МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ
ВИТЕБСКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
КАФЕДРА ОТОРИНОЛАРИНГОЛОГИИ

Kryshtopava M.A., Warnakulasuriya M. L. S., Bisunkov A.B.

PRIMARY CARE SURGICAL SKILLS COURSE IN OTORHINOLARYNGOLOGY DESIGNED FOR MEDICAL STUDENTS OF FACULTY OF MEDICINE AND HEALTH SCIENCE

методические рекомендации

Vitebsk, 2023

УДК 616.21-082:378.147=111(075.8)
ББК 56.8я73
К 86

Рецензент: зав. кафедрой офтальмологии ВГМУ, к.м.н., доцент Королькова Н.К.

Kryshtopava, M. A.
K 86 Primary care surgical skills course in otorhinolaryngology designed for medical students of faculty of medicine and health sciences / M. A. Kryshtopava, M.L. S. Warnakulasuriya, A. B. Bisunkov. – Vitebsk : VSMU, 2023. – 91 p.

ISBN 978-985-580-158-1

Методические рекомендации подготовлены в рамках практико-ориентированного обучения и содержат краткие анатомические сведения, перечень используемого инструментария, пошаговые алгоритмы выполнения наиболее распространенных практических навыков в оториноларингологии. Описаны методы обследования пациента, а также наиболее простые и часто выполняемые диагностические и лечебные манипуляции.

Издание предназначено для студентов медицинских университетов (лечебный, педиатрический и стоматологический факультеты), использующих английский язык в качестве языка-посредника, при подготовке к дифференцированному зачету по оториноларингологии. Может быть полезно врачам-интернам и клиническим ординаторам-оториноларингологам, а также врачам общей практики.

Утверждено и рекомендовано к печати Научно-методическим Советом УО «Витебский государственный ордена Дружбы народов медицинский университет» от 25 января 2023 года, протокол № 6.

УДК 616.21-082:378.147=111(075.8)
ББК 56.8я73

ISBN 978-985-580-158-1

CONTENT

INTRODUCTION

1. ENT primary care surgical skills course designed for medical students of the 4th year of the faculty of medicine and health science.

2. The course is delivered in 1 session between September and January or February and June, of 86 hours (2,5 ECTC), scheduled to take place 8.15am - 13.20pm (5 days) and 8.30am-12.45pm (3 days).

3. Surgical skills laboratory in otorhinolaryngology provides medical students crucial skills for real-life scenarios in ENT practice.

a. This course covers nontraumatic conditions of the ear, nose, mouth, and throat. Many of these conditions are common occurrences in individuals.

b. The clinician needs to understand the anatomy and physiology discussed in this book and feel comfortable performing an examination of the patient.

c. Diagnosis of these conditions can usually be made on the basis of the patient's history, signs, symptoms, and observations.

OBJECTIVES

At the conclusion of this course the reader should be able to do the following:

1. Describe the basic anatomy of the ear, nose, mouth, and throat.

2. Perform a basic examination of the ear, nose, mouth, and throat, identifying normal and pathological conditions.

3. Properly use an otoscope to examine the ear and the nose.

4. Recognize common pathological conditions of the ear, nose, mouth, and throat, including signs and symptoms, differential assessment, and when to refer the patient to a physician.

5. Appreciate the common diagnostic tests and standard medical treatment for conditions of the ear, nose, mouth, and throat.usually be made on the basis of the patient's history, signs, symptoms, and observations.

The ENT examination and equipment

Equipment

A fully equipped ENT department will have all the necessary instruments to perform a full ENT examination. However, if you are GP, or if you are working in another speciality? you will need to obtain a basic equipment kit.

ENT SHOs or SpRs will also need to have such a kit when visiting patients at home or visiting peripheral hospitals.

Basic equipment

- A light source – a portable headlight / Head Mirror
- Wooden tongue depressors
- Aural speculum
- Nasal speculum
- Laryngeal mirrors
- Post- nasal mirrors / Posterior rhinoscopy mirror

- Wire Vectis with cerumen spuds
- Cotton wool carrier
- Nasal packing forceps
- Suction canula
- An otoscope with several specula
- Pneumatic attachment for the otoscope
- Turning fork 512Hz
- Pen and paper
- Gloves

Advanced equipment

- Lidocaine 5% phenylephrine 0,5% spray for decongesting and anaesthetizing the nose
- A flexible nasendoscope with light source
- Alcohol skin swabs to act as demister for the scope
- Water-based gel to lubricate the scope

Emergency equipment

- Large nasal tampons, e.g., Merocel (you can always cut 10 cm ones to size)
- Silver nitrate sticks
- Foley-type urinary catheters (to control posterior epistaxis)

Head mirror

Fig. 1.1

Head mirror **(Fig. 1.1)** It has a circular concave mirror and a headband attached to it. It has a central hole of diameter of approximately 2 cm through which examiner can see. 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.

Aural Speculum

Fig. 1.2

This aural speculum **(Fig. 1.2)** is used to examine the ear canal and tympanic membrane.

Nasal Speculum (Vienna Nasal Speculum)

Fig. 1.3

Nasal speculum **(Fig.1.3)** is usually held in the left hand with the blades of the instrument facing the patient. Index finger and thumb hold the instrument and middle and ring finger control the movements of blades. 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.

Laryngeal mirror

These are small plane mirrors fixed in a circular metallic bracket (Fig.1.4). They are used to examine the larynx and pharynx. The mirror surface is gently heated before doing the examination. This is to prevent condensation of patient's breath on the mirror. As you do not see the actual larynx but a mirror image. The procedure is known as Indirect Laryngoscopy.

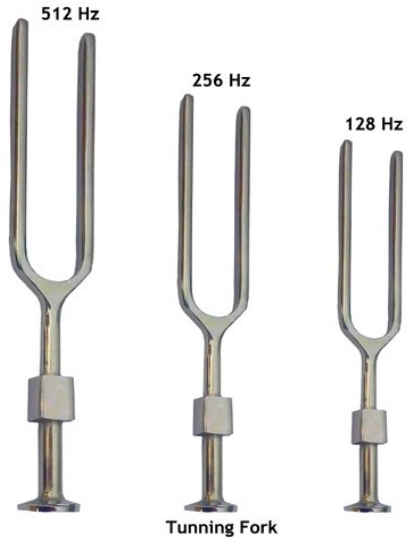
Fig.1.4

Post-nasal Mirror / Posterior rhinoscopy mirror

These mirrors are similar to laryngeal mirrors but smaller in size and the handle is not straight (Fig.1.5). It is having two bends in it. This is to suit the instrument in the post-nasal space and to keep the hand of clinician away from the visual field while examining. This examination is called as Posterior Rhinoscopy.

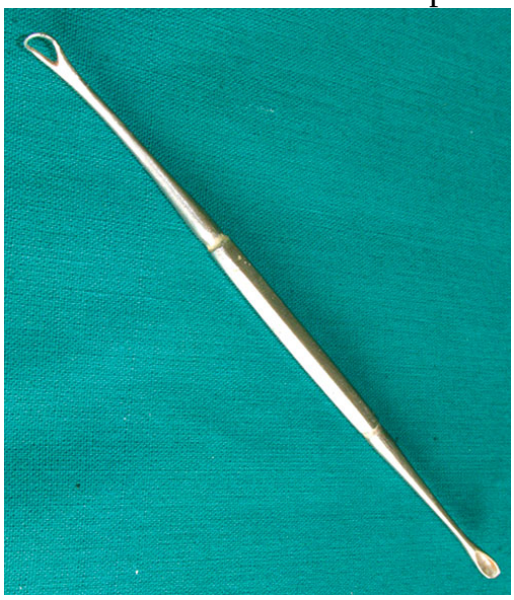
Fig.1.5

Tuning Forks



Tuning forks (Fig. 1.6) 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 Rinne test, Weber test, etc.

Wire Vectis with Cerumen Spud



This instrument is used for removal of FB/wax in clinical practice. **(Fig.1.7)**

Fig.1.7

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. **(Fig.1.8)**

Fig.1.8

Cotton Wool Carrier

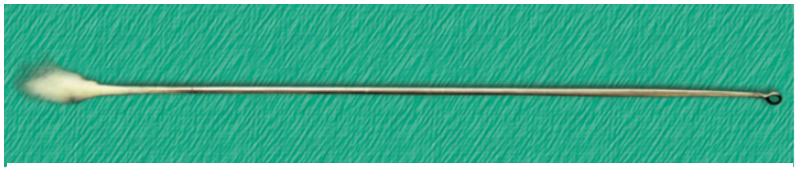


Fig.1.9

This instrument **(Fig.1.9)** 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.

Nasal packing forceps

It is used for the nasal/aural packing, removal of FB or crusts. **(Fig.1.10)**

Fig.1.10

Otoscope

This is one more useful instrument in ENT **(Fig. 1.11)**. 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.

Fig.1.11

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.

- Name
- Age
- Sex
- Occupation (The job he/she is doing may itself be directly or indirectly responsible for his/her present problem. For example, 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.)
- Residence

- Complaints:

I. Duration
II. Severity
III. Laterality (unilateral or bilateral)
IV. Periodicity (constant or intermittent)
V. Character of the discharges (colour, quantity, consistency and smell of discharges / Otorrhoea may be watery, mucoid, mucopurulent, purulent, thick inspissated, cheesy or blood stained. Yellowish, whitish, blackish discharge may be seen in fungal infection of ear canal (Otomycosis).
VI. 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.)
VII. Tinnitus (tickling, whistling, fussing, roaring, soft or very harsh)
VIII. Giddiness
IX. Itching in the ear
X. Blocking/ woolly or FB sensation in ear
XI. Autophony or Hyperacusis
XII. Swellings
XIII. Bleeding
XIV. Nasal crusting
XV. Disturbance of smell (Anosmia, Hyposmia, Parosmia and Cacosmia)
XVI. Nasal itching
XVII. Headache
XVIII. Epiphora (watering eyes)

- Past history
- Personal history
- Family history

Anatomy and Physiology

Nose and Nasopharynx

The external nose consists of bone in the proximal third of the nose and cartilage in the lower two thirds covered by skin. The nasal bones arise from extensions of the frontal and maxillary bones, forming the nasal bridge **(Figure 1.12)**. The hard and soft palates form the floor of the nose and nasopharynx, and the frontal and sphenoid bones forms the roof. The external nose humidifies, filters, and warms inspired air and serves as a passageway for expired air.

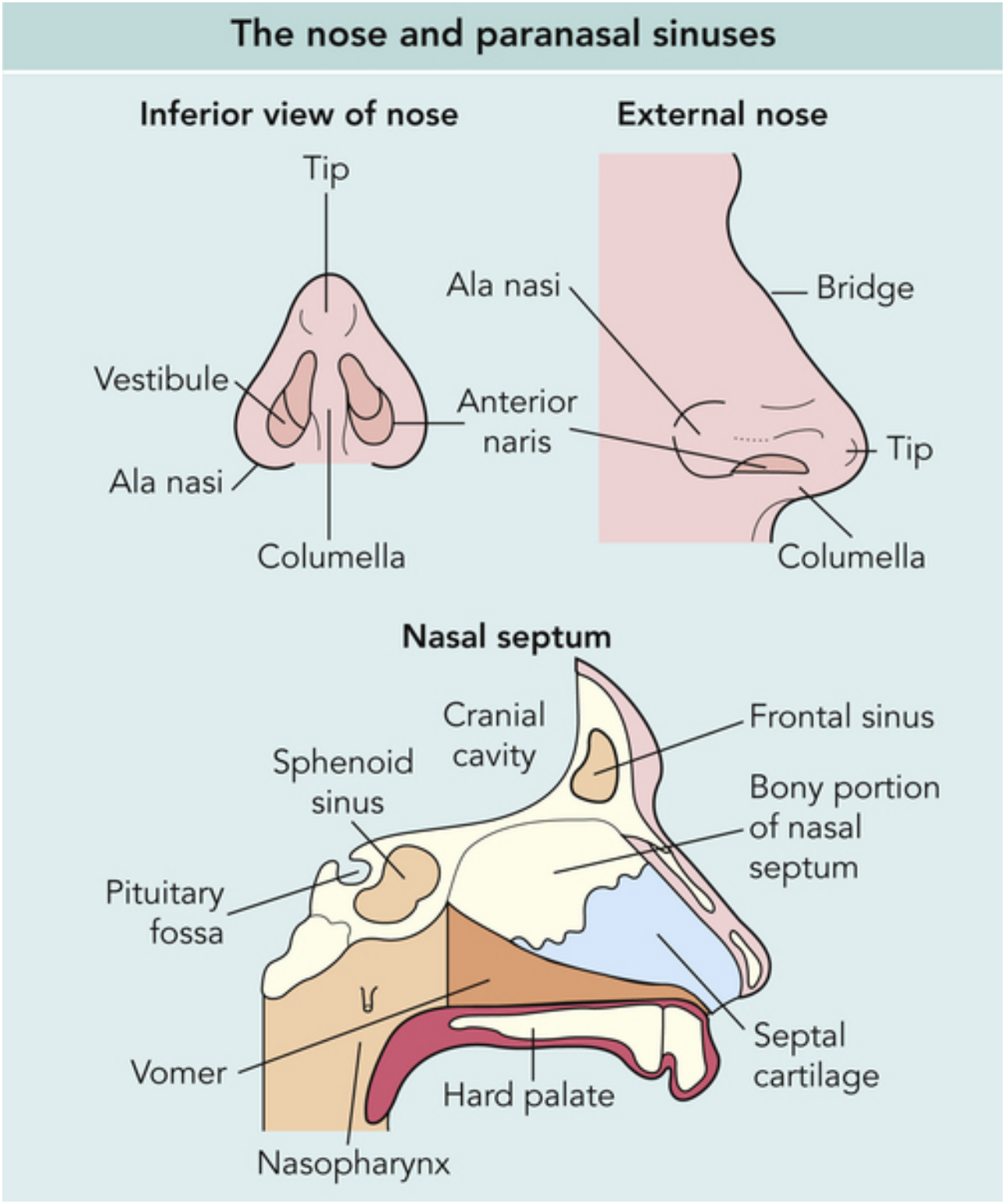


FIGURE 1.12. The nose and nasal septum. (From Epstein O, Perkin GD, Cookson J, et al: Clinical examination, ed 4, Philadelphia, 2008, Mosby.)

The internal nose is divided into two cavities by the septum. Air enters the nose through the nostrils and passes posteriorly to the nasopharynx through the choanae (The anterior and posterior apertures of the nose are called the anterior and posterior choanae respectively). The nasal cavity has a roof, floor, and medial and lateral walls. The floor is formed by the palatine processes of maxillae and horizontal plates of the

two palatine bones. The roof is made of nasal bones, under surface of the nasal spine of the frontal bone, cribriform plate of the ethmoid and under- surface of the body of sphenoid bone. The cribriform plate has the sensory endings of the olfactory nerve (i.e., cranial nerve I). The medial wall of the nasal cavity is formed by the nasal septum. A group of small arteries and veins is located on the anterior superior portion of the septum. This group of arteries and veins is called Kiesselbach's plexus and is often responsible for epistaxis. The adenoids lie on the posterior wall of the nasopharynx. The lateral wall of the nose has ridges and depressions. The ridges are formed by turbinate.

There are three turbinate's bone covered by vascular mucous membrane, the turbinate separates the nose into a superior meatus, medial meatus, and inferior meatus **(Figure. 1. 13)**. While the inferior turbinate is a separate bone, the middle and superior turbinate are parts of the ethmoid bone. The turbinate help to increase the surface area for warming, filtering, and humidifying air. The paranasal sinuses are air-filled spaces within the cranium. They are generally named for their location and drain into respective nasal cavities.

The sinuses lighten the weight of the skull bones and serve as resonators for sound production. They also produce mucus from the membranes that line the cavities, which drains into the nasal cavity. Because the sinus openings are narrow and occlude easily, they are a common site for inflammation.

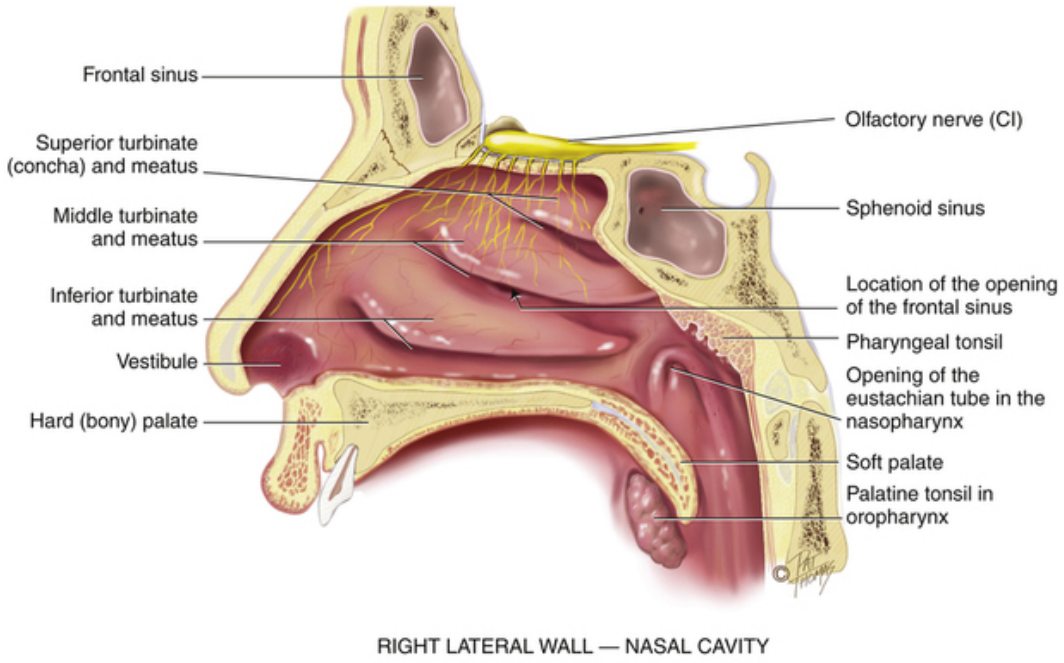


FIGURE. 1.13. A cross-sectional view of the anatomical structures of the nose and nasopharynx, including the turbinates. (From Jarvis C: Physical examination & health assessment, ed 5, St. Louis, 2008, Saunders.)

Mouth, Oropharynx, and Throat

The oral cavity contains the lips, cheeks, tongue, teeth, and salivary glands **(Figure.1.14)**. It functions include serving as a passage for food as well as the initiation of digestion by mastication and salivary secretion. The mouth and

oropharynx also serve for vocalization and expiration. The oral cavity may be divided into the mouth and vestibule. The vestibule is the area between the buccal mucosa and the outer surface of the teeth and gums. The roof of the mouth, which is formed by the hard and soft palates, separates the oral cavity from the nasal cavity.

The soft palate is muscular tissue covered by mucous membrane that plays an active role in swallowing and vocal resonance. The soft palate, the tonsillar pillars, tonsils, base of the tongue, and posterior pharyngeal walls make up the oropharynx. The tongue is a skeletal muscle covered by mucous membrane, which helps to form the floor of the mouth and is anchored to the floor of the mouth by the frenulum **(Figure.1.15).** Papillae cover the surface of the tongue to assist in movement of food. Taste buds are contained within the papillae, and allow people to taste what they are eating. Three pairs of salivary glands are located in the mouth. The parotid, submandibular, and sublingual glands secrete saliva to moisten and lubricate food and to begin the digestion process **(Figure.1.16).** A parotid gland lies within each cheek, just anterior to the ear, and for each gland a duct, known as Stensen's duct, extends to an opening on the buccal mucosa opposite the second molar.

The submandibular glands lie beneath the left and right mandibles at the angle of the jaw. For each a duct runs to the floor of the mouth, with the opening on either side of the frenulum. The sublingual glands are the smallest of the three pairs and are located under the tongue. The teeth are embedded in the alveolar ridges and are protected by gingivae that cover the neck and roots of each tooth.

Adults typically have 32 permanent teeth that are divided into upper and lower rows **(Figure.1.17).** Each tooth consists of enamel, dentin, and pulp. The enamel is an extremely hard surface that covers the dentin. The periodontal ligament that surrounds the root of the tooth helps keep the tooth stable. The pulp chamber contains the pulp, nerves, and blood vessels **(Figure.1.18).**

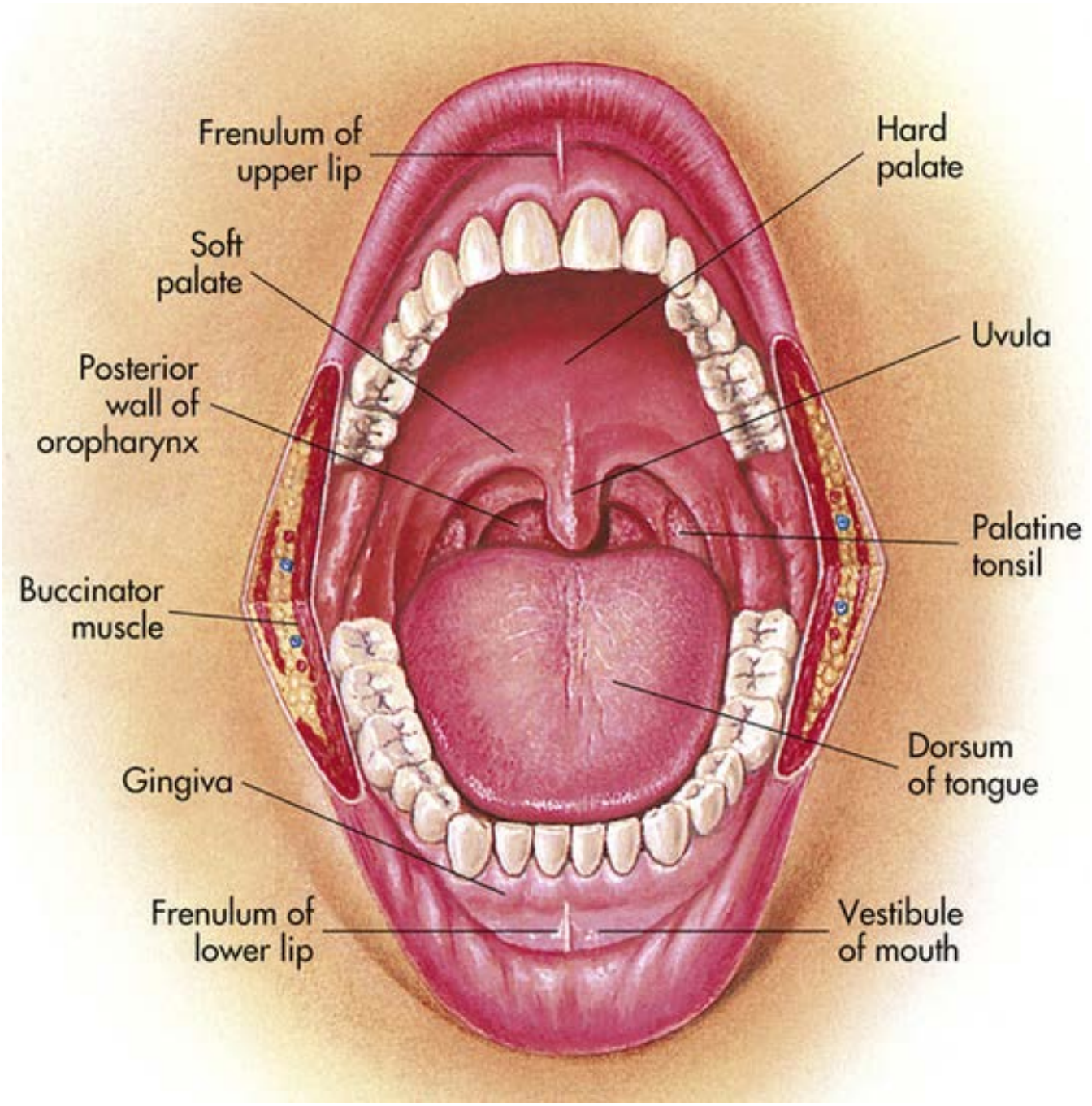


FIGURE.1.14.: The anatomical structures of the oral cavity. (From Seidel HM, Ball JW, Dains JE, et al: Mosby's guide to physical examination, ed 7, St. Louis, 2011, Mosby.)

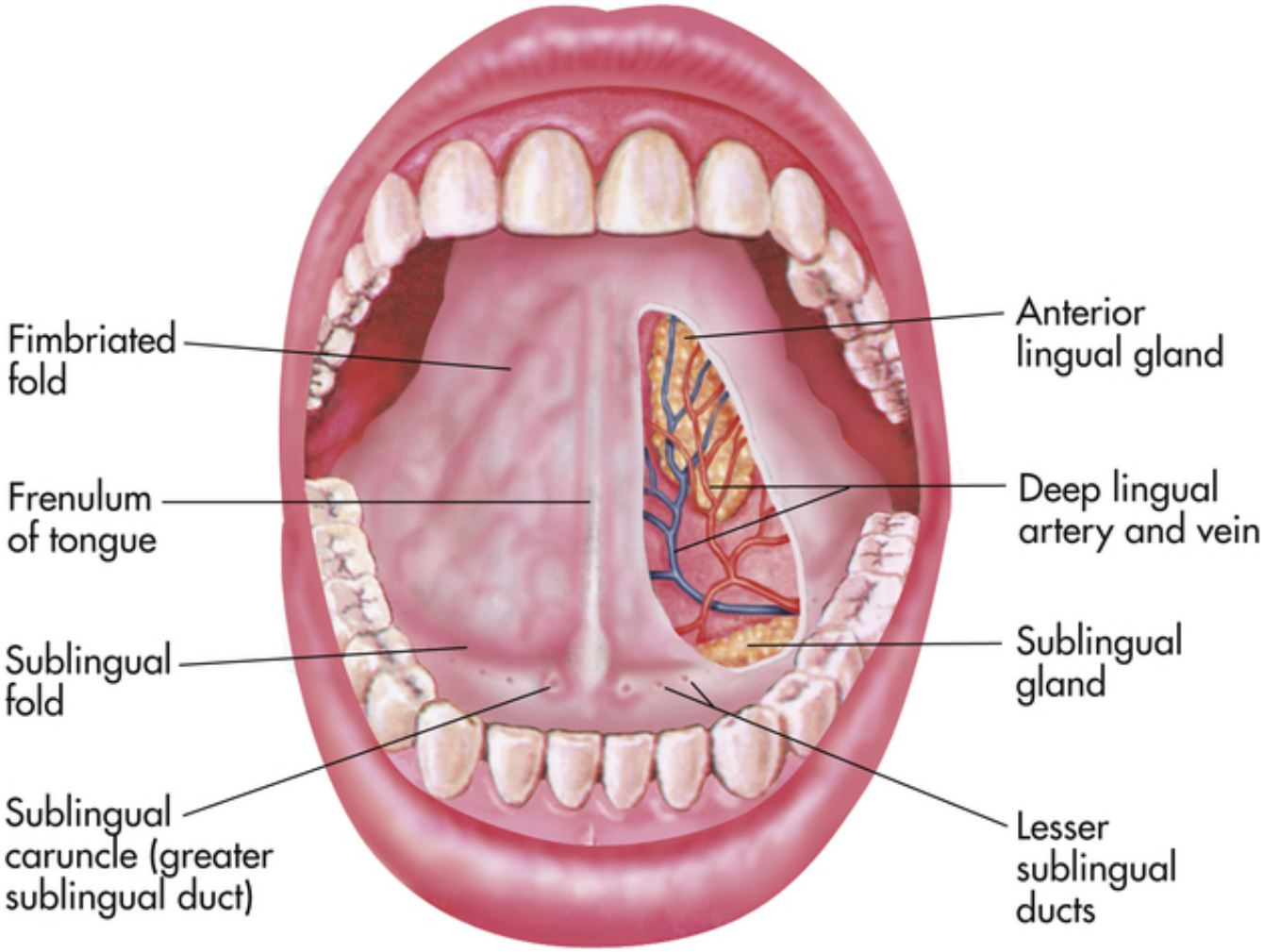


FIGURE.1.15. The ventral surface of the tongue showing anatomical landmarks. (From Seidel HM, Ball JW, Dains JE, et al: Mosby's guide to physical examination, ed 7, St. Louis, 2011, Mosby.)

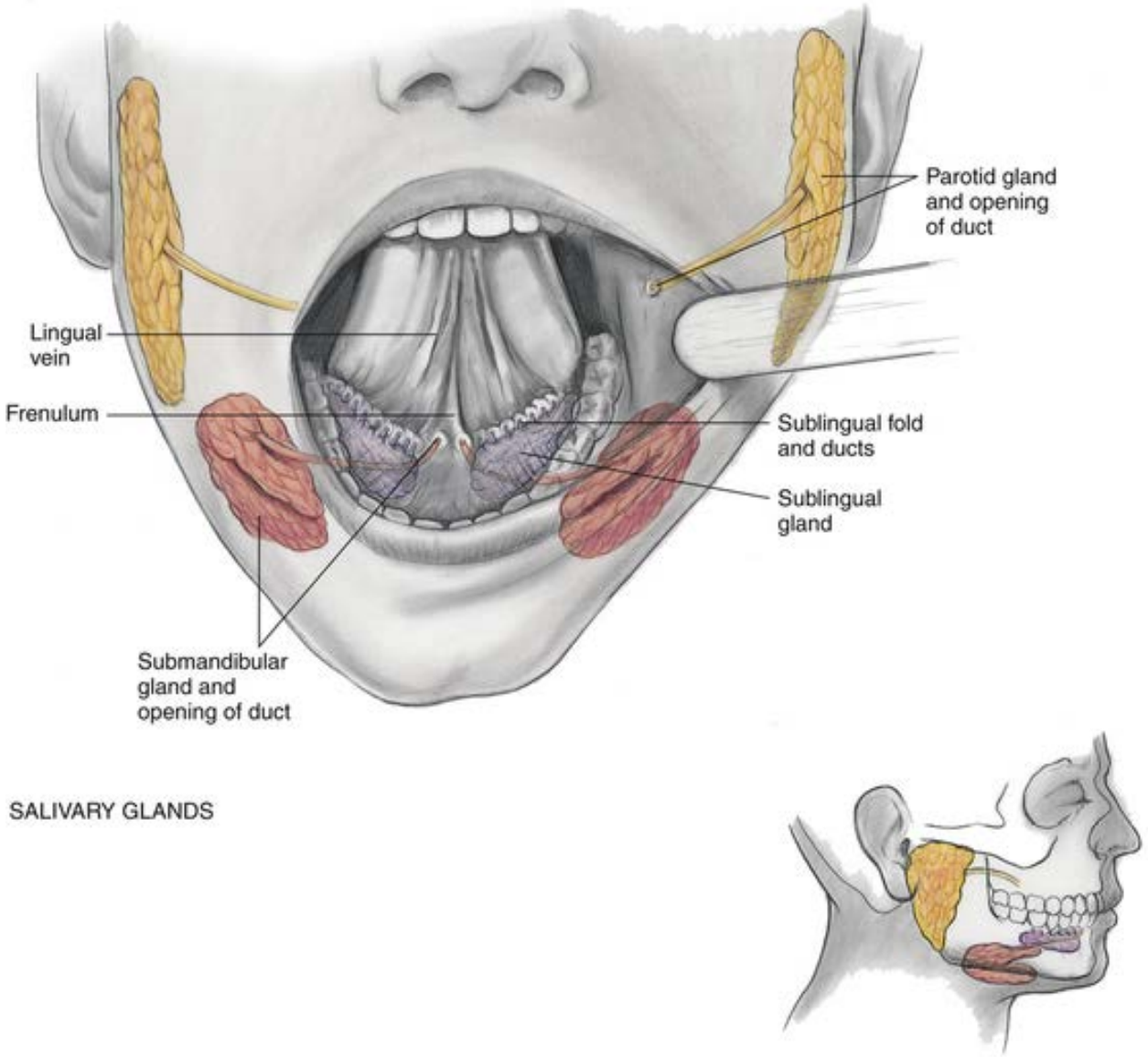


FIGURE.1.16 The salivary glands include the parotid, submandibular, and sublingual, which secrete saliva to moisten food and begin the digestive process. (From Jarvis C: Physical examination & health assessment, ed 5, St. Louis, 2008, Saunders.)

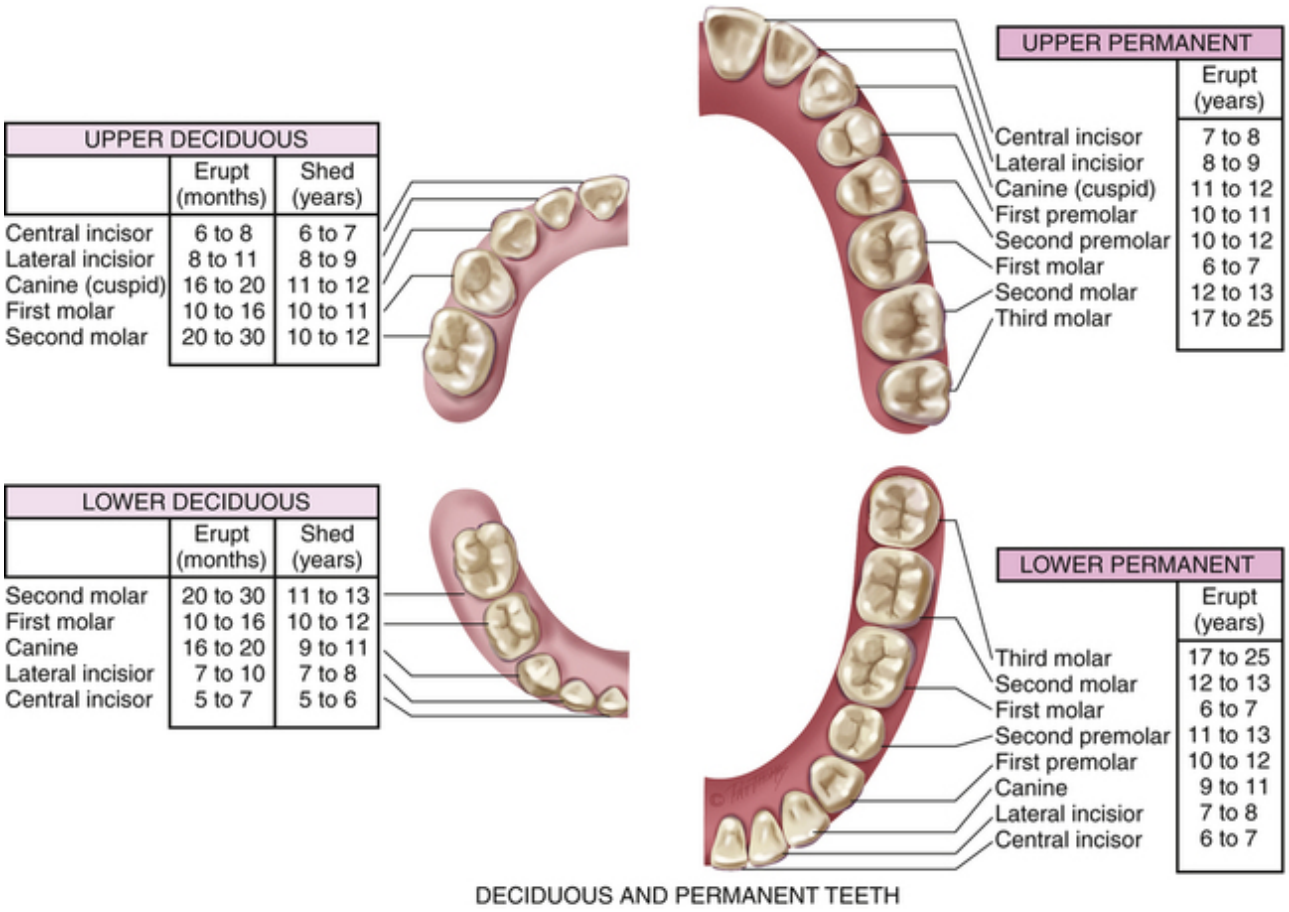


FIGURE.1.17. Human adults typically have 32 teeth. The teeth and gums are inspected during any evaluation of the mouth. (From Jarvis C: Physical examination & health assessment, ed 5, St. Louis, 2008, Saunders.)

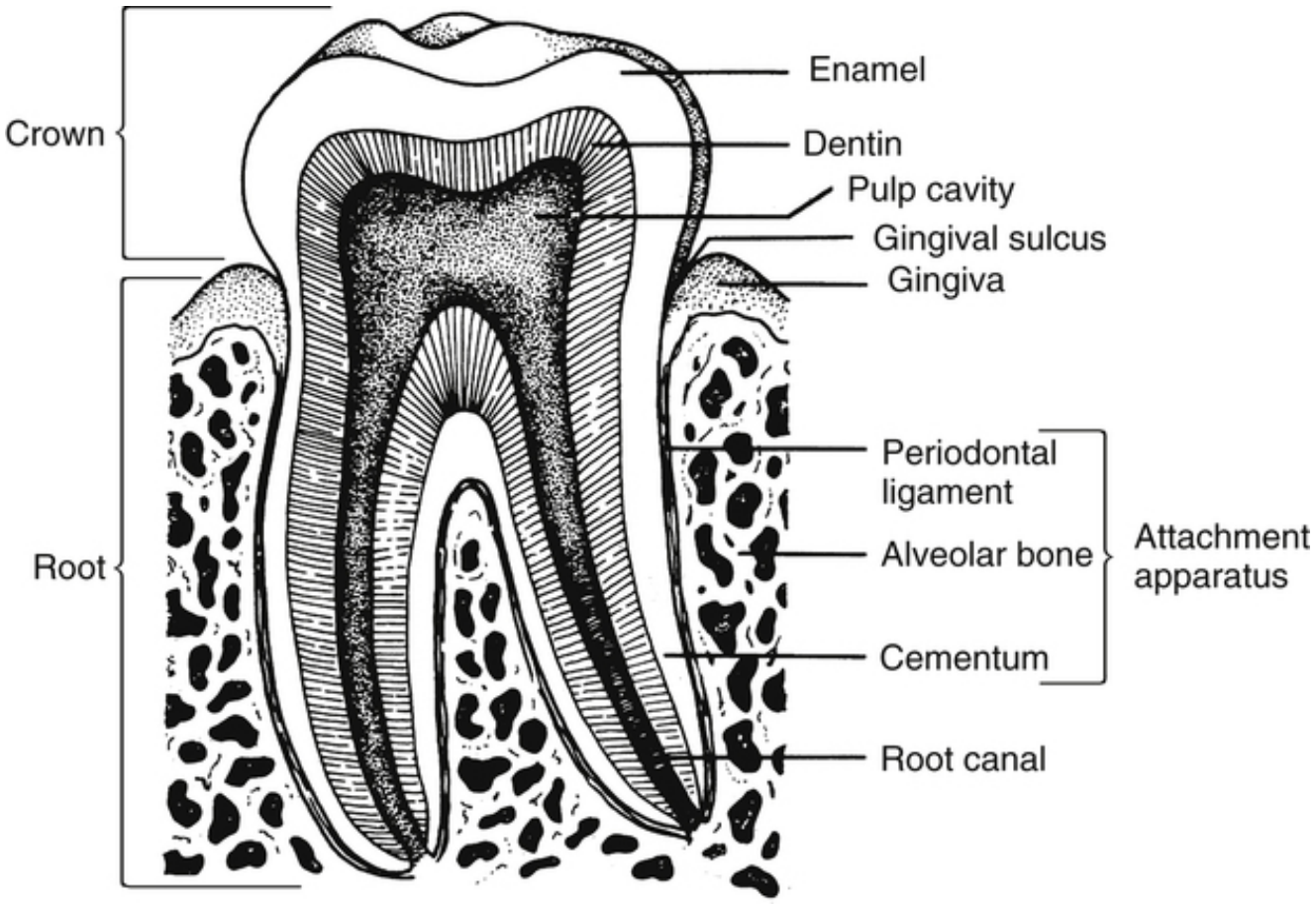


FIGURE.1.18. The anatomy of a tooth. (From Marx J, Hockberger R, Walls R: Rosen's emergency medicine: concepts and clinical practice, ed 7, St. Louis, 2010, Mosby.)

The pharynx consists of the combined upper parts of the respiratory and digestive tracts: the nasopharynx, oropharynx, and laryngopharynx **(see Figure.1.13.)**. The larynx functions in respiration, prevents food and saliva from entering the respiratory tract, and produces sound. It is protected anteriorly by the thyroid cartilage and inferiorly by the cricoid cartilage.

Ear

The ear has two main functions: (1) to identify, locate, and interpret sound and (2) to maintain balance. It consists of three distinct parts: the external, middle, and inner ears **(Figure.1.19)**. The external ear consists of the pinna, or auricle; the external auditory canal; and the lateral surface of the tympanic membrane. The pinna has a cartilage framework that is covered in skin, whereas the ear lobe is fat covered in skin. The shape of the pinna is designed to gather or channel sound into the canal. The approximately 2.5 cm long canal is lined with epithelial cells, hairs, sebaceous glands, and ceruminous glands. The ceruminous glands function to produce cerumen, or ear wax, which lubricates the ear canal and tympanic membrane while serving as a protective barrier against foreign matter and bacteria. The outer third of the canal is flexible as it attaches to the pinna but is rigid for the last two thirds as it enters the skull.

The external ear and the middle ear are separated by the tympanic membrane. The translucent tympanic membrane permits visualization of the middle ear, which is an air-filled cavity in the temporal bone that contains the ossicles: the malleus, incus, and stapes. These bones transmit vibrations from the tympanic membrane mechanically to the inner ear, where the mechanical vibrations are changed to electrical signals. The middle ear is connected to the nasopharynx by the eustachian tube. This passage opens briefly to equalize pressure within the inner ear that occurs with changes in atmospheric pressure caused by swallowing, sneezing, or yawning.

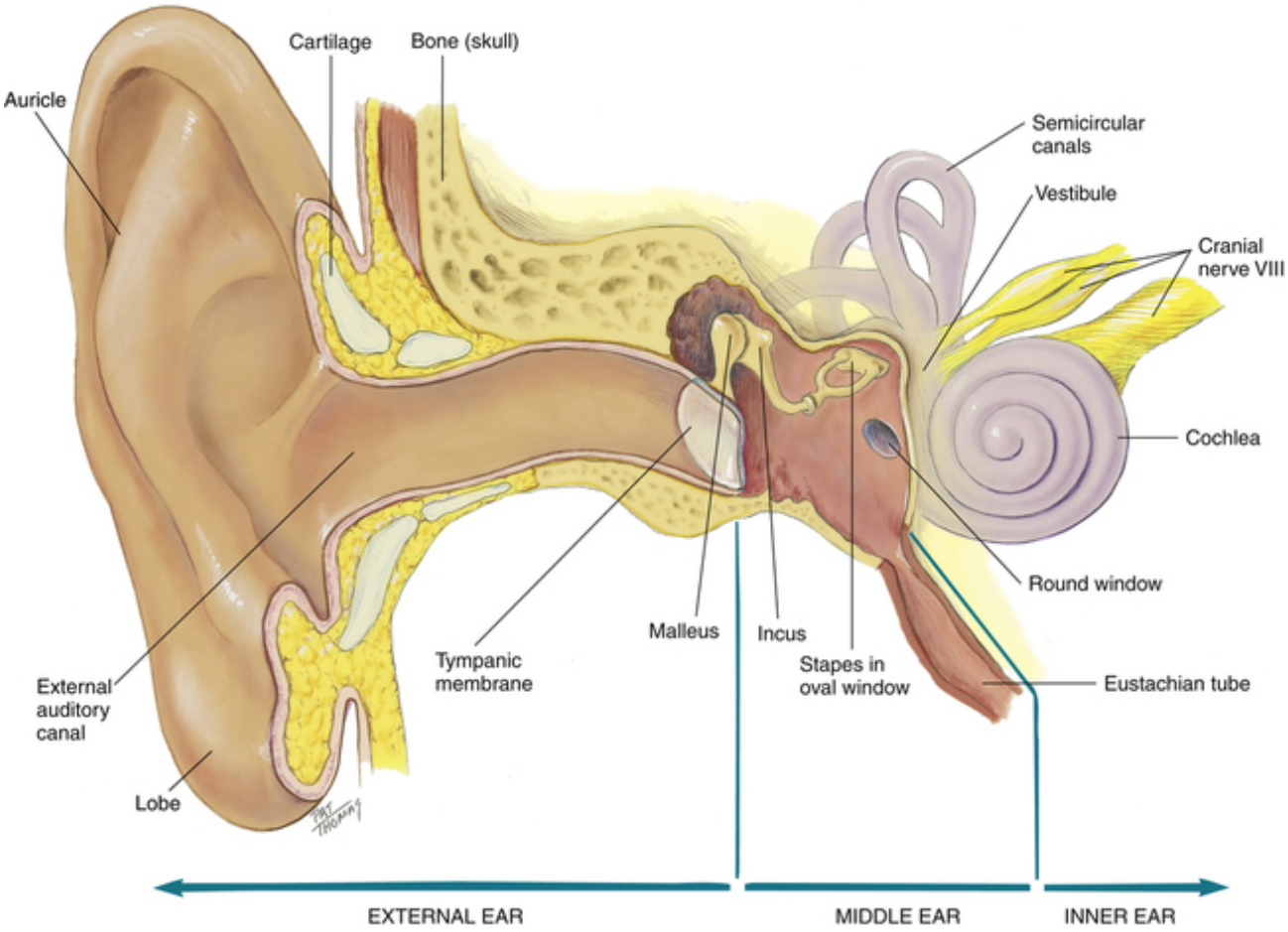


FIGURE.1.19 Anatomy of the ear, showing the external, middle, and inner ear. (From Jarvis C: Physical examination & health assessment, ed 5, St. Louis, 2008, Saunders.)

The inner ear consists of the vestibule, semi-circular canals, and cochlea. The cochlea encodes the previous mechanical vibrations as electrical impulses that are then sent to the eighth cranial nerve (i.e., vestibulocochlear). The vestibule is directly responsible for balance as the fluid in the semi-circular canals shifts with head movement. Feedback from this movement is provided to the brain, assisting to maintain upright posture and balance. Hearing is an interpretation of sound waves received via an air conduction path. The most efficient and normal hearing pathway is through air conduction; however, bone also conducts sound, by transmitting the vibrations of the skull directly to the vestibulocochlear nerve (**Figure 1.20**).

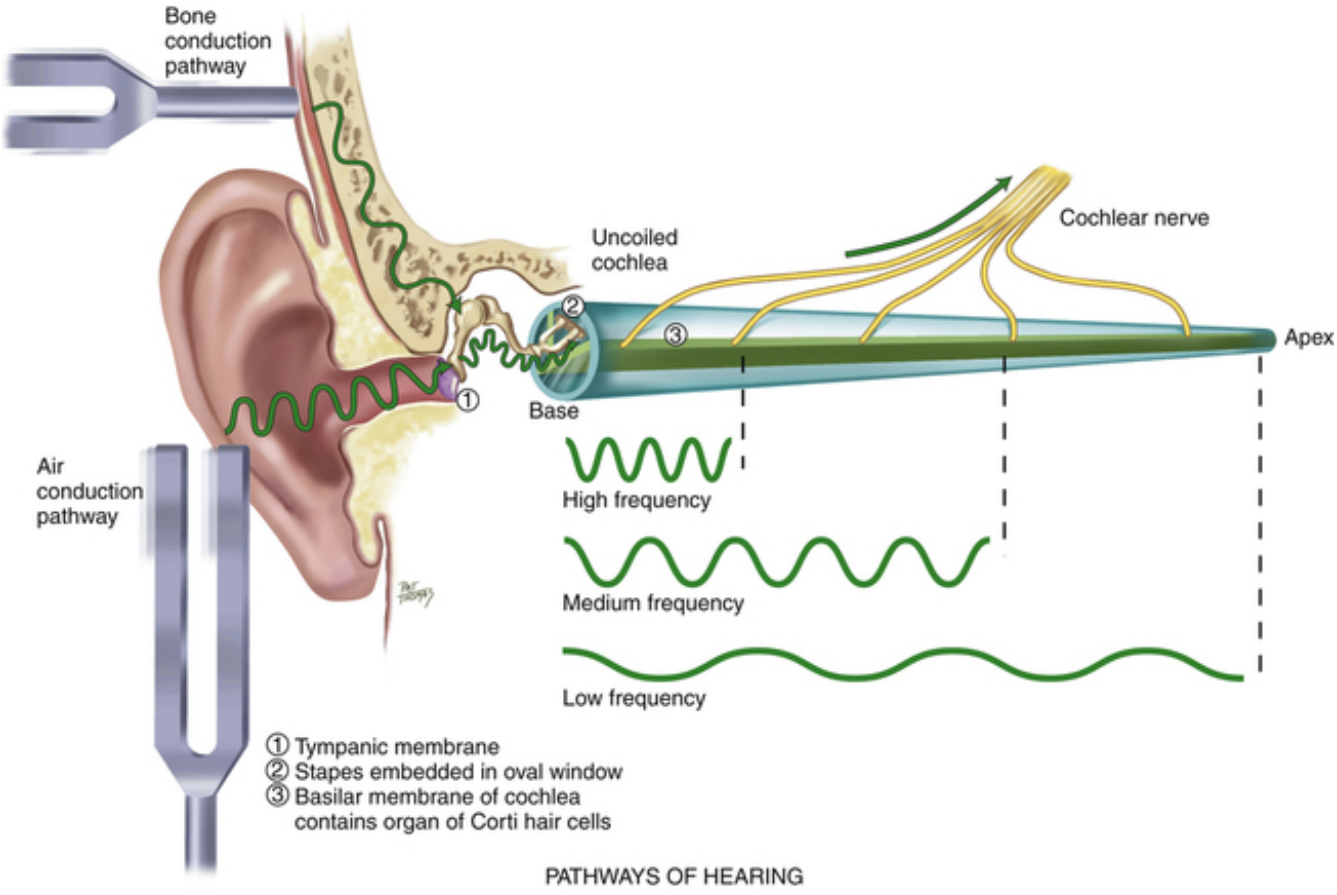


FIGURE1.20. Pathways of hearing From Jarvis C: Physical examination & health assessment, ed 4, Philadelphia, 2004, Saunders, p 344.

Air Conduction Pathway

- Tympanic membrane
- Stapes embedded in oval window
- Basilar membrane of cochlea contains organ of Corti hair cells

Bone Conduction Pathway

- Bones of skull vibrate
- Vibrations transmitted directly to inner ear and cranial nerve VIII

Using of the head mirror

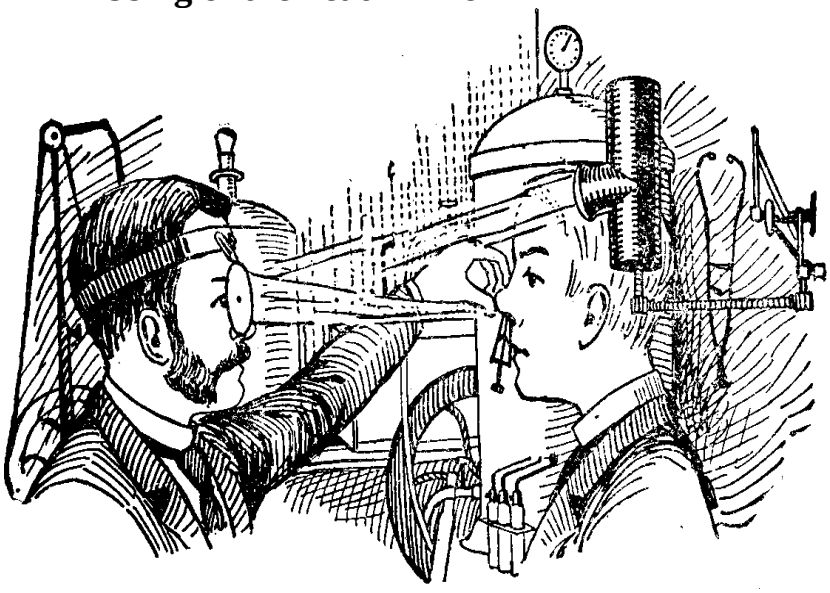


Fig. 1.21

The reflecting head mirror with separate light source is the traditional method of illumination. In 1841 Friedrich Hoffman first described the use of a centrally perforated, handheld mirror to reflect sunlight into the ear **(Figure.1.21)**. Anton von Tröltsch, a contemporary German otologist, popularised the concept and ultimately fastened a circular, concave mirror to his forehead, as is currently practised. Today, a standardised mirror is used for otoscopy, rhinoscopy, and laryngoscopy. Much practice is needed to use the instrument properly. **The aim** of this procedure is to illuminate area of investigation for otoscopy, rhinoscopy, and laryngoscopy.

Equipment

1. Reflecting head mirror;
2. Separate light source;
3. Procedure mask;
4. Disposable Cap

Procedure

Explain the procedure to the patient and gain consent
Wear the disposable cap and surgical mask
Wash hands
Position yourself facing the patient at the same level as the patient, of 25-35 cm distance.

Adjust the headband to your size. (**Fig.1.22)**

Figure.1.22

Figure.1.23

Position the central aperture of the head mirror in front of your dominant eye. Close your non-dominant eye and look through the central aperture of the head mirror at your objective (e.g., tip of the nose) (**Fig.1.23)**. Then open your eye and focus with both eyes. This eliminates head shadow and parallax, allowing all-important stereoscopic vision.

Figure.1.24

Position the light source /lamp above and behind the right patient's shoulder, of 10-15 cm distance **(Fig.1.24)**.
You must sit opposite the patient with the light shining directly at your mirror.

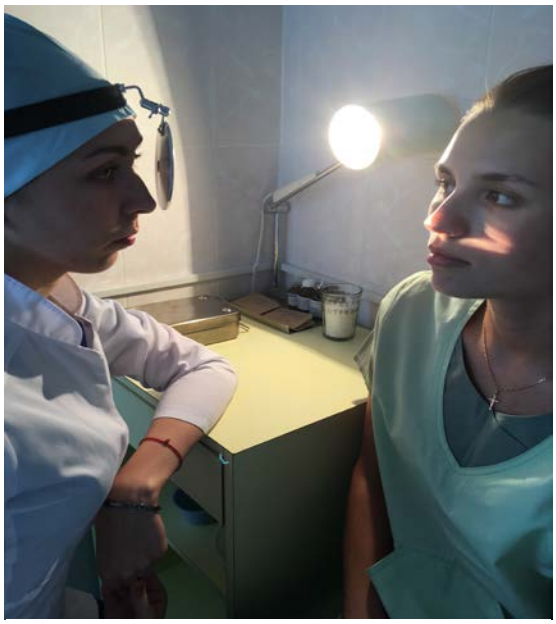


Figure.1.25

Direct the light from the lamp onto the mirror and reflect the light onto your objective. (**Fig.1.25)**
You should now be able to use both hands freely and see the objective with both eyes. (**Fig.1.26)**.Use the head mirror for otoscopy, rhinoscopy, and or laryngoscopy. Ensure the patient feels good. Remove the head mirror. Wash hands. Document procedure.

Examination of the Nose

The most difficult part of this examination is learning to hold the Thudicum's speculum. This is a bit like a nose clip used in swimming but in reverse-it holds the nose open rather than closed.

Basic positionThe patient should be sitting in a swivel chair opposite the seated examiner. It is useful to have the patient's chair slightly higher than the examiner's chair. A good light source is essential: either a bull lamp positioned over the patient's left shoulder reflected onto your head mirror and back at the patient alternatively, and

preferably on the ward, use a headlight. Keep your legs together and place them alongside and parallel to the patient's legs. This allows you to get less than an arm's length away from the patient to examine and perform any necessary procedures. Examination is systematic as always.

External nose

- Inspect its shape, size, and colour.
- Check for scars.
- Look at the skin type and thickness.
- Observe and palpate the nasal bones, upper lateral and lower lateral cartilages.
- Look for symmetry and abnormal seating of the cartilages with the patient left and right lateral position and straight on.
- Tilt the head back to view the columella and alar cartilages in a similar way.
- The nostrils are examined for discharge as well as any unilateral flaring or narrowing.
- Palpate the external nose and the facial bones **(Fig. 2 A, B)**

Swelling, Tenderness, Masses, Any displacement of bone or cartilage.

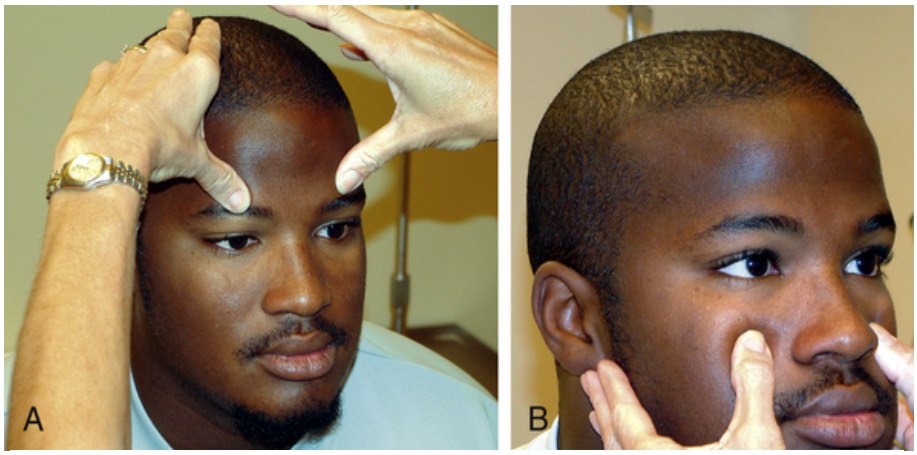


Fig.2. A &B

○Palpation and percution of the facial bones and the sinuses determines any areas of tenderness, swelling, or deformity.

The facial areas over the frontal sinus are palpated by the examiner positioning the thumb up and under the athlete's eyebrow.

○The maxillary sinus is palpated by pressing with thumbs up under the zygomatic process.

Internal nose

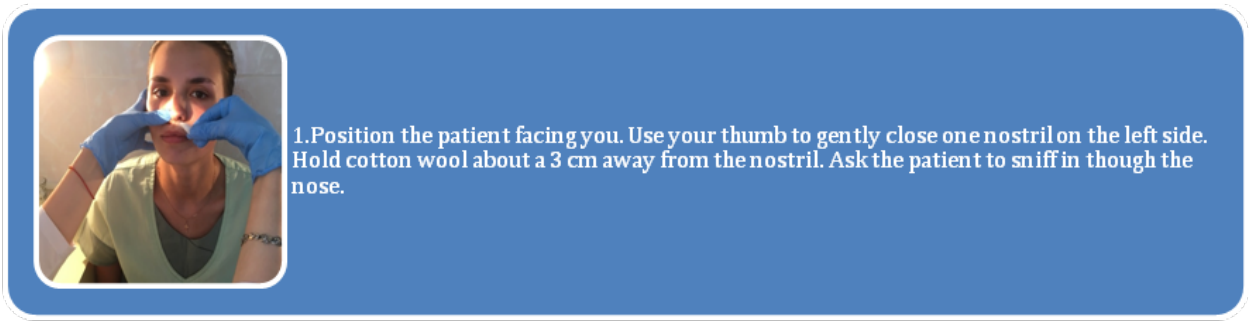
Nasal breathing evaluation

The aim of this test is to check of patency of each nasal airway.

Equipment

- Cotton wool

Procedure (it is important to test the respiratory function one side at a time)



- In children, a metal tongue depressor held under the nose will show exhaled air – if there is a blockage, if will not steam up.
- If there is an obstruction and the nostril collapses perform ***Cottle's test***. (Place one or two finger tips on your cheeks on either side of your nose. Gently, press and pull outward. This temporarily opens the nasal valve. If doing this helps you inhale more easily through your nose, the nasal obstruction is likely to be in the nasal valve, in the front part of your nose.) Lateral pressure on the skin of the cheek lateral to the nose can stop nasal collapse if there is obstruction at the nasal valve. Alternatively, a probe such as Jobson-Horne can be inserted into the nose. Tenting the nostril at various positions can stop the collapse and further localize a site of weakness.
- Wash hands.
- Document procedure.

Performing olfactory test

The aim of this test is to evaluate olfactory function of the nose

Equipment

Procedure (it is important to test the olfactory one side at a time)

1.Position the patient facing you.
2.Use you thumb to gently occlude one nostril.
3.Open the container and hold it about a 30 cm away from the nose.
4.Ask the patient if they can smell anything.
5.If they cannot, bring it a few cm closer.
6.Do this until they can smell it, and then ask them if they know what it smells like.
7.Note how close the item was before they could smell it, and if they were accurate at guessing the object.

1.After going through all four items with the left nostril blocked, let the patient rest, then do it on the other side.
2.Once again, note the distance and accuracy of each items.
3.Compare the results to see if one side was weaker than the other.

- Document procedure:

– They should be able to smell and recognize items about 20-30 cm from their nose.

– Weaker left nostril indicates weakness in the left hemisphere and a weaker right nostril indicates weakness in the right hemisphere.

– Anosmia, hyposmia, dysosmia, parosmia, phantosmia, hyperosmia.

Nasal speculum examination (anterior rhinoscopy)

The aim is to inspect the nose internally using Thudicum's speculum. An otoscope with large speculum can be used for children who don't like the bright headlight or the Thudicums

Equipment

1. Reflecting head mirror
2. Separate light source
3. Nasal speculum (Thudicum's speculum or Killian's speculum(rarely)
4. Disposable cap
5. Surgical mask
6. Gloves

Procedure (it is important to exam one side at a time).

1.A good anterior view of the nose can be obtained simply by pressing on the tip of the nose.

Hang the speculum on your non-dominant hand. Put the dominant hand on the forehead of the patient to guide the patient's head. Gently insert the speculum into the nose. Controlling the speculum with your fingers, allow it to slowly open. Using a head mirror, reflect light into the nose to give a clear view. To view the septum and turbinates tip the patient's head slightly backward. To see the middle meatus and middle turbinates tilt the patient's head backward. Remove the nasal speculum.

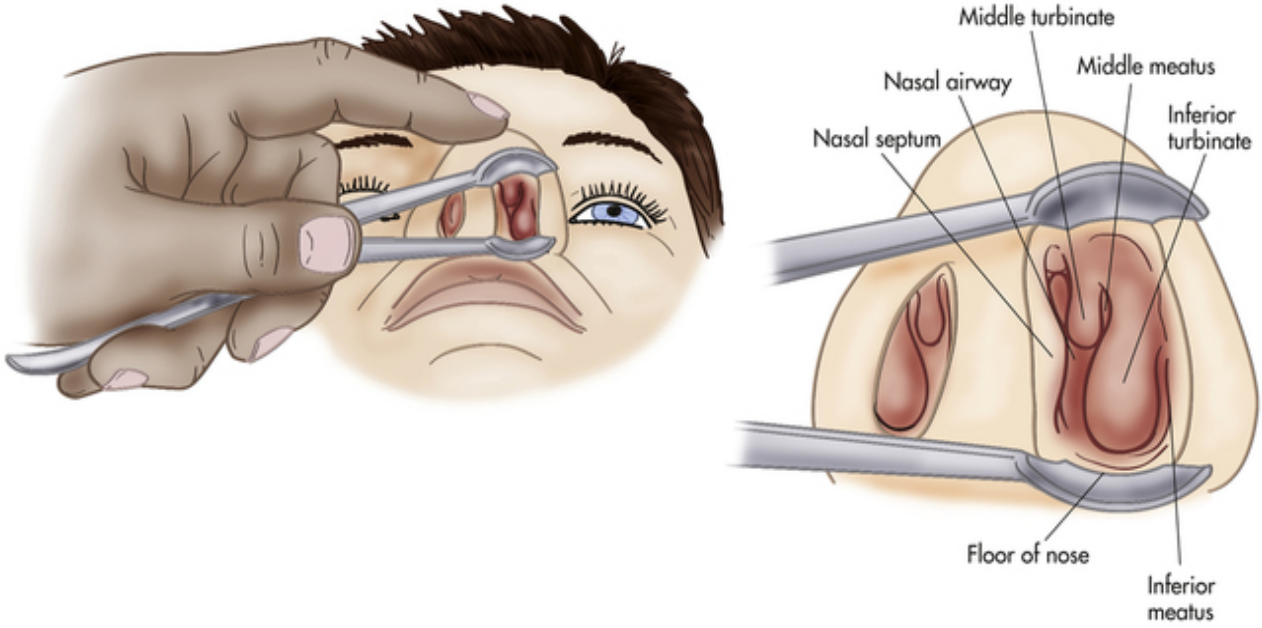


Fig.2.1

- Document procedure: assess the straightness and integrity of the septum, the size of turbinates, note the mucosal appearance.

Structures seen in Anterior Rhinoscopy (Figure 2.1)

- Nasal vestibule
- Nasal septum
- Colour of the mucosa
- Lateral nasal wall
- Nasal floor

Remember

✓ The septum is normally pink and glistening and should be thicker anteriorly.

✓ The turbinates should be pink, moist, and free of any lesions or discoloration.

Posterior rhinoscopy (postnasal space examination)

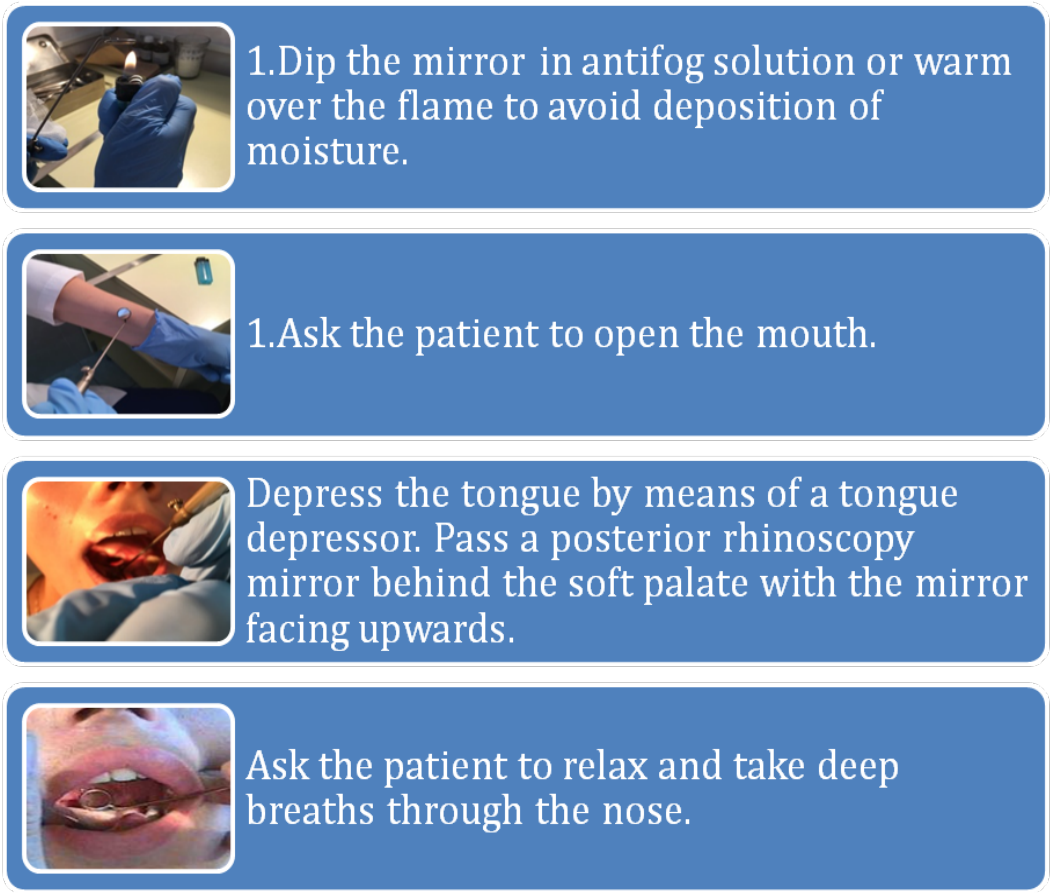
The aim of this procedure is to inspect the posterior choanae and postnasal space with an endoscope or with a mirror.

Equipment

1. Posterior laryngeal mirror
2. Mirror warmer
3. Tongue depressor
4. Local anaesthetic (lidocaine 5% phenylephrine 0,5%)

Procedure

- The test should be explained to the patient.
- Anaesthetize the oropharynx with lidocaine 5% phenylephrine 0,5%
- The postnasal mirror is gently heated on spirit lamp to prevent condensation.
- Test the postnasal mirror on your skin to see that it is not too hot to scald the patient.
- Hold a Luc's tongue depressor in your left hand and use it to depress the anterior 1/3 of the patient's tongue.
- With your other hand run a small mirror along the top of the tongue depressor to enter the oropharynx behind the soft palate.
- Ask the patient to relax and breath through the nose.
- Mirror is rotated in various angles without touching the posterior pharyngeal wall or the base of the tongue to prevent gag reflex.
- The reflected light should illuminate the postnasal space to visualize the posterior choanae and the ends of the inferior turbinate. any adenoidal tissue will also be seen.



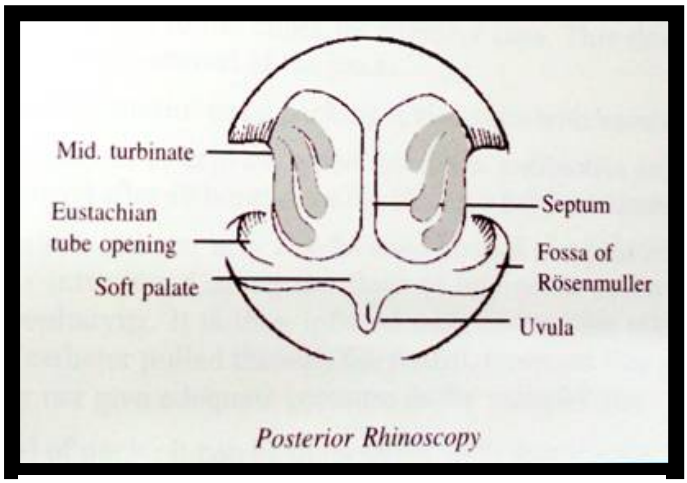


Fig. 2.2

Structures visualised (Figure 2.2):

- Laterally Eustachian tube opening is seen on the posterior end of the inferior turbinate.
- Medially, Posterior end of middle, inferior and superior turbinate and posterior part of septum.
- Inferiorly end posterior surface of the soft palate.
- Rosenmullers fossa is seen behind the Eustachian tube.

Problems in Posterior Rhinoscopy:

- In about 20% of the patients, it is not possible to examine the post nasal space by posterior rhinoscopy mirror.

- A ***nasopharyngoscopy*** (fibre-optic) in preferred in such cases.
  - Gag Reflex
  - In some sensitive patients this prevents proper examinations
  - Children are usually not very co-operative in this procedure

Cold spatula test

The aim is examining the patency of each nostril separately.

Equipment

- Tongue depressor

Procedure

1. The test is explained to the patient.
2. The patient is sitting upright.

i. The tongue depressor is held just below the anterior nares and the patient is asked to blow gently on it. **(Fig.2.3)**

3. Two distinct areas on the tongue depressor would show fogging due to exhaled air.
4. Absence or less fogging indicates obstruction on the side.

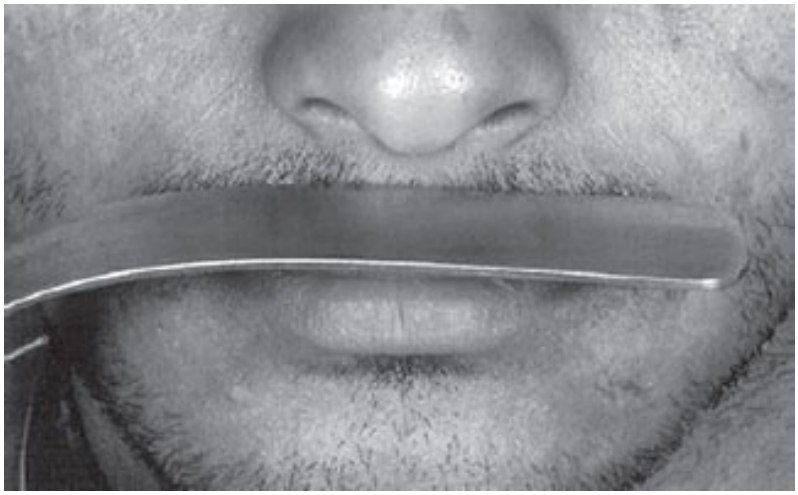


Fig.2.3

Performing Nasendoscopy (fibre-optic)

The aim of this procedure is to examine nasal cavity, nasopharynx and larynx.

Indications

- To assess the degree and located the site of nasal obstructions.
- To evaluate patients complaining of headache.
- To evaluate patients with Epistaxis.
- To monitor the progress in the treatment of nasal and para nasal sinus infections.
- To locate the site of Cerebrospinal, Rhinorrhoea.
- To monitor nasal fossa after resection of tumours.

Equipment

1. The flexible nasal endoscope **(Fig.2.4)**

2. Light source

3. Fibreoptic cable
4. Local anaesthetic (Lidocaine 5% phenylephrine 0,5%)
5. Lubricating Gel

Procedure

1. Generally, the patient is seated in a chair, through sometime the procedure is performed with semi-reclined, or lying down on your back.

2. The flexible nasendoscope must be sterilised and lubricated before use.
Local anaesthetic may be introduced into the nose, though is not strictly necessary.

Figure.2.4

3. This example shows the most powered light source, but portable battery powered light sources are also available.

Figure.2.5

Figure.2.6

4. Hold the endoscope in your dominant hand and use your thumb on the lever that controls the instrument's tip direction.

Figure.2.7

5. Carefully insert the endoscope into the nose.

Figure.2.8

6. The endoscope can now be gently advanced to give views of the nose, nasopharynx and larynx.

7. Remove the endoscope
8. Document procedure.

Advantages of Diagnostic Nasal Endoscopy

1. All parts of nasal cavity, meatii and the postnasal space can be visualized directly under better illumination and clarity, thus detecting many pathologies, which would be missed during the routine anterior rhinoscopy.
2. The efficacy of medical or surgical treatment can be followed up by subsequent repeat nasal endoscopy.
3. It is an OPD procedure.

Antral Puncture (Antral Lavage)

In this procedure **(Figure.2.9)** 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.

Instruments

- Tilley Lichtwitz trocar and cannula
- Kidney tray
- Higginson's syringe,
- Nasal speculum,
- Nasal dressing forceps.

Procedure

1. The test is explained to the patient
2. Patient is given local anaesthesia
3. Patient is sitting upright
4. Tilley Lichtwitz trocar and cannula are negotiated in the inferior meatus **(Figure.2.10)** approximately 1 to 1.2 cm posteriorly from anterior end of inferior turbinate to reach genu.
5. Then it is directed laterally and upwards towards tragus of the same side and pierced firmly to enter maxillary sinus.
6. A 'click' is heard, a sensation of loss of resistance is felt and trocar/cannula is in the antrum
7. Trocar is taken out keeping cannula in situ.
8. With the help of 5 ml syringe fluid if any is aspirated and sent for culture/sensitivity or cytology.
9. Patient is asked to lean forward **(Figure.2.11)**.
10. 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.
11. Irrigation is continued till clear fluid returns.
12. The procedure may be repeated every week 2 to 3 times if needed.
13. 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.

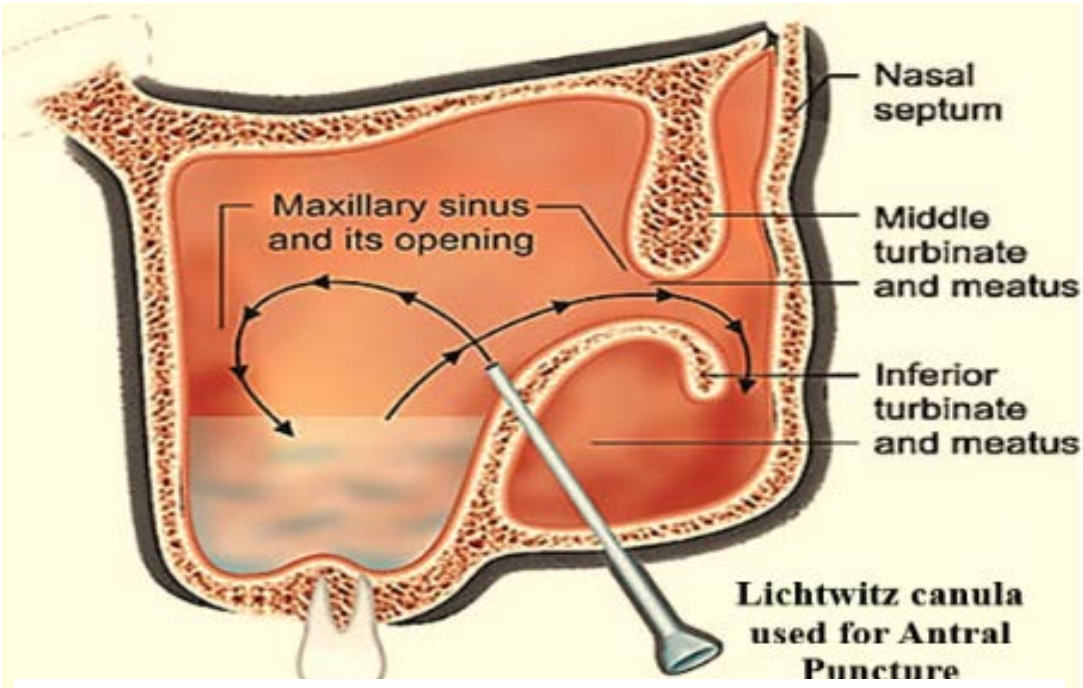


Figure.2.9

Figure.2.10

Figure.2.11

Complications

- False passage
- Bleeding
- Vaso-vagal attack
- Injury to eyeball
- Air embolism.

Anterior Nasal Packing for Epistaxis

The aim of this procedure is to place an intranasal device that applies constant local pressure to the nasal septum. Traditional gauze packing is sufficient if prefabricated nasal tampons like Rapid Rhino or Merocel are not available.

Indications

1. Epistaxis not controlled by simple pinching of the nose, application of ice or cauterising the bleeder.
2. Post operation

Contraindications

1. Patients with respiratory compromise may first require airway control and mechanical ventilation.
2. Patients with hemodynamic compromise may first require volume and blood product resuscitation.

Equipment

1. Gloves
2. Head mirror
3. Nasal packing forceps
4. Tongue depressors
5. Nasal speculum.

6. Lidocaine 2% or spray 10%
7. Epinephrine 1:1000.
8. Epistaxis tray.
9. Suction.
10. Bayonet forceps.
11. Silver nitrate sticks.
12. Merocel nasal packing with airway, 8 cm.

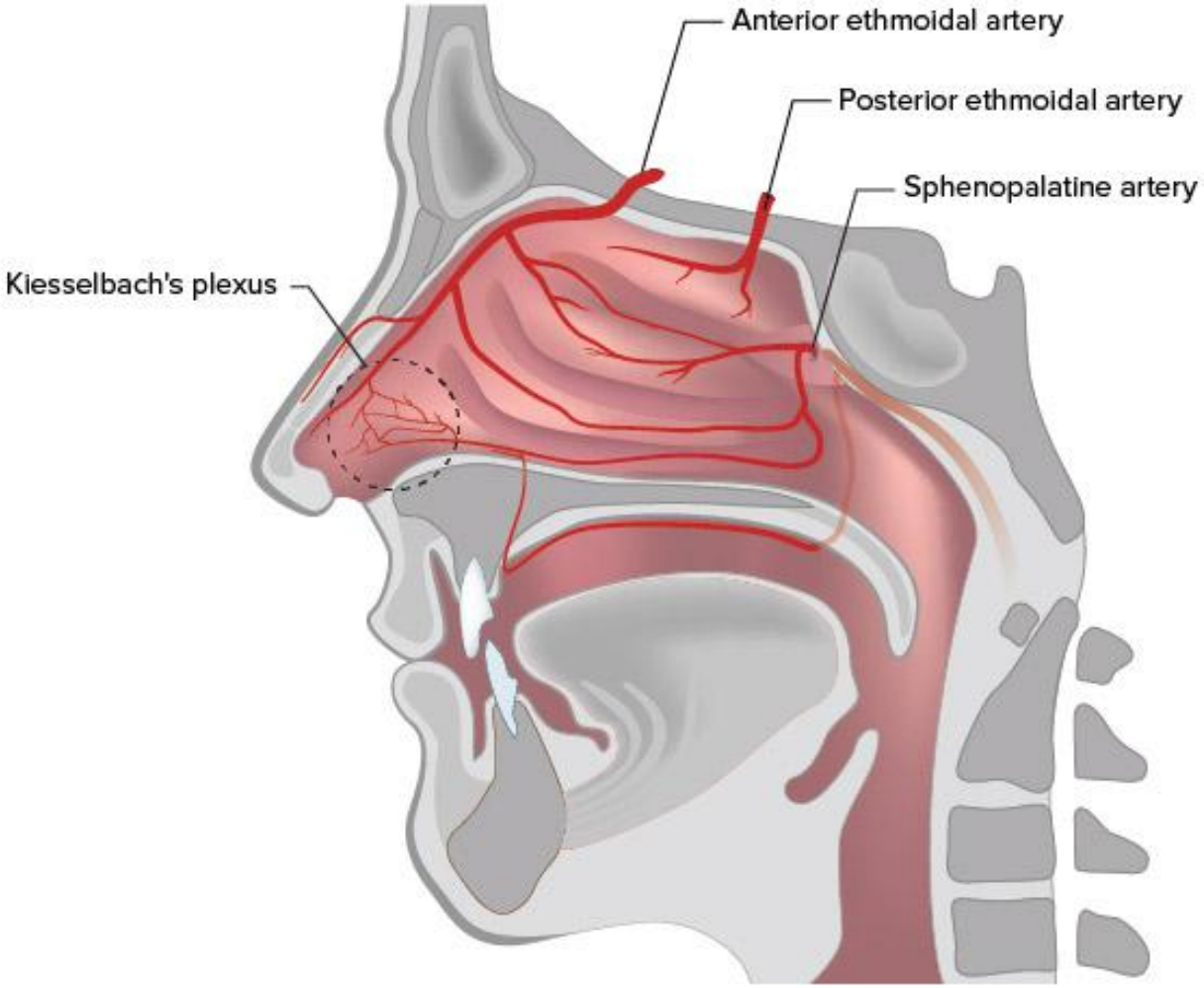


Figure.2.12 Nasal vascular anatomy

Airway, breathing, and circulation (ABCs) take priority in the acute management of epistaxis. Less invasive approaches to controlling epistaxis should be attempted before anterior nasal packing is initiated (Figure 2.12).

Technique

1. **Direct Pressure**

Apply anterior nasal pressure **(Figure.2.13)** to the cartilaginous part of the nose for 10 minutes. If this manoeuvre does not control the bleeding, a more invasive approach is required.

Figure.2.13

Assemble equipment and put on gown, goggles, and gloves. A headlamp is used to visual field.

Keep patient in an upright or minimally reclined position.

Figure.2.14

Figure.2.15

Figure.2.16

2. **Topical Anaesthesia and Vasoconstriction**

Soak cotton balls in a mix of 2% lidocaine and 1:1000 epinephrine. Put 1-2 cotton balls into the bleeding nostril or better into both nostrils). Place a dry cotton ball at the external nares to prevent leakage and dripping. Leave the cotton balls in place for 10 minutes. If these anaesthetic supplies are unavailable, a commercially produced topical nasal decongestant may be quickly inhaled; then, place cotton balls and apply anterior nasal pressure.

3. **Evacuation of Blood and Clots**

Remove the cotton balls placed for local anaesthesia. To evacuate clots, use suction or have patient blow gently. Previously accumulated blood comes out in a gush and then stops. Ongoing bleeding appears as steadily dripping, bright red blood.

4. **Identification of Bleeding Source**

Stabilize your hand on the patient's face, and visualize the septum through the nasal speculum. Examine the Kiesselbach plexus for bleeders.

Cauterization of Bleeding Source

Figure.2.17

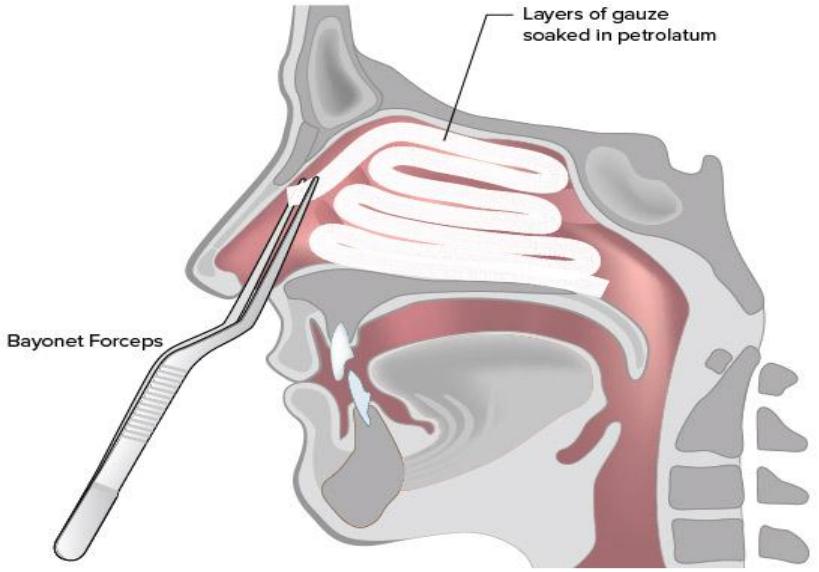
5. **Nasal Packing (Figure.2.17.1)**

Only anterior 2/3 of nasal cavity is packed (**Figure.2.17)**. Application of pack in posterior part causes gag reflex and soft palate movements may dislodge the pack in oral cavity.

- **Packing with commercial products**

Anterior packing with prefabricated nasal tampons.

Apply surgical lubricant to the tampon, and gently insert it to the maximum achievable depth. Advance the tampon almost



horizontally, along the floor of the nasal cavity.

- **Packing with gauze:**

Prepare a length of ribbon gauze impregnated with aminocaproic acid.

Use bayonet forceps and a nasal speculum to place the gauze in a layered, accordion fashion, packing it from anterior to posterior (see the image below). The gauze should be placed as far posteriorly as is possible.

Figure.2.17.1

6. Packing is removed after 48 hours. During this period patient is given antibiotics to prevent infections.

Remember *If anterior packing failed to stop a confirmed and visualized anterior bleeding source, consider bilateral packing to increase the pressure on the nasal septum. If the anterior bleeding source was unconfirmed and bleeding continues, suspect posterior bleeding.*

Complications

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

Posterior Nasal Packing

Posterior nasal packing **(Figure.2.20)** is a procedure that is helpful in those cases of nasal bleeding where anterior nasal packing alone has failed to control the bleeding. It is normally done under local or general anaesthesia.

Indications for posterior nasal packing

1. Post adenoidectomy bleeding
2. Post angiofibroma excision bleeding from the nasopharyngeal area
3. Epistaxis not controllable by anterior nasal packing

Equipment

1. Gloves
2. Head light
3. Tape
4. Tongue depressors
5. Nasal speculum

6. Posterior packing (balloon methods) - Commercially produced double-balloon tampon; Foley catheter **(Figure.2.19)**, 10-14 French with a 30-mL balloon

7. Rubber catheters

8. Gauze

9. Post nasal pack (**Figure.2.18)**

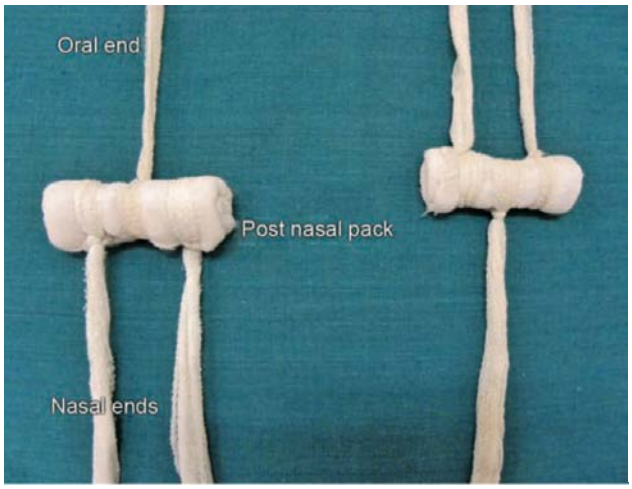
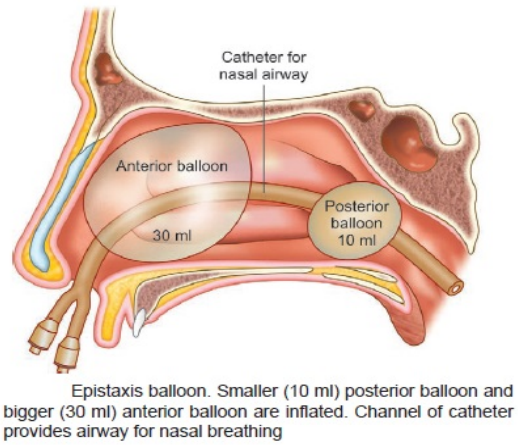


Figure.2.18

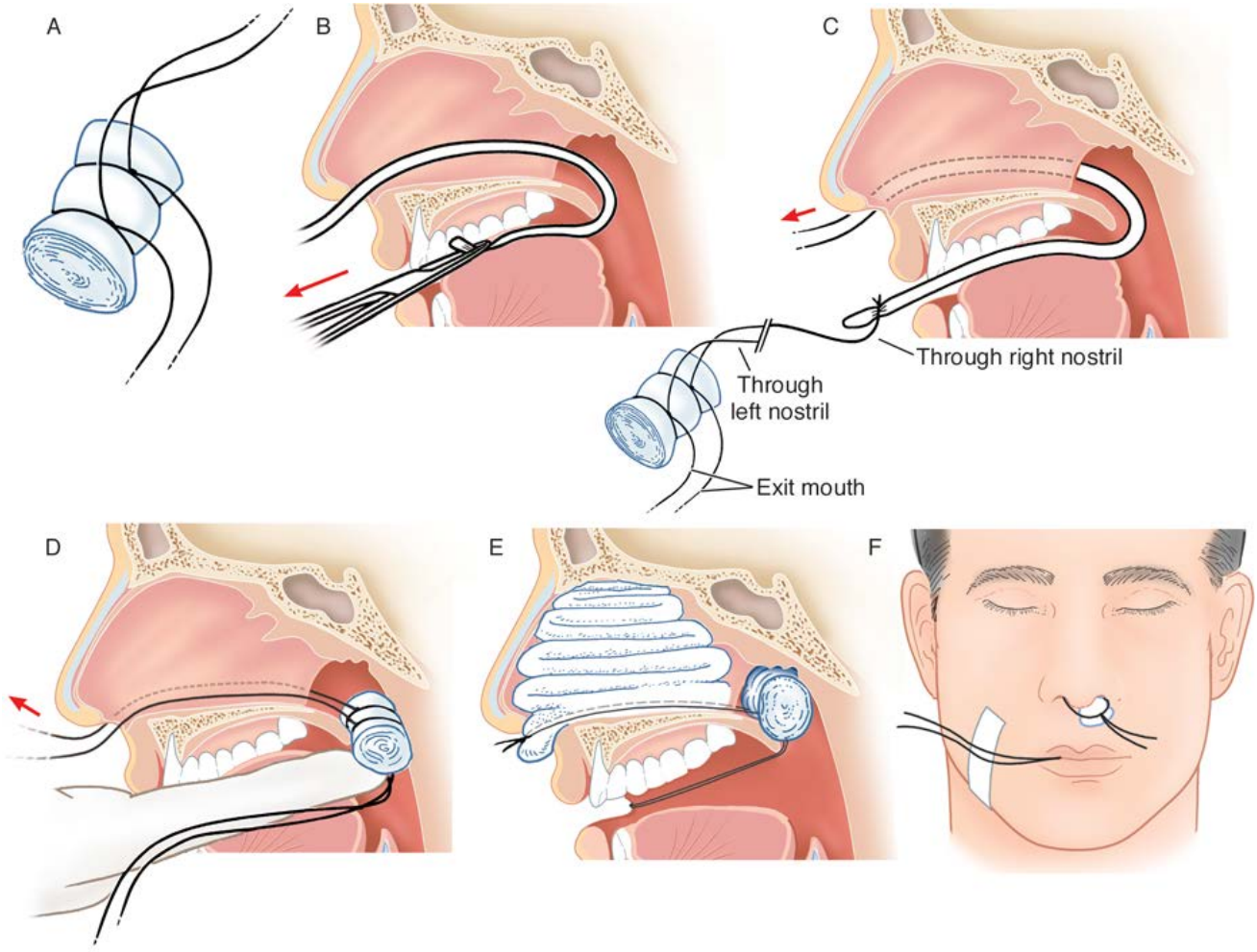
A post nasal pack



Epistaxis balloon. Smaller (10 ml) posterior balloon and bigger (30 ml) anterior balloon are inflated. Channel of catheter provides airway for nasal breathing

Figure.2.19

Foley catheter used instead of post nasal pack



Source: Reichman EF: *Emergency Medicine Procedures, Second Edition:* www.accessemergencymedicine.com

Figure.2.20

Procedure

1. Patient is under anaesthesia.
2. A thin red rubber catheter is passed one from the nostril, from anteriorly backwards into the oropharynx. They are drawn through the mouth and tied to two tapes secured to a pack
3. The post nasal pack is soaked in antibiotic ointment and a thread is attached to it
4. The catheter and attached tapes are then pulled forward through the nose and tied across a bolster which protects the columella
5. The thread attached to the pack is brought out through the mouth and attached to the cheek by adhesive tape. This thread helps in per-oral removal of the pack.
6. Usually, anterior nasal packing is also done with aminocaproic acid
7. The patient is kept on broad spectrum antibiotics and pack is removed after 48 hours once the bleeding has been under control

8. A foleys catheter may also be used instead of a post nasal pack. It is introduced along the floor of one nasal cavity into the nasopharynx. It is then inflated with air and the other end of the catheter pulled through the nostril. However, this procedure may not give adequate pressure in the nasopharynx
9. Embolization a. maxillaris
10. External carotid arteria ligation.

Complications

1. Acute otitis media.
2. Sinusitis.
3. Drying up of the mouth due to the mouth breathing.

How is posterior nasal packing removed?

Removal of pack: It can be done under local anaesthesia. However, to minimize the chances of bleeding and aspiration, especially for post operative cases it can be removed under general anaesthesia. In spite of the above, if the bleeding is not controlled, the anterior ethmoidal or internal maxillary artery is ligated.

Foreign body removal from nose

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 cannot be held firmly it is better to remove the foreign body under anaesthesia.

Equipment

- Wire Vectis
- Nasal speculum

Procedure

1. Patient sit upright or child is held firmly
2. Foreign body is inspected for its size, shape, consistency, location and lie in the nose.
3. A wire vectis is negotiated in the nostril beyond the foreign body and FB is pulled along with it
4. It is a very simple procedure in expert hands.

Complications

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

Evaluation of the Mouth and Throat

Performing Oropharyngoscopy.

The aim of this examination is to examine oral cavity and pharynx

Equipment

1. Reflecting head mirror
2. Separate light source
3. Tongue Depressors

Procedure

1.The assessment of the mouth and oropharynx starts with inspection of the face, head, and neck.
2.The face, ears, and neck are observed, noting any asymmetry or changes on the skin.
3.The neck is palpated, with the examiner paying special attention to the hyoid bone, thyroid and cricoid cartilages, and the thyroid gland (**Figure 2.21**).
4.Special attention should be paid to the size of the various glands in the face and neck including the parotid glands in the cheeks over the mandible, the submandibular glands that lie beneath the mandible at the "angle" of the jaw, and the thyroid gland.
5.During palpation, the examiner should also note swelling or tenderness of the lymph nodes in the neck and along the jaw.

Figure.2.21

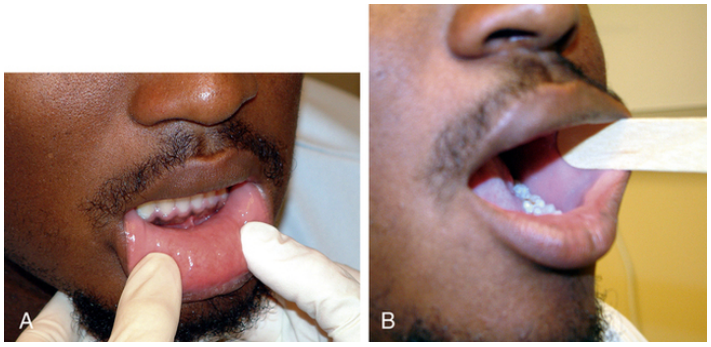


Figure.2.22

6. Examination continues with evaluation of the lips **(Figure.2.22. A)** with the mouth both open and closed, noting the texture, colour, and any surface abnormalities.
7. The examiner asks to open the mouth to visually examine the labial mucosa as well as the maxillary and mandibular vestibules and notes the colour and texture as well as any swelling of the mucosa or gingivae. The buccal mucosa is examined, extending from the labial commissure back to the anterior tonsillar pillar. **(Figure.2.22. B)**

Figure.2.23

Figure.2.24

Figure.2.25

8. A tongue depressor is used to pull the buccal mucosa away from the teeth **(Figure.2.23).** The examiner notes pigmentation, colour, texture, mobility, and other abnormalities of the mucosa.

9. First, the examiner examines the buccal and labial aspects of the gingivae and alveolar ridges (i.e., processes) by starting with the right maxillary posterior gingivae and alveolar ridge and then moving around the arch to the left posterior area.

1. 10. The inspection continues with the left mandibular posterior gingivae and alveolar ridge and moves around the arch to the right posterior area. The examiner looks for any abnormal lesions, especially white or dark pigmented areas. Stensen's duct, the opening of the parotid gland, will look like a small dimple opposite the upper second molar.

11. With the patient's tongue at rest and mouth partially open, the dorsum of the tongue is inspected for any swelling, ulceration, coating, or variation in size, colour, or texture. **(Figure.2.24)**

12. The examiner visualizes the papillary pattern on the surface of the tongue, asks the patient to stick out the tongue, and notes any abnormality of mobility or positioning.

13. Then the tip of the tongue is grasped with a piece of gauze to assist in its full protrusion and to aid in examination of the more posterior aspects of the tongue's lateral borders. (**Figure.2.25)**

Figure.2.26

14. The ventral surface of the tongue is examined along with the floor of the mouth. **(Figure.2.26)**

15. The examiner is looking for changes in colour, texture, swelling, or other surface abnormalities.

Figure.2.27

16. With the mouth wide open and the patient's head tilted back, the base of the tongue is gently depressed with a tongue depressor. **(Figure.2.27)**
17. The hard palate is examined, followed by the soft palate and oropharyngeal tissues.
18. Movement of the soft palate may be evaluated by asking the patient to say "ah." This also tests cranial nerves IX and X, the glossopharyngeal and Vagus nerves, respectively.
19. Next, the oropharynx is inspected while keeping the tongue depressed with a tongue blade.
20. The tonsillar pillars should be pink and blend in with the integrity of the retropharyngeal wall.

21. Hypertrophied or reddened tonsils that may be covered in exudates indicate a viral or bacterial infection.

22. The posterior wall is normally pink and smooth, although some irregular spots of lymphatic tissue may be present. A yellowish film may indicate postnasal drip.

23. The examiner may elicit the gag reflex at this point in the examination, which also tests the glossopharyngeal and Vagus nerves.

24. Ensure the patient feels good

25. Wash hands.

26. Document procedure.

Findings

Tongue

Size	Appearance	Swelling	Ulcers	Mobility
Macroglossia	Pink/pale/ leucoplakia/black hairytongue/glossitis/fissure	Number/ site/ size/shape/ surface/ other features	Size/shape/ number margins and base of	Check for "tongue tie"/hypogloss al nerve

			ulcers	injury/malignancy

Teeth and gum

- Carious teeth
- Loosening or absence of teeth
- Artificial teeth

Cheek and Gingivo-labial Gutters

Swelling	Ulcers	Congestion or Foreign body	Appearance
Number/site/size /shape/surface/other features	Size/shape/number margins and base of ulcers	Examine for FB and congestions	Leucoplakia/erythroplakia/ tobacco staining

Hard palate, soft palate, uvula

Appearance	Movement
Cleft palate Bifid uvula Torus palatinus	Restricted in Vagal palsy and Diphtheria

Anterior pillars

- Pink in colour (normal condition)
- Congestion due to infection

Posterior pillars

- Not visible when tonsils are enlarged

Tonsils

Colour	Size	Others
Normal- pink Infection- congested, red	Grade I – Medial surface of tonsil hidden behind Ant pillar Grade II- Medial surface of tonsil just at the level of Ant pilar Grade III- Size in between Gr II and Gr IV Grade IV – Tonsils touching each other (kissing tonsils)	Follicles, membrane, cyst, FB. Keratosis, Ulcer, Growth, etc.

Posterior Pharyngeal wall

- Congestion
- Bulging
- Postnasal drip
- Granulation
- Aphthous ulcer or malignant ulcer

Evaluation of the Larynx
Performing Indirect Mirror Examination (Laryngoscopy)

Figure.2.28: Laryngoscopy, showing a doctor looking into a patient's mouth, illuminated by indirect light from a gas lamp, vintage engraved illustration. Usual Medicine Dictionary by Dr Labarthe – 1885

The aim of this procedure is to examine hypopharynx and larynx

Equipment

1. Reflecting head mirror
2. Separate light source
3. Laryngeal mirror
4. Mirror warmer
5. Gauze tissue

Procedure

1. Explain the procedure to the patient and gain consent
2. Wear the surgical mask
3. Wash hands
4. Position yourself facing the patient at the same level as the patient, of 25-35 cm distance
5. Position the head mirror

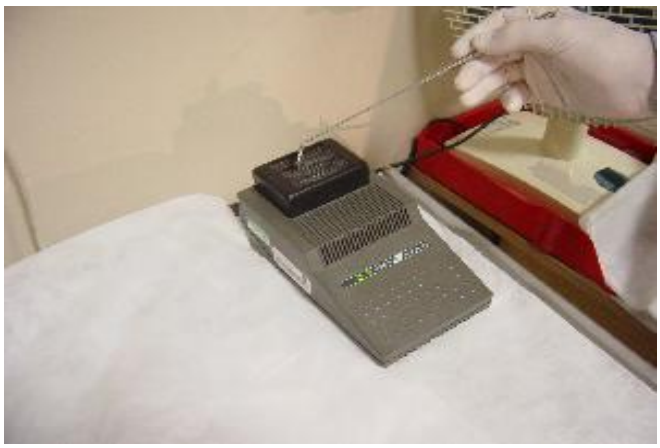


Figure.2.29

6. Heat the laryngeal mirror to prevent it from misting up. Check that it is not too hot by feeling its temperature on the back of your hand.

Figure.2.30

7. Position the patient with the lamp by his shoulder and ask him to stick out his tongue.

Figure.2.31

8. Reflect light from the lamp onto the mouth using a head mirror.

Figure.2.32

9. Carefully hold the patient's tongue firmly with the help of gauze square pad in between left thumb and middle finger. Rest your left index finger on the upper incisors in order to keep the upper lip is retracted.

Figure.2.33

10. Warmed laryngeal mirror is held like a pen and can now be inserted with care so that the patient does not gag. Light from the lamp via the head mirror is now directed onto the laryngeal mirror, to give a view of the larynx.

Figure.2.34

11. Vocal cords:
a. Appearance,
b. Position at rest,
c. In relation to each other, symmetry,
d. Glottic closure,
e. Movements in quite breathing, vocalization,
f. and deep breathing

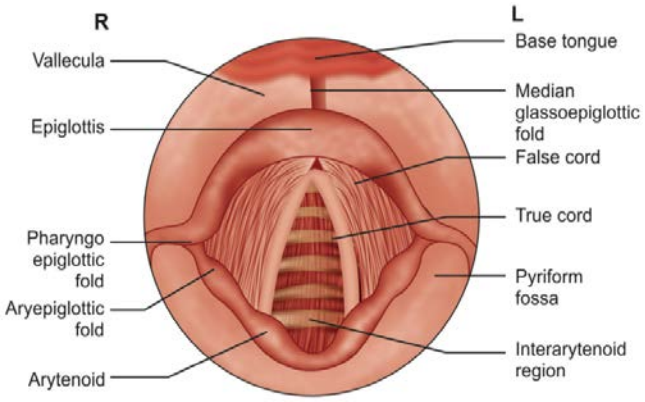


Figure.2.35

12. Various structures seen during laryngoscopy. Check for any congestion, oedema, ulcer, growth, foreign body, loss function or any other obvious lesions.
(Clinical Methods in ENT, PT Wakode, Jaypee Brothers Medical Publishers. 2013)

13. Ensure the patient feels good
14. Remove the head mirror.
15. Wash hands.
16. Document procedure

Foreign body removal from the throat

Equipment

- Good light source
- Head lamp or head mirror
- Laryngoscope or trans nasal flexible pharyngoscopy
- Tilley's forceps
- McGill's intubation forceps

Procedure

1. Use a good light to examine the patient.
2. Spray the throat with topical anaesthetic.
3. Try feeling for a FB even if you cannot see one in the tonsil or tongue base
4. Perform an AP and lateral soft-tissue radiograph of the neck.
5. For foreign bodies not visualized trans orally, the patient may be placed supine with a shoulder roll. A Macintosh or Miller laryngoscope can be inserted gently to the vallecula if tolerated. Alternatively, transnasal flexible pharyngoscopy can be used to guide a transoral extraction.
6. Tilley's forceps are best for removing foreign bodies in the mouth
7. McGill's intubating forceps may be useful for removing foreign bodies in the tongue base or pharynx.

Examination of the Ear

Otoscopy

When examining the ears, the examiner begins with a general inspection of the auricle, or pinna, noting its general size, shape, and symmetry. The clinician notes any deformities or discoloration indicating trauma to the external ear. The examiner also looks for lesions or nodules. Inspection of the external auditory canal for obvious discharge or Odor is included in the ear examination. Straw-coloured fluid draining from the ear after a head injury could be cerebrospinal fluid (CSF) indicative of a brain injury. The auricles and mastoid areas are palpated for point tenderness, swelling, and nonvisible nodules. The consistency of the auricle should be firm and mobile without nodules.

Equipment

1. Reflecting head mirror
2. Separate light source
3. Tar speculum

Key points of ear examination

1. Use the largest speculum that can comfortably fit in the ear.
2. Pull the pinna up and back to straighten the canal.
3. Do not insert the speculum too deep.
4. Expect the normal ear canal to look pink, without scaling or discharge.
5. Expect the normal tympanic membrane to be “pearly grey,” with no perforations, bulging, or redness.

Procedure

1. Patient is sitting up right. Explain to the patient what you are going to do.
2. Check with the patient that their ear is not sore too much.
3. Examine the pinna and look for periauricular abnormalities.
4. Examine for postauricular and endaural scars.
5. An otoscope with a disposal speculum is used to inspect the ear canal.
6. Specula come in different sizes to conform to different-sized ears.
7. The largest speculum that can be comfortably fit into the ear is used to allow the best view of the canal and the tympanic membrane.
8. The otoscope should be held like a pen with the little finger extended to touch the patient’s cheek. This position enables an early warning of head turning, particularly in children. The right hand holds the otoscope for the right ear examination and vice versa.
9. The otoscope is turned on by rotating the dial on top of the handle.
10. The examiner asks the patient to tip the head slightly toward the opposite shoulder and to avoid moving during the examination.
11. Because the canal slopes inferiorly and forward toward the eye, the external auditory canal must be “straightened” from its S shape by pulling the pinna up and backwards.

12. Otitis externa is suspected if the patient experiences pain while the examiner is pulling on the pinna. The speculum is inserted gently and slightly down and forward approximately 0.5 inch into the ear canal. The examiner places a finger or side of the hand against the cheek to guard against inserting the speculum too far into the ear (**Figure.3)**.

Figure.3.: To view the inner structure of the ear with an otoscope, the ear canal must be straightened by pulling the pinna up and back.

Using otoscope

1. To visualize the tympanic membrane the otoscope must be slowly moved in a circular direction as if looking at a large area through a small window.
2. The tympanic membrane appears translucent and “pearly grey” in colour. The translucent nature of a healthy tympanic membrane allows visualization of the middle ear cavity including the malleus. The tympanic membrane is concave because it is pulled in at the centre, or umbo, by the malleus, allowing a light reflex to be visible when inspected with an otoscope.
3. The light reflex occurs as a result of the otoscope’s light beam reflecting off the semi-transparent tympanic membrane and can be seen as a wedge-shaped bright spot originating from the umbo.
4. The tympanic membrane should be free from holes or breaks and should not be bulging or bloody. These signs may indicate a tympanic membrane puncture.
5. Redness of and around the tympanic membrane indicates infection in the middle ear, whereas a white colour may indicate pus behind the tympanic membrane.
6. A pneumatic otoscope (which can deliver a small puff of air to the tympanic membrane) may be used to confirm the flexibility of the tympanic membrane. A tympanic membrane that is bulging because of inflammation or infection will not be flaccid but rather is rigid when the puff of air strikes the membrane, and is indicative of otitis media.

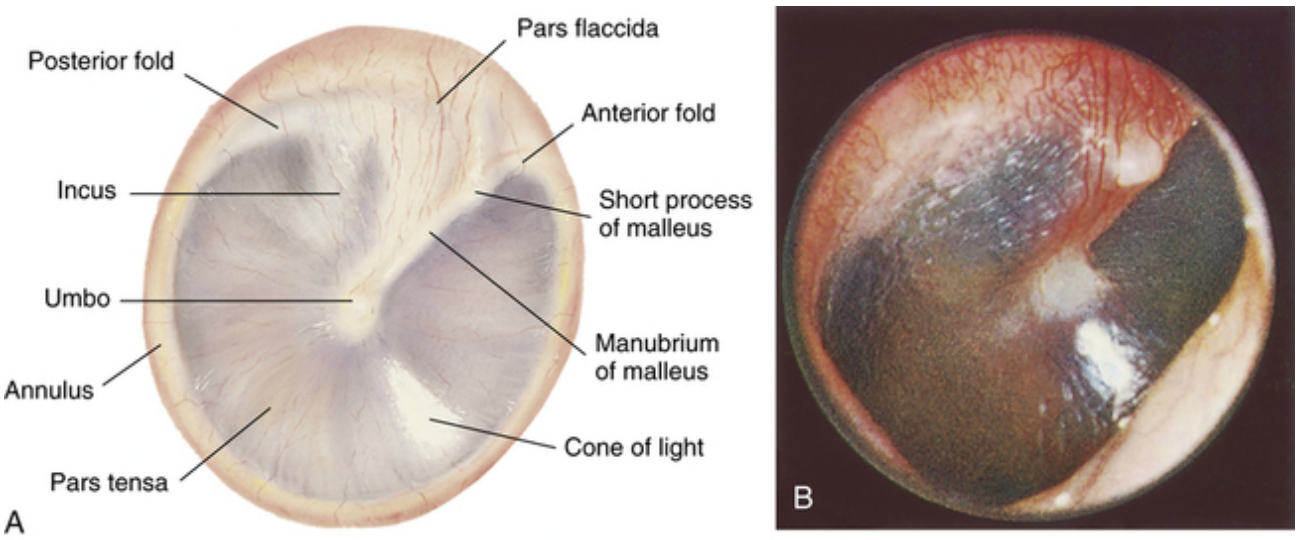


FIGURE.3.1. A &B The anatomic landmarks of the tympanic membrane. B, Normal tympanic membrane. (A from Potter PA, Weilitz PB: Mosby's pocket guide to health assessment, ed 6, St. Louis, 2007, Mosby; B from Jarvis C: Physical examination & health assessment, ed 5, St. Louis, 2008, Saunders.).

Abnormal Findings of the Tympanic Membrane

Abnormal Finding	Possible Indication
Pink or red, bulging	Inflammation of the tympanic membrane
Bluish or dark color	Blood behind the tympanic membrane
White color	Pus behind the tympanic membrane
Perforations or scar	Current or previous tympanic membrane rupture

Auditory canal abnormalities

Figure.3.2.A,B,&C

A. Otitis externa **B. Exostosis of external auditory** **C. Cholesteatoma**

(From Macleod's clinical examination. Graham Douglas, Fiona Nicol and Colin Robertson. 2013 edition)

Tympanic membrane abnormalities

Figure.3.3.A,B&C

A. Tympanic membrane perforation **B. Retraction pocket of pars tensa** **C. Grommet in situ**

(From Macleod's clinical examination. Graham Douglas, Fiona Nicol and Colin Robertson. 2013 edition)

Otitis media

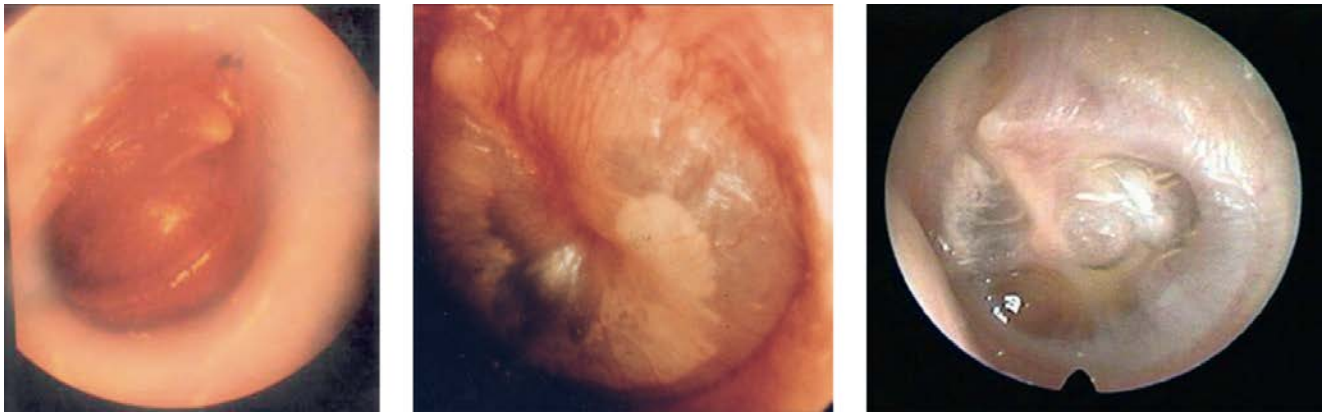


Figure.3.4.A,B&C

A. Acute otitis media **B. With effusion** **C. Fluid level behind tympanic membrane**

(From Macleod's clinical examination. Graham Douglas, Fiona Nicol and Colin Robertson. 2013 edition)

Examination of ear with Aural speculum

Equipment

1. Reflecting head mirror
2. Separate light source
3. Aural speculum

Procedure

1. Patient is sitting up right. Explain to the patient what you are going to do.
2. Wear the reflecting head mirror
3. Examining ear should face the clinician
4. Examine the pinna and look for periauricular abnormalities.
5. Examine for postauricular and endaural scars.

6. Proper size speculum is chosen.

7. The pinna is pulled upward, outward and laterally to make this sigma shaped canal straight.

8. Speculum is gently negotiated in the ear canal with rotatory movements and passed just beyond the junction of bony and cartilaginous ear canal, eardrum is examined. **(Figure.3.5**)

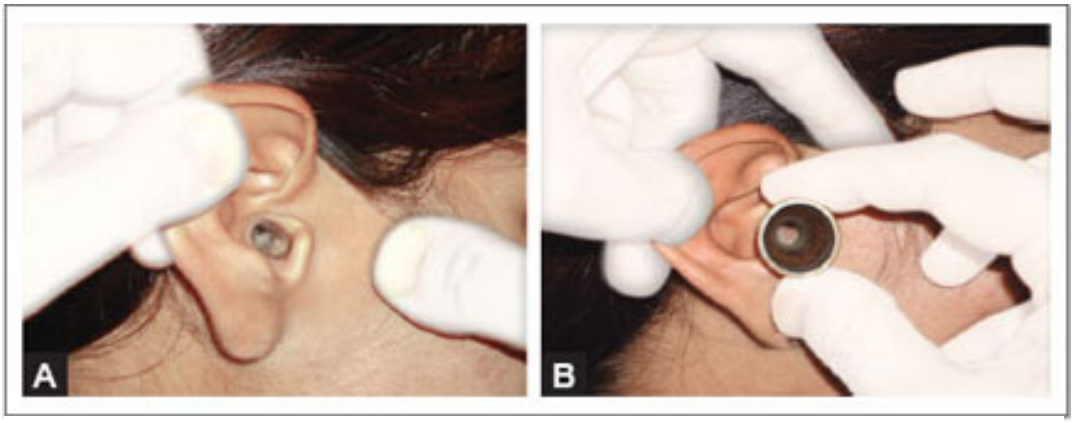


Figure.3.5.A&B

Gross hearing testing

Whispered Voice Test

During this test, your own voice is used as a stimulus, while the patient's non test ear is masked by rubbing your fingers over the tragus.

Ask the patient if they have noticed a change in their hearing recently. Assess each ear individually, standing behind the patient.

Procedure

1. Explain to the patient that you're going to say a word or number and you'd like them to repeat it back to you.

2. Stand behind the patient.

3. With your mouth approximately 15cm from the ear, whisper a number or word. **(Figure.3.6)**

4. Mask the hearing in the other ear by rubbing the tragus.

5. Ask the patient to repeat a set of 3 different random numbers (e.g., 6,1,9) presented to the tested ear at four decreasing levels of loudness

6. If the patient repeats the correct word or number, repeat the test at an arm's length from the ear (normal hearing: conversational voice at 60cm from the ear, and whispered voice at 60cm from the ear. Exhale completely prior to testing with whispered voice.) **(Figure.3.6.1)**

7. Assess the other ear in the same way.

Figure.3.6

Figure.3.6.1

The Weber and Rinne tests

The aim of this tests is to distinguish between sensorineural and conductive hearing loss. When a patient appears to have hearing loss, the Weber or Rinne test may be used to distinguish whether it is sensorineural or conductive in nature.

Equipment

1. Tuning fork 512hz/128

Weber Test

Turning 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. Patients may listen it on both side 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 labelled as "*lateralisation*" to that side.

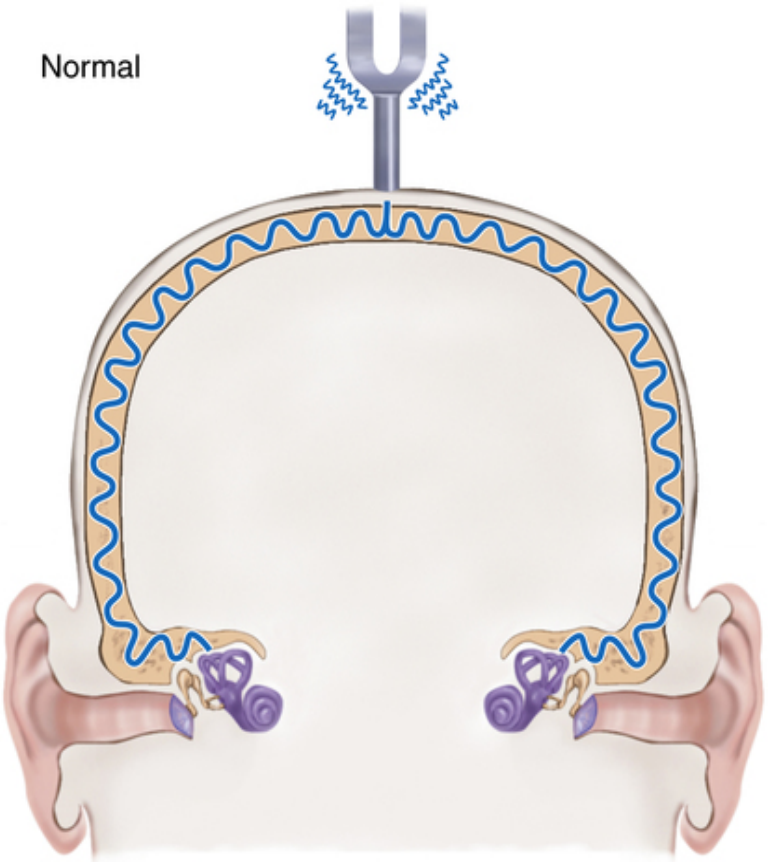
Procedure

1. Hold the tuning fork at its base, and tap it lightly against the palm of the hand to start its vibrations.

2. Place the tuning fork at the vertex of the patient's head.

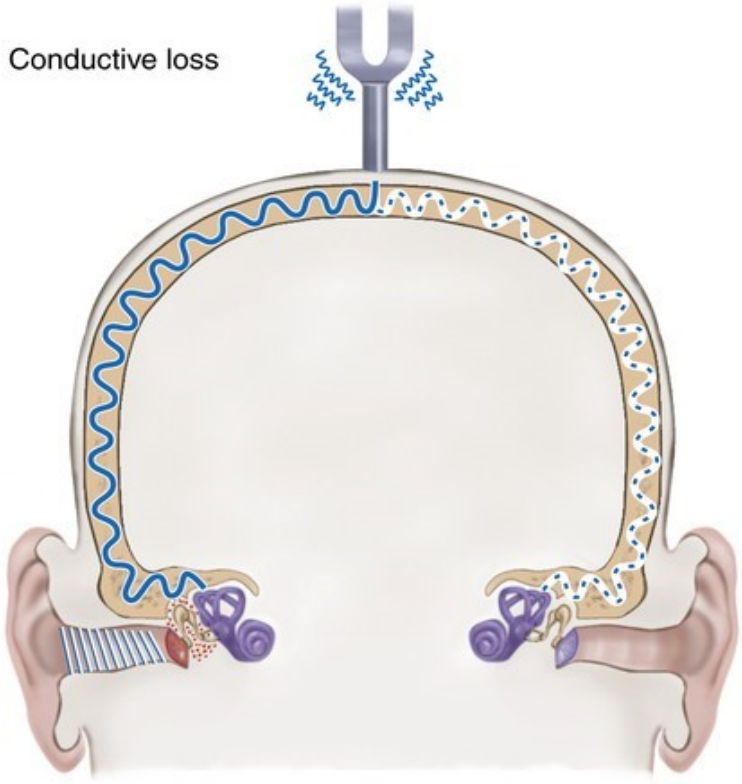
3. Ask the patient if the sound is heard better in one ear or equally in both.

Results



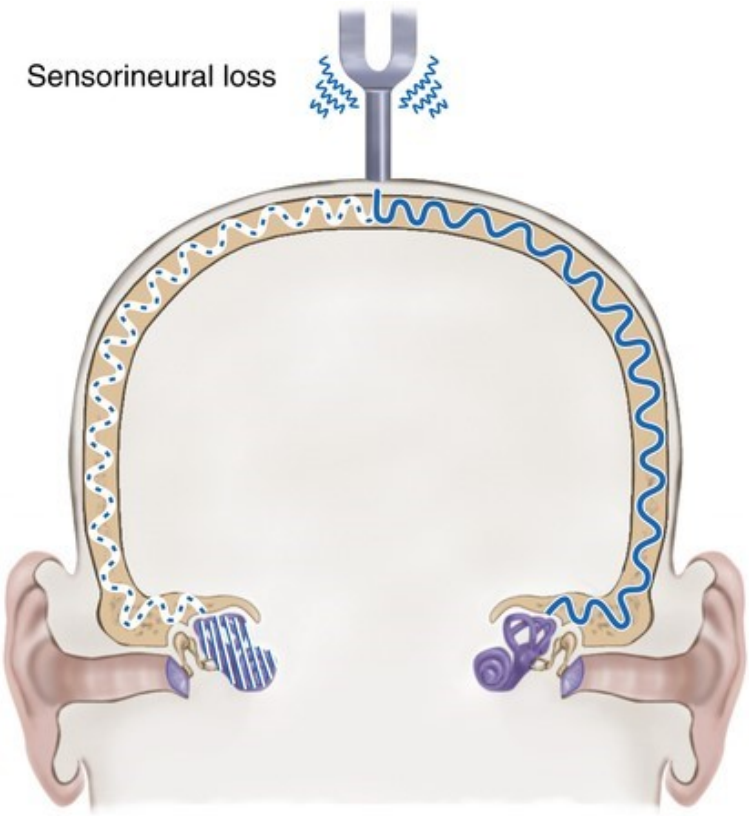
- Normal finding: Sound heard equally in both ears (Fig. 3.7).

Figure.3.7



- Conduction hearing loss: Sound heard best in impaired ear:
- Right conductive deafness (Fig. 3.8).

Figure.3.8



- Unilateral sensorineural hearing loss: Sound identified only in normal ear:
- Right conductive deafness (Fig. 3.9).

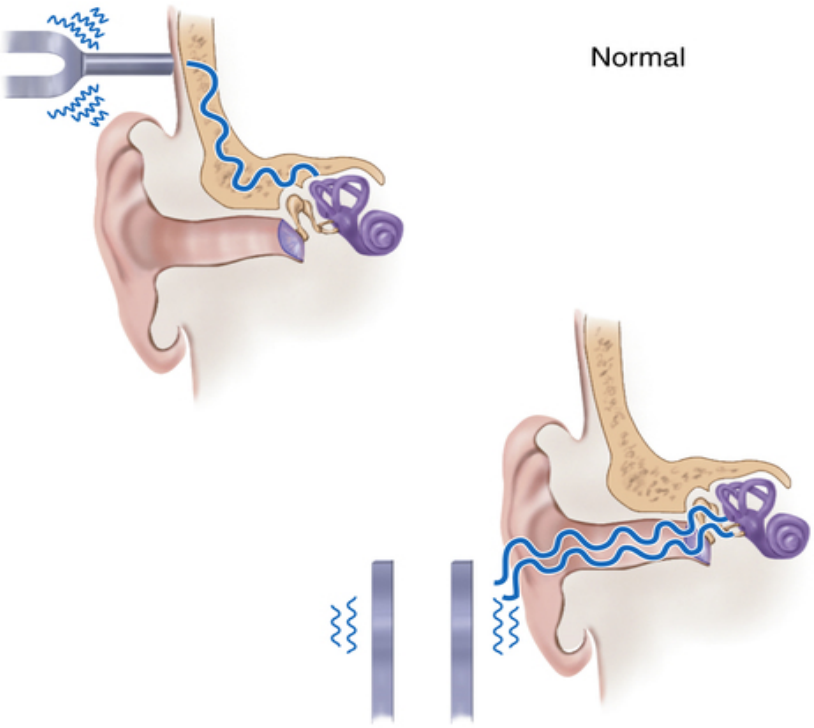
Figure.3.9

Rinne Test

This test is used to compare air conduction with bone conduction.

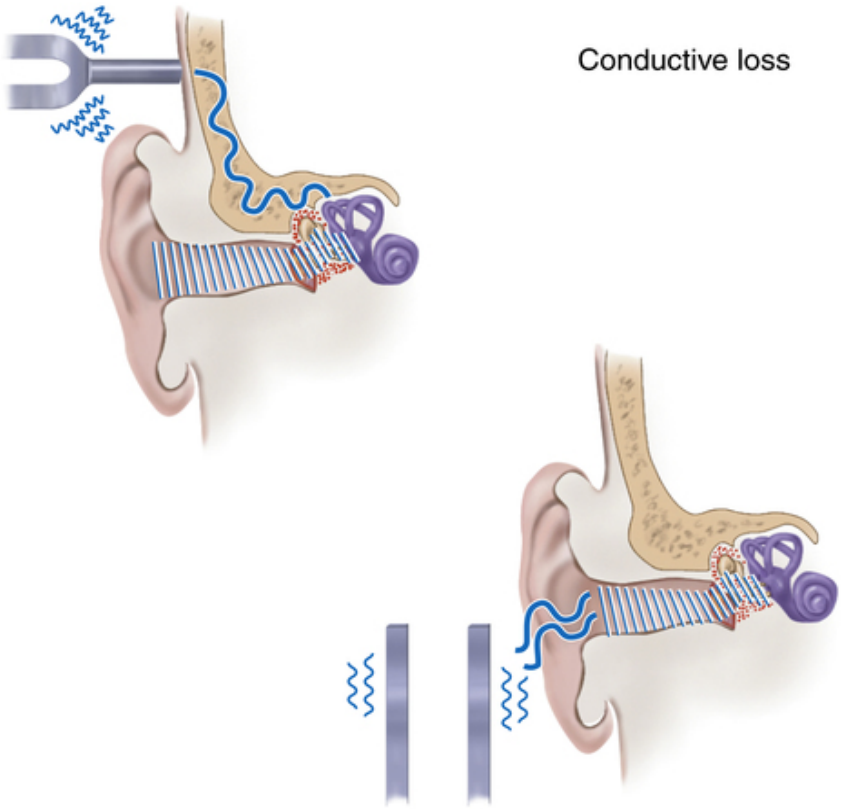
Procedure

1. Test is explained to the patient
2. A turning fork of 512 cps is taken. Hold the tuning fork at its base, and tap it lightly against the palm of the hand to start its vibrations.
3. Vibrating fork is placed lateral to ear canal approximately at a distance of 2 cm. Hold the fork in a such a way that axis of sound waves should be in the same axis that of ear canal.
4. Patient is asked to listen the sound.
5. Place the stem of the tuning fork immediately against the patient's mastoid process. Patient listens to the sound and again it is transferred in front of the ear canal. This is continued till patient stops listening at one place.
6. Ask the patient to say when the sound is no longer (by bone conduction and by air conduction) heard. Count the seconds until the sound is no longer heard and note the number of seconds.
7. Compare the number of seconds the sound is heard through the air and when in contact with the bone.
8. 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.
9. The test is repeated by using 256 and 1024 Hz.
10. Similar testing is done on opposite ear and findings are noted down.



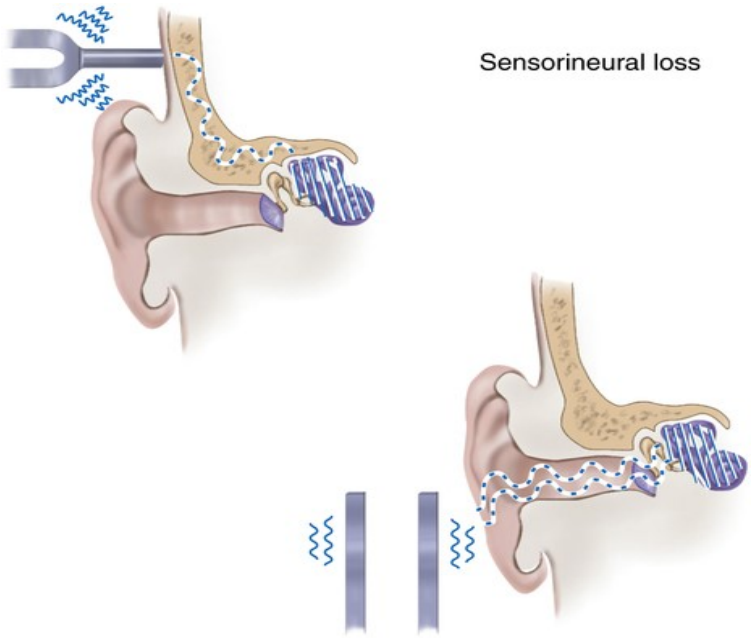
- Normal finding: Air-conducted sound heard twice as long as bone-conducted sound (Fig. 3.10).

Figure.3.10



- Conduction hearing loss: Bone-conducted sound can be heard longer (Fig. 3.11).

Figure.3.11



- Sensorineural hearing loss: Sound reduced and heard longer through the air (Fig. 3.12).

Figure.3.12

Modified from Jarvis C: Physical examination & health assessment, ed 5, St. Louis, 2008, Saunders.

CONDUCTIVE	TEST	NORMAL
0	Subjective noise	0
6 M	Whispered speech	6 M
> 6 M	Colloquial speech	>6 M
15	C128 (air)	60 c
28	C128 (bone)	30 c
20	C2048 (air)	20-30 c
Same or elongated	SCHWABACH	same
Lateralisation to affected ear	WEBER	No lateralisation
-	RINNE	+

SENSORINEURAl	TEST	NORMAL
+	Subjective noise	0
0,5	Whispered speech	6 M
3	Colloquial speech	>6 M
15	C128 (air)	60 c
10	C128 (bone)	30 c
5	C 2048 (air)	20-30 c
shortened	SCHWABACH	same
Lateralisation to nonaffected ear	WEBER	No lateralisation
+	RINNE	+

Rinne's test and its interpretation

Test details	Result	interpretation

– AC > BC – BC >AC – AC =BC – BC> AC?	– Rinne + Ve – Rinne –Ve – Rinne = – Rinne false negative	– Normal or SN loss. – Conductive deafness. – Mild conductive deafness. – This is seen when the 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 percives 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.

Quantification of HL using Rinne's test

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

Schwabach test or Absolute Bone Conduction (ABC) Test

In this test the bone conduction level of the patient is compared to that of clinician.

Procedure

1. Patient is explained the test
2. Test ear is closed by gently pressing the tragus against ear canal
3. Foot piece of vibrating tuning fork is kept over mastoid bone and patient listens to the fork till sound disappears completely.
4. 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
5. If clinician does not listen the sound after tranferring it from mastoid of the patient, the procedure may be reversed, i.e. clinician listen 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.

Pure Tone Audiometry (PTA)

Pure tone audiometry is a test is to get a qualitative and quantitative analysis of the patients hearing. The frequency range tested is 125 Hz to 8000 Hz.

The aims of pure tone audiometry

1. Analysis of the patients hearing loss (conductive hearing loss, sensorineural hearing loss or mixed loss);
2. For pre-operative and post operative evaluations
3. Medico-legal purposes
4. For prescription of hearing aid
5. In malingering patients

Procedure

1. Pure tone audiometry is carried out in a sound proof room.
2. Test is explained to the patient.
3. Headphones are applied and sound is fed.
4. Air conduction thresholds for frequencies up to 125, 250, 500, 1000, 2000, 4000 and 8000 Hz, and bone conduction thresholds for 250, 500, 1000, 2000 and 4000 Hz are done.
5. The patient is told to raise his finger or give a signal when he appreciates the slightest sound.
6. Level of sound for that is just audible for each frequency is measured and plotted on a graph called “audiogram”

Interpretation of pure tone audiometry

- Normal hearing is detection of pure tone at less than 20 dB
- Mild hearing loss: 21-40 dB
- Moderate hearing loss: 61-80 dB
- Profound hearing loss: no detection of pure tones below 81 dB

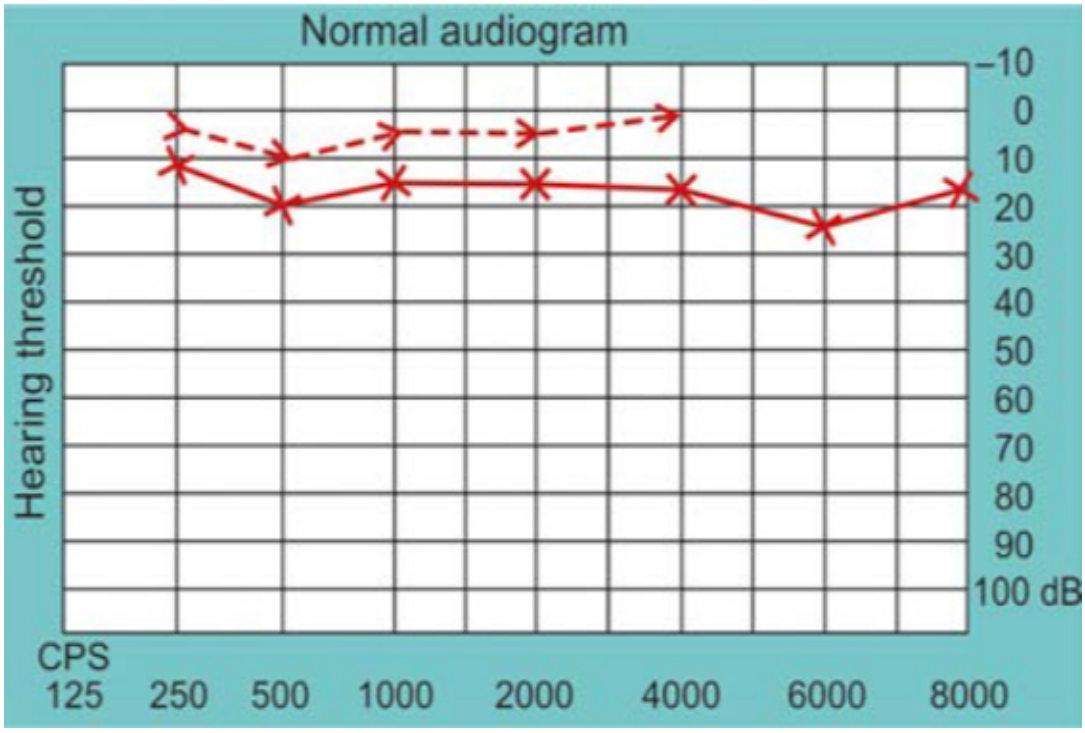


Figure.3.13

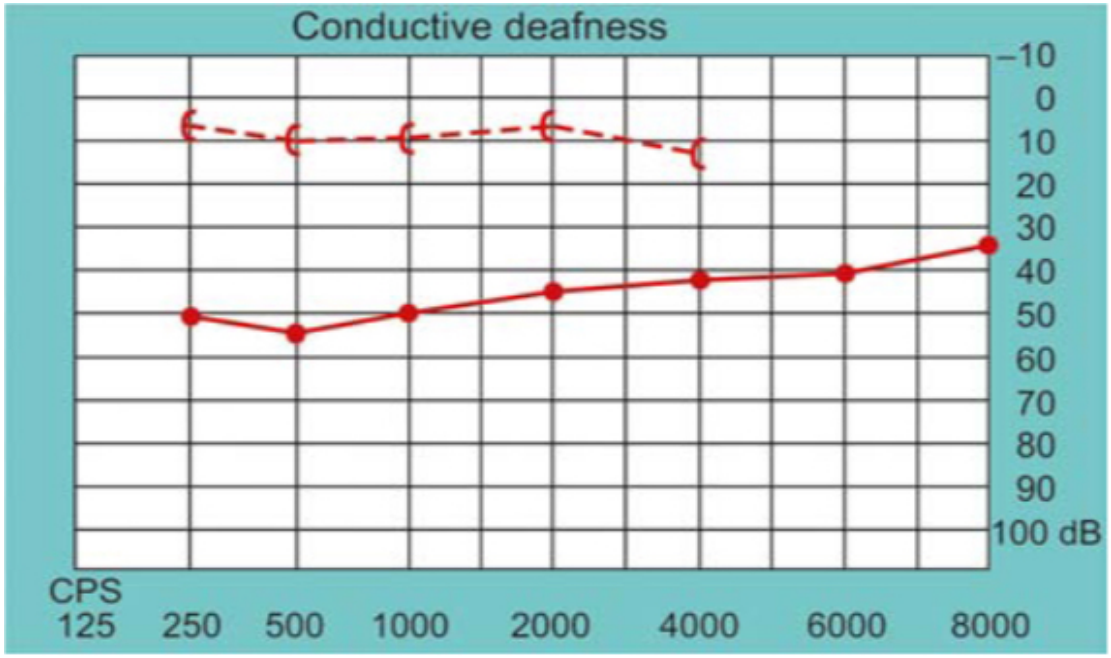


Figure.3.13.1

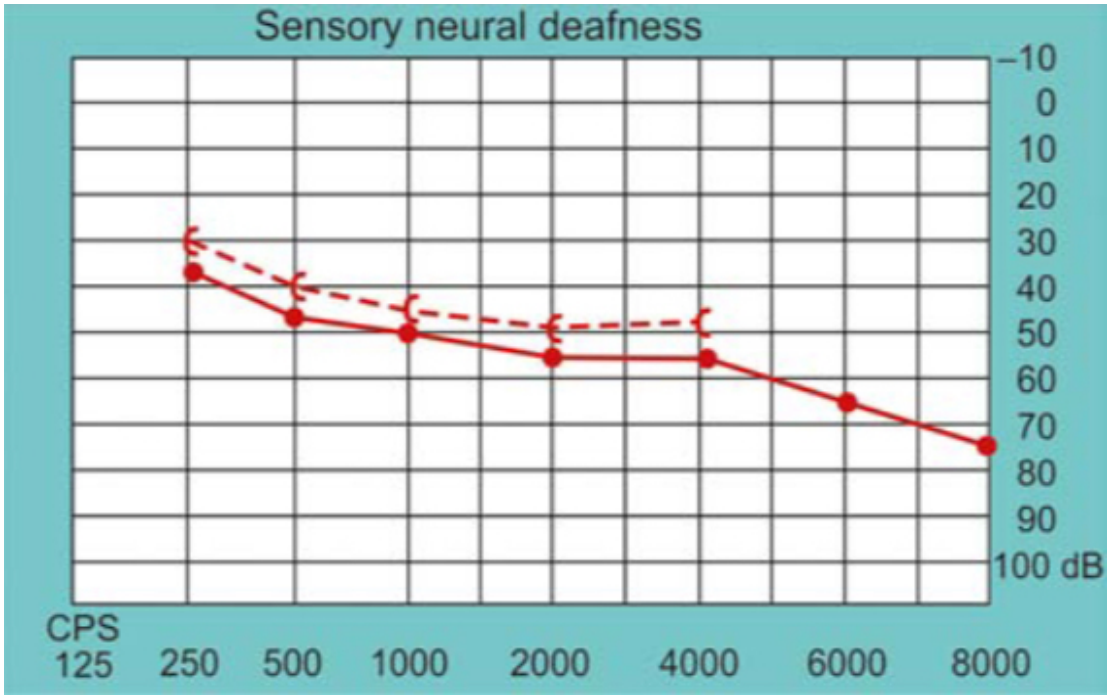


Figure.3.13.2

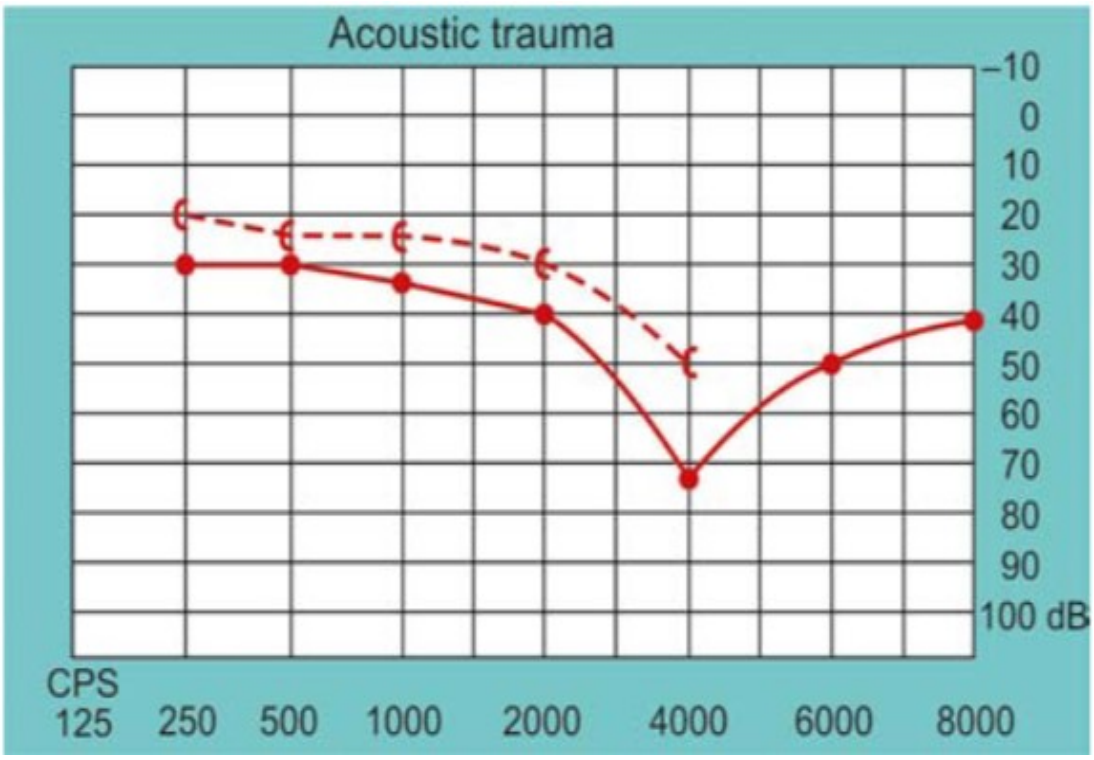


Figure.3.13.3

(Clinical Methods in ENT, PT Wakode, Jaypee Brothers Medical Publishers. 2013)

Important

1. The intensity of the sound raised above the normal level is directly proportional to the degree of hearing loss.
2. The bone conduction hearing is indicative of the cochlear function.
3. The difference between the thresholds of air and bone conduction is a measure of the conductive hearing loss.
4. The audiometer is calibrated such that a normal person would have an air bone gap within 20db with bone conduction higher than air conduction.
5. Sensorineural hearing loss shows reduction in threshold of both bone conduction and air conduction.

Foreign body removal from ear

Equipment

- Good light source
- Head lamp or head mirror
- Syringe irrigation
- Alligator or Tilley's forceps
- Mineral oil
- Wire Vectis

Procedure

1. Children will usually require a general anesthetic unless they are remarkably cooperative.

2. Insects may be drowned with mineral oil or lidocaine.

3. Syringe irrigation may be used if you can be certain there is no trauma to the ear canal or drum.

Caution: vegetable material may swell and further obstruct the canal with hydration.

4. Use a head lamp or mirror, an operating otoscope or microscope.

5. Soft foreign bodies (FB) such as cotton wool may be grasped with a pair of alligator or Tilley's forceps

6. Solid foreign bodies such as a bead are best removed by passing a wire Vectis or Jobson–Horne probe beyond the foreign body and gently pulling toward you.

Dix- Hallpike Positional Test

The aim is to check for a common type of vertigo called benign paroxysmal positional vertigo, or BPPV. Vertigo is the sudden feeling that you or your surroundings are spinning.

Principle: when a tiny crystal of calcium breaks free from the wall of one of semi-circular canals and moves into the canal. That can cause vertigo or make you feel like you're moving when you're not.

Procedure (Fig. 3.14)

1. Ask the patient to sit upright, close to the edge of the couch or table.
2. Warn the patient about what you are going to do.
3. Turn the patient's head 45° to one side.
4. Rapidly lower him, so that the head is now 30° below the horizontal. Say "Keep your eyes open even if you feel dizzy"
5. Watch the eyes carefully for nystagmus.
6. Repeat the test, turning the head to the other side.

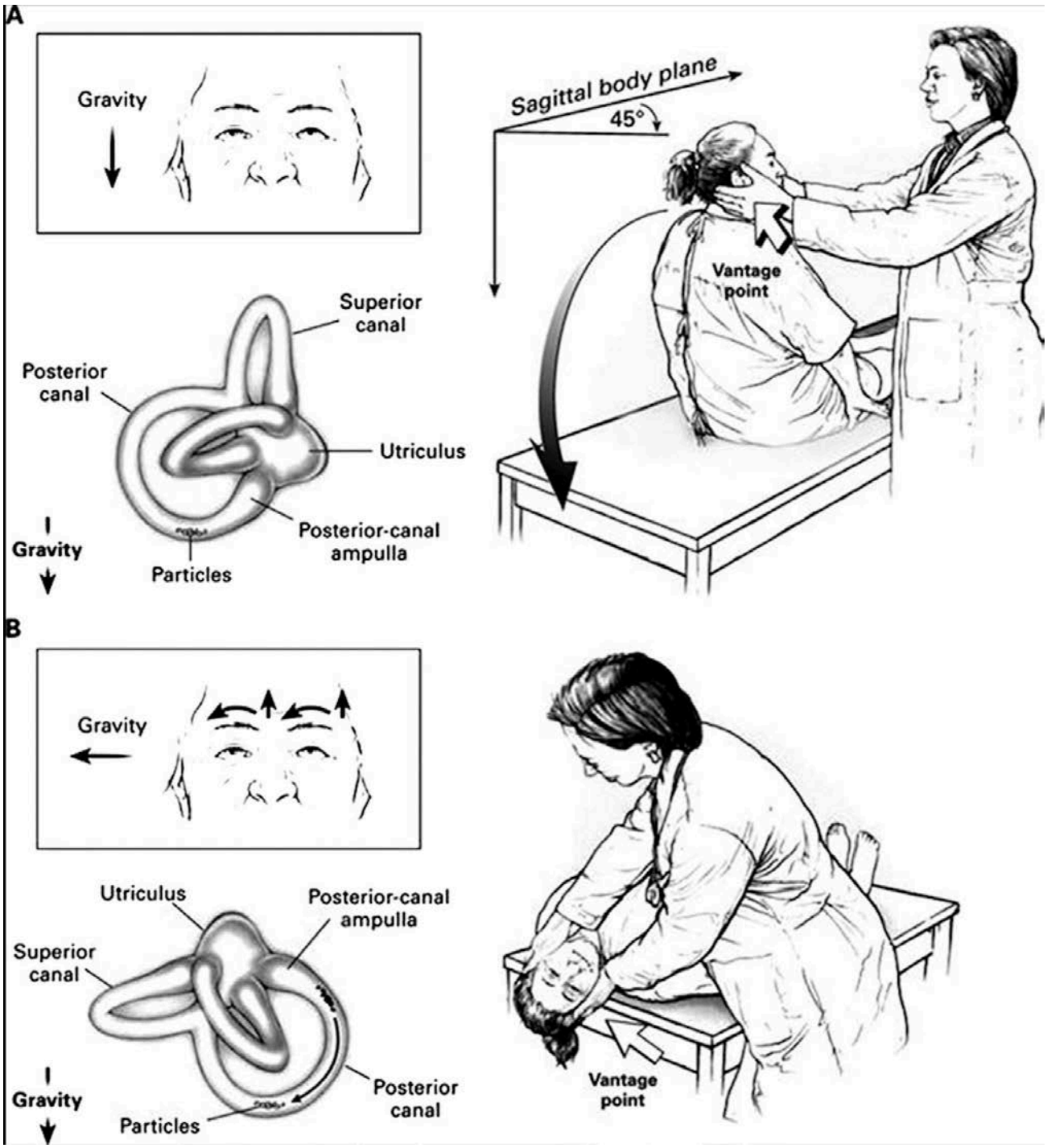


Figure.3.14

Unterberger's Test

The aim is to identify which labyrinth may be dysfunctional via vestibulospinal reflexes

Procedure (Fig. 3.15 – 3.15.1)

1. Explain the test to the patient
2. Ask the patient to march on the spot with his eyes closed and the hand stretched in front of him
3. Subject is assessed after 50-100 steps

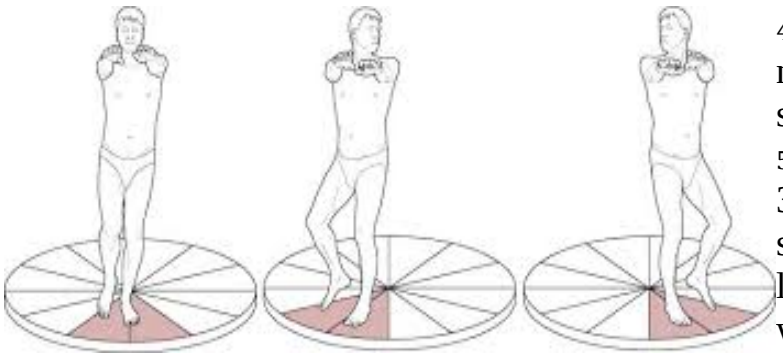


Figure.3.15

4. The maximum rotation in a normal individual is 30° to either side with 50 steps
5. A deviation of greater than 30° about the vertical axis suggests asymmetrical labyrinthine function with the weaker side identified by the direction of rotation.

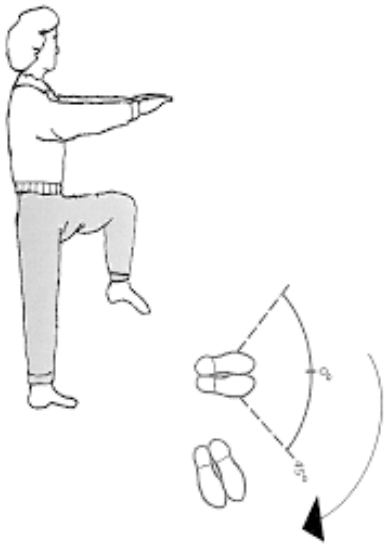


Figure.3.15.1

Fistula Test

The aim of the fistula test is to detect a fistula in the bony labyrinthine wall of the inner ear.

Principle: Pressure changes in the external auditory canal are transmitted to the labyrinth via the fistula which produces nystagmus.

Equipment

Figure.3.16: Siegel's speculum

Procedure

1. Patient is explained the test.
2. Pressure changes in the external canal are brought by applying intermittent pressure on the tragus or by Siegel's speculum.
3. In a normal person, the test is negative because the pressure changes cannot be transmitted into the labyrinth (when there is no fistula).

How are the results of Fistula test interpreted?

1. In fistula over the dome of the lateral semi-circular canal: Increase pressure causes conjugate horizontal deviation of the eyes towards the normal side. As pressure is maintained, jerk nystagmus develops with fast component towards the affected ear. As pressure is released, eyes return to normal
2. Fistula of the lateral semi-circular canal (anterior to the ampulla) causes deviation of eyes, to the affected side
3. Vestibular erosion causes rotatory horizontal nystagmus towards the diseased ear
4. Fistula of the posterior semi-circular canal causes vertical movement of eyes.

Fistula test is positive in:

1. Fenestration surgery (post-stapedectomy)
2. Round window rupture

False-positive Fistula test:

1. Congenital syphilis
2. Meniere's disease – (Hennebert's sign)
3. Hypermobile stapes footplate

False-negative Fistula test:

1. Cholesteatoma covering the fistula
2. Dead labyrinth.

Syringing Ears (Ear irrigation)

The aim of this procedure is in removal of wax, foreign bodies, debris from the ear.

This procedure is done by an aural syringe with a piston which can push water with force through a nozzle.

Equipment

1. Aural syringe
2. A kidney tray
3. Luke warm water/ saline

Indications for syringing

4. Removal of wax
5. Dried fungal debris
6. Epithelial debris
7. Blunt foreign bodies

Contraindications for syringing

1. Acute inflammatory conditions of the external or middle ear.
2. Perforation of the tympanic membrane

3. Hygroscopic foreign bodies
4. Sharp foreign bodies

Procedure

1. Position: Patient is seated with the ear to be syringed towards the examiner
2. Place your cerumenolytic of choice in the external auditory canal and leave it in the ear for fifteen to thirty minutes before initiating irrigation.
3. A kidney tray placed over the shoulder of the patient
4. The syringe is held in the right hand. Normal saline, distilled water or normal water can be used after boiling and cooling at 37º which is the normal body temperature. Water has to be cooled to body temperature to prevent labyrinthine stimulation.
5. Pinna is pulled upward and backward and stream of water is directed towards the posterior-superior wall of the meatus. The pressure of the water builds up deeper to the wax and expels the wax out.
6. Collect water and cerumen into a basin beneath the ear.
7. Repeat as necessary until the canal is clear
8. STOP if the patient complains of pain
9. The ear is made dry with a cotton swab after the procedure. At the end of this procedure, the ear canal, and tympanic membrane must be inspected and dried up with a cotton pledget.

Complications of syringing

1. Trauma to external canal or tympanic membrane
2. Giddiness usually temporary
3. Vaso-vagal attack
4. Spread of infection

Tracheostomy

"The time to do a tracheostomy is the first time you think of it"

The aim of tracheostomy is making an opening on the anterior wall of the trachea for establishing an airway.

What are the functions of Tracheostomy?

1. Reduces the dead space by 40%
2. In patients with severe respiratory depression, it allows Intermittent Positive Pressure Ventilation (IPPR)
3. For tracheobronchial toilet
4. Prevents aspiration as portex tracheostomy tube has a cuff
5. Creates a bypass to relieve upper respiratory tract obstruction.

Indications of tracheostomy

1. Intrinsic:

a. Laryngeal causes

i. Congenital
ii. Laryngeal stenosis
iii. Laryngeal web
iv. Laryngeal haemangioma

b. Traumatic
i. Cut throat injury
ii. Laryngeal oedema due to toxic fumes
iii. Strangulation
c. Inflammatory
i. Acute epiglottitis
ii. Acute laryngotracheal bronchitis
iii. Diphtheria
iv. Tuberculosis
2. Extrinsic: Extra laryngeal
a. Congenital – Choanal atresia
b. Trauma – Burns, chest trauma
c. Inflammatory
d. Ludwig's angina
e. Cellulitis
f. Neoplastic
i. Bronchogenic carcinoma
ii. Malignancy of thyroid
iii. Lymphoma
iv. Haemangiomas
3. Neural:
a. Poliomyelitis
b. Guillain-Barre Syndrome
c. Tetanus
d. Spinal cord lesions
e. Myasthenia gravis
f. Abductor cord palsy
4. Central:
a. Head injury
b. Muscle relaxant poisoning
c. Cerebrovascular accidents
d. Coma
5. Miscellaneous:
a. Prior to tongue, larynx and mandible surgery. Rarely bronchoscopy
b. Tracheobronchial toilet
c. Foreign body larynx
d. Rarely, laryngomalacia

Contraindications of tracheostomy:

As tracheostomy is a lifesaving procedure, there are no absolute contraindications to tracheostomy. However, some relative contraindications are. In patients with obstructive carcinoma of the larynx, once tracheostomy is done there are increased chances of stromal recurrence. Bleeding disorders: They can give troublesome bleeding from the tracheostomy site. If a foreign body is lodged below the level of the tracheostomy site, it would not help in relieving the stridor unless

emergency bronchoscopy is done. It must be understood that the above should not be considered in cases of an emergency.

Complications

Complications of tracheostomy are numerous but can be minimized if carefully performed, with good post operative care.

Complications are divided into:

I. ***Immediate***: They present before or at termination of the surgery.

1. Bleeding commonly from the thyroid isthmus, anterior jugular and inferior thyroid veins
2. Damage to recurrent laryngeal nerve
3. Damage to pleura
4. Apnoea, due to loss of hypoxic respiratory stimulation
5. Injury to cricoid cartilage (In high tracheostomy)
6. Vagal stimulation
7. False passage of the tracheostomy tube
8. Anaesthetic complications

II. ***Delayed or intermediate:*** They occur during the first few hours or days after the tracheostomy.

1. Surgical emphysema
2. Aspiration and lung abscess
3. Tracheitis and tracheobronchitis especially in children
4. Pneumothorax and pneumomediastinum may occur if the surgical emphysema progresses
5. Bleeding
6. Dysphagia due to pressure on oesophagus
7. Blockage of tube
8. Dislocation of the tube

III. ***Late complications***: They are the most common complications especially if the tube has been left there for a prolonged period.

1. Localised tracheomalacia
2. Tracheooesophageal fistula may occur due to an inadvertent incision on the posterior tracheal wall.
3. Tracheal stenosis due to injuries or perichondritis of cricoid cartilage.
4. Tracheo-cutaneous fistula
5. Difficulty in de-cannulation
6. Localised tracheomalacia occurs at the superior part of the tracheostomy opening if the tube is too large or sharply angled

What kind of post operative management is required for tracheostomy patients?

Post operative management of tracheostomy patient

1. A tracheostomy patient requires diligence and patience.
2. The tracheostomy tube should be kept in situ for 2-3 days before it can be changed and the tract is well formed.
3. A fresh tracheostomy tube and dilator must be kept near the patient.

4. As the patient cannot speak, a bell should be kept next to the patient.
5. Inner tube is removed and cleaned every one or two hours in the first 48 hours after tracheostomy. Later it can be cleaned every four hours.
6. Suction with aseptic precautions must be done every half an hour.
7. Humidification of the inhaled air is necessary to prevent tracheitis and crust formation. This can be done using a Walton's humidifier or, ultrasonic nebulizer in the room.
8. Chest physiotherapy is required to clear any accumulated secretions.
9. Local dressing to be changed every day using sterile gauze and anti-septic cream to avoid skin erosion and wound infection.
10. Mucolytic agents and expectorants
11. Antibiotics in cases of chest or wound infection

Topical Medicine Application

The purpose of using topical medicine is to deliver medication directly onto areas that are irritated, inflamed, itching, or infected. It uses for topical anaesthesia and/or vasoconstriction.

Equipment

1. Applicator: nasal (short), laryngeal (long)
2. Cotton wool
3. A tropical medicine: Lidocaine 2% or Epinephrine 1:1000.

Procedure

1. Wash hands and put on gloves
2. Prepare applicator
3. Check the medication label to avoid medication errors. Be sure it is the right medicine, the right dose (strength), the right time, the right person and the right method. Look at the expiration on the label. Do not use outdated medicine.
4. Soak cotton end of applicator in a mix of 2% lidocaine and 1:1000 epinephrine. Put applicator under the lower turbinate.
5. Then do it on the other side.
6. Leave the applicator in place for 5 minutes.
7. Remove the applicators
8. After applying topical medicine, place the glove and/or cotton wool in a trash bag.
9. Wash hands.
10. Document the medication administrations.

Administering otic (ear) drops

1. Wash hands with soap and warm water, applying vigorous friction for at least 20 s. Put on clean gloves.
2. Ask the patient to lie on his/her side, with the affected ear (i.e., the ear that requires medication administration) towards the ceiling.
3. Gently roll the medication between both hands for 10-20 s to both re-suspend particles and to warm the medication prior to administration. Cold ear medications may cause dizziness or nausea when administered.

4. Using the non-dominant hand, gently pull the ear auricle up and outward to straighten the ear canal. For children 3 years old and younger, grasp the pinna and pull down and back to straighten the canal.
5. Hold the medication bottle with the dominant hand approximately 1 cm above the ear canal and instil the prescribed number of drops. Never allow the tip of the medication bottle to touch the ear or the ear canal.
6. Release the ear and gently place the medication bottle on the bedside table.
7. To ensure medication application down the ear canal, gently rub the tragus and/or gently tug the ear pinna.
8. Ask the patient to remain on his/her side for 2-3 min to aid in medication absorption.
9. As with all medication administration and patient contact, remove gloves and complete hand hygiene.
10. Document the medication administrations.

Swab

Swabs suitable for taking specimens of exudates from the throat, nasal cavity, ear, skin, wounds and other accessible lesions consist of a sterile pledget of absorbent material, usually cotton-wool or synthetic fibre, mounted on a thin wire of sticky.

Swabs for special purpose:

1. Nasal swabs;
2. Post-nasal swabs;
3. Laryngeal swabs
4. Throat swabs

Nasopharyngeal (NP) swab specimen

The aim of this procedure is to take a nasopharyngeal (NP) swab specimen, commonly used in flu testing.

Procedure

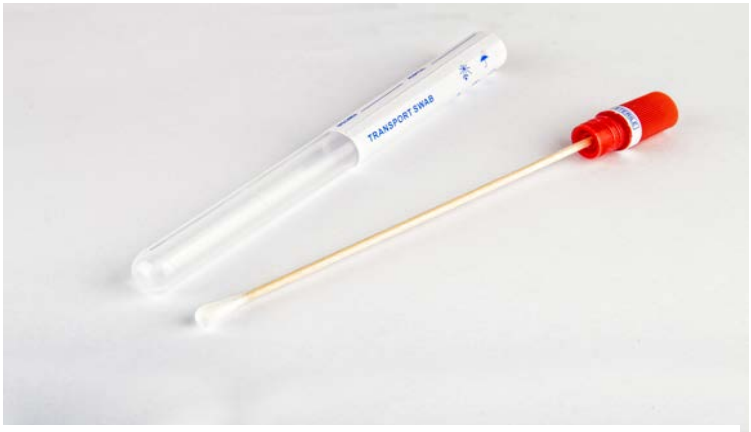


Figure.3.17

1. When collecting samples, it is recommended to wear appropriate personal protective equipment (gloves, surgical mask, eye protection).
2. Choose a swab with a flexible plastic handle and flock tip moistened with sterile saline.
3. Insert swab into one nostril straight back (not upwards) and horizontally to the nasopharynx up to the measured distance on the swab handle.
4. Rotate the swab up to 5 times and hold in place for 5-10 seconds to collect sample material.
5. Remove swab and insert into a vial.
6. Break the swab handle at

scored breakpoint line.

7. Label the vial with appropriate patient information.

8. An Ideal Request form:

a. Name Age Sex
b. IP/ OP N^{o}
c. Time Date Ward
d. Urgent / Routine☐
e. Nature of specimen☐
f. Investigation needed
g. Doctor/Staff Contact No

Oral, Nasopharyngeal, Nasal, Laryngeal, Throat swabs

Procedure

1. Container: Swab moistened with Stuart's or Amie's medium

2. Collection:

a. Oral swab:

- Remove the oral secretions or debris from the surface of lesion with swab and discard;
- Using 2nd swab, vigorously specimen the lesion avoiding any areas of normal tissue

b. Nasopharyngeal swabs:

- To collect nasopharyngeal cells, all mucus is removed
- Small flexible nasopharyngeal swab is inserted along the nasal septum to the posterior pharynx
- Rotate slowly for 5 sec. against the mucosa several times

c. Nasal swab:

- Use swab moistened with sterile saline.
- Insert approx. 2cm into nares
- Rotate swab against nasal mucosa
-

d. Laryngeal swab:

- Before use the swab is moistened with sterile What is the difference between using sterile distilled water.
- Patient is made sit and holding the tongue fully protruded with help of a piece of gauge,
- Pass the swab back through the mouth wire mid-line and downwards over the epiglottis into larynx where it should induce reflex coughing that will expel sputum onto swab
- Withdraw the swab and replace it in its tube for delivery to the laboratory

e. Throat swab (**Figure 3.18**):

- Depress the tongue with a tongue depressor

- Introduce the swab between the tonsillar pillars and behind the uvula without touching the lateral walls of the buccal cavity
- Swab back and forth across the posterior pharynx
- Any exudates or membrane should be taken for specimen
- Transport: Within 24hrs

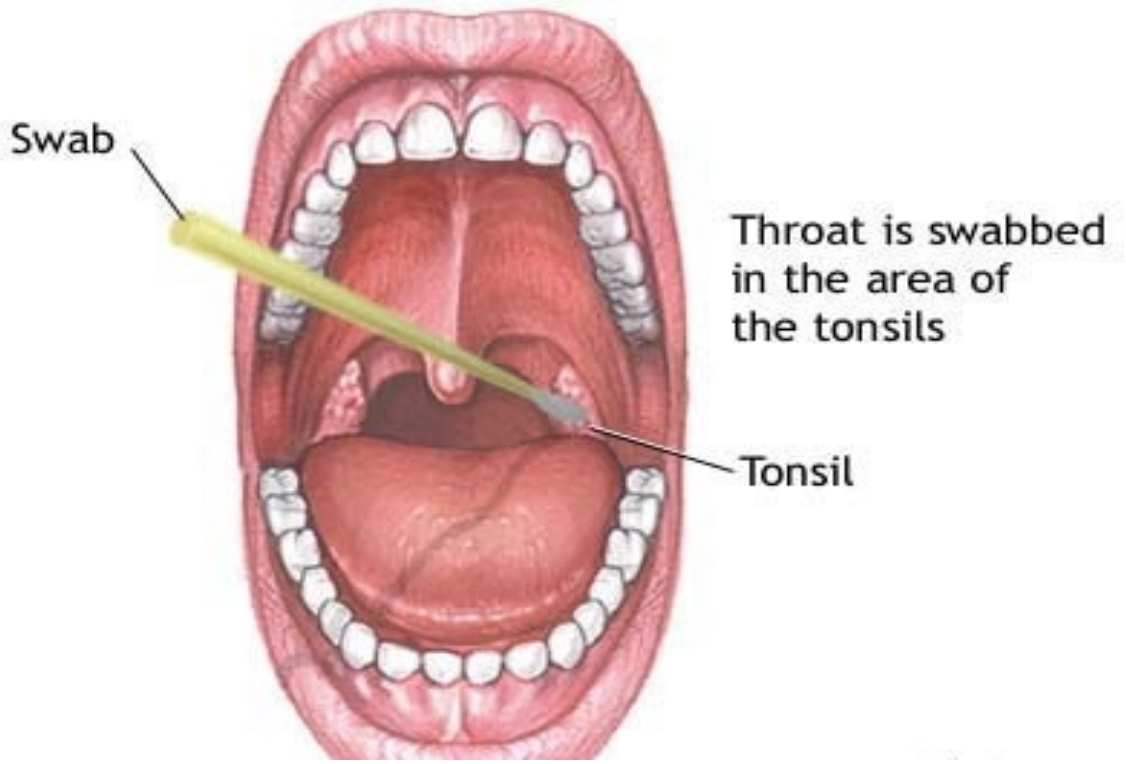


Figure.3.18

Normalizing middle-ear pressures

Politzerization

Politzerization, also called the Politzer manoeuvre or method, is a medical procedure that involves inflating the middle ear by blowing air up the nose during the act of swallowing. It is often performed to reopen the Eustachian tube and equalise pressure in the sinuses.

The procedure was derived from a medical experiment first performed by Ádám Politzer of Vienna. He introduced a pear-shaped rubber air-bag for performing the procedure in 1863, which came to be known as a Politzer bag.

Procedure

1. Rubber tube attached to Politzer bag is put into one nostril and both nostrils pinched.
2. Ask the patient to swallow repeatedly or count 1-2-3 and politzer bag is squeezed simultaneously.

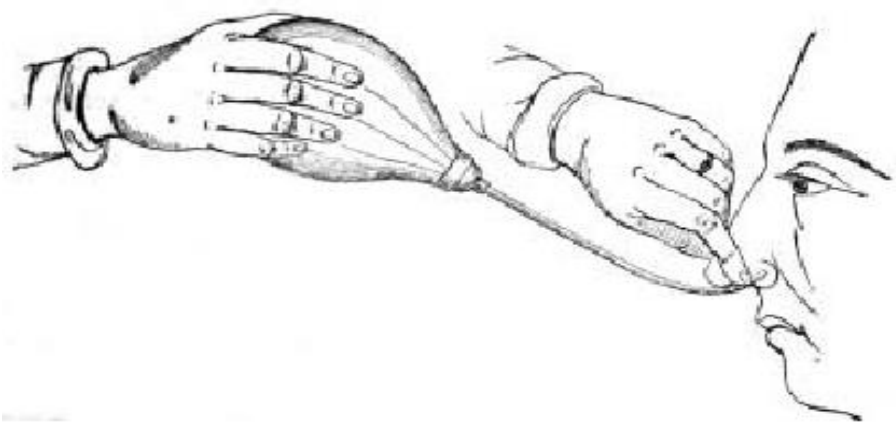


Figure.3.19

Valsalva manoeuvre

VM is performed by moderately forceful attempted exhalation against a closed airway, usually done by closing one's mouth, pinching one's nose shut while pressing out as if blowing up a balloon.

Variations of the manoeuvre can be used:

1. In medical examination as a test of cardiac function and autonomic nervous control of the heart,
2. To clear the ears and sinuses (that is, to equalize pressure between them) when ambient pressure changes,
3. In diving, hyperbaric oxygen therapy, or air travel.

The technique is named after Antonio Maria Valsalva, a seventeenth-century physician and anatomist from Bologna whose principal scientific interest was the human ear. He described the Eustachian tube and the manoeuvre to test its patency (openness). He also described the use of this manoeuvre to expel pus from the middle ear.

Procedure

1. Ask the patient to take a deep breath,
2. Close your mouth and pinch your nose with the thumb and index finger
3. Attempt to breathe out gently, keeping your cheek muscles tight, not allowing them to bulge out.

Mobility of Tympanic membrane

– While the patient is doing the manoeuvre, his ear drums are observed otoscopically. If the eardrum moves laterally, it is said that TM is mobile and ET is patent. These movement may be restricted or absent in middle ear dysfunction.

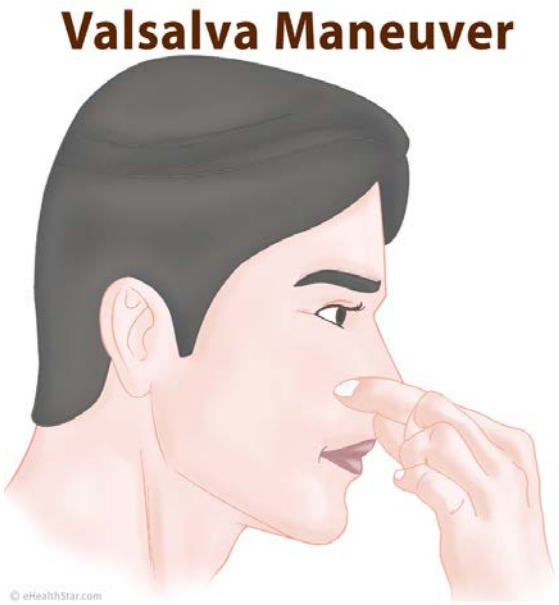


Figure.3.20

Eustachian tube catheterization

Aim: This procedure is more than a century old and was earlier routinely done to check patency of the Eustachian tube.

Equipment

1. Eustachian Tube Catheter

Procedure

1. The tip of the catheter is inserted into the nose and passed along the floor of the nasal cavity till it touches the posterior pharyngeal wall. The tip is now in the nasopharynx.

2. It is then rotated 90° medially and drawn forward till it meets resistance. The tip is now touching the posterior free end of the nasal septum.
3. At this point, the tip is rotated 180° laterally so that it enters the opening of the Eustachian tube in the lateral wall.

4. A Politzer bag is attached to the other end of the catheter. Air pushed from it can be heard rushing into the ear if the Eustachian tube is patent.

5. The original procedure was a blind one, with only the metal ring to indicate the direction of the catheter's tip. But the procedure can also be done under endoscopic guidance.

Important: the method only tests patency of the Eustachian tube and does not reflect on its function.

Vestibulometry

Vestibulometry (Latin vestibulum a threshold + Greek metreo to measure, measure) — investigation of function of a vestibular mechanism.

Equipment

1. Barani's chair

Barani's chair — the chair rotating in the horizontal plane (Fig. 3.21) offered in 1906 to Barani for artificial irritation of a vestibular mechanism. At research the examinee sits down in a chair, puts legs on a support, edges do not concern a floor, and clasps ahead of himself the steel bar (chain) strengthened on armrests not to drop out of a chair during rotation. The doctor by means of a core manually rotates a chair with various speed a necessary number of times depending on character of a research, then stops and watches a nystagmus.

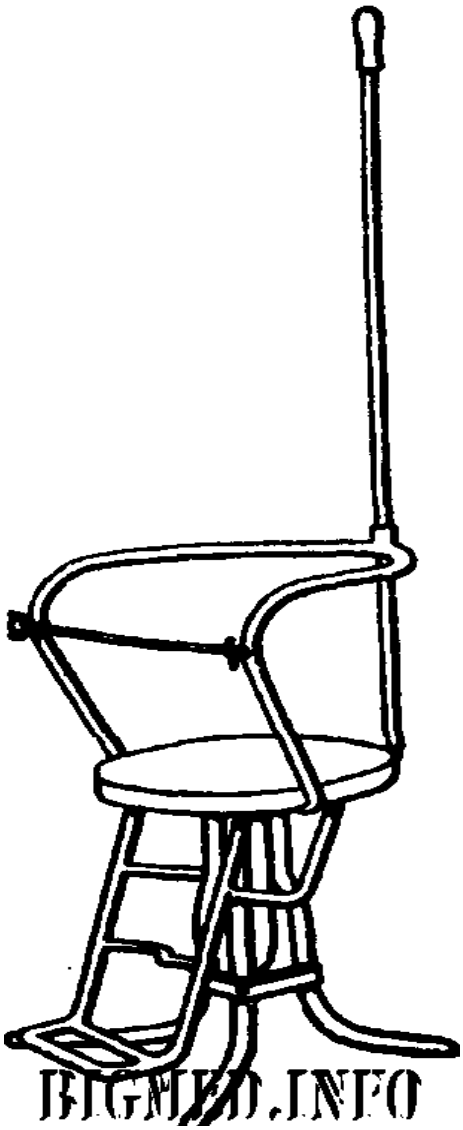


Figure.3.21

Rotary test

1. Rotary test is made on a usual chair of Barani or on a chair with the devices allowing to graduate duration and power of irritation (kupulometry).
2. The nystagmus arises both at the beginning of rotation, and after its termination (postnystagmus).
3. Duration of a post rotary nystagmus after tenfold rotation in the plane of horizontal semi-circular channels (rotation of the patient in a sitting position, the head is hung on 30 ° down) on average equals 20 — 30 sec.
4. The nystagmus in such conditions is caused preferential by current of an endolymph in horizontal semi-circular channels. It is caused by the fact that at the person uptakes do not lie in mutually perpendicular planes and their receptors react to rotation in various planes. Therefore, the isolated irritation of lobbies or back semi-circular channels by rotation is impracticable. At rotary test results depend on simultaneous irritation of both labyrinths that limits a possibility of use of this test at clinical trials.

Double rotation

1. Double rotation according to V. I. Voyacheka a trunk of investigated is inclined forward by 90 degrees and rotate in Barani's chair of 5 times during 10 sec.
2. After the spinning investigated continues to sit blindly in the same situation during 5 sec. then to it suggest to become straight quickly.
3. The combined irritation of receptors of a vestibular mechanism is as a result created. People with normal excitability of a vestibular mechanism transfer such functional load easily, they have no considerable motor and vegetative reactions.
4. Emergence strong motive, especially vegetative, reactions testify to the lowered resistance to vestibular «loadings». Functional researches of a vestibular mechanism are made also by means of Hilov's swing and centrifuges.

Caloric test

Caloric testing is a useful clinical tool that can assess and quantify the functional status of the individual vestibular systems. The test utilizes the mechanics of the vestibular-ocular reflex to test for a unilateral peripheral deficit. The vestibular-ocular reflex requires an intact brain stem to function, and its purpose is to maintain eye fixation on a stationary target while the head is in motion, thus keeping the object of attention in the centre of the visual field

Caloric test is based on emergence in a labyrinth at thermal irritation (warming or cooling) of convection currents of an endolymph. The main advantage of a method is the possibility of influence by an irritant on each labyrinth separately.

Procedure

1. Patient sits with the head which is cast away back (on 60 °).
2. Enter 100 — 200 ml into outside acoustical pass cool (usually from 15 to 30 °) or is hotter (St. 37 °) than water.
3. At introduction of a cold water in the horizontal semi-circular channel there are currents of an endolymph causing a horizontal nystagmus in the party

opposite to the irritated ear, and at administration of hot water — towards the studied ear.

4. With loss of vestibular function, it is not possible to cause a nystagmus by means of caloric test in patients. For ensuring the uniform and dosed water delivery of a certain temperature use the special device — otokalorimetry.

5. For the purpose of definition of a threshold of vestibular excitability in an ear pour in 5 — 10 ml of water (27 — 35 °) — Kobrak's method.

6. Caloric test is not applied at dry perforation of a tympanic membrane. At perforation of a tympanic membrane blow a cold air.

7.

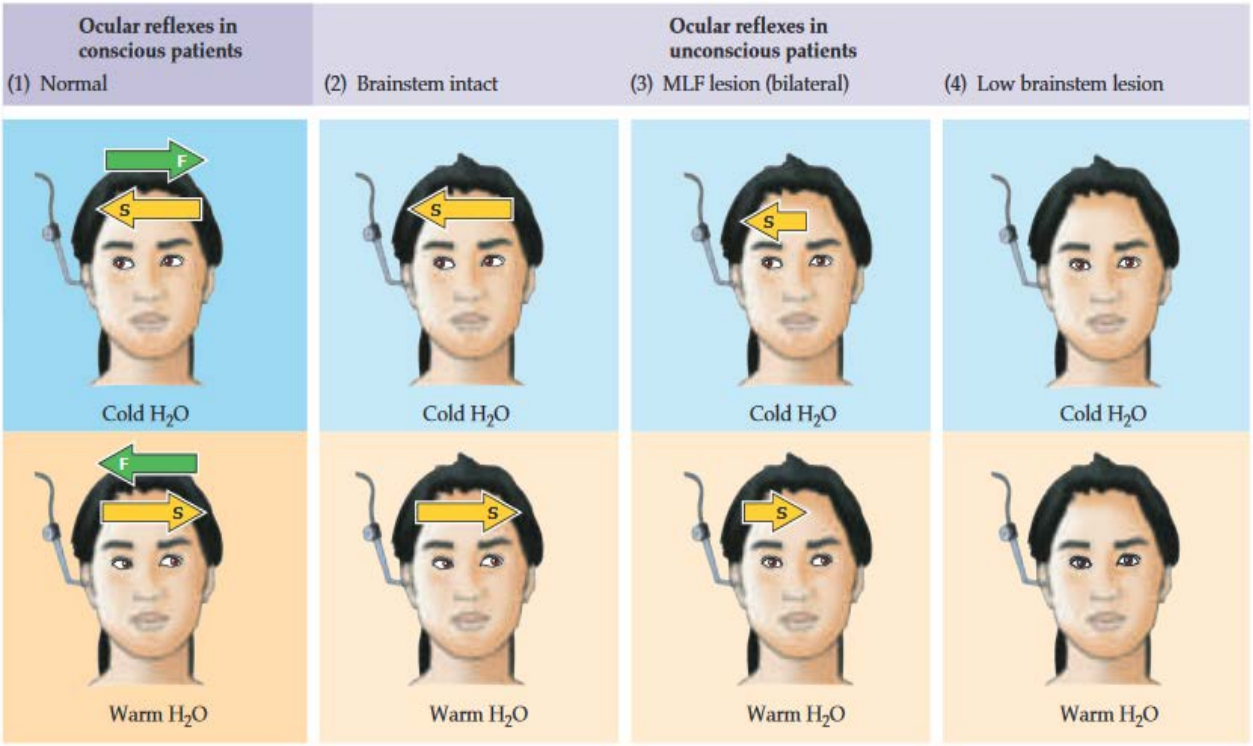


Figure.3.22

X-ray and CT scans

A sinus X-ray may also be called X-ray of the sinuses or paranasal sinus radiography. It’s a non-invasive test that can be completed quickly and with little discomfort or pain.

There are four different pairs of sinuses:

1. Frontal sinuses: The right and left frontal sinuses are located over and around your eyes. Specifically, they’re situated near the centre of your forehead just above each eye.

2. Maxillary sinuses: The maxillary sinuses are the largest of the sinuses. They’re positioned behind your cheekbones near your maxillae, or upper jaws.

3. Sphenoid sinuses: The sphenoid sinuses are located behind your skull, near your optic nerve and pituitary gland.

4. Ethmoid sinuses: These sinuses are situated between your eyes and the bridge of your nose. Ethmoid sinuses consist of a collection of 6 to 12 small air cells

that open independently into your nasal passage. They’re divided into front, middle, and rear groups.

5.

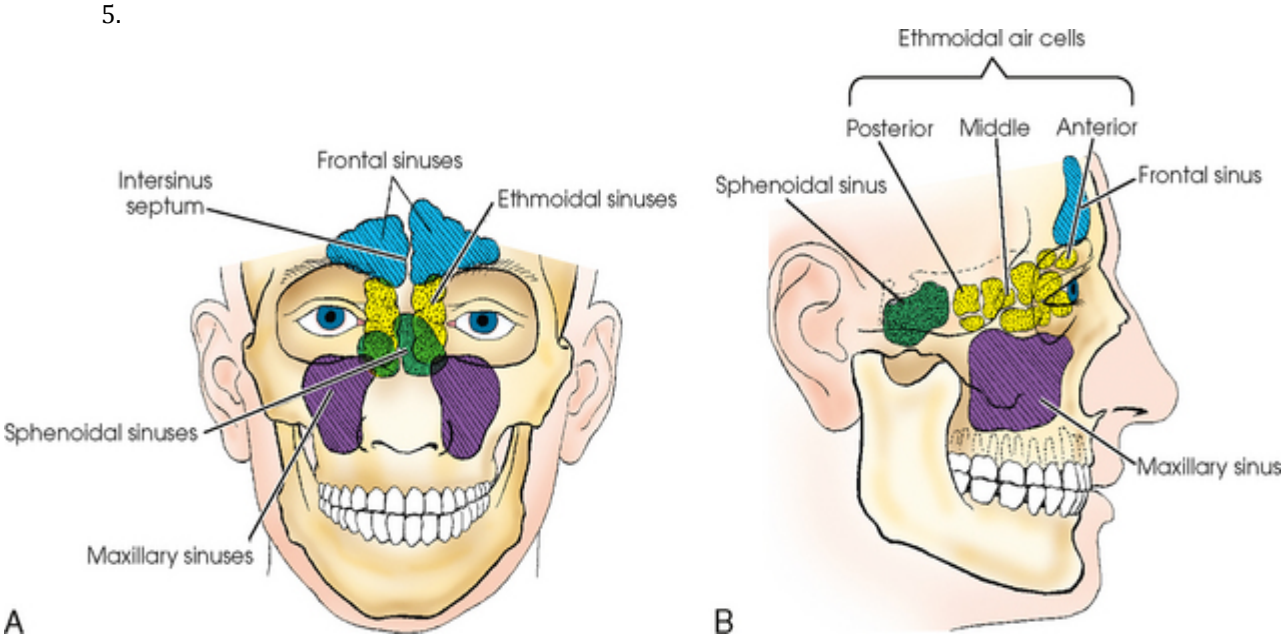


FIG.4. A&B. 1 A, Anterior aspect of paranasal sinuses, showing lateral relationship to each other and to surrounding parts. B, Schematic drawing of paranasal sinuses, showing AP relationship to each other and surrounding parts.

A sinus X-ray helps doctors detect problems with the sinuses. Sinuses are normally filled with air, so the passages will appear black on an X-ray of healthy sinuses. A grey or white area on an X-ray of the sinuses indicates a problem. This is most often due to inflammation or a build-up of fluid in the sinuses.

Technical Considerations

Radiographic density is probably more critical and more misleading in the sinuses than in any other region of the body **(Figs.4.1 to 4.3)**. Overpenetration of the sinuses diminishes or completely obliterates existing pathologic conditions, and under penetration can simulate pathologic conditions that do not exist.

Figure.4.1 Correctly exposed radiograph of sinuses.

Figure.4.2.Overexposed radiograph of sinuses showing two artifacts caused by

.

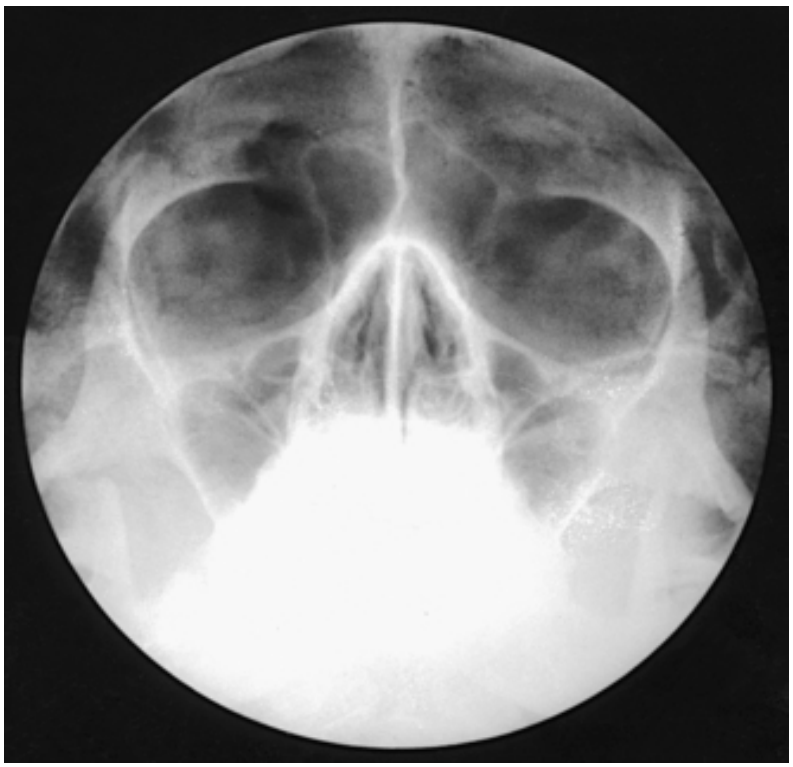


Figure.4.3.Underexposed radiograph of sinuses.

Sinus X-ray reporting template:

Findings

[The paranasal sinuses are clear. No evidence of air-fluid level.]

Impression

[Negative examination. No evidence of sinusitis.]

Figure.4.4

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.

1. Occipito mental view (Water's view)

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". **(Figure 4.5)**

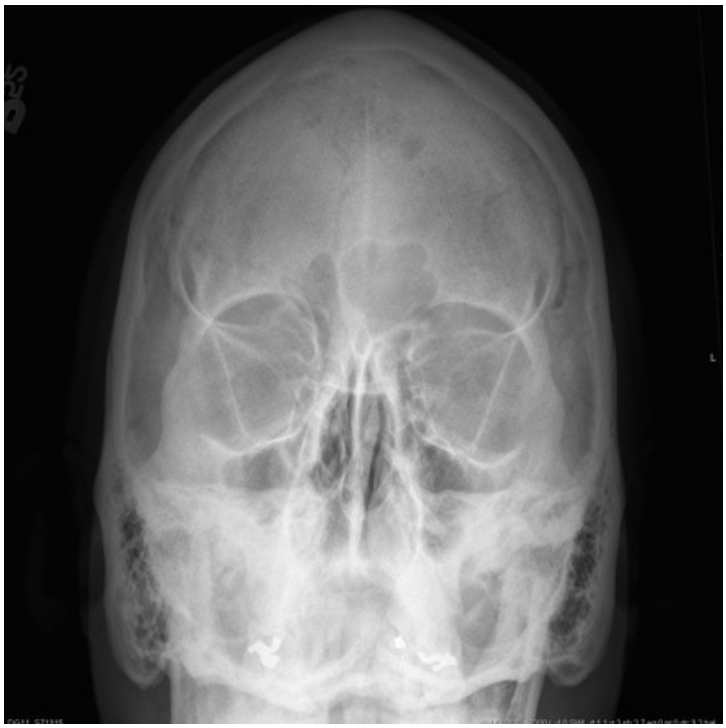


Figure.4.5

2. Occipito-frontal view (Caldwell view)

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. **(Figure 4.6)**

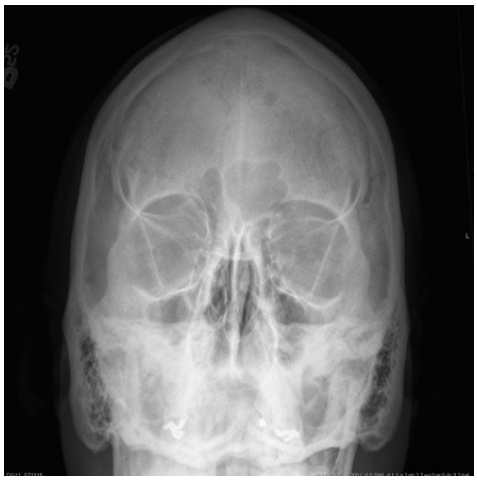


Figure.4.6

3. X-ray Base skull (submento- vertical view)

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 **(Figure 4.7)**

Figure.4.7

4. Lateral view

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. **(Figure 4.8)**

Figure.4.8

CT scan

Common uses

- Paranasal sinus scan is used to evaluate chronic and acute sinusitis and for detailing the bony anatomy for endoscopic sinus surgery.
- Evaluation of head and neck masses.
- Evaluation of the deep extension of mucosal disease as well as lymphadenopathy.
- Assessment of middle ear and mastoid infections.
- Assessment of temporal bone and skull base for infections and tumours.
- Evaluation of traumatic head, neck, and facial injuries and temporal bone fracture.

Planes of scanning:

1. Axial
2. Coronal
3. Sagittal

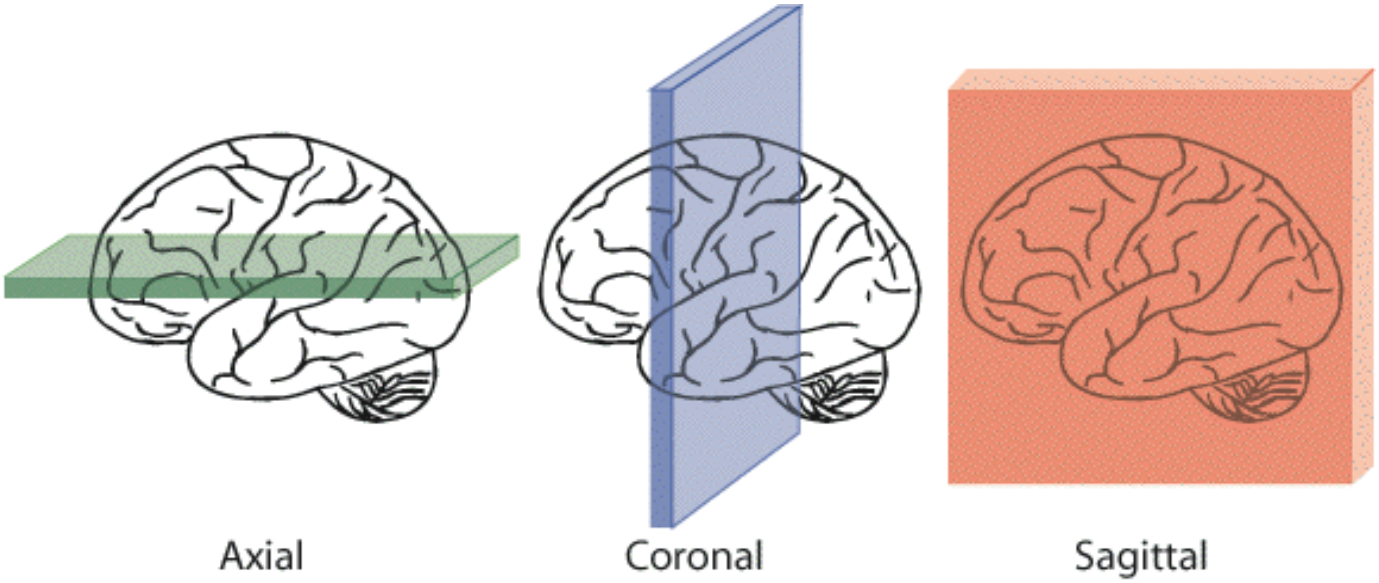


Figure.4.9

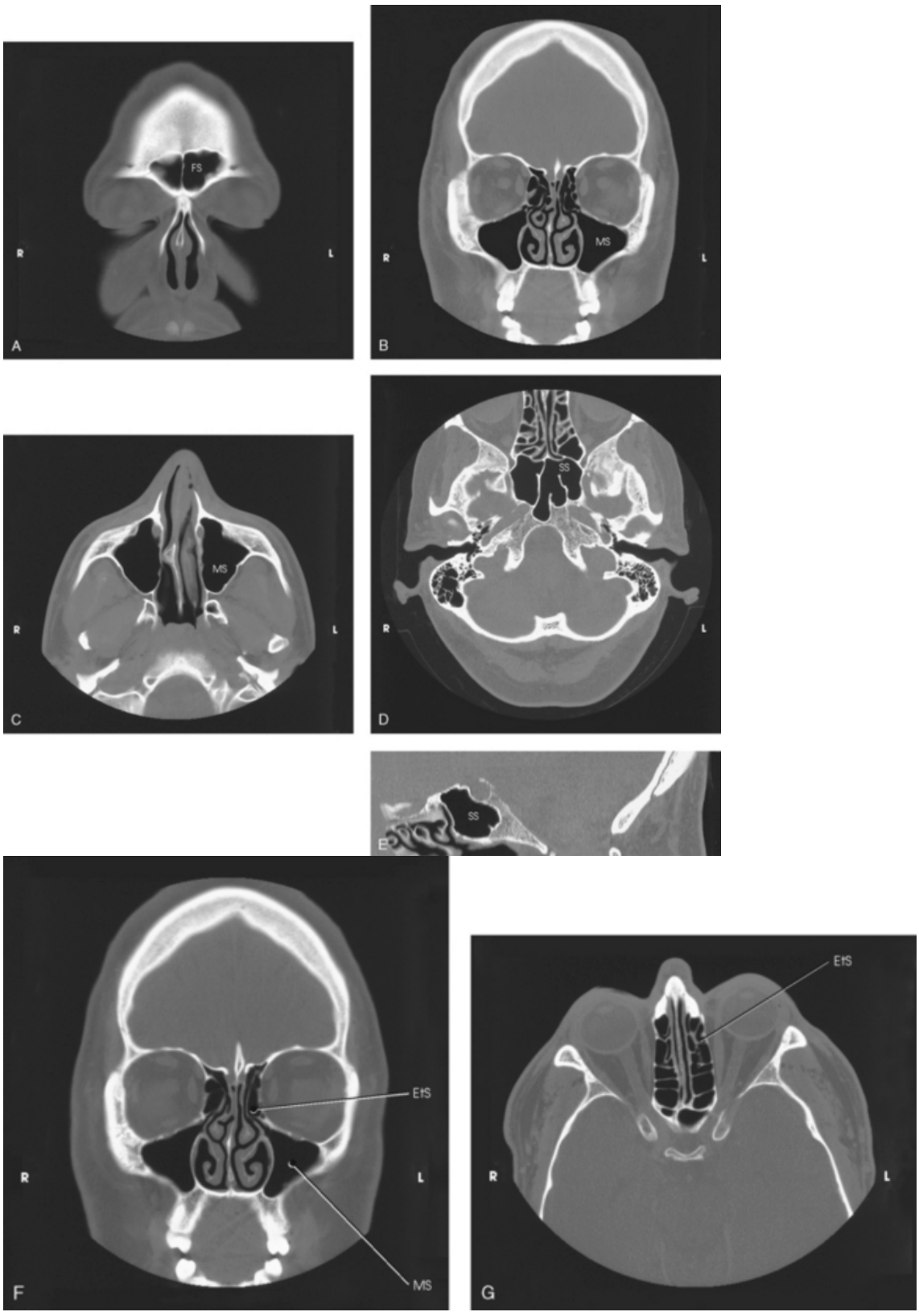


FIG.4.10 A, Coronal CT image of frontal sinuses (*FS*). **B,** Coronal CT scan of maxillary sinuses (*MS*). **C,** Axial CT image of *MS*. **D,** Axial CT image of sphenoid sinuses (*SS*). **E,** Sagittal CT image of *SS*. **F,** Coronal CT image of ethmoidal sinuses (*EtS*). **G,** Axial CT image of *EtS*. (From Kelley LL, Petersen CM: *Sectional anatomy for imaging professionals,* ed 2, St Louis, 2007, Mosby.)

CT Sinuses reporting template:

Findings

Right sinuses and drainage pathways
Frontal sinus and frontal recess: [Normal.]

Maxillary sinus: [Normal.]

Ethmoid sinuses: [Normal.]

Ostiomeatal complex: [Normal.]

Sphenoid sinus: [Normal.]

Sphenoethmoidal recess: [Normal.]

Left sinuses and drainage pathways
Frontal sinus and frontal recess: [Normal.]

Maxillary sinus: [Normal.]

Ethmoid sinuses: [Normal.]

Ostiomeatal complex: [Normal.]

Sphenoid sinus: [Normal.]

Sphenoethmoidal recess: [Normal.]

Other findings
Post-surgical changes: [None.]

Anatomic variations: [None.]

Nasal cavity: [Normal turbinates and septum.]

Orbits: [Normal.]

Anterior cranial fossa: [Normal.]

Other findings: [None.]

Findings
Sinuses: Sinuses [Minimal mucosal thickening in bilateral frontal ethmoidal recesses. The visualized paranasal sinuses are otherwise well aerated. No evidence of air-fluid level. Bilateral ostiomeatal units are patent.]

Orbits: [No abnormality in visualized bilateral orbits.]

Other findings: [None.]

Impression
[Negative examination. No evidence of sinusitis.]

Paediatric hearing assessment

Assessment of the hearing of infants and children can be difficult because most hearing tests involve the active cooperation of the participant. To avoid this problem, a number of tests have been specifically designed for children and different tests are used at different ages. Objective testing such as otoacoustic emissions and

auditory brainstem testing are very useful in the early stages. OAE testing is the most common screening program for neonates.

Distraction testing

Two testers are required for this examination. The child sits on the parent or caregiver's lap, and one of the examiners sits in front of the child to occupy the child's attention. The other tester stands behind the child and uses sounds of particular frequency and volume to stimulate the child to turn the head. Turning is considered a positive response.

Visual reinforcement audiometry

This test is similar to distraction testing, but it uses speakers or head- phones to deliver the unilateral sound. If the child turns around correctly, then a light or a toy turns on to reward their turning.

Conditioned response audiometry

The child is conditioned to perform a task in response to a sound—for example, putting a toy man into a toy boat.

McCormick toy testing

This test uses 12 paired toys or objects with similar-sounding names, for example, a cup and a duck. The child points to or picks up the correct toy. The intensity of the sound of the command can be changed. The child's hearing threshold is determined by an 80% response.

Pure tone audiogram

This can sometimes be performed on children as young as 3 years of age. Use of PTA with bone conduction can be uncomfortable for younger children.

Tympanometry

This test measures pressure in the middle ear and is useful and accurate in detecting middle-ear effusions in children.

Учебное издание

Kryshtopava M.A., Warnakulasuriya M. L. S., Bisunkov A.B.

PRIMARY CARE SURGICAL SKILLS COURSE IN OTORHINOLARYNGOLOGY DESIGNED FOR MEDICAL STUDENTS OF FACULTY OF MEDICINE AND HEALTH SCIENCE

методические рекомендации

Подписано в печать 28.03.2023 г. Формат бумаги 64x84 1/16 Бумага типографская №2. Гарнитура Times New Roman. Усл-печ. л. 2,29. Уч.-изд. л. 5,69.
Тираж 92 экз. Заказ № 217.
Издатель и полиграфическое исполнение УО «Витебский государственный медицинский университет»
ЛП № 02330/453 от 30.12.2013г.
Пр-т Фрунзе, 27, 210023, г. Витебск