in the gland give the patient a lemon or vitamin C tablet to chew. This would give rise to a painful swelling in the submandibular area. Because of obstruction of stone the salivary secretion of gland remains collected in the gland itself.

Palpation:
Procedure: Left hand finger is kept over the skin of submandibular triangle and index finger of right hand is passed below the tongue in the floor of mouth and submandibular gland is palpated bimanually. It is normally a soft structure and can be easily differentiated from submandibular lymph node. A stone may be palpated in the Wharton's duct by palpating along the duct in the floor of mouth.



Figures 9.3A and B: (A) Submandibular swelling, and (B) Palpation of submandibular gland and duct

Submandibular Gland Calculus

Calculus is more common in the submandibular gland as compared to parotid gland.

Reasons:
1. Secretions of submandibular gland contain more calcium and magnesium.
2. The duct is long tortuous in course and has to work against the gravity to drain the secretions.

For these reasons stasis of secretions is more common in submandibular gland which may result into stone formation.

Figure 9.4: Silography showing submandibular duct

Symptoms: Painful swelling in the submandibular area, which may increase in size at the time of taking food.

Signs: Swelling in the submandibular area. Stone may be palpated in the gland itself or in the course of the Wharton's duct.

Investigations: Apart from routine investigations submandibular gland silography may be advised which gives an idea about the size, shape of the Wharton's duct and stone if any.

Treatment:

1. Milking of the stone.
2. Removal of stone surgically.
3. Removal of the gland itself if stone formation is recurrent or more than one stones are found or stone found in the gland.

NB:

- Tumours arising from deep lobe of parotid gland may present as parapharyngeal swelling.
- Ectopic salivary tumours from minor salivary glands may arise anywhere in oral cavity but particularly over hard palate.

SECTION C

ten

diseases of oesophagus

Oesophagus is a fibromuscular tube approximately 25 cm in length starting from hypopharynx and ending in stomach. This structure is not available for clinical examination and hence one has to rely more on the investigations to diagnose diseases of this organ.

Symptoms

1. Dysphagia/ odynophagia/ burning sensation
2. Regurgitation
3. Bleeding
4. Respiratory symptoms
5. FB.

DYSPHAGIA

Patients vaguely describe this complaint. One should try to elicit the correct information. It may be difficulty during swallowing, pain during swallowing or burning sensation during swallowing or just a retrosternal burning. And one can get various permutations and combinations of these symptoms.

Any disease affecting tongue, oral cavity, floor of mouth, tonsil, etc. may cause dysphagia and hence the symptom of dysphagia may not point us towards oesophagus. However if one goes into the details of the history of dysphagia some clue may be obtained. Say for *example,* inflammatory lesions of oral cavity give rise to dysphagia in the beginning of act of swallowing. Lesion in upper part of oesophagus may cause sense of obstruction to food passage along with pain and to pass the food bolus down, patient has to make voluntary acts of swallowing. Lesion in the lower part of oesophagus may cause sense of discomfort while food is passing down.

Strictures in the oesophagus may cause sense of obstruction during swallowing but usually there is no pain. Stricture in upper part of oesophagus may result into spill over of the food to larynx resulting into severe bout of cough. Patients with neuromuscular disorders experience more difficulty to liquids than to solids, as

liquids may spill over. Total obstruction may result into malnourishment and cachexia.

Candidial oesophagitis may cause painful swallowing.

REGURGITATION

Undigested food may return to mouth due to obstruction in the oesophagus down below. The amount of regurgitation may be copious and foul smelling in achalasia cardia and small in quantity in pharyngeal pouch. Acid regurgitation from stomach may cause burning sensation in throat, chest and back.

BLEEDING

Bleeding from oesophagus may be scanty due to injury and malignancy but copious in amount in case of oesophageal varices. One should also keep in mind the bleeding disorders and leukemia.

RESPIRATORY SYMPTOMS

Liquid/solid regurgitation may result into spill over to the larynx and may even be aspirated. This may give rise to severe bout of cough. Recurrent regurgitation or neurological lesion of larynx like cord palsy may accelerate the process of aspiration pneumonia.

Congenital oesophageal atresias are usually associated with tracheo-oesophageal fistulas. And these children do present with aspiration pneumonia, which may be fatal.

FB IN OESOPHAGUS

- Common in children.
- May be seen in old people due to dental factors.

Clinical Examination

- When you suspect that the disease is oesophageal in origin look for evidence of wasting or dehydration.
- Complete ENT examination comprising of oral cavity, pharynx, indirect laryngoscopy, examination of neck and thyroid should be done carefully. Look for laryngeal crepitus, which may be lost in postcricoid malignancy.
- General examination should be carried out specially looking for weight loss, anaemia, dehydration, hypotension, nutritional deficiency, etc. This can also give clue about severity and duration of obstruction.

Patient should be observed while taking liquids/solids.
This would give much more additional information.

Investigations

For diagnosis and confirmation of oesophageal diseases the following two investigations are routinely carried out.

a. Radiography
b. Oesophagoscopy.

a. *Radiography*

i. X-ray neck AP lateral
ii. X-ray chest PA and lateral
iii. Barium swallow.

Out of these the barium swallow is the most common and useful investigation. Barium study may give information about site of obstruction, severity of obstruction, type of obstruction and also gives a chance to study peristaltic waves.

X-rays of neck may help to diagnose conditions like retropharyngeal abscess, cervical spondylosis, kyphoscoliosis which may be responsible for dysphagia in some cases.

X-ray chest may show cardiac hypertrophy, mass in lung fields which also contribute to dysphagia.

Oesophagoscopy

This is a procedure to examine the oesophagus by rigid or flexible oesophagoscope

Indications:

X. Diagnostic
- To investigate dysphagia
- To investigate haematemesis
- To confirm FB in oesophagus.

Y. Therapeutic
- To remove FB
- Control of bleeding oesophageal varices
- To dilate esophageal strictures.

Contraindications: Today there are as such no contraindications except corrosive poisoning and severe trismus. One can safely perform flexible oesophagoscopy even in debilitated patients and in patients having spine lesions and aortic aneurysm.

Anaesthesia: General or local.

Position:
Boycee's position: Patient is supine on operation table. Patient's head is raised by 15 cm above table level and head end of table is dropped. This flexes the neck.

Extension is given at atlanto-axial joint. The first assistant sits on a stool on left side of patient winding his right arm around the patients neck and at the same time retracting the lips of patient as and when required. He supports his hand on the crossed legs.

The second assistant is standing on the right side of patient and pressing the shoulders of patient against operation table as and when needed.

The surgeon is standing at head end of table and trolley is kept on right side of surgeon. Anaesthetist is standing beside the first assistant along with his anaesthesia equipment.

This position is standard position for all per oral rigid endoscopies. Because this position brings the inlet of larynx and pharynx in the direct visual axis of the surgeon, it gives best possible vision.

Procedure:

Oesophagoscope is held like a pen in right hand and negotiated from right side of mouth along the tongue till pyriform fossa is identified. At the cricopharyngeal opening one should wait till sphincter is relaxed and then scope is furthered. Scope should be negotiated further without using force in a 'feathery touch' manner. When oesophagoscope enters cardiac end of stomach, the colour of mucosa is changed to pink, the mucosal rugosity is increased and gush of liquid is noticed from stomach. During the journey of oesophagoscope through oesophagus, one should look for congestion of mucosa, ulcer, growth, foreign body or stricture as the case may be. Scope should be removed slowly and mucosa should be examined while removing the scope.

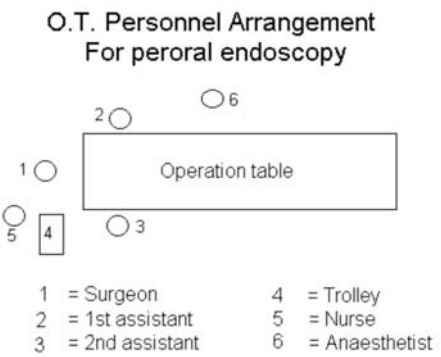


Figure 10.1: Diagrammatic representation showing OT personnel arrangement during peroral endoscopy

Complications: (common with rigid oesophagoscopy)

1. Perforation of oesophagus.
2. Injury to teeth, lips, gums and cheek.
3. Cardiac arrest.
4. Rupture of aneurysm of aorta.

Diseases of Oesophagus

A. Congenital

- Atresia of oesophagus
- Tracheo-esophageal fistula
- Oesophageal stenosis
- Short oesophagus.

B. Traumatic
C. Inflammatory
   - Fungal
   - Non-specific oesophagitis.
D. Miscellaneous
   - Hiatus hernia
   - Achalasia cardia
   - Pharyngeal pouch
   - Strictures
   - Foreign body in oesophagus.
E. Neoplastic
   - Carcinoma oesophagus

Common oesophageal conditions in ENT practice are:

Foreign bodies in oesophagus:

Age: Common in children and old age. In old age due to poor peristaltic power food bolus may get impacted in oesophagus. Dentures used by old people may get dislodged and result into foreign body in oesophagus.

Food: Fish bones, bony pieces in minced meat are notorious to cause foreign body in oesophagus.

Site: The usual site where the FB gets impacted is cricopharynx, but in oesophagus FB may stuck up at the site of stricture or at the site of natural constrictions, i.e. at the level of crossing of aorta, left main bronchus, diaphragm

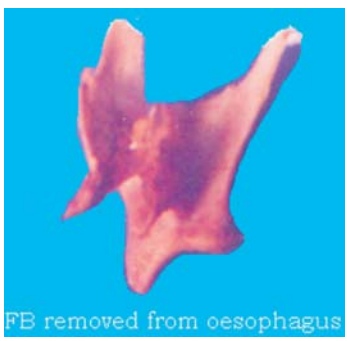


Figure 10.2: Photograph showing irregular bone removed from oesophagus

Symptoms: Dysphagia is the predominant symptom. It may be minimal to begin with however as surrounding tissue oedema develops due to FB, dysphagia progresses. It may progress to the level that patient can't swallow his own saliva.

Signs: Neck movements may be painful and tender spot may be located.

Diagnosis: Usually confirmed by X-rays.

Treatment: Oesophagoscopy and FB removal.

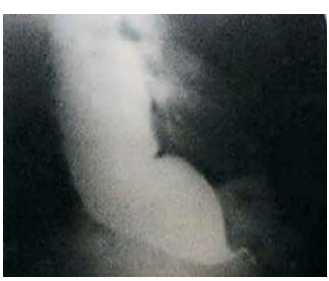


Figure 10.3: Ba swallow showing ' Mega' oesophagus

Achalasia cardia: (cardiospasm)

Aetiology: Not exactly known.

Pathology: Degeneration of Auerbach's plexus in lower part of oesophagus, resulting into unco-ordinated

peristaltic movements. Lower sphincter of oesophagus fails to relax in response to food bolus. This results into retention of food and distension of oesophagus, producing mega oesophagus.

Symptoms: Sense of fullness in epigastrium, dysphagia, regurgitation of food, loss of weight.

Barium swallow may show dilated oesophagus and smooth narrowing at the lower end. Barium picture is typically known as *Parrot beak appearance.*

Oesophagoscopy shows large dilated and at times ulcerated oesophagus

Treatment:

- *Conservative:* Regular dilatation of stricture with the help of mercury bougies. Various other methods of dilatation are in use.
- *Operative*: Heller's operation- a longitudinal incision at cardio-oesophageal junction in muscular coat of oesophagus without cutting mucosa of oesophagus.

Carcinoma of oesophagus:

Aetiology: Not exactly known. However chronic oesophagitis, fibrous stricture, achalasia cardia and Paterson Brown Kelly syndrome are considered as predisposing factors.

Figure 10.4: Barium swallow showing mucosal irregularity and obstruction in 1lower 1/3 of oesophagus giving a typical "rat tail appearance"

Age: Usually after the age of 50 years.

Pathology: Squamous cell carcinoma is most common. Adenocarcinoma may be seen at cardiac end of oesophagus.

Symptoms: Progressive dysphagia. Dysphagia, initially for the solids may end up with total dysphagia.

Signs: Dehydration, cachexia, weight loss are evident.

Barium swallow study may show hold up and irregularity of lumen.

Oesophagoscopy should be done in all suspected cases. And biopsy obtained from suspected tissue should be sent for histopathological examination.

Treatment:

1. Surgery
2. Radiotherapy
3. Chemotherapy
4. Combination therapy.

Food intake should be maintained either by Ryle's tube, souttar's tube or any other tube. If negotiation of feeding tube is not possible then gastrostomy is done. Palliative radiotherapy is all that is possible in late cases. However in operable cases oesophagectomy with gastric pull up can be done. Chemotherapy can be advised in combination with radiotherapy or independently. Overall prognosis of carcinoma oesophagus is gloomy.

eleven

tracheo-bronchial tree

Anatomy

Trachea is cartilaginous and membranous tube measuring about 10 to 11.5 cm in length in adults. Trachea starts from C6 level and ends at T5 level where it divides into right and left main bronchi. This bifurcation is at a distance of 25 cm from upper incisor teeth in adults.

Right main bronchus is further subdivided into right upper lobe (RUL) bronchus, right middle lobe (RML) bronchus and right lower lobe (RLL). Similarly left main bronchus is subdivided into Left upper lobe (LUL) bronchus, lingular lobe and Left lower lobe (LLL) bronchus. Further ramification of bronchi is shown in Figure 11.1.

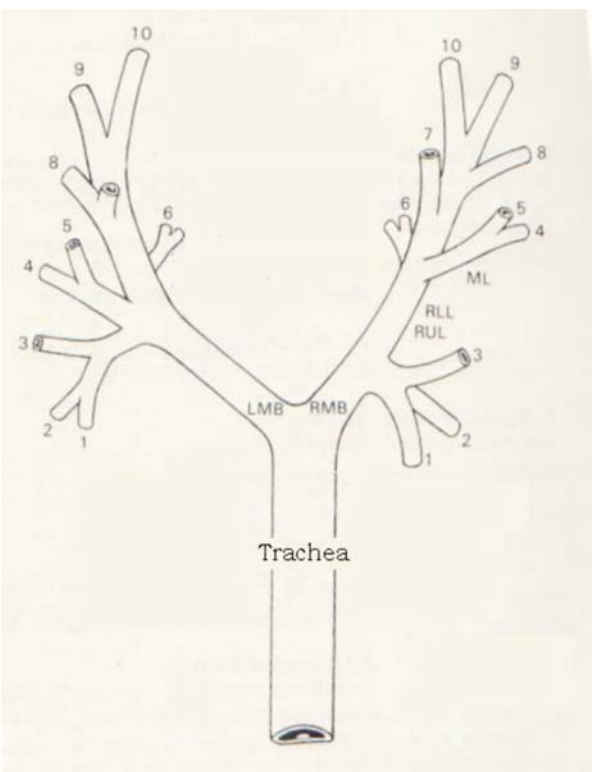


Figure 11.1: Showing bronchopulmonary segments

RMB – RUL
1. Apical
2. Posterior
3. Anterior

RML
4. Lateral
5. Medial

RLL
6. Apical
7. Medial basal
8. Anterior basal
9. Lateral basal
10. Posterior basal

LMB – LUL
1 & 2 Apico posterior
3. Anterior

LINGULAR
4. Superior
5. Inferior

LLL
6. Apical
7. Medial basal (absent)
8. Anterior basal
9. Lateral basal
10. Posteior basal

EXAMINATION OF TRACHEA AND BRONCHI

Palpation of Trachea in Neck

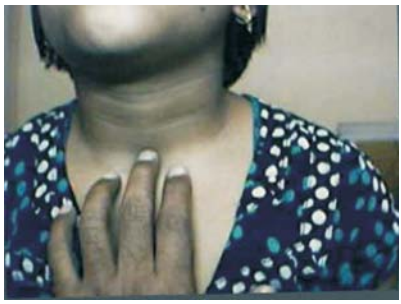


Figure 11.2: Showing how to palpate trachea in neck

Only a small part of trachea in the neck is accessible for clinical examination. Patient is sitting comfortably in chair or lying in bed with his head straight. Extension of neck is avoided as far as possible. Left index and ring fingers are kept over sternoclavicular joints of both sides and left middle finger enters gently in suprasternal space of burn. The finger palpates trachea, tracheal rings and its relation with lower ends of sternomastoid muscle. This gives you information whether trachea is central or not. Normally it is centrally located. But may be slightly shifted to right side. Conditions that pull or push the mediastinum may shift the position of trachea.

Part of trachea behind sternum is not available for clinical examination and should be assessed by:

1. Radiography
2. Bronchoscopy
3. Mediastinoscopy.

Symptoms related to trachea and bronchi may be:

1. Dyspnoea
2. Cough +/- expectoration
3. Cyanosis
4. Stridor
5. Apnoea
6. FB in trachea/bronchi
7. Haemoptysis.

1. Dyspnoea is uncomfortable respiration. It may be due to obstruction in repiratory passage or due to metabolic disorders causing air hunger.
2. Cough may be dry or wet. When it is with expectoration details of expectoration should be asked. It may be scanty in acute bronchitis. It may be coloured, copious and foul smelling in bronchiectasis. It may be blood stained in malignancy and frothy in allergic bronchitis.
3. Stridor (described elsewhere)
4. Apnoea: It is complete stoppage of respiration. Usually it is central in origin. However it may be seen during tracheostomy.
5. Haemoptysis:
   Bleeding or blood stained discharge from sputum is known as haemoptysis.
   Causes: Tuberculosis of lungs, bronchial malignancy, carcinoma of larynx, etc.

DISEASES OF TRACHEA AND BRONCHI

A. Congenital, e.g. stenosis, tracheo-oesophgeal fistula, tracheomalacia.
B. Traumatic—Road accidents, throttling, etc.
C. Inflammatory—Tracheitis, bronchitis, laryngotracheobronchitis, bronchiectasis.
D. Neoplastic—Multiple papillomas, carcinoma bronchus
E. Miscellaneous—Scleroma of trachea and bronchi, FB, etc.

Foreign Bodies in Trachea and Bronchii

FB is more common in bronchus as compared to trachea.
It is more common in children as compared to adults.
It is more common in right main bronchus than left.

Because
1. Right main bronchus is direct continuation of trachea.
2. It is wider than left bronchus.

Factors for FB Lodgement in Respiratory Tract

- Children put non-edible things like button, pencil, and rubber in the mouth.
- In children seeds of watermelon or custard fruit slip easily in respiratory tract while eating the fruit.
- Some toys have a valvular whistle. Children blow the whistle by sucking in air through it. In this manoeuvre whistle dislodges from the toy and enters respiratory tract of child.
- In adults dentures, loose teeth and dental material may slip into respiratory passage inadvertently.
- Road accidents may cause FB lodgment in respiratory tract.
- It is also common when person is under the influence of alcohol.

Pathophysiology

A. When a FB is hygroscopic or large, air can neither enter in (ingress) nor can escape out (egress). This is known as *STOP VALVE* mechanism. It may result into collapse of concerned lung. When infection sets in consolidation may be seen.
B. When a FB is small enough or FB is having a lumen [whistle, broken tracheostomy tube], it may allow ingress and egress both. This is known as BYPASS VALVE. This causes wheeze or rales. But usually no lower respiratory tract changes.
C. During inspiration the bronchi are dilated and may allow ingress of air. But during expiration the lumen of bronchi is narrowed and egress is not possible. This is known as BALL VALVE mechanism. It causes air to be trapped in the lower respiratory tract and may result into emphysema or pneumothorax.

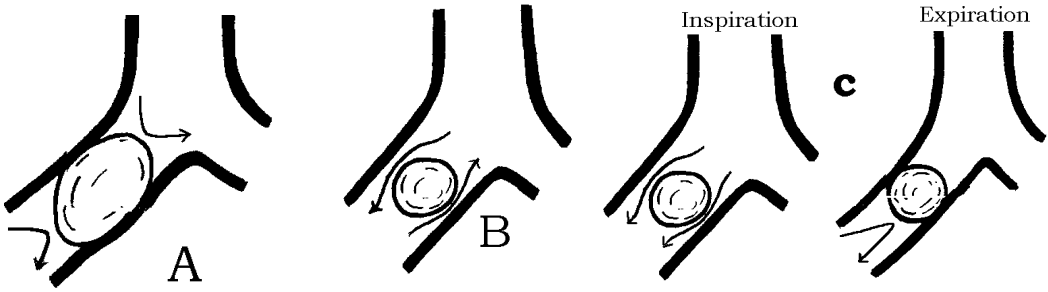


Figure 11.3A
No ingress
No egress
(STOP VALVE)

Figure 11.3B
Ingress +
Egress +
(BYPASS VALVE)

Figure 11.3C
Ingress + during inspiration
Egress –nt during expiration
(BALL VALVE)

And thus depending upon size, site and duration of FB, collapse, consolidation, emphysema or pneumothorax may develop.

Symptoms: Dyspnoea, cough, stridor, cyanosis, tachypnoea, fever are the common symptoms in FB respiratory tract.

Depending upon pathophysiological changes one would get the clinical picture.

The picture may be deceptive and mimic lower respiratory tract infection, like tracheobronchitis, tuberculosis and lung abscess. Utmost care is taken to elicit the history of FB inhalation.

It may be old history which child has forgotten or is afraid of telling it. Hence with the slightest doubt, FB should be suspected and child investigated for FB.
A duplicate of FB should always be asked if available.

Investigations

1. X-rays chest lateral and PA views.
2. Diagnostic bronchoscopy.

Treatment: Removal of FB by bronchoscopy.

Position: Boycee's position.

Anaesthesia: Usually GA.

Procedure: Though flexible fibreoptic bronchoscope can remove some of the foreign bodies, rigid bronchoscope should be preferred over the flexible. Ventilating bronchoscopes with telescopes give good illumination, vision and safety during anaesthesia. Appropriate sized bronchoscope is taken.

Patient's mouth is opened and appropriate sized bronchoscope is negotiated through right side of mouth along the tongue till you reach posterior 1/3 of tongue. Bronchoscope is then taken in the centre and negotiated further. Epiglottis is identified and crossed. Inlet of larynx is seen and bronchoscope is negotiated through the cords in trachea. As you reach to the lower end of trachea a vertical ridge is seen. It is carina and you can locate right and left main bronchi on its two sides.

Scope is negotiated in main bronchus and looked for any foreign body, pus discharge, secretions, bleeding, tumour, ulcer, etc. depending upon the clinical diagnosis secretions may be sent for culture and sensitivity or AFB culture, or even for cytology. Biopsy may be taken in suspected cases and sent for histopathology. If the tumour mass is very small even brush biopsy may be useful.

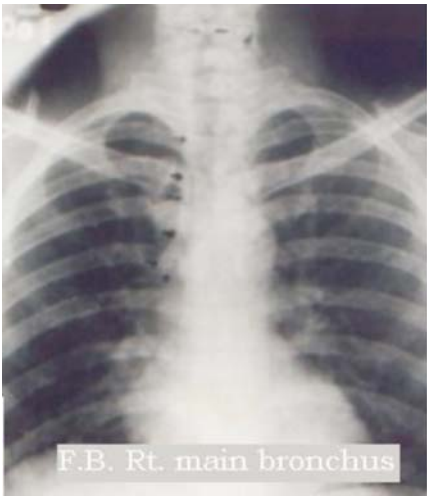


Figure 11.4: Showing FB in right main bronchus (black arrows)

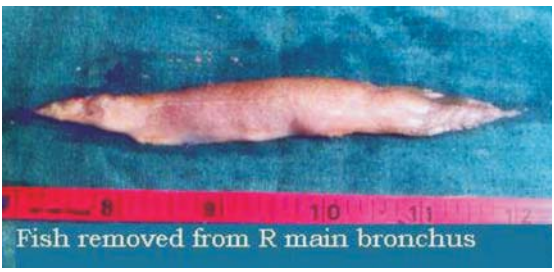
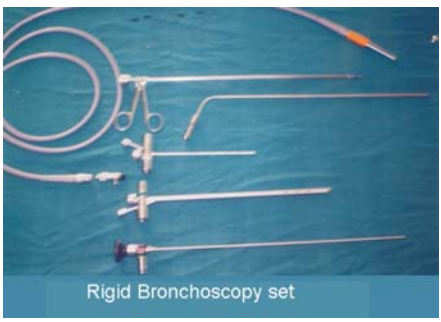
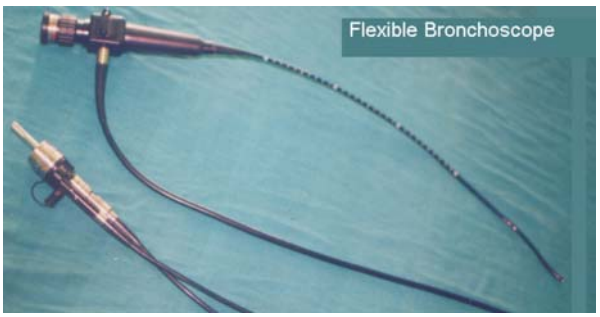


Figure 11.5: Showing fish removed from the RMB





Figures 11.6A and B: (A) Rigid bronchoscopy set, (B) Flexible bronchoscope

Complications

1. Cardiorespiratory arrest- more common in hypoxic children.
2. Injury to teeth, tongue, palate or pharynx and cervical vertebrae.
3. Difficulties in removal of FB may be experienced.

Bronchiectasis

It may be associated with 'Kartagener's syndrome' a triad of bronchiectasis, chronic sinusitis and dextrocardia. It may be associated with retained FB, strictures or tumours.

Copious foul smelling cough with expectoration is the classical picture.

Carcinoma Bronchus

Aetiological factors: Chronic mucosal irritation by smoking, environmental pollution, radioactive substances in working place, arsenic, chromate and nickel exposure, pneumoconiosis, chronic bronchitis, etc.

Pathology: Squamous cell carcinoma, adenocarcinoma, anaplastic carcinomas are commonly found.

Symptoms: Cough, discomfort in chest, pain in chest, haemoptysis, dyspnoea, weight loss, pyrexia are commonly seen.

Investigations:
1. X-ray chest PA and lateral views are most important
2. Bronchoscopy
2. CT scans
3. FNAB
4. Exploratory thoracotomy.

Treatment:
1. Lobectomy or pneumonectomy
2. Radiotherapy
3. Chemotherapy.

PART V

twelve

examination of cranial nerves

Diseases like cholesteatoma, # temporal bone, can give rise to facial nerve palsy. Similarly large neck masses can cause compression over cranial nerves resulting into palsy. Hence it is mandatory for the student posted in ENT to know about various cranial nerves and method of examining these nerves.

OLFACTORY NERVE

Basic function of olfactory nerve is sense of smell or olfaction. The olfactory system is made up of the olfactory epithelium, bulbs, and tracts, together with the olfactory areas in the brain.

Olfactory nerve is not tested in routine course of cranial nerve examination. However in case of anosmia after a head trauma it should be examined.

Clinical Examination

- Examine the nose for nasal patency. Rule out any DNS, polyp, turbinate hypertrophy or any other local nasal disease.
- Ask the patient to close his eyes.
- Each nostril is tested separately for peppermint, camphor, and rose-water to test the sense of smell.

Causes of anosmia: Blocked nasal passage due to any cause, head trauma, Parkinson's disease, and frontal lesion like glioma or meningioma.

Figure 12.1A: Bottles containing aromas

Figure 12.1B: Blind folding of patient

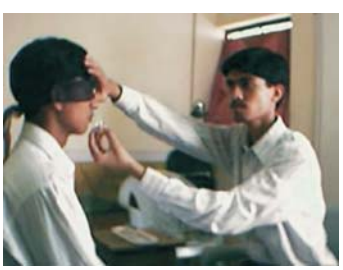


Figure 12.1C: Testing sense of smell

OPTIC NERVE

It is beyond the scope of this book to give detailed optic nerve testing. A brief outline is given here

Visual acuity: Can be tested with the help of a Snellen's eye chart.

- Position the patient 20 feet in front of the Snellens's eye chart (or hold a Rosenbaum pocket card at a 14-inch "reading" distance).
- Ask the patient to cover one eye at a time with a card.
- Ask the patient to read progressively smaller letters until he can go no further.
- Record the smallest line the patient reads successfully (20/20, 20/30, etc.)
- Repeat the test in other eye.

Visual field:

- Ask the patient to look at your eyes.
- Put your hands out, on both sides approximately 50 cm apart and 30 cm above eye level.
- Slowly move your finger medially till patient can see your finger. Thus map out the visual field.
- Repeat the test with fingers 30 cm below eye level.

The examiner can interpret his own field of vision when he sees the finger entering in his view. And based on the results given by patient, clinician can localise the defects in field of vision.

Colour vision: This can be tested by Ishihara's chart.

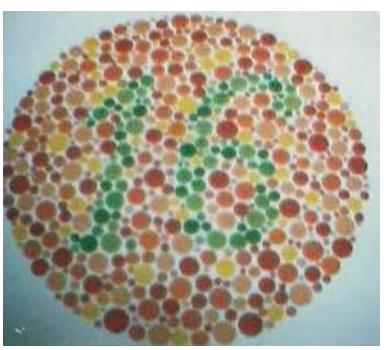


Figure 12.2: Ishihara's chart

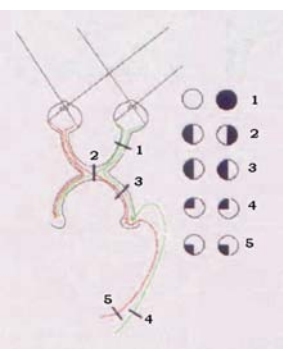


Figure 12.3: Showing effects of lesions in visual pathway

Pathological Lesions

1. A pre-chiasmatic lesion results in ipsilateral blind eye.
2. A chiasmatic lesion can result in bitemporal hemianopia.
3. Post-chiasmatic lesions proximal to the geniculate ganglion can result in left or right homonymous hemianopia.

Lesions distal to the geniculate ganglion can result in upper (4) or lower (5) homonymous quadrantopia.

The Pupillary Light Reflex

- Ask the patient to look at distance.
- Shine a bright light obliquely into each pupil in turn.
- Look for both the direct (same eye) and consensual (other eye) reactions.
- Record pupil size in mm and any asymmetry or irregularity.

Light shown in the ipsilateral eye will cause constriction of both pupils provided both IInd and IIIrd cranial nerves are functioning properly.

Pupillary Accommodation

- Hold your finger about 10 cm from the patient's nose.
- Ask him to look at your finger and at distance alternately.
- Observe the pupillary response in each eye.

OCULOMOTOR NERVE

As the name implies, the oculomotor nerve plays an important role in eye movements. In addition to the general motor component that innervates extraocular muscles, the third nerve also contains visceral efferents (parasympathetic) that innervate intrinsic ocular muscles. The nerve also innervates the levator palpebrae superioris that elevates the upper eyelid.

Pupillary Light Reflex

Light entering the eye causes signals to be sent along the optic nerve to the pretectal region of the midbrain to elicit pupillary constriction. Light shown in either eye causes constriction of the pupil in the same eye (direct light reflex) and also in the other eye (consensual light reflex). When the parasympathetic fibres in the third nerve are damaged, light shown in the affected eye does not cause constriction of its pupil (loss of direct light reflex). However, the light causes pupillary constriction of the opposite, unaffected eye (preservation of consensual light reflex).

Symptoms: Ptosis, diplopia,

Signs: Infero-lateral displacement of ipsilateral eye, mydriasis.

Clinical Examination

- Observe for ptosis

Tests for extraocular muscles

- Stand in front of the patient at 3 to 6 feet distance.
- Ask the patient to follow your finger with eyes without moving his head.
- Check gaze in the six cardinal directions using a cross or "H" pattern.
- Check convergence by moving your finger toward the bridge of the patient's nose.

Oculomotor nerve lesions:

Causes:

- # Base skull
- ↑ Intracranial pressure
- Aneurysm or tumours compressing the nerve.

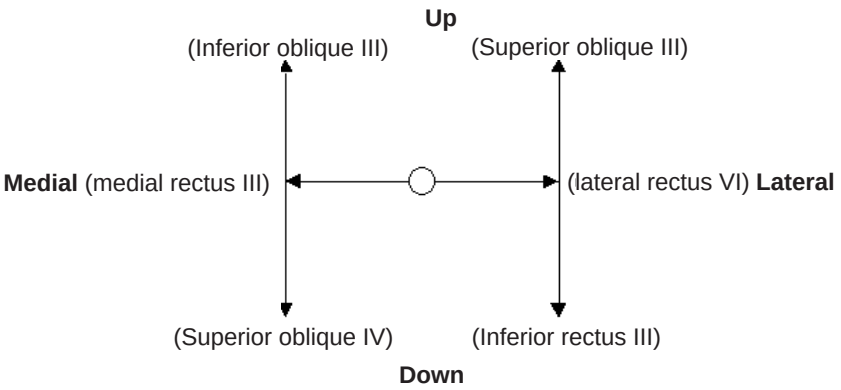


Figure 12.4: Diagrammatic representation of testing extraocular muscles

TROCHLEAR NERVE

The trochlear nerve is a motor nerve that innervates a single muscle in the orbit, the superior oblique. Since the trochlear nerve crosses to the opposite side, each superior oblique muscle is innervated by the contralateral trochlear nucleus.

Symptoms:

- Extortion of the ipsilateral eye
- Severe diplopia with attempted downgaze, which improves when head turned to contralateral side.

Clinical examination: Already described in tests for extraocular muscles.

Causes for lesion:

- Fracture of the sphenoid wing
- Intracranial haemorrhage
- Neoplasm or aneurysm.

TRIGEMINAL NERVE

Introduction

As the name implies "trigeminal" has three major divisions, the ophthalmic, maxillary, and mandibular. It is the major sensory nerve of the face but also has a motor component. The trigeminal nerve emerges on the midlateral surface of the pons as a large sensory root and a smaller motor root. Its sensory ganglion, the trigeminal ganglion sits in a depression in the floor of the middle cranial fossa. The three divisions of V nerve arise from the ganglion.

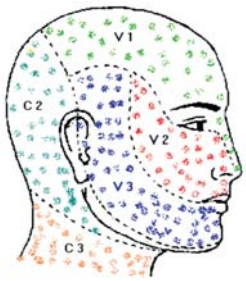


Figure 12.5: Sensory distribution of trigeminal nerve

Applied Anatomy

- *Ophthalmic branch (V1)*
  Passes forward in dura mater on lateral wall of cavernous sinus and then subdivides into frontal, lacrimal and naso-ciliary branches as it passes through superior orbital fissure. It supplies to the skin of upper nose, eyelid, forehead and scalp. It also supplies cornea, conjunctiva, mucosa of frontal, ethmoidal and sphenoidal sinus, upper part of nasal cavity.
- *The maxillary nerve (V2)*
  Arises from the gasserian ganglion and exits the skull base through foramen rotundum into pterygopalatine fossa. It innervates lower eyelid, dura of middle cranial fossa, temple area, upper cheek and adjacent part of nose and upper lip, mucosa of upper mouth and nose, roof of pharynx, maxillary, ethmoid and sphenoid sinuses, gums teeth and palate.
- *Mandibular division (V3)*
  It arises from gasserian ganglion and exits the skull base through foramen ovale into infratemporal fossa. It divides and lingual branch receives pre-ganglionic fibres from chorda tympani of facial nerve. The parasympathetic fibres enter the submandibular ganglion as secretomotor fibres for submandibular gland.
  - *Sensory*—Branches of V3 supply dura of middle and anterior cranial fossa, teeth and gums of lower jaw, mucosa of cheek and floor of mouth, epithelium of anterior 2/3 of tongue, temporomandibular joint
  - *Motor*—Muscles of mastication, i.e. masseter, temporalis, medial and lateral pterygoid. It also supplies anterior belly of diagastric mylohyoid, tensor veli palatini and tensor tympani. These muscles are responsible for initiation and co-ordination of act of swallowing.

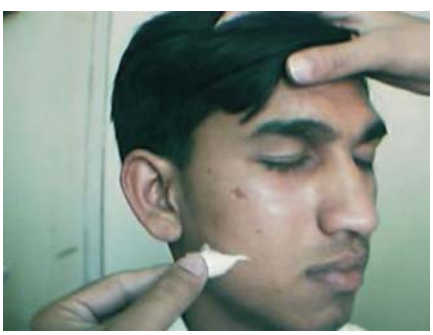


Figure 12.6: Showing testing of trigeminal nerve (sensory)

Clinical Examination

Sensory Functions

- Light touch and pain.
  - Sit in front of the patient. Explain the test. Ask him to close the eyes.
  - Take cotton wool and touch the various parts of the face supplied by V1, V2 and V3.
  - Ask the patient to count every time he perceives a "touch".
  - Compare it with opposite side.
  - Similar test done with the help of pinprick for pain sensation.
  - Deficit if found, is mapped.
- Temperature can be similarly tested.

Corneal Reflex

Afferent for corneal reflex is naso-ciliary branch of V1 and efferent is the facial nerve. Touching the cornea evokes a brisk contraction of orbicularis oculi (blinking). Because of interneural connections the corneal reflex is bilateral, direct and consensual.

- Ask the patient to look up and away from you.
- Without the knowledge of patient, touch the cornea by twisted cotton wool, by bringing it from temporal side.
- Watch both the eyes.
- Repeat on the other side.

	Interpretation
Both eyes blink	Normal
No blink on either side	V1 lesion
No blink on one side	7th nerve lesion

Motor Function

- Inspect the muscles of mastication for wasting. And compare with opposite side.
- Ask the patient to clench his teeth and palpate masseter muscle bulk and compare it with opposite side.
- Ask the patient to open the jaw against resistance.

- Unilateral pterygoid weakness causes the jaw to deviate to the weak side when mouth is opened.
- When patient tries to move the jaw from side to side, there is difficulty in moving it to the contralateral side.

Trigeminal neuropathy:
Aetiology

- Skull #
- Tumour of the nerve
- Surgery on the face
- Lesions in cavernous sinus
- Lesions at petrous apex.

Trigeminal Neuralgia (Tic Doloureux)

Aetiology: Not known. May be demylinating plaque, tumour, or post-herpetic lesion.

Symptoms: Sudden severe lanceting pain in lips, gums, cheek or chin. Brushing, washing of mouth may provoke the attack. No sensory loss.

Treatment (if no precipitating cause found)
Medical—Carbamazepine 100 mg BD to begin with
Surgical—Phenol injection in the nerve. Radiofrequency rhizotomy.

ABDUCENT NERVE

Abducent fibres originate from the brainstem at the anterior junction of the pons and medulla. It passes through the cavernous sinus and exits through the superior orbital fissure where it innervates the lateral rectus muscle. Contraction of lateral rectus muscle results in abduction of eye.

Symptom: Diplopia

Signs: Medial deviation of ipsilateral eye. No lateral movement of eye.
Diplopia improves if contralateral eye is abducted.

Causes of lesion:

- # Skull base
- Mass in cavernous sinus
- Aneurysm of vessel
- Raised intracranial tension due to any cause *(This acts as false localising sign)*
- Petrositis as a complication of CSOM (Gradenigo's syndrome).

FACIAL NERVE

Facial nerve has following functions:

1. Motor function (supplies muscles of facial expression)
2. Secreto-motor function (lacrimal gland and submandibular gland)
3. Sensory function (taste function in anterior 1/3 of tongue).

Motor Functions

Upper part of the face has motor supply from contralateral and ipsilateral motor cortex where as lower part has supply only from contralateral motor cortex. Motor fibres course dorsally from the nucleus towards the floor of the fourth ventricle and then they loop around (from medial to lateral) the abducent nucleus to form a slight bulge in the floor of the fourth ventricle (the facial colliculus).

Upper motor neuron lesions affect voluntary control of only the lower muscles of facial expression contralateral to the lesion. Upper muscles of facial expression continue to function because the part of the facial nucleus that innervates them still receives input from the ipsilateral motor cortex. Lower motor neuron lesion results in paralysis of all the ipsilateral muscles.

Secreto-motor function: This is the parasympathetic component of the VIIth nerve which is responsible for control of the lacrimal, submandibular, and sublingual glands, mucous glands of the nose pre-ganglionic fibres come from superior salivary nucleus.

Sensory function: Taste sensation from ant. 2/3 of tongue is carried via chorda tympani nerve. A small part in EAC is also having sensory supply from facial nerve.

Clinical Examination

- Observe the face at rest for any facial asymmetry
- Observe any facial tics, symmetry of eye blinking or eye closure
- Observe the patient during smiling.

Action:
1. Ask the patient to close his eyes
2. Ask the patient to wrinkle the forehead
3. Ask the patient to show his teeth
4. Ask the patient to blow out his cheek with lips closed
5. Ask the patient to whistle.

Figure 12.7: Action 1

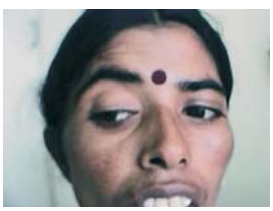


Figure 12.8A: Action 2

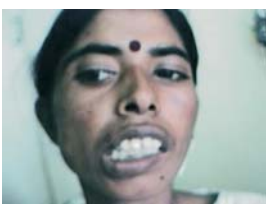


Figure 12.8B: Action 3

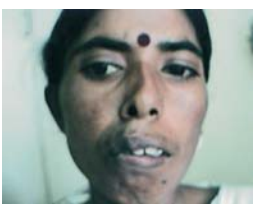


Figure 12.8C: Action 4

Action 1: Normal person can close his eyelids effectively, which can't be opened up by using mild force to open them. In infranuclear palsy eyelid is not completely closed. Instead the eyeball rolls up. This is known as *Bell's phenomenon*

Action 2: On the side of facial palsy patient can't wrinkle his forehead
Action 3: Angle of mouth deviates towards normal side while showing teeth
Action 4: Patient can't blow out his cheek as air escapes from affected side
These tests indicate the muscular weakness if any in facial nerve.

Sensory Function Testing

Taste function testing:
- Close the eyes of the patient.
- Ask the patient to protrude out his tongue.
- Place sweet, salt, bitter and sour substances on one side of tongue one by one.
- Test the opposite side also.
  Electro gustometry is used nowadays.

Secreto-motor Function

Schirmer's test: Put a small piece of blotting paper under the lower eyelid on affected and non-affected side. Remove blotting paper within 5 minutes. On affected side blotting paper may not be damped at all or damped much less as compared to normal side.

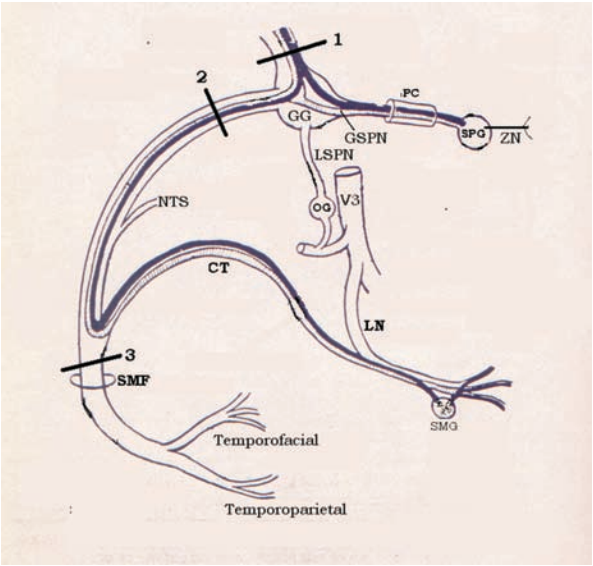
Causes for lesion:
- Traumatic
  Accidental—# Temporal bone
  Surgical – Surgery of middle ear, parotid and skull base.
- Inflammatory
  - Viral (Herpes zoster oticus{Ramsay Hunt syndrome})
  - Malignant otitis externa
  - Cholesteatoma.
- Neoplastic—Cerebellopontine angle tumours, parotid tumours.
- Miscellaneous—Brainstem infarction, multiple sclerosis, idiopathic facial palsy (Bell's palsy).

VESTIBULOCOCHLEAR NERVE

NB: It is beyond the scope of this book to give detailed examination of vestibulocochlear nerve. A brief account is given. The tests given below are meant to assess vestibular and cochlear functions.

This nerve has two different functions to perform:
A. Vestibular—Balancing of the body
B. Cochlear—Hearing.

Vestibular function is a complex function carried from vestibular apparatus (i.e. semicircular canals and labyrinth) to vestibular nerve, which enters, in vestibular nucleus in the floor of 4th ventricle.



GG—geniculate ganglion
PC—pterygoid canal
SPG—spenopalatine ganglion
ZN—zygomatic nerve
GSPN—greater superficial petrosal nerve
LSPN—lesser superficial petrosal nerve
OG—otic ganglion
V3—mandibular nerve
NTS—nerve to stapedius
CT—chorda tympani
LN— lingual nerve
SMF—stylomastoid foramen
SMG—submandibular ganglion

Figure 12.9: Diagrammatic representation of facial nerve and its lesion at different sites

Effect of lesion at

1. No Lacrimation
   No taste
2. Lacrimation intact
   Taste lost
3. Lacrimation intact
   Taste intact

This testing has a topographic value. It indicates the site of lesion clinically.

Pathology: Vestibular nerve may be affected by:

- Infection: Vestibular neuronitis, purulent labyrinthitis
- Trauma: # Skull base, surgery over labyrinth
- Toxic: Use of drugs like streptomycin, kannamycin
- Tumors: Acoustic neuroma.

Major symptoms of vestibular nerve affection are:

- Vertigo
- Vomiting
- Nausea.

Clinical Examination

- Ask the patient to stand erect with eyes open and eyes closed and observe whether patient is waving to one or the other side.
- Ask the patient to walk in a straight line keeping minimum distance in two steps (eyes open and closed) and observe waving.

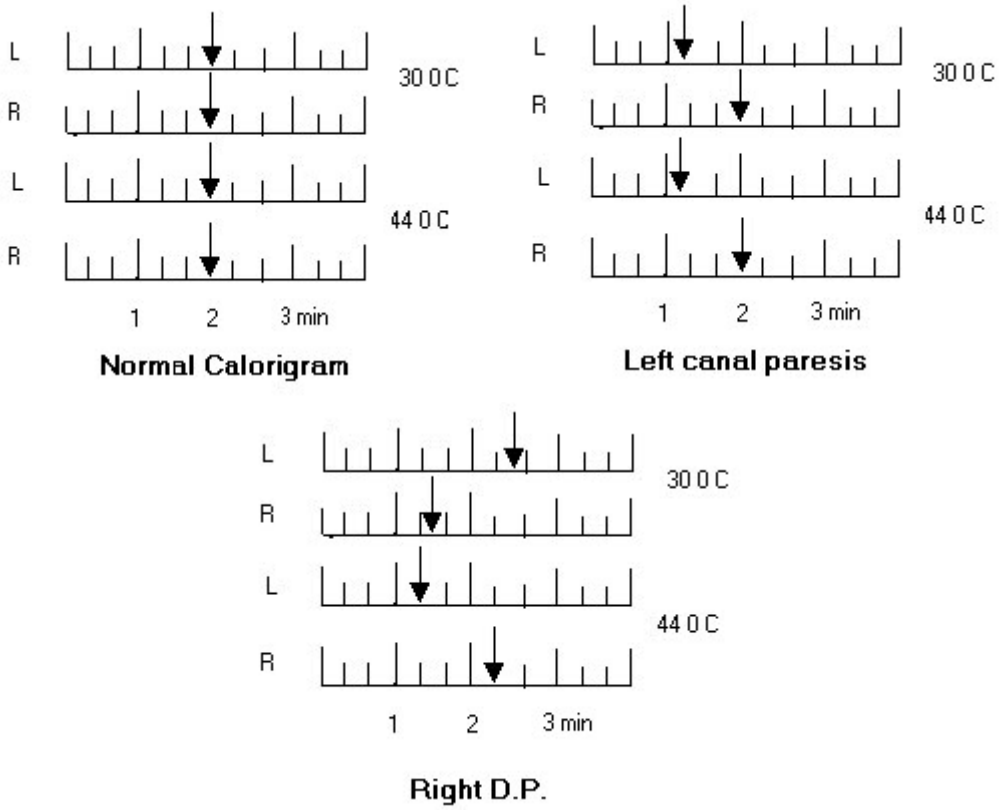
- *Romberg's test*
  Patient's eyes are closed and he is asked to lift his left and right foot alternately off the ground. Approximately 80 to 90 steps are repeated in a minute. During the process patient deviates from his original position. This deviation is measured and concluded.
  Normally a person gets feedback of his position from 3 receptors. One is labyrinth, other is eyes and third is stretch receptor. Because of constant foot lifting stretch receptors are eliminated and with the eyes closed eyes too do not give feedback about one's position in the space and hence patient has to rely totally on his vestibular apparatus. If there is defect in the vestibular apparatus patient is unable to maintain his original position and deviates in the course of examination.

- *Unterberger test*
  This is a modification of Romberg's test. Herein patient's eyes are closed and hands are stretched in front and he is asked to step-up and step-down his feet alternately approximately 80 to 100 times on the point he is standing. After the test the clinician evaluates the deviation of the patient from his original position.

- *Positional testing*
  In this, patient is explained the test. He wears Frenzel's glasses and then made to sit errect on an examination table. Patient is asked to look at the clinician's forehead and not to close the eyes.
  Then suddenly patient's head is lowered down by 30° and tilted to one side by 30 to 45°. Patient's eyes are observed for 15 seconds for any nystagmus. The test is repeated for other neck position and the position that gives rise to vertigo/nystagmus or giddiness is noted down. Based on this test a patient may be labeled as having "Benign Positional Nystagmus" or "Central Positional Nystagmus"

- *Caloric testing* (Hallpike and Dix test)
  This is very important vestibular function test. Herein the cold and hot water is irrigated in the ear canal to stimulate the labyrinth.
  Pre-requisite: There should not be a drum perforation or wax in ear.
  Procedure: Patient is lying in supine position on a table, and head is elevated by 30° so as to make the horizontal semicircular canal, vertical in position. Ear canal is irrigated with water having temperature of 30°C and 44° C respectively. This causes change in the temperature of endolymph and sets up convection currents in endolymphatic fluid, thereby stimulating the labyrinth and vestibulo-ocular reflex is elicited. Nystagmus thus evoked has a slow and fast component and is labeled by the direction of fast component. Cold water causes nystagmus to the opposite side and warm water to the same side. This is popularly known as "COWS RESPONSE". Duration of nystagmus is noted and plotted on a graph called 'calorigraph'. Normal duration of nystagmus is 1.5 to 2.5 minutes. A reduced response is known as canal paresis. Exaggerated response to one side is known as directional preponderance.

Figures 12.10A to C: Showing different types of caloric responses



Figures 12.10A to C: Showing different types of caloric responses

Cochlear Nerve

Cochlear nerve testing can be done by:

- Whispering test, tuning fork tests.
- Pure tone audiometry, evoked response audiometry, cochleography
  All these tests except ERA are given in chapter on ear examination.

GLOSSOPHARYNGEAL NERVE

Glossopharyngeal nerve exits the brainstem medulla at the post-olivary sulcus. It then travels with vagus nerve and accessory nerve and exits the cranium through the jugular foramen.

Motor nuclei are located in the nucleus ambiguus in the medulla and supply to stylopharyngeus muscle.

Sensory supply lining of middle ear cavity, eustachian tube, mucosa of pharynx, tonsil and conveys taste sensation from post 1/3 of tongue.

Secreto-motor supply for the parotid gland.

Clinical Examination

Gag reflex: (IX nerve afferent, X nerve efferent)
Touching the tonsil or pharynx with swab stick causes reflex contraction of palatal and pharyngeal muscles leading to elevation of palate and pharynx.

- Take a cotton swab stick and look for tactile sensation over palate, upper pharynx and tonsil.
- Touch tonsil or pharynx with cotton swab each side separately and elicit 'gag reflex'.
- Taste sensation over posterior 1/3 of tongue is usually not tested.
- *Oculocardiac reflex (slowing of heart rate on orbital compression)* is usually **not tested.**
- *Carotid reflex (slowing of heart rate and pulse on carotid bulb massage)* usually **not tested.**

Due to its close proximity with vagus nerve and accessory isolated lesions of IXth cranial nerve are rare.

Symptoms: Numbness of ipsilateral pharynx—Dysphagia

Signs: Absence of gag reflex.[on touching affected side]

VAGUS NERVE

Arise as rootlets from post-olivary sulcus of lateral medulla and exit the skull through jugular foramen.

Motor supply: To muscles of upper pharynx and soft palate and intrinsic muscles of larynx including cricothyroid.

Sensory supply: Dura mater of posterior cranial fossa and posterior wall of external auditory canal.

It acts as efferent in gag reflex, oculocardiac reflex and carotid reflex.

Symptoms: Change in voice, hoarseness and dysphagia, nasal regurgitation, cough during swallowing due to aspiration.

Clinical Examination

- Ask the patient to open his mouth and say 'aah'. Observe the movement of soft palate and uvula.
  (Normally both sides of palate elevate symmetrically and uvula remains in midline.)
- Touch tonsil or pharynx with cotton swab each side separately and elicit 'gag reflex'.

Results

- Uvula and soft palate moves to one side (contralateral side) in upper and lower motor neuron lesion of vagus.
- Uvula/palate does not move or saying 'aah' or gag in bilateral palatal muscle paralysis.
- Uvula/palate moves on saying 'aah' but does not gag in IXth nerve palsy.
- Indirect laryngoscopy is done and vocal cords palsy if any is assessed.

SPINAL ACCESSORY NERVE

Anatomy

It is a purely motor nerve arising from two nuclei. One is intimately related to the caudal part of nucleus. The much larger spinal nucleus arises from a and g motoneurons in anterior horn cells of C1-C3. The nerve runs upwards in subarachnoid space and enters the cranial cavity through foramen magnum. And exits the skull through jugular foramen. Upon leaving the cranium it crosses the transverse process of the atlas and enters the sternomastoid muscle. It emerges from posterior border of sternomastoid, crosses posterior triangle of the neck to reach the trapezius.

The ipsilateral cerebral hemisphere supplies the contralateral trapezius and ipsilateral sternomastoid muscle.

Clinical Examination

- Inspect the trapezius muscle from behind.
- Ask the patient to shrug the shoulders, maintain them in elevation and apply downward pressure to shoulders to check the paresis of trapezius muscle.
- Inspect and palpate the size and tone of sternomastoid muscle.
- Ask the patient to turn his head to one side against pressure. And examine the strength of sternomastoid muscle.

Causes for Lesion

In radical neck dissection spinal accessory is cut by choice.
In skull base tumours.
In progressive bulbar palsy.

HYPOGLOSSAL NERVE

It arises from motor nucleus located beneath the floor of 4th ventricle. It exits the skull through hypoglossal canal in occipital bone. It passes to the root of tongue and supplies intrinsic and extrinsic muscles of tongue.

Clinical Examination

- Observe the tongue (while in floor of mouth) for fasciculation. Fasciculation may indicate peripheral 12th nerve dysfunction.
- Ask the patient to protrude out and move his tongue in all directions.
- Ask the patient to make rapid movements of tongue in and out and side to side to assess the motor activity.

In unilateral supranuclear lesion in first few hours or days tongue deviates towards [opposite] side because of stronger pull of healthy genioglossus. Later on tongue may not deviate. After a long gap the tongue muscles atrophy and on protrusion of tongue it deviates to the side of lesion

12th cranial nerve palsy may be seen in:

- In skull base tumours.
- Medullary infarct.
- Vertebral artery aneurysm.
- # Base skull.
- Motor neuron disease.
- Iatrogenic- during surgery of submandibular gland and radical neck dissection.

Index

H

I

L

M

N

O

P

Q

R

S

T

U

V

W