THE ESSENTIAL POCKET GUIDE TO ENT PRACTICE

OXFORD HANDBOOK OF ENT AND HEAD AND NECK SURGERY

Covers preparation of patients for theatre and common operations

Includes emergencies and paediatric ENT

Patient-centred approach throughout

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Chapter 1
Overview

Using this book

The aim of this book, like all the other Oxford Handbooks, is to provide a compact but comprehensive guide to medical practice. It has been designed to slip inside the pocket of a white coat and to be rapidly retrieved for reference. There are many blank facing pages for notes, and for amending or annotating the text to fit in with local practice.

The core text is based on an anatomical list of ear nose and throat (ENT) diseases. There are separate sections on ENT examinations, investigations, common operations, ward care, and emergencies. There is also a separate section on the work of other ENT health professionals.

Chapter 3, ‘Common methods of presentation’. is unique for this type of book. This chapter is a guide for dealing with patients as they present in clinical practice. It also provides a convenient way of accessing the relevant chapter in the anatomical list.

We hope that the book will be well used and will help guide you through the sometimes complex world of ENT.

ENT as a subject and career

ENT is a fantastic specialty that is every bit as exciting in practice as it is in theory. It is difficult to conceive of any specialty which can provide such diversity in medical practice.

- ENT conditions make up 25-50% of all general practice consultations.
- ENT conditions affect people of all ages from neonates to the elderly.
- Outpatient work is about 50% of the ENT workload. This gives a good balance between surgical and medical practice.
- Surgical skills are broad, from microsurgery on the smallest bones in the body, to major head and neck reconstructive surgery.
- ENT is an expanding surgical specialty that is taking over traditional general surgical areas such as salivary gland surgery and thyroid surgery.
- Cosmetic surgery is undertaken by ENT, in the form of facial plastics.
- Surgery is also performed on the skull base and pituitary gland.
- ENT offers enormous research potential from nasal polyps to congenital hearing loss.
- There are cutting edge developments occurring in ENT, such as cochlear implantation.

We hope that your experiences in ENT will fill you with enthusiasm for this specialty.

Further sources of information

British Association of Otolaryngologists

website: www.entuk.org

Royal College of Surgeons website: www.rcseng.ac.uk

Students and ENT

The subject of ENT can seem quite daunting to students. Particularly as this vast subject occupies such a small part of the curriculum, and has been dropped entirely from some medical schools.

In strong contrast to the time given to it in training, ENT conditions make up between 25-50% of all general practice consultations. As a

student, it is important to have a firm idea in your mind of important topics you want to cover in ENT. These will form your learning aims and objectives—see the next section (p.8). There may be local variations.

You will find that ENT departments throughout the world are welcoming to students, but do not abuse their hospitality by being late or discourteous. Professional conduct is important whatever specialty you are studying.

There are particularly sensitive areas within ENT practice which require special tact as a student. Two of these are:

Head and neck cancer

These cancers form an important part of the ENT workload. You will need to be sensitive in dealing with these patients. They often have unique problems associated with their disease and treatment. These may include:

- Poor communication
- Disfiguring surgery
- Depression
- Alcohol withdrawal.

Hearing problems

The diagnosis of hearing loss in a child can be a devastating blow to parents. You will need to be sensitive to this. Another cause of great concern to parents is when a poorly performing child has a normal hearing test, as this may confirm the diagnosis of global developmental delay.

ENT learning aims and objectives for clinical medical students

Aims

- To acquire sufficient knowledge of ENT conditions to be able to recognize common problems and when and what to refer.
- To understand that ENT conditions are extremely common and form a large part of the workload of a general practitioner.
- To learn the skills required to examine patients with ear, nose, and throat diseases and to make a presumptive diagnosis.
- To learn how to prioritize and manage different ENT conditions.
- To become stimulated and interested in the specialty of ENT.

Objectives

- To learn the signs and symptoms of common ENT conditions.
- To learn the techniques of ear, nasal, and neck examination.
- To demonstrate an understanding of the basic anatomy and physiology of the ear and upper aero-digestive tract, and relate this knowledge to the signs and symptoms of ENT disease.
- To understand the medical and surgical treatment of common ENT conditions.
- To be familiar with the commonly used medications for treating ENT problems, and their side effects.
- To understand the risks and complications of surgery.
- To recognise the different ways in which head and neck malignancy can present, and to understand that early diagnosis of head and neck cancer leads to improved survival.
- To learn the ways in which ENT related communication difficulties can arise and be overcome.
- To appreciate and be sensitive to the impact of ENT conditions on patients and their families.

Student ENT curriculum

Practical skills

- Use of the auriscope to examine the external auditory meatus and tympanic membrane.
- Basic examination of the nose.
- Examination of the oral cavity and oropharynx.
- Examination of the neck.
- How to manage a nosebleed.
- How to deal with a tracheostomy.

Ear

- Basic anatomy and physiology of the ear.
- Presentation and management of common ear disease e.g. otitis externa, otitis media, glue ear, chronic suppurative otitis media with or without cholesteatoma, vertigo, and facial palsy.
- Examination of the ear including the pinna, ear canal, and otoscopy.
- Testing hearing with tuning fork tests.
- The advantages of the microscope and the fibreoptic otoscope.
- Basic interpretation of play audiometry, pure tone audiograms, and tympanograms.
- The principles of grommet insertion, mastoid surgery and the treatment of Menieres disease.
- Identifying postoperative problems following ear surgery i.e. sensorineural hearing loss, facial nerve palsy, and vestibular dysfunction.
- Understanding the differential diagnosis of facial nerve palsy and its treatment.

Nose

- Anatomy and physiology of the nose.
- Symptoms and signs of common sinonasal disease e.g. rhinitis, sinusitis, nasal polyps.
- Examination of the nose including an assessment of the appearance, the septum, the turbinates, and the mucosa.
- The endoscopic evaluation of the nose.
- Management of a fractured nose and the timing of intervention.
- Management of epistaxis from minor nosebleeds to torrential haemorrhage.
- The principles of common nasal operations including septal surgery, functional endoscopic sinus surgery, and rhinoplasty.

Head and neck—benign and malignant disease

- The basic anatomy and physiology of the oral cavity, salivary glands, pharynx, larynx, oesophagus, and lymph node drainage.
- The presentation of head and neck cancer.
- The presentation and management of salivary gland disease.
- Examining the oral cavity, larynx and pharynx including the use of the nasendoscope.
- Examining the neck with reference to the lymph nodes.
- The role of fine needle aspiration cytology (FNAC).
- The principles and limitations of radiological investigation of the head and neck region.
- Management of neck lumps, in particular the malignant lymph node with an unknown primary.
- The management of the airway in patients with a tracheostomy or end tracheostomy after laryngectomy.
- A basic knowledge of the principles of operative surgery, in particular the principles of reconstructive surgery and the surgery for salivary gland disease e.g. parotidectomy.

- The postoperative management of a patient who has undergone major head and neck surgery.
- The role of the multidisciplinary team in head and neck cancer and voice disorders.

Supplementary knowledge

- The role of otoacoustic emissions and evoked auditory potentials in managing hearing loss.
- The use of speech audiometry.
- The surgery for otosclerosis.
- Bone-anchored hearing aids for conductive hearing loss.
- Cochlear implantation and the reactions of the deaf community to this intervention.
- The use of sign language.
- Neuro-otology, in particular the presentation and management of acoustic neuromas.
- Craniofacial surgery and the interplay between ENT, plastic surgery and neurosurgery.
- The management of cleft palate and the increased risk of glue ear.
- Advanced endoscopic sinus surgery for the mangement of sinonasal malignancy, pituitary tumours and skull base tumours.
- Microlaryngeal surgery and surgical voice restoration.
- The use of chemotherapy and radiotherapy in head and neck malignancy.

Working in ENT

Working in ENT should be a very enjoyable experience, whether it is a temporary attachment or a long-term career plan. It is helpful if you have an understanding of what others expect of you. It is also important for you to think about your own career development.

Your duties

- Patient care and continuity.
- Professional development.
- Research.

Other staff

- Show courtesy and consideration to all staff on the ward.
- Always consider yourself to be part of a multidisciplinary team.

Communication

- It is essential to develop good communication skills, both written and verbal.
- You will need to liaise closely with junior and senior staff when on call.
- Always keep people informed if you have swapped your on call duties.

Timetable

- Be aware of your own and others' timetables.
- Never miss a clinic or theatre session.
- Always arrive in clinic or theatre with time to spare, and don't leave until the job is finished.

Rotas

- You will be expected to organize your own rota. Any disputes should be settled amicably without the involvement of senior staff if at all possible.
- Try to plan your annual and study leave in advance and arrange this at the beginning of the job, in consultation with your colleagues.

- If you are going to be away, make sure the administrative staff have cancelled your clinics and theatre lists.

▶ Always try to establish the best way of communicating with the team you are on call with. Obtain contact numbers directly rather than relying on switchboard to connect you each time. Always contact the other members of your team with your numbers when you are on call so they can contact you in an emergency. Write down all the numbers you are likely to need.

Research

▶ Make research a priority in your mind. It is important to keep your CV moving and improving. Aim to produce at least one publication every six months. Don't be distracted by trying to be involved in too many projects at once.

Work in a team if you can, to maximize your publications. Don't take on too many projects in a team—each team member should take on one research project at a time. Ask senior colleagues about possible projects, and affiliated University departments may be helpful. Involve a statistician before undertaking research. This will often help turn an idea into a first rate publication and avoid unnecessary work. Always check local ethics committee guidelines before you start. Research is expected but not everyone needs to produce a D. Phil.

Minimum requirements for entry into specialist training:

- One publication in a peer reviewed journal.
- Three presentations at national meetings.
- Full understanding of research methods, including statistical interpretation.
- Critical appraisal skills to evaluate published material.

Audit

Audit is often regarded as a poor relative of research. At its best, audit can be very informative and can lead to changes in practice.

Involvement in audit is an expected part of professional practice. There are many opportunities available and help is often on hand from audit departments within the hospital.

Like research, make sure that you plan an audit that will achieve something with a tangible result. The best audits provide a completion of the audit cycle (see Fig. 1.1).

Types of audit

- Structure—how the system is set up.
- Process—how the system works.
- Outcome—the product of the system.
- Departmental—audits which are carried out in your department.
- Regional—audits carried out in your region.
- National—audits carried out by national organizations, such as the National Tonsillectomy Audit, NCEPOD.

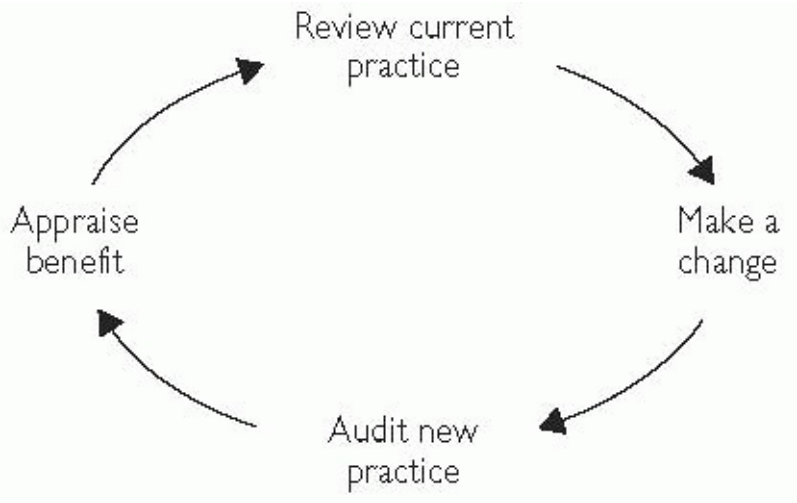

Fig. 1.1. The audit cycle diagram

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Chapter 2

The ENT Examination

Equipment

A fully equipped ENT department will have all the necessary instruments for performing a full ENT examination. However, if you are a GP, or if you are working in another specialty, 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 that runs off batteries is ideal.
- Wooden tongue depressors.
- Thudicum nasal speculum.
- An otoscope with several speculae.
- Pneumatic attachment for the otoscope.
- Tuning fork 512Hz.
- Pen and paper.
- Gloves.

Advanced equipment

- Co-phenylcaine spray.

- A flexible nasendoscope with light source.
- Alcohol wipe to act as demist for the scope.
- Aqueous lubricating gel for the scope.

Emergency equipment

- Large nasal tampons (you can always cut 10cm ones to size).
- Silver nitrate sticks.
- Foley catheters.

▶ *On call tip*

Many SpRs are not resident on call. Therefore always pack an emergency kit box to leave in your car. This can be passed from SpR to SpR nightly. Even some of the most basic pieces of equipment are sometimes impossible to find in the middle of the night.

Basic requirements

How to master the use of a head mirror

The principle of the head mirror is that a light source is reflected from mirror onto the patient. The mirror is concave and the light is focused to a point. Also, it has a hole through which the examiner can look also allowing binocular vision. Correct positioning the examiner and the light source is important. Ensure that the light source is placed approximately level with the patients left ear. You must sit opposite the patient with the light shining directly at your mirror. Place the mirror over the right eye, close the left eye, adjust the mirror so that you can look through the whole directly at the patients nose. Now adjust the light and mirror until

the maximum amount of light is reflected onto the patient. When the left eye is opened, you should have binocular vision and reflected light shining to the patient's nose. The focal length of the mirror is approximately two feet. This means that the reflected light will be brightest and sharpest when the examiner and patient are this

distance apart.

Examination of the ear

The examination should be practised and repeated regularly so that it becomes routine. It is equally important to document the findings of any examination accurately.

▶ *Know your otoscope*

Each type of otoscope is turned on in a slightly different way, usually by twisting it at the top of the body. Nothing inspires less confidence when you are examining a patient, than being unable to turn on the otoscope. It should be held like a pen with the little finger extended—like an affected tea drinker—to touch the patient's cheek. This enables an early warning of head turning, particularly in children. The right hand holds the otoscope for the right ear examination and vice versa. See Fig. 2.1.

Routine examination

- Ask the patient which is their better hearing ear and start by examining this ear.
- Check with the patient that their ear is not sore to touch.
- Examine the pinna and look for preauricular abnormalities.
- Examine for postauricular and endaural scars (see Fig. 2.2.).
- Straighten the EAC by pulling the pinna up and backwards (if you are examining a baby pull backwards only).
- Examine the EAC skin and document any changes using an otoscope.
- Systematically examine the tympanic membrane.
- Visualize the handle of the malleus and follow it up to the lateral process. Then you will not miss the superior part of the drum. You may need to kneel down to get the correct angle.
- Perform a pneumatic otoscopy. It will be more accurate if you have a soft tipped speculum which can occlude the EAC (see Fig. 2.3.).

- Repeat with the pathological ear.
- Perform tuning fork tests (see Chapter 2, p.23).
- Perform a free field test of hearing (see Chapter 2, p.26).
- Check facial nerve function—ask the patient to smile and close their eyes, while looking for facial weakness.
- Visualize the postnasal space with an endoscope.

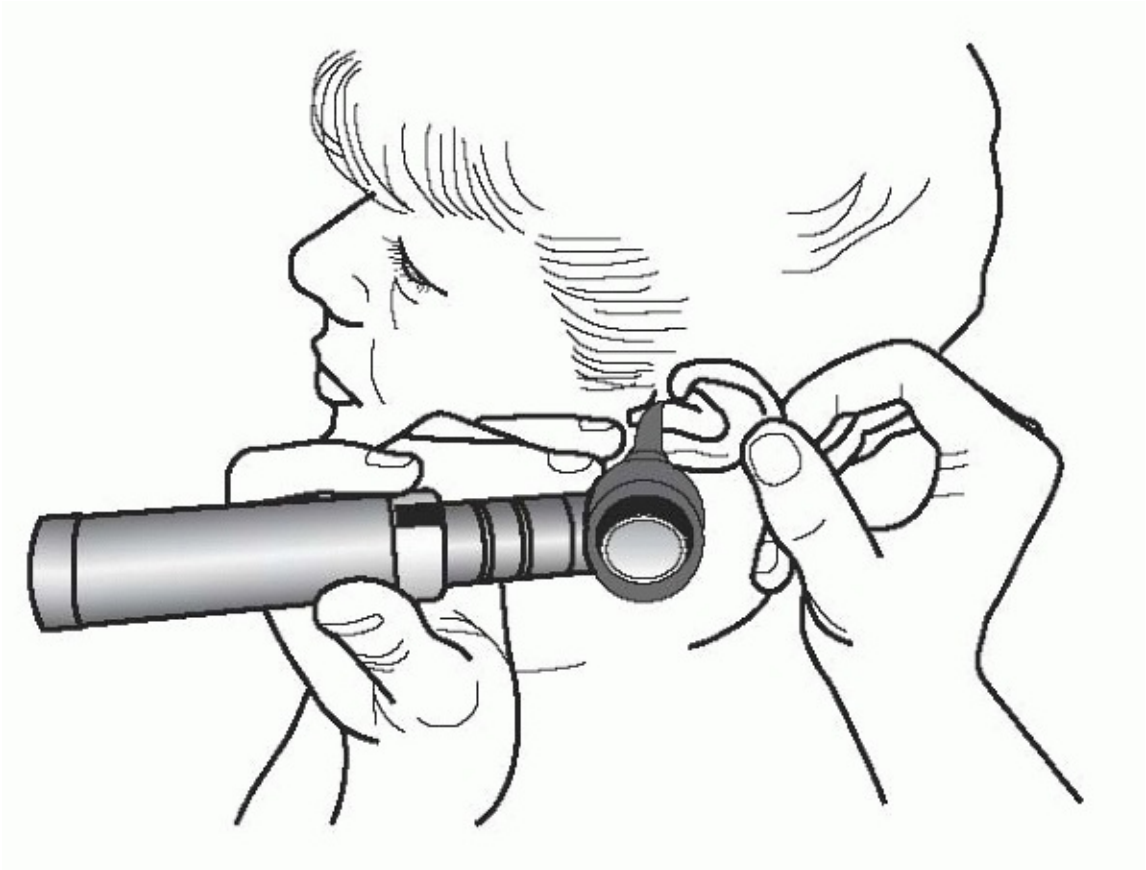


Fig. 2.1. How to hold the otoscope

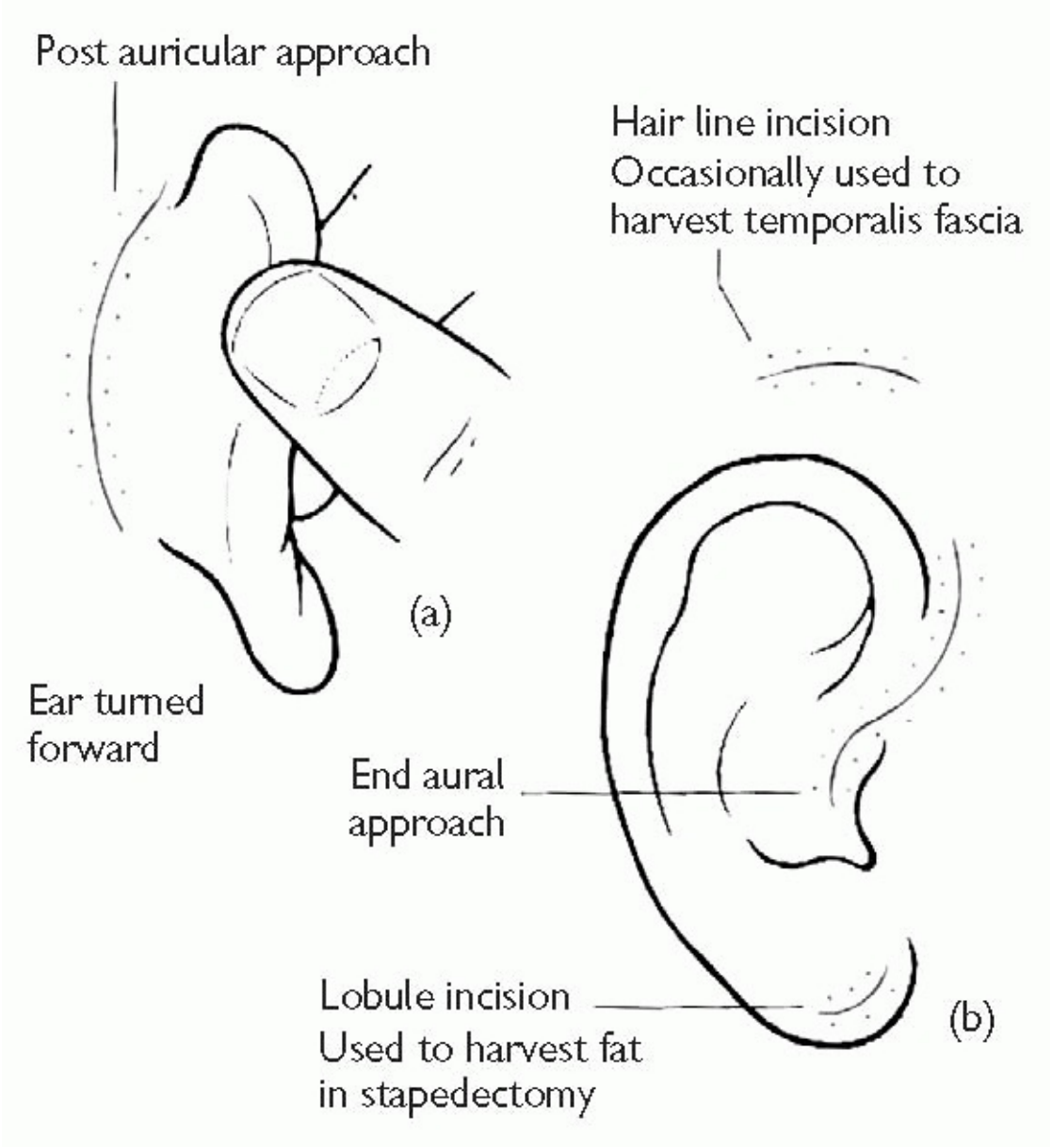


Fig. 2.2. Common ear incisions

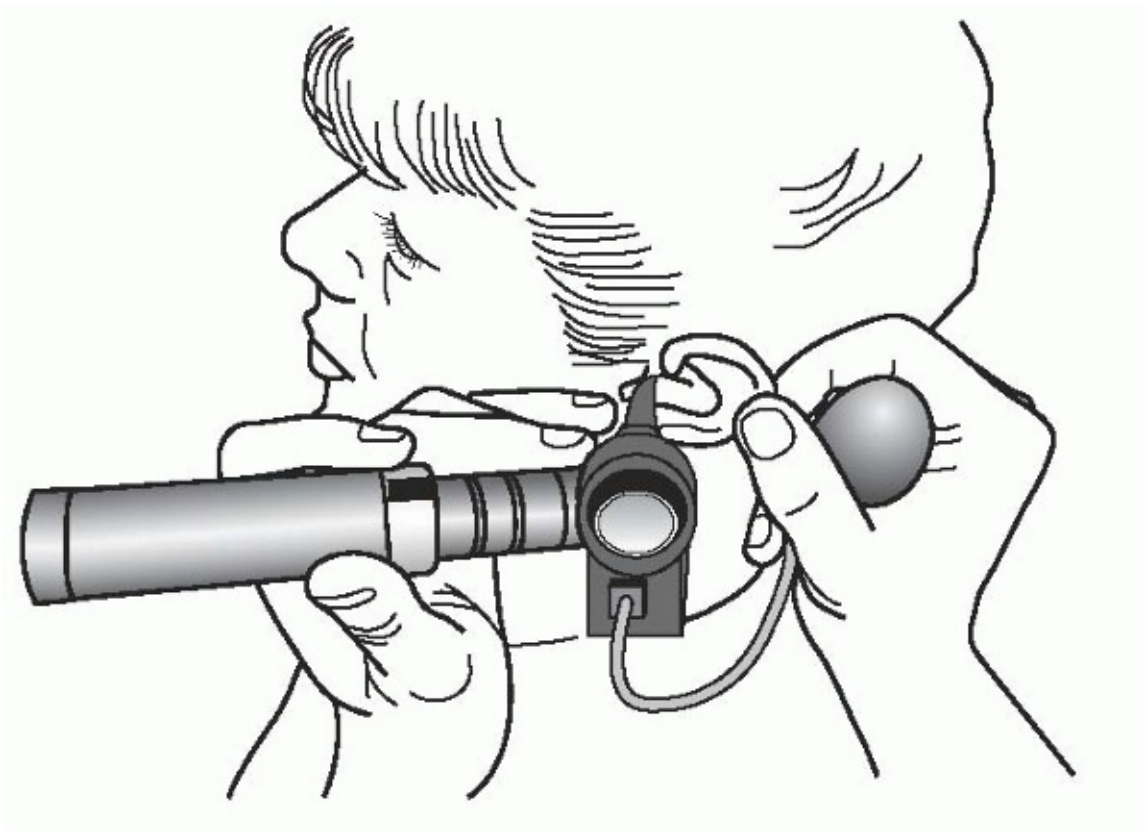


Fig. 2.3. The performance of pneumatic otoscopy

Using an otoendoscope

The use of this instrument is becoming more widespread in ENT. It is often attached to a camera and TV monitor. The patient may enjoy seeing their ear on screen, and it can help when explaining ear pathology or surgery. No anaesthetic is used. The end can fog-up, so use an alcohol wipe to demist (see Fig. 2.4.).

Tuning fork tests

These are simple tests of hearing which are most often used to differentiate between a conductive or a sensorineural hearing loss. They should be performed with a tuning fork of 512Hz. If the frequency is lower, then vibrations are produced which can mislead patients who think this is an auditory stimulus.

The ends of a tuning fork are known as tynes not prongs. The loudest sound from the tuning fork is produced at the end of the tyne.

Start the tuning fork by hitting your elbow or knee. Plucking the tynes produces less efficient sound and hitting a table or desk edge produces overtones. Weber's and Rinne's test's are performed together as a ‘package’ to help identify the type of hearing loss.

Weber's test

In this test (Fig. 2.5.), the tuning fork is placed at the top of the patient's head. The patient then says which ear hears the sound loudest, or if it is in the middle.

In normal hearing, sound is not localized to either ear. In sensorineural hearing loss the non-affected ear hears the sound loudest. In conductive loss the sound is heard loudest in the affected ear.

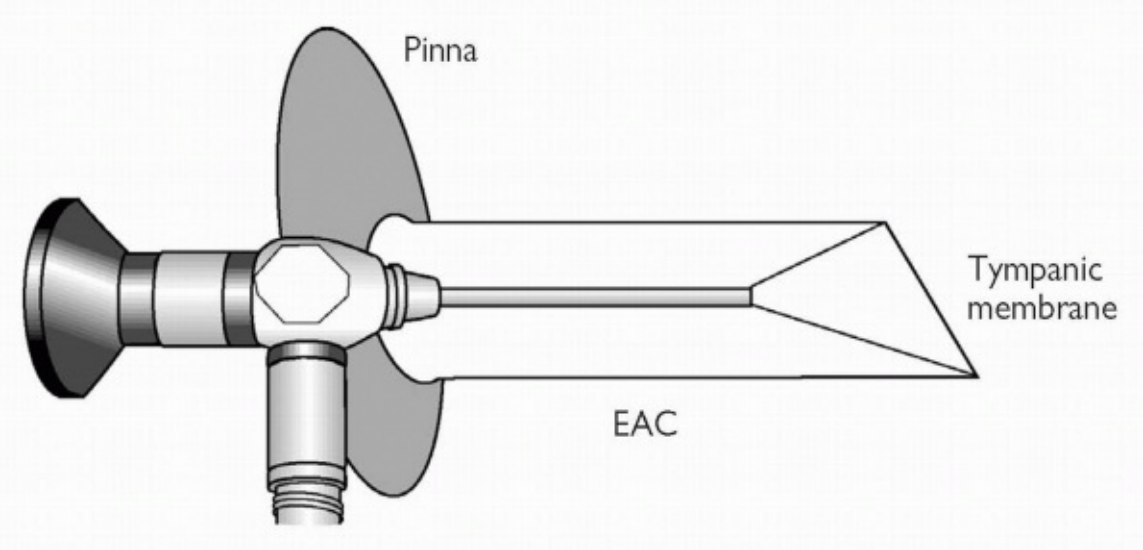


Fig. 2.4. Inserting the otoendoscope

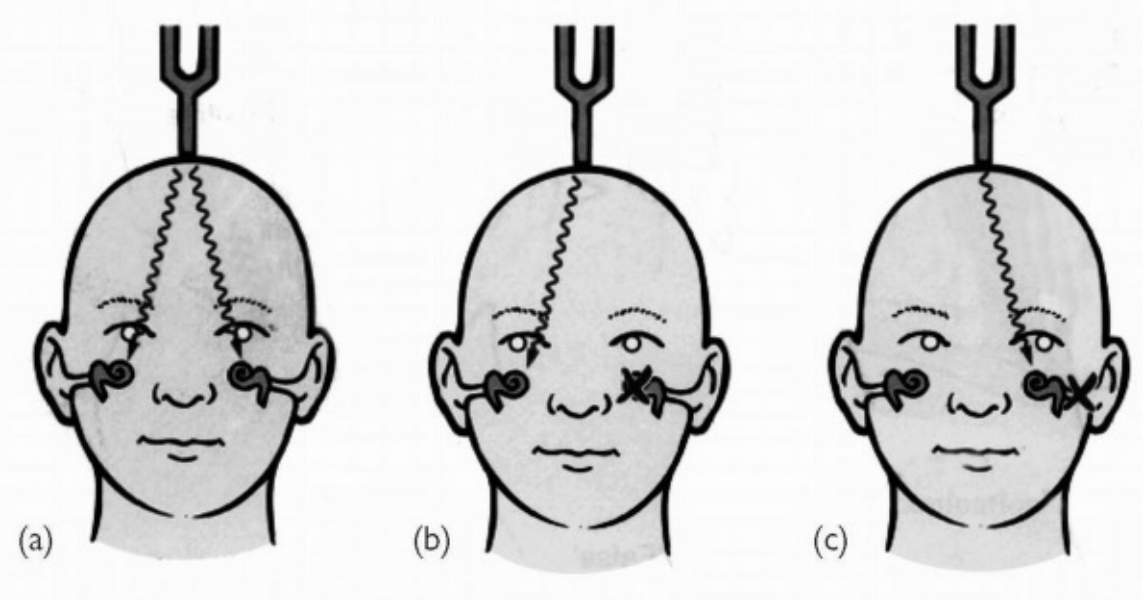


Fig. 2.5. Diagram of Weber's tests

Rinne's test

This test (Fig. 2.6.) compares air conduction with bone conduction. The activated tuning fork is placed behind the patient's ear, against the mastoid process. The patient is asked to say when they stop hearing the stimulus. The tuning fork is then moved to a position 2cm away from the EAM and held with the tips of the tynes level and in line with the ear canal. The patient is then asked if they can hear the sound.

This test can be modified by moving the tuning fork from the mastoid to the EAM before the sound has diminished. The patient is then asked which is the loudest sound.

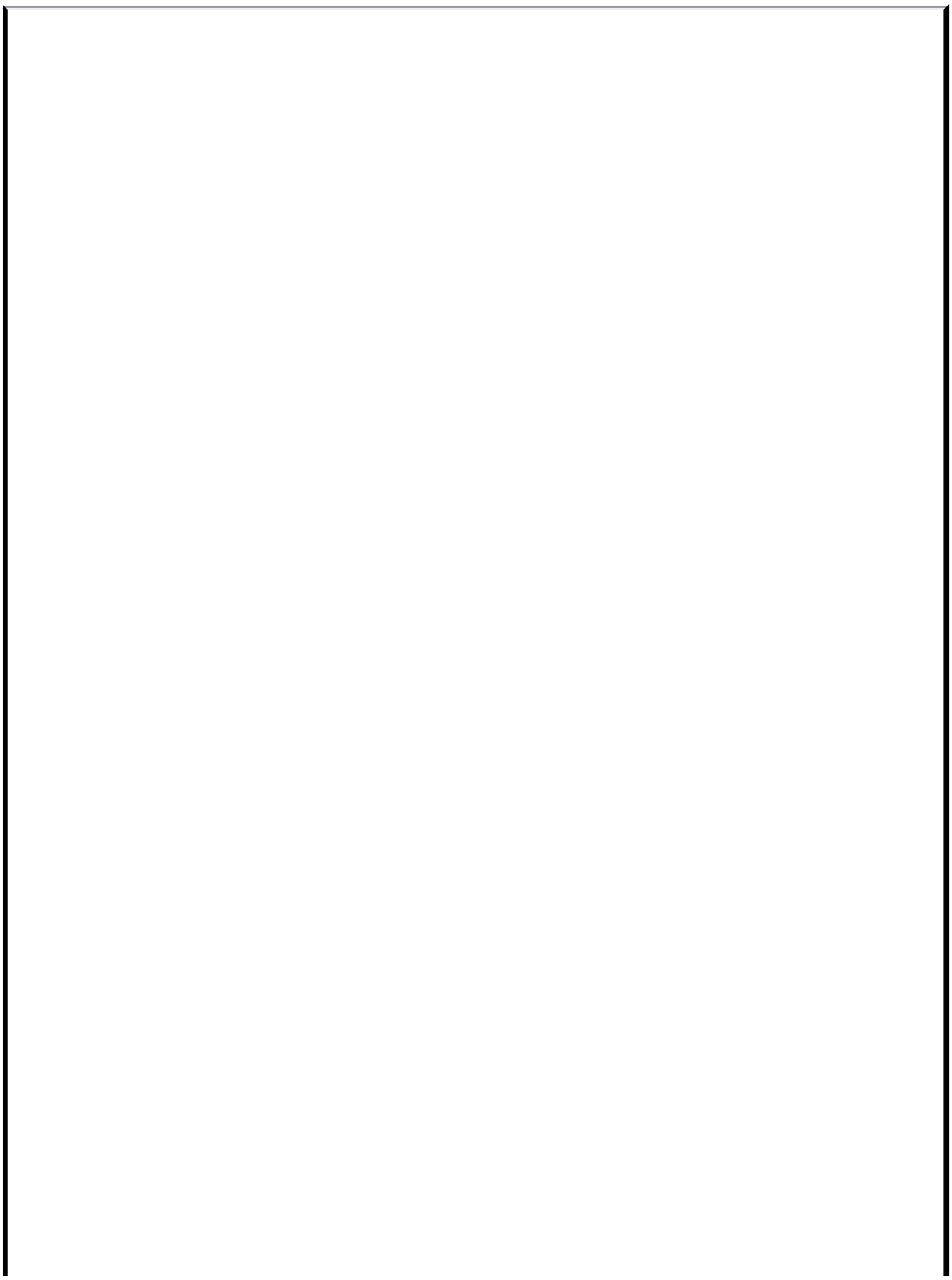
The test results can be confusing, because a pathological test result is called a negative test! This is contrary to almost all other tests in medicine where a positive result is an abnormal result and a negative result is normal.

- **Positive test**: air conduction is better than bone conduction.

- **Negative test**: bone conduction is better than air conduction.

▶ *False negative Rinne's test*

This happens when the sound is actually being heard by the other ear. Sound conducted by bone is absorbed and travels across the skull, so when the tuning fork is placed on the left side it will be heard almost as well by the right inner ear as the left . To stop this effect the other ear can be masked.



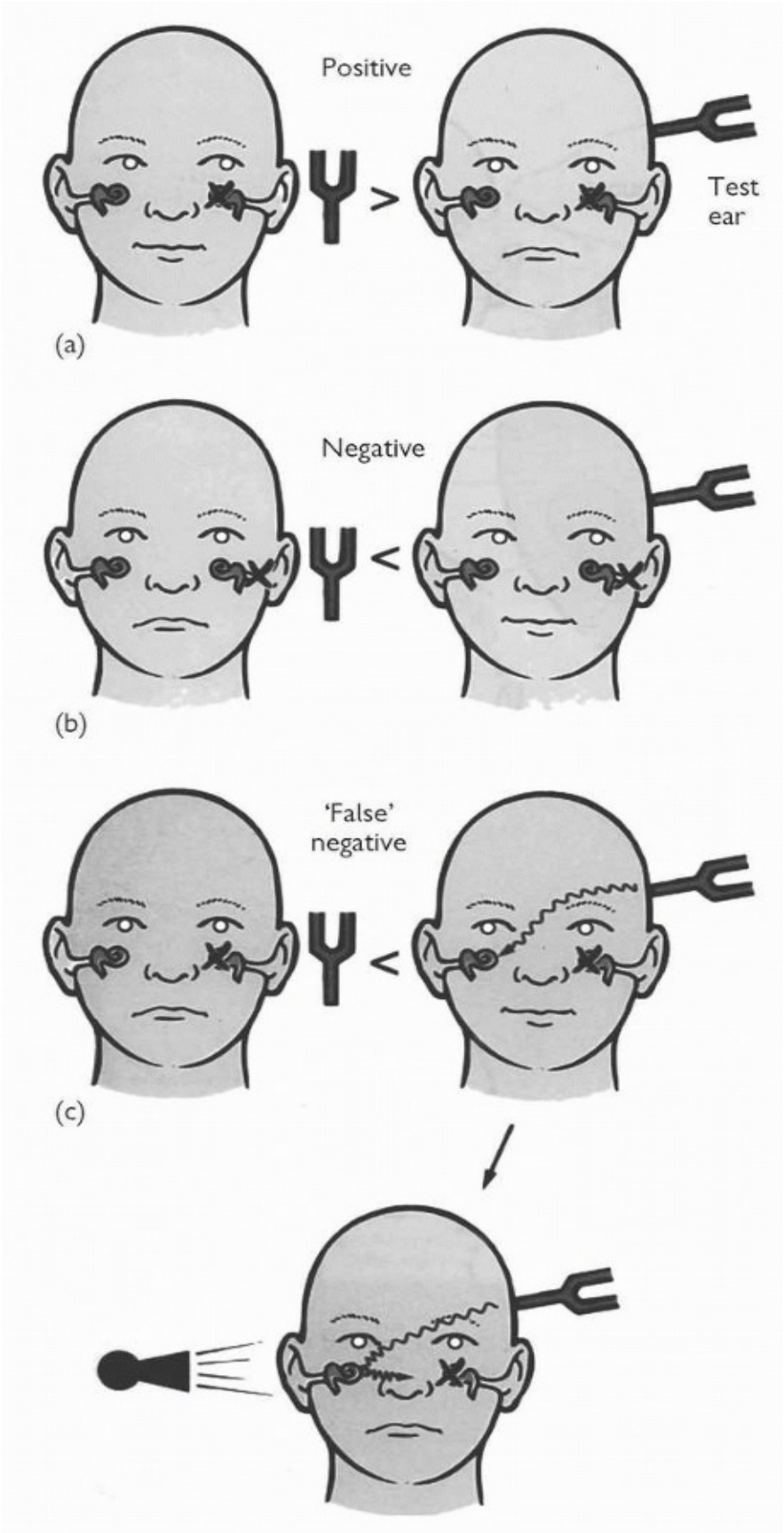

Positive
>
Test ear
(a)
Negative
<
(b)
'False' negative
<
(c)

Fig. 2.6. Diagram of Rinne's tests

Free field hearing tests

Patients will usually have a formal audiogram when they attend an ENT outpatients appointment. However, there are some situations when you may need to make a rough guess at a patient's hearing threshold. This might happen because there are no formal audiometric facilities available, or if you suspect a patient may be exaggerating a hearing loss.

During this test, your own voice is used as a sound stimulus, while the patient's non-test ear is masked by rubbing your finger over the tragus. This produces some sound, which helps to ‘mask’ that ear. Practise is essential as the positioning for this procedure can be awkward. See Fig. 2.7.

Procedure

- Shield the patient's eyes with your hand.
- Tragal rub with your other hand to the non-test ear.
- Whisper a number at approximately 60cm from the test ear.
- If the patient cannot hear, use a normal volume spoken voice, followed by a shout if necessary.
- Repeat with opposite ear.

Patients should be 50% accurate at repeating your words to pass the test. If they hear your whisper at a distance of 60cm, then their hearing is better than 30dB.

▶ *Examining tip*

You can perform a cruder version of this test in a covert manner. When the patient sits in front of you, a whispered question as you hold the

patient's notes in front of your mouth, can produce an interesting response, not always corresponding to the patient's seemingly poor audiogram!

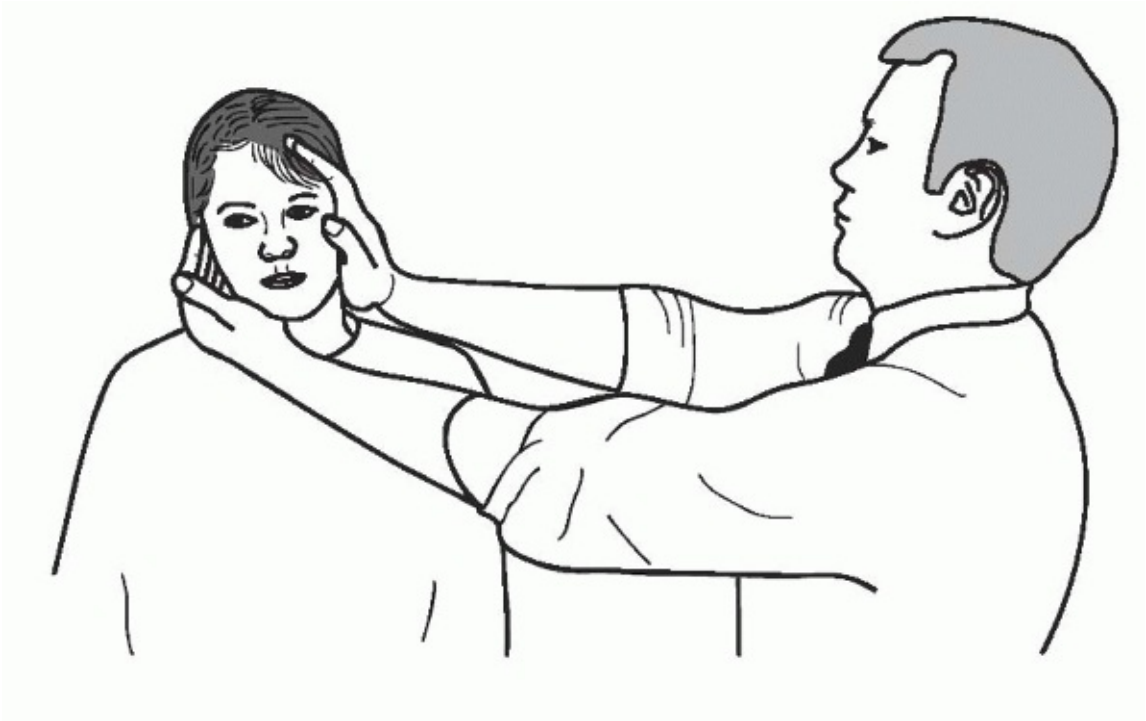


Fig. 2.7. Positioning for free field testing

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 position

The 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 light positioned over the patient's left shoulder reflected onto the nose via

a head mirror or use a headlight. Examination is systematic as always.

External nose

- 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 in the right and left lateral position and straight on.
- Tilt the head back to view the columella and alar cartilages in a similar way.

Internal nose

- Check the patency of each nasal airway.
- Occlude one nostril with a thumb and then ask the patient to sniff in through the nose.
- Repeat on the opposite side.
- In children a metal tongue depressor held under the nose will show exhaled air; if there is a blockage, it will not steam up.
- Perform Cottle's test if there is obstruction, to improve airflow (see Fig. 2.8.).
- Inspect the nose internally using the thudichum speculum. An otoscope with a large speculum can be used for children.
- Assess the straightness and integrity of the septum.
- Assess the size of the turbinates.
- Note the mucosal appearance.
- Use the endoscope to assess the posterior part of the nose.
- Feel for lymph nodes.

Postnasal space examination (Fig. 2.9.)

- Inspect the posterior choanae and postnasal space with an endoscope or with a mirror.
- Anaesthetize the oropharynx with co-phenylcaine.
- Hold a Luc's tongue depressor in the right hand and use it to depress the patient's tongue.
- In the other hand use a small mirror run along the top of the tongue depressor to enter the oropharynx behind the soft palate.
- The reflected light should illuminate the postnasal space to visualize the posterior choanae and the ends of the inferior turbinates. Any ademoidal tissue will also be seen.

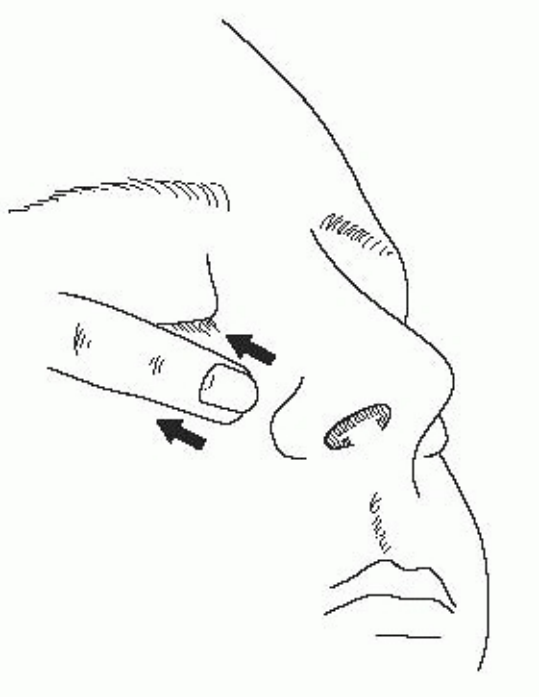


Fig. 2.8. Cottle's Test diagram (Lift the skin upwards and laterally to see if there is an imrovement in nasal patency)

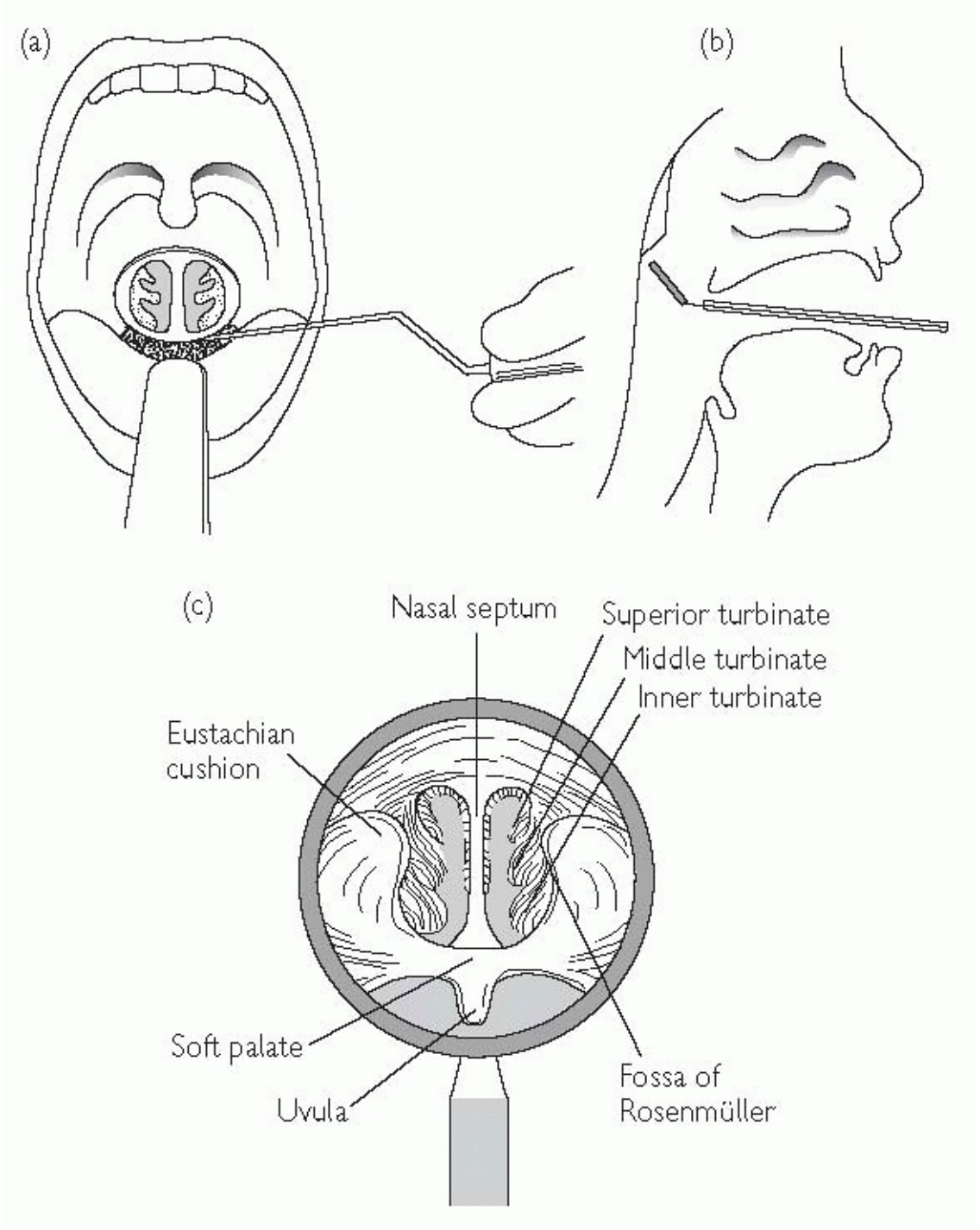


Fig. 2.9. Diagram of visualization of Post nasal space (PNS)

Rigid nasendoscopy

This is regarded as the standard technique for assessing the nose. It may be performed with the patient seated or with them laid supine on an examination couch. The advantage of having the patient lying down is that they cannot back away!

Procedure

- Before starting, warn the patient that the nasal spray tastes dreadful, that their throat will be numb and that hot food or drink should be not be consumed for an hour to avoid burns.
- Prepare the patient's nose with co-phenylcaine spray—usually five sprays to each nostril. The anaesthetic and vasoconstrictive effect of the spray takes six minutes to work. So it is essential to wait six minutes before starting the procedure. A diluted solution of the co-phenylcaine can be given to children.
- Use a 4mm 0° and 30° endoscope. A 2.7mm scope can be helpful in a narrow nose.
- Use the standard three pass technique as shown in Fig. 2.10.

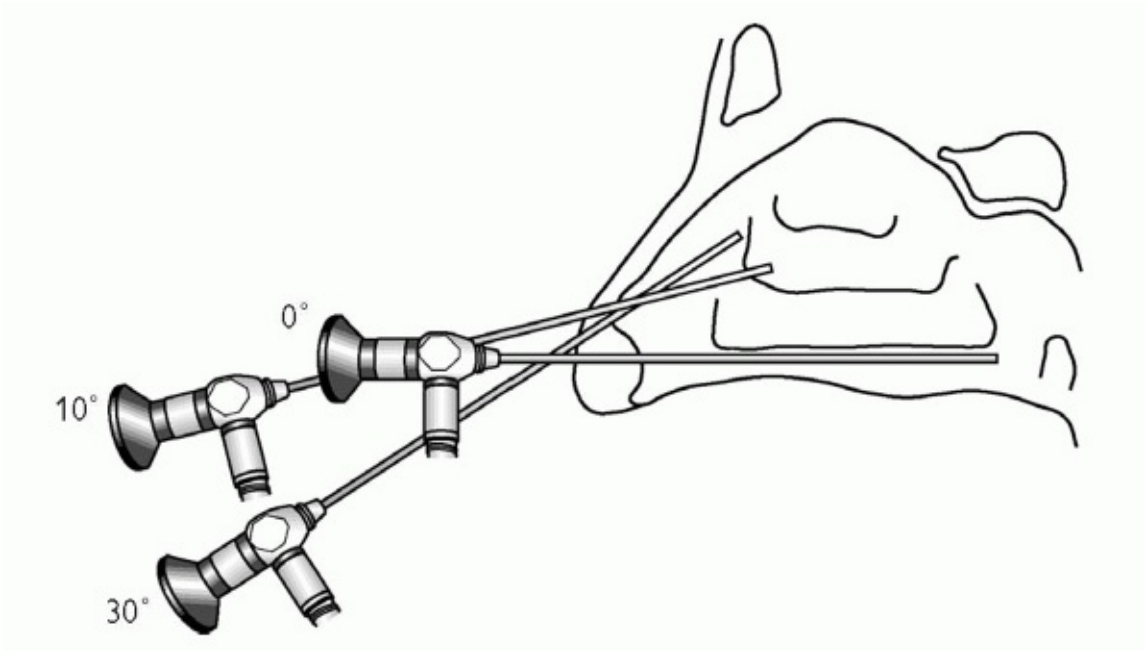
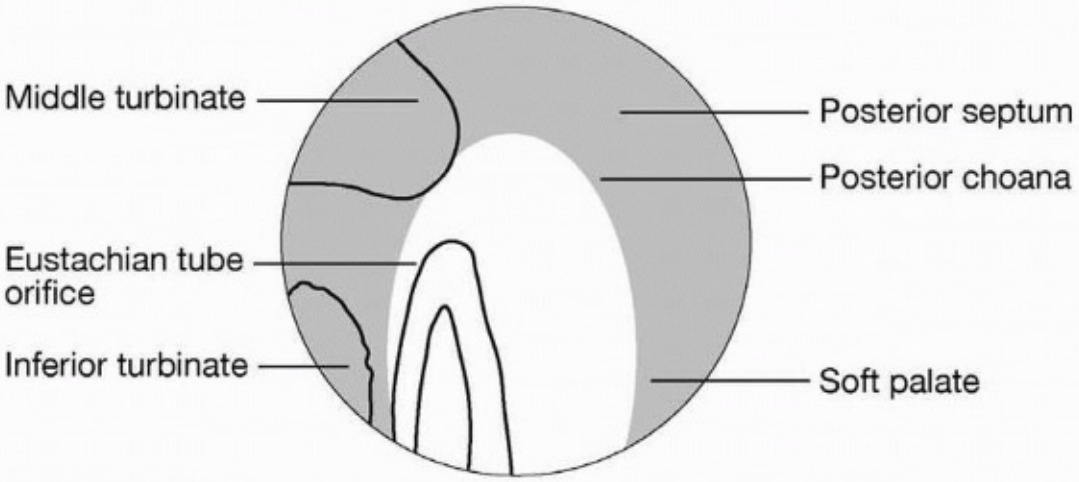
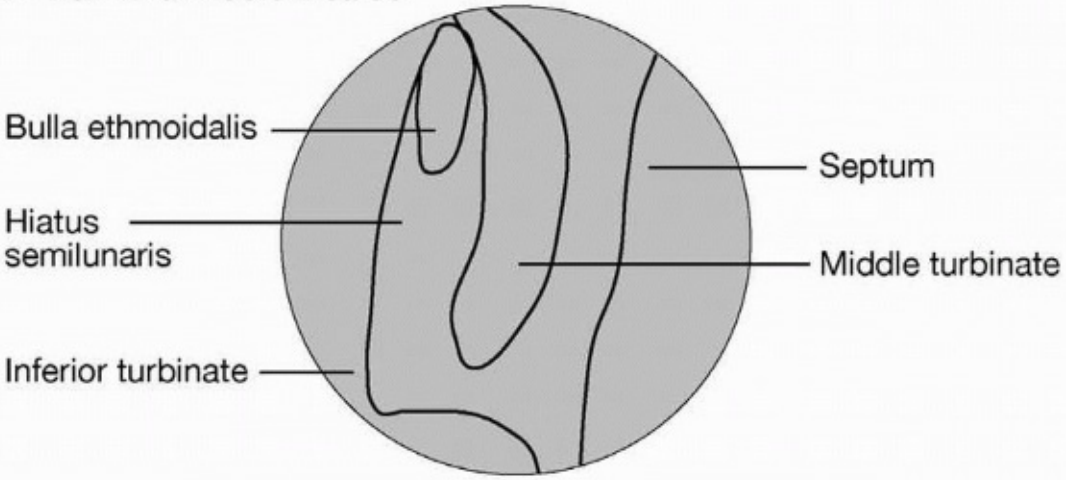


Fig. 2.10. Three pass technique diagram

1. View along floor of nose to postnasal space



2. View into middle meatus



3. View into frontal recess

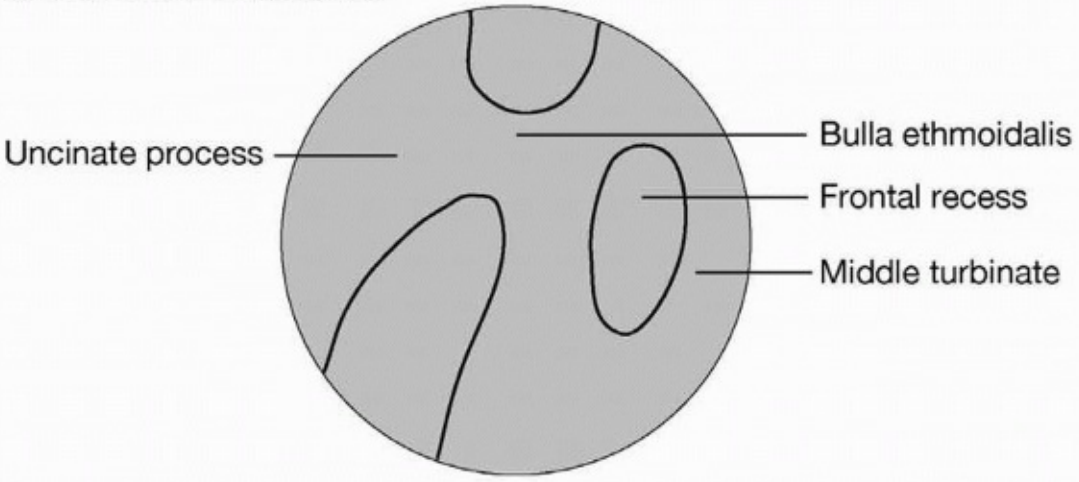


Fig. 2.11. Views on endoscopy seen during the passes in right nasal cavity

Examination of the mouth, larynx, and pharynx

Examination of the oral cavity

A good light source is essential. Ask the patient to remove all dentures in order to avoid important pathology even hidden. Ask the patient to open their mouth wide; limitation of jaw opening (trismus) may occur as a result of acute inflammation or tumour infiltration of the muscles of mastication. In an orderly way inspect the tongue, looking first that it upper surface then the lateral edges and it's under surface. Pay particular attention to the lateral edges of the tongue especially posteriorly, it may be necessary to use the tongue depressor to push the tongue medially in order to adequately examine this area. Any abnormality seen should also be examined with a gloved finger, since tumours of the tongue are usually hard and the depth of invasion can be difficult to assess by inspection alone. Now turn your attention to the floor of the mouth, the lower teeth and gums. Use a tongue depressor to distract the cheek and look at the parotid duct opening, opposite the second upper molar tooth. Inspect both hard and soft palate. Inspect in turn each of the tonsils as well as the posterior pharyngeal wall. Test the movements of the palate by asking the patient to say ‘aahh’ and the integrity of the hypoglossal nerve by asking for the tongue to be stuck out. The best way to assess the submandibular gland is via bimanual palpation with one hand placed on the neck and a gloved finger of the other in the floor of the mouth.

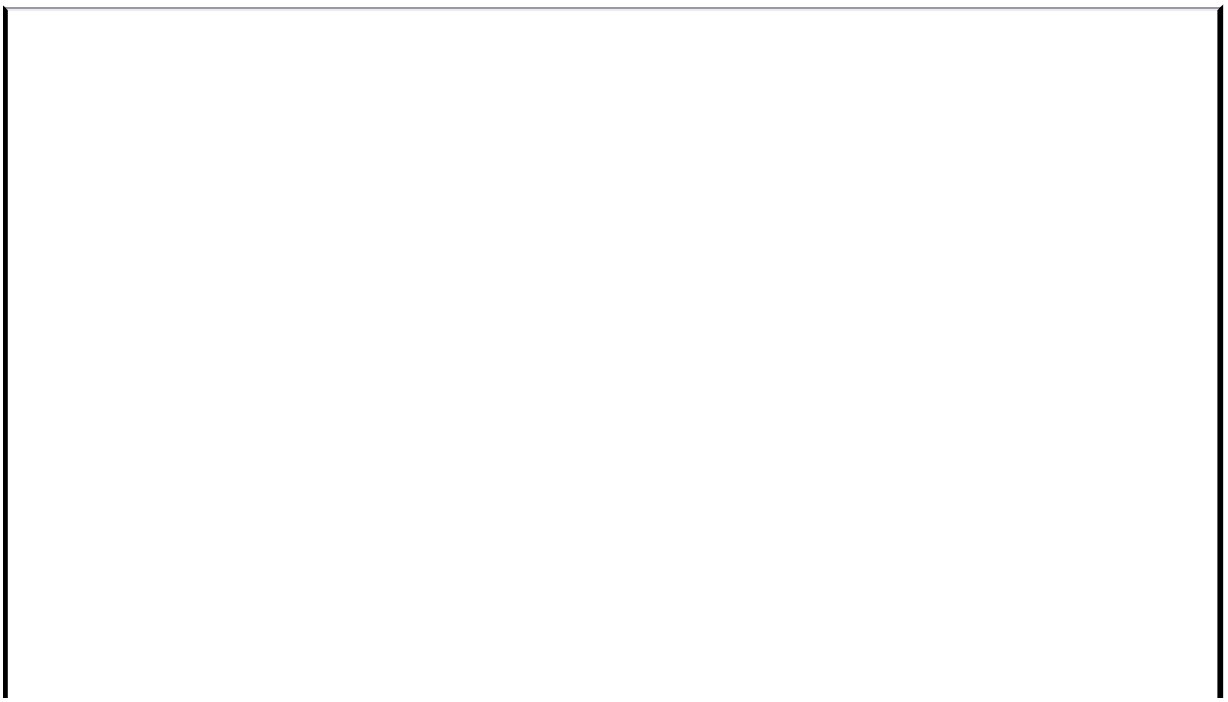
Examination of the pharynx and larynx

A lot of information can be gained by simply listening to the patient's voice. A week, breathy voice with a poor cough may suggest vocal cord

palsy. A harsh hoarse voice is suggestive of a vocal cord lesion. With experience one can also recognize the characteristic voice of vocal cord nodules and Reinkes' oedema, however the definitive diagnosis depends upon inspection of the vocal cords.

How to perform indirect laryngoscopy

Positioning the patient is very important, they should be placed leaning slightly forward with the head slightly extended. An appropriately sized laryngeal mirror should be selected which is large enough to give a good view but small enough to be placed comfortably at the back of the mouth. The mirrored surface should be gently warmed using either a spirit lamp, or electrical mirror warmer. Ask the patient to open their mouth and put out their tongue. Gently wrap their tongue in a gauze and hold it between finger and thumb. Now, introduce the warmed mirror into the mouth, gently pushing the soft palate and uvula upwards and away from you. Ask the patient to concentrate on their breathing, sometimes asking them to pant helps them to focus further and also improves your view. Ask the patient to say ‘eeee’ and note the movements of the vocal cords. In some patients, where there is a strong gag reflex, some local anaesthetic spray (e.g. xylocaine) may be helpful.



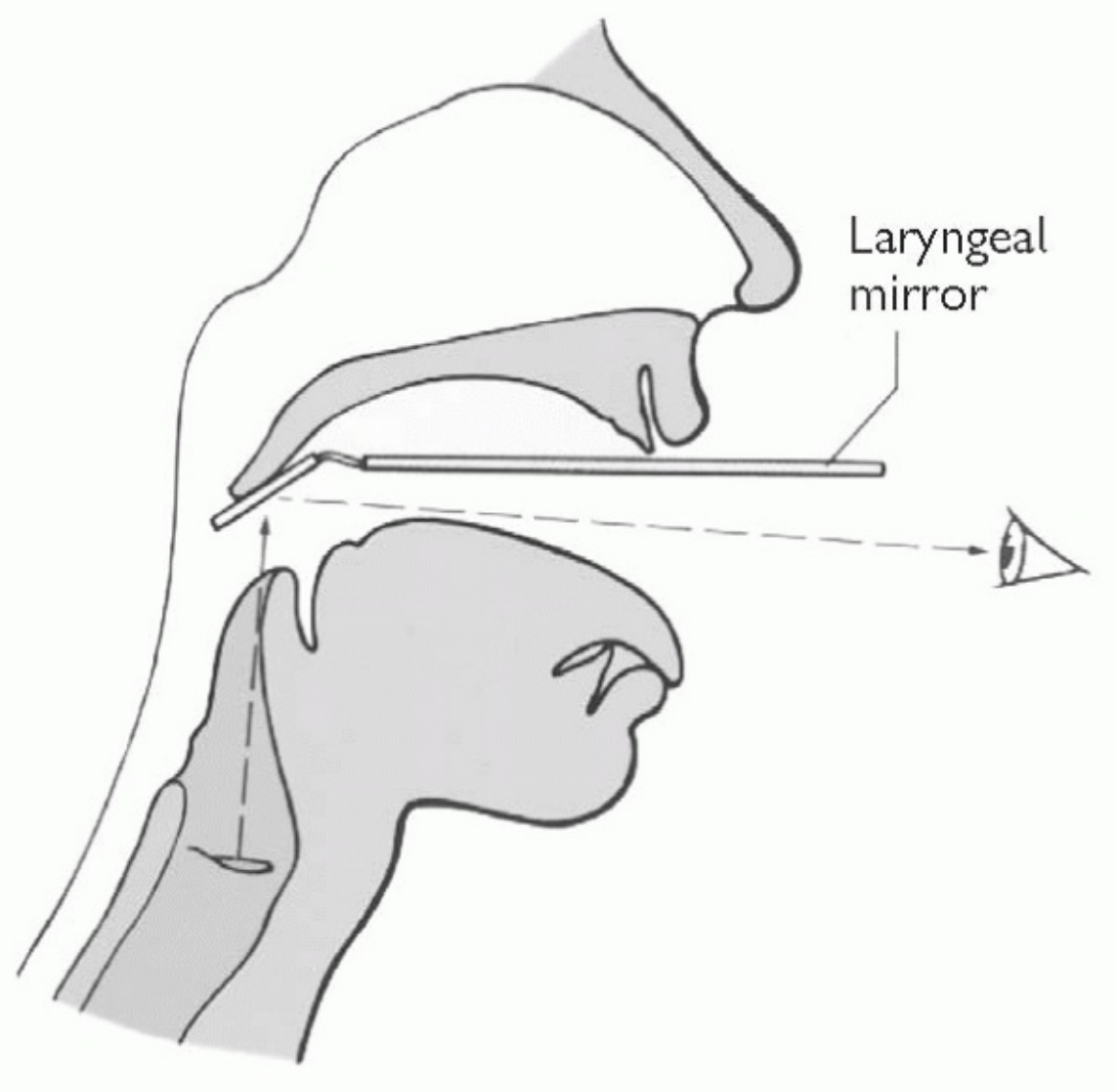


Fig. 2.12. Indirect laryngoscopy

Flexible nasal endoscopy and stroboscopy

ENT surgeons will commonly in use a flexible nasendoscope in order to examine the upper aero digestive tract. This is easy to perform in the outpatient clinic usually with the aid of some topical decongestant and anaesthetic. The highly manoeuvrable flexible scope is passed through

the nose giving the opportunity to inspect the middle and inferior turbinates, nasal septum, and osteomeatal complex. The endoscope is then advanced to the post nasal space where the Eustachian tube orifices and adenoids can be seen. By advancing over the superior aspect of the soft palate the endoscopist can see the tongue base, vallecula, laryngeal inlet and piriform fossa. Visualization of these areas can be improved by asking the patient to stick out their tongue and also performing a valsalvoer whilst the examiner pinches the patients nose to prevent their escape. Asking the patient to speak the movements of the vocal cords can also be assessed.

Fine movements of the vocal cords and 'mucosal wave' require stroboscopic examination. Here, a microphone is placed on the patients neck and the frequency of vocal cord vibration is matched to the frequency of a strobe light flashing. The resulting images shown in effect a slow motion movie picture of the vocal cords. Video stroboscopy is most commonly performed in the specialist voice clinic.

Examination of the neck

Start by inspecting the neck from the front. Look for any scars or masses, deformity or asymmetry which may be visible. Ask the patient to swallow and pay particular attention to the lower central neck looking for a thyroid mass which should rise on swallowing. Now move to behind the patient and lay hands on the patient having enquired if they have any pain or tender areas. Again a systematic examination will ensure that no area is missed. See Fig. 2.13 which illustrates a suggested method of examination.

Examination of a neck lump

If you do find a lump or abnormality ensure you can adequately described it and how it is related to anatomy of the neck i.e. site, size, consistency, surface, fixity, single?, pulsitile? The position of a neck lump will give clues as to the likely cause. The facing diagram gives a list of the common differential diagnoses dependent upon the site of the lump.

Examination of the thyroid

Thyroid lumps are common and often appear in exams at all levels. Full examination of the neck, as above is required, however some additional points are important to demonstrate. Start by shaking the patients hand and looking at their face. Note a cold or hot and sweaty hand which may indicate hypo/hyper thyroidism, similarly look at the skin and hair quality. Look for loss of the outer third of the eyebrow, which may occur in hypo function. Look at the neck from the front and ask the patient to swallow noting any thyroid lump which will rise during swallowing. Ask the patient to cough, listening for a weak cough and breathy voice which may occur in a recurrent laryngeal nerve palsy due to malignant infiltration of the nerve. Now move to behind the patient and feel the midline from the chin to the sternal notch. Feel for any midline lumps, especially thyroglossal cysts which will elevate on protrusion of the tongue so distinguishing them from isthmus thyroid lumps. Remember that the normal thyroid gland is impalpable. Feel each of the lobes in turn by as well as the isthmus, asking the patient to swallow once more and checking that any palpable lump rises during swallowing.

Examination of salivary glands

Palpation of the parotid gland should be included within the routine examination of the neck. Remember that most to parotid lumps are found just behind the angle of the mandible and that the tail of the parotid gland can extend down into the neck as far as the hyoid. Tumours of the deep lobe of the parotid may present as a mass arising in the mouth and pushing the tonsil medially (just like a quinsy!). Examination of the parotid gland includes testing the function of the facial nerve and visualization/palpation of the duct.

Submandibular gland masses are best felt via bimanual palpation. Remember to also inspect/palpate the length of the submandibular duct as it runs along the floor of the mouth and opens at a punctum next to the frenulum of the tongue.

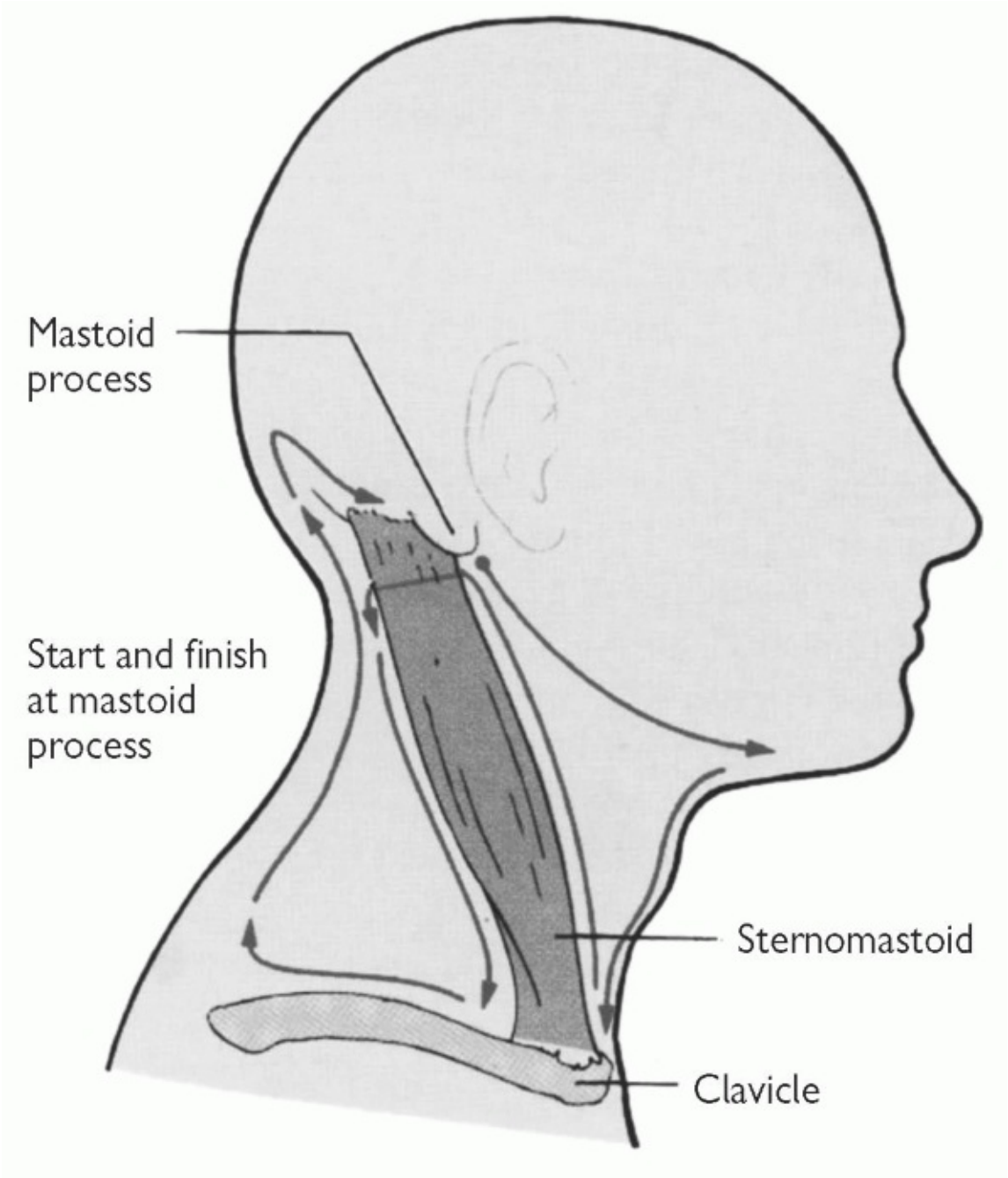


Fig. 2.13. Systematic examination of the neck

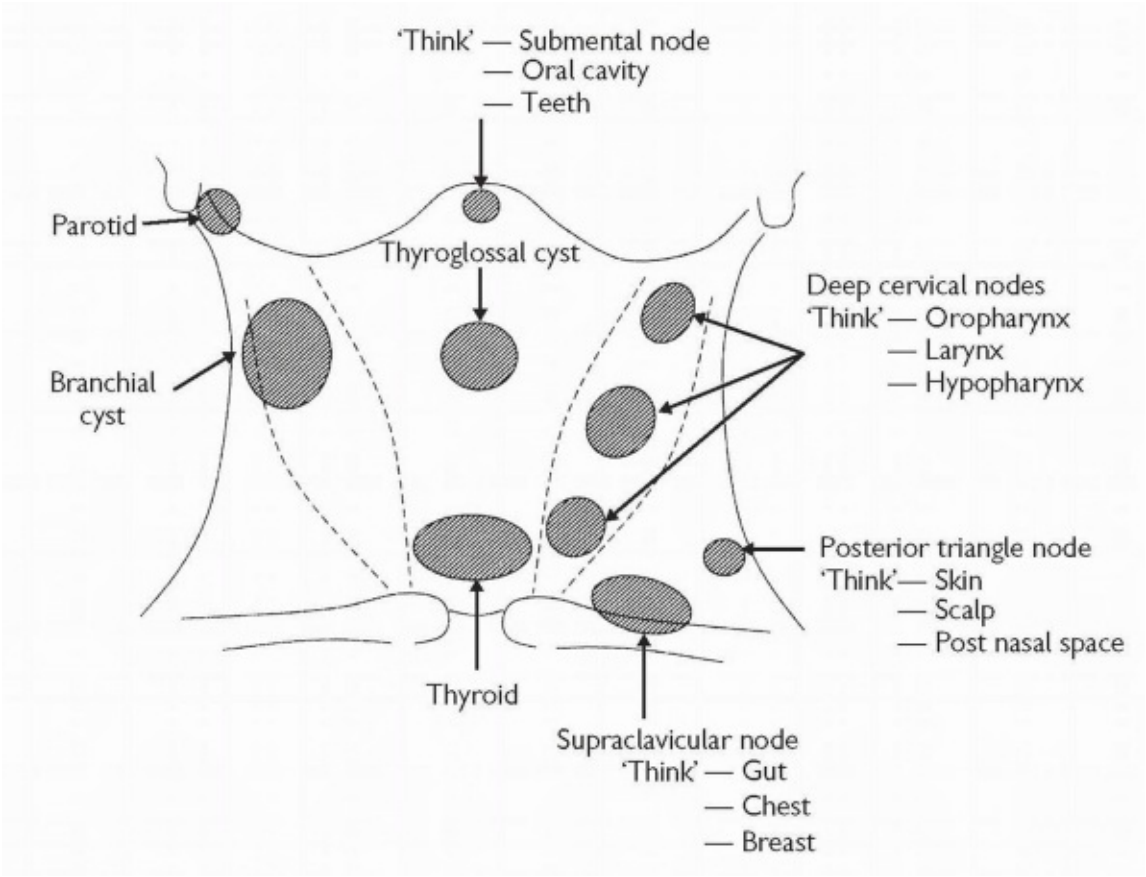


Fig. 2.14. Diagram of neck lumps by position and likely diagnosis

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: ***Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition***

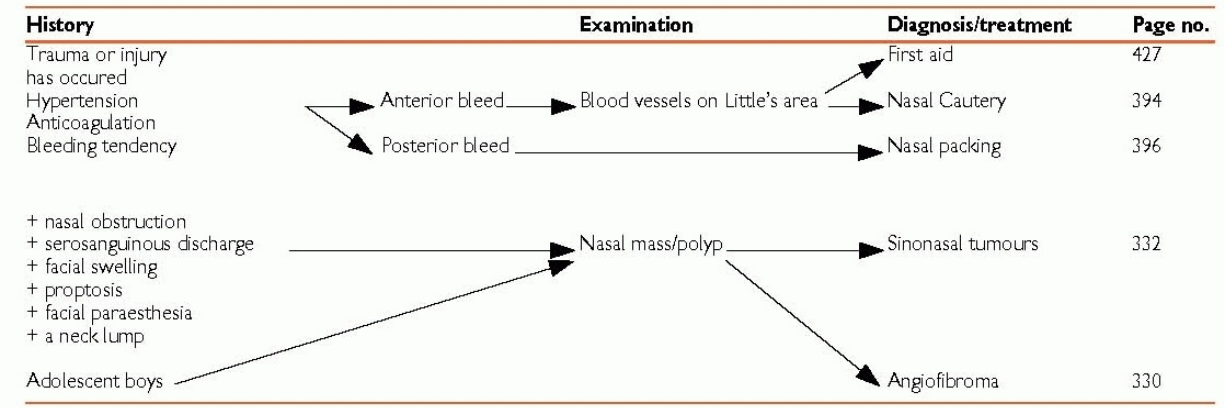
Chapter 3

Common Methods of Presentation

Hoarse voice

History	Examination		Diagnosis	Page no.
Lasted less than 2 weeks + pyrexia + a sore throat + URTI symptoms	→		Acute laryngitis	168
Lasted more than 3 weeks Constant Progressive Patient is a smoker ☐ dysphagia ☐ pain ☐ otalgia ☐ a neck lump	→ Vocal cord lesion	→ Unilateral	→ Laryngeal cancer	172
			Vocal polyp	178
			Vocal granuloma	178
			Papillomata	178
		→ Bilateral	→ Reinkes oedema	
			Papillomata	178
			Vocal nodules	178
		→ Immobile	→ Vocal cord palsy	179
Variable + voice abuse Comes and goes ☐ GORD	→ No vocal cord lesion	→	Muscle tension dysphonia	179

Epistaxis (nosebleed)



P.44

Dysphagia (swallowing difficulty)

History	Examination	Diagnosis	Page no.
Constant Progressive Solids worse than liquids Pain Otalgia Neck lump	± a neck lump Endoscopy—lesion seen Endoscopy—pooling of saliva	Carcinoma Post cricoid web Achalasia	204 198 200
Constant Progressive Regurgitation Halitosis		Pharyngeal pouch	202
Liquids worse than solids	+ neurology/cranial nerve palsies	Neurological dysphagia	196
Intermittent Saliva worse than solids or liquids Variable With or without variable voice problems Heartburn Feeling of a lump in the throat Mucus in the throat	Normal	Globus GORD	 194

P.46

A feeling of a lump in the throat

History	Examination	Diagnosis	Page no.
Constant Same site Worse with solids Unilateral ± pain ± otalgia ± neck lump ± hoarse voice Patient is a smoker	→ Lesion seen on examination Palpable neck lump	→ Carcinoma of pharynx Carcinoma of oesophagus	106 204
Variable site Comes and goes Worse with saliva No true dysphagia Central in the neck Variable voice problems Anxiety Patient has a cancer phobia Heart burn/GORD	→ Examination normal	→ Globus	

A lump in the neck

All of the below may apply to children, but the majority of neck masses in children are benign and most are reactive lymph nodes. Parotid lumps in children are more frequently malignant than in adults.

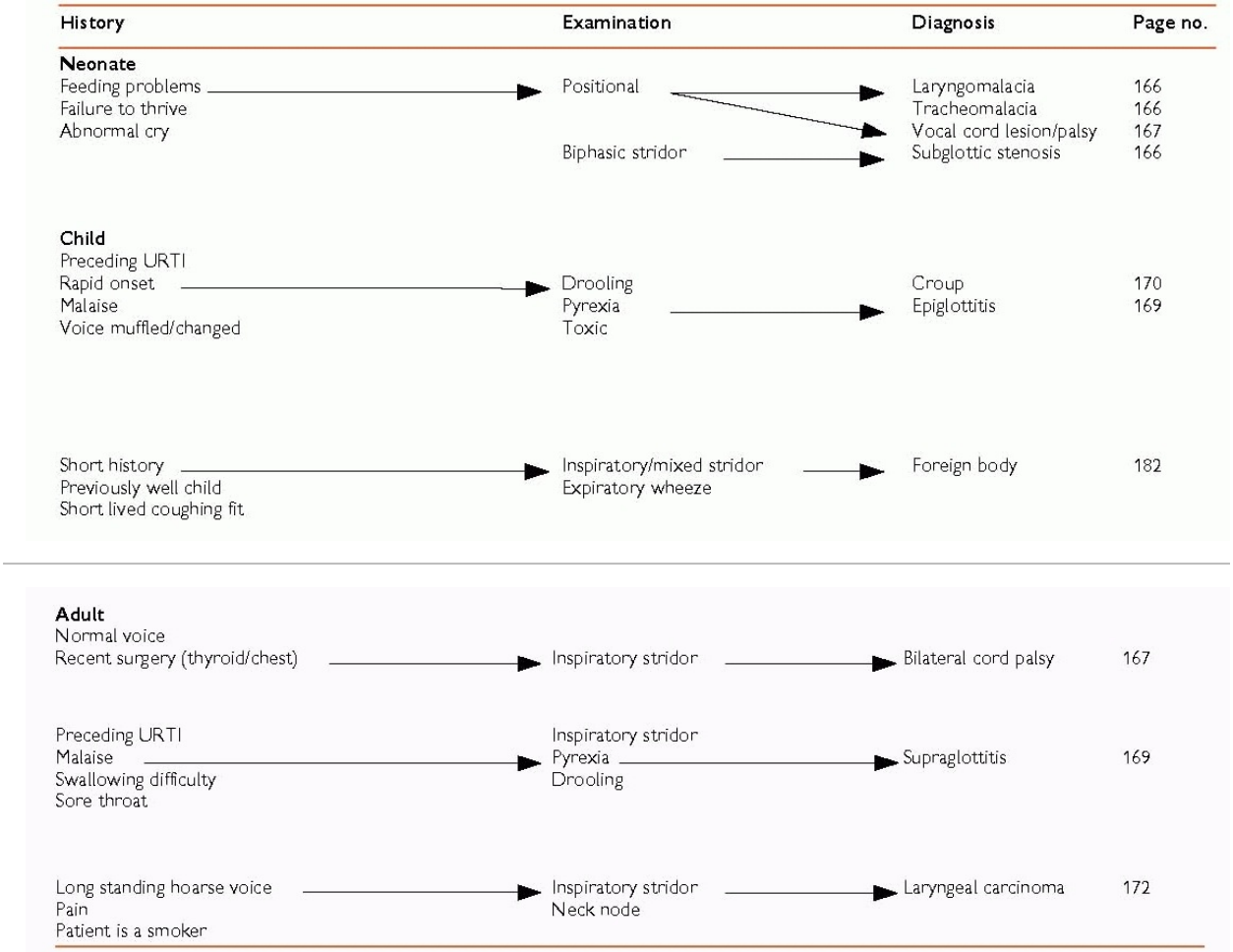
History	Examination	Diagnosis	Page no.
Short history (weeks/months) Lump is enlarging Unilateral nasal obstruction Otalgia Sore throat Patient is a smoker Hoarse voice Swallowing problems	→ Laterally placed Firm/hard Single/multiple	→ Malignant lymphadenopathy ENT primary	220
Weight loss Night sweats Anorexia Fever	→ Multiple Rubbery Groin/axillary nodes	Malignant lymphoma Glandular fever/toxoplasma	220 218
Foreign travel		→ Tuberculosis	218

Previous/recent URTI	Multiple/single	Reactive lymphadenopathy	218
Long history (months/years) No associated symptoms	Single & lateral	Branchial cyst	214
	Single & midline		
	Rises on swallowing	Thyroid lump	228
	Rises on tongue protrusion	Thyroglossal cyst	214
	No relation to swallowing	Dermoid cyst	214
		Lymph node	218/220
	Parotid region		
	No facial weakness	Benign parotid tumour	148
	Facial weakness & pain	Malignant parotid tumour	148
	Submandibular region	Submandibular gland tumour	148
Changes with eating	Parotid	Parotid stone/parotiitis	150/152
	Submandibular	Submandibular stone/sialadenitis	150/152

Mouth or tongue ulcer

History	Examination	Diagnosis	Page no.
Trauma or injury Poor fitting denture Sharp tooth Pain	Lateral tongue Buccal mucosa	Traumatic ulcer	92
Patient is a smoker Alcohol Betel nut chewer Progressive Pain Neck mass Otalgia	Lateral tongue Floor of mouth Tonsil Firm/hard ulcer Neck nodes	Malignant ulcer (SCC)	94
Normal immune function Recurrent	Multiple ulcers Tongue tip/lateral border	Aphthous ulcers	92
Dietary insufficiency	Angular stomatitis Skin lesions	Dietary/blood disorders	92

Stridor



Facial nerve palsy

History	Examination	Diagnosis	Page no.
Recent trauma Haemotympanum	Head injury Trauma to ear canal/drum CSF from ear/nose	Fractured Temporal bone	320
Rapid onset Other weakness	Forehead unaffected Abnormal neurological exam	CVA	
Rapid onset Isolated weakness	Forehead affected	Bell's palsy	422
Otalgia	Vesicles in ear	Ramsay Hunt	422
Gradual onset Other weakness	Abnormal neurological exam	MS Motor neurone disease	
Gradual onset Facial pain	Parotid lump	Parotid carcinoma	148
Hearing loss Balance disturbance	Sensorineural heaing loss ataxia	CPA tumour	326
Ear discharge	Conductive hearing loss	Cholesteatoma	270

P.56

Nasal obstruction

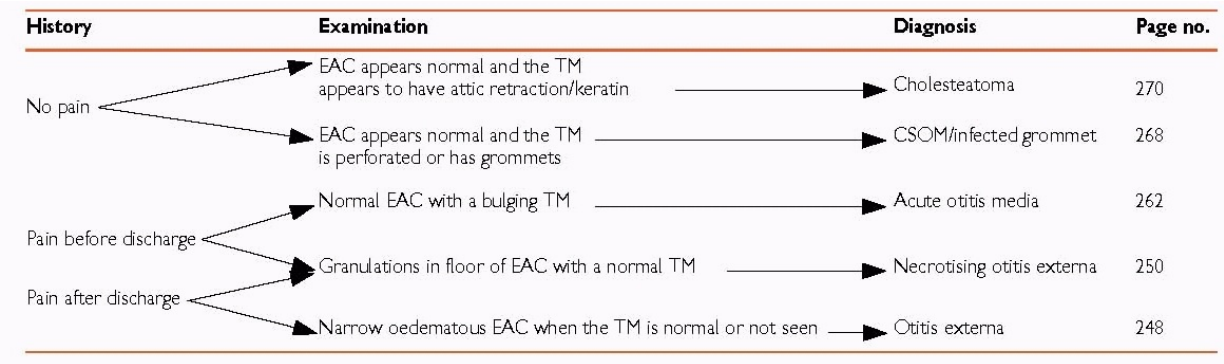
Careful examination of the nasal anatomy will reveal what is responsible for nasal obstruction. Always remember that several anatomical problems can co-exist. Symptoms can vary, especially for mucosal problems, so ascertain the severity of the problem when you examine the patient's nose.

	History	Examination	Diagnosis	Page no.
Unilateral	Traumatic injury to nose	Misshapen nose	Deviated nasal Septum	136
	Longstanding obstruction Noticed in childhood	Deviated septum		
	Recent onset Bleeding Foul smell Woodworker	Nasal polyp	Nasal tumour/polyp	132/134
Bilateral	Perennial problem — Decreased nasal airflow	Septal deviation	Deviated nasal septum	136
		Turbinate hypertrophy	Rhinitis	116
		Nasal polyps	Nasal polyposis	132
	Perennial problem — Good nasal airflow	Middle meatus congested	Rhinosinusitis	116/122
	Seasonal/intermittent	Enlarged turbinates	Rhinitis	116
		Mucosa inflamed		
		Nasal polyps	Nasal polyps	132

P.58

The discharging ear

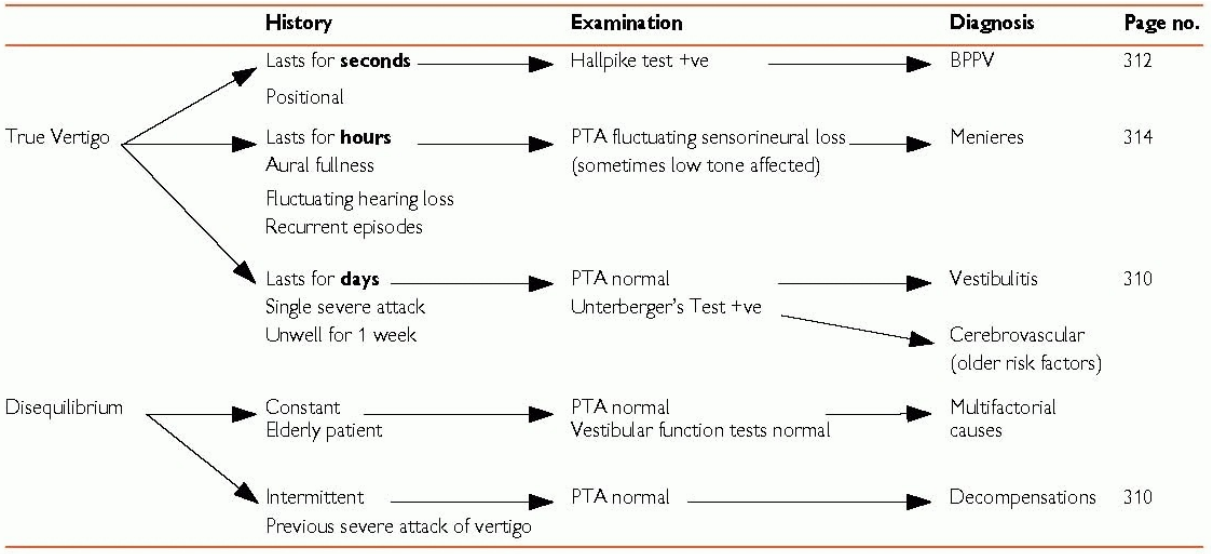
The timing of the onset of discharge in relation to any pain often helps with diagnosis. Otitis externa in particular can be secondary to infection spreading from the middle ear. Microsuction, or dry mopping, is often necessary to visualise the tympanic membrane. A final diagnosis is sometimes not possible until the ear has been cleaned and the local infection has been treated. It is important to visualise the ear drum after treatment in order to exclude serious pathology at the level of the tympanic membrane.



P.60

Dizziness and vertigo

The most important aspect here is the patient's history. Take great care to elicit the character of the dizziness and its time course to establish if this is dizziness or true vertigo.



P.62

Otalgia (earache)

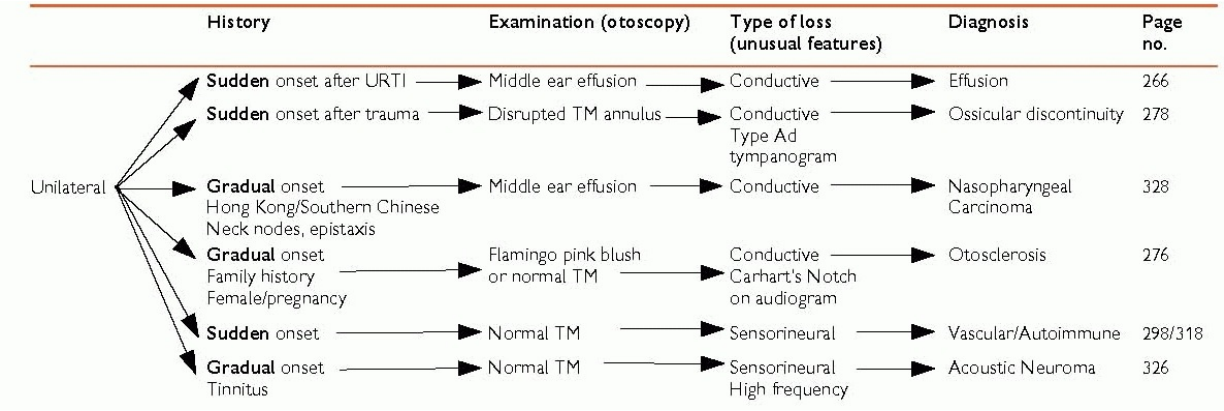
Patients who present with otalgia can present a challenging problem. A careful history can help distinguish many conditions. Beware the red reflex—a reflex dilatation of the blood vessels on the handle of the malleus caused by the otoscope speculum touching the bony ear canal. This is often misdiagnosed as early acute otitis media, and the true cause of otalgia is missed. Always consider if the otalgia is referred pain.

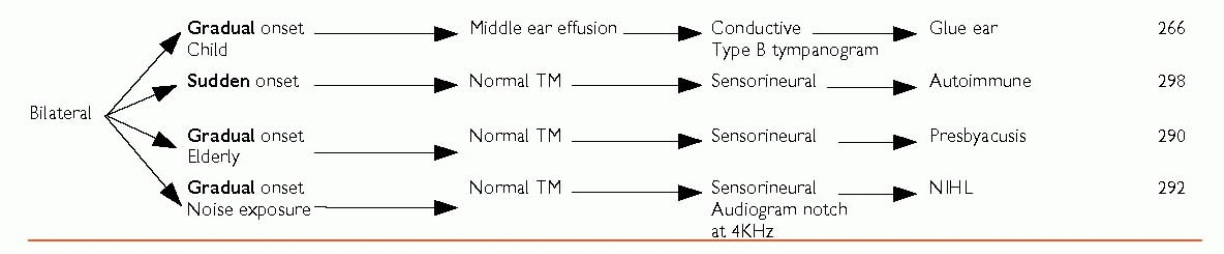
History		Examination (using an otoscope)	Diagnosis	Page no.
Severe pain Child/preceding URTI Very painful		Erythema—a bulging drum A high temperature Distressed patient	Acute otitis media	262
Severe pain Preceding itch Longstanding Surfer/swimmer	Not diabetic	Narrow EAC Mucopus	Otitis externa	248
Severe pain Elderly	Diabetic	EAC floor granulated Patient unwell Cranial nerve palsies	Necrotising otitis externa	250
Intermittent severe pain At night time Known glue ear		Middle ear effusion	Glue ear	266
Severe pain Anterior to tragus Worse with eating		Normal TM Tender over TMJ Malaligned bite	TMJ dysfunction	
Moderate/severe pain		Normal TM Tumour head and neck region	Referred pain	106

Hearing loss

A diagnosis of hearing loss in children and adults depends on combining the information from the patient's history, the examination and any special investigations. An audiogram, or a tympanogram with tuning fork tests will help to distinguish conductive from sensorineural hearing loss and will determine if the problem is bilateral or affects only one ear.

Sudden hearing loss is an emergency.

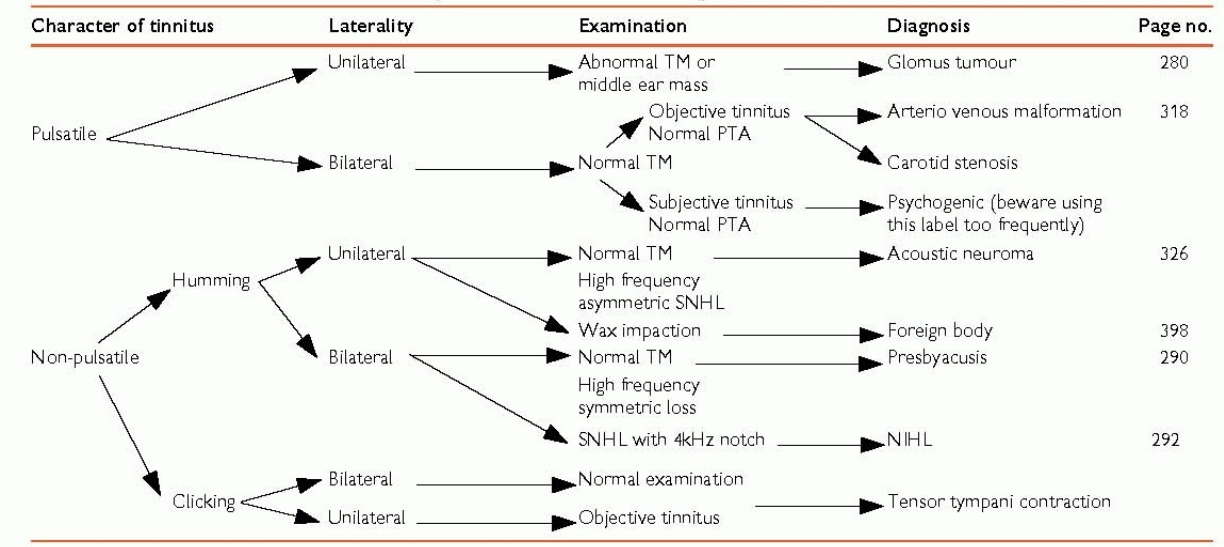




Tinnitus

It is important to distinguish between objective tinnutus (which the examiner can hear) and subjective tinnitus (which only the patient can hear). The character of the tinnitus is also important. A thorough otoneurological examination—of the ears, cranial nerves and central nervous system—is essential. Auscultate the ear, eye and carotids.

Remember that tinnitus can be caused by medication or other drugs.



Facial pain

Patients with this problem may present to a variety of specialties for an opinion e.g. ENT, neurology or maxillofacial surgery. It is important to have a broad mind to avoid a misdiagnosis. Never be afraid to ask for another specialist's opinion.

History	Examination	Diagnosis	Page no.
Severe acute pain Pain periorbital/cheeks Provoked by URTI Nasal obstruction Temperature	Pus/polyps in middle meatus	Acute sinusitis	124
Chronic fullness Worse bending over Nasal obstruction	Middle meatus occluded/narrowed	Chronic sinusitis	130
Severe pain Localised to specific site No nasal obstruction No rhinitic symptoms	Normal nasal examination Normal nasendoscopy	Atypical facial pain	
Intermittent pain Worse on eating Radiates to ear	Normal nasal examination Normal nasendoscopy Tendernes over TMJ	TMJ dysfunction	

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 4

Investigations in ENT

Children's hearing assessment

Assessing the hearing of babies and children can be difficult, because most hearing tests involve the active co-operation of the participant. To get round this problem, a number of tests have been specially designed for children and different tests are used at different ages.

Neonatal screening

In the past, neonatal screening for hearing problems was for high risk infants only. The success of pilot studies means that now all babies get neonatal screening. The otoacoustic emissions test is used. This phenomenon measures the active sounds produced by the outer hair cells which are recorded in response to tone clicks applied to the ear. The test is accurate, rapid, and easy to perform.

Distraction testing

This test is usually done by health visitors, as part of the routine health screening of infants at nine months of age. Two testers are required for this examination. The child sits on the parent or carer's lap, and one of the examiners sits in front of the child to occupy its attention. The other tester stands behind the child and uses sounds of particular frequency and volume to stimulate the child to turn its head. Turning is a positive response.

Visual reinforcement audiometry

This test is similar to distraction testing, but it uses speakers or headphones to deliver the unilateral sound. If the child turns round 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 test can sometimes be performed by children as young as three years old. PTA using bone conduction can be uncomfortable for younger children (see p.74 for details).

Tympanometry

This test measures pressure in the middle ear and is useful and accurate in detecting glue ear in children (see p.76 for details).

Pure tone audiometry (PTA)

This is the most common method used for assessing hearing. The examination will ideally take place in a soundproof booth. To avoid cheating, the patient should not be able to see the audiometer controls.

The examiner and the patient are in contact via a microphone and a headset. The patient wears headphones and is given a handheld button to press when they hear a sound during the test. The better hearing

ear is tested first.

The test begins using air conducted sounds. Initially, sound is played through the headphones at a level above the hearing threshold. The sound is decreased in 10dB increments until it is no longer heard. The sound intensity is then increased in 5dB increments until a 50% response rate is obtained.

- The frequency order of testing is 1kHz, 2kHz, 4kHz, 8kHz, 500Hz, 250Hz and then repeated at 1kHz.
- The re-test at 1kHz should be within 10dB of the initial result.
- The test-retest error is approximately 5dB.

The test is then repeated using bone conduction if necessary. The bone conductor is tightly applied to the mastoid area where the skin is tethered to the bone more securely and better contact is obtained.

Masking

Like tuning fork testing, there is a potential source of error in the pure tone audiogram. This is because sound can be perceived in the non-test ear if it is conducted through bone or through the air. The main differences are:

- 10dB for bone conduction.
- 40dB for air conduction. When thresholds show a difference of >40dB then masking should be used.

This is the amount of sound intensity travelling to the opposite ear when a sound is presented to one ear.

Masking is noise which is applied to the non-test ear to prevent it from picking up sounds presented to the test ear. The audiological rules of masking are complex to understand at first. Essentially masking is required when:

- Air conduction audiometry shows a greater than 40dB difference in the two ears.
- The difference in air conduction threshold between the test ear and

the bone conduction in the non-test ear is >40dB.

- An unmasked air bone gap in the test ear is greater than 10dB (a sensorineural loss may be hidden).

Tympanometry

Tympanometry is a way of measuring the pressure in the middle ear. It was developed and popularized by Jerger[1] as a way of establishing the cause of conductive deafness. He classified the different patterns described opposite.

Method

During the test a probe is placed in the external auditory meatus to give a tight seal to the external ear canal (EAC). This probe can vary the pressure in the EAC whilst firing a 225Hz sound signal at the tympanic membrane (TM) or ear drum. The probe then measures the amount of sound reflected from the TM and calculates how much of the sound energy is admitted. Most sound is admitted when the pressure in the EAC matches that of the middle ear space. Thus the instrument measures the compliance of the tympanic membrane. By calculating the amount of air needed to change the EAC pressure the machine also calculates an approximate EAC volume.

Normal Ear

Type A—Peak at atmospheric pressure or maximal compliance.

Ossicular chain problems

Type As—the normal tympanogram can be flattened as a fixed ossicular chain reduces compliance.

Type Ad—the disarticulated ossicular chain causes the compliance to increase.

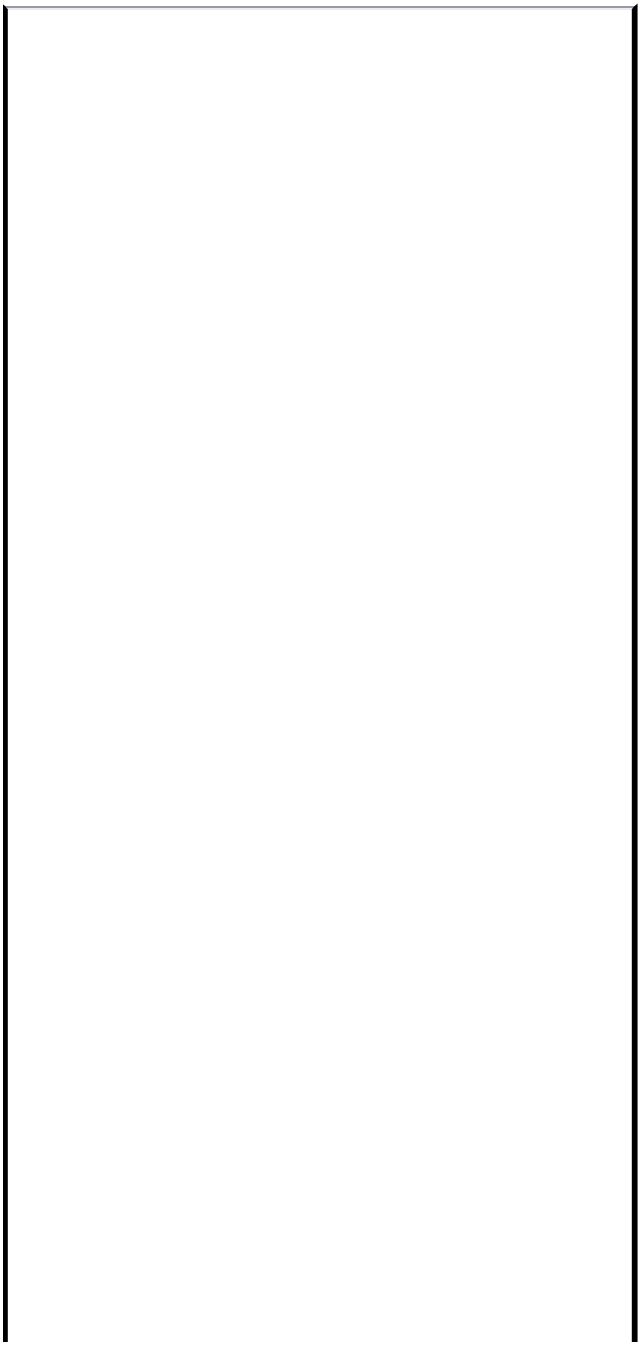
Middle ear effusion/glue ear

Type B—when there is fluid in the middle ear the ear drum's

compliance alters giving a flat trace.

Perforation

Type B—if there is a perforation in the tympanic membrane, the compliance will remain unchanged. But EAC volume will be increased as the tympanometer is changing the pressure of the EAC and middle ear space.



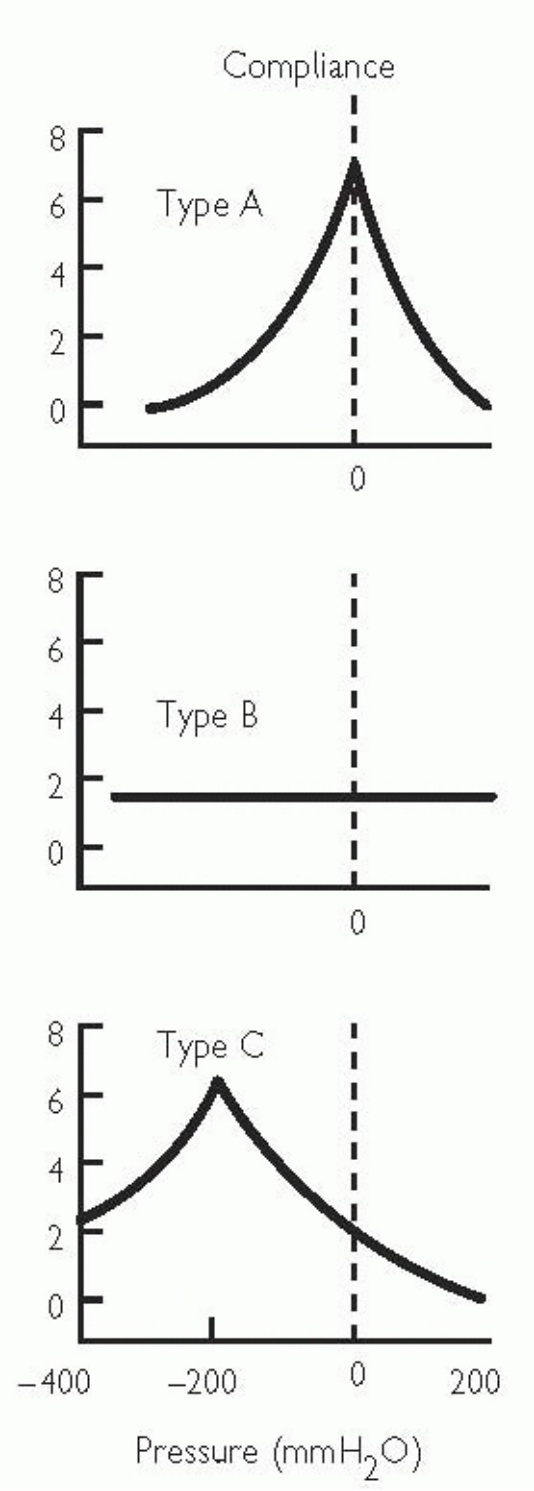


Fig. 4.1. Types of tympanogram

Electronystagmography (ENG)

Electronystagmography (ENG) is a balance test and it measures the chorioretinal electrical potential difference. Electrodes placed near the eyes can pick up electrical changes caused by eye movements. ENG allows testing of the vestibulo-ocular reflex (VOR). The VOR allows clear vision during head movements by producing compensatory eye movements.

The ENG test is usually done in a dimly lit room with a light bar to provide visual calibration. The patient sits on an examination couch.

Uses of ENG

ENG enables an assessment of the following:

- Disorders in SCC and otolith organs.
- Integrity of brainstem-cerebellar pathways.
- Integrity of central vestibulo-ocular pathways.

Subtests

If a patient needs more detailed investigations, they may be sent for more tests which may include:

- Oculomotor control test
  - Saccades
  - Tracking/Smooth pursuit
  - Optokinetic Test
  - Gaze Test.
- Positional testing
  - Headshake
  - Dix-Hallpike Test.
- Caloric tests

- Warm and cold irrigations
- Ice calorics
- Fixation tests.

Calorics

This balance test involves irrigating warm or cold water into the ear. This stimulates the inner ear balance mechanisms and will make the patient dizzy. The degree of stimulation can be measured by observing the nystagmus that is produced. This test is performed on both ears and any difference gives an indication of pathology in the balance system. It is used to confirm an inner ear cause of a balance problem.

Procedure

- Irrigation with warm water at 44°C and cool 30°C the EAC for 30 seconds with 200ml of fluid.
- Alternatively warm air at 50°C and cool at 24°C for 60 seconds at 9L/min flow rate.
- Temperature difference stimulates eddie currents in lateral SCC. Nystagmus induced according to COWS (cold opposite warm the same).
- Responses compared according to formula below.

Unilateral weakness (>25% significance)

$$\frac{(RC + RW) - (LC + LW) \times 100}{RC + LC + RW + LW} = \text{unilateral weakness}$$

Directional preponderance (>25-30% significance)

$$\frac{(RC + RW) - (LC + RW) \times 100}{RC + LC + RW + LW} = \text{directional preponderance}$$

where: RC = Right Cold;
RW = Right Warm;
LC = Left Cold;
LW = Left Warm.

P.82

CT scan

Computed tomography (CT) provides excellent information for defining differences between bony and soft tissue. In ENT it is used for looking for problems affecting the temporal bone and the inner ear.

Procedure

The patient lies supine on the scanner bed. The scan uses X-rays applied in a circumferential manner to acquire information. Information is produced in the form of pixel cubes. These can be joined to produce images in multiple planes. There is a significant radiation dose with this technique.

Uses

- Evaluation of bony anatomy for endoscopic sinus surgery.
- Evaluation of mandibular involvement in floor of mouth tumours.
- Assessment of middle ear in suspected mastoiditis.
- Evaluation of traumatic head injury and temporal bone fracture.

P.84

MRI scan

This technique provides excellent soft tissue definition with no radiation risk. In ENT it is used for looking at the nerves to and from the inner ear.

Procedure

The patient is placed lying down, inside a circular magnet. The magnetic field aligns all the hydrogen atoms, mainly body water. An electromagnetic pulse is directed towards the patient, which knocks the hydrogen atoms out of alignment. Once the pulse wave has subsided the hydrogen atoms spring back into alignment. This process causes energy to be released, which is detected by the scanner.

The timing of recording, and the information collected can be analysed separately to give different information. Software algorithms produce the 3D image information. Contrast can enhance the information.

Common protocols

- T1 weighted scans (fat bright).
- T2 weighted scans (water bright).
- STIR sequence (short tau inversion recovery) produces fat suppressed images.
- MRA angiographic information from scan sequence.

Uses

- Identifying acoustic neuroma—MRI is the gold standard.
- Checking the spread of a tumour.
- Assessing the involvement of vascular structures in head and neck malignancy.
- Assessing the intracranial spread for sinonasal tumours.

Skin prick testing

This test enables you to detect if a patient is allergic to various substances. It has a rapid result, allowing you to see the allergic response. Skin prick testing is used in patients with rhinitis, to guide therapy and to aid advice on which allergens to avoid.

Procedure

- Before starting this test, it is important to ensure that resusitation facilities are nearby, with adrenaline.
- The procedure for testing should be explained to the patient. The test solutions are then placed on the patient's forearm. These include a positive control substance (histamine) and a negative control substance (excipient solution). A small amount of solution is innoculated intradermally by using a lancet pricked into the patient's skin.
- A positive response is measured after 30 minutes, as a wheal >2mm.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 5

The Mouth, Tonsils, and Adenoids

Anatomy

The nose and throat

The nose and throat can be divided into the following anatomical areas (see Fig. 5.1.):

- Oral cavity—extends from the lips to the anterior pillar of the tonsil.
- Oropharynx—extends from the anterior pillar to the posterior pharyngeal wall. It contains the tonsils and the base of the tongue.
- Nasopharynx—located above the hard palate and contains the adenoids. The Eustachian tubes open into it laterally and it communicates with the nasal cavity anteriorly.

The tongue

The anterior third and posterior two thirds of the tongue have different embryological origins, and different nerve supplies.

- ***Motor supply*** to the tongue is via the hypoglossal nerve.
- ***Sensation*** to the anterior two thirds of the tongue is via the lingual nerve. The posterior third is supplied by the glossopharyngeal nerve.
- ***Taste*** fibres pass with the facial nerve to the middle ear. From here they separate—as the chorda tympani—and pass forwards. As they

exit the middle ear they merge with the mandibular division of the trigeminal nerve to eventually run with the lingual nerve.

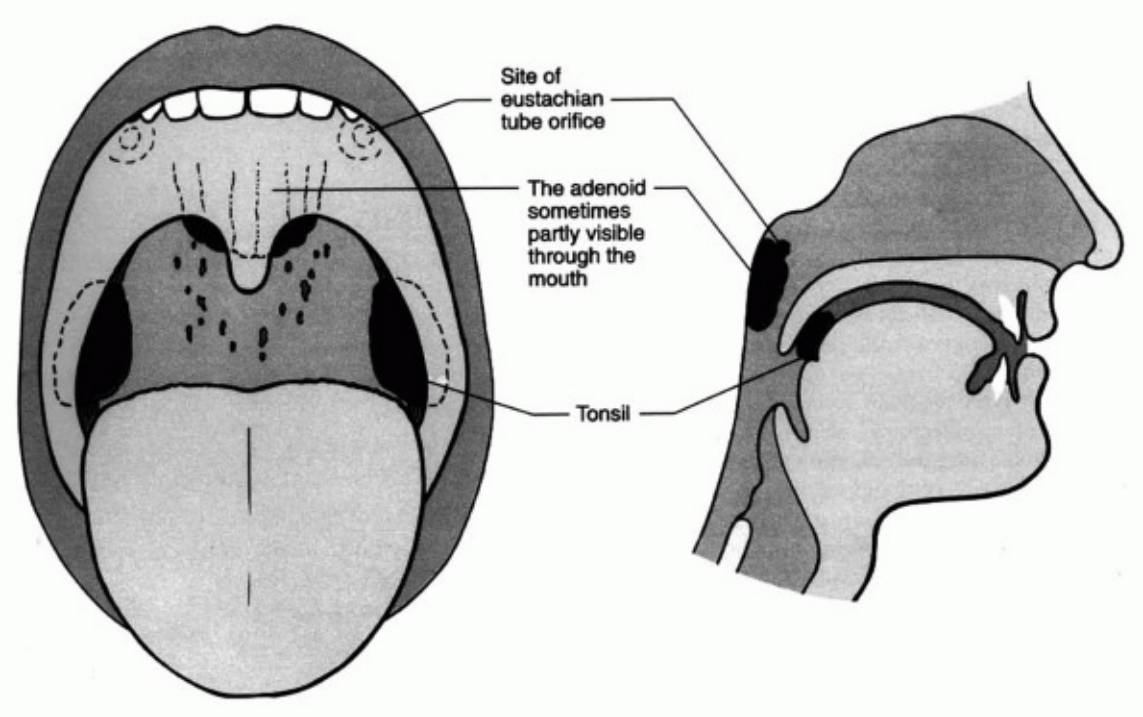


Fig. 5.1. Oral cavity AP and oropharynx/nasopharynx lateral

Oral ulcers—benign

Traumatic ulcers

Acute traumatic ulcers are common, they heal quickly and patients rarely seek any medical attention. Chronic traumatic ulcers are seen more often. These can arise from ill-fitting dentures, sharp or rotten teeth. These usually occur on the lateral aspect of the tongue, or on the inside of the cheek. The only treatment required is a dental review or a refitting of the denture.

Aphthous ulcers

These are the common mouth ulcers that most people will suffer from at some time in their lives. They are small and painful and usually appear in crops. They most often affect the lateral border or the tip of the tongue, but they may occur anywhere in the oral cavity. It is unclear what causes them, but hormonal changes, poor oral hygiene, trauma, poor diet and stress have all been suggested as factors. Usually, these ulcers present little more than a minor irritation for 24-48 hours. However, occasionally they are severe and recurrent. Treatment in this case should consist of simple analgesia, local anaesthetic gels or steroid pastels. Rarely, a single giant aphthous ulcer may develop. This can look alarming or may even appear malignant. In this case, a biopsy may be necessary.

Infective ulcers

Herpes simplex may cause mouth ulcers which look similar to aphthous ulcers. However the patient will often have additional symptoms of mild pyrexia and malaise. Acyclovir is effective if given in the early stages. Herpes zoster may affect the oral cavity but is usually seen in immunocompromised and debilitated patients.

The ‘snail track’ ulcers of syphilis are rarely seen. Oral ulceration along with candidiasis, tonsillitis, Kaposi's sarcoma and hairy Leukoplakia are all features of AIDS infection.

Dietary and blood disorders

Deficiencies in iron, folate, and vitamin B12 can cause oral ulceration, since these agents are required for normal mucosal development. Mouth ulcers also occur as a result of leukaemia, polycythaemia and agranulocytosis. Signs of scurvy and pellagra include a sore mouth and ulceration.

Torus palatinus

This is a benign osteoma on the hard palate. Its surface may become ulcerated, usually as a result of trauma from an overlying denture. In this case the lesion may look and feel malignant. These lesions need only be removed if they interfere with the fitting of a dental plate.

Oral ulcers—malignant

Squamous cell carcinoma

This is the commonest malignant lesion found in the mouth. Risk factors include smoking, drinking alcohol (in particular spirits), chewing betel nuts and having sharp teeth.

Symptoms and signs

It usually starts as an ulcer, often on the lateral border of the tongue, the floor of the mouth, or the gum. These ulcers progress and are painful, often with referred pain to the ear. Malignant ulcers of the tongue may be superficial or deeply infiltrating, but in either case they usually feel hard.

Investigations

More information can usually be gathered from palpation than from inspection. It is vital to adequately examine the neck for lymph node metastasis, paying particular attention to the submandibular and submental triangles as well as those nodes deep to the sternomastoid running along the internal jugular vein. SCC of the oral cavity will most commonly metastasize to the nodes in levels 1, 2 and 3 (see p.210). A MRI scan or a spiral CT scan is most often employed to assess the neck. Ultrasound guided FNA is a highly sensitive and specific tool in assessing the neck in skilled hands.

Management

Any ulcer which fails to heal within two weeks should be biopsied in order to exclude malignancy. Many patients who develop oral cavity SCC have widespread mucosal field change as a result of their smoking and drinking. They are at a high risk of developing another upper aero digestive tract cancer at the same time or at some time in the future. All patients presenting with SCC should have a panendoscopy under general anaesthetic in order to exclude any additional primary tumour.

The panendoscopy will also allow proper assessment of the primary tumour.

Treatment

Options include both external beam and interstitial radiotherapy as well as surgical en-bloc resection with all the affected hard and soft tissues. The surgically created defect will require reconstruction to produce an acceptable functional and cosmetic result for the patient.

White patches in the mouth

There are many possible causes of white patches in the mouth. These include:

Candida

Candida tends to occur in debilitated and immunocompromised patients. White specs coalesce to form patches, or a white membrane, which when lifted reveals a red raw mucosal surface. It sometimes occurs on the soft palate and can complicate the use of steroid inhalers in asthma patients. Candida is usually diagnosed by looking at it, but if any doubt remains, scrapings of the lesion should be taken and sent for microbiological examination.

Leukoplakia

Any white patch in the mouth can be called leukoplakia. But it usually refers to hyperkeratosis of the oral mucosa. This happens to patients who share the same risk factors as those who develop SCC: smoking, alcohol, strong spices and prolonged irritation from sharp teeth or poorly fitting false teeth. This lesion is premalignant and 3% will undergo malignant change within five years of diagnosis. A biopsy and regular reviews are essential. A particular form of leukoplakia known as hairy leukoplakia occurs in AIDS patients, the condition is so named because of its histological appearance.

Lichen planus

This condition usually occurs on the inside of the cheek and has a white lace-like appearance. It may be extremely painful but usually responds to topical steroid preparations. The aetiology remains unclear.

Mucus retention cysts

These usually form a smooth pale round swelling which may occur anywhere in the oral cavity, base of tongue or the tonsils. These swellings arise from a blockage in one of the many mucus glands found throughout the mucosa of the upper aero digestive tract. Reassurance is usually all that is required. If there is any diagnostic uncertainty, or if they become large enough to cause symptoms as a result of their size, then excision/marsupialization may be required.

Miscellaneous mouth conditions

Geographic tongue

This is a common condition where depapillation of the tongue surface occurs as red patches with a white border. The sites vary and seem to move around the tongue. The cause is unknown but it often runs in families. Reassurance is the only treatment required.

Angioedema

This allergic reaction causes generalised swelling of the tongue. Seafood, peanuts and drugs such as lisinopril can all have this effect. The swelling may progress rapidly and obstruct the airway. Medical treatment consists of intravenous steroids, piriton and nebulized adrenaline. The airway may need to be secured either by endotracheal intubation or tracheostomy.

Median rhomboid glossitis

This appears as a raised smooth patch in the centre of the dorsum of the tongue. It has been linked with reflux and candida infection. In most cases simple reassurance is all that is required.

Tongue tie

This is a birth defect in which the frenulum is short. Babies usually grow out of it before the age of two—speech defects do not occur as a result of this condition. Reassurance is usually all that is required. Occasionally parents may request surgical division.

Macroglossia

Enlargement of the tongue can be seen in acromegaly, Downs syndrome, multiple endocrine adenoma syndrome, hypothyroidism and amyloidosis.

Burning tongue syndrome

The anterior and lateral aspects of the tongue are most commonly affected and it tends to occur in young women. This is an unsatisfying condition to treat because its cause is unknown and simple analgesics are the only available medications which seem to help.

Hairy leukoplakia

This condition appears as white patches on the lateral border of the tongue, in patients with AIDS.

Black hairy tongue

This aptly named condition occurs due to overgrowth of the filiform papillae of the tongue and generally occurs in smokers. Treatment consists of brushing the tongue with a soft toothbrush.

Ranula

This is a retention cyst which forms in the floor of the mouth under the tongue. It develops from the submandibular or sublingual glands. It is treated by marsupialisation.

Cystic hygroma

This is a benign tumour of the lymph vessels (lymphangioma) which consists of large, dilated lymphatic channels. They usually present at, or soon after birth and can grow to massive proportions. They may cause life-threatening compression of the airway. They may be injected with sclerosant or surgically exercised.

Tonsillitis

Tonsillitis, or infection of the tonsils is commonly seen in ENT and in general practice. Common bacterial pathogens are B haemolytic streptococcus, pneumococcus and haemophilus influenzae. Sometimes this occurs following an initial viral infection. Treatment consists of appropriate antibiotics (e.g. penicillin), regular simple analgesia, oral fluids and bed rest.

Signs of acute tonsillitis

- Sore throat
- Enlargement of the tonsils
- Exudate on the tonsils
- Difficulty in swallowing
- Pyrexia
- Malaise
- Bad breath
- Ear ache.

Complications of tonsillitis

Airway obstruction: This is very rare, but may occur in tonsillitis due to glandular fever. The patient may experience severe snoring and acute sleep apnoea. This may require rapid intervention e.g. insertion of nasopharyngeal airway or intubation.

Quinsy (paratonsillar abscess): This appears as a swelling of the soft palate and tissues lateral to the tonsil, with displacement of the uvula

towards the opposite side. The patient is usually toxic with fetor, trismus and drooling. Needle aspiration or incision and drainage is required, along with antibiotics which are usually administered intravenously. See Fig. 19.8 and *How to drain a quinsy,* p.400.

Parapharyngeal abscess: This is a serious complication of tonsillitis and usually presents as a diffuse swelling in the neck. Admission is required and surgical drainage is often necessary via a neck incision. The patient will usually have an ultrasound scan first, to confirm the site and position of the abscess.

Management

Patients with complicated tonsillitis, and those who are unable to take enough fluid orally, will need to be admitted to hospital for rehydration, analgesia, and intravenous antibiotics. Ampicillin should be avoided if there is any question of glandular fever, because of the florid skin rash which will occur.

Treatment

See p.104 for tonsillectomy.

Indications for tonsillectomy

Absolute indications for surgery

- Suspected malignancy
- Children with OSA (obstructive sleep apnoea)
- As part of another procedure such as UPP for snoring.

Relative indications for surgery

- Recurrent acute tonsillitis
- 3 attacks per year for 3 years or
- 5 attacks in any one year
- More than one quinsy.

Big tonsils which are asymptomatic need not be removed.

Glandular fever

Glandular Fever is also known as infectious mononucleosis or Epstein-Barr virus infection. It is common in teenagers and young adults. Patients with glandular fever may present a similar picture to patients with acute bacterial tonsillitis, but with a slightly longer history of symptoms. Diagnosis relies upon a positive monospot or Paul-Bunnell blood test, but early in the course of the disease this test can still show up negative.

Signs and symptoms

- Sore throat
- Pyrexia
- Cervical lymphadenopathy
- White slough on tonsils
- Petechial haemorrhages on the palate
- Marked widespread lymphadenopathy
- Hepatosplenomegaly.

Treatment

This is a self limiting condition for which there is no cure as such. Treatment is largely supportive with painkillers, although patients may appreciate a short course of corticosteroids to decrease swelling. IV fluids may be necessary if they cannot drink enough.

Complications

Patients should be advised to refrain from contact sports for six weeks because of the risk of a ruptured spleen. This can lead to life threatening internal bleeding.

Tonsillectomy

This is one of the most commonly performed operations. Patients usually stay in hospital for one night, so that bleeding may be recognized and treated appropriately. Tonsils are removed by dissection under general anaesthetic. Haemostasis is achieved with diathermy or ties.

Post-op

Tonsillectomy is very painful and regular simple analgesia is always required afterwards. Patients should be advised that referred pain to the ear is common. Until the tonsillar fossae are completely healed, eating is very uncomfortable. The traditional jelly and ice cream has now been replaced with crisps, biscuits, and toast, since chewing and swallowing after tonsillectomy is very important for recovery and in helping to prevent infection.

In the immediate postoperative period the tonsillar fossae become coated with a white exudate, which can be mistaken as a sign of infection.

Complications

Postoperative haemorrhage is a serious complication for between 5-15% of patients after a tonsillectomy.

A reactive haemorrhage can occur in the first few hours after the operation, this will frequently necessitate a return trip to the operating theatre.

A secondary haemorrhage can occur any time within two weeks of the operation. See ENT emergencies, Chapter 20, p.420.

Tonsillar tumours

Benign tumours are very rare. But tonsillar stones (tonsiliths) with surrounding ulceration, mucus retention cysts, herpes simplex or giant aphthous ulcers, may mimic the more common malignant tumours of the tonsil. These tumours are becoming increasingly common, and

unusually, are now being found in younger patients and in non-smokers.

Squamous cell carcinoma (SCC)

This is the commonest tumour of the tonsil. It tends to occur in middle-aged and elderly people, but in recent years tonsillar SCC has become more frequent in patients under the age of 40. Many of these patients are also unusual candidates for SCC because they are non-smokers and non-drinkers.

Signs and symptoms

- Pain in the throat
- Referred otalgia
- Ulcer on the tonsil
- Lump in the neck.

As the tumour grows it may affect the patient's ability to swallow and it may lead to an alteration in the voice—this is known as ‘hot potato speech’.

Diagnosis is usually confirmed with a biopsy taken at the time of the staging panendoscopy. Fine needle aspiration of any neck mass is also necessary. Imaging usually entails CT and/or a MRI scan. It is important to exclude any bronchogenic synchronous tumour with a chest X-ray and/or a chest CT scan and bronchoscopy where necessary.

Treatment

Decisions about treatment should be made in a multidisciplinary clinic, taking into account the size and stage of the primary tumour, the presence of nodal metastasize, the patient's general medical status and the patient's wishes.

Treatment options include:

- Radiotherapy alone
- Chemoradiotherapy

- Trans oral laser surgery
- En-bloc surgical excision—this removes the primary and the affected nodes from the neck. It will often be necessary to reconstruct the surgical defect to allow for adequate speech and swallowing afterwards. This will often take the form of free tissue transfer such as a radial forearm free flap.

Lymphoma

This is the second most common tonsil tumour.

Signs and symptoms

- Enlargement of one of the tonsils
- Lymphadenopathy in the neck—may be large
- Mucosal ulceration—less common than in SCC.

Investigations

- Fine needle aspiration cytology may suggest lymphoma, but it rarely confirms the diagnosis. It is often necessary to perform an excision biopsy of one of the nodes.
- Staging is necessary with CT scanning of the neck chest, abdomen, and pelvis. Further surgical intervention is not required other than to secure a threatened airway.

Treatment

Usually consists of chemotherapy and/or radiotherapy.

Adenoidal enlargement

The adenoid is a collection of loose lymphoid tissue found in the space at the back of the nose. The Eustachian tubes open immediately lateral to the adenoids. Enlargement of the adenoids is very common, especially in children. It may happen as a result of repeated upper

respiratory tract infections which occur in children due to their poorly developed immune systems.

Signs and symptoms

- Nasal obstruction
- Nasal quality to the voice
- Mouth breathing which may interfere with eating
- A Runny nose
- Snoring
- Obstructive sleep apnoea syndrome (OSAS)
- Blockage of the eustachian tube.

A diagnosis of adenoidal enlargement is usually suspected from the history. Using a mirror or an endoscopic nasal examination will confirm the diagnosis.

The glue ear which arises as a result of poor eustachian tube function may cause hearing impairment. Adenoiditis or infection of the adenoid, may allow ascending infections to reach the middle ear via the eustachian tube.

Treatment

An adenoidectomy is performed under a general anaesthetic. The adenoids are usually removed using suction diathermy or curettage.

Complications

Haemorrhage (primary, reactionary, and secondary): These are serious complications of an adenoidectomy, but this is less common than with a tonsillectomy. The procedure is frequently carried out safely as a day case.

Nasal regurgitation: The soft palate acts as a flap valve and separates the nasal and the oral cavity. If the adenoid is removed in patients who have even a minor palatal abnormality, it can have

major effects on speech and swallowing. Palatal incompetence can occur in these patients resulting in nasal regurgitation of liquids and nasal escape during speech. Assessment of the palate should form part of the routine ENT examination before such an operation, in order to avoid this complication.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 6

The Nose and Sinuses

Structure and function of the nose

Structure

The structure of the nose is made up of four parts:

- The surface anatomy—see Fig. 6.1. for the surface landmarks.
- The nasal skeleton—composed of the two nasal bones, the paired upper lateral and lower lateral cartilages and the nasal septum, covered in subcutaneous tissue and skin (see Fig. 6.2.).
- The internal anatomy—includes the septum of the nose which forms the medial wall of the nasal cavity. The turbinates on the lateral wall are also called conchae (the Latin term for scroll) which describes their appearance neatly (see Fig. 6.3.).
- The osteomeatal complex—a key functional area of the nose. Understanding its anatomy is essential in understanding the aetiology of sinus disease (see Fig. 6.4.).

Knowing the anatomical terms for parts of the nose helps you to describe the site of lesions accurately, and to document the findings of examinations accurately.

Function

The nose is the main route for inspired air, and its structure is related

to this function. As the air passes over the large surface area of the turbinates, the inspired gases are warmed and humidified. Mucus on the mucosa of the nose removes large dust particles from the air as it is breathed in (as anyone who has blown their nose after a trip on the London underground knows!).

The voice resonates in the sinuses and nose and this provides character to the speech. Patients with very obstructed nasal passages have what is often described as a nasal quality to their speech.

Pneumatization of the sinuses—they are air filled spaces—reduces the weight of the skull.

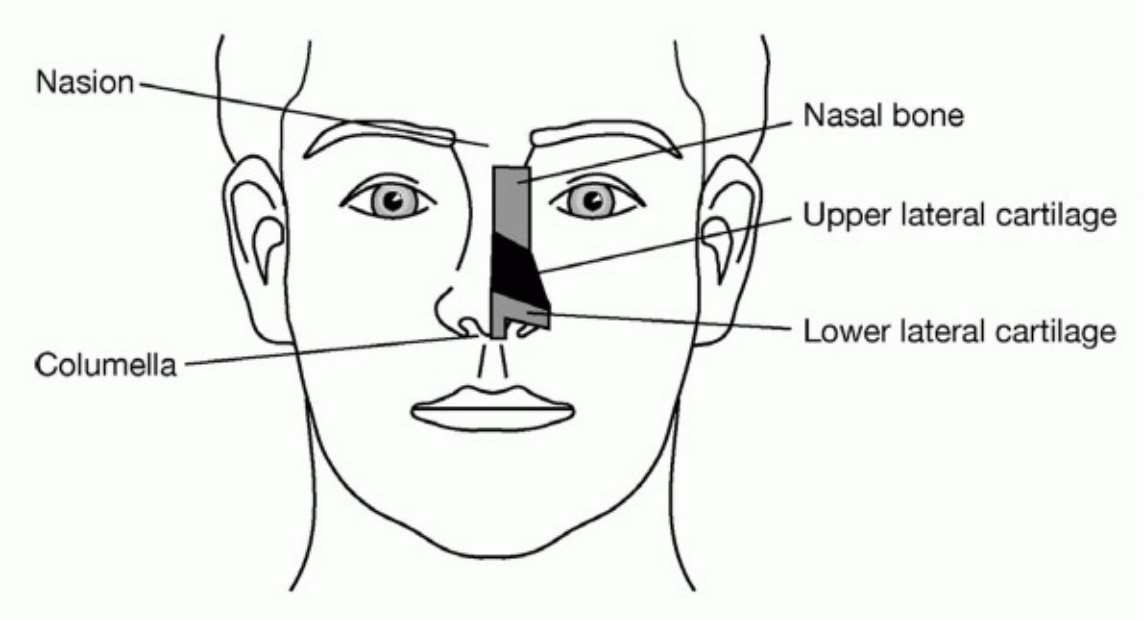


Fig. 6.1. Diagram of the surface markings of the nose

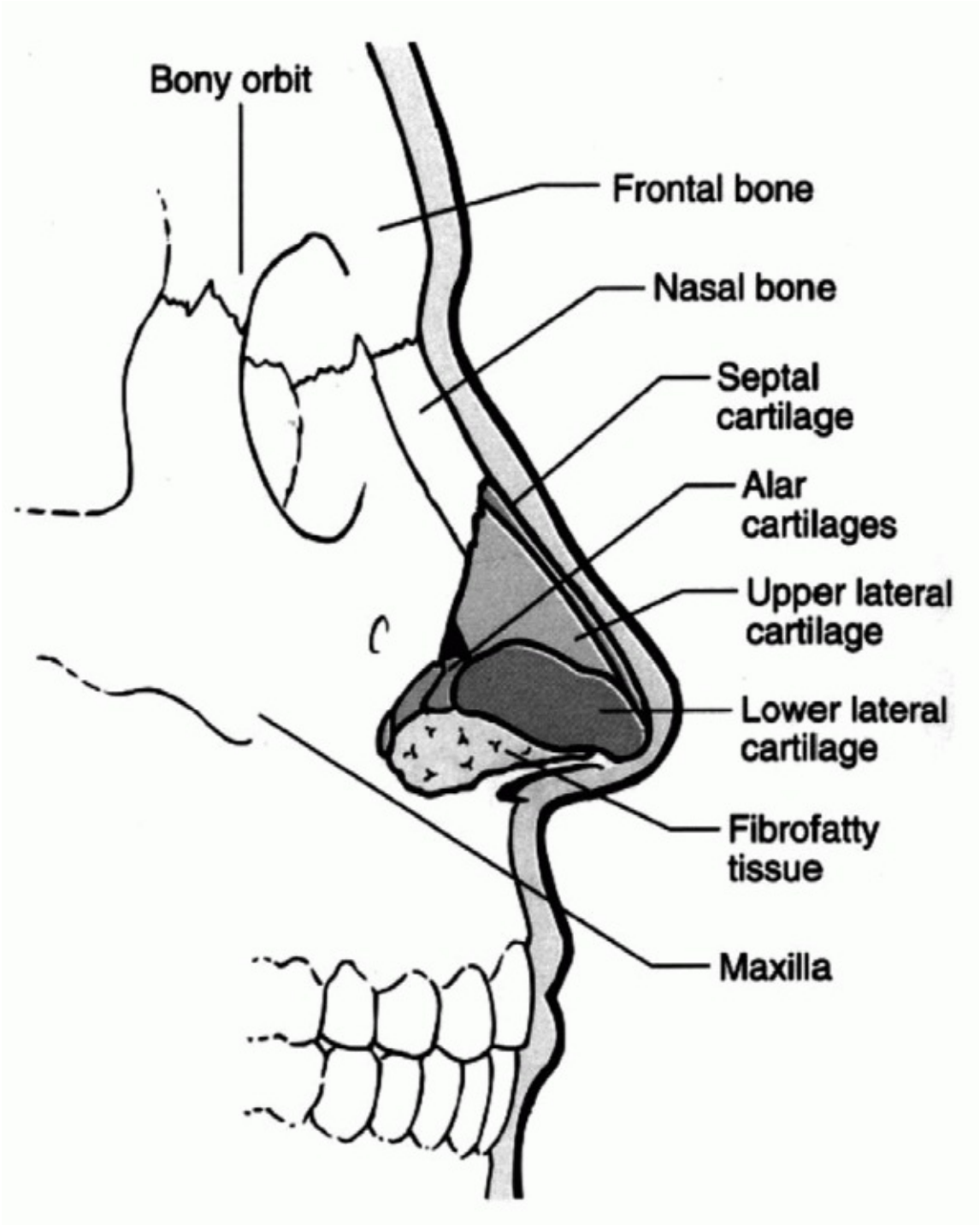


Fig. 6.2. Diagram of the nasal skeleton

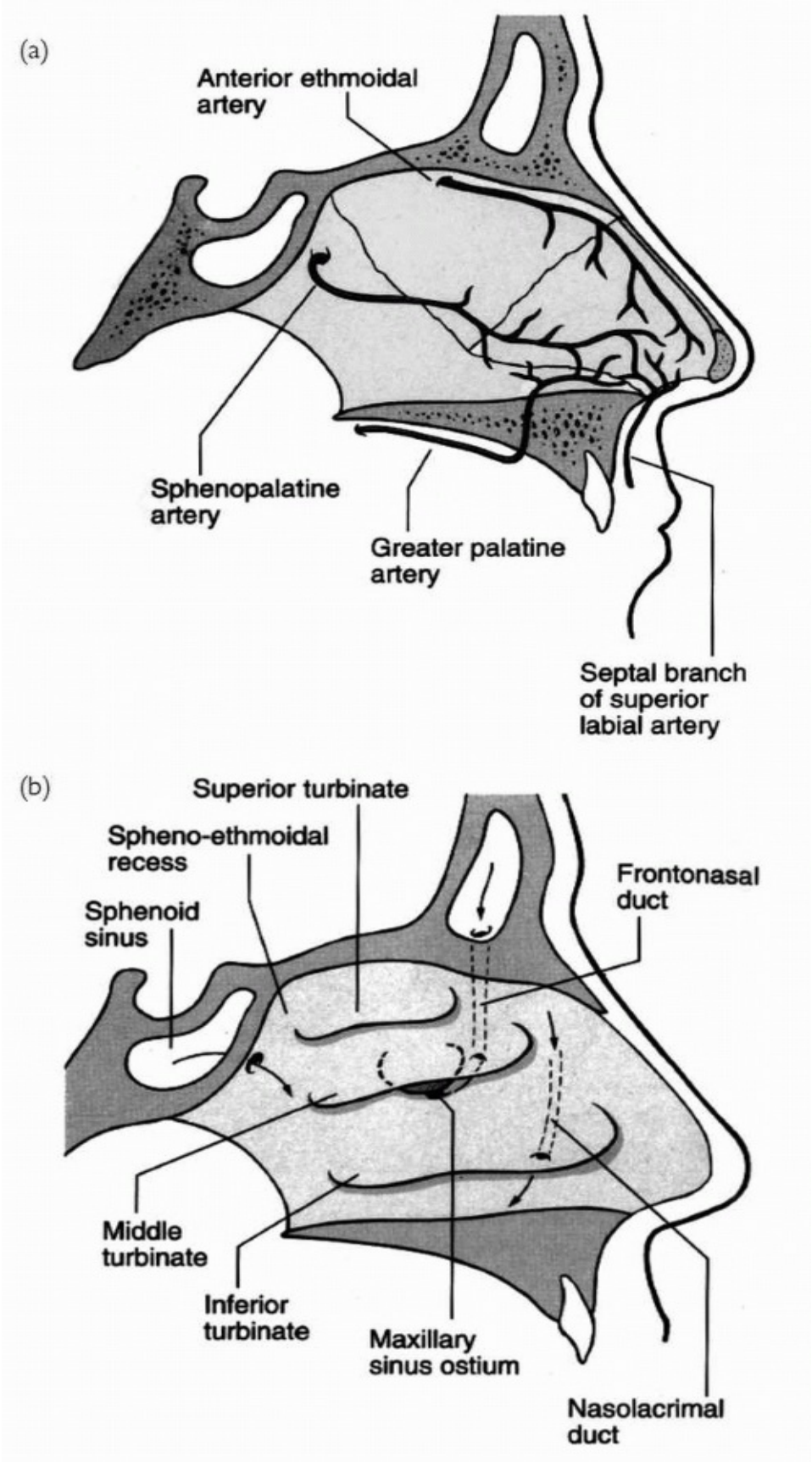

(a)
Anterior ethmoidal artery
Sphenopalatine artery
Greater palatine artery
Septal branch of superior labial artery
(b)
Superior turbinate
Spheno-ethmoidal recess
Sphenoid sinus
Frontonasal duct
Middle turbinate
Inferior turbinate
Maxillary sinus ostium
Nasolacrimal duct

Fig. 6.3. Diagram of the internal structure of the nose

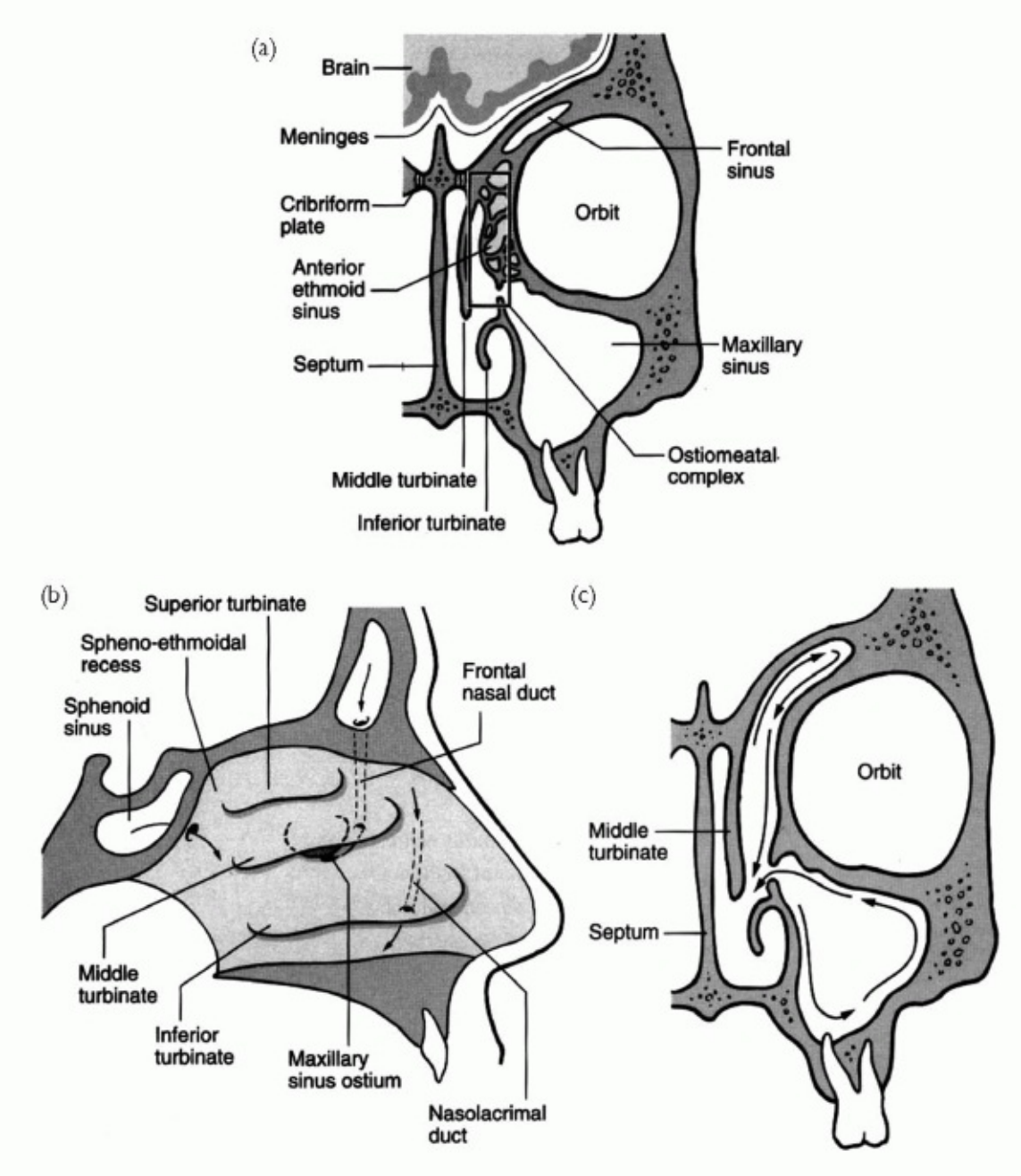


Fig. 6.4. The osteomeatal complex

Rhinitis

Rhinitis is an inflammation of the nasal lining. Rhinitis may be diagnosed if a patient has two out of three of the following symptoms for more than one hour every day for over two weeks:

Symptoms

- Blocked nose
- Running nose—including postnasal drip
- Sneezing.

This condition is very common. Approximately one in six adults suffer from rhinitis.

Causes

There are a multitude of factors which cause rhinitis. It may be caused by several different factors, so it is important to treat each different cause. The symptoms of rhinitis may also be part of systemic disease (see Table 6.1).

The commonest forms of rhinitis are allergic and infective. Classification of the disease and its rarer forms are shown in Table 6.1.

History

It is important to take a full history to determine the cause of rhinitis. This includes asking the patient about any history of atopy or asthma, and any seasonal variation in the symptoms. Documenting the main symptoms—blockage, running, and sneezing—and noting which one is predominant will help in treatment selection.

The patient should be asked what medications are being used and about their smoking history—almost every smoker has a degree of rhinitis. The patient should be asked about any previous treatment for rhinitis, including its duration and effectiveness.

Investigations

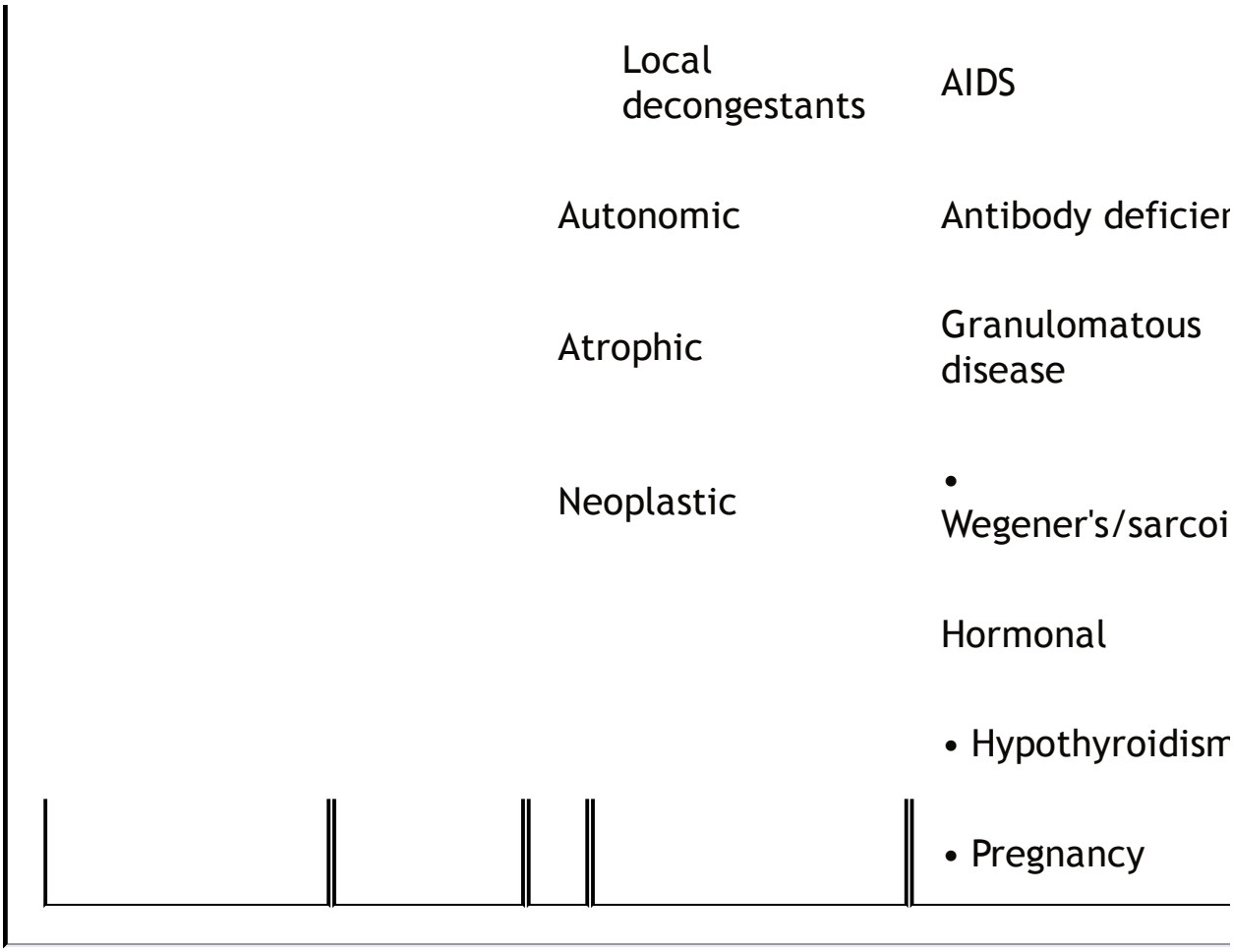
- **Anterior rhinoscopy**—looking for enlarged turbinates (a blue tinge often indicates an allergic rhinitis) or nasal polyps.
- **Rigid nasendoscopy**—examining the middle meatus for mucopus or polyps.
- **Skin prick tests**—tiny amounts of test substances are placed on the skin and a pin prick is made—a positive result leads to a small

raised, red, itchy patch.

- **RAST tests**—a blood test which indicates if patients are allergic to a range of test substances.
- **Peak flow**—many patients with rhinitis also have asthma—their peak flow test may be reduced.

Table 6.1 Classification of rhinitis

Common		Rare	
Allergic	**Infect**	**Other**	**Part of systemic diseas**
Seasonal	Acute	Idiopathic	Primary mucus d
Perennial	Chronic	NARES (non-allergic rhinitis with eosinophilia)	• Cystic fibrosis
Occupational			• Young's disease
		Drug-induced	Primary ciliary dyskinesis
		B-blockers	• Kartageners syndrome
		Oral contraceptives	Immunological
		Aspirin	• SLE
		NSAIDS	• Rheumatoid arthritis



Medical treatment of rhinitis

Treatment of rhinitis is related to the underlying aetiology of the condition. Medical treatment is given if the patient feels their symptoms are bad enough.

Allergen avoidance

If the patient's rhinitis is caused by an allergy, skin prick testing can identify allergens to be avoided. It gives a visual feedback to the patient to confirm the diagnosis. Following a positive skin prick test, allergen avoidance information can be given to the patient both verbally and on information sheets.

Pharmacological treatments

Each of the different medications have different effects on symptoms (see Table 6.2).

- Steroids—should ideally be delivered topically to the nasal mucosa using sprays or drops. When using drops it is important to use the correct position i.e. head down. Oral steroids can be very effective but their systemic effects limit their long term use. A short course can be ideal for an important summer event such as an exam or a wedding.
- Antihistamines—non sedating antihistamines are effective against sneezing, itch and watery rhinorrhoea. Used systemically they can be effective for other atopic problems such as watery eyes. They are not useful for symptoms of blockage.
- Nasal decongestants—are only useful in the short term at the start of other therapy or for flying. Prolonged use can produce intractable rhinorrhoea of rhinitis medicamentosa.
- Ipratropium bromide—this is an intranasal preparation and is effective for watery vasomotor type rhinitis.
- Sodium cromoglycate—this is a mast cell stabilizer and is useful for allergic rhinitis.

Table 6.2 Medications and their symptom control

	Sneezing	Discharge	Blockage	Anosmia
Cromoglycate	++	+	+	-
Decongestant	-	-	+++	-
Antihistamine	+++	++	+/-	-
Ipratropium	-	++	-	-

Topical steroids	+++	++	++	+
Oral steroids	++	++	+++	++

N.B. Degree of benefit where +++ is maximum and - is minimum.

Surgical treatment of nasal obstruction

The role of surgery is limited in the treatment of rhinitis. Surgery to improve nasal function may be a useful adjunct to other treatments. Even if a surgically correctable problem is found it is worth a trial of medical therapy alone in the first instance. There is often a high rate of symptom resolution. It is also worth obtaining a CT scan of the paranasal sinuses if surgery is considered in order to review the need for sinus surgery.

Turbinate reduction

The turbinates often hypertrophy in all types of rhinitis but particularly in allergic rhinitis. Their hypertrophy often obstructs the airway to such a degree that it is impossible to deliver topical medication. Reduction can be achieved by several means:

- Surface linear cautery—burning the surface
- Submucous diathermy—burning under the surface
- Cryotherapy—freezing
- Outfracture—pushing out of the airway
- Submucosal conchopexy—changing the shape of the turbinate
- Trimming or excising the turbinate.

These techniques are effective in improving the airway for 18 months but additional medical therapy is needed to prevent recurrence of the

hypertrophied mucosa. The technique of trimming has a better long term result, but has the potential for severe postoperative haemorrhage. Surgeons undertaking this type of surgery are known as turbinate terrorists!

Septal surgery

A deviated septum may need to be corrected to improve nasal function and help medication delivery.

Functional endoscopic sinus surgery

This surgery is aimed at the osteomeatal complex—it aims to remove blockage in the critical area and restore the normal function and drainage of the sinuses. It could benefit patients with sinusitis who do not respond to medical treatments.

Sinusitis

Sinusitis is a common inflammation of the sinuses. It is now regarded as a continuation of the spectrum of rhinitis.

The work of Messerklinger has shown that effective sinus drainage occurs through the area known as the osteomeatal complex (see Fig. 6.4. p.115). Obstruction in this area due to anatomical or mucosal problems impairs sinus drainage and leads to obstructed outflow. This can occur as an acute phenomenon (see p.124) or as a chronic condition (see p.128).

Acute sinusitis

It is thought that everyone will suffer from an episode of sinusitis at some time in their life. It is caused by an acute bacterial infection which often develops after a preceding viral illness, such as a cold.

Signs and symptoms

- Preceding URTI
- Nasal obstruction

- Severe facial pain over the sinuses particularly the maxillae/cheeks
- Pain which is worse on bending down or coughing.

A swelling on the face is usually caused by a dental abscess rather than by sinus disease. Tenderness over the sinuses is an overemphasized sign.

Investigations

- An anterior rhinoscopy—to examine the inside of the nose
- A rigid nasendoscopy—often shows pus in middle meatus or oedematous mucosa.

Treatment

In previously healthy adults, medication alone is usually effective.

- Antibiotics may be given—Augmentin 625mg po tds for 1 week
- Decongestant—Xylometolozine 0.5% drops 2 drops tds for 1 week
- Anti-inflammatory Betnesol drops—2 drops bd both nostrils.

If sinus symptoms do not resolve, consider sinus washout or endoscopic sinus surgery after CT to confirm the diagnosis.

In immunocompromised patients, consider a sinus washout to obtain microbiology for more effective antimicrobial treatment. Also, seek advice from local microbiologists for other appropriate therapy.

Tip: A pledget soaked in 5% cocaine solution placed in the middle meatus under endoscopic guidance may relieve the obstructed osteomeatal complex due to its intense vasoconstriction.

Recurrent acute sinusitis

Patients presenting with a history of recurrent sinusitis are often difficult to diagnose. This is because in the absence of an acute infection there may be no abnormal physical signs. Even CT scans may be entirely normal. If the history is good then functional endoscopic

sinus surgery (FESS) is appropriate if the number of episodes of infection is sufficient to cause disruption to the person's lifestyle.

To avoid misdiagnosis, patients can be given an open appointment to turn up when their symptoms are severe. Endoscopic examination at this time may reveal pus in the middle meatus. When a patient is symptomatic a CT scan can also be helpful, but this depends on a cooperative radiology department who will allow rapid access.

▶ *Differential diagnosis of sinusitis*

- Migraine—typical or non-classical migraine symptoms may mimic sinus symptoms
- Dental problems—Abscess or temporomandibular joint disorders
- Trigeminal neuralgia
- Neuralgias of uncertain origin
- Atypical facial pain.

Remember that the CT paranasal sinuses may be normal unless the patient is symptomatic.

Beware of operating on patients where there is no good evidence of sinus disease on a CT scan or on endoscopic examination—the results of surgery in this group are disappointing.

Chronic sinusitis

Chronic sinusitis is an inflammation of the sinuses lasting more than six weeks. Diagnosing chronic sinusitis, like diagnosing acute sinusitis, may be difficult, as other causes of facial pain may mimic it.

Signs and symptoms

- Pressure in the face—which gets worse on bending over
- Pain when flying—in particular when descending
- A feeling of nasal obstruction—can be objective or subjective

- Rhinitis—runny or blocked nose and sneezing.

Investigations

- Nasal examination—to check the patency of the airway
- Anterior rhinoscopy—to examine the septum and nasal cavity
- Posterior rhinoscopy with rigid endoscope—to examine the middle meatus and look for nasal polyps.

Treatment

80% of patients respond to medical therapy. This will involve one or more of the following medication for at least three months:

- Intranasal steroid—for mild inflammation/oedema in the nose such as Flixonase 2 sprays od both nostrils. For gross oedema a higher concentration of steroids is needed—use Betamethasone drops 2 drops bd both nostrils
- Oral antihistamine such as Cetirizine hydrochloride 10mg od po.

If medical treatment fails, the following treatments may be considered:

- A CT scan—to provide a surgical road map
- FESS—extent dictated by disease process at surgery
- Septoplasty—may be necessary in addition to above.

Complications of sinusitis

Mucociliary damage

Long standing or chronic sinusitis can lead to mucociliary failure. This means that the sinus cannot drain properly, even if it is anatomically ventilated. Cigarette smoke will also paralyse cilia action, so smoking should be avoided by those with sinusitis.

Orbital complications

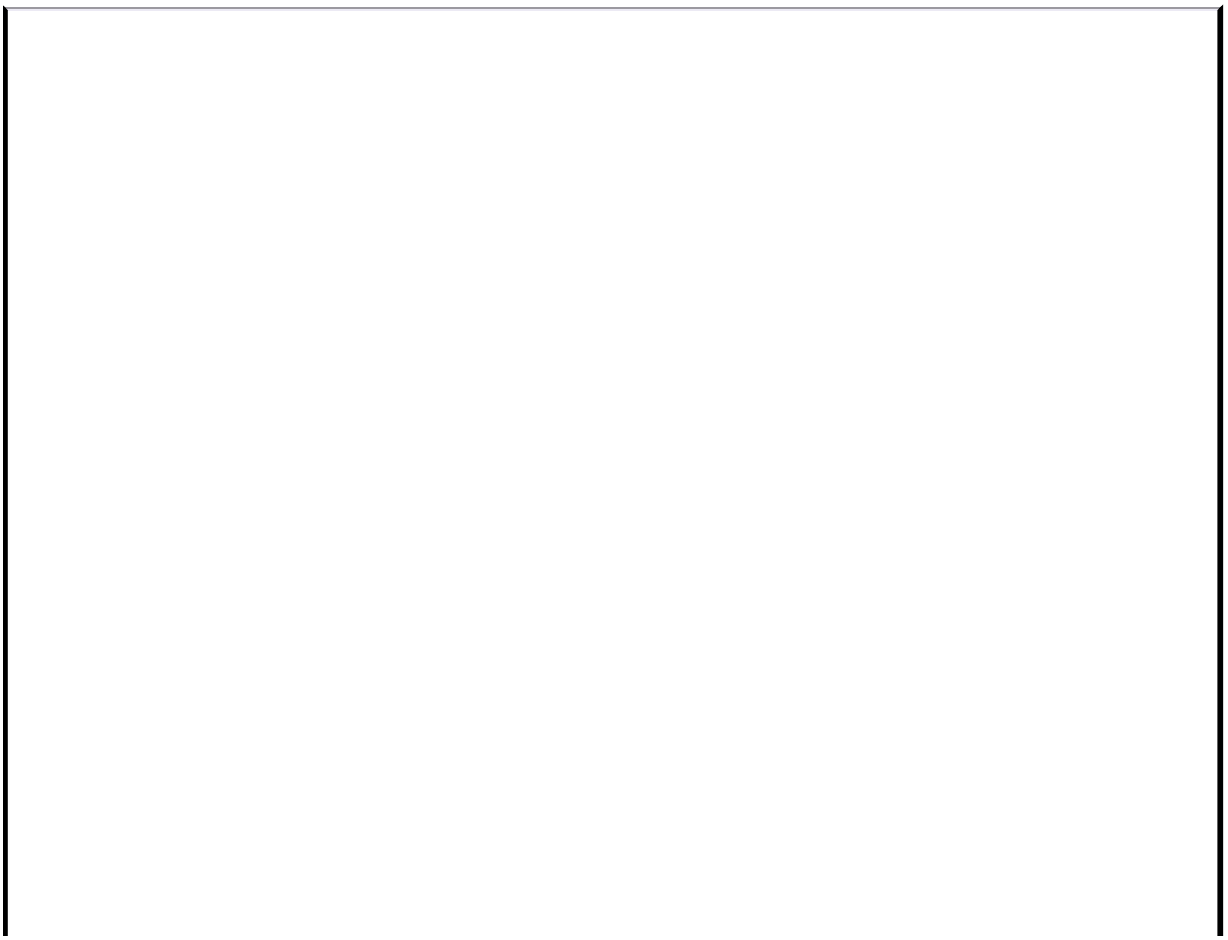
An unresolved episode of acute ethmoid or pansinusitis may lead to orbital complications as shown in Fig. 6.5. The management of this problem is dealt with in the emergencies section (see p.414). The Chandler classification of orbital complications is shown in Fig. 6.5.

Intracranial complications

Infection can spread from the frontal sinuses causing problems as shown in Fig. 6.6.

Potts puffy tumour

Ongoing frontal sinusitis can lead to osteomyelitis of the frontal bone. A soft boggy swelling then appears on the skin of the forehead. It was given this colourful name by Percival Pott.



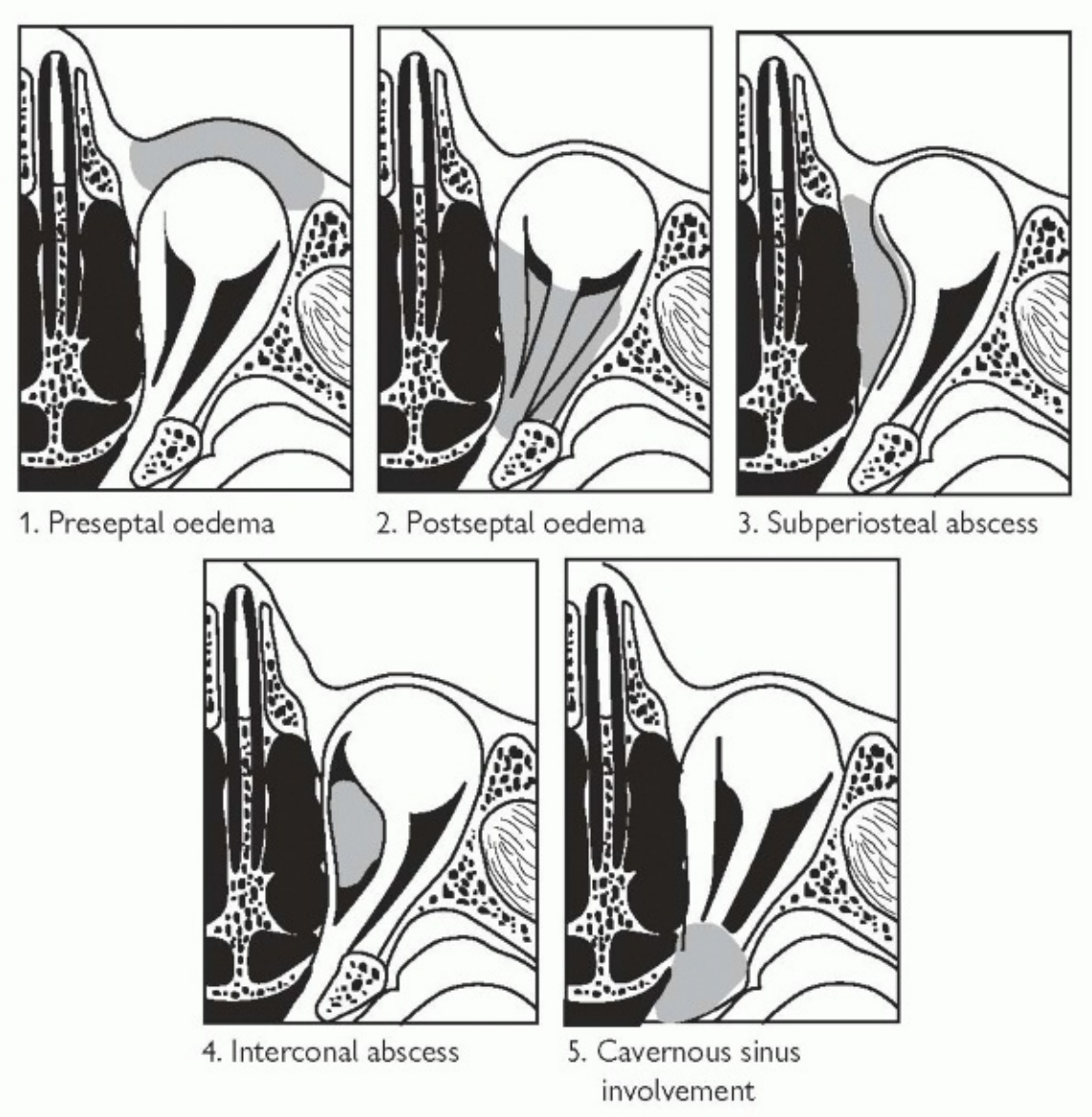


Fig. 6.5. Chandler classification of orbital complications

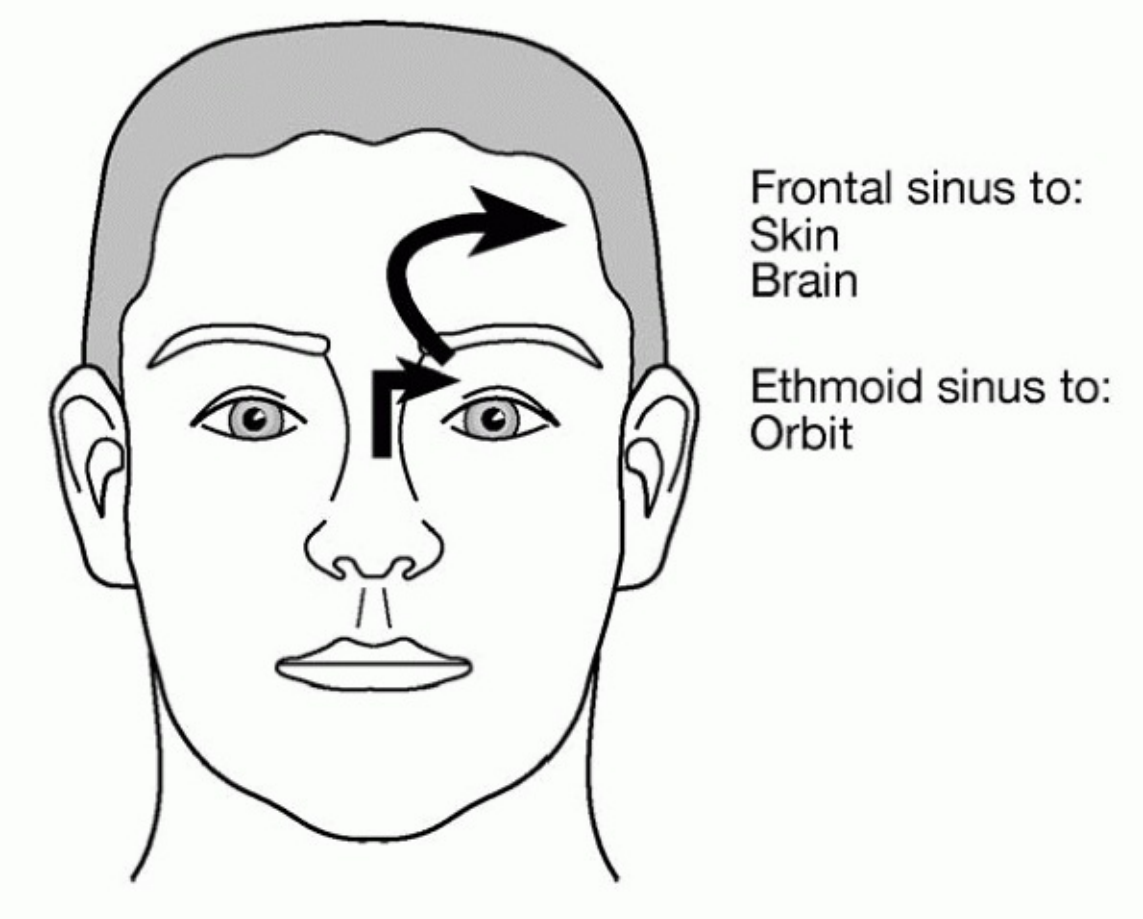


Fig. 6.6. Pathways of spread for intracranial complications

Nasal polyps

Simple nasal polyps are part of the spectrum of rhinosinusitis as the lining of the nose becomes inflamed and thicker. These polyps are oedematous sinus mucosa, which prolapse to fill the nasal cavity to a variable extent. They are common, and their cause is unknown.

Signs and symptoms

- Variable symptoms—with the season or with URTI
- Rhinitis—blocked or runny nose and sneezing

- Sinusitis—due to osteomeatal obstruction
- Nasal obstruction
- Appearance of the polyps at the anterior nares.

Investigations

- Anterior rhinoscopy—Inferior turbinates are often incorrectly diagnosed as polyps, a rhinoscopy can help avoid this misdiagnosis (see Fig. 6.7.).
- Rigid nasendoscopy—examining the nose with an endoscope.
- Polyp size can be graded (see Fig. 6.8.).

Treatment

- For small nasal polyps—give Betamethasone drops. 2 drops bd for 2 weeks followed by Flixonase 2 sprays od both nostrils for 3 months.
- For large nasal polyps—give oral steroids 30mg od for 1 week followed by Flixonase 2 sprays bd for 3 months.

If medical treatment fails, the following treatments should be considered:

- Surgical removal for obstructive polyps—if the patient is sufficiently symptomatic.
- A CT scan to provide a road map prior to surgery.
- FESS—using a microdebrider for atraumatic polypectomy.
- Postoperative intranasal steroids to prevent recurrence.

Samters triad associated polyp

This is the association of:

- Aspirin sensitivity—making patients wheezy when they take asprin
- Late onset asthma
- Nasal polyps.

It is caused by a defect in leukotriene metabolism. Polyps in this condition are florid and recur frequently.

Treatment

- Diet—refer patient to a dietician for advice on a low salicylate diet. This is very bland and difficult to maintain.
- Intranasal steroids—patients often elect to use long term Betamethasone drops despite their risk of systemic side effects.
- Repeat surgery as for nasal polyps above—the microdebrider is the atraumatic instrument of choice.
- Leukotriene antagonists e.g. Monteleukast aim to reduce the polyps —results may vary.

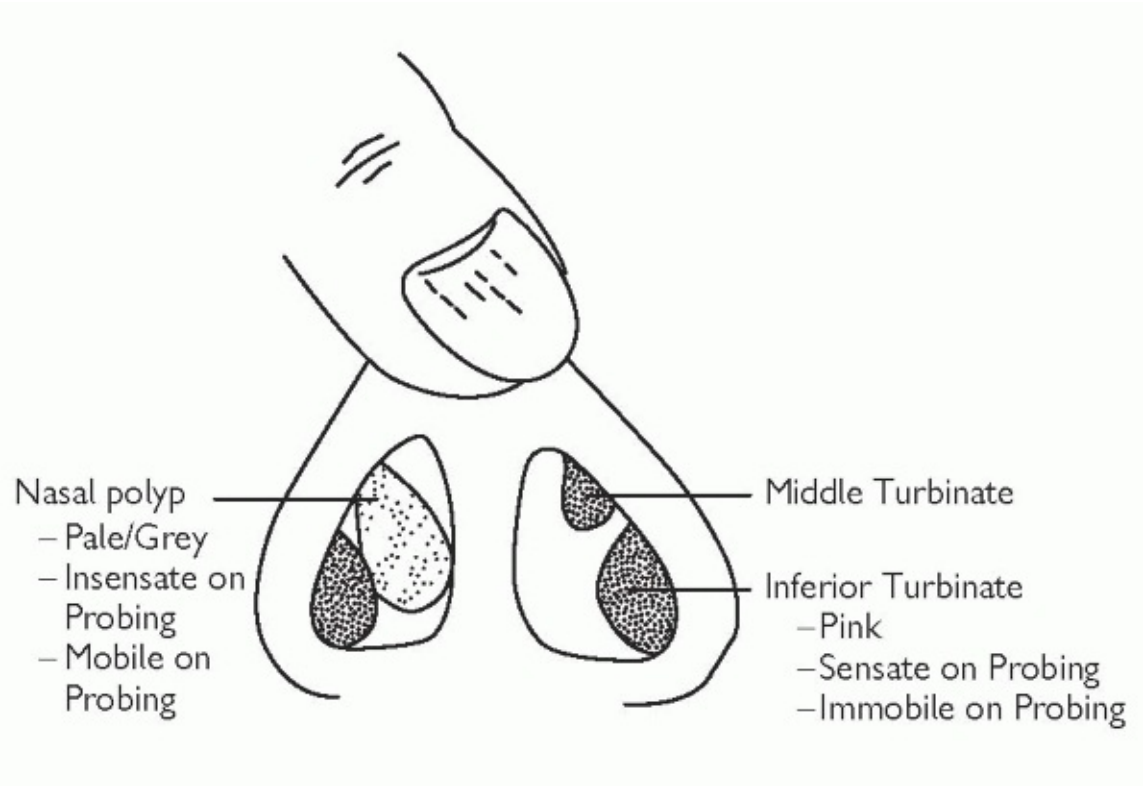


Fig. 6.7. Diagram of nasal polyp showing features compared with inferior turbinate

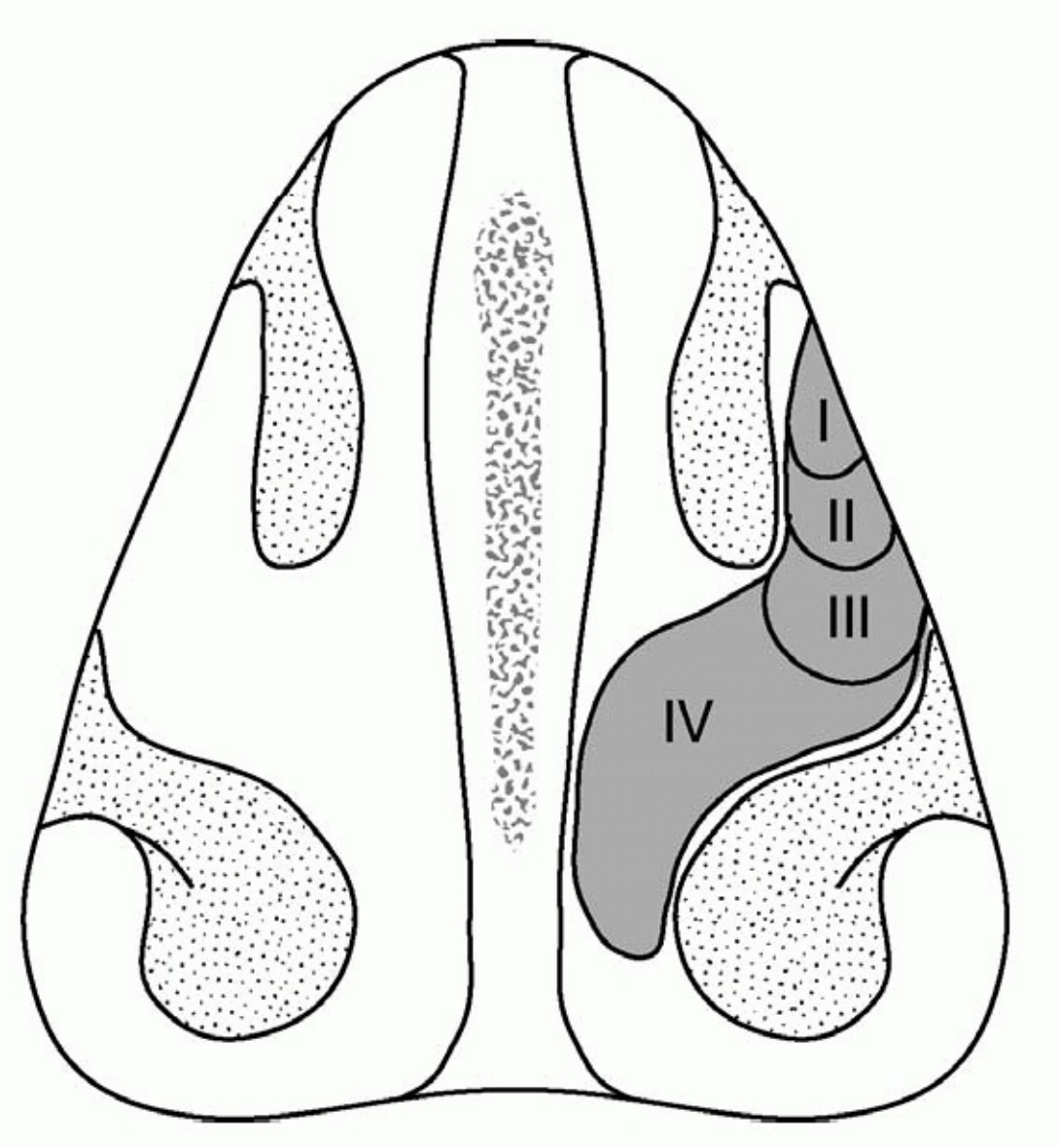


Fig. 6.8. Polyp size can be graded

Unusual nasal polyps

Antrochoanal polyps

These polyps originate from the maxillary sinus and often present as a unilateral pendulous mass in the nasopharynx (see Fig. 6.9.). The uncinate process directs the polyp posteriorly as it emerges from the maxillary sinus. They are uncommon and their cause is not known.

Macroscopically, the polyp is formed from a nasal component which is similar in appearance to a common nasal polyp.

The maxillary antral component is a thin fluid filled cyst. A small fibrous band joins the two as it passes out of the sinus.

Treatment

- CT scan—to confirm the diagnosis.
- Endoscopic removal of the polyps from its point of attachment in the maxillary sinus.
- Caldwell-Luc approach for recurrent problem—an open sinus operation accessing the sinus via a cut in the mouth under the top lip.

Childhood polyps

Polyps presenting in childhood are very unusual. They are usually associated with an underlying mucociliary abnormality such as cystic fibrosis or Kartagener's syndrome.

Investigations

- Consider a sweat test—the diagnostic test for cystic fibrosis.
- Send samples to the lab to check that it is not a tumour.
- Fresh sample of nasal lining for special tests of ciliary function.
- Sample for electron microscopy—to check the cillary structure.

Treatments

- Medical treatment with steroids.

- Surgical removal.

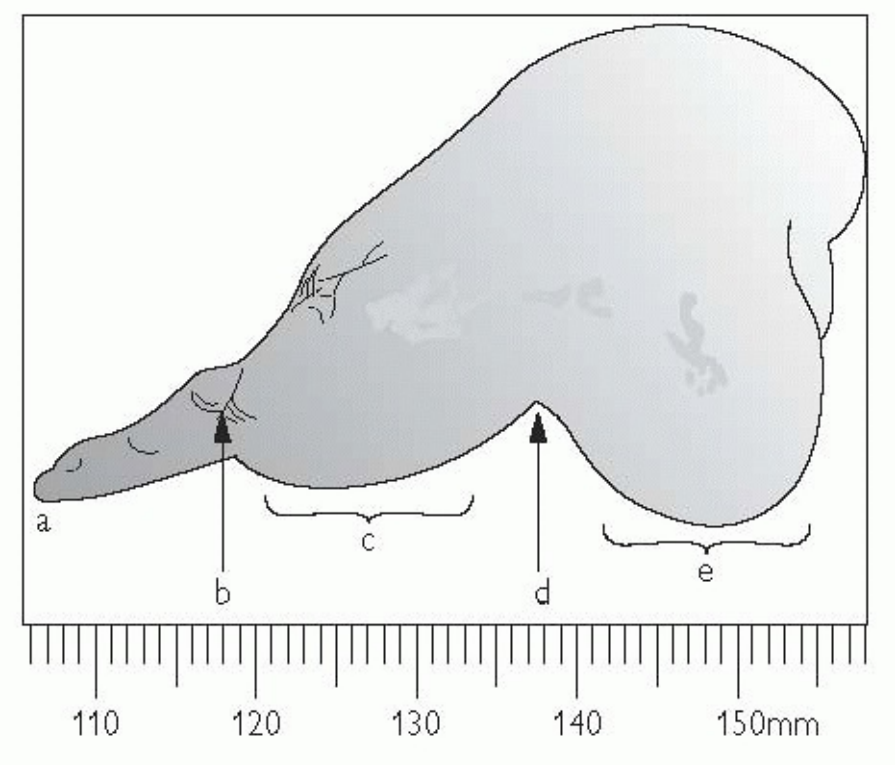


Fig. 6.9. Antrochoanal polyp and its anatomical relations a = maxillary sinus attachment; b = maxillary ostium; c = osteomeatal complex; d = posterior choana; e = nasopharynx.

Septal problems

The nasal septum provides an important mechanical support for the external nasal skeleton. Problems with the nasal septum can lead to both a cosmetic and functional disturbance of the nose. The nose may look bent to one side and/or the nasal airway may be restricted.

Septal deviation

The causes of septal deviation can be either congenital or traumatic. A traumatic septal deviation could be the result of a broken nose.

Congenital septal deviation can occur after birth trauma to the nose, or the differential growth of the nasal septum compared to the rest of the skull.

Almost all nasal septae are deviated to some extent. Most people do not experience any problems, but some find their airway has become restricted.

Acoustic rhinomanometry and computer flow modeling has shown that deviations at the area of the nasal valve cause most functional impairment to airflow. This area is situated about 1cm posterior to the nares. It is bounded superiorly by the overlap of the upper and lower lateral cartilages. Laterally is the origin of the anterior part of the inferior turbinate. Inferiorly, the floor of the nose and medially, the nasal septum. Changes in the relative position of any of these structures causes a change in the cross-sectional area of the nasal valve.

Investigations

- Anterior rhinoscopy—to exclude other problems e.g. rhinitis.
- Cottle's test—to exclude alar collapse.
- Nasendoscopy—to exclude sinusitis.

Treatment

- Three months trial of an intranasal steroid.
- Surgery—septoplasty or a sub mucus resection (SMR) is an operation on the nasal septum to improve nasal breathing.

Septal perforation

There are several reasons why a patient's septum may be perforated. These include:

- Trauma or accident.
- Post septal surgery.

- Nose picking.
- Granulomatous disease—must be excluded before treating perforation (see p.140).
  - Wegener's
  - Sarcoidosis
  - TB
  - Syphilis
- Cocaine addiction.

Signs and symptoms

- Whistling—if there is a small anterior perforation.
- Bleeding from the nose.
- Crusting of the nose at the site of the perforation.

Treatment

- Apply Vaseline to the edge of the perforation.
- Treat epistaxis expectantly.
- Septal button—this is a plastic prosthesis fitted into the hole in the septum. Only half of patients find it tolerable and continue using it long term.
- Surgical septal repair—the results of surgery are variable even in experienced hands.

Granulomatous conditions

These are an uncommon group of diseases which are classified together because of their histological appearance—they all form granulomas.

These conditions include:

- **Wegener's granulomatosis**—this is a multisystem disease characterised by perivascular granuloma formation—it most often affects the respiratory system and the kidneys.
- **Sarcoidosis**—this is another granulomatous condition; its cause is unknown.
- **Syphilis**—a sexually transmitted disease which can affect the nose.

Signs and symptoms

- The patient may present with nasal granulomas as part of generalised condition e.g. sarcoid with chest problems.
- Patients may have isolated nasal symptoms such as septal perforation (posterior in syphilis) or crusting on the nasal septum.

Investigations

- FBC
- U&Es
- ESR
- Syphilis serology
- ANCA
- CXR
- Nasal biopsy.

Treatment

- Involve the medical team who deal with the condition in hospital such as chest or renal teams.
- Give immunosuppressants—both steroids and non steroid are used.

Sinonasal malignancy

Sinonasal malignancy is dealt with in Chapter 15, p.332.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 7

The Salivary Glands

Structure and function of the salivary glands

There are three main pairs of salivary glands—the parotid, the submandibular and the sublingual. In addition, there are a number of other tiny minor salivary glands scattered throughout the mucosa of the mouth and throat. They produce the saliva which is needed for digestion and lubricating the food bolus.

The parotid gland

This gland lies on the side of the face or upper neck behind the angle of the mandible and in front of the ear. The gland is pyramid shaped and covered in thick fibrous tissue. It produces watery, serous saliva. The parotid duct opens into the mouth opposite the second upper molar tooth.

The external carotid artery, retro-mandibular vein and lymph nodes all lie within the parotid gland.

The facial nerve traverses the skull base and exits at the stylomastoid foramen. It then passes through the parotid gland splitting into its 5 main divisions—temporal, zygomatic, buccal, mandibular, cervical—as it does so.

The submandibular gland

This gland lies just below the jaw in front of the angle of the mandible.

It produces saliva. The submandibular duct runs from the deep lobe and ends as a papillae, at the front of the floor of the mouth (see Fig. 7.1.).

The lingual nerve—which gives sensation to the anterior two thirds of the tongue—and the hypoglossal nerve—which provides the motor to intrinsic muscles of the tongue—lie in close apposition to the deep surface of the gland.

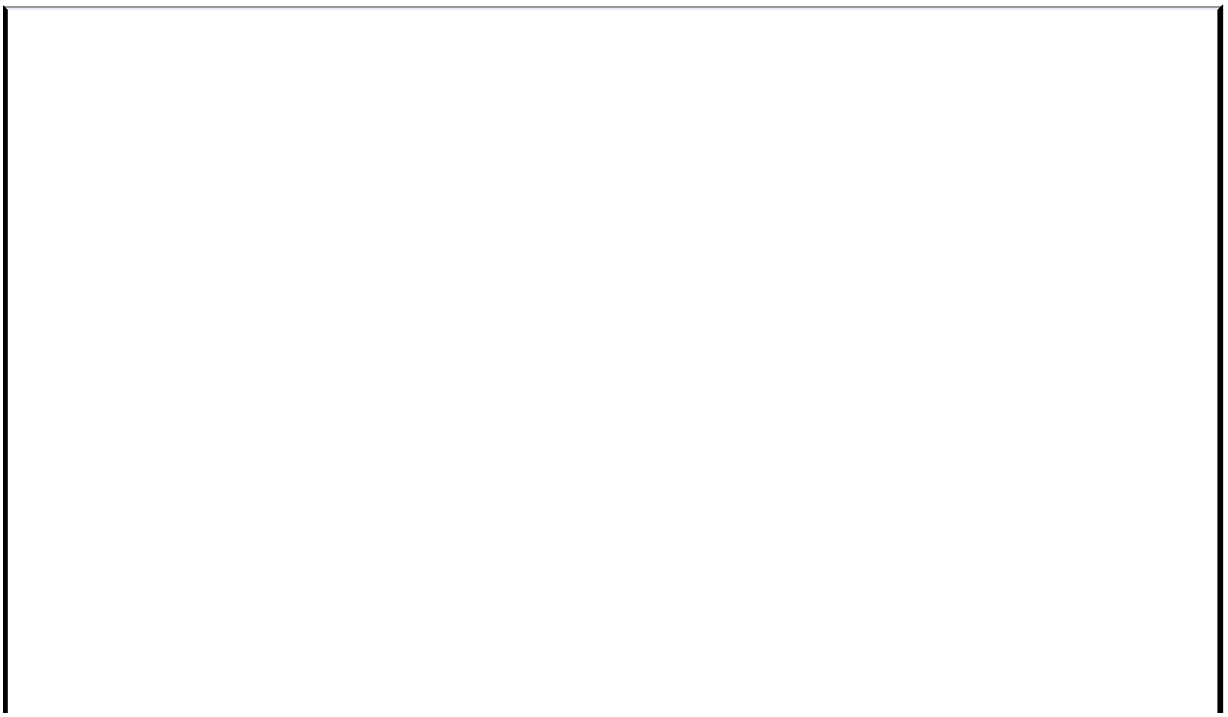
The marginal mandibular branch of the facial nerve runs just deep to the platysma close under the skin which overlies the gland. Surgeons must be aware of these nerves in order to prevent iatrogenic damage.

A number of lymph nodes also lie close to or within the submandibular gland.

The sublingual gland

This is the smallest of the major salivary glands. It is found, or felt in the floor of the mouth, running along the submandibular duct, into which it opens via 10-15 tiny ducts.

Parasympathetic secretor motor supply to the salivary glands. This is rather complicated and is best shown diagrammatically (Fig. 7.2.).



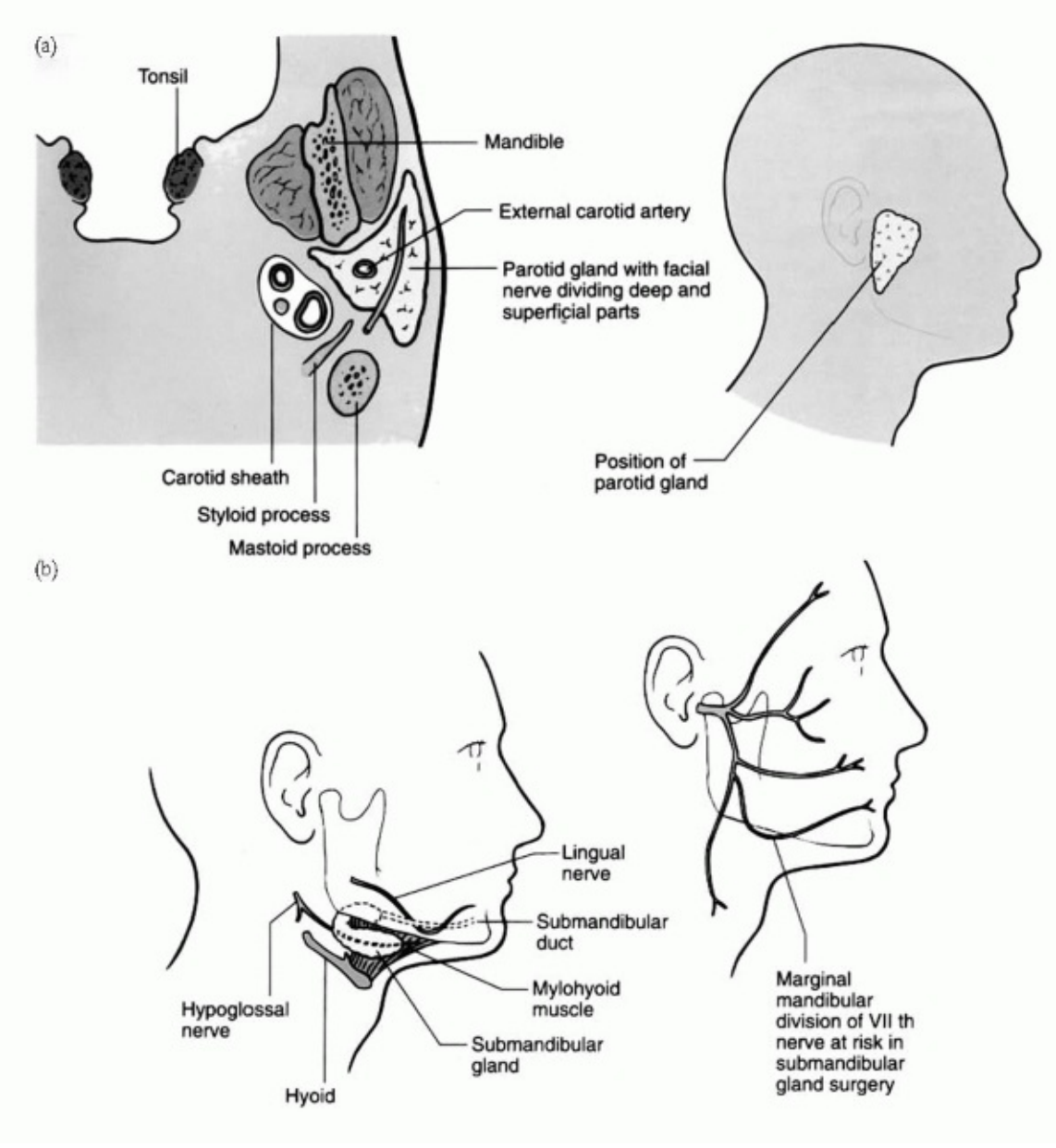


Fig. 7.1. Relations of parotid and SMG

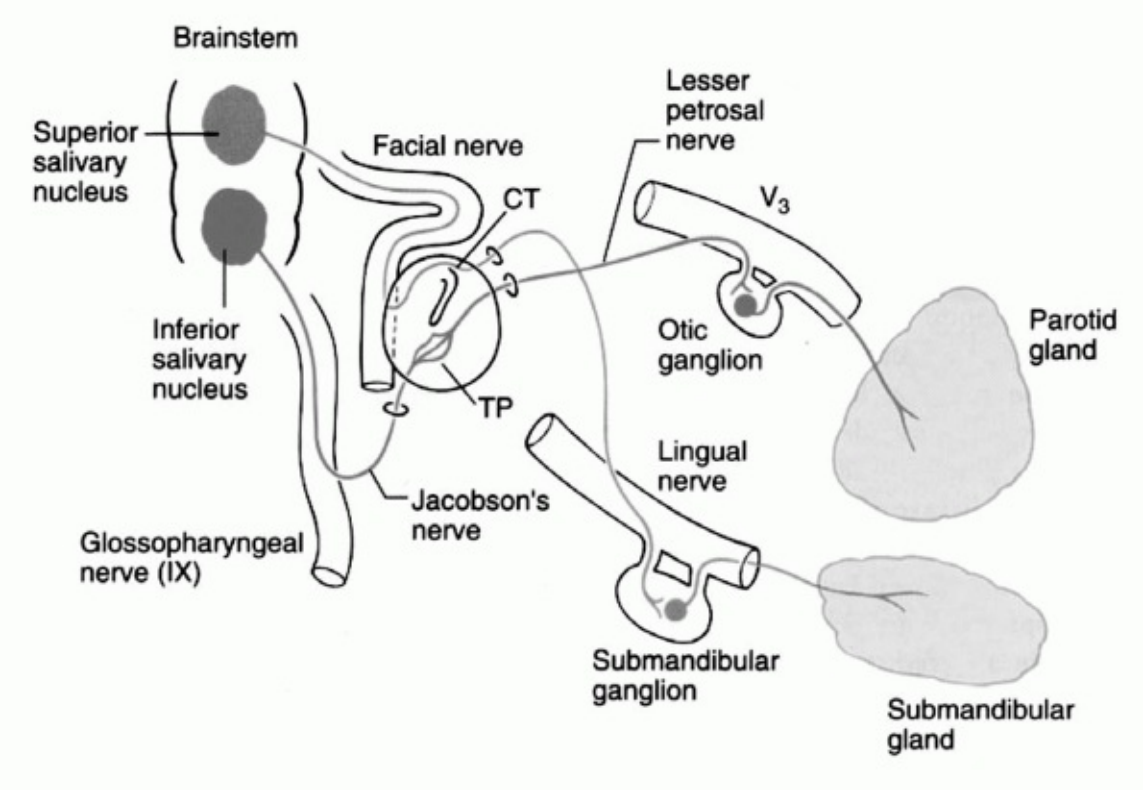


Fig. 7.2. Parasympathetic secretomotor nerve supply

Salivary gland tumours

80% of all salivary gland tumours occur in the parotid gland.

80% of these are benign pleomorphic or mixed adenomas.

50% of submandibular gland tumours are malignant.

80% of minor salivary gland tumours are malignant.

Benign tumours

Pleomorphic adenomas

Parotid pleomorphic adenomas are the most common salivary tumour. They are benign, but if they are present for many years they may turn malignant. They appear most often as an asymptomatic lump behind

the angle of the mandible—this may displace the ear lobe upwards slightly. If the patient has weakness of the facial nerve, this suggests a malignant infiltration and the diagnosis must be questioned.

Diagnosis is usually made via fine needle aspirate, and treatment is surgical. In order to prevent the adenomas recurring, the surgeon should remove a cuff of normal parotid tissue around the lump, and ensure that no tumour is spilt during excision. The surgeon will take great care to identify and preserve the facial nerve during parotid surgery.

Warthins tumour or adenolymphoma

This is the next most common benign tumour of the salivary glands. It is common in elderly men. It occurs most often in the parotid gland, often in its tail—the part of the parotid that extends into the neck. This is the only tumour which is recognised as occurring bilaterally, and its cause is unknown. Treatment is surgical.

Other benign swellings in the saliva glands include lipoma, cysts, oncocytoma and monomorphic adenoma.

Malignant tumours

Malignant salivary gland tumours are much less common than benign ones, but the symptoms can be similar—usually a lump in the neck. The following symptoms may suggest a malignant tumour:

- Pain
- Facial or other nerve weakness
- Skin involvement such as ulceration or fixation of the overlying skin
- Bloodstained discharge into the mouth
- Local lymph node enlargement suggesting metastasis.

There are minor salivary glands in the mucosa of the nose, mouth and throat. Neoplastic transformation here is often malignant.

Adenoidcystic tumours (have nothing to do with the adenoids!)

These are the most common malignant salivary gland tumours. They are slow growing and have a strong tendency to spread along the nerves— this is called perineural infiltration. They can spread several centimeters beyond the palpable lump in this way. Treatment is excision of the tumour and postoperative radiotherapy.

The short term or 5 year prognosis tends to be good, and patients with a recurrent tumour and even lung metastases may live for years. But the long term or 25 year prognosis is less good and in most cases patients will eventually die of this disease.

Mucoepidermoid carcinomas

These are unusual tumours in that they have a range of aggressiveness from low to high. High grade tumors require excision and post-operative radiotherapy, whereas low grade tumors will usually only need surgery.

Sialadenitis

This is an acute infection of the submandibular or parotid gland. Sialadenitis usually occurs in elderly or debilitated patients, who may be dehydrated and have poor oral hygiene. Drugs, such as the oral contraceptive pill, thiouracil and alcohol may cause mild sialadenitis.

Signs and symptoms

The symptoms are usually a painful swelling of the gland and pyrexia. Pressure over the affected gland may lead to pus leaking from the duct.

Treatment

Treatment involves rehydration, antibiotics and attention to oral hygiene. Sialogogues, such as lemon drops which stimulate saliva production, are helpful. Surgical drainage may be required if an intra glandular abscess complicates this infection,

Chronic salivary gland inflammation or recurrent acute attacks of sialadenitis may arise as a result of stones or stricture within the gland

or duct. Stones arise as accumulations of calcium and other salts found in saliva, deposits on foreign material, and food debris within the ducts. Strictures most often occur after an episode of inflammation in the duct. Pain and swelling when eating are common. This usually occurs in the submandibular gland, and surgical excision may be required.

Sialolithiasis

Sialolithiasis, or salivary stones, is common, and usually affects the submandibular gland since the secretions are richer in calcium and thicker.

Signs and symptoms

Symptoms may include pain and swelling in the affected gland during or after meals. The gland will become tense and tender. Inspection of the floor of the mouth may reveal the thickened inflamed submandibular duct, and the stone maybe palpable within the duct. If there is any uncertainty about the diagnosis, a plain X-ray or a sialogram (an X-ray of the duct system using dye) should be used.

Treatment

Conservative treatment with rehydration, analgesia, and sialogogues may be all that is required. Sometimes a small stone will spontaneously pass out of the duct into the mouth and the symptoms will settle. Larger stones may need to be removed. This can be performed trans-orally if the stone is palpable in the floor of mouth. If the stone is placed close to the gland, the whole gland may need to be removed by an open operation via the neck.

Other inflammatory conditions

- **Sjögren's syndrome**—an autoimmune disease. It causes a dry mouth, dry eyes and in many cases diffuse enlargement of the parotid gland. The diagnosis can be confirmed by biopsying a minor saliva gland found in the mucosa of the oral cavity.

- **Systemic viral infections**—such as mumps and HIV may cause inflammation of the parotid or submandibular glands.
- **Granulomatous conditions**—such as tuberculosis and sarcoidosis may affect the saliva glands.

P.156

Pseudosalivary swellings

These swellings may mimic salivary gland enlargement, such as:

- Intra-glandular lymph nodes.
- Hypertrophy of the masseter muscle—may mimic parotid enlargement.
- Parapharyngeal space masses—may present as an intra oral mass in a similar way to a deep lobe of parotid mass.
- Lesions/cysts of the mandible or teeth—may look like a submandibular gland mass.
- Winging of the mandible—may mimic parotid swelling.

P.158

Salivary gland surgery

See figures showing incisions (Fig. 7.3.), the facial nerve and its relations to the parotid (Fig. 7.4.), and the submandibular gland and anatomy (Fig. 7.5.).

The facial nerve passes through the parotid gland—this is a risk in parotid surgery. Surgeons will often use the facial nerve monitor to help them identify the facial nerve.

Other surgical pointers to the position of the facial nerve are listed below:

- The facial nerve exits from the stylomastoid foramen which lies at the root of tympanomastoid suture. This is palpable during parotid surgery.
- The facial nerve lies approximately 1cm deep and 1cm inferior to a small V shaped piece of cartilage known as the tragal pointer.

- The facial nerve bisects the angle made between the mastoid process and the posterior belly of the digastric muscle.

Complications of parotid gland surgery

- Paraesthesia or numbness of the ear lobe is common, because the greater auricular nerve may need to be divided to gain access to the parotid gland.
- Haematoma.
- Salivary fistula—when saliva leaks out through the incision.
- Temporary facial nerve weakness—occurs in about 10% of cases.
- Permanent facial nerve weakness—occurs in less than 1% of cases.
- Frey's syndrome—sweating and redness of the skin overlying the parotid gland when eating. It occurs when post synaptic secretomotor nerve fibres are severed during surgery, and they re-grow abnormally, innervating the sweat glands of the skin.

Complications of submandibular gland surgery

- Haematoma—the most common complication.
- Weakness of the marginal mandibular nerve—this can usually be avoided by a low horizontal incision being made 2cm below the angle of the mandible. The surgical dissection should be carried out deep to the capsule of the gland i.e. in a plane deep to the nerve.
- Lingual and hypoglossal nerve damage—these nerves lie close to the deep surface of the gland and are potentially at risk during the surgery—in reality damage is extremely rare.

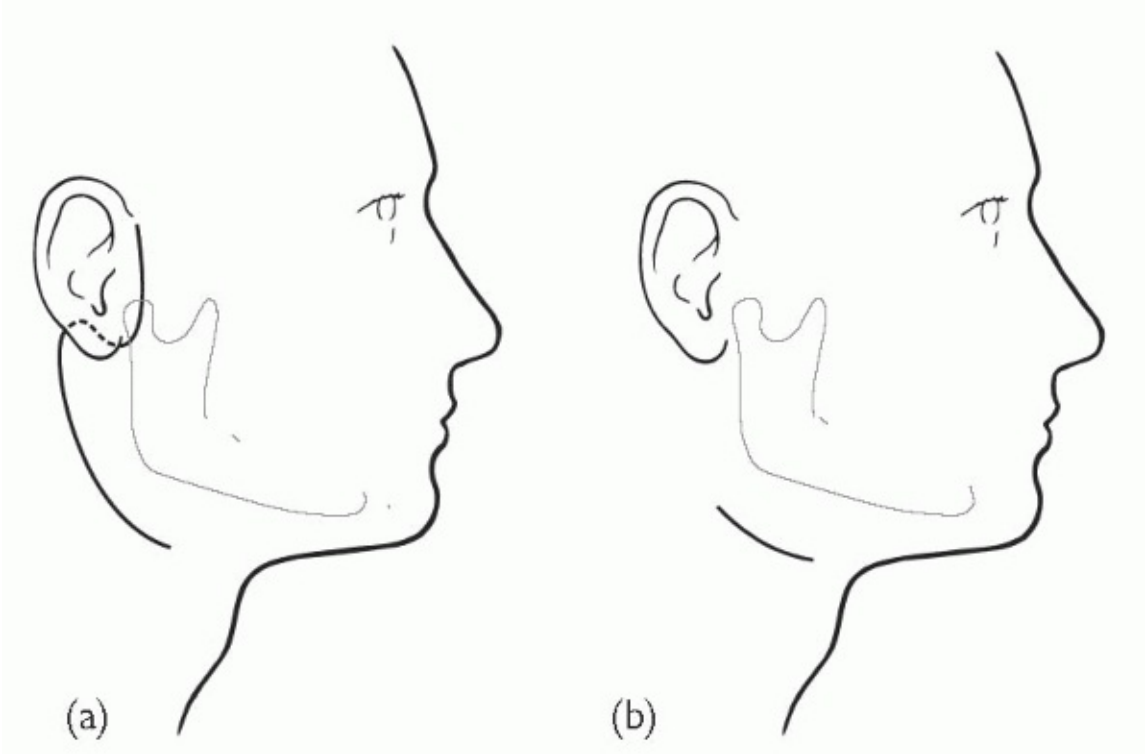


Fig. 7.3. (a) Incision for parotid surgery; (b) incision for submandibular surgery

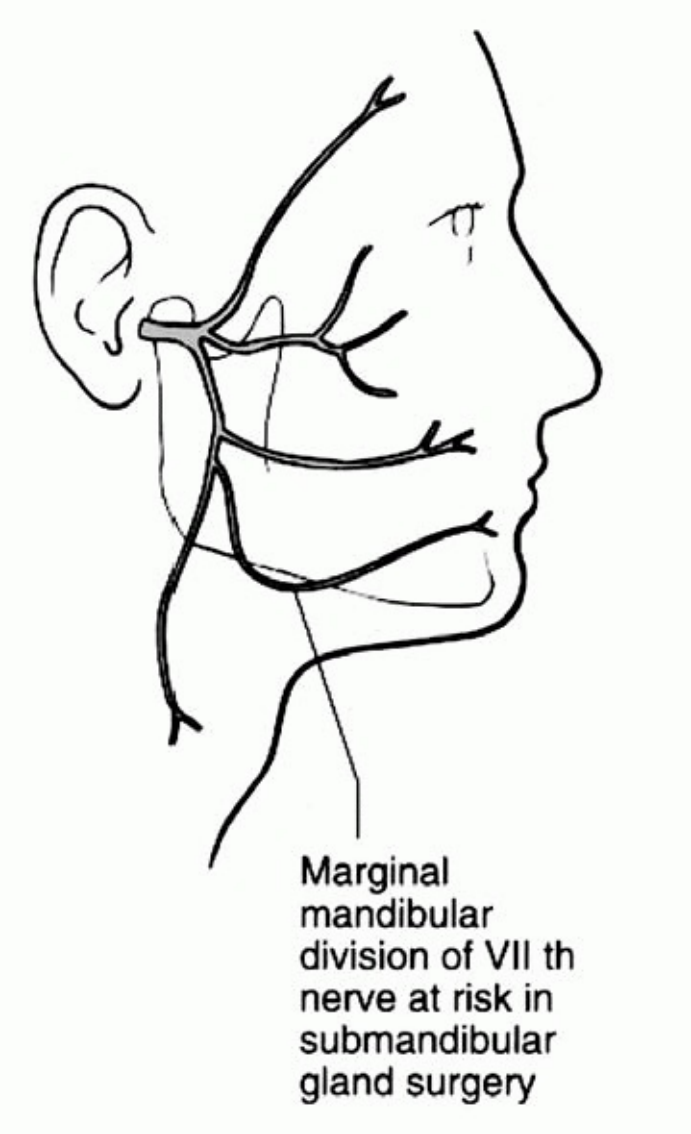


Fig. 7.4. Diagram of facial nerve and relations to the salivary glands

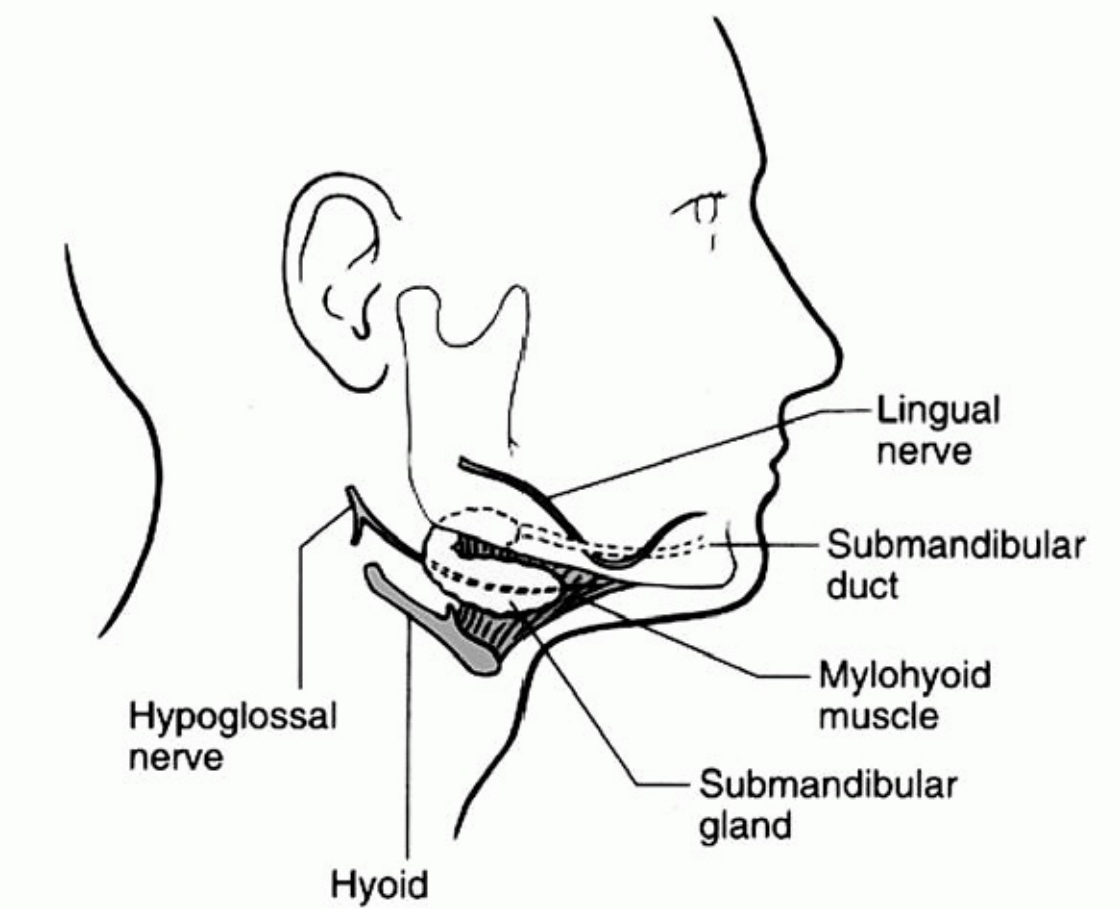


Fig. 7.5. Diagram of submandibular gland and anatomy

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 8

The Larynx

Structure and function of the larynx

Structure

The larynx is a tube made up of cartilage and bone, held together by membranes, ligaments and muscles. Above, the larynx connects with the pharynx and oral cavity, below it connects with the trachea and major airways (Fig. 8.1). Behind the larynx is the opening of the oesophagus.

Food and drink are guided from the mouth to the oesophagus, while air passes via the trachea to the lungs. Food passes over the back of the tongue and runs down two channels called the piriform fossae. These lie slightly behind and to the side of the larynx. They join behind the cricoid cartilage and form the oesophagus (see Fig. 8.2.).

Function

The main function of the larynx is to protect the lower airways from contamination by fluids, liquids and saliva. The way this happens is as follows: the larynx rises during swallowing, bringing the laryngeal inlet closer to the tongue base and allowing the food bolus to pass on either side. The epiglottis folds down to cover the larynx. The vocal cords and false cords, (see Fig. 8.3.) come together.

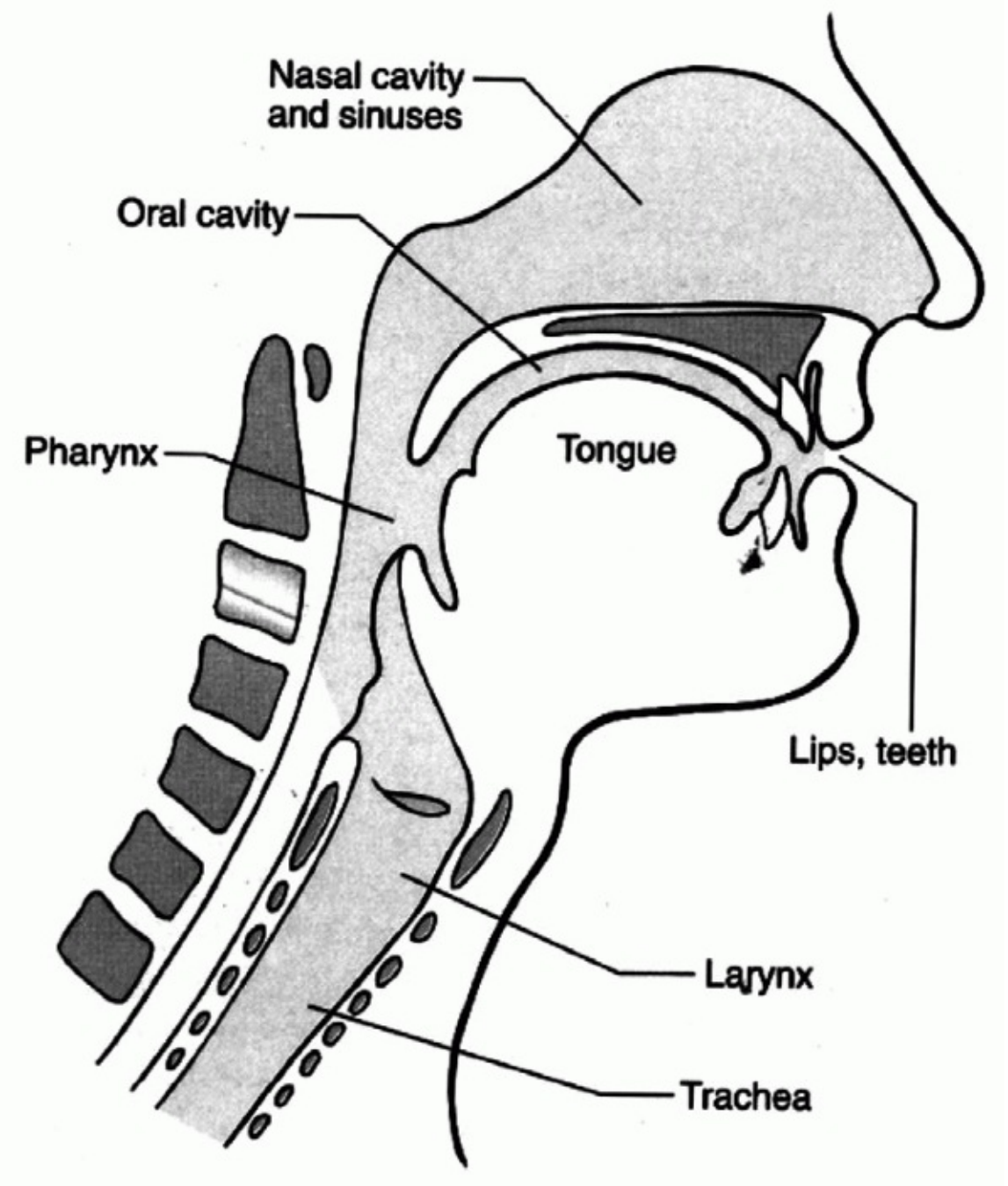


Fig. 8.1. Vocal tract

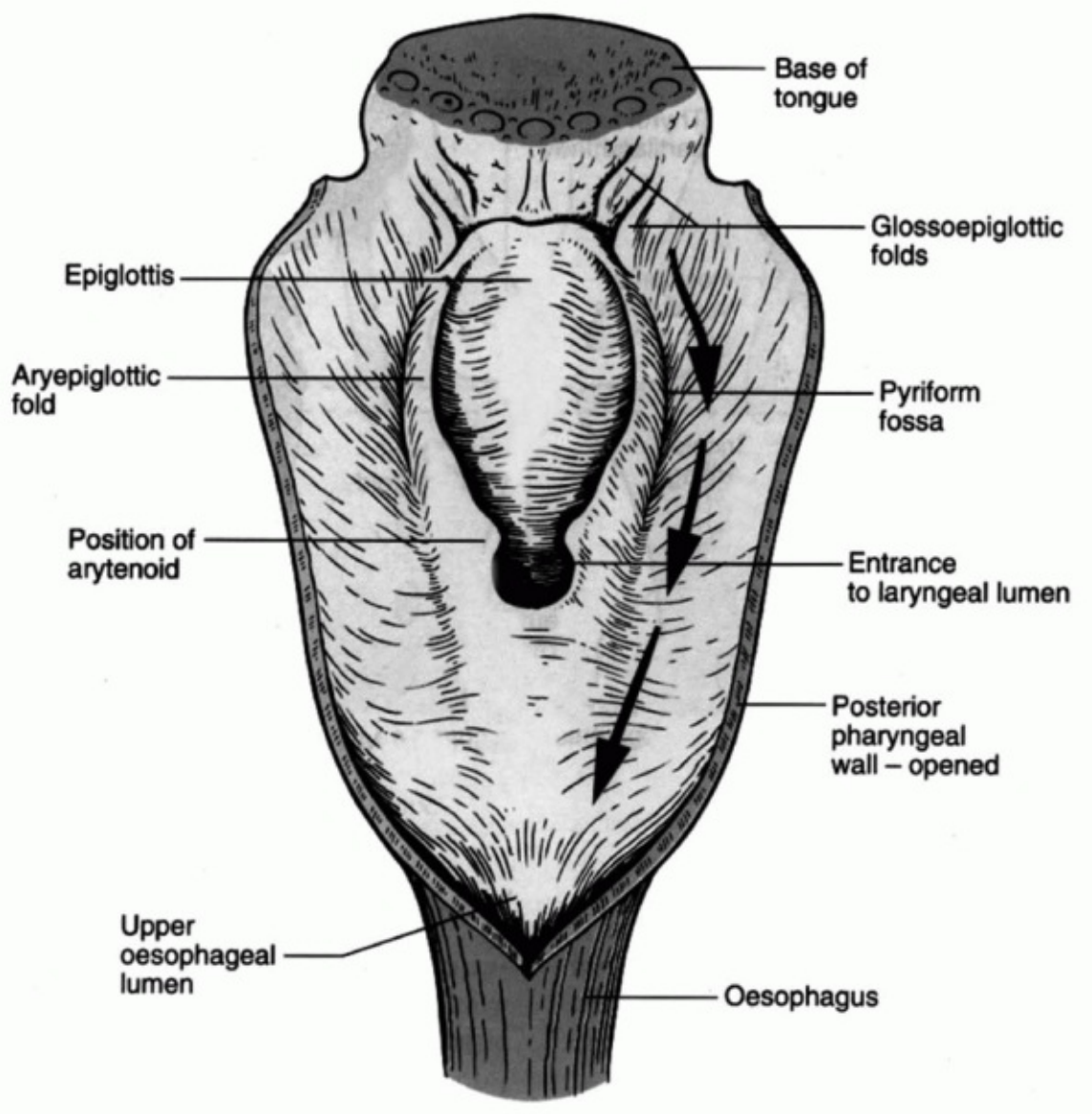


Fig. 8.2. External view of larynx

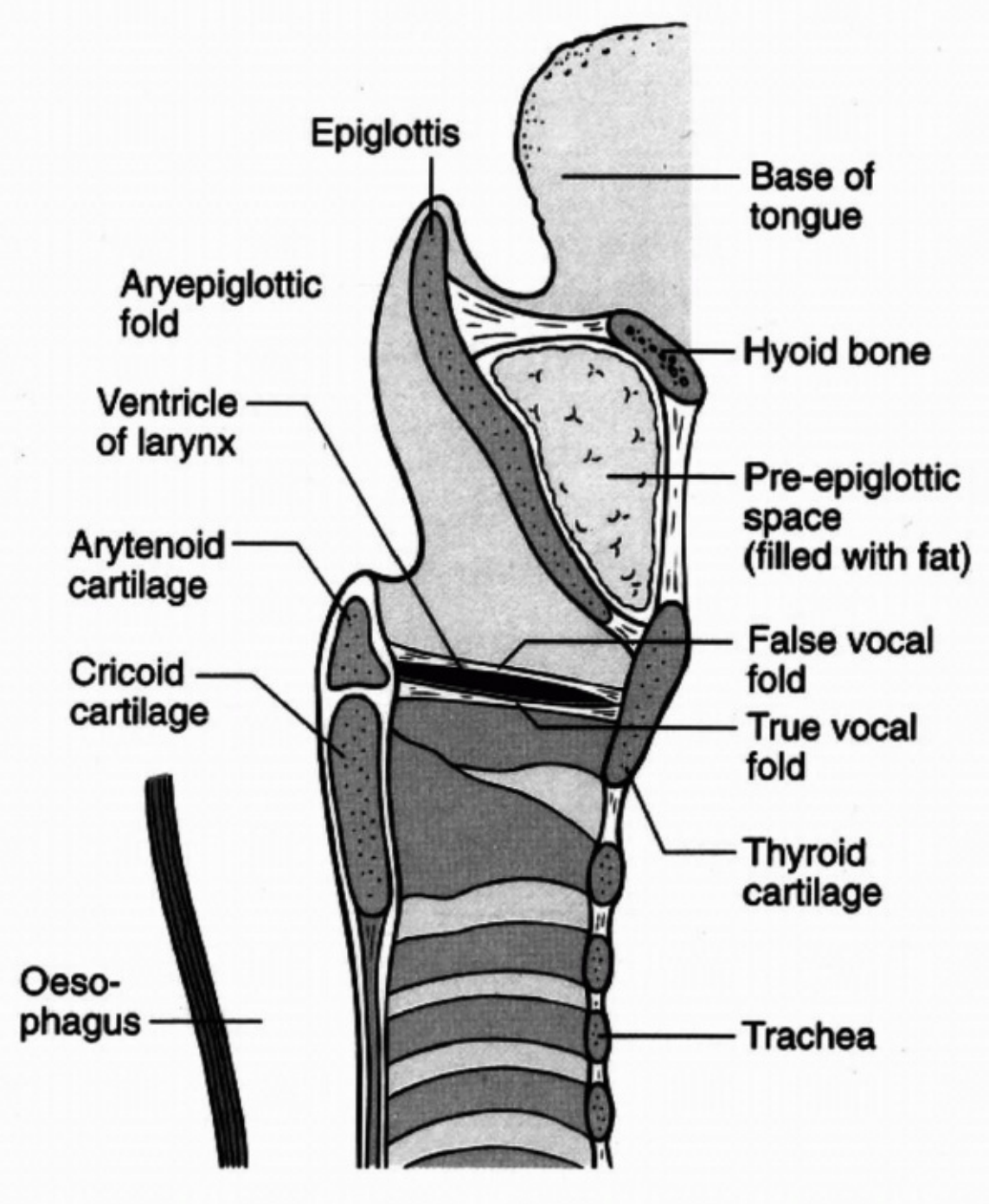


Fig. 8.3. Internal side view of larynx

The vocal cords

Structure

The vocal cords, also called the vocal folds, and collectively called the glottis, are suspended in the airway. They divide the larynx in two—the supraglottis lies above the vocal cords and the subglottis lies below.

The cords are made of a stiff central muscle and ligament, and a soft loose cover. They are fixed to the thyroid cartilage at the front and to the arytenoid cartilages at the back. These cartilages can slide away from and towards each other, opening and closing the laryngeal inlet.

Innervation: The sensation of the supraglottis is carried by the internal branch of the superior laryngeal nerve. The external branch carries motor fibres to the cricothyroid muscle. This muscle is important in adjusting the tension of the vocal cord. The vagus nerve gives rise to the recurrent laryngeal nerve and this in turn carries sensation to the subglottis and is motor to all the other muscles of the larynx. The left recurrent laryngeal nerve has an unusually long course and loops down into the chest, lying close to the hilum of the lung. It is prone to infiltration by tumors of this region. (See Fig. 8.8., p.180, Neurological laryngeal conditions.)

Lymph drainage: The vocal cords are a watershed for lymphatic drainage. Above, the supraglottis drains to the pre-epiglottic and upper deep cervical nodes, whilst below, drainage is to the lower deep cervical and pre-tracheal nodes. The cords have very poor lymph drainage, so tumors limited to vocal cords have a low risk of lymphatic spread. Tumors of the lymphatic rich supra or sub-glottis frequently present with lymph node metastases and consequently will have a worse prognosis (see Fig. 8.4., p.165).

Function

The vocal cords are the source of the sound vibration, which we adapt with our mouth, tongue, lips and teeth to produce speech. As air passes up between the cords the Bernoulli effect draws the mucosa of the cords together. They meet for a fraction of a second and then the pressure rises below the cords, blowing them apart again. This vibration of the cords and the distortion of the mucosa that results

from it is known as the mucosal wave. This causes the voice.

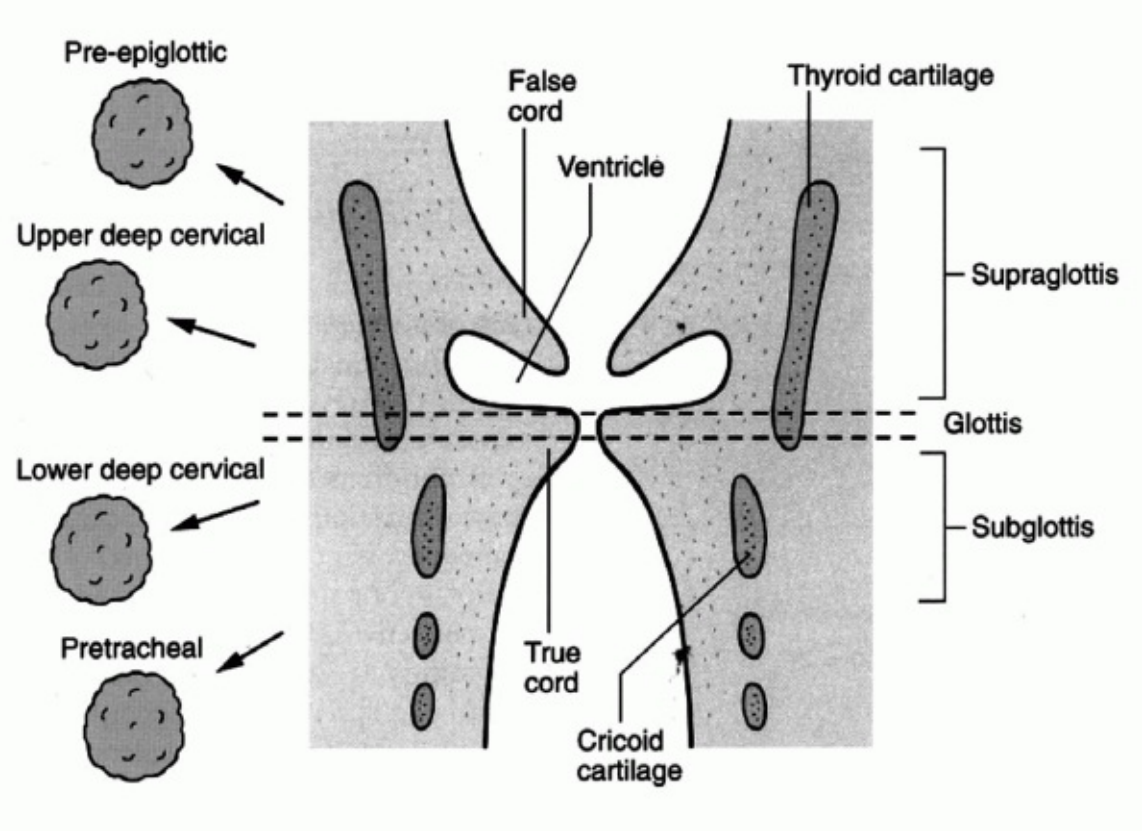


Fig. 8.4. Lymph drainage of larynx

Congenital laryngeal lesions

Babies are more prone to breathing difficulties because their larynx differs from an adults in the following ways:

- The airway is smaller both relatively and absolutely.
- The laryngeal mucosa is less tightly bound down and as a result may swell dramatically.
- The cartilaginous support for the airway is less rigid than in an adult — this makes it more prone to collapse, especially during inspiration.

Laryngomalacia

Signs of this condition show themselves shortly after birth with inspiratory stridor and feeding difficulties. When breathing in, these babies experience an excessive collapse and indrawing of the supraglottic airways, leading to breathing difficulties.

Usually this condition is mild and self limiting. When it is severe an aryepiglottoplasty may be performed. This involves dividing the excessively tight aryepiglottic folds, which allows the epiglottis to spring upwards and open up the airway.

Subglottic stenosis

This abnormality is caused by an excessively narrow cricoid cartilage. It is either a birth defect, or it arises as a result of intubation and prolonged ventilation. Subglottic cysts and haemangiomas may present with similar symptoms.

The main sign of this condition is stridor at any age from birth to 2 years. Diagnosis is made by inspecting and measuring the diameter of the subglottis under general anaesthetic. Mild cases may be treated conservatively, but more severe stenoses require surgical invervention and laryngo-tracheal reconstruction. See Table 8.1 of stenosis opposite.

Laryngeal web

This condition occurs when the vocal cords fuse together and the airway is reduced. Fusion can be minimal, with little effect on the airway; or complete fusion can occur which is incompatible with life.

The main signs of this condition are respiratory difficulties, stridor and a hoarse cry. Severe cases will require immediate surgical intervention either via a tracheostomy (when an artificial breathing hole is made in the neck below the cords to bypass the obstruction) or by endoscopic division of the web.

Laryngeal cleft

This condition occurs when the posterior larynx has failed to fuse. At its most severe this will also extend down to involve the posterior wall of the trachea.

The main signs are respiratory problems associated with feeding, as a result of aspiration into the trachea. Mild cases can be difficult to diagnose. Where there are symptoms, surgical repair may be needed.

Vocal cord palsy

The recurrent laryngeal nerves are long in children and adults, reaching from the skull base down into the chest and back up again to the larynx. Because of their length, they are prone to damage anywhere along their course. Unilateral palsy will cause a weak breathy cry and feeding difficulties as a result of aspiration, and bilateral palsy will present as marked stridor.

Table 8.1 Congenital laryngeal lesions: Cotton grading of tracheal stenosis

Grade 1	≤50% obstruction
Grade 2	51-70% obstruction
Grade 3	71-99% obstruction
Grade 4	No lumen

Infections of the larynx

Acute laryngitis

Inflammation of the larynx may occur in isolation or as part of a

general infective process affecting the whole of the respiratory tract. It is very common, often presenting as a sore throat and loss of voice with a cold.

Signs and symptoms

- Hoarse voice
- Pain on speaking and swallowing
- Malaise
- Slight pyrexia
- Examination of the vocal cords will show them to be reddened and swollen.

Treatment

Most patients with acute laryngitis either self medicate or are treated in the primary care setting with supportive therapy such as voice rest, simple analgesia, steam inhalations and simple cough suppressants.

Voice rest is especially important for any professional voice user. Patients should be advised of this, and of the risk of haemorrhage into the vocal cord, which can produce permanent adverse effects on the voice.

Chronic laryngitis

Chronic laryngitis is a common inflammation of the larynx caused by many different factors. It often begins after an upper respiratory tract infection. Smoking, vocal abuse, chronic lung disease, sinusitis, post nasal drip, reflux, alcohol fumes and environmental pollutants may all conspire together to maintain the inflammation.

Signs and symptoms

- A hoarse voice.
- A tickle in the throat or a feeling of mucus in the throat.

- A patient who is constantly clearing their throat or coughing—this causes still more inflammation of the cords and establishes a vicious circle.
- A laryngoscopy which reveals thickened, red, oedematous vocal cords.

The patient should be referred for a laryngeal examination if their symptoms fail to settle within 4 weeks. If any concern remains after this examination, the patient should be admitted for an examination and a biopsy, under general anaesthesic, to exclude laryngeal malignancy.

Treatment

The agents that are causing the chronic laryngitis should be removed. The patient may require the skills of a speech therapist. Patients will also respond well to explanation and reassurance that they do not have a more serious condition.

Reinke's oedema

This is a specific form of chronic laryngitis found in smokers. The vocal cords become extremely oedematous and filled with a thin jelly-like fluid. The oedema fails to resolve due to poor lymph drainage of the vocal cord. Stopping smoking and speech therapy are helpful in removing the causes of this condition. In many cases microlaryngeal surgery is required to incise the cord and suck out the oedema. It is important to avoid any damage to the free edge of the vocal cord when performing this operation, as it can permanently affect the mucosal wave and hence the voice.

Epiglotitis and supraglottitis

This is an inflammation of the epiglottis or supraglottic tissues that affects children and adults. Epiglotitis is now rare in children in the UK (as a result of the HIB vaccination). It is seen more often in adults, where it tends to affect the whole of the supraglottic tissues (and is called supraglottitis). Most ENT departments see one case per month in

the winter. The causative agent is usually *H. influenzea*.

Signs and symptoms

- Difficulty in swallowing leading to drooling of saliva.
- Change in the voice, described as a muffled or ‘hot potato voice’ or change in the child's cry.
- Dramatic swelling of the supraglottic tissues.
- Pools of saliva seen collected around the larynx on endoscopy.

This condition should not be underestimated. It may start with features similar to any other respiratory tract infection, but it can rapidly progress to total airway obstruction within hours of onset. Consider this diagnosis early on, and get expert help.

Management

- Admit the patient and keep them upright. Lying the patient flat could obstruct their airway.
- Do not attempt to examine the mouth, as this may obstruct the patient's breathing.
- No X-rays—they do not add much to the diagnosis and remove the patient from immediate expert assistance should they need it
- Call for senior help—an ENT surgeon and an anaesthetist.

Treatment

If epiglotitis or supraglottitis is suspected, stop further investigations. Escort the patient calmly and quickly to an operating theatre where an experienced paediatric anaesthetist and scrubbed consultant ENT surgeon are standing by with the appropriate equipment (laryngoscope, ventilating bronchoscope and tracheostomy set).

Where possible the patient should be intubated and treated with the appropriate antibiotics. However, oral intubation may be difficult and the ENT surgeon may be asked to secure the airway surgically.

Croup

This infection is common in children. It affects the whole of the upper respiratory tract (URT), hence the more descriptive name, acute laryngotracheo-bronchitis. It is usually viral in origin, but a bacterial infection with *H. influenzae* is sometimes seen. The speed of onset of croup is slower than in epiglottitis, but it can be extremely serious and even life threatening.

Signs and symptoms

- Mild preceeding upper respiratory tract infection
- Rising pyrexia
- Stridor
- Malaise.

Treatment

- Admission to hospital may be necessary in all but the most minor cases
- Intravenous antibiotics
- ± nebulised adrenaline
- Ventillatory support where required.

Cancer of the larynx

The vast majority of laryngeal cancers are squamous cell carcinomas. Smoking is the risk factor for laryngeal cancer, although smoking and drinking in combination puts the patient at even more risk. It is the most common neck and head malignancy.

Since the whole of the upper aero digestive tract has been exposed to the same risk factor (that is, smoke), there is a widespread field change throughout this mucosa. These patients therefore have an increased risk of developing another cancer in the mouth, pharynx, larynx or oesophagus. 5% of patients with one head and neck cancer

will present with a second primary tumour elsewhere in the head or neck. This may be silent and cause no symptoms at all!

Signs and symptoms

The patient's symptoms will depend upon which site(s) within the larynx is affected. A tumour on the vocal cord will cause a hoarse voice, and a patient in this situation will usually present early. However, a tumour in the supra-glottis may present few symptoms until much later and a patient may present with advanced disease. All patients with a lump in the neck must be referred for an ENT examination.

Signs of advanced laryngeal cancer are:

- Pain—often referred to the ear.
- Voice change—the voice is muffled rather than hoarse, unless the tumour also extends to involve the true vocal cords.
- Breathing difficulties and stridor.
- Difficulty swallowing or inhaling.
- Lymph node enlargement in the neck—this is often the only presenting feature.

Investigations

Although a clinical diagnosis can often be made after examination of the larynx, a biopsy is essential. This is because conditions such as laryngeal papillomas, granulomas and polyps may mimic laryngeal cancer. All patients should also have an examination of the whole of the upper aero digestive tract (panendoscopy) to check for a second primary tumour.

All patients must have at least a CXR. A CT scan of the chest is routine practice in many centres. CT/MRI scanning of the neck is also mandatory, particularly looking for thyroid cartilage erosion and enlarged lymph nodes in the deep cervical chain.

Staging

TNM staging is applied to head and neck cancers in a similar way to other sites.

- The T stage is determined by the anatomical site/sites affected.
- The N stage refers to the local nodal spread.
- The M stage is determined by the presence or absence of distant metastases (see Boxes 8.1, 8.2 and 8.3).

Box 8.1 T staging of laryngeal cancer

TX:	Tumour cannot be assessed.
Tis:	Carcinoma in situ.
T1a:	Tumour limited to one cord and not affecting the anterior commisure.
T1b:	Tumour limited to the cord but involving the anterior (or posterior) commisure.
T2:	Tumour spreading upwards or downwards from the cord to involve the supraglottis or subglottis with normal vocal cord mobility.
T3:	Tumour which fixes the vocal cord either by involvement of the recurrent laryngeal nerve or by infiltration of the cricoarytenoid joint or simply as a result of the bulk of the tumour.
T4:	Tumour escaping from the larynx to involve another site or erosion of the cartilaginous framework of the larynx.

Box 8.2 N staging for the head and neck

N1:	A single ipsilateral node, < 3cm in size.
N2a:	A single ipsilateral node > 3cm but < 6cm in size.
N2b:	More than one ipsilateral node < 6cm in size.
N2c:	A contralateral node or bilateral nodes < 6cm in size.
N3:	Any node > 6cm in size.

Box 8.3 M staging for the head and neck

M0: No distant metastases.

M1: Distant metastases.

Treatment of laryngeal cancer

Treatment is either surgery or external beam radiotherapy. Early laryngeal tumours are satisfying to treat, since more than 90% can be cured.

If a patient is too unfit to undergo radical treatment, palliative radiotherapy or chemotherapy may be used to shrink the tumour. This can reduce symptoms and improve the patient's quality of life.

Although practice does vary slightly between different units and countries, in general, treatment is as follows:

- Small tumours (stage T1 and T2) are treated with radiotherapy—surgery is used only if they recur afterwards.
- Big tumours (stage T4) are treated with radical excision—a partial or total laryngectomy.
- The treatment of T3 tumours is controversial—some opt for primary surgery and others advocate radiotherapy, holding surgery in reserve for radiation failures.

Each patient should be assessed individually and treatment decisions must be made in an multi disciplinary team setting, with the knowledge and consent of the patient.

Surgery for laryngeal cancer

The decision as to which type of surgery is performed is largely dependant on the size and extent of the tumour. Surgery may be performed endoluminally—with endoscopes from the inside—usually with the aid of a laser. Or, the radical excision of part of, or the entire

larynx may be needed. In general, smaller tumours (T1 and T2) are more easily treated with endoscopic laser surgery, and larger T3 and 4 tumours are offered radical excisional surgery. (see Laryngectomy p.175)

Radical radiotherapy for laryngeal cancer

A total dose of 50-70 Gy is given over 4-6 weeks, Monday to Friday.

Each treatment only lasts a few minutes but the patient has to wear a custom made Perspex mask, rather like a neck brace. This holds the patient in exactly the same position each day, ensuring that the radiotherapy fields are directed accurately onto the tumour and immediate area. This spares the uninvolved areas of the head and neck.

Towards the end of treatment the patient will suffer with painful mucositis. Swallowing can become difficult, and the patient may need to be admitted for enteral feeding and analgesia.

Box 8.4 Key learning points—Radiotherapy for laryngeal cancer

- Treatment intent maybe palliative or curative
- Chemotherapy is only used as an addition to radiotherapy (or surgical) treatment
- Small tumours do very well
- Radiotherapy is usually given for small tumours
- Large tumours are usually treated with a laryngectomy
- Post operative radiotherapy is often given in advanced disease with poor histology.

Laryngectomy

Several different types of partial laryngectomy have been described. These are collectively known as ‘less than total’ and are beyond the scope of this book.

A ***total laryngectomy*** was first described at the beginning of the last century, but it remains a reliable and effective treatment. During a total laryngectomy the larynx is removed and the trachea is brought to the skin as an end stoma in the neck. The pharynx is opened and repaired to reconstitute the swallowing mechanism. (See Fig. 8.5.). A neck dissection is often performed in combination with this procedure. This is because patients with advanced or recurrent laryngeal disease are at considerable risk of having nodal metastases, which may be palpable or hidden.

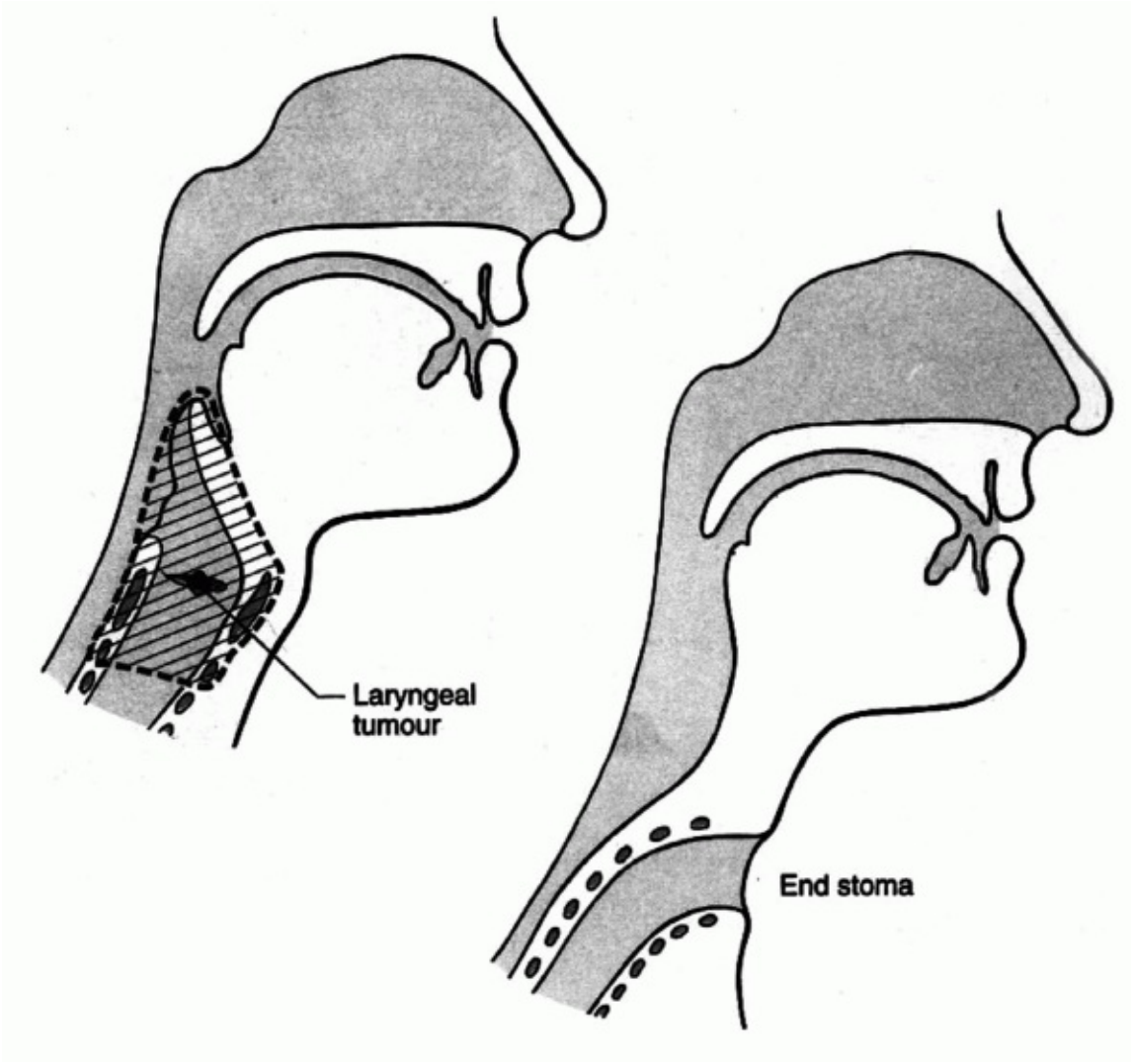


Fig. 8.5. Diagram of pre and post laryngectomy anatomy

Voice restoration after laryngectomy (see also p. 374)

Oesophageal speech (See Fig. 8.6a)

In those who can achieve it, oesophageal speech offers near normal verbal communication. The basic principle is that air is swallowed into the stomach and then regurgitated into the pharynx. This causes vibration of the pharyngo-oesophageal segment (PE segment) similar to a belch. This can be modified with the lips and teeth into intelligible speech.

The main problem is that not all patients can manage to achieve this type of speech, and even if they do, only small amounts of air can be swallowed. This means that the resultant speech can only be made up of short phrases at best.

Tracheo-oesophageal puncture (See Fig. 8.6b)

This is when artificial communication is created between the back wall of the trachea and the front wall of the pharynx/oesophagus. This is usually done at the time of the initial surgery (primary puncture) but can be performed at anytime thereafter (secondary puncture).

A one-way valve is inserted into this tract which allows the passage of air from the trachea to the oesophagus, vibrating the PE segment as above. In order to activate the valve, the patient must occlude their stoma and try to breathe out. This may be done with a finger, or by using a second manually operated valve which sits over the stoma as part of a heat and moisture exchanger (HME). The HME also filters the inhaled air and prevents excess water vapour being lost from the respiratory tract—in effect this replaces some of the functions of the nose.

Artificial larynx (Servox)

Some patients cannot achieve either of the above forms of speech,

and require an external vibrating source. The vibrating end of this device is held firmly onto the patient's neck, floor of their mouth or cheek, and this causes these tissues to vibrate. As a result, the air within the pharynx and oral cavity vibrates and sound is produced. The voice produced does sound rather unnatural but this is a simple and effective means of communication (see Fig. 8.7.).

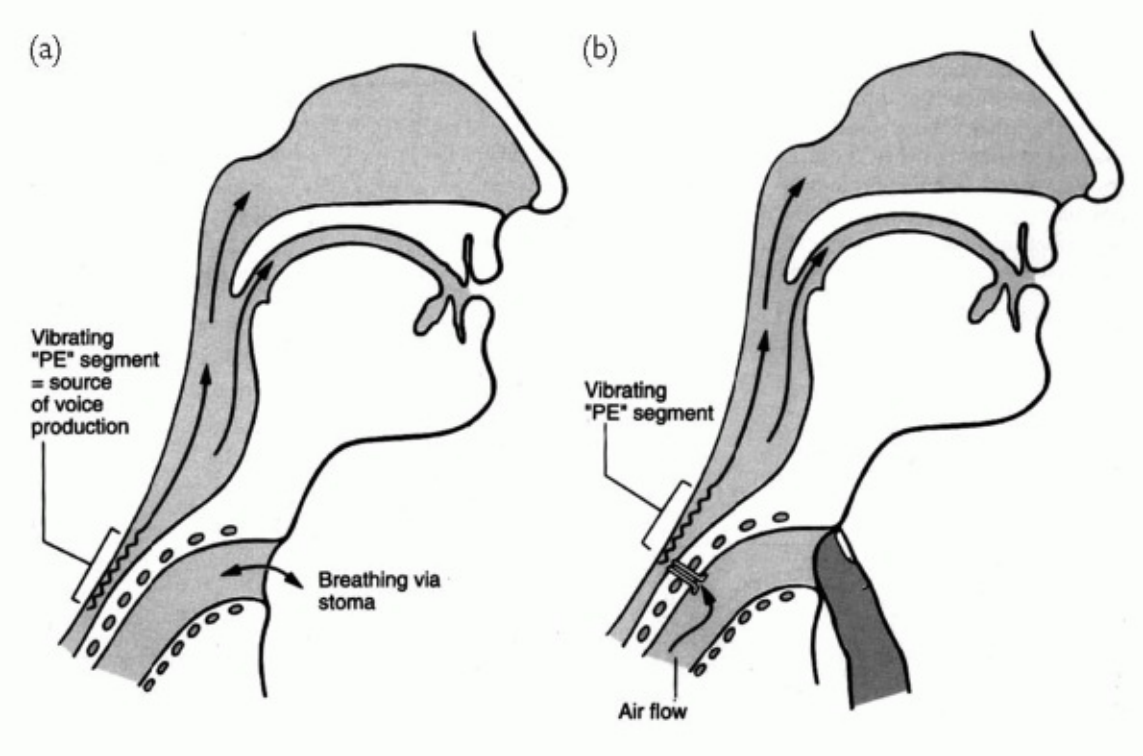


Fig. 8.6. Diagram of TEP voice

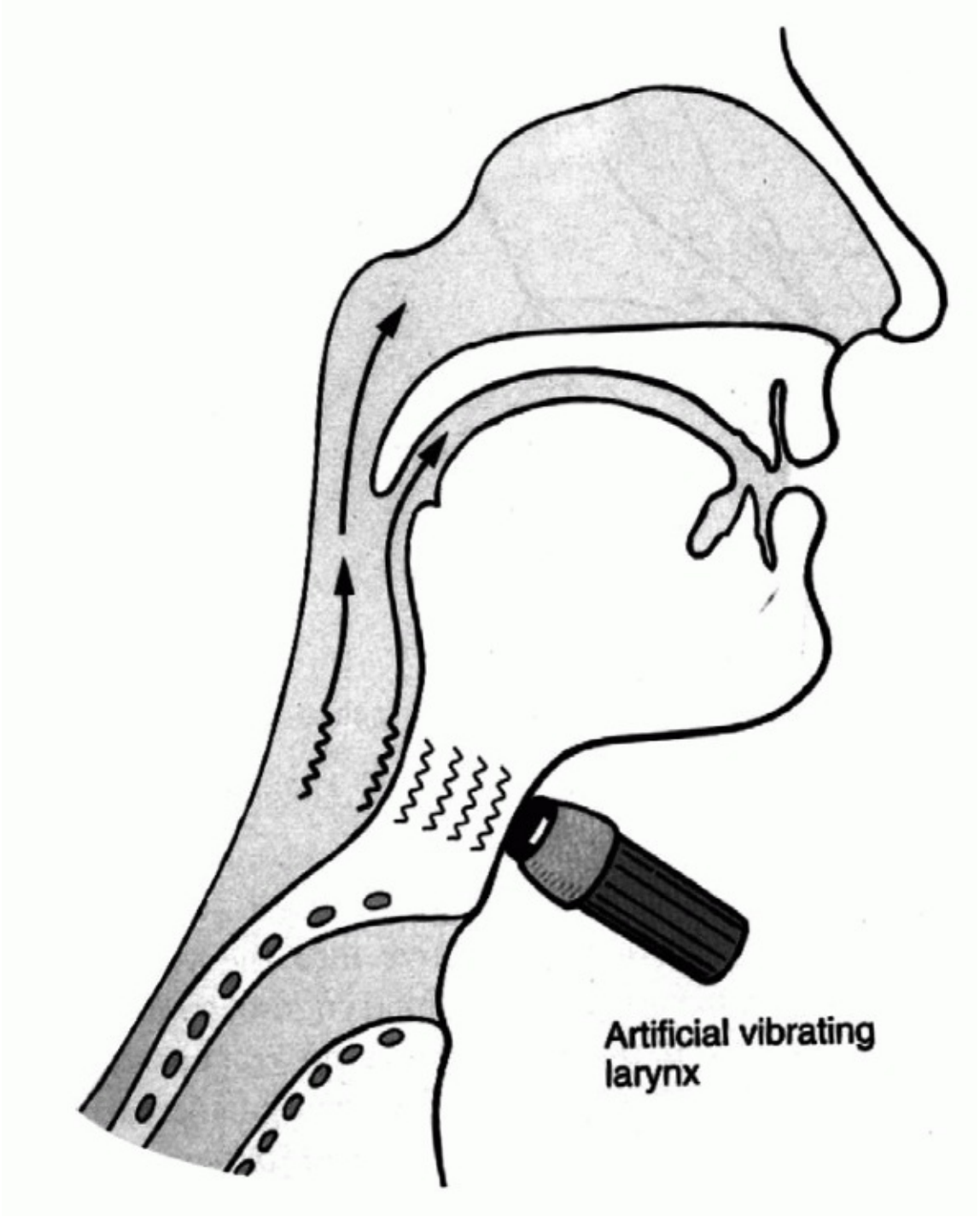


Fig. 8.7. Diagram of servox

Benign lesions of the larynx

These are lesions of the vocal cords which are not cancer. Signs of a benign lesion—such as a hoarse voice—can be indistinguishable from those of laryngeal cancer. It is therefore imperative that any patient with a change in their voice lasting more that 4 weeks is referred to an ENT surgeon to exclude a laryngeal malignancy.

Vocal cord polyp/cyst

These lesions are indistinguishable histologically. They usually arise spontaneously, but they may be associated with previous laryngeal inflammation. The symptoms are a sore throat and/or a hoarse voice.

The cysts are intra-cordal, whereas polyps are pedunculated and may be difficult to see because they sometimes hang down on their stalk to sit below the cords. Treatment is with microsurgical excision, taking care to avoid iatrogenic damage to the free edge of the vocal cord, and hence the mucosal wave and voice.

Vocal cord granuloma

This lesion is usually unilateral and affects the posterior aspect of the vocal cord. As a result, it can have quite a minimal effect on the voice. Vocal cord granuloma arises as a result of inflammation of the arytenoid cartilage (perichondritis). It is most often seen as a result of intubation trauma or excessive coughing. The patient usually complains of pain in their larynx. Reflux is a commonly associated feature.

The lesion requires a biopsy as SCC can present with similar features. Treatment may include surgical excision, speech therapy and the treatment of acid reflux.

Singer's nodules

These nodules—also known as screamers' nodules—occur as a result of prolonged voice abuse or misuse. They are common in children, amateur actors and singers—they give a characteristic huskiness to the voice.

They are always bilateral and occur at the junction of the anterior

third and posterior two thirds of the vocal cords. Early or ‘soft’ nodules will resolve with speech therapy and good vocal habits, but long established ‘hard’ nodules may require surgery.

Papillomas

These non cancerous growths are most commonly seen in children but may also occur in adults. Papillomas arise as a result of human papilloma virus (HPV). The route of transmission is thought to be through inhalation. There may also be some defect in the host immune system, as some individuals are affected and others are not. Spontaneuous resolution tends to occur in children around puberty, but this is less common in adults.

In its most severe form, papilloma may result in significant airway obstruction in the larynx, trachea and major bronchii. If the patient's airway is obstructed, surgical debulking of the papilloma is required. Removal of every last papilloma in not advised, since this will cause scarring of the vocal cords and they often recur. A tracheostomy may be required, but even then papillomas may grow around the stoma.

Malignant transformation may occur in adults especially with subtypes 7 and 11. Systemic treatment with interferon is effective, but rebound growth may be dramatic when it is stopped.

Muscle tension dysphonia

This is a common problem seen in general and ENT practice. Symptom is a hoarse voice which tires easily and may vary in pitch. Patients sometimes say their voice ‘cracks’ or ‘gives out’ and the quality of the voice varies from day to day and moment to moment. Occasionally the patient may present with aphonia.

These problems are caused by laryngeal muscular tension abnormalities. They are associated with voice misuse, psychological stress and psychiatric disease.

Globus type symptoms are frequent. Thesse include a feeling of a lump in the throat, a feeling of mucus in the throat and frequent throat clearing. The treatment is reassurance and explanation, with speech

therapy for patients who do not respond well.

Vocal cord palsy

Palsy or paralysis of the vocal cords will mean that the patient may have a weak breathy voice rather than the harsh hoarse voice of laryngeal cancer. They will have a poor, ineffective cough and aspiration is common. See Box 8.5, p.180.

The recurrent laryngeal nerve (RLN) is a branch of the vagus nerve and has a long course (see Fig. 8.8. p.180). This makes it susceptible to damage in a variety of sites.

Investigation

Remember the rule of thirds below:

- 1/3 idiopathic
- 1/3 surgery
- 1/3 neoplasia

Where there is no history of recent surgery, order:

- CXR—if it is negative proceed to—
- CT scan—skull base to hilum
- ± USS thyroid
- ± oesphagoscopy

If the above are negative then post viral neuropathy is the most likely cause. The causes of vocal cord immobility (fixation rather than palsy) include rheumatoid arthritis, laryngeal trauma, prolonged intubation and carcinoma affecting the cricoarytenoid joint. An endoscopy, together with palpation of the joint is necessary to confirm this abnormality.

Treatment

Where there is a small gap between the cords, speech therapy may be

all that is needed to strengthen the mobile cord and aid compensation. When there is a larger gap, the paralysed cord can be medialised, either by an injection technique or via a thyroplasty. (See Fig. 8.10., p.181 and Fig. 8.11., p.181). Poor function of the cords may lead to aspiration and chest infections. Dietary modifications, tube feeding and even a tracheostomy may be required to protect the airway from soiling.

Neurological laryngeal conditions

Any condition which affects the brainstem (CVA, trauma or tumour) will affect the function of the vagus nerve and as such the recurrent laryngeal nerve. With these conditions, the voice problems may be less a cause for concern than the lack of protection of the airway, which can lead to life threatening aspiration. Any systemic neurological or neuromuscular condition such as multiple sclerosis or muscular dystrophy may also affect the voice. But it is rare for these conditions to present first to an ENT surgeon as voice problems.

Box 8.5 Learning points—vocal cord palsy

- Unilateral vocal cord palsy leads to vocal cord lateralisation and a weak voice but a good airway.
- Bilateral vocal cord palsy leads to vocal cord medialisation and airway problems but a good voice.

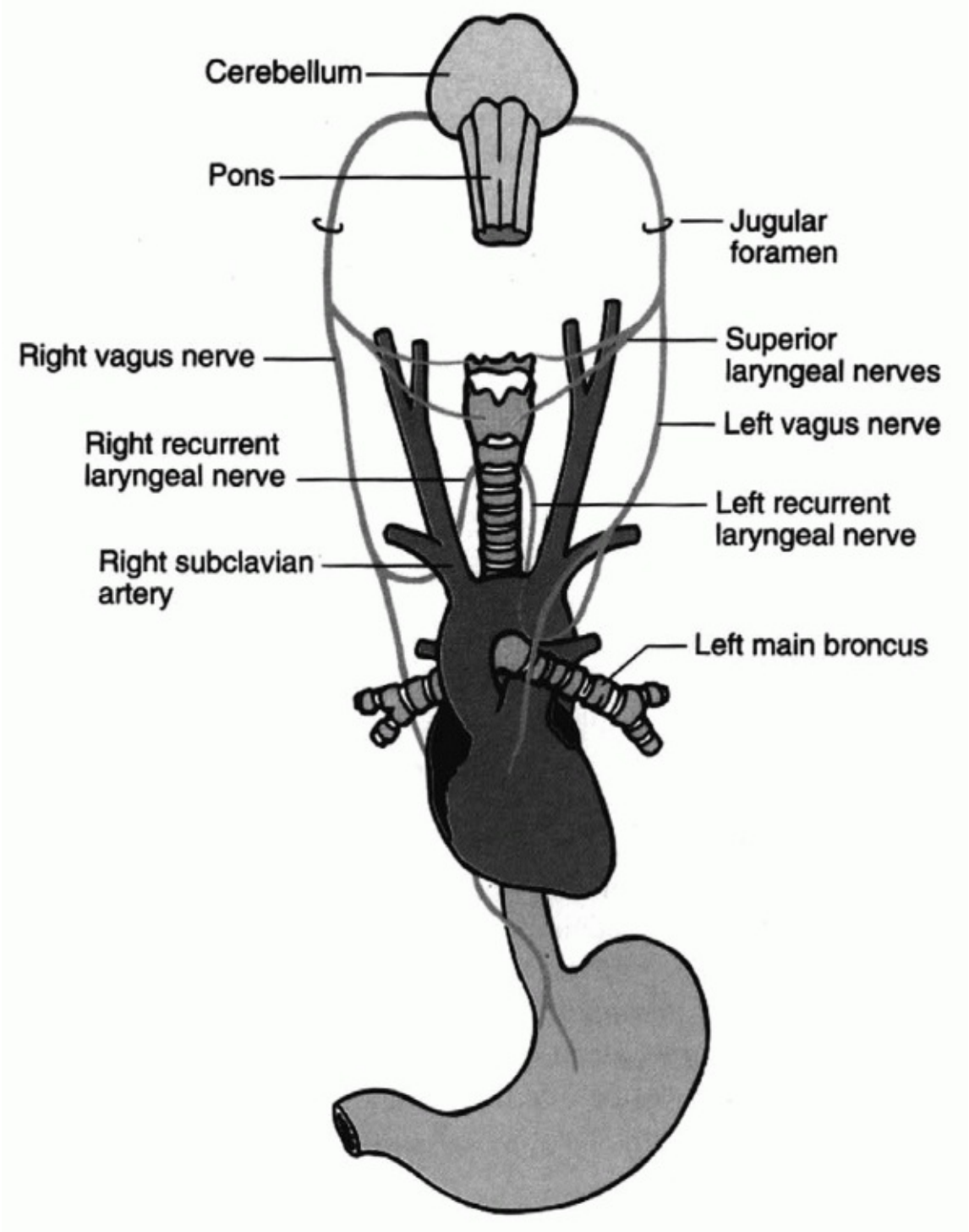


Fig. 8.8. Diagram of RLN anatomy and sites of damage

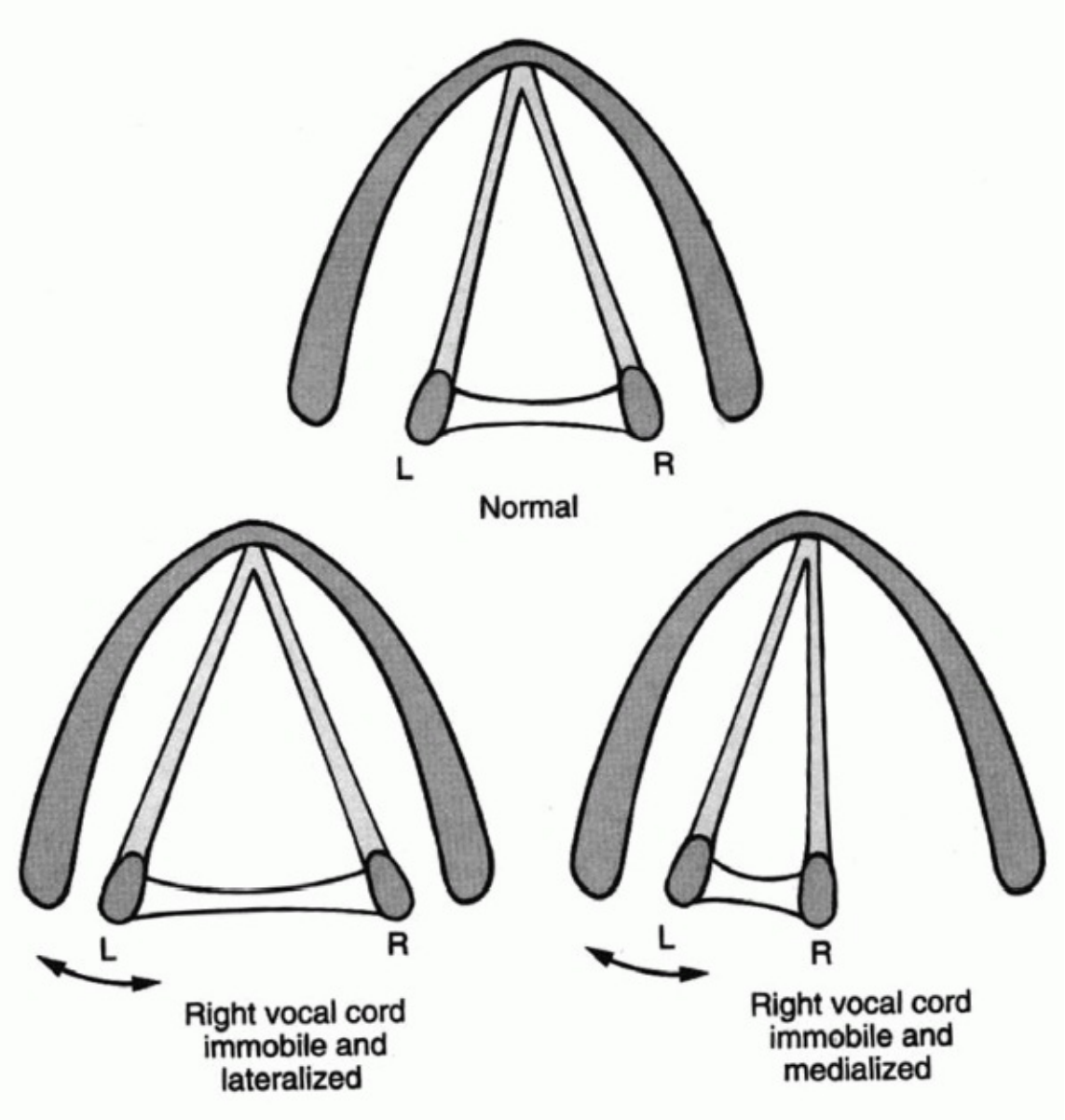


Fig. 8.9. Diagram of palsy positions

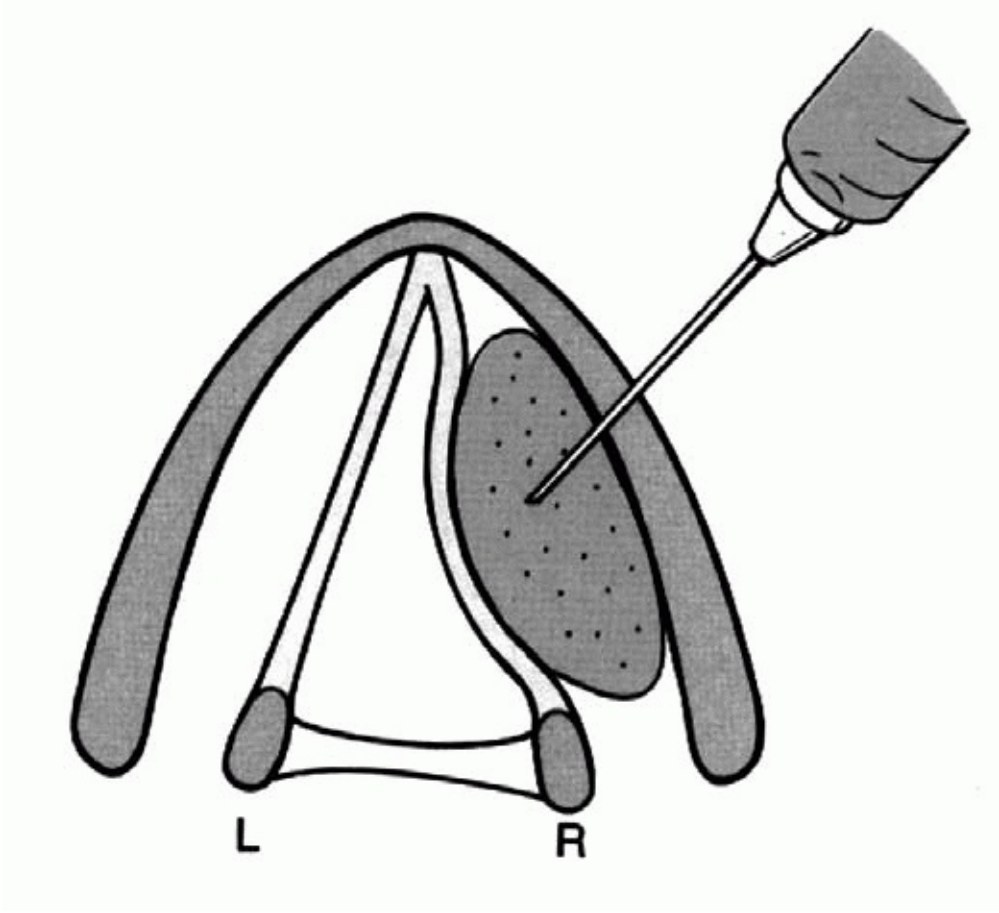


Fig. 8.10. Diagram of injection

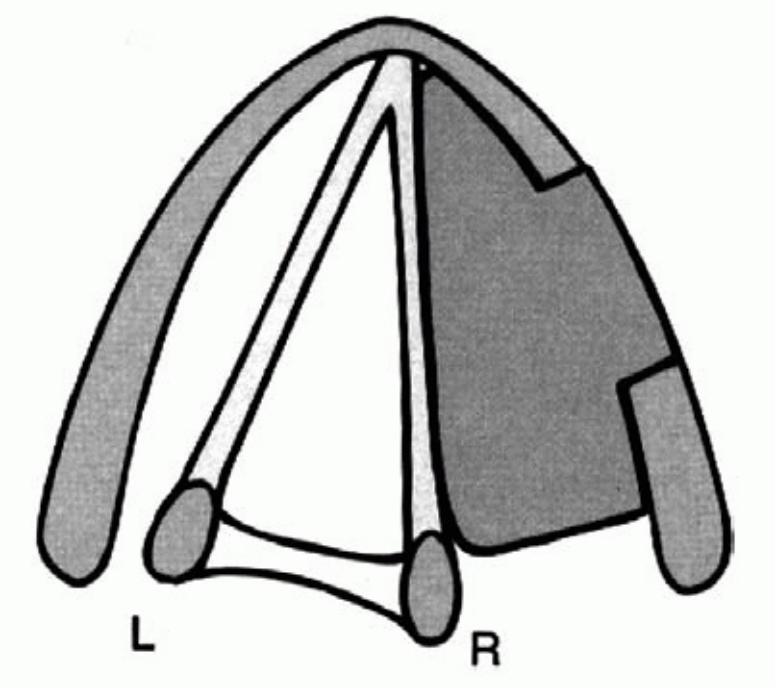


Fig. 8.11. Diagram of thyroplasty

Stridor

Stridor is a high pitched noise caused by a restricted airway. It is most common in children, due to the anatomical differences between the paediatric and the adult larynx (see p.166).

The timing of the stridor in respiration tells you the site of the obstruction or restriction:

- Laryngeal stridor = inspiratory
- Tracheal stridor = expiratory—a wheeze
- Subglottic stridor = biphasic—occurs when breathing in or out

A small reduction in the diameter of the airway leads to a dramatic increase in the airway resistance and hence the work of breathing (Poiseuilles law resistance $=r^4$).

Causes of stridor

Congenital

- Laryngomalacia
- Vocal cord web
- Bilateral vocal cord palsy
- Subglottic stenosis.

Acquired

- Trauma
- Foreign body
- Epiglottitis/supraglottitis
- Croup
- Carcinoma
- Airway compression e.g. thyroid.

Assessment

Stridor is an ominous sign. Even if the patient appears to be coping, be sure that they are closely observed and that facilities to secure the airway are readily at hand. Patients may suddenly decompensate with devastating consequences.

- Take a rapid history
- Measure O_2 saturation
- Take temperature
- Check respiratory rate.

In children, pyrexia, drooling, dysphagia and a rapid progression of the illness, suggests epiglottitis. Take the patient to a place of safety such as a resuscitation room or operating theatre, and call for a senior ENT

surgeon and experienced anaesthetist.

A similar history in adults suggests supraglottitis. This diagnosis can usually be confirmed by a careful nasolaryngoscopy. See also ‘The emergency airway’, p.184.

The emergency airway

Remember to keep calm!

The following questions should be answered first

- Will admission and observation be sufficient for the time being or do you need to intervene to secure the airway?
- If intervention is required do you need to do something now, or do you have time to wait for senior help to arrive?

Assessment

Assessment should follow three stages: Look, listen, and observation.

Look

- What is the patient's colour—are they blue?
- Is there any intercostal recession or tracheal tug?
- What is the patient's respiratory rate?

Listen

- Can the patient talk in sentences, phrases, words or not at all?
- Do they have stridor? Is it inspiratory, expiratory or mixed?
- What history can the patient give?

Observation

- Is the patient's respiratory rate climbing?
- Is the patient feverish?

- What is the patient's O_2 saturation? Is it falling?

Interventions

Consider the following options:

- Give the patient oxygen via a face mask or nasal prongs.
- ± broad spectrum antibiotics, such as Augmentin (check they are not allergic).
- Nebulized adrenaline (1ml of 1:1000 with 1ml saline).
- Heliox—this is a mixture of helium and oxygen that is less dense than air. It is easier to breathe, and it buys you time. during which you can take steps to stabilize the airway.

Endotracheal intubation

This should be the first line of intervention where possible. If it proves difficult or impossible, move on quickly.

Cricothyroidotomy (See Fig. 8.13.)

Any hollow tube can be inserted through the cricothyroid membrane into the airway. The Biro is famous for having being used in this way, but a wide bore cannula, 'mini-trac', or trans-tracheal ventilation needle are probably more appropriate! If you are unsure of your landmarks, fill a syringe with a little saline and use a needle to probe for the airway, with suction applied. A steady stream of bubbles will appear when the airway is entered.

Tracheostomy

A surgical hole is made in the trachea below the cords. In an emergency, a longitudinal incision is made in the midline of the neck and deepened to the trachea, dividing the thyroid. Brisk bleeding is to be expected. The blade is plunged into the airway and twisted sideways to hold the tracheal fenestration open. A cuffed tracheostomy or ET tube is inserted into the airway and the bleeding

thyroid is dealt with afterwards.

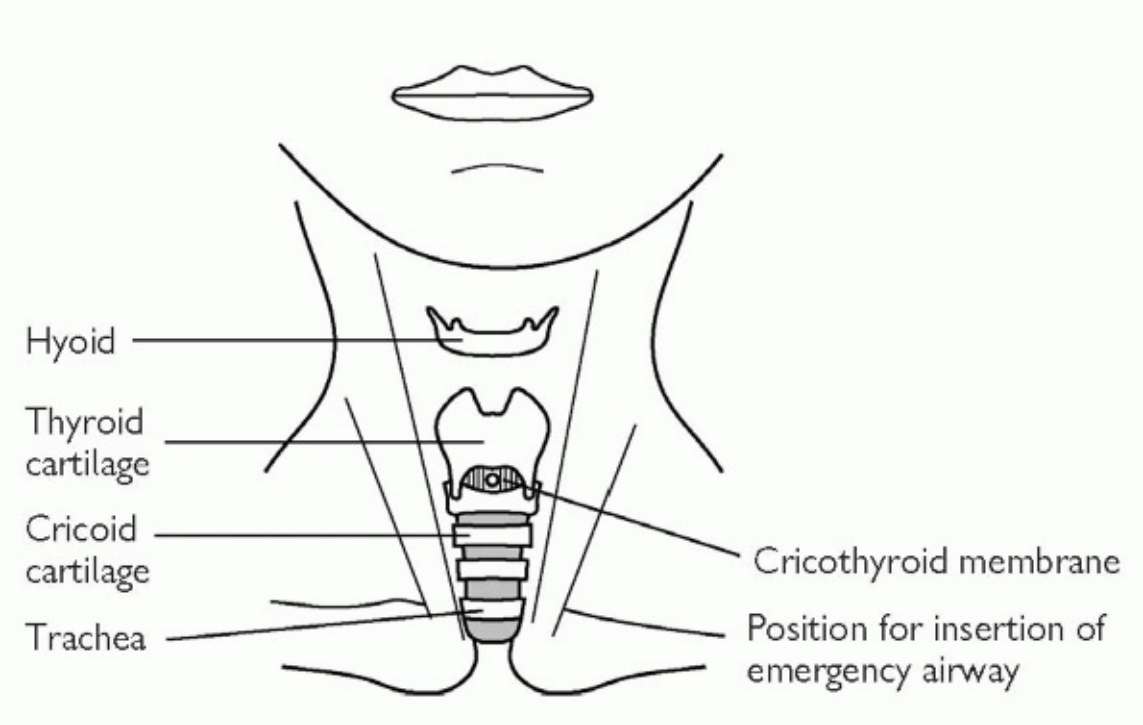


Fig. 8.13. Cricothyroidotomy

Tracheostomy care and trache tubes

Tracheostomy operation

In an elective tracheostomy, the incision is usually placed horizontally. The strap muscles are separated in the midline, and the thyroid isthmus is carefully divided and over sewn. The trachea is opened at the 3rd or 4th tracheal ring, and a window of tracheal cartilage is removed. A tracheostomy tube of the right size (three quarters of the diameter of the trachea) is inserted and the cuff is inflated.

Tracheostomy tubes (See Figs. 8.14. *and* 8.15.)

The choice of tubes may seem bewildering, the basic principles are as

follows:

Trache tubes with inner tubes

The inner tube is slightly longer than the outer, and crusting tends to occur at the distal end and on the inner tube. The inner tube can easily be removed, cleaned and replaced without removing the outer tube. Any patient who is likely to require a tracheostomy for more than 1 week is probably best fitted with a trache tube with inner.

Cuffed and non-cuffed tubes

The cuff, as in an endotrachial tube, is high volume and low pressure. This prevents damage to the tracheal wall. The cuff prevents fluid and saliva leaking around the tube and into the lungs. In addition, it makes an airtight seal between the tube and the trachea, so allowing for positive pressure ventilation. Most tubes are cuffed, but when a tracheostomy is in place long term, a non-cuffed tube may be used to prevent damage to the trachea.

Metal tubes

Metal tubes are non-cuffed and are used only for patients with permanent tracheostomies. They have the advantage of being inert and ‘speaking valves’ can be inserted.

Fenestrated tubes

Most tubes are non fenestrated. The advantage of a fenestrated tube (one with a hole in its side wall) is that air can pass through the fenestration, through the vocal cords and enable the patient to talk. The disadvantage is that saliva and liquids may penetrate through the fenestration, into the lower respiratory tree.

Post tracheostomy care

In the first few days after a tracheostomy operation, special care needs to be taken. The patient should be nursed by staff familiar with tracheostomy care. The patient should be given a pad and pencil with

which to communicate.

Precautions

- The tube should be secured with tapes, and knotted at the side of the neck until a tract is well established.
- The tapes should be tied with the neck slightly flexed.
- The cuff should not be over inflated, in order to prevent ischemic damage to the tracheal wall. Use a pressure gauge to check the cuff's pressure.
- The patient must be given humidification for at least the first 48 hours to reduce tracheal crusting.
- Regular suctioning of the airway to clear secretions may be needed.
- A spare tracheostomy tube and an introducer should be kept by the patient's bed in case of accidental displacement of the tube.
- Tracheal dilators should also be close by for the same reason.

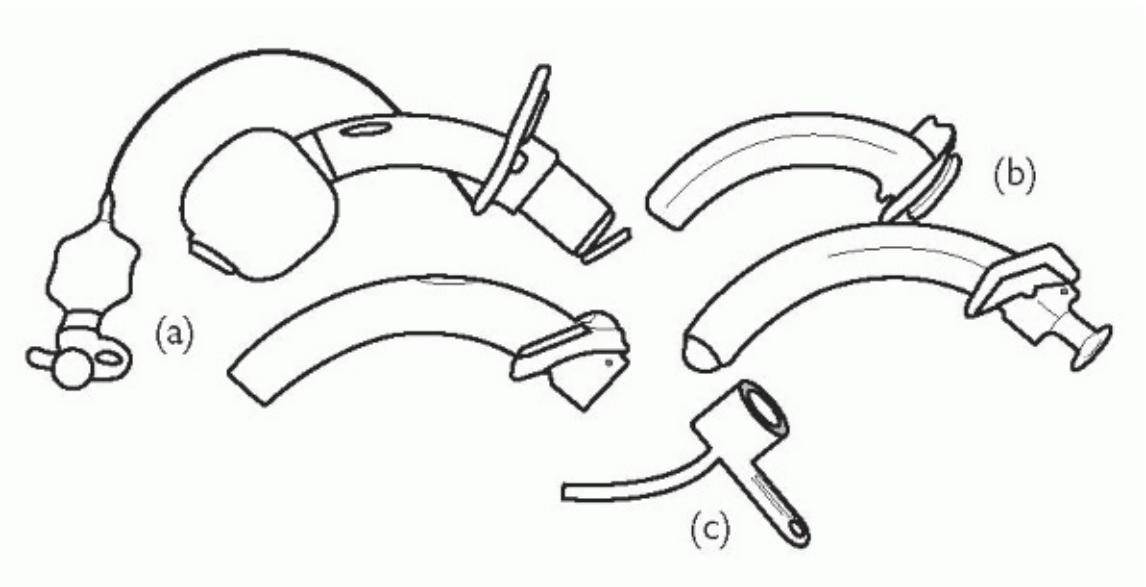


Fig. 8.14. Diagram of tracheostomy tubes. (a) Cuffed fenestrated tube; (b) non cuffed nonfenestrated tube; (c) paediatric tube

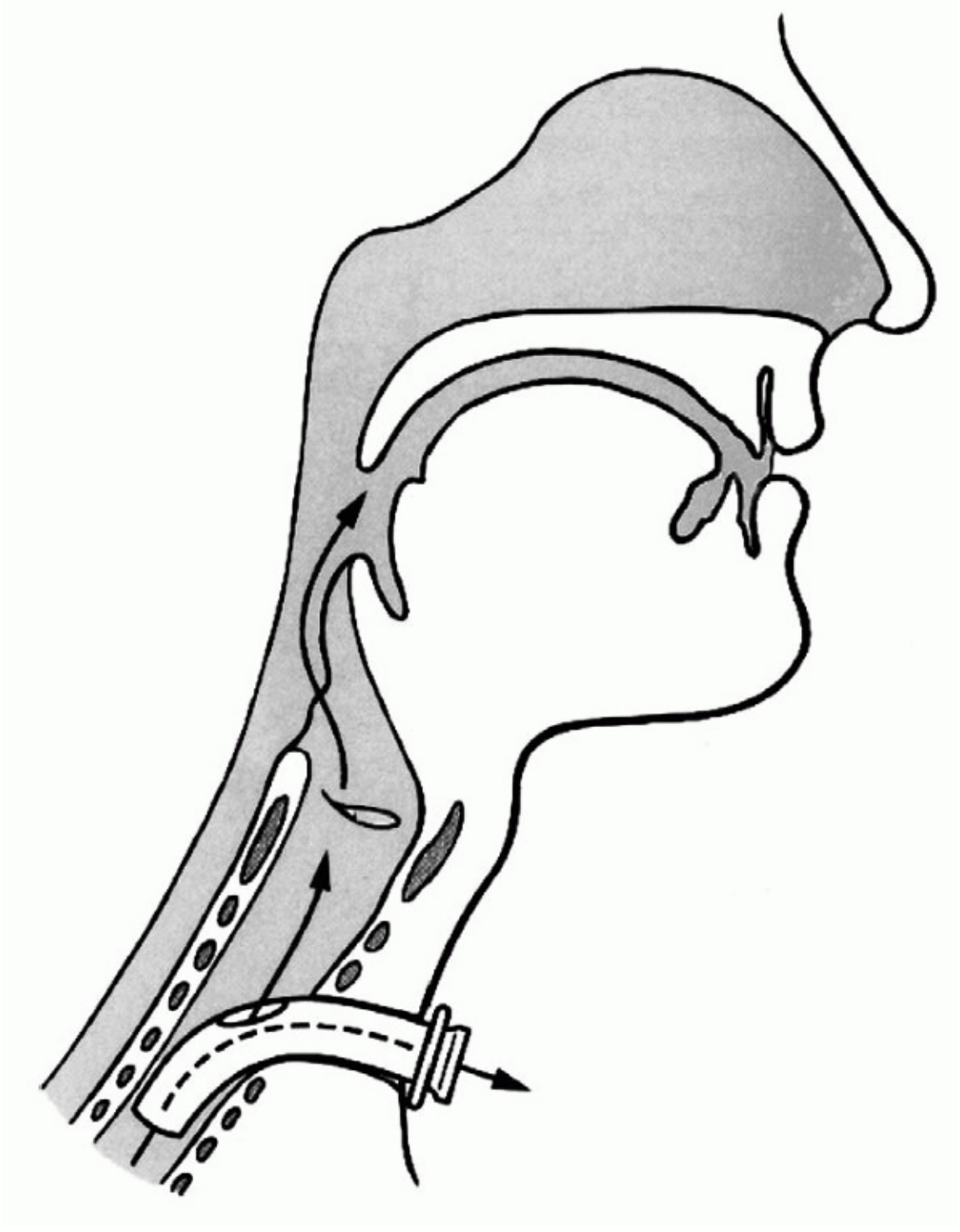


Fig. 8.15. Diagram of tracheostomy tube position (note fenestration)

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Chapter 9

The Oesophagus

Introduction

The oesophagus is a muscular tube connecting the pharynx to the stomach. In adults it is 25cm long. It starts at the level of C6, the cricoid cartilage and it ends at the gastro-oesophageal junction, or the diaphragm. The cricopharyngeus muscle acts as an upper oesophageal sphincter.

Congenital oesophageal conditions

These rare conditions may account for some cases of infant death, feeding problems or failure to thrive. They are frequently associated with other abnormalities of the larynx and/or the trachea. Complex surgery may be required and treatment should be given in specialist paediatric centres (see Fig. 9.1.).

Oesophageal foreign bodies

See p.418, ENT emergencies.

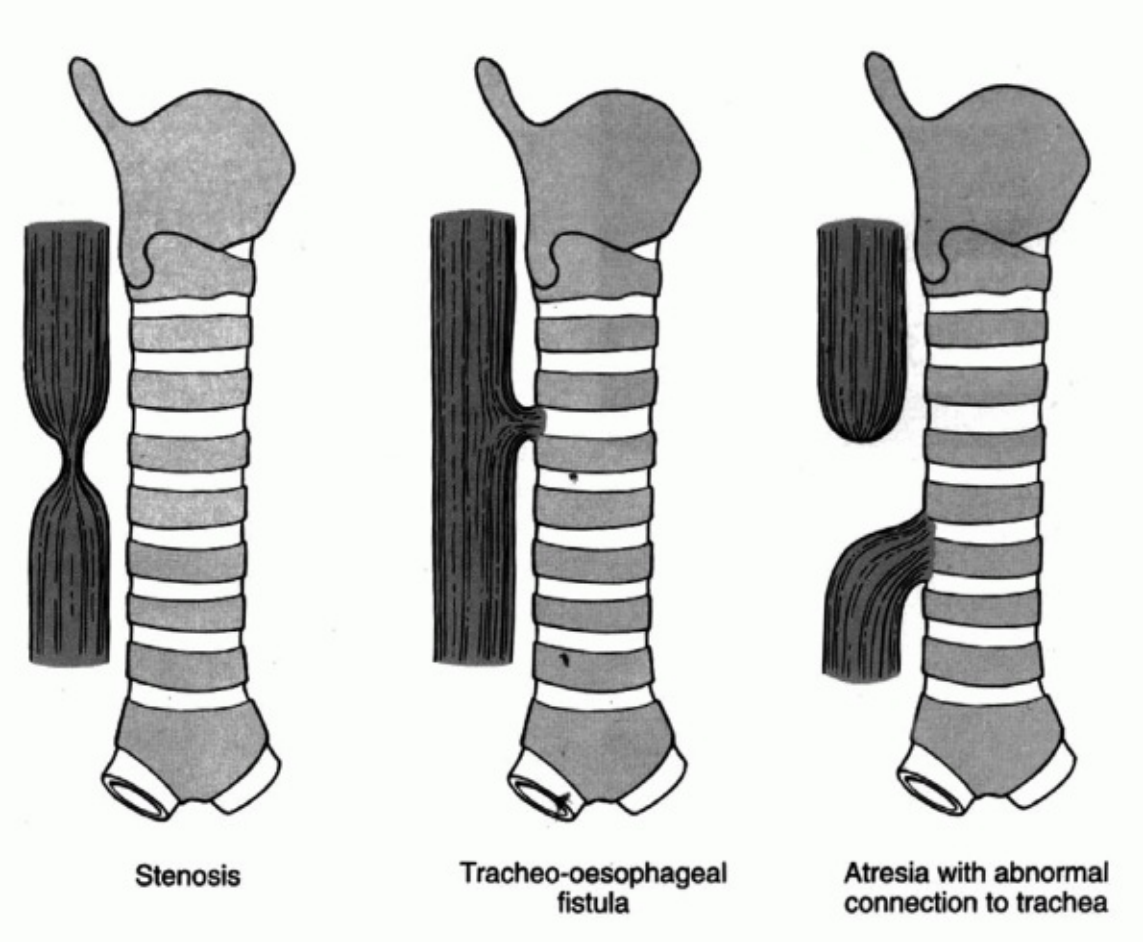


Fig. 9.1. Congenital oesophageal lesions

Globus

Globus pharyngeus/syndrome/hystercus are all terms which have been used to describe a common symptom complex of a ‘feeling of a lump in the throat (FOSIT) with no obvious cause’. It is probably caused by excess muscle tension in the pharyngeal musculature.

Features include

- Feeling of a lump in the throat
- Mucus collection in the throat which is rarely cleared

- Symptoms come and go
- Symptoms are usually in the midline
- The sensation is most noted when swallowing saliva rather than food or drink.
- Worse when stressed
- Worse when tired
- More common in women
- Associated with GORD.

Pharyngeal malignancy may present with similar symptoms so beware especially

- Unilateral globus
- Globus and Otalgia
- Globus and a neck lump
- Persistent/progressive symptoms.

Reassurance is usually all that is required to treat globus but barium swallow or endoscopy may be required to exclude malignant disease.

Gastro-oesophageal reflux disease (GORD) and hiatus hernia

Gastro-oesophageal reflux disease or GORD is a common condition. It is caused by changes in the oesophagus and the upper aero-digestive tract due to stomach acid reflux. It is often associated with an incompetent lower oesophageal sphincter or hiatus hernia.

Doctors and patients may not recognise that GORD, a stomach problem, could be responsible for their throat symptoms.

Classical symptoms of GORD

- Heartburn
- Discomfort behind the sternum

- Nausea
- Waterbrash—bitter fluid regurgitation
- Odynophagia—discomfort with hot or cold drinks.

ENT symptoms of GORD

- Mucus in the throat
- A feeling of a lump in the throat
- Hoarse voice
- Sore throat on waking.

Investigations

Patients with a history of reflux symptoms such as indigestion, heartburn and burping, may be treated with a therapeutic trial of a proton pump inhibitor (PPI) for 1 month.

If the GORD recurs, or if the treatment fails completely, patients should be referred for further investigation with an upper GI endoscopy, barium swallow ± 24 hour pH monitoring.

Conservative treatment

Patients should be advised on the following:

- Making dietary changes such as avoiding spicy food, fizzy drinks, and alcohol
- Trying to lose weight, if obesity is a problem
- To avoid going to bed within 3 hours of eating
- Stopping smoking
- Propping up the head of the bed on a couple of bricks or blocks.

Medical treatment

- Antacids such as Gaviscon

- H_2 antagonists such as Ranitidine
- Proton pump inhibitors such as Zoton.

Surgical treatment

Patients who are resistant to treatment may require anti reflux surgery, which can be performed laproscopically.

Neurological causes of swallowing problems

The mechanics of the upper aero-digestive tract are complex. Food, drink and saliva are directed towards the oesophagus, via the pyriform fossae, while air passes to the lower respiratory tract via the larynx.

The swallowing mechanism is a complex process involving both sensory and motor functions. It is initiated voluntarily but progresses as a dynamic reflex. A neurological condition which affect a patients motor or sensory function may also cause problems with swallowing.

Common neurological causes of swallowing problems

- CVA (stroke)
- Bulbar palsy
- Motor neurone disease
- Multiple sclerosis
- Tumours of the brain stem
- Cranial nerve lesions e.g. vagal neuroma
- Systemic neurological conditions e.g. myasthenia gravis.

Investigations

Assessment will involve taking a detailed swallowing history and asking the patient about any coughing or choking attacks, indicating aspiration.

A general neurological examination, and a specific cranial nerve examination, should be done. A CXR may show lower lobe collapse or consolidation if aspiration is present. A video swallow gives detailed information about the function of the oesophagus (such as delay, pooling, incoordination, spasm etc). A barium swallow test may be of limited value because it will only give static pictures.

Treatment

Wherever possible, the patient's underlying condition should be treated, but there will be times when treatment aims to control the symptoms. This could involve:

- Swallowing therapy as directed by a speech and language therapist.
- Dietary modification, such as thickened fluids.
- Percutaneous endoscopic gastrostomy (PEG)—a long-term feeding tube.
- Cricopharyngeal myotomy—surgical division of the upper oesophageal sphincter muscle.
- Vocal cord medialisation procedures—where a vocal cord paralysis causes aspiration.
- Tracheostomy (see p.185).
- Tracheal diversion or total laryngectomy (see p.175).

Post-cricoid web

This is a rare condition and its cause is unknown. An anterior web forms in the lumen at the junction of the pharynx and oesophagus, behind the cricoid cartilage.

Patterson Brown-Kelly (UK) and Plumber-Vinson (USA) both describe this condition—their names are frequently used in association with the syndrome.

A post-cricoid web is linked with iron deficiency anaemia, and it has the potential to become malignant. Because of this chance of malignancy, an endoscopy and a biopsy is recommended. It may also

cause dysphagia, and can be seen on a barium swallow.

The web may be dilated and/or disrupted with the help of an endoscope.

Achalasia

This is a rare condition where there is hypertonia in the lower oesophageal sphincter muscle. No increase in pressure is found at endoscopy. Achalasia appears to be due to an abnormality of the parasympathetic nerve supply within the muscles of the oesophagus.

Signs and symptoms

- Progressive dysphagia
- Regurgitation
- Weight loss.

Investigations

A barium swallow may suggest achalasia. An endoscopy is needed to exclude an oesophageal tumour, as this can produce similar X-ray appearance and symptoms.

Treatment

- Inhaled amyl nitrate prior to meals—causes relaxation of the sphincter
- Repeated dilatation—stretches the sphincter
- Cardioplasty—surgical enlargement of the sphincter
- Bypass procedures—surgical bypass of the obstruction.

Pharyngeal pouch

This is a type of hernia or pulsion diverticulum, which affects the junction of the pharynx and oesophagus. Elderly males are most often affected.

It is believed to arise as a result of incoordination of the swallowing mechanism leading to an increased intra-luminal pressure above the closed upper oesophageal sphincter. As a result of this pressure, the pharyngeal mucosa herniates through an anatomical area of weakness, known as Khillian's dehiscencethis—lies between the two heads of the inferior constrictor muscle (see Fig. 9.2.).

Signs and symptoms

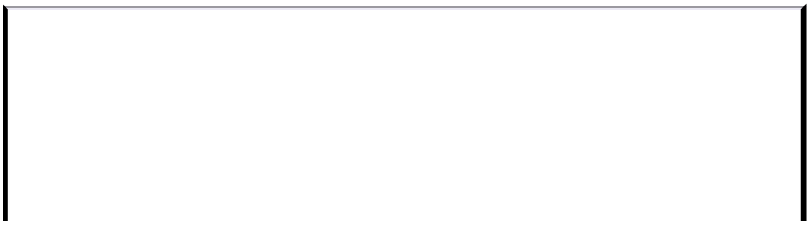
- Dysphagia
- Regurgitation of undigested food
- Halitosis
- Gurgling noises in the neck
- A lump in the neck
- Aspiration
- Pneumonia.

Investigations

A barium swallow will indicate the diagnosis. A rigid endoscopy must follow to exclude the rare finding of a carcinoma within the pouch. This is sometimes the result of long term stasis of its contents.

Treatment

Treatment is only necessary if the patient is symptomatic. Endoscopic stapling of the wall which divides the pouch from the oesophagus is the current treatment of choice. Excision, inversion and suspension of the pouch have been described and are reserved as second line treatments.



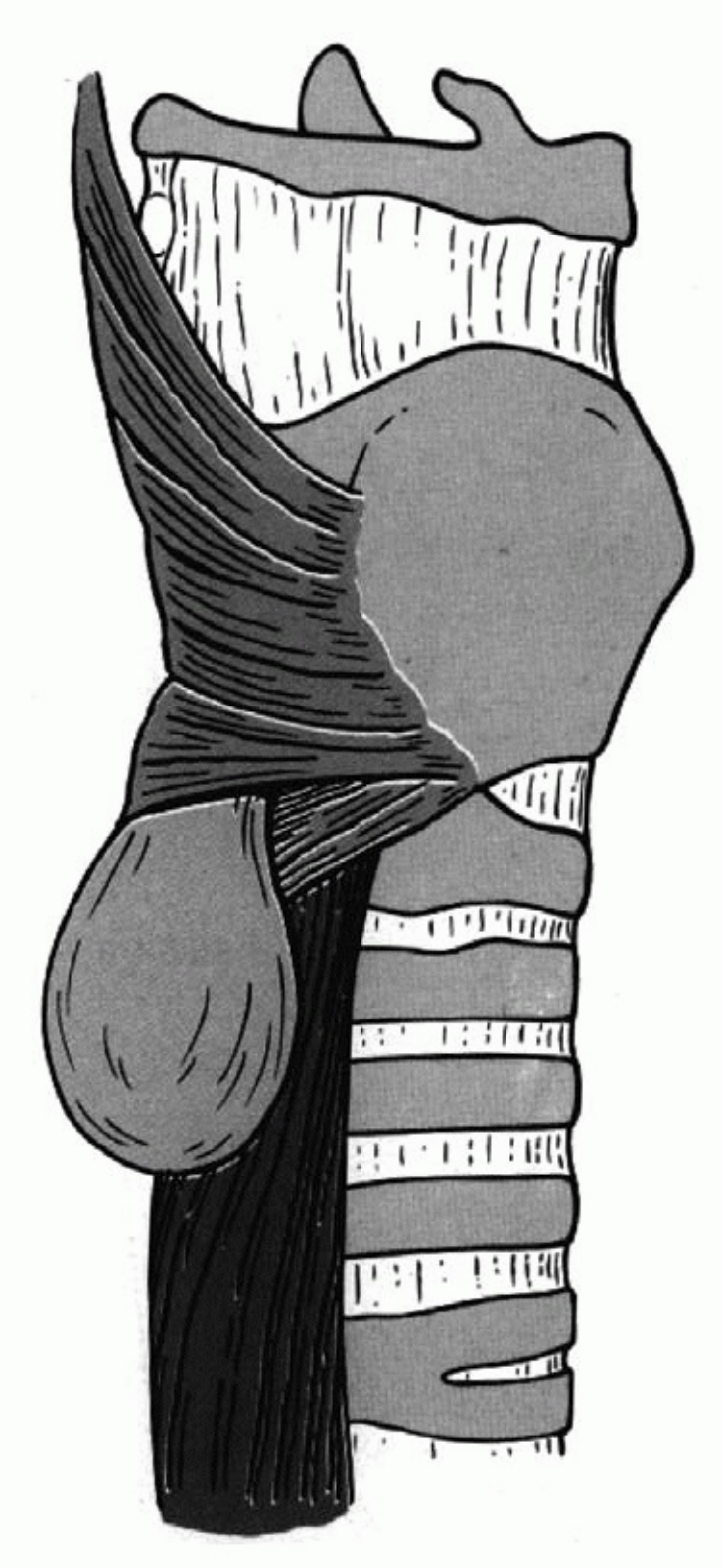


Fig. 9.2. Pharyngeal pouch

Oesophageal tumours

Benign oesophageal tumours are rare and arise from the local tissue elements e.g. leiomyoma, adenoma, lipoma.

Malignant oesophagal tumours

The risk factors for a malignant oesophagal tumour include smoking, a high alcohol intake, achalasia, and anaemia. 80% of malignant tumours occur in males over 60 years old. Primary carcinomas are the most common. These carcinomas are squamous and adenocarcinoma. Adenocarcinoma most frequently occur in the lower third of the oesophagus.

The signs and symptoms of a malignant tumour may include weight loss, pain in the throat and/or epigastrium, and progressive dysphagia.

Investigations

- Barium swallow—may show a narrowing or mucosal abnormality suggesting a malignant tumour.
- Endoscopy and biopsy—will confirm the diagnosis.
- CT scan of the chest and abdomen—to assess the extra-mucosal extent and metastatic spread.

Treatment

- The best chance of a cure is with surgical excision where possible. This may be given with pre-op chemotherapy, and post-op radiotherapy.
- After the excision, the resulting oesophageal defect will be reconstructed, either with either a stomach pull up, free jejunal grafting, or a myocutaneous flap (see Fig. 9.3.).

Where a cure is not possible, palliation may be achieved via:

- Radiotherapy
- Laser debulking of the mass
- Endoscopic stenting
- PEG tube for long-term feeding.

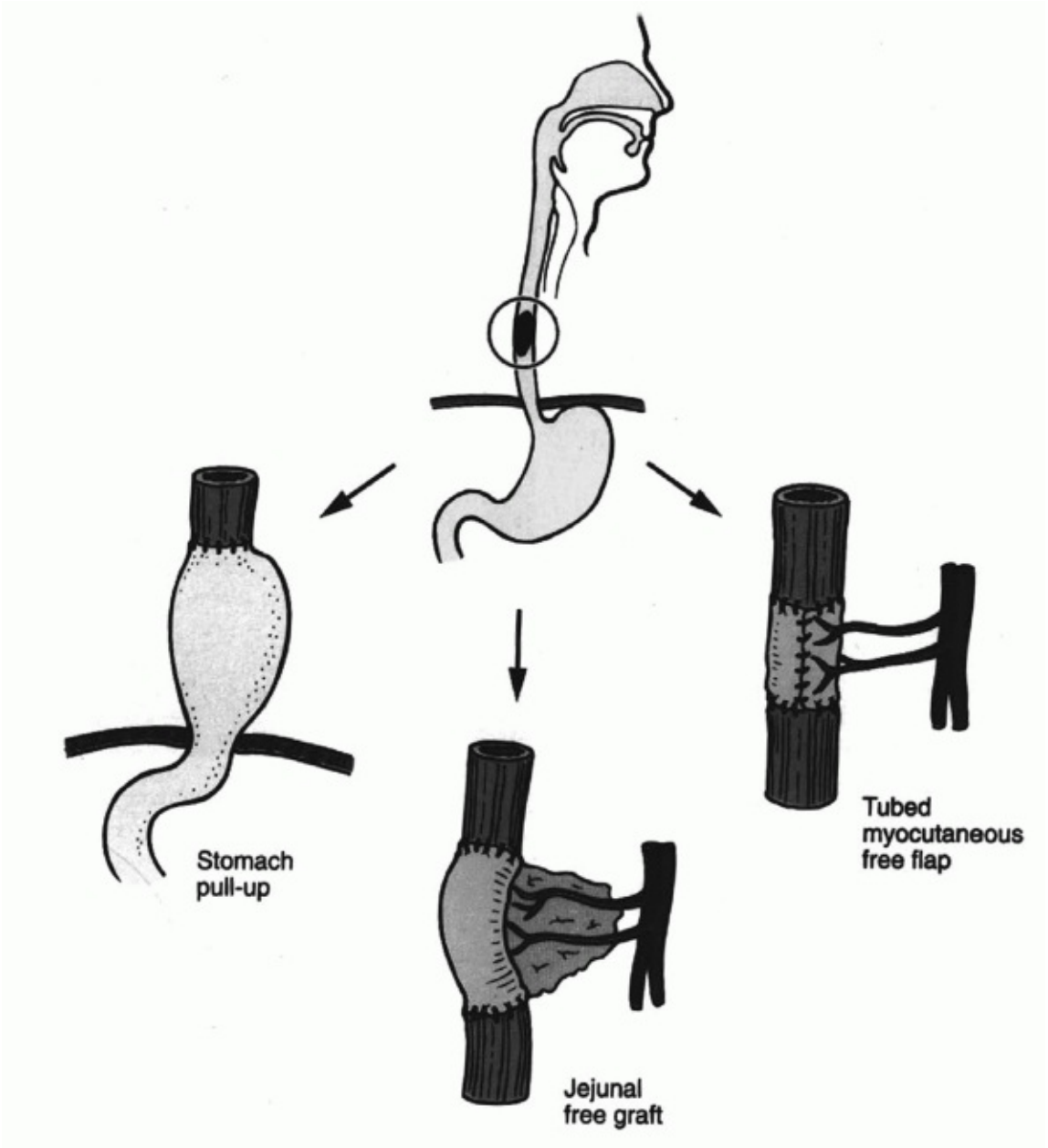


Fig. 9.3. Reconstruction

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Chapter 10

The Neck

Anatomy of the neck

Surface anatomy

Many of the important structures in the neck can be seen or felt on examination These are:

- The mastoid process (a)
- The clavicular heads (b)
- The sternomastoid muscle (c)
- Trachea (d)
- Cricoid cartilage (e)
- Cricothyroid membrane (f)
- Thyroid prominence (g)
- Hyoid bone (h)
- Carotid bifurcation (i)
- Thyroid gland (j)
- Parotid gland (k)
- Submandibular gland (l)
- Jugulodigastric lymph node (m).

Use Fig. 10.1. opposite to identify the above structures on yourself. It is particularly important to quickly identify the cricothyroid membrane in order to be able to perform an emergency cricothyroidotomy (see p.184).

Triangles of the neck

The anterior and posterior triangles of the neck are often referred to in clinical practice and are useful descriptive terms. These triangles maybe subdivided as shown in Fig. 10.2a., but the usefulness of the subdivisions is questionable. (This is not to say that an enthusiastic examiner would not be prepared to quiz you on them!)

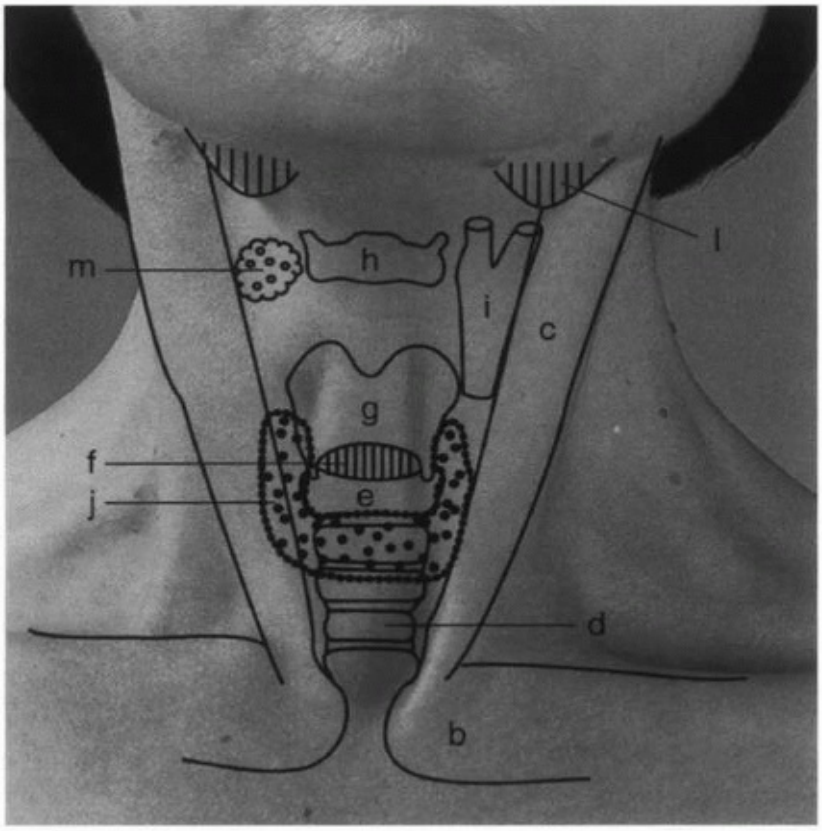
Deep anatomy

The neck is divided into anatomical compartments by strong fascial layers (see Fig. 10.2b.).

- ***The posterior compartment***—contains the skeletal muscles of the cervical spine
- ***The anterior compartment***—contains additional fascial envelopes containing these important structures:
  - The pretracheal fascia encloses the thyroid gland and binds it to the trachea
  - The carotid sheath encloses the carotid, internal jugular and vagus nerve.

Between these fascial planes lie the parapharyngeal space and the retropharyngeal space. These spaces are clinically relevant because they may become involved in and allow the spread of deep seated infections or malignancy.

(a)



(b)

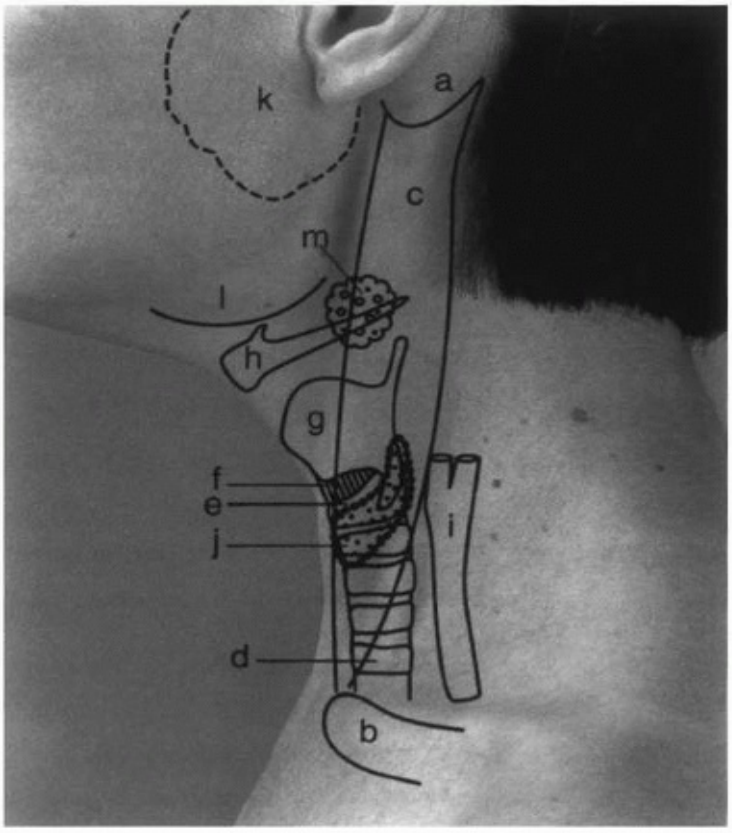


Fig. 10.1. Surface anatomy of the neck

Lymph node levels

The classification of lymph node levels in the neck are commonly referred to in clinical practice and it is important to have an understanding of them. (See Fig. 10.3)

Most lymph drainage from the aero-digestive tract is through the deep cervical chain which runs along the internal jugular vein deep to the sternomastoid muscle. It has been discovered that particular anatomical sites drain reliably to particular groups of lymph nodes.

A nodal level system has been devised in order to simplify the discussion of lymph nodes and to ensure that we are all talking the same language. Essentially this is a naming system which gives a number or level to groups of lymph nodes in a particular area. See Fig. 10.3., which is a diagram of the lymph node levels in the neck.

This nodal level system is of particular importance when considering the lymphatic spread of ENT cancers. The first group of nodes which a cancer involves is called the first echelon nodal level. For example, the first echelon nodes for tonsil cancer are level 3, from here other nodal levels may be affected, usually levels 2 and 4.

Cancers in other sites may metastasize in different patterns, for example the first echelon nodes from nasopharyngeal cancer tends to be level 5. This concept and model has led to the development of selective neck dissections i.e., supra-oma-hyoid neck dissections (see p.221).

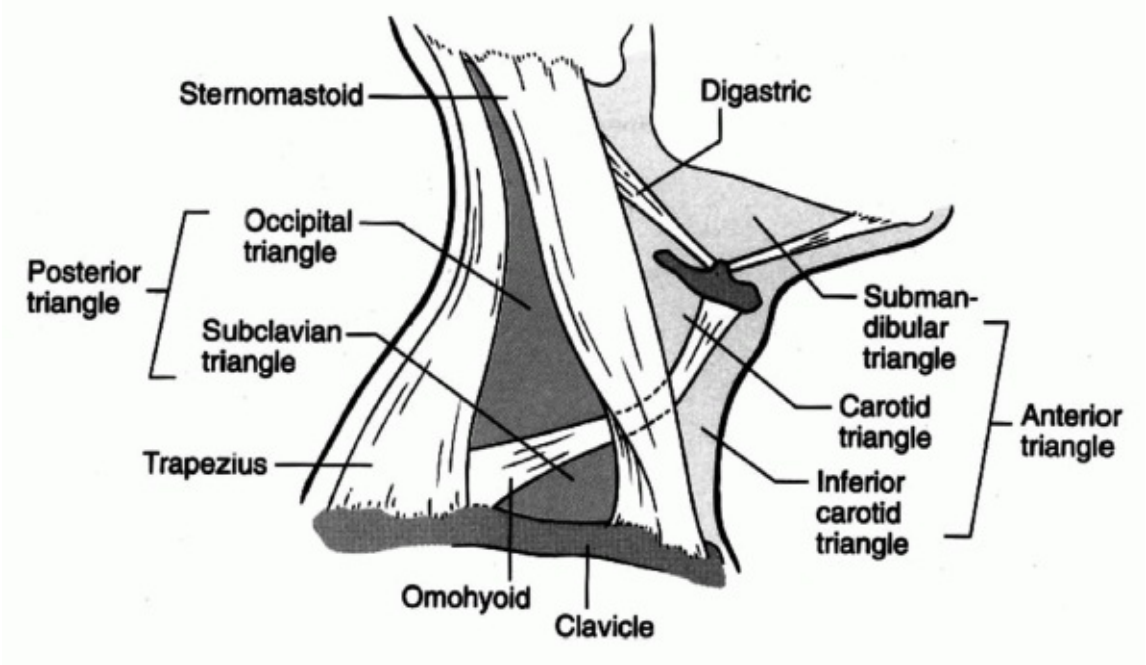


Fig. 10.2a. Triangles of the neck

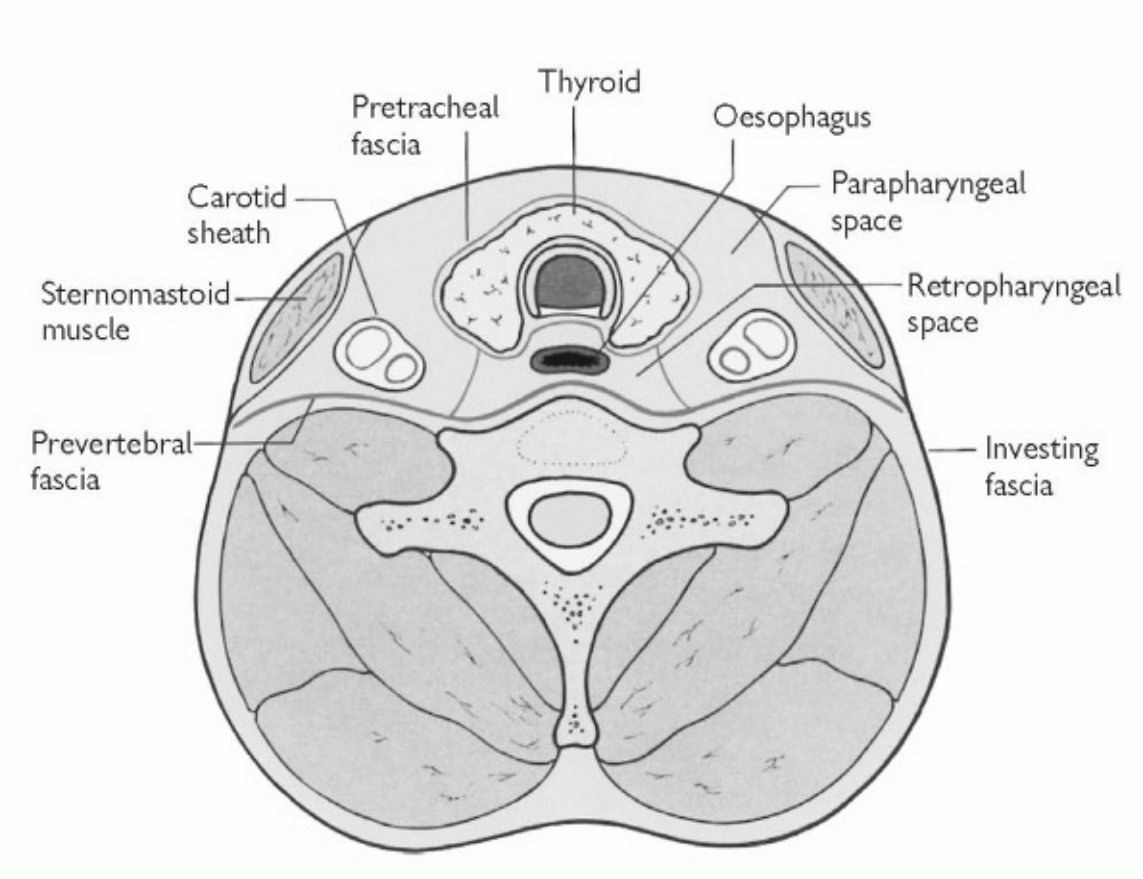


Fig. 10.2b. Fascial layers and spaces of the neck

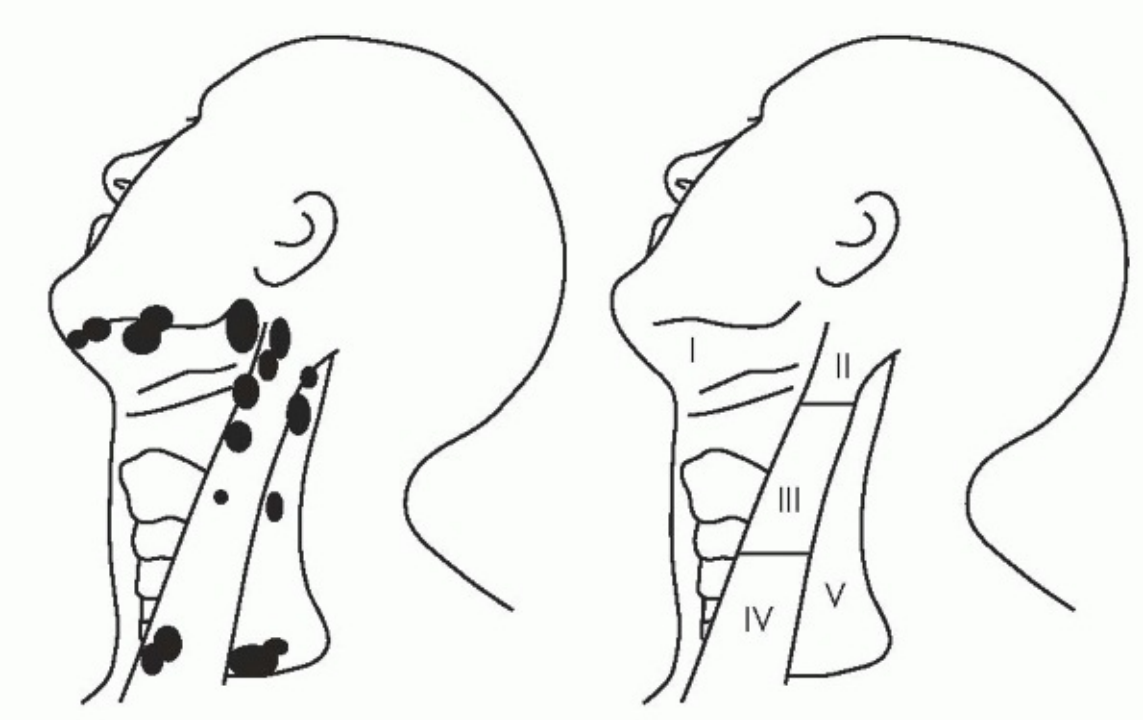


Fig. 10.3. Lymph node levels in the neck

Investigation of neck lumps

Neck lumps are common. All patients with a neck lump must have an ENT examination in order to exclude a malignancy.

A full history should be taken including duration, change in size, smoking history, pain (including referred otalgia), and any inter-current illness.

A neck lump should be thoroughly examined and the following aspects noted: site, size, shape, texture (smooth or lobulated), position (midline or central), solid or cystic, single or multiple, tender, attached to deep structures, movement on swallowing, movement on tongue protrusion, pulsatile (see p.39, Fig. 2.14.).

In addition to the above, a full ENT examination should be given.

Investigations

- **Fine needle aspiration cytology (FNAC)**: is the single most important diagnostic test. It is like a blood test but involves taking cells from the lump rather than blood from a vein, There is no danger of seeding malignant cells if the appropriate method is used (see p.408, How to perform an FNA).
- ***Blood tests***: Where the history suggests an inflammatory mass consider:
  - FBC
  - ESR/CRP
  - Paul-Bunnell/monospot/IM screen
  - Toxoplasma
  - HIV test.
- **Biopsy**: May be needed if a diagnosis cannot be made. Wherever possible this should be excisional rather than incisional. All but the most trivial neck masses should be biopsied under general anaesthetic.
- **Endoscopy**: Cancers of the silent sites of the head and neck may give little or no symptoms themselves but may metastasize to the neck, presenting as a neck mass. Examination of these sites is vital, usually under general anaesthetic i.e. a panendoscopy, which looks at all the food and breathing passages . The silent sites are:
  - Nasopharynx
  - Tongue base
  - Tonsil
  - Vallecula
  - Pirifom fossa
  - Post-cricoid region.
- Radiology

- CXR—for malignancy, TB, HIV.
- USS—for thyroid, salivary glands. This test is may be useful in children as it is non-invasive and easy, and it can distinguish between a solid or a cystic lump.
- Spiral CT—rapid acquisition is useful for mobile structures like the larynx and for those patients who find lying flat difficult.
- MRI—provides excellent soft tissue definition but is degraded by patient movement.

Congenital neck remnants

Thyroglossal cysts and fistulae

The thyroid gland develops at the base of the tongue and descends through the tissues of the neck to its final position overlying the trachea. It leaves a tract which runs from the foramen caecum of the tongue to the thyroid gland. This tract curves around the body of the hyoid bone. Thyroglossal cysts and fistulae arise from congenital abnormalities of this process. They are common in teenagers and in young adults.

Signs and symptoms

These may present as a midline, a para-median swelling or a discharging sinus. The cyst will rise on tongue protrusion, due to their attachment to the tongue base. (See Fig. 10.4. and Fig. 11.1, p.227.)

Treatment

Before surgical excision of the lesion, ensure that there is a normal functioning thyroid gland in its usual position in the neck. Surgical excision, known as Sistrunks operation, involves removing the lesion plus that tissue block between the lesion and the hyoid, plus the mid portion of the hyoid bone and any associated tract passing to the foramen caecum of the tongue. If there is a risk of recurrence, less radical procedures may be used.

Branchial cysts

These common, benign neck cysts usually appear before the age of 30. They occur at the junction of the upper third and lower two thirds of the sternomastoid muscle. They often arise following an URTI. They are thought to be caused by degeneration of epithelial inclusions in a lymph node.

Branchial cysts are usually asymptomatic, but they may become painful due to a secondary infection. A FNAC test yields a pus-like aspirate that is rich in cholesterol crystals. The treatment is surgical excision.

In patients over 50 years old, branchial cysts may be confused with metastatic deposits of SCC, which have undergone cystic degeneration. In this group, a FNAC suggesting a branchial cyst should be treated with suspicion.

Branchial fistulae

These arise as a defect in the fusion of branchial clefts. They present as a discharging skin sinus somewhere along the anterior border of the sternomastoid. There is an associated tract, which runs from the skin to the oropharynx, usually ending at the anterior pillar of the tonsil. This tract will pass between the external and internal carotid arteries, in close proximity to cranial nerves X, XI and XII. Surgical excision of the complete tract, including the tonsil may be necessary.

Dermoid Cysts

These cysts lie anywhere between the chin and the suprasternal notch. They arise from defects in fusion of the midline and are an example of ‘inclusion cysts’. They present as painless midline swellings and do not move on swallowing or tongue protrusion. Treatment is via surgical excision.

Cystic hygroma

These are rare, benign lymphangiomas found in neonates and infants.

They insinuate themselves between the tissues of the neck and may reach a massive size. They may cause compressive airway symptoms.

Treatment involves securing the airway where necessary, surgical excision can be staged, or injection with sclerosant.

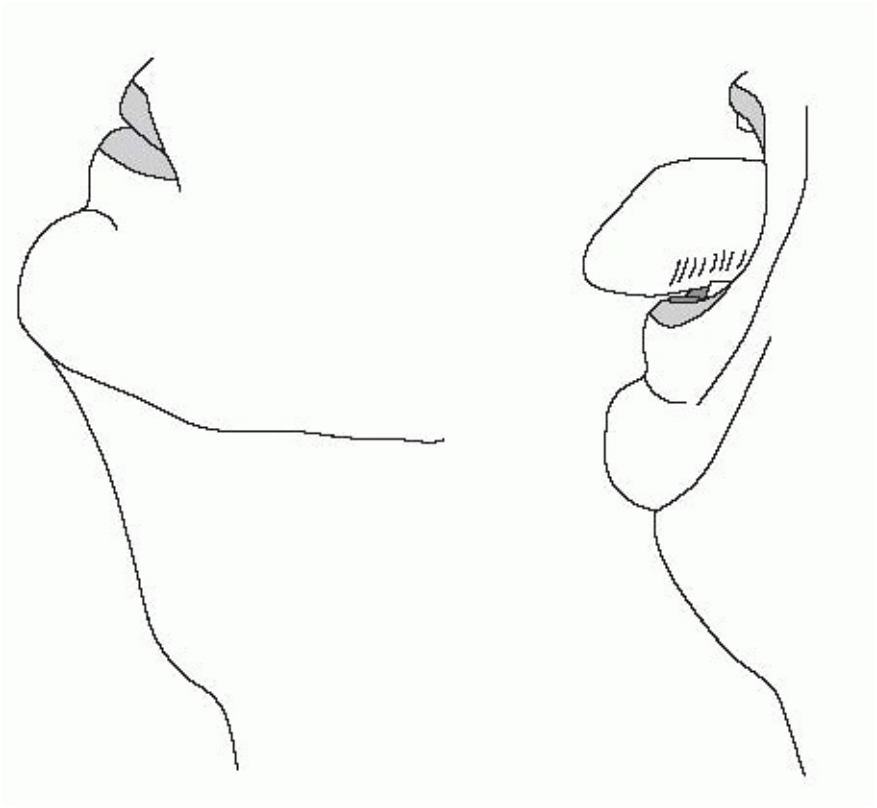


Fig. 10.4. Thyroglossal cysts rise on tongue protrusion

Neck infections

Parapharyngeal abscess

This is a deep seated infection of the parapharyngeal space (see p.208). It often results from a primary infection in the tonsil or is an extension from a parapharyngeal abscess (or quinsy) (see p.100). It is more common in children than in adults.

Signs and symptoms

Include pyrexia, neck swelling deep to sternomastoid muscle and a patient who seems unwell. There may be trismus, or a reduced range of neck movements. The tonsil and the lateral pharyngeal wall may be pushed medially. Airway compromise is a late and ominous sign.

If the diagnosis is in doubt, a CT scan will often distinguish between lymphadenitis and an abscess.

Treatment

This will involve a high dose of IV broadspectrum antibiotics (Augmentin), in addition to surgical drainage via a lateral neck approach.

Retropharyngeal abscess

This is a very rare infection of the retropharyngeal space. It is much more common in children and infants than in adults.

Signs and symptoms

An unwell patient, with pyrexia, often with preceding URTI or swallowing difficulty. There may be shortness of breath or stridor, or torticollis—due to prevertebral muscle irritation.

Treatment

A high dose of IV broad spectrum antibiotics (Augmentin). Where necessary the airway will be secured and surgical incision and drainage may be performed via the mouth.

Ludwig's angina

This is a rare infection of the submandibular space, it usually occurs as a result of dental infection. It is more common in adults than in children.

Signs and symptoms

These include pyrexia, drooling, trismus, airway compromise due to backward displacement of the tongue. There may be firm thickening of the tissues of the floor of mouth—best appreciated on bi-manual palpation

Treatment

High doses of IV broad spectrum antibiotics (Augmentin). Secure the airway (try a naso-pharyngeal airway first since this will often suffice, but were necessary consider a tracheostomy). Surgical incision is often unsatisfying since little pus may drain away.

Lymph node enlargement

- The majority of neck nodes in children are benign
- The majority of neck nodes in adults are malignant
- Neck nodes may be involved secondarily in an infection of any part of the ENT systems.

(See p.210 Lymph nodes.)

Infective lymphadenopathy

This secondary lymphadenopathy is extremely common in children. An example is jugulo-digastric node enlargement during or following tonsillitis. A single node or a group of nodes may be enlarged. There may be tenderness and symptoms related to the primary infection.

Specific infections presenting with lymph node enlargement (primary lymphadenopathy) include:

- Glandular fever
- TB
- Toxoplasmosis
- Brucellosis

- Cat-scratch fever
- HIV.

The diagnosis in these cases will often be made following the appropriate screening blood test and CXR. FNAC and even excision biopsy may be needed to exclude malignancy.

Neoplastic lymphadenopathy

Lymphoma

This is a primary malignant tumour of the lymphatic tissues.

Signs and symptoms

Multiple nodes of a rubbery consistency. The patient may or may not experience night sweats, weight loss, axillary or groin nodes, and lethargy.

Investigations

FNAC may be suspicious but an excision biopsy is often required to confirm the diagnosis and allow for sub typing. A CXR and/or a chest CT scan may be done, or, for staging, a CT scan of the abdomen or pelvis. Bone marrow may be needed for staging.

Treatment

May involve chemotherapy and/or radiotherapy. The patient may need a lymphoma multi-Disciplinary Team review.

Squamous cell carcinoma

This is a primary muco-cutaneous malignancy which commonly spreads to local lymph nodes. It can affect single or multiple nodes.

Signs and symptoms

The patient may have ENT-related symptoms such as a sore throat, a

hoarse voice or otalgia. The nodes may have a firm or hard consistency. The patient may have a history of smoking.

Investigations

These may include FNAC, ENT examination looking for ENT primary carcinoma, a CT or MRI scan of the neck, a CT scan of the chest and/or CXR (metatases), a liver USS (metastases), a panendoscopy and biopsy.

Where no ENT primary is seen on examination, a rigorous search should be done for a silent tumor. This will usually involve imaging as above with ipsilateral tonsillectomy, biopsy of the tongue base, post nasal space and piriform fossa as a minimum. (See Silent areas of ENT, p.212).

Treatment

This depends on the stage, the size and the site of the primary (see also Box 10.1). Options for treatment include:

Radiotherapy: this involves 4-6 weeks of daily treatment with a total dose of 50-60Gy.

Radical neck dissection: this involves removing the affected nodes as well as all the other nodal groups and lymph-bearing structures on that side of the neck. This includes the lymph nodes at level 1, 2, 3, 4, and 5, the internal jugular vein (IJV), the sternomastoid muscle, and the accessory nerve.

Modified radical neck dissection: this takes all the nodal levels (1, 2, 3, 4, 5) but preserves one or all of the IJV, the Sternomastoid and the accessory nerve.

Selective neck dissection: Instead of all the nodal groups being removed, those groups thought to be at most risk are selectively dissected and removed. All other structures are preserved.

Box 10.1 N staging of the neck

N1	A single node <3cm
N2a	A single node >3cm but <6cm

N2b	>1 ipsilateral node <6cm
N2c	Bilateral or contralateral nodes <6cm
N3	Any node >6cm

Neck Hernias

Pharyngeal pouch

See p.202.

Laryngocoele

This is caused by expansion of the saccule of the larynx. The saccule is a blind-ending sac arising from the anterior end of the laryngeal ventricle (p.163, Fig. 8.2.). A laryngocoele is an air-filled herniation of this structure. This can expand, and either remains within the laryngeal framework (internal laryngocoele), or part of it may extend outside the larynx (external laryngocoele). It escapes through a point of weakness in the thyrohyoid membrane.

There is a rare association with a laryngeal cancer of the saccule, and all patients should have this area examined and biopsied.

There is little evidence to support the supposition that this condition is more frequent in trumpet players and glass blowers.

Signs and symptoms

- Lump in the neck which may vary in size
- Hoarseness
- A feeling of something in the throat FOSIT
- Swallowing difficulties
- Airway problems

If the laryngocoele become infected and full of pus (laryngo-pyo-coele)

then they may rapidly increase in size and cause additional pain.

Authors: **Corbridge, Rogan; Steventon, Nicholas**
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Chapter 11

The Thyroid

Embryology and anatomy of the thyroid

Thyroid problems are frequent topics in both undergraduate and post graduate exams. It is therefore well worth investing some time in understanding the thyroid.

Embryology of the thyroid

The thyroid begins its development at the foramen caecum at the base of the tongue. The foramen caecum lies at the junction of the anterior two thirds and the posterior third of the tongue in the midline. (see Fig. 11.1.)

The thyroid descends through the tissues of the neck and comes to rest overlying the trachea. This descent leaves a tract behind it—this can be the source of pathology in later life (e.g. thyroglossal cysts—see Chapter 10, p.214)

Anatomy of the thyroid

The thyroid gland is surrounded by pre-tracheal fascia and is bound tightly to the trachea and to the larynx. This means the gland moves upwards during swallowing. The recurrent laryngeal nerves (branches of the vagus) lie very close to the posterior aspect of the thyroid lobes. These nerves have ascended from the mediastinum in the tracheo-oesophageal grooves and they are at risk in thyroid operations. They

may become involved in thyroid malignancy—in cases of malignancy a patient will most often present with a weak and breathy hoarse voice.

The thyroid gland has a very rich blood supply—trauma or surgery to the gland can lead to impressive haemorrhage into the neck.

The parathyroid glands—important in calcium metabolism—lie embedded on the posterior aspect of the thyroid lobes.

Box 11.1 Key points—thyroid related swellings

- Thyroid masses move on swallowing
- Thyroglossal cysts move on tongue protrusion (see p.214).

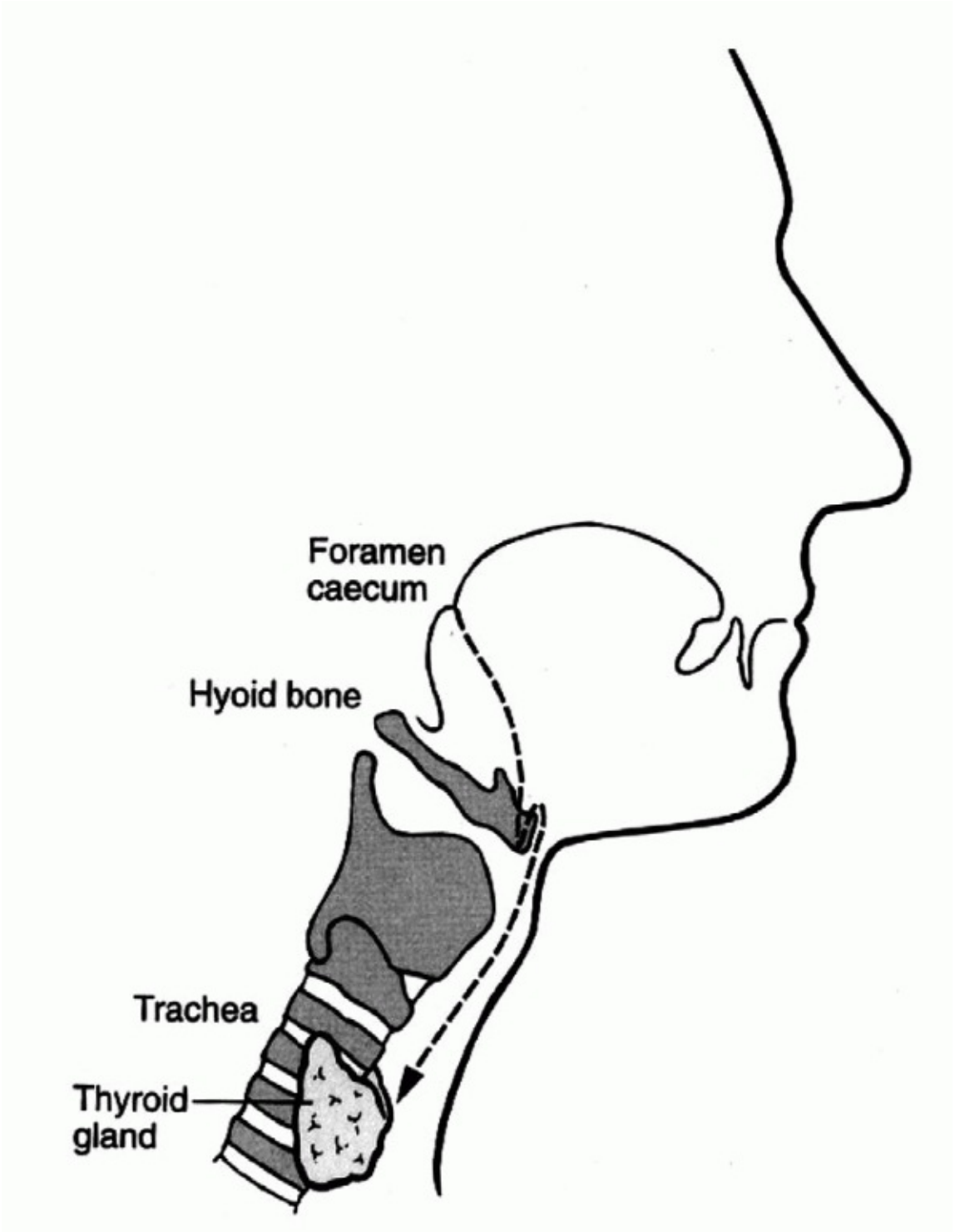


Fig. 11.1. Embryology of the thyroid gland

Thyroid enlargement (goitre)

Goitre simply means an enlargement of the thyroid gland. It is not in itself a diagnosis. Both physiological and pathological conditions may cause a goitre.

Simple goitre

This is a diffuse enlargement of the thyroid and may result from iodine deficiency. Diffuse enlargement of the gland also occurs in Graves' disease.

Multinodular goitre

This benign goitre is the commonest thyroid problem. It is caused by episodic periods of thyroid hypo-function and subsequent thyroid stimulating hormone hyper secretion which leads to hyperplasia of the gland. This is followed by involution of the gland. Prolonged periods of hyperplasia and involution are thought to be responsible for the nodular enlargement of the gland found in a multi nodular goitre.

A finding of a single nodular enlargement of the thyroid raises the question of malignancy. This should be managed as described (see Fig. 11.2.).

Treatment

A partial thyroidectomy may be necessary but only in a patient with one or all of the following signs:

- Pressure symptoms in the neck
- Dysphagia
- Airway compression
- Cosmetic deformity.

Graves' disease

This is an auto-immune condition where antibodies are produced which

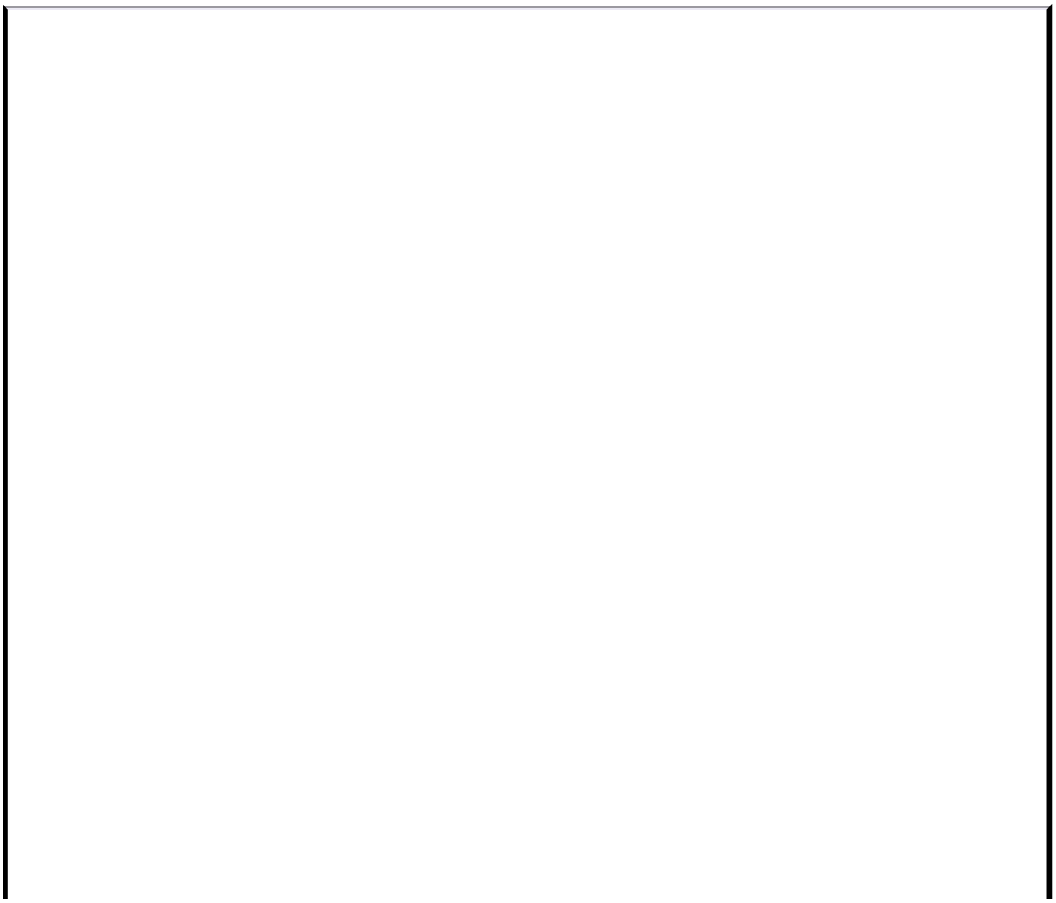
mimic the effect of TSH. A hyperthyroid state develops and there is often a smooth goitre. The patient's eye signs may be most impressive, (the actor Marti Feldman had this condition). See p.232 for eye signs in Graves' disease.

Treatment

Hormonal manipulation with carbimazole. Surgery to correct the proptosis may be achieved via a trans-nasal orbital decompression. Here, the medial wall of the bony orbit is removed to allow the orbital contents to herniate into the nasal cavity.

Hashimoto's thyroiditis

This is an auto immune condition where there is often hyperthyroidism and many patients develop a goitre. Thyroxine replacements may be necessary. Patients with this condition have an increased risk of developing a thyroid lymphoma.



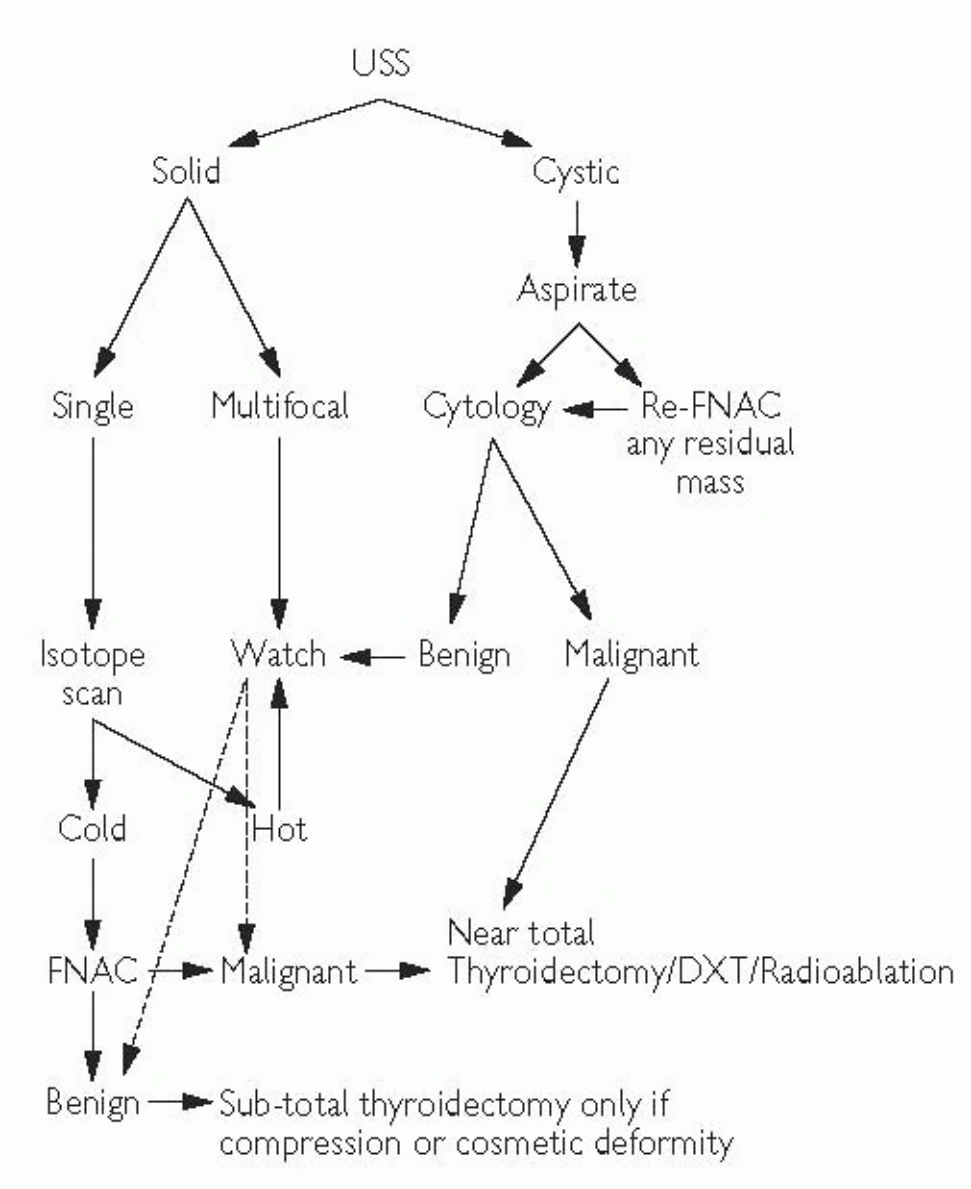


Fig. 11.2. Management of a thyroid lump

Thyroid neoplasia

Thyroid tumours may arise from either the follicular cells or the supporting cells found in the normal gland. They are quite common and each of these tumours has its own particular characteristics (see

Fig. 11.3.). Papillary and follicular adenocarcinomas are frequently referred to as differentiated thyroid tumours.

Follicular cell neoplasms

- Papillary adenocarcinoma
- Follicular adenocarcinoma
- Anaplastic adenocarcinoma

Supporting cell neoplasms

- Medullary carcinoma

Papillary adenocarcinoma

These usually affect adults age 40-50 years. There are usually multiple tumours within the gland. 60% of affected patients have involved neck nodes.

If the disease is limited to the gland, 90% of patients will survive 10 years or more. If the disease has spread to involve the neck nodes, 60% of patients will survive 10 years or more.

Treatment: Involves a near total thyroidectomy. Plus a neck dissection where there are involved nodes. Post operative radio-iodine may be given to ablate any viable thyroid tissue or tumour left behind after the surgery. After surgery, patients will need life-long thyroid replacement at TSH suppressing doses.

Follicular adenocarcinoma

It usually affects adults age 50-60 years. There is a well defined capsule enclosing the tumour and it spreads via the bloodstream. Up to 30% of patients will have distant metastases at presentation and hence to prognosis is less good than in papillary adenocarcinoma.

Treatment: As above for papillary adenocarcinoma.

Anaplastic thyroid carcinoma

This condition occurs in adults over 70 years of age, and is more common in women. It involves rapid enlargement of the thyroid gland and pain. The patient will have airway, voice or swallowing problems due to direct involvement of the trachea, larynx or oesophagus.

The prognosis is very poor. 92% of patients with this condition will die within 1 year, even with treatment.

Medullary carcinoma

This arises from the parafollicular C cells (or calcitonin secreting cells). The patient's level of serum calicitonin is raised and their serum calcium level remains normal. Neck metastases are present in up to 30% of patients.

Treatment: Involves a near total thyroidectomy and radiotherapy.

Benign thyroid adenoma

These can be functioning or non functioning:

Functioning adenomas

They produce thyroxine and will take up iodine and technetium. They appear bright or ‘hot’ on isotope scanning. Symptoms of thyrotoxicosis may develop. They are rarely malignant.

Treatment is usually medical via thyroid suppressing drugs, but may be treated surgically via excision. Radiotherapy and ablation may be required.

Non-functioning adenomas

These adenomas do not take up iodine. They appear ‘cold’ on isotope scanning. 10-20% will be malignant. Treatment will be via a surgical excision.

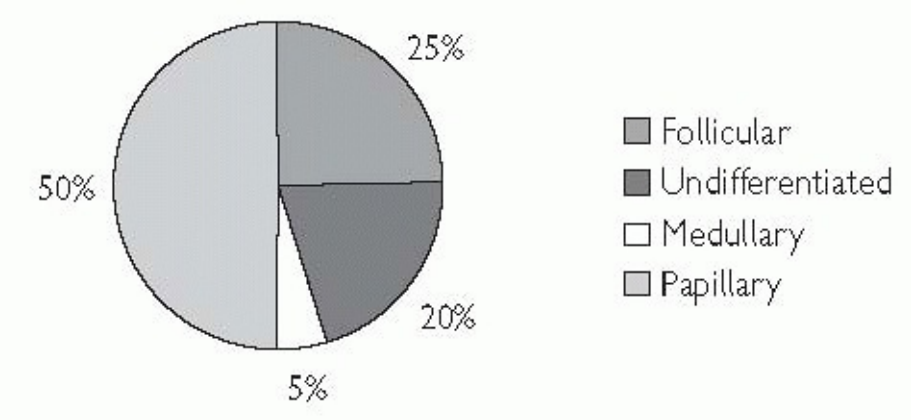


Fig. 11.3. Distribution of thyroid tumours

Thyroid investigations

Before performing any special investigations look for signs of abnormal thyroid function. Classic signs are given Table 11.1:

Table 11.1 Classic signs of abnormal thyroid function

Hyperthyroidism	Hypothyroidism
Irritability	Mental slowness
Heat intolerance	Cold intolerance
Insomnia	Hypersomnolence
Sweatiness	Dry skin
Amenorrhoea	Menorrhagia

Weight loss	Weight gain
Diarrhoea	Constipation
Palpitations	Bradycardia
Hyper-reflexia	Slow relaxing reflexes
Tremor	Loss of outer third of eyebrow
Atrial fibrillation.	Hoarse voice.

Graves' disease gives rise to particular ‘eye signs’. These include:

- Lid lag
- Exopthalmos
- Ophthalmoplegia
- Lid retraction
- Proptosis
- Chemosis.

Blood tests

Thyroid function tests (TFTs)

T4 (thyroxine) and T3 (tri-iodo-thyronine) are both bound to plasma proteins in the blood, but a proportion of both remains unbound and is physiologically active. Bear this in mind when interpreting these results in conditions where the free-to-bound ratio may be disturbed e.g. nephrotic syndrome or pregnancy.

Thyroid stimulating hormone (TSH) controls the production of thyroid hormones via a negative feedback mechanism. TSH is usually raised in

hypothyroidism and reduced in hyperthyroidism.

Thyroglobulin

This is the carrier protein for T4. Its levels can be measured directly in the blood. It is most frequently used as a tumour marker for the differentiated thyroid carcinomas.

Calcitonin

This is produced by the medullary C cells of the thyroid. Levels are raised in medullary thyroid carcinomas.

CEA—carcinoembryonic antigen

This is a tumour marker of medullary carcinoma of the thyroid.

Thyroid autoantibodies

Specific thyroid autoantibodies can be identified in Graves' disease and Hashimoto's thyroiditis.

Radioisotope scanning

Radio labelled iodine (^{123}I) or technetium (^{99}Tc) is given to the patient orally. Then radiology is used to assess its subsequent uptake into metabolically active thyroid tissue. A thyroid nodule may take up the marker—it will appear bright or ‘hot’, or it will fail to accumulate the marker—and it will appear ‘cold’.

- 80% of thyroid nodules are ‘cold’
- 10-20% of ‘cold’ nodules are malignant
- ‘Hot’ nodules are almost always benign.

Ultrasound (USS)

This is an excellent investigation to demonstrate the thyroid. It will readily distinguish solid and cystic masses inside the thyroid. Often, a USS will show that what appears clinically as a single nodule is in fact

part of a multinodular goitre.

MRI/CT scan

These scans may be helpful in determining the extent of a retrosternal swelling. They may confirm airway distortion or compression from a large goitre or they may demonstrate nodal metastases.

FNAC (fine needle aspiration cytology)

This test will differentiate solid from cystic masses and may diagnose malignancy. A residual mass noted after cyst aspiration should be tested again by FNA to exclude malignancy. It is difficult to distinguish between follicular adenoma and follicular carcinoma. This difference relies on demonstrating capsular invasion which is impossible on cytological features alone. Formal histology is usually required to confirm this diagnosis.

Treatment of thyroid conditions

Management of a thyroid lump

This is best shown diagrammatically, see the flow chart in Fig. 11.2., p.229.

Hormonal manipulation

Thyroxine: Patients experiencing hypothyroid states and after thyroidectomy may need to take thyroxine for life. Doses of thyroxine sufficient to suppress the TSH production are given in well differentiated thyroid cancers in order to reduce tumour growth since these tumours are also TSH driven.

Carbimazole or propylthirouracil: May be given in hyperthyroidism since these inhibit the formation of T3 and T4.

Radioactive ablation

Most well differentiated thyroid tumours will trap iodine. This ability

can be put to therapeutic effect by administering radioactive iodine. The patient is first rendered hypothyroid by thyroidectomy. The tumour cells then become hungry for iodine and as such will avidly take up the radioactive iodine to their own cytotoxic demise! Radio-iodine therapy can also be used to control a persistent hyperthyroid state.

Thyroid surgery

Thyroid surgery is generally safe and well tolerated by patients.

Hemithyroidectomy: This involves the removal of one thyroid lobe. It is indicated in benign thyroid conditions and as an excisional biopsy procedure where malignancy is suspected but not confirmed.

Total thyroidectomy: This is indicated in thyroid malignancy. Because it increases the risks to the recurrent laryngeal nerves and to the parathyroid glands, some surgeons will perform a near total thyroidectomy, leaving a small amount of thyroid tissue behind in the area of the recurrent laryngeal nerve.

Risks and complications of thyroid surgery

These are some of the most common and important risks of thyroid surgery:

Vocal cord palsy

This is due to recurrent laryngeal nerve damage. Patients will present with a weak and breathy voice. All patients should undergo a vocal cord check pre-operatively to document cord mobility before the procedure.

Bilateral vocal cord palsy

This will lead to medialisation of the vocal cords resulting in life threatening airway obstruction. Facilities for re-intubation and tracheostomy must be readily available.

Haematoma

Haematoma after thyroid surgery is another potentially serious complication. This is because the vascular nature of the thyroid can lead to a rapid accumulation of blood in the neck, resulting in compression of the airway. For this reason, all thyroidectomy patients should have stitch/clip removers at the bedside. If a patient's neck begins to swell rapidly after thyroid surgery, the wound should be re-opened (on the ward if necessary), the clot evacuated and the airway restored. Once the airway has been secured, the bleeding point can be found and controlled.

Hypocalcaemia

This should be anticipated whenever a total thyroidectomy has been performed. Daily calcium levels should be checked and the patient should be observed for the signs of hypocalcaemia such as:

- Tingling in the hands and feet
- Perioral paraesthesia
- Muscle cramps
- Carpopedal spasm—muscle spasms affecting the hands and feet
- Chvosteck's sign—facial spasm seen on tapping over the facial nerve in the region of the parotid
- Tetany—generalized muscle spasm.

As soon as hypocalcaemia is suspected give the patient IV calcium gluconate and start oral replacement therapy.

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Chapter 12

The External Ear

Structure and function

A working knowledge of the anatomy of the ear helps in documentation, correspondence and in describing sites of lesions and trauma over the telephone. The main anatomical points are shown in Figs. 12.1. and 12.2.

The external part of the ear consists of two parts:

- The pinna
- The external auditory canal (EAC).

The pinna collects sound waves and directs them into the external auditory canal. Its shape helps to localize sound direction and amplification. The EAC helps in transmitting sound waves to the eardrum or tympanic membrane.

The EAC has two parts:

- An outer cartilaginous part.
  - In adults, the cartilaginous canal slopes forward and downward.
  - In neonates and infants, the canal slopes forward.
  - The outer canal contains hairs and ceruminous glands that produce wax.
- An inner bony part.

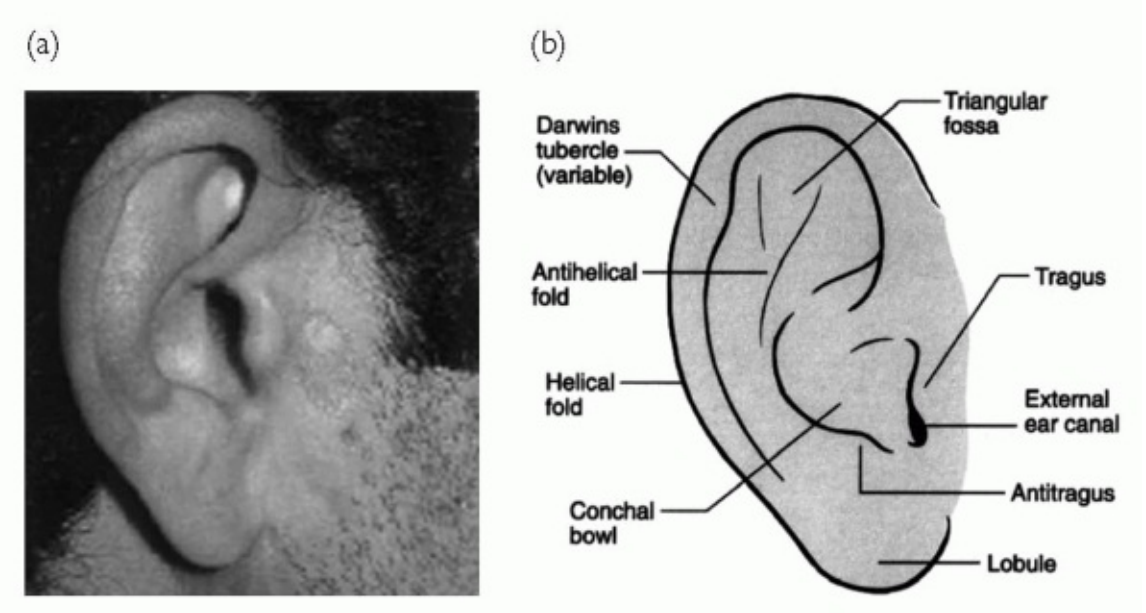


Fig. 12.1. Diagram of the Pinna

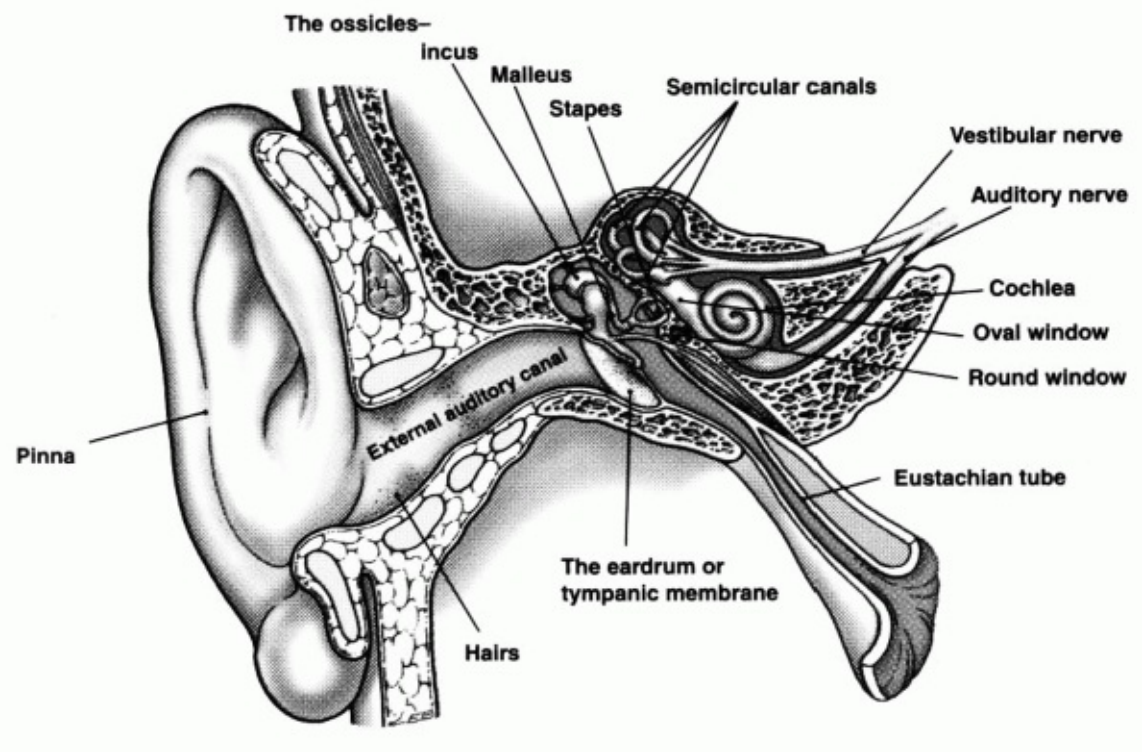


Fig. 12.2. Diagram of the EAC

Congenital abnormalities

Minor abnormalities of the ear are common, but often they do not come to medical attention.

Malformed pinna

The pinna develops from the six hillocks of His. Maldevelopment or failure to fuse, can produce obvious abnormalities of the ear. Malformed pinna are described as microtia or anotia. They may or may not be associated with middle or inner ear abnormalities. The various classifications are shown in Fig. 12.3.

Investigations

This includes documenting the defect, examining the EAC, and doing a hearing assessment. A CT scan to assess middle ear/ossicles/cochlea anatomy may also be done.

Treatment

- Where there are minor anatomical abnormalities, no treatment is given or hearing support is given as required.
- Where there is a major deformity or anotia, removal of the pinna may be considered. Consider a Bone Anchored Hearing Aid (BAHA) and abutments to attach an artificial pinna.

Skin tags

Skin tags are often detected at a neonatal baby check. They are often incidental. Investigations involve checking for normal EAC and screening hearing.

Preauricular sinus

This is a small dimple anterior to the tragus. It is usually detected at a baby check and is caused by the incomplete fusion of the hillocks of His. This preauricular dimple may be the external opening of a network of channels under the skin. Patients who present late may have a discharge from the punctum. Occasionally, repeated infections may require drainage.

Treatment

Where there is simple discharge treat with oral antibiotics such as Augmentin. Where there are repeated infections antibiotics may be given and surgical removal may be necessary (Fig. 12.4.).

Fig. 12.3. Diagram of Microtia grade III. Grading of Microtia: I Normal ear; II All pinna elements present but malformed; III Rudementary bar only; IV Anotia

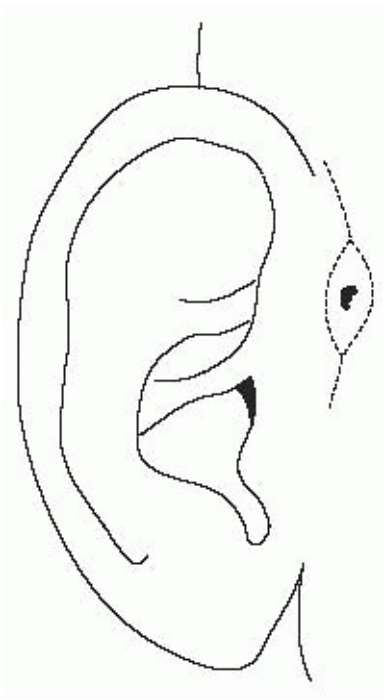


Fig. 12.4. Diagram of preauricular sinus

Infection of the pinna

This would present as a painful, hot, red ear.

Investigations

- Identify the cause of the infection. Is this a spreading infection from the EAC or is it a primary infection of the pinna?
- Identify whether it is an infection of the skin or does it involve cartilage? If the cartilage is infected there is severe tenderness on touching the pinna.
- Take a history and exclude trauma or an insect bite. Remember non-accidental injury in children. Diabetic or immunocompromised patients may have severe cellulitis of the pinna.

Treatment

- Where there is a localized infection—remove any cause such as piercing or an insect's sting. Give oral antibiotics such as Augmentin 625mg tds 1 week PO.
- Where there is cellulitis of the pinna—remove the cause and treat with IV antibiotics such as Cefuroxime 1.5g 8 hourly and Metronidazole 500mg tds IV 8 hourly until cellulitis resolves; for at least 24 hours followed by oral antibiotics for 1 week in total.
- Where there is perichondritis—remove the cause or treat otis externa if present. Treat with IV antibiotics such as Cefuroxime 1.5g 8hourly Metronidazole 500mg tds IV 8 hourly until cellulitis resolves; for at least 24 hours followed by oral antibiotics for 1 week in total.

Box 12.1 Piercings

- Trends in fashion dictate that piercings are often multiple and not in the lobule of the ear. Lobule piercings have less likelihood of infection as there is no cartilage in the lobule.
- Other piercings transfix the cartilage framework of the pinna. This can lead to infection and cellulitis of the pinna.

Trauma to the pinna

Assess the patient, bearing in mind that a blow to the ear is a head injury. Discover the force and mechanism of the injury. The site of the injury should be carefully documented with the help of a diagram or a photograph.

Any blunt trauma to the ear may cause a hearing loss or a traumatic perforation of the eardrum. Always examine the EAC drum and perform a simple bedside hearing assessment as follows:

- Examine the pinna and note the findings
- Examine the EAC
- Examine the tympanic membrane

- Perform tuning fork tests
- Perform free field testing of hearing
- Check patient's tetanus status.

Lacerations of the skin

These are simply repaired, using non absorbable sutures such as 5.0 Prolene. Apply local anaesthetic to the area, clean the wound, and use interrupted sutures. Pay careful attention to everting the edges and ensuring good opposition of the skin edges. Check the patient's tetanus status.

Lacerations involving the cartilage

- Clean wounds can be simply sutured in layers to include the cartilage.
- The cartilage is very painful to suture and a general anaesthetic (GA) may be required.
- Dirty wounds may need surgical debridement under before closure.
- All wounds require antibiotic cover such as Augmentin 625mg tds PO.

Haematoma of the pinna

This is a collection of blood between the perichondrium and the cartilage which leads to pressure necrosis of the cartilage. Subsequent deformity, infection and fibrosis with cartilage loss, leads to the typical ‘cauliflower ear’ of the rugby player.

Aspiration of the haematoma is difficult due to the thickness of the clot. It is better to incise the haematoma and suture, using bolsters to prevent reaccumulation (see Fig. 12.5.).

Treatment

- Local anaesthetic or GA
- Incision over haematoma

- Dental roll bolsters tied in place
- Removal of dressing after 5 days
- Oral antibiotics e.g. Augmentin 625mg tds 1 week PO.

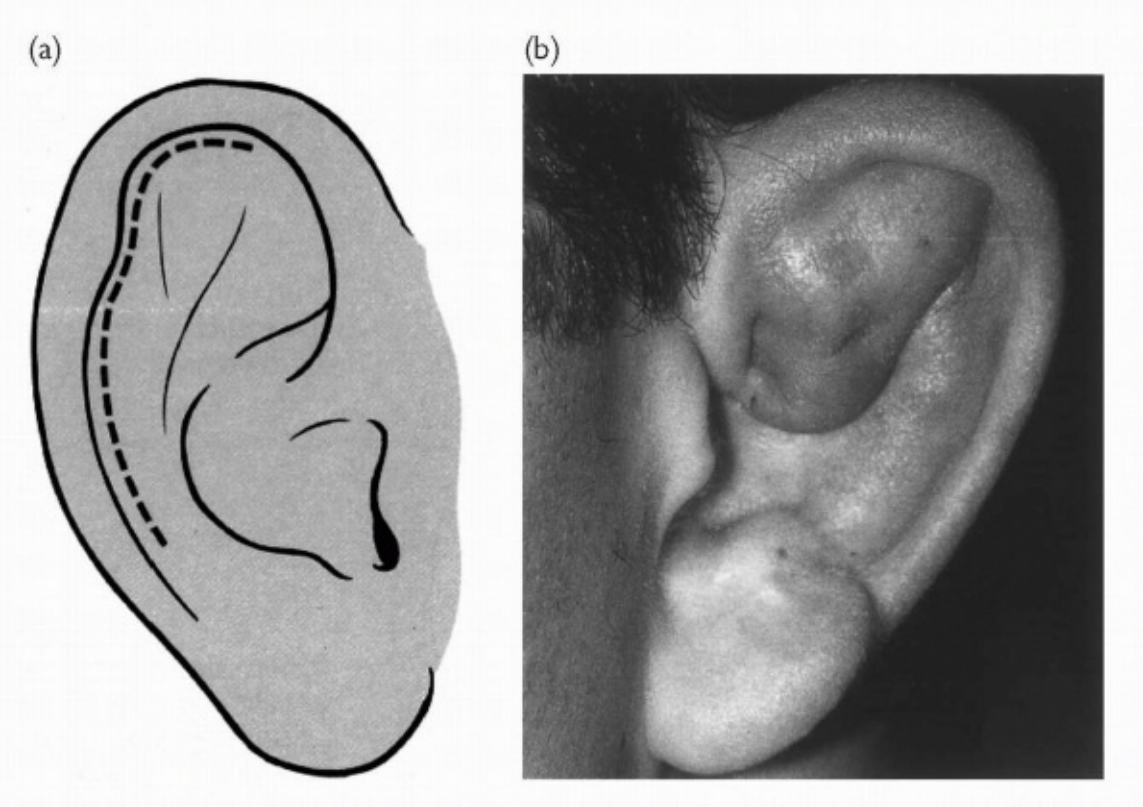


Fig. 12.5. Haematoma of pinna

Otitis externa

This common condition forms a large percentage of both the emergency and the routine workload of an ENT Department. Its presentation is varied and it produces a spectrum of disorders which are classified below.

Risk factors

- Swimmers and surfers
- Daily hairwashers
- Diabetics
- Psoriais sufferers
- People with an abnormal migration of keratin.

Clinical grading

- Is the pinna normal? if there is cellulitis, admission may be needed—severe OE
- What is the appearance of EAC after cleaning under microscope?
- Is the EAC normal diameter?—mild OE
- Is the EAC narrow but the tympanic membrane (TM) is still visible?—moderate OE
- Is the EAC narrow but the TM is not visible due to oedema?— severe OE
- Is there a furuncle in the EAC?
- Are there granulations in the floor of the EAC?—this may be necrotizing OE (see p.250)
- Test the patient's facial nerve function.

Treatment

All patients should keep ears water-free during treatment.

Mild OE

Presentation: scaly skin with some erythema.

- Use either 0.5% Hydrocortisone cream prn to be applied to the EAC.
- Or Betnovate scalp lotion.
- Or Earcalm Spray (contains acetic acid). Lowering of the pH changes the flora of the EAC.

- Regular aural toilet and avoid swimming.

Moderate OE

Presentation: painful, discharging smelly ears. Narrowed EAC with cream cheese-like discharge.

- Microsuction clearance.
- Swab for microscopy if there has been previous antibiotic treatment.
- Otowick if the EAC very narrow.
- Hygroscopic drops e.g. aluminium acetate.
- Change wick in 48 hours.
- Swab if no improvement. Consider combination therapy with antibiotic steroid drops depending on swab result and response to treatment.

Severe OE

Presentation: complete occlusion of the EAC or spreading pinna cellulitis.

- Microsuction clearance.
- Treat as moderate OE.
- If there is severe pain, it may be furunculosis. Lance boil with a needle or fine end of sucker. Add flucloxacillin 500mg qds PO to regime.
- If there is cellulitis, admission for IV antibiotics may be needed.
- Exclude the tympanic membrane during treatment.

Beware of allergy

Patients not responding to the appropriate therapy may be allergic to the constituents of the drops. Patch testing by a local dermatologist may help to elucidate this problem. Betnovate scalp lotion can be

useful as it has none of the excipients that can cause allergic reactions.

Necrotizing otitis externa

This is an uncommon, severe, bacterial ear infection where the infection spreads beyond the ear canal and into the surrounding bone. It was formerly known as malignant otitis externa, due to the mortality associated with the condition. It is usually seen in diabetics or immunocompromised patients. If you see a diabetic patient with otitis externa, consider this condition.

Signs and symptoms

- Otalgia out of proportion to the clinical appearance of the EAC.
- Granulation tissue in the floor of the EAC at the junction of the bony and cartilaginous parts of the canal.
- Microvascular disease predisposes to an osteomyelitis which spreads across the skull base. Cranial nerves VII and IX-XII may be affected. The opposite side of the skull base can be affected.
- Pseudomonas on culture.

Management

- Admit patient for assessment
- Take a full history
- Make a thorough ENT examination
- Check cranial nerves
- Perform an aural toilet
- Perform a biopsy of the ear canal under GA/LA to exclude malignancy (p.254)
- Do a CT scan to examine the appearance of the skull base and to stage the extent of the disease

- Give ciprofloxacin drops 2 drops bd
- Give oral ciprofloxacin 400mg bd PO
- Involve the infectious disease team for expert help
- Continue with drug therapy for 6-12 weeks
- Perform a surgical debridement only if the patient does not respond to treatment or if there is skull base extension.

Beware malignancy

If things fail to settle or if the condition progresses, don't forget there may be a possible malignant cause. An initial negative biopsy may be wrong. Consider further deep biopsy or cortical mastoidectomy for histology.

Malignancy of the pinna

- The pinna is a common site for malignant skin lesions to develop.
- The types of cancer are BCC, SCC and malignant melanoma.

Risk factors

- Sun exposure
- Previous skin cancers
- Chemical exposure
- Xeroderma pigmentosum.

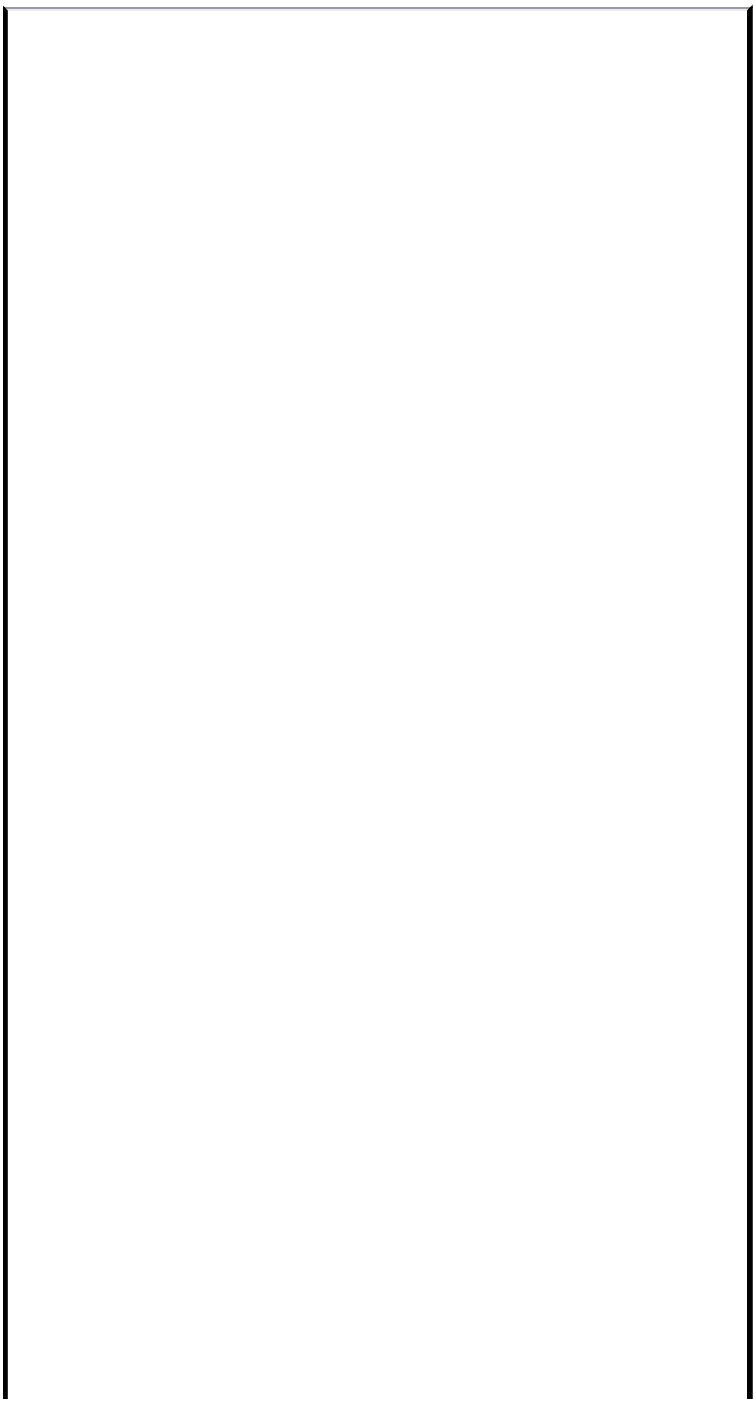
Investigations and treatment

It is sometimes possible to make a diagnosis based on clinical observation. Usually excision biopsy is the treament of choice. Histological examination can confirm the type of malignancy. Further wider excision with or without grafting can be undertaken.

Special reconstructions of the pinna

The unique appearance and structure of the pinna leads to several novel methods of reconstruction after tumour removal. These aim to preserve the structure of the pinna and its cosmetic appearance without compromising curative removal. See Fig. 12.6.

If there is gross cartilage involvement, it may be necessary to remove the pinna entirely.



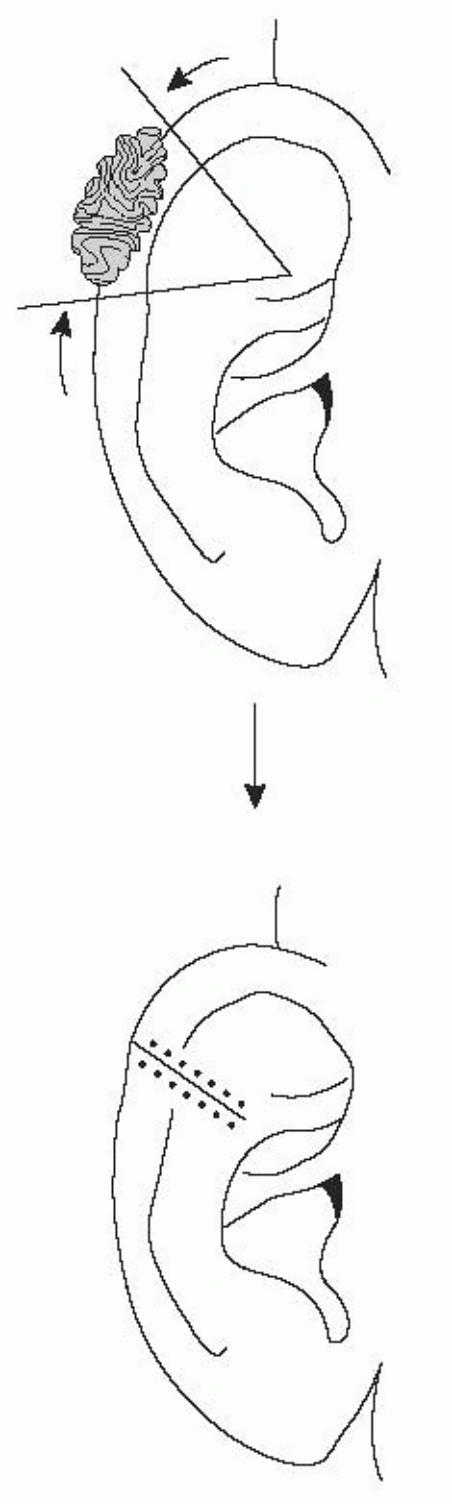


Fig. 12.6. Diagram of wedge resection

Malignancy of the external auditory canal

This is a rare condition, but it forms an important differential in dealing with infections or masses in the ear. When seen, it usually affects the elderly. SCC is the commonest type of malignancy.

Signs and symptoms

- A growth in the EAC
- An otitis externa
- Facial nerve palsy
- Other cranial nerve palsies such as IX-XII
- Lymph node metastases.

Management

- Treat any infection
- Biopsy the lesion
- CT scan to stage the lesion
- MRI scan to assess intracranial spread.

Treatment options

- Palliative
- Curative
- Radiotherapy
- Surgery.

Prognosis

The outlook for these patients is universally poor, with low 5 year survival rates.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 13

The Middle Ear

Structure and function

The middle ear is made up of the following structures (see p.241, Fig. 12.2):

- The tympanic membrane
- The ossicular chain
- Nerves of the middle ear
- Muscles of the middle ear
- Mastoid air cell system
- Eustachian tube.

The function of the middle ear is to transduce sound waves, amplify them and pass them to the cochlea. There is also an intrinsic mechanism to protect the ear from loud noise.

Tympanic membrane (Fig 13.1.)

This is composed of three layers. It is divided into the pars flaccida and the pars tensa by the anterior and posterior malleolar folds. These two parts differ in their strength. The pars tensa has collagen fibres arranged radially, and the flaccida has randomly arranged collagen and a high elastin content. The squamous epithelium grows from central drum germinal centres. It then migrates radially and out along the EAC

to be shed at the EAM.

The ossicular chain

The malleus, incus and stapes conduct and amplify sound. The difference in contact area between the drum and the malleus compared to the conact area between the stapes and the oval window leads to an amplification. When this is added to the mechanical advantage of the articulated ossicular chain, the total amplification is in the order of 22 times.

Nerves of the middle ear

The facial nerve has an intricate course. The chorda tympani is a branch of the facial nerve. The tympanic plexus has secretomotor fibres to the parotid.

Muscles of the middle ear

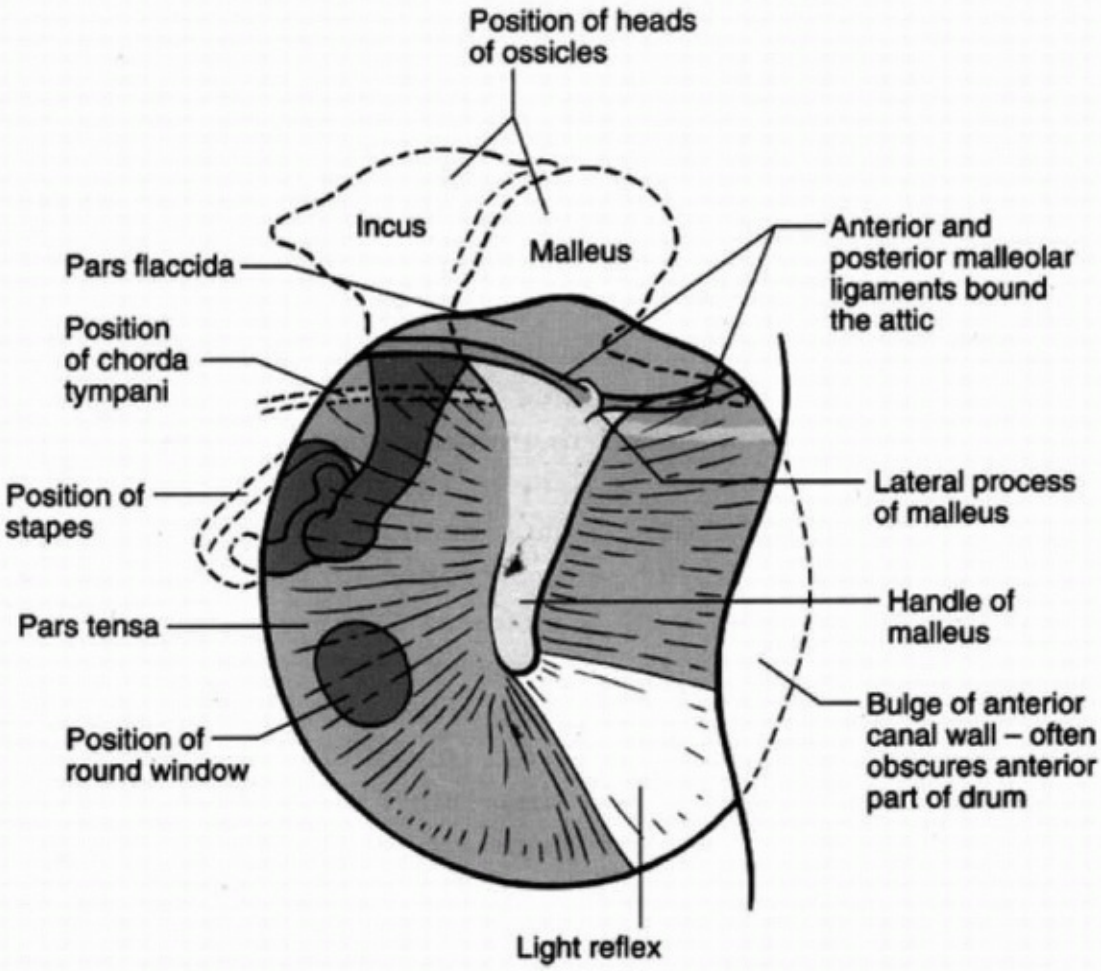
The stapedius contracts and damps the movement of stapes. The tensor tympani contracts and stabilises the movement of the malleus. Both these mechanisms protect the ear from loud noise.

Mastoid air cell system

This connects with the middle ear via the antrum. It provides a reservoir of air to balance vast changes in air pressure.

Eustachian tube

This tube provides a mechanism for the equalization of air pressure on either side of the eardrum.


Position of heads of ossicles
Incus
Malleus
Pars flaccida
Anterior and posterior malleolar ligaments bound the attic
Position of chorda tympani
Position of stapes
Lateral process of malleus
Handle of malleus
Pars tensa
Bulge of anterior canal wall – often obscures anterior part of drum
Position of round window
Light reflex

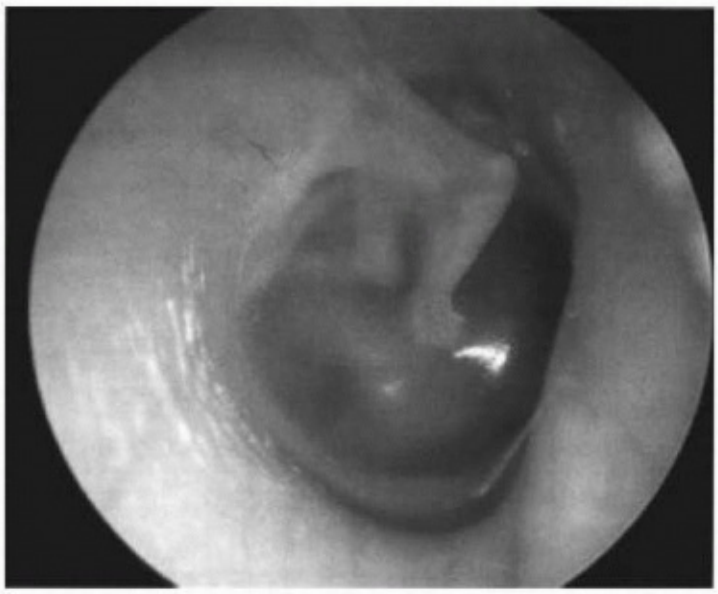


Fig. 13.1. Diagram of tympanic membrane showing quadrants and what lies behind

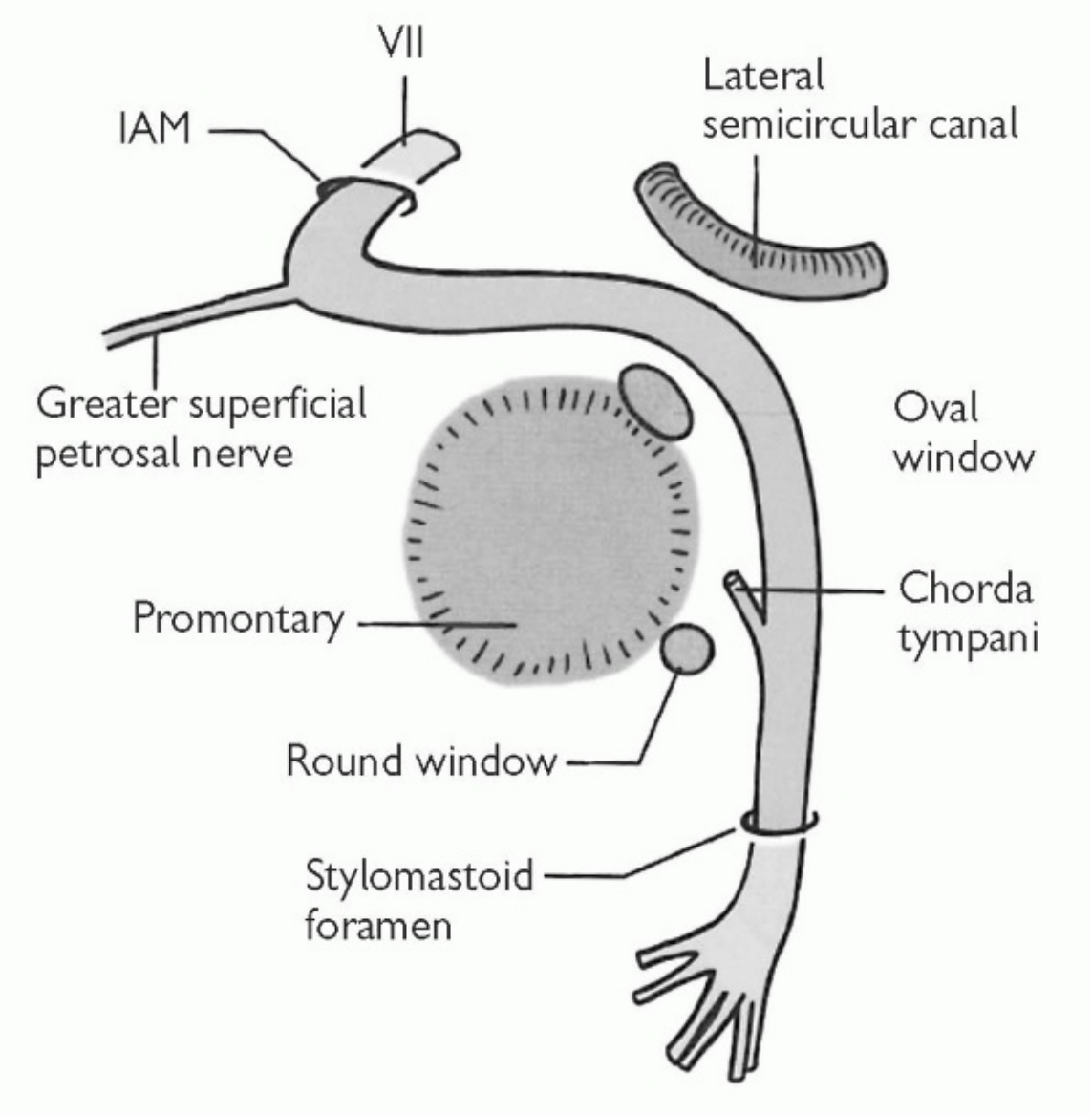


Fig. 13.2. The medial wall of the middle ear

Congenital abnormalities

Congenital abnormalities of the middle ear are rare in isolation. Middle ear abnormalities are more common in association with microtia (see p.242). Abnormalities of the ossicular chain can occur in isolation.

Signs and symptoms

Conductive hearing loss never more than 60dB.

Normal tympanogram/As type/Ad type.

Management

- Diagnosis is usually suggested on CT + confirmed by performing a tympanotomy.
- If the abnormality is in the better hearing ear, use a hearing aid. Surgery carries a higher risk of permanent sensorineural loss.
- If the abnormality is in the worse hearing ear then consider a tympanotomy after a trial of a hearing aid.

Acute otitis media

This is a very common condition (see Fig. 13.3.). Almost everyone will suffer with acute otitis media during their lifetime. Signs and symptoms may include a preceding URTI, severe and progressive otalgia, or a discharge—this is usually associated with a resolution of the otalgia. A diagnosis is made by taking a history, examining the tympanic membrane and taking the patient's temperature.

Treatment for acute otitis media is controversial. Systematic review suggests treatment with analgesia only. However, these reviews may have included a high proportion of viral ear infections where antibiotics would not be expected to be useful.

Management

- Give analgesia in all cases.
- Give oral antibiotics for one week such as Augmentin po.
- Discharge may continue for 1 week.
- When infection has resolved always check the tympanic membrane is normal.

Recurrent infections of the middle ear

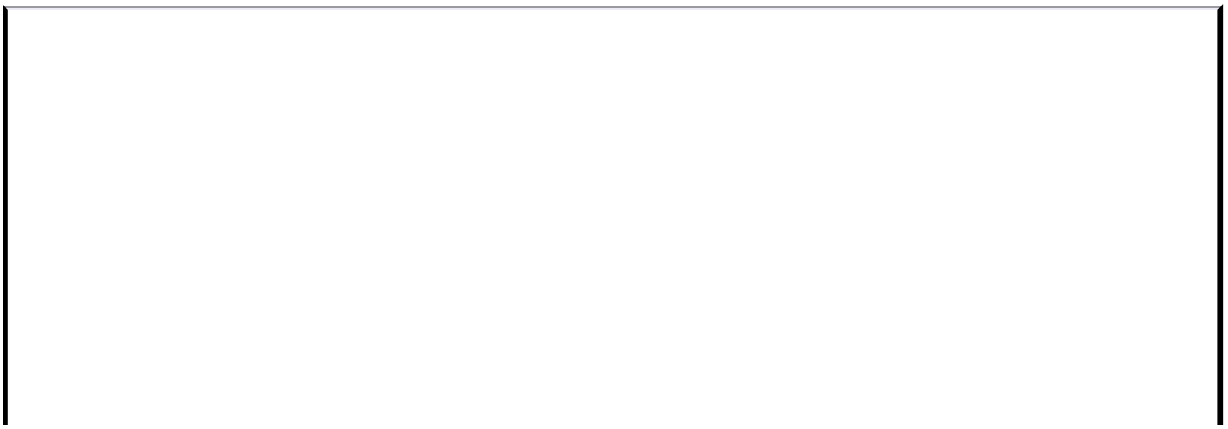
These must be differentiated from one persisting infection. Treat any acute infection actively as above. If the patient has more than five infections in six months, then consider alternative treatment.

Treatment

- Medical—consider prophylactic trimethoprin syrup po.
- Surgical—if there is effusion or glue ear consider grommet insertion ± adenoidectomy.
- All treatment needs monitoring—use an infection diary to record episodes of infection pre and post treatment.

Caution

Acute otitis media is often misdiagnosed. Children with nocturnal earache often have glue/eustachian tube dysfunction. The tympanic membrane may be red or injected but there is no discharge and the pain resolves very quickly upon waking.



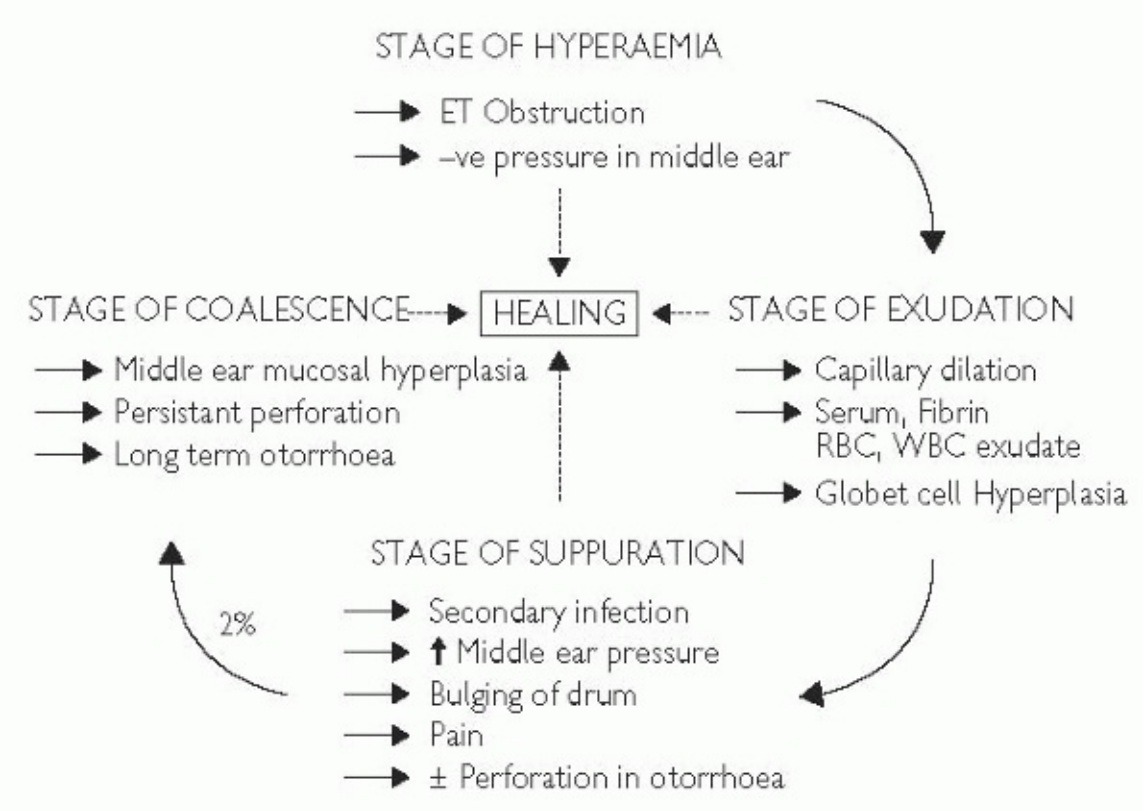


Fig. 13.3. Diagram of acute otitis media stages

Complications of acute otitis media

Chronic infection

- The infection may persist and become chronic. This may be due to resistant bacteria. Use a broadspectrum antibiotic such as Ciprofloxacin.
- Consider myringotomy for relief of symptoms or to obtain

microbiological information.

Facial nerve palsy

- 10% of people have a dehiscent facial nerve—when the bony covering is absent over the nerve. This results in a facial nerve irritation and palsy.
- The patient must be admitted to hospital and given IV antibiotics.
- Consider myringotomy and grommet insertion if the condition fails to resolve in 24hrs.

Acute mastoiditis

This is an infection of the mastoid air cells which will lead to a severe ear ache with tenderness, swelling and redness behind the pinna. The pinna may also be pushed forwards, making it look more prominent.

This is an ENT emergency and requires admission IV antibiotics ± surgical drainage.

Perforation of tympanic membrane

Repeated infections which perforate the tympanic membrane can lead to perforations that do not heal.

Sensorineural hearing loss (SNHL)

Rarely, toxins can spread to the inner ear to produce a sensorineural hearing loss. This is a greater risk with recurrent infection.

Vertigo

Infection near the lateral semicircular canal can produce a para labrynthitis. This can cause a spectrum of vestibular disturbance ranging from mild unsteadiness to disabling vertigo.

Glue ear

Glue ear is caused by a combination of exposure to infection and a

non-functioning eustachian tube. Almost 8 out of 10 children will have glue ear at some time during childhood. The incidence of glue ear decreases with age as the immune system develops and the eustachian tube becomes larger.

The signs and symptoms of glue ear can include: decreased hearing, recurrent ear infections, poor speech development, failing performance at school and, sometimes, antisocial behaviour.

Risk factors

- Smoking parents
- Bottle feeding
- Day-care nursery
- Cleft palate
- Atopy.

Investigations

Take a full history, do a full examination including the palate, carry out age appropriate audiometry (see p.72) and tympanometry.

Management

This depends on a balance of:

- **Social factors**—more urgent action is needed if the family is unlikely to re-attend for further appointments.
- **Hearing disability**—how the child is coping with their hearing problem socially and at school is more important than the actual level of hearing loss.
- **Appearance of tympanic membranes**—if there is gross retraction, intervention may be needed to avoid retraction pocket formation.

Treatment

There are three options:

- **Watchful waiting**—this should apply to all patients for three months as glue ear will resolve in 50% of cases.
- **Hearing aid**—there is a window of opportunity at 4-8years old, It is non invasive, but may lead to teasing at school.
- **Insertion of grommets**—short general anaesthetic ± adenoidectomy —see p.356.

Chronic suppurative otitis media without cholesteatoma

- This common condition is associated with eustachian tube dysfunction with or without an infection in the mastoid.
- As with other ear diseases, its prevalence continues despite antibiotics.
- The signs and symptoms of chronic suppurative otitis media include continuous recurrent otorrhoea, perforation in tympanic membrane (usually central), and no cholesteatoma present.

Risk factors

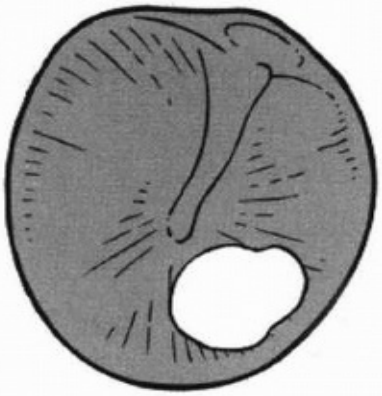
- Smoking patient
- Smoking parents
- Acute otitis media
- Decreased immunity.

Investigations

- Take a full history and do an ENT examination
- Do a microscopy of the eardrum with thorough cleaning, and
- Take a swab for microbiology.

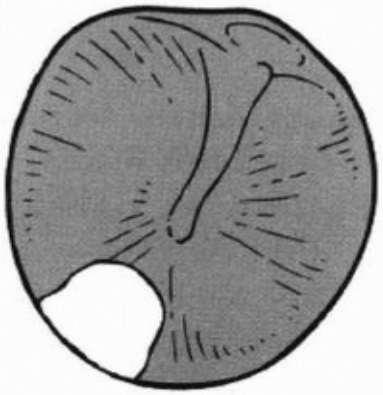
Management

- Give appropriate topical and systemic antibiotics based on the swab result. The condition may settle with antibiotics and water precautions.
- Perform a regular aural toilet.
- Persistent infections may need surgery in the form of myringoplasty and cortical mastoidectomy.



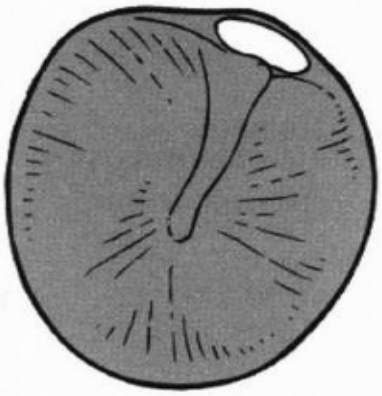
A central pars tensa perforation

≡ Safe ≡ Tubotympanic



A marginal pars tensa perforation

≡ Unsafe ≡ Tubotympanic



An attic/pars flaccida perforation

≡ Unsafe ≡ Attico-antral

A subtotal perforation (central)

≡ Safe ≡ Tubotympanic

Fig. 13.4. Diagram showing sites of perforations. Safe/unsafe refers to the risk of developing an associated cholesteatoma

Chronic suppurative otitis media with cholesteatoma

- This is often divided into congenital and acquired:
- **Congenital cholesteatoma** results from an abnormal focus of squamous epithelium in the middle ear space i.e. a dermoid.
- **Acquired cholesteatoma** results from chronic eustachian tube dysfunction.

It was hoped that the incidence of this condition would have changed with the advent of antibiotics. Unfortunately the disease continues and can present at any age. Signs and symptoms include recurrent otitis media with a smelly mucopurulent discharge, hearing loss, facial nerve palsy and vertigo.

Development of a cholesteatoma

The pars flaccida develops a retraction pocket. Prolonged low middle ear pressure allows for propagation of the pocket. The pocket neck becomes small compared to the sac itself. Initially, squamous epithelium migrates with ease through the pocket. As the sac gets bigger the squamous epithelium builds up inside the pocket. Eventually germinal centres are incorporated. Infection supervenes on the impacted squamous epithelium/keratin. Release of lytic enzymes from the cholestaetoma causes destruction of local structures.

Investigations

- Aural toilet
- Microscopy and suction clearance

- Topical antibiotic/steroid drops for 10 days
- Review under the microscope after one month
- Audiometry
- CT scan of the temporal bone to look for pneumatisation of mastoid or erosion of scutum.

Management

This depends on the age and fitness of the patient, which ear is affected, the patient's wishes and their ability to tolerate ear toilet.

Prophylaxis: This is a controversial treatment where early retraction pockets are treated by inserting a grommet to reverse the development of a cholesteatoma.

Early retraction pocket: Attempting to clean the pocket and remove keratin. GA may be required. Maintenance of a cleaned pocket can be undertaken by an aural care nurse.

Established non-cleaning pocket: If the worse hearing ear is the one affected, surgery will be required to remove the risk of intracerebral complications. See Mastoid surgery, p.272.

Follow up

These patients are at risk of recurrence and therefore need careful follow up.

Mastoid surgery

Cortical mastoidectomy

A simple opening of the mastoid and ablation of the individual air cell in order to create one large cavity or drain pus. This was frequently performed in the pre-antibiotic ear to treat acute mastoiditis. This is much less common nowadays and usually performed as part of a more complicated mastoid operation.

Modified radical mastoidectomy (MRM)

See Fig. 13.5. This is performed to remove cholesteatoma from the middle ear and mastoid. The cholesteatoma, head of the malleus and incus are all removed and the connnections between the middle ear cleft and mastoid are enlarged. A ‘mastoid cavity’ is created by removal of the posterior canal wall, this may require cleaning in the outpatients.

Combined approach tympanoplasty (CAT)

This operation is also performed for cholesteatoma but here the posterior canal wall remains intact and no cavity is formed. The eardrum looks normal after the operation. Benefits of this approach include less outpatient care, better hearing results, and patients are better able to tolerate swimming. However since cholesteatoma can be ‘sealed in’ behind an intact drum a ‘second look’ operation is required at 6-12 months to ensure the disease has been eradicated.

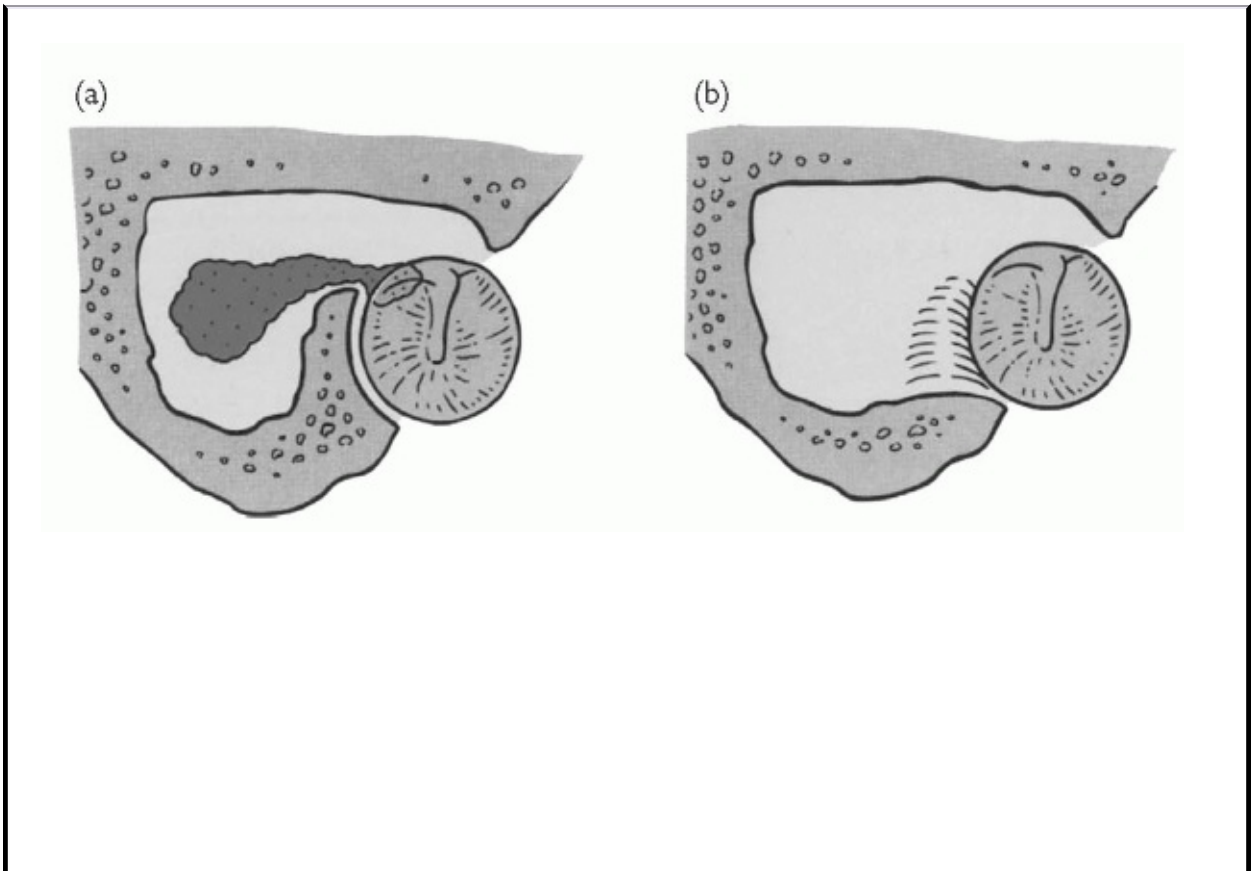


Fig. 13.5. (a) An attic cholesteatoma extending backwards into the mastoid. (b) Modified radical mastoidectomy. Here the cholesteatoma has been removed and the mastoid cavity 'exteriorized', i.e. connected to the ear canal by removal of the posterior ear canal wall

Complications of chronic suppurative otitis media

These are related to local and distant effects of cholesteatoma

Local effects

Conductive hearing loss: As the retracted attic segment of the ear drum lies against the long process of the ear drum, it interferes with its already tenuous blood supply. The incus initially thins then loses its attachment to the stapes. The cholesteatoma can bridge this gap and temporarily improve the conductive loss.

Sensorineural hearing loss: The toxic effect of the local infection can cause a sensorineural hearing loss.

Vertigo: May be due either to a paralabrynthitis causing an irritative vestibulopathy, or it may be the result of erosion into the lateral semicircular canal—called a fistula.

Facial nerve dysfunction: If a dehiscence exists, infection can produce a direct irritation of the nerve. The cholesteatoma may also directly erode the bony covering of the facial nerve.

Mastoiditis: A chronic infection may lead to mastoiditis.

Distant effects

Meningitis: The roof of the middle ear is also the floor of the middle

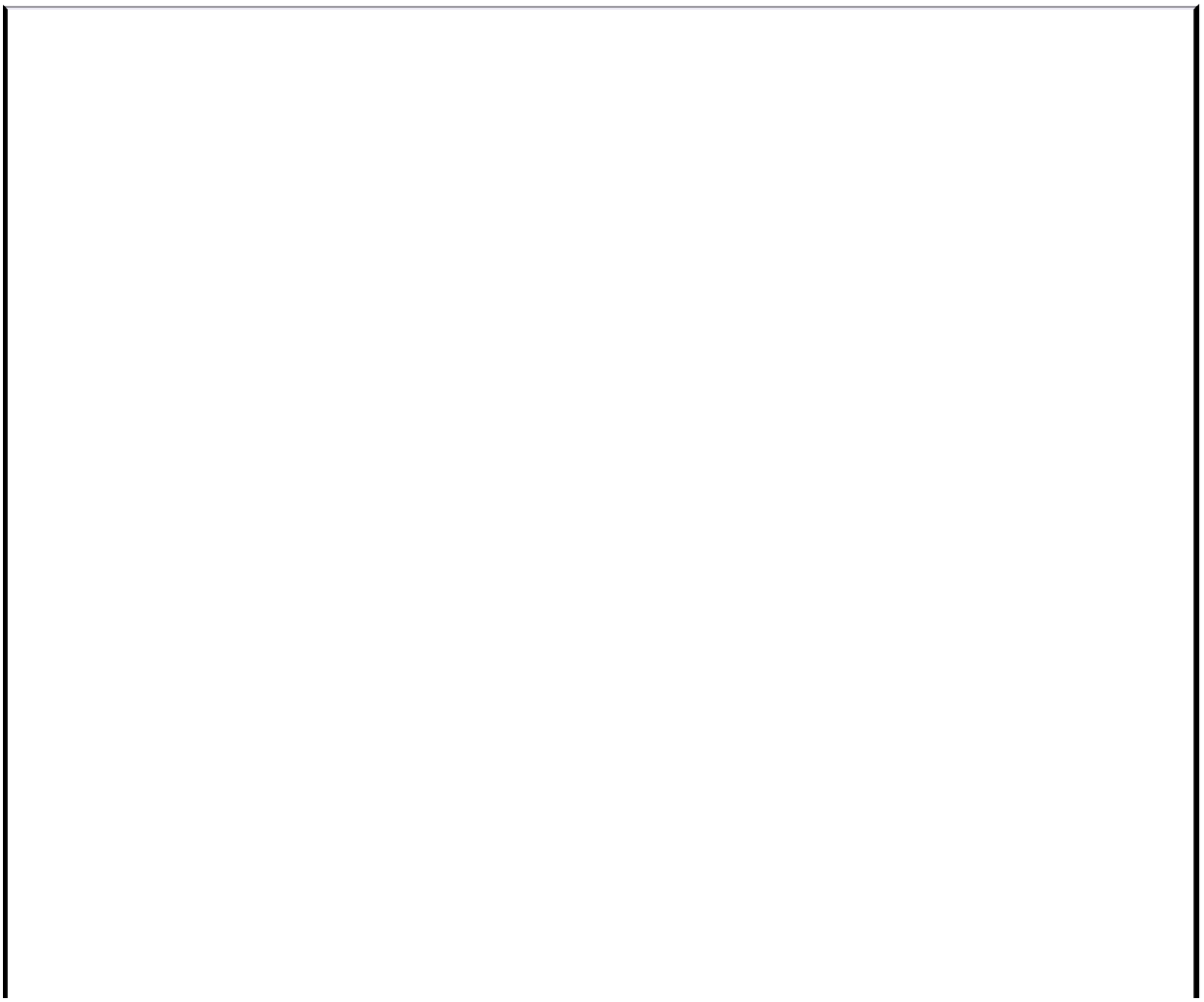
cranial fossa. A thin plate of bone separates the middle ear from the meninges in this area. This can be eroded by an extensive cholesteatoma, with a spread of infection to the meninges.

Cerebral abscess: A spread of infection can lead to abscess formation which can progress to the temporal lobe.

Lateral sinus thrombosis: The lateral sinus is one of the relations of the mastoid air cell systems. Infection can spread to the lateral sinus, causing local thrombosis. This in turn can lead to hydrocephalus.

Bezolds abscess: Infection from the mastoid spreads through the mastoid tip and travels under the sternomastoid, it then points in the neck anterior to the muscle.

Citellis abscess: Infection spreads medially from the mastoid tip to collect in the digastric fossa.



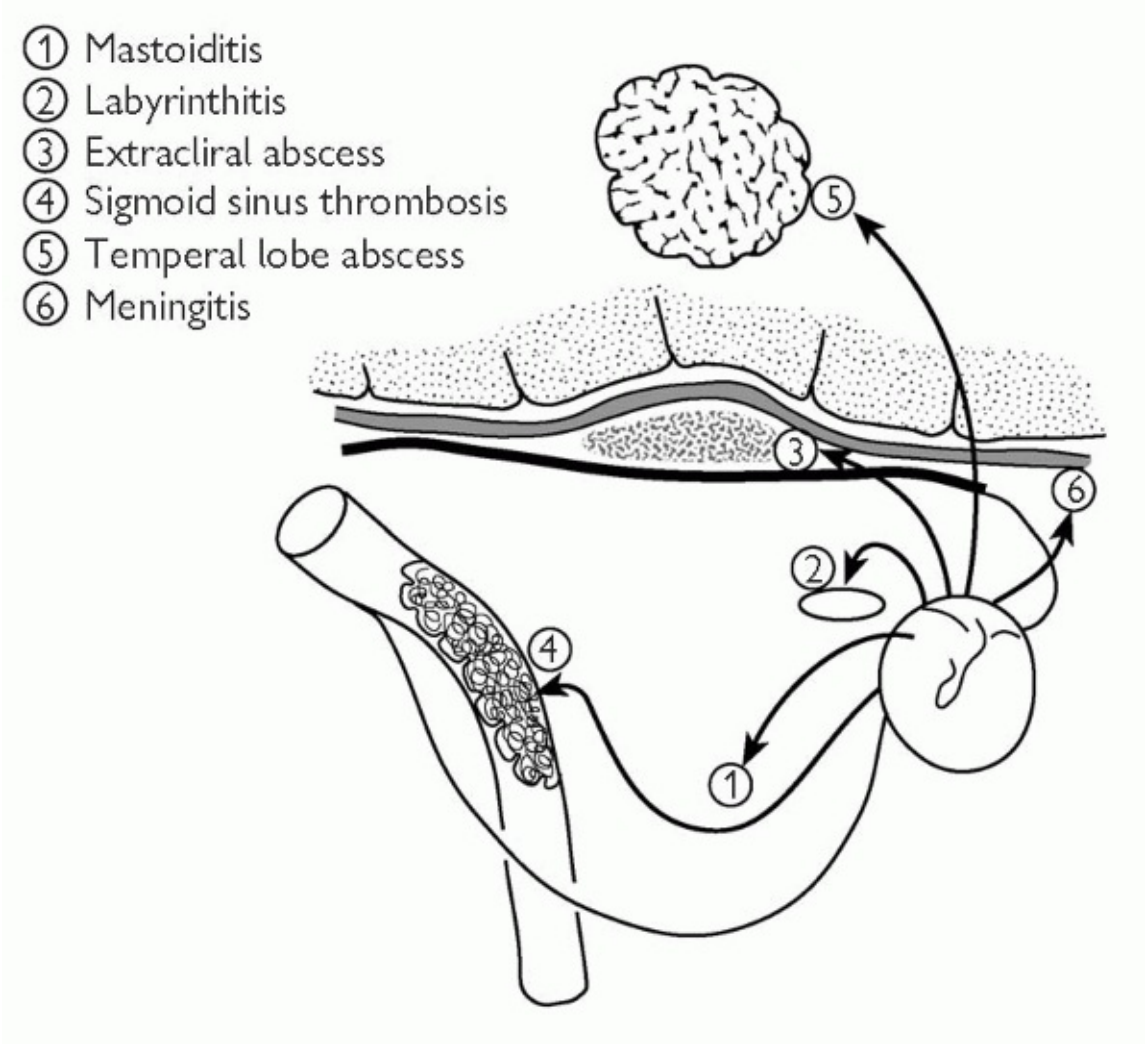


Fig. 13.6. Routes of spread of infection from middle ear

Otosclerosis

This is an osseous dyscrasia of the temporal bone. It presents as a slow progressive hearing loss, usually beginning in the patient's twenties. There is usually a family history of the condition. The patient may have difficulty hearing when chewing and may have problems with quiet conversations. 69-80 per cent of patients have tinnitus. Dizziness is rarely caused by this condition. There is no history of infection.

In its early stages the lesion is ‘spongiotic’. Later, this spongiosis

becomes sclerosis, or a combination of these two abnormal bone types. Later, osteocytes at the edge of the lesion extend into the bone, surrounding the central vascular spaces. Stapes fixation occurs when annular ligament or stapes footplate becomes involved. Spread to cochlea produces high tone sensorineural hearing loss.

Incidence

- The female to male ratio is two to one.
- 6.4% of temporal bones have evidence of otosclerosis.
- 0.3% of the population have a clinical manifestation of the disease.
- The condition is bilateral in 70% of patients.
- 50% of patients with otosclerosis have a family history.

Investigations

- Check for a normal mobile intact tympanic membrane.
- Look for ‘Schwartzes sign’—flamingo pink blush anterior to the oval window. This means there is increased vascular supply to the otospongiotic focus.
- Perform pure tone audiometry. This shows conductive hearing loss (CHL) typical of a Carhart's notch (see Fig. 13.7.).
- Check for absent stapedial reflex.
- Carry out a CT scan—this may help to exclude other bony abnormalities of the middle ear such as ossicular fixation.

Differential diagnosis

Paget's disease: There is other bony involvement, (e.g. frontal bossing) increased alkaline phosphatase mixed hearing loss

Osteogenesis imperfecta: Also known as Van der Hoeve syndrome, leads to mixed hearing loss with blue sclera. There is frequently a history of multiple bony fractures.

Treatment

The options are:

- No treatment
- Hearing-aid
- Surgery—stapedectomy after 3 month trial of hearing aid

Contra indications to surgery

- Surgery should be performed on a worse hearing ear only.
- Previous sensorineural hearing loss in contralateral ear.
- If there is tympanic membrane perforation, this will necessitate a myringoplasty first.
- Infection.

Cochlear otosclerosis

This is due to the spread of the otosclerotic process to the basal turn of the cochlea. Treatment with sodium fluoride helps to reduce the abnormal bone metabolism and so stabilises hearing loss. Monitor with serial pure tone audiograms.

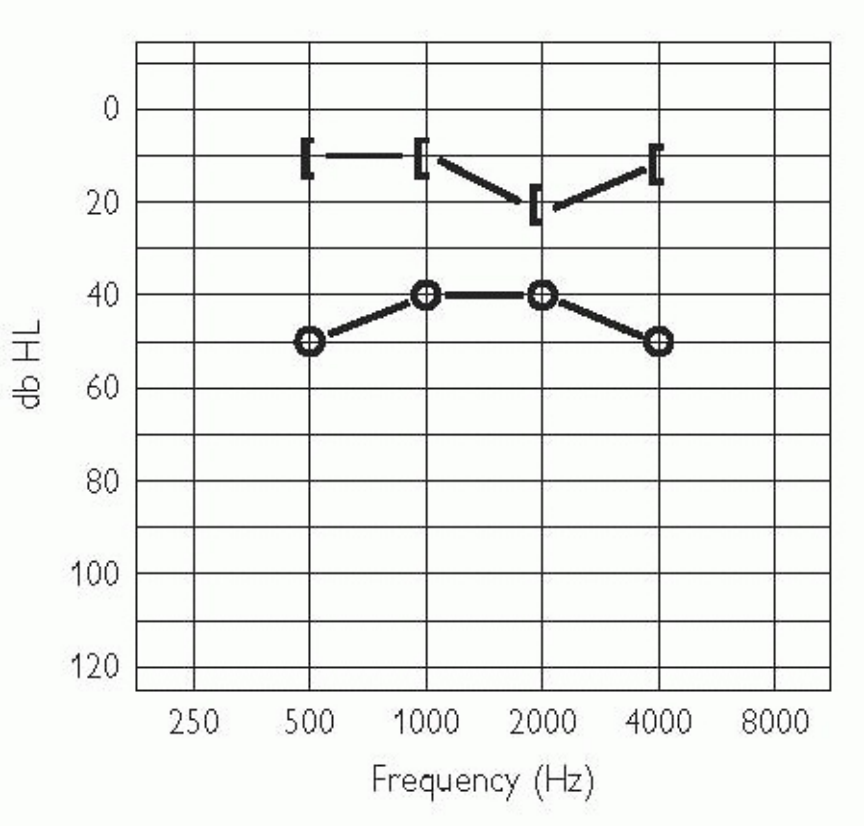


Fig. 13.7. Pure tone audiometry showing conductive hearing loss typical Cahart's notch

Trauma

Acoustic trauma

Loud noise can produce direct traumatic effects on the middle ear. See Chapter 14, p.292 (NIHL).

Head injury

Direct blows to the head can produce:

- A temporal bone fracture—p.320
- A coexistent haemotympanum—blood in the middle ear

- Ossicular chain disruption
- Rarely, cochlea concussion can produce a SNHL.

Management

Patients with severe trauma may present late to ENT, as they usually have more pressing priorities in their management. Treat the patient's head injury and check for a cervical spine injury. Perform an otoscoopy and look for CSF otorrhoea. Check the facial nerve function.

Hearing assessment

- A tuning fork test will distinguish CHL from SNHL.
- Pure tone audiogram will confirm the tuning fork findings and will quantify any hearing defect.

Treatment

SNHL*:* Consider steroids. Prednisolone1mg/kg po one week if no contraindications. Follow with serial audiograms.

CHL*:* No immediate treatment. Review in OPD six weeks. The haemotympanum will have resolved. Re-test the patient's hearing. If CHL persists check the tympanogram to ensure that there is no glue ear and consider tympanotomy with ossicular reconstruction.

Box 13.1 Pens, cotton buds, and lollysticks

If these objects are inserted into the EAC, they rarely reach the eardrum. They usually impact on the skin of the EAC and tear it, causing bleeding. Careful examination with the otoscope can usually identify this problem.

Traumatic perforations of the TM heal sponataneously. Treat haemotympanum and possible ossicular dislocation as above.

Neoplasia

Benign and malignant tumours involving the middle ear space can

occur, but these are very rare.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 14

The Inner Ear

Structure and function of the inner ear

The inner ear can be divided into two parts—the cochlea and the vestibular system (Fig. 14.1.).

The Cochlea

This is the organ of sound transduction. The cochlea is coiled as a helical form, and is encased in hard bone of the petrous temporal bone.

The specialized structure of the cochlea turns sound waves into electrical signals which pass to the brain.

The cochlea has a tonotopic representation - this means that different areas are frequency specific. High frequencies are dealt with at the start or at the base of the cochlea. Low tones are dealt with at the cochlea apex.

See Fig. 14.2. for a cross section of the cochlea.

The neurological pathway to the auditory cortex is best remembered by using the E COLI mnemonic.

E eighth nerve

C cohlear nucleus

O Superior olive

L Lateral lemniscus

I inferior colliculus

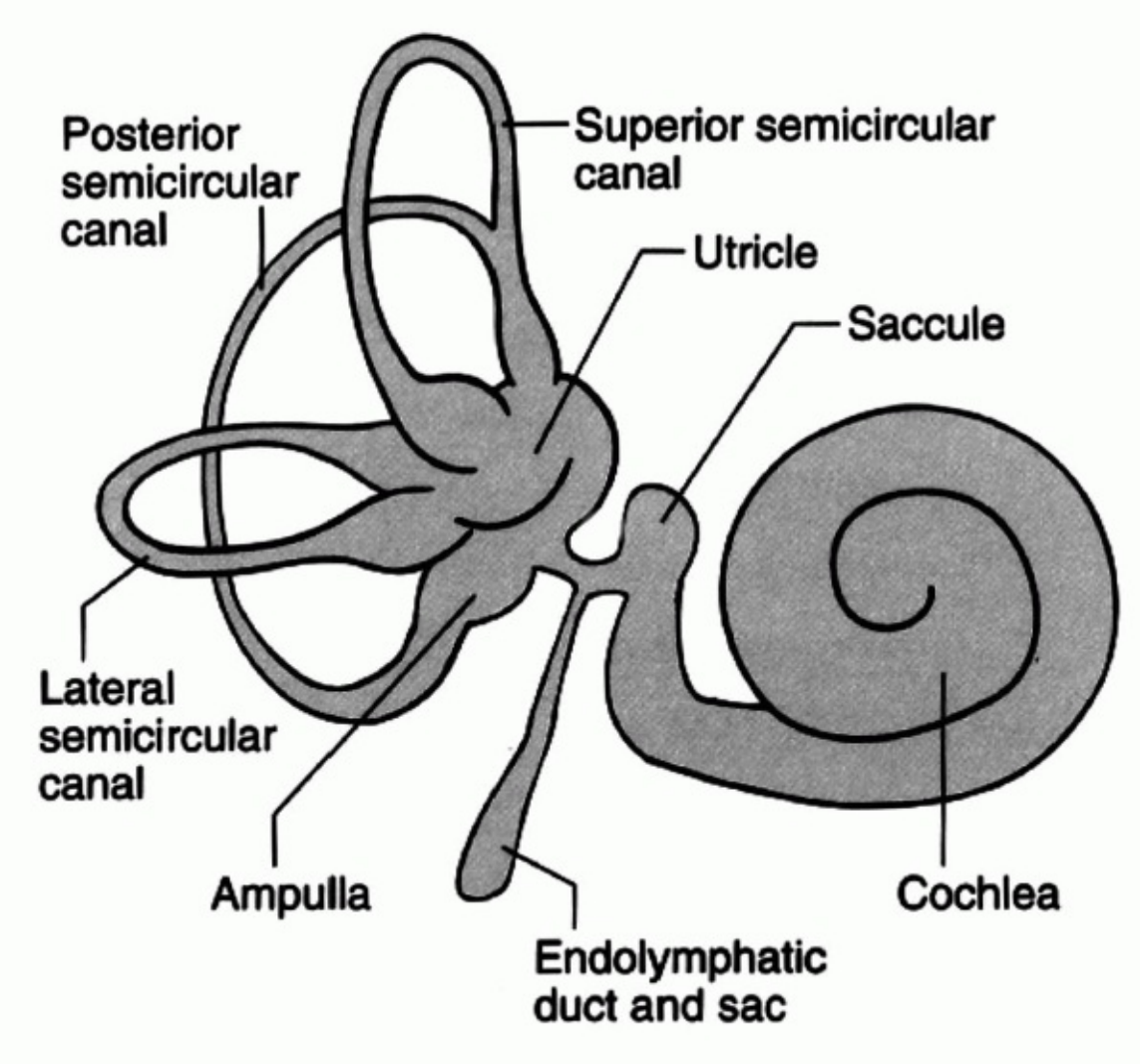


Fig. 14.1. Diagram of the inner ear

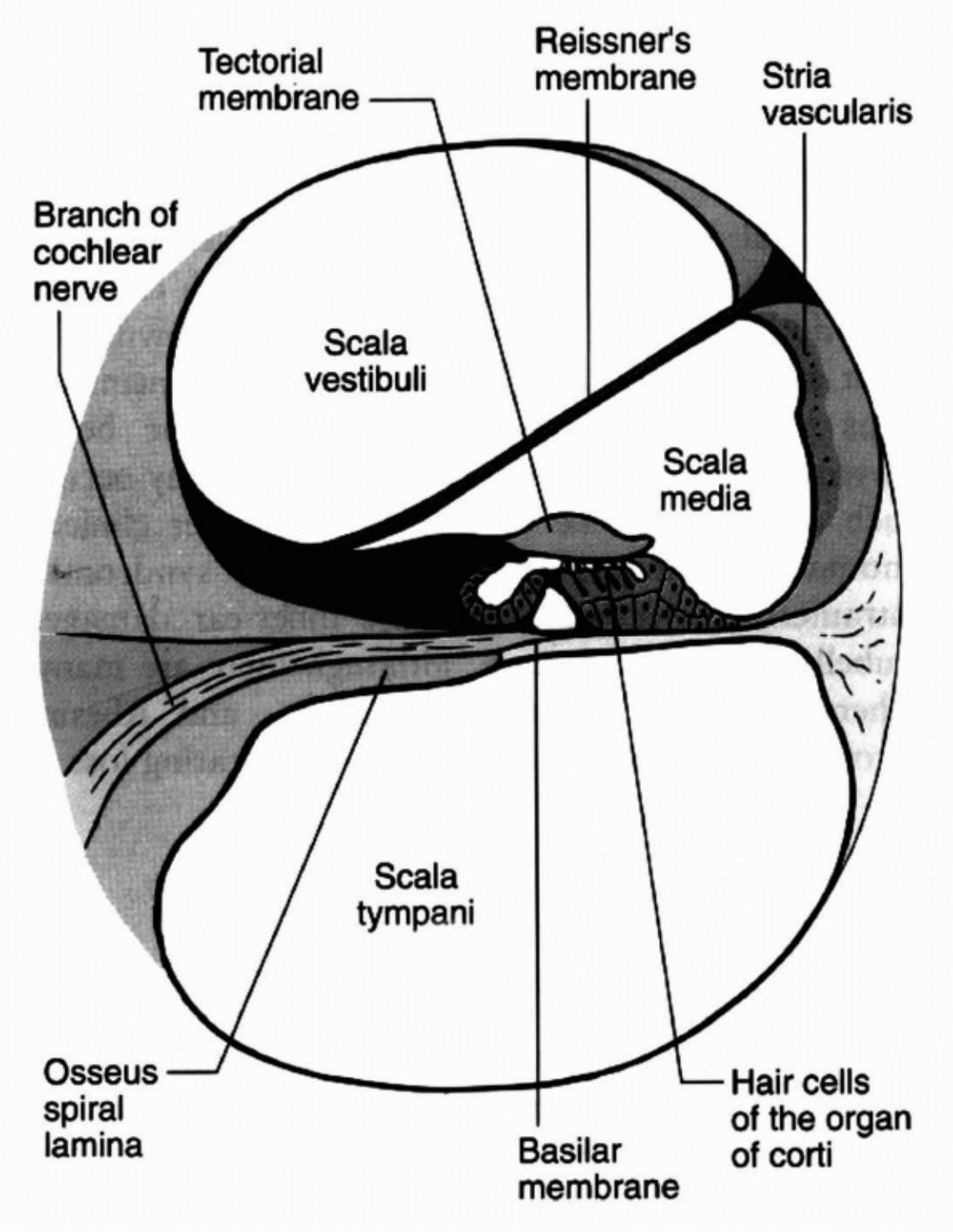


Fig. 14.2. Cross section of the cochlea

Vestibular system

The vestibular system functions to provide information about angular and linear acceleration for the brain. It is also encased in the petrous temporal bone.

5 separate neuroepithelial elements work in combination to provide this information: 3 semicircular canals, the utricle and the saccule.

The semicircular canals are paired to provide complimentary information about the direction of travel (Fig. 14.3.).

The inferior and superior vestibular nerves pass the information to the brain.

The ultrastructure of these neuroepithelial elements is shown in Fig. 14.4.

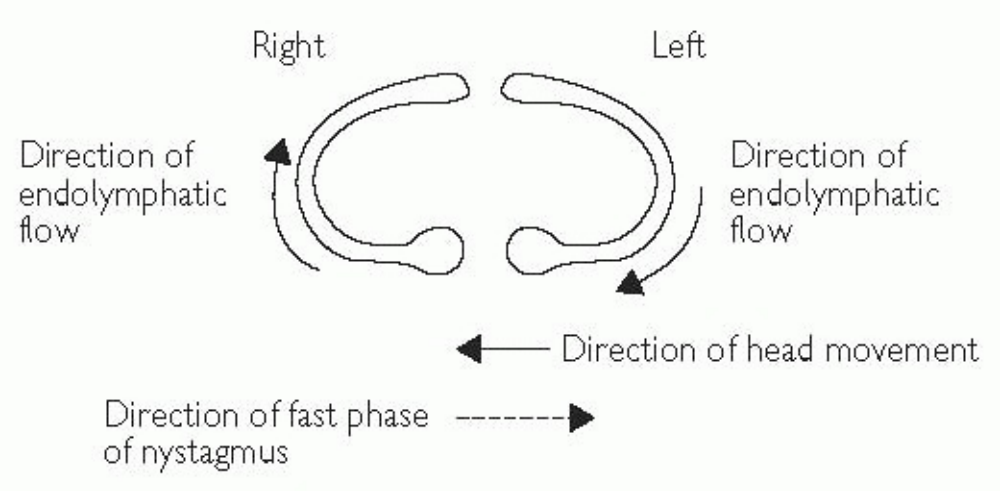


Fig. 14.3. Paired motion of the semicircular canals

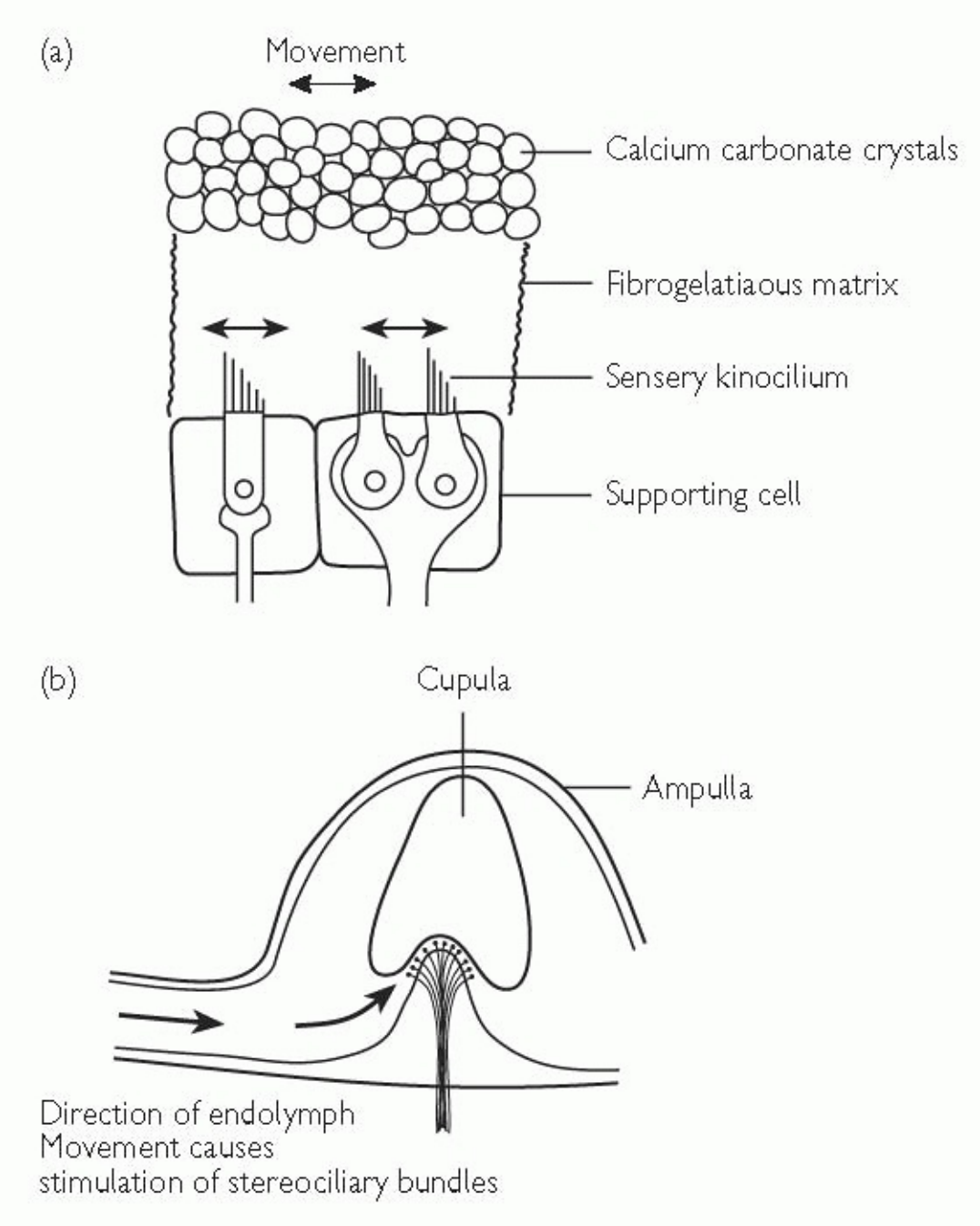


Fig. 14.4. Ultrastructure of semicircular canals/utricle

Sensorineural hearing loss

The aetiology of such a hearing loss can usually be determined by careful consideration of the patient's history, a clinical examination and the findings of special investigations.

The age of onset of the patient's hearing loss is important, as is any family history of hearing loss. Careful consideration of a patient's pregnancy and perinatal history are also important.

Examination

This examination will aim to discover any congenital abnormality or inherited syndrome in which hearing loss may play a part.

Ears	Pre-auricular pits present? shape and location of the pinnae size of the EAC appearance of the TM
Eyes	Eyebrows
	Interpupillary distance
	Colour of iris
	External ocular movements
	Appearance of fundus
	Retinal pigment
Face	Shape
	Symmetry
Skin	Texture
	Pigmentation
Extremities	Shape of fingers and toes
	Carrying angle

Investigations

These investigations aim to confirm and assess the extent of the

patient's hearing loss and to look for any evidence of an inherited condition.

Audiological assessment

Radiology including CT/MRI

Blood tests U+Es

Glucose

TFTs

ECG

Cytogenetics

Specialist opinions

You may need to consult an Opthalmologist and/or a Clinical Geneticist.

Table 14.1 Classification of patients presenting with inner ear hearing loss

Non hereditary	Hereditary
Presbyacusis	Syndromic
Noise Induced Hearing Loss	Non Syndromic
Idiopathic Sudden Hearing Loss	
Autoimmune Hearing Loss	
Vascular causes	

Ototoxicity	
Non Organic Hearing Loss	

Presbyacusis

This term describes a decreased peripheral auditory sensitivity. It is usually age related, and affects men more than women.

Signs and symptoms

This condition shows itself as bilateral, progressive, symmetrical sensorineural hearing loss, with no history of noise exposure. The patient may have worse speech discrimination than expected when reviewing the audiogram. Decreasing central auditory discrimination leads to phonemic regression.

Investigations

Otoscopy.

Pure tone audiogram. (See Fig. 14.5.).

Types of Presbyacusis

Based on the shape of the audiogram and the site of loss, presbyacusis can be subdivided into the following subtypes:

- ***Sensory presbyacusis:*** steep sloping audiogram above speech frequency. It starts in mid life so speech discrimination is preserved. Degeneration in Organ of Corti.
- ***Neural presbyacusis:*** down sloping high frequency loss. Flatter than sensory presbyacusis. Thought to be 1st order neurone loss. Disproportionate discrimination score.
- ***Strial presbyacusis:*** flat audiogram. Good discrimination.
- ***Cochlear conductive/indeterminate presbyacusis:*** Down sloping

audiogram. Increasing stiffness of basilar membrane.

- ***Central presbyacusis:*** Loss of GABA in Inferior Colliculus
- ***Middle ear aging:*** Loosening of ligaments or ossicular articulation problem.

Management

The patient may be given counselling and advice about hearing loss, and Given a hearing aid where the symptoms are troublesome.

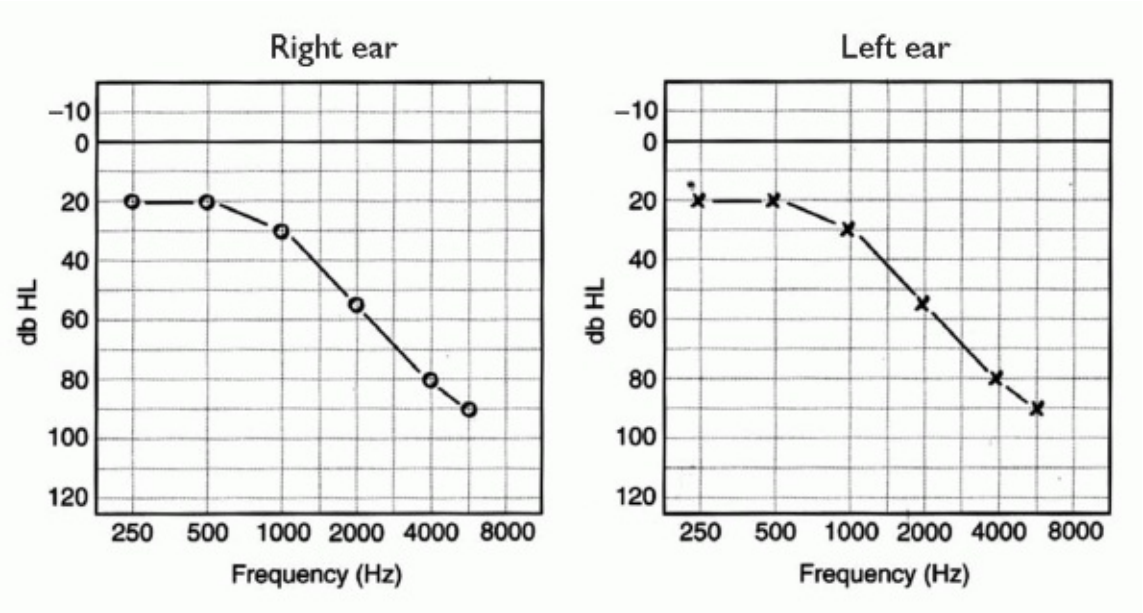


Fig. 14.5. Investigation of presbyacusis: pure tone audiogram for (a) right ear; (b) left ear

Noise induced hearing loss

This is defined as damage to the inner ear caused by exposure to loud noise. There is a relationship between the volume of sound and its duration which causes damage. Eight hours of exposure to a sound level of 85 dB usually causes damage. Louder sounds will cause damage at shorter exposure times.

Acoustic trauma is caused by sounds greater than 180 dB. Rupture of the tympanic membrane and ossicular fracture may occur.

Signs and symptoms

The patient will usually present with bilateral and symmetrical hearing loss. There may be a noise induced temporary threshold shift (TTS)—for example, hearing may improve over the weekend if the problem is noise at work. The patient may have difficulty hearing in background noise or they may have tinnitus.

Investigations

Use audiometry. For a typical pattern see Fig. 14.6.

Pathology

Hearing loss is greatest in 3-6kHz region of cochlea. Below 2kHz the acoustic reflex is protective. EAC resonant frequency is 1-4kHz so energy delivered at these frequencies is greater. The actual loss of cochlea cells occurs where noise damage is greatest. Outer hair cells lose rigidity and the stereocilia fuse.

Management

Consider the following to prevent further noise damage:

- Health and safety at work
- Provision of ear defenders
- Routine hearing screening for occupations at risk

For established damage consider:

- Hearing aids
- Counselling for tinnitus

▶ *Rifle Shooting*

This will sometimes result in an asymmetric SNHL with the noise

damaged pattern. When firing a rifle, one ear is nearer to the gun barrel. If the patient shoots right handed, their LEFT ear is most affected as it is nearer to the barrel of the gun.

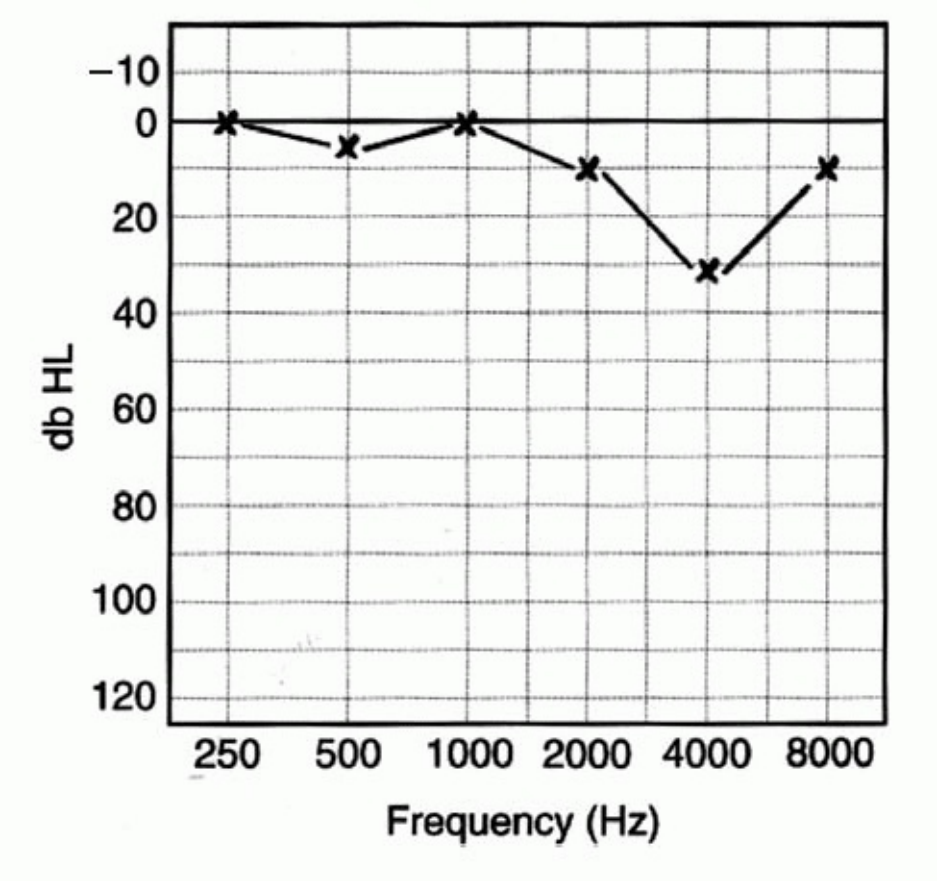


Fig. 14.6. Audiogram of presbyacusis

Idiopathic sudden hearing loss

See emergencies section, p.420.

Tinnitus

This is a sensation of a noise in the ear. It can exist with a hearing loss of any cause and can even occur in patients with normal hearing. However it is most commonly associated with sensorineural hearing

loss. Most people will experience tinnitus at some time in their lives and for most it is no more than a transient nuisance, however in some it is a troublesome symptom, which can trigger depression or even suicide. Tinnitus is usually intrinsic, i.e. only heard by the patient.

Causes of intrinsic tinnitus

- Drugs
- Labyrinthitis
- Trauma
- Vascular
- Presbycusis
- Meniere's disease
- Noise induced hearing loss
- Otosclerosis
- Acoustic neuroma

Cause of extrinsic tinnitus

- Insects in the ear canal
- Vascular malformations
- Palatal myoclonus

The tinnitus model (see Fig. 14.7.)

Experiments have shown that 95% of normal people will experience a degree of tinnitus when put into a sound proofed room. This means that the ear/auditory pathways are producing ‘noise’ or electrical activity that even normally hearing people can recognize, however our central auditory pathways filter out this useless information and we do not normally perceive it. In fact our CNS is constantly monitoring our surroundings but little of this is brought to our attention, e.g. up to this point YOU were not aware of your shoes on your feet, or the noise

of passers-by and traffic, but now they have been brought to your attention, you become aware of them.

This screening system is essential in order to avoid sensation overload! It is believed that tinnitus becomes problematic when this screening or filtering process breaks down, and the 'noise' that the ear generates is not discarded as useless information, but is perceived as a threat, which in itself triggers an emotional reaction via the limbic system.

Tinnitus retraining therapy seeks to reverse this process by counselling and removing the perception of noise as a threat.

NB: When meeting patients with tinnitus it is very important to avoid negative counselling, e.g. '*Tinnitus-oh that's awful I would hate to have that*' or '*Tinnitus-well there is nothing that can be done about that you will just have to put up with it*'. Sentiments such as these will only serve to reinforce the negative feelings patients have about their condition and turn their feelings of 'threat' to feelings of hoplessness.

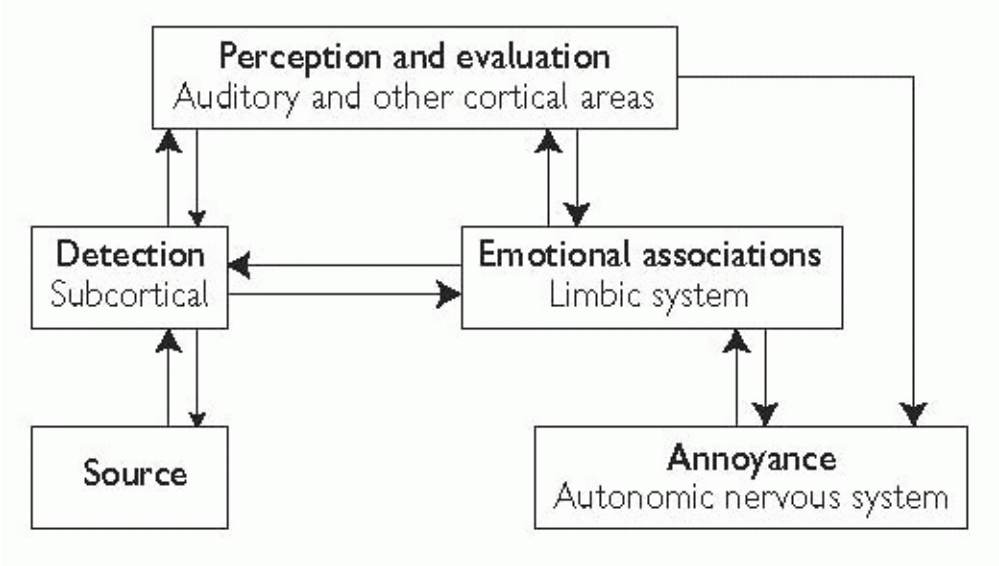


Fig. 14.7. Tinnitus retraining—diagram of model

Autoimmune ear disease

Autoimmune ear disease is classified as either organ specific, or as a systemic disease.

Organ specific

Vestibuloauditory autoimmunity or evidence of cell mediated immunity against inner ear antigens.

Systemic disease

Part of a recognised systemic autoimmune disease. Common diseases which have auditoryvestibular involvement are shown opposite.

Patients with autoimmune ear disease are usually middle-aged and are more likely to be female than male.

Signs and symptoms

- Bilateral unexplained SNHL
- May be fluctuant dizziness or Meniere's like syndrome with aural fullness
- Rapidly progressive hearing loss over days or weeks
- Associated VIIth nerve palsy
- Normal otoscopic examination
- Coexistent systemic immune disease.

Investigations

Take a full history and give a full oto-neurological examination, including a pure tone audiogram. Do a MRI scan to exclude acoustic neuroma with unilateral presentation.

Carry out the following blood tests

- Antigen specific antibodies
- Antigen non specific antibodies
- Acute phase reactants

- Lyme titres

Treatment

Treatment should be given under the guidance of neurotolgist and/or a rheumatologist.

Give steroids such as Prednisolone 1mg/kg per day PO

Or give steroid sparing alternatives:

- Cyclophosphamide
- Methotrexate
- Plasmaphoresis

The following conditions are thought to have an auto-immune basis and can cause hearing loss:

Polyarteritis nodosa

This condition affects the small and medium arteries. There is a rare association with an inner ear hearing loss.

Cogan's syndrome

This is a non syphilitic interstitial keratitis with vestibuloauditory dysfunction. It presents with photophobia and lacrimation one to six months before vestibuloauditory symptoms develop.

Atypical cogan's

This interstitial keratitis develops one to two years before auditory vestibular problems.

Wegener's granulomatosis

This is a necrotising granulomatous vasculitis of the lower and upper respiratory tract which also affects the kidneys causing focal necrotising glomerulonephritis. 90 per cent of patients have a sensorineural hearing loss and 20 per cent have a conductive hearing

loss with effusion. cANCA positive 90 per cent.

Relapsing polychondritis

In this condition, giant cell arteritis and systemic vasculitis cause recurrent episodes of inflammatory necrosis. There is a raised ESR and a false positive VDRL.

Rheumatoid arthritis

Very common condition with characteristic arthropathy.

Ototoxicity

Drugs can damage the cochlea and vestibular system. It is worth taking a careful drug history, as a wide range of drugs can cause symptoms. Cross check with the BNF for side effects.

Aminoglycoside antibiotics

These antibiotics have a narrow therapeutic index and can cause damage to the inner ear. Common side effects are drug induced vestibular symptoms and hearing loss.

Patients requiring parenteral aminoglycoside antibiotics should have the plasma levels of the drug monitored during therapy. Local policy varies; often trough levels of antibiotic are used to determine future dose levels.

Topical antibiotics

Most topical antibiotics available contain an aminoglycoside antibiotic. These drugs are experimentally ototoxic in guinea pigs and other animals. They are believed to enter the inner ear through the round window membrane causing direct ototoxic effects. Drug data sheets also warn of the risks of using these preparations when there are grommets in situ or where there is a perforation of the TM.

▶ Short courses of these topical antibiotics—less than 10 days—are safe with perforations or grommets in the presence of infection. Oedema of

the middle ear mucosa with a thickened round window membrane, limits the entry of antibiotic into the inner ear. ***Untreated infection is a greater risk to hearing than the antibiotic***.

Therapeutic uses

Aminoglycosides can be used to treat patients with Menieres disease by causing a vestibulopathy when instilled into the middle ear. Much higher doses are used compared with the standard drops.

Other drugs

Chemotherapy, especially cisplatin, induces SNHL. Aspirin and Erythromycin can cause a reversible SNHL. Patients present with tinnitus.

Hereditary hearing loss

Heredited hearing loss may be divided into syndromic and non syndromic types. Non syndromic or non organic hearing loss is most common, representing about two thirds of cases.

As the loci of genes associated with hearing loss are identified, it becomes more obvious that the classifying of these conditions on syndromic basis may be misleading. Many patients with apparently non syndromic hereditary hearing loss have the same gene alterations as their syndromic counterparts but are not phenotypically syndromic.

Other classifications of hereditary hearing loss are:

Genetics	See Table 14.2
Age of onset	Early (Birth to age 2)
	Known congenital
	Suspected congenital
	Delayed (3 to 20)
	Adult (>21 years)

Hearing loss	Sensorineural
	Conductive
	Mixed hearing loss
Laterality	Unilateral/bilateral
Stability	Stable
	Fluctuating
	Progressive
Frequencies	Low (250-1kHz)
	Medium (>1kHz-4kHz)
	High (>4kHz)
Associations	Radiological abnormalities
	Vestibular dysfunction

Table 14.2 Genetic inheritance of hearing loss

Inheritance	Percentage	Condition
Autosomal recessive	60-70%	Non syndromic SNHL Pendreds Ushers Jervell-Lange-Nielsen

Autosomal dominant	20-25%	Waardenburg's BOR
		Alports
X-linked recessive	2-3%	X-linked mixed hearing loss with stapes gusher
X-linked dominant	Uncertain	Alports
Chromosomal	<1%	
Mitochondrial	<1%	
Multifactorial	Uncertain	

Syndromic hearing loss

Goldenhaars syndrome (Oculoauricularvertebral OAV syndrome)

This is the most common syndrome occurring in approximately 1 in 10,000 live births. It is sporadic, not caused by genetic inheritance.

Features of Goldenhaars syndrome

Face	25% Marked asymmetry
	Maxilla and temporal bones reduced and flattened
	Hypolpasia/aplasia of mandible.

Ear	Flattened helical rim
	Pre-auricular tags
	EAC atretic/small
Hearing loss	CHL
	SNHL 15%
Associations	Skeletal abnormalities c-spine/skull base
	Cleft lip/palate
	Velopharyngeal insufficiency
	Mental retardation 15%

Treacher collins

Patients have a mandibulofacial dysostosis due to 1st/2nd branchial arch, groove and pouch abnormalities. This is the commonest syndrome of hearing loss. 60% of cases are sporadic rather than genetic. This abnormality has been found to occur on gene 5q 31-4.

Features of Treacher Collins syndrome

Face	Depressed cheeks
	Narrow midface
	Malformed pinnae cup shaped
	Hypertelorism
Ear	Narrow EAC
	Malformed ossicles, cochlea and labyrinth
Associations	Cleft palate
	Palatopharyngeal incompetence 30-40%

Normal intelligence

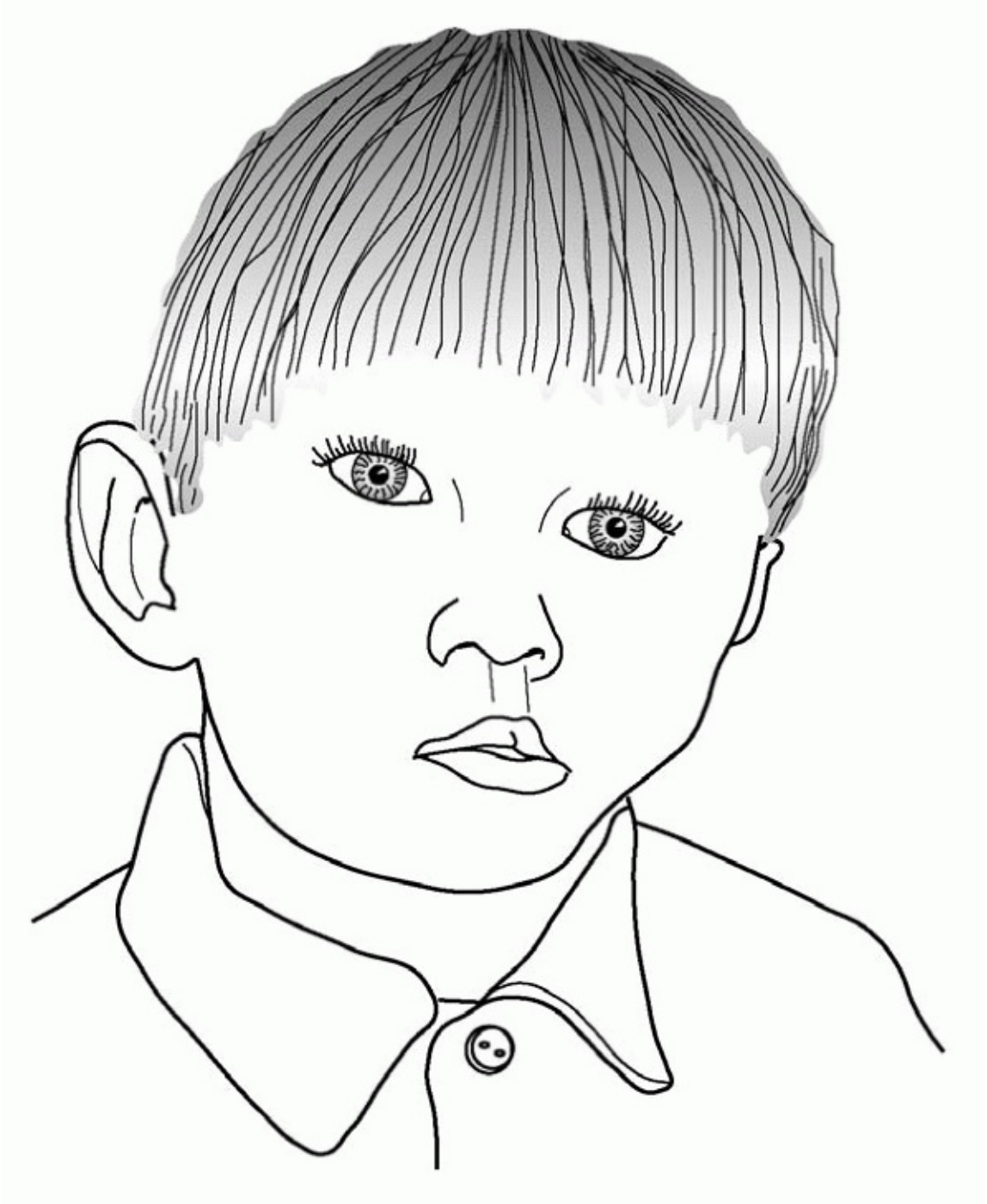


Fig. 14.8. Features of Goldenhaars syndrome

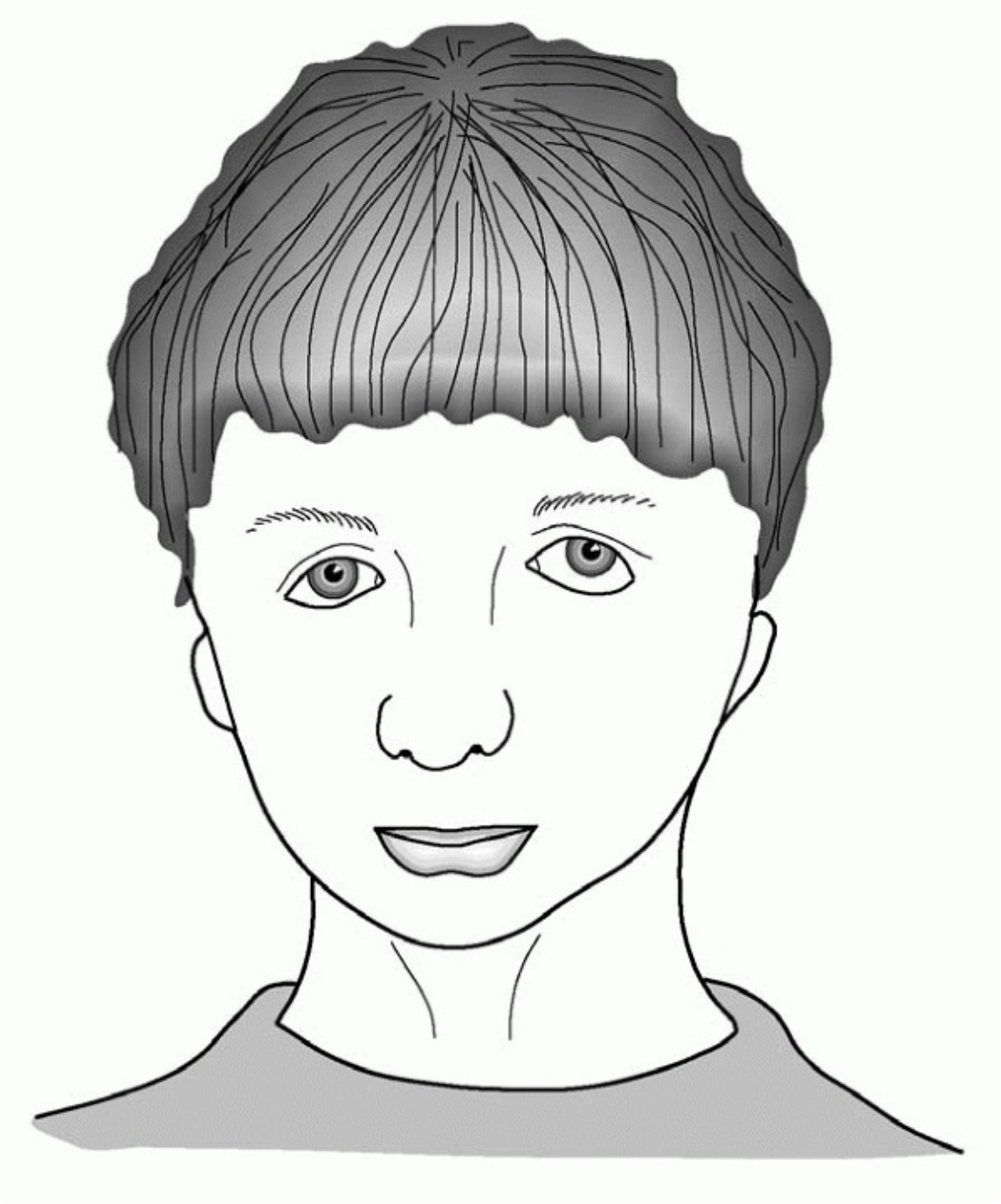


Fig. 14.9. Features of Treachers Collins syndrome

Syndromic hearing loss II

Waardenburg's Syndrome

2-5% of congenitally deaf children have Waardenburg's syndrome

Features of Waardenburg's Syndrome

Appearance	Dystopia canthorum in type 1
	Synophrys—confluent eyebrows 85% type 1
	Heterochromia iridis (Different colour irides)
	Broad nasal root
	Sapphire eyes
	White forelock 30-40%
	Vitiligo
	Premature grey hair
Hearing loss	Congenital SNHL
	20% of those with type 1 WS and 50% of those with type 2 have a hearing loss
	50% of people with WS have normal hearing

Branchial-oto-renal syndrome(BOR)

In this rare condition there is an association of branchial fistulas/cysts with hearing problems and renal abnormalities.

Alport's syndrome

This is a rare hereditary progressive glomerulonephritis with SNHL. It presents as hearing loss and renal problems. There are six subtypes of Alport's syndrome classified by type of inheritance, age of onset of renal failure, presence of hearing loss and ocular abnormalities. The diagnosis of Alport's syndrome depends on three out of four of the

following being found:

- Positive family history of haematuria and renal failure
- Electronmicroscopic evidence of glomerulonephritis on renal biopsy
- Characteristic ophthalmic signs
- Progressive high frequency SNHL starting in childhood

Pendred's syndrome

This is a rare autosomal recessive inherited condition where a non-toxic goitre is found in association with profound congenital SNHL. It is associated with the mondini deformity of the cochlea.

Jervell-Lange-Nielsen syndrome

This condition is believed to be autosomal recessive. The abnormality is located on chromosome 11. There is a prolonged QT interval on ECG. Multiple syncopal episodes may occur from the age of 3-5 years onwards.

Usher's syndrome

This is an autosomal recessive condition consisting of retinitis pigmentosa and hearing impairment.

Non-organic hearing loss (NOHL)

This describes a situation where a patient claims to have a hearing loss where none exists, or where a patient exaggerates a hearing loss which does exist.

A typical example may be a child who is having difficulties at school or at home, and who presents with a very poor hearing test result. Often the hearing loss documented on the audiogram will seem out of keeping with the child's participation in the consultation. Another example is a patient who is pursuing a claim for damages as a result of a hearing loss.

The clues to look for when diagnosing this condition are: concerns

raised by the audiologist about inconsistent results, if there is litigation involved or if the parent-child interaction is unusual.

Investigations

- Pure tone audiometry
- Tuning fork tests—Stenger test
- Speech audiogram—more difficult to fabricate abnormal response
- Stapedial reflex testing
- Delayed speech feedback—the patient reads aloud and their speech is played into the affected ear. The playback is slightly delayed which will cause the patient to hesitate or stutter if they can hear.
- Brain stem evoked auditory response—this is the gold standard in litigation cases.

Management

Careful handling of non-organic hearing loss is required. It may be wise to suggest to affected children that you know their hearing is better, but don't be too confrontational. Bring them back for another audiogram and suggest that they try to be a little more accurate.

Litigation claims needs more tact and multiple investigations before any confrontation.

Stenger test

Use two 512Hz tuning forks.

Step 1

The patient closes their eyes and the examiner stands behind.

The tuning fork is activated and placed at 5cm from each ear in turn

The patient will hear the note in their good ear but deny hearing it in the non hearing ear.

Step 2

Both tuning forks are used without the patient realizing it.

One is held 5cm from the ear with the alleged poor hearing. The other is held, at the same time, 15cm away from the good ear.

The patient with NOHL will deny hearing any sound. The tuning fork held near the bad ear will mask the sound of the tuning fork near the good ear. The genuine patient will only hear the tuning fork near the good ear.

Labyrinthitis (vestibular neuronitis)

This presents as a sudden episode of vertigo in a previously well person. It is equally common in men and women, with the usual age of onset being thirty to forty years. Attacks are usually single, but people may occasionally experience multiple attacks, and it can be recurrent. It normally lasts 1-2 days and improves over weeks. Vertigo is usually unilateral, or rarely, bilateral. Epidemics can occur in the spring or summer. There may be an associated URTI two weeks prior to the vertigo. It occasionally leaves a BPPV symptom complex.

Pathology

- Axonal loss—endoneurial fibrosis and atrophy of the nerve
- Suspected viral aetiology e.g. Rubeola, HSV, Reovirus, CMV, influenza and mumps.

Investigations

- Pure tone audiograms
- Nystagmus away from affected side
- Quix Test +ve (Seated Rombergs Test)
- ENG if there is clinical doubt about the diagnosis
- MRI if there is asymmetry or recurrent episodes

Treatment

- Vestibular suppressant for acute attack—Stemetil 5mg sub-buccal/12.5mg IM
- Steroids if SNHL—Prednisolone 1mg/kg for 1 week
- Patients usually compensate well for this condition.
- Vestibular rehabilitation—for patients who do not compensate.

Benign paroxysmal positional vertigo

This is the most common cause of peripheral vertigo. It usually starts around the age of 50 years. The patient experiences brief episodes of vertigo caused by changes in position, in particular looking up and rolling over in bed. It is worse in the morning and the evening. This condition is believed to occur as a result of stimulation of the semi-circular canals by otoliths which have become mis-placed.

There are three typical patterns in benign paroxysmal positional vertigo:

- Acute form—resolves in three months
- Intermittent form—active and inactive periods over years
- Chronic form—has continuous symptoms over longer duration.

Investigations

- Full otoneurological examination
- Dix-Hallpike test
- Pure tone audiogram
- ENG—if there is diagnostic uncertainty
- MRI scan—if symptoms persistent for more than 3 months

Dix-Hallpike test

Place the patient on the examining couch, positioned in such a way that when they lie back their head will be over the end of the bed. While the patient is sitting turn their head 30° towards the examiner.

This leads to maximal stimulation of the PSCC on lying down. Then ask the patient to lie down, looking at the examiner's nose. The examiner supports the head and allows the head to extend over the edge of the bed. A positive test results in rotatory nystagmus after a delay of 1-5 seconds, This lasts between 10 to 30 seconds. Reversal to the upright position changes the direction of the nystagmus. This process is fatiguable and sensitivity of the test can be improved with Frenzel glasses which do not allow optic fixation.

Treatment

Fatiguing exercises: if the patient has significant symptom free episodes (see Fig. 14.10.)

Epleys manoeuvre: can bring 90% relief if the patient has had symptoms by repositioning the displaced otoliths (see Fig. 14.11.).

Surgery: this is rare. A singular neurectomy may lead to SNHL in 10-20% of patients. A retrosigmoid vestibular nerve section may result in 1% mortality as the proceure involves craniotomy. A posterior canal occlusion via a mastoid operation will control the symptoms, but a SNHL may complicate 5% of cases.

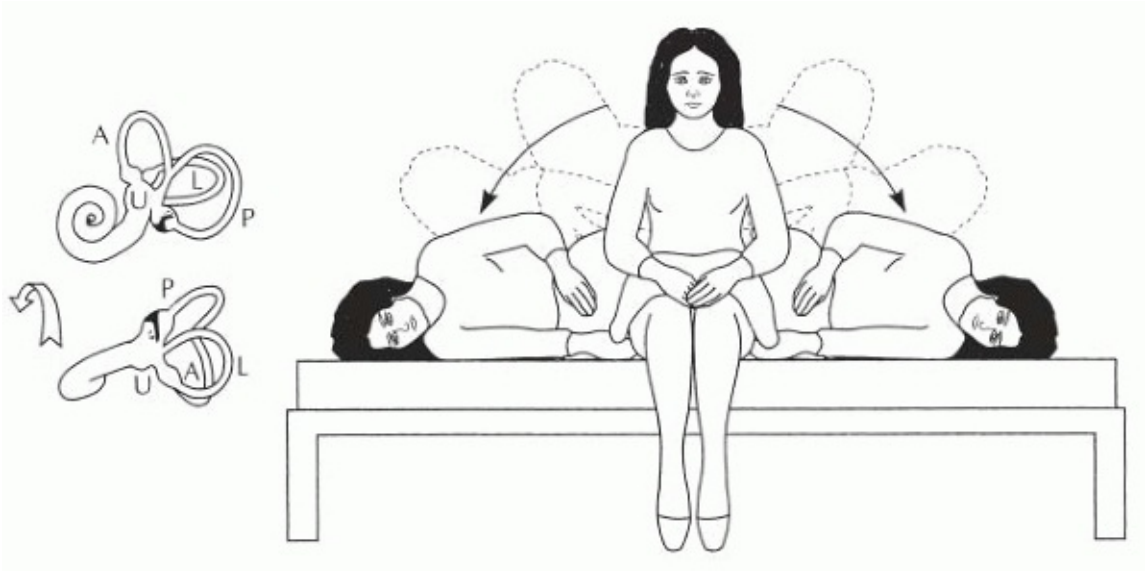


Fig. 14.10. Brandt Doroff exercises

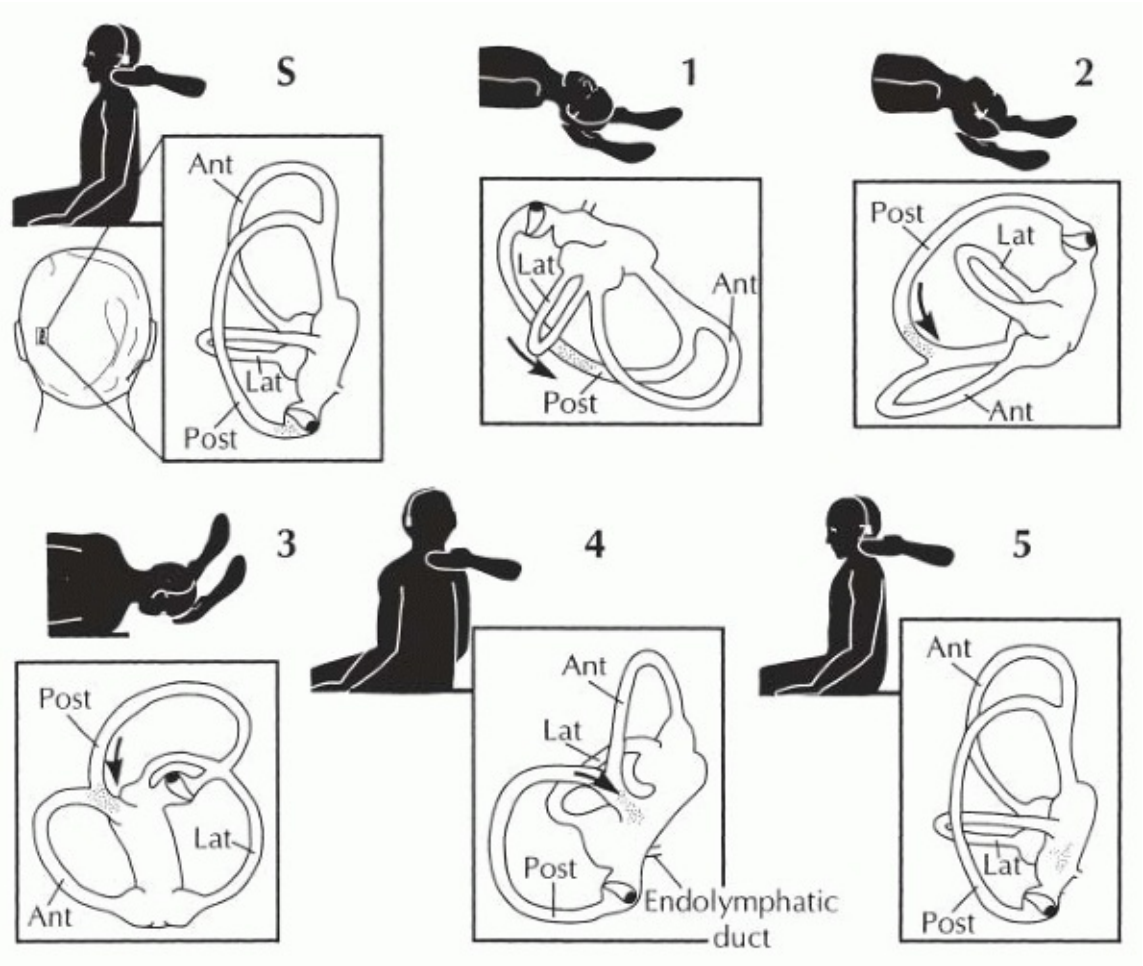


Fig. 14.11. Epley manoeuvre

Meniere's disease/syndrome

Meniere's disease presents itself as increasing fullness in the ear and roaring tinnitus, with a sensation of blocked hearing, and episodic vertigo. Alternatively there may be a sudden onset of vertigo with no warning (see Signs and symptoms, p.314). 30-50% of people with Meniere's disease have bilateral symptoms within 3 years of presentation.

Meniere's disease occurs in between 50-150 people per 100,000 of the population. It is more common in females than in males and usually occurs between the ages of 35-40.

Causes

- Idiopathic Meniere's disease
- Post traumatic head injury or ear surgery
- Post infectious delayed e.g. in mumps and measles
- Late-stage syphilis
- Classical Cogan's
- Atypical Cogan's

Signs and symptoms

Of people with Meniere's disease:

- 42% have hearing loss alone
- 11% have vertigo alone
- 44% have vertigo and hearing loss
- 3% have tinnitus

Vertigo lasts more than 20 minutes and is associated with nausea, vomiting and autonomic effects. Most episodes last 2-4 hours (although some last for more than 6 hours).

Horizontal or horizonto-rotatory nystagmus is always present.

The patient may experience disequilibrium after an attack for several days.

A fluctuating SNHL is found in the early stages of the disease. Later, the hearing loss becomes permanent. The hearing may not change for some days after an attack.

Types of hearing loss

- Low frequency SNHL
- Flat moderately severe SNHL
- Bilateral SNHL with >25dB asymmetry

Poorly controlled patients have progressive hearing loss, stabilizing at 50-60dB

Variant Presentations of Meniere's disease include

- Lemoyez variant—hearing improves with vertigo attacks
- Otolithic crisis of Tumarkin—patient has drop attacks with vertigo (decompression of saccule)
- Cochlear Meniere's—auditory symptoms only
- Vestibular Meniere's—vestibular symptoms only

Investigations

There is no single diagnostic test.

- Otoneurological examination
- Pure tone audiogram
- MRI scan if there is asymmetry
- Autoantibodies—ESR, ANA, RhF, IgGs
- Echocochleography (ECoG)—this test involves placing a recording electrode either in the EAC or through the tympanic membrane to rest against the promontory of the cochlea. Sound is then applied to the test ear and the electrical activity in the ear is documented. Several components can be identified and measured. An increased ratio of the summating potential compared to the action potential >0.4 suggests hydrops (Fig 14.12.).

Pathology

On sectioning the inner ear in affected patients, the scala media is found to be expanded, as if there has been too much pressure in the endolymph. This is known as Endolymphatic hydrops.

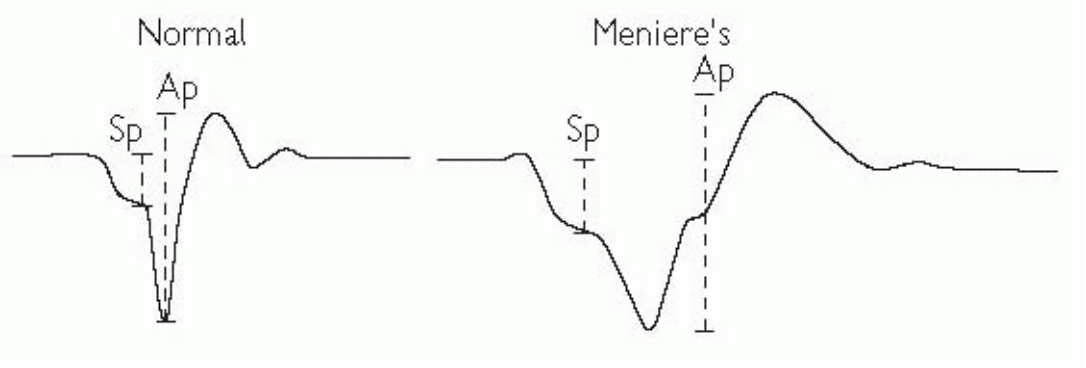


Fig. 14.12. Diagram of ECoG waveform

Treatment of Meniere's disease

Medical management

- **Prophylaxis**—no added salt in diet serc, 16mg tds PO
- **For acute attacks of vertigo**—stemetil, 5 mg sub-buccal
- Six monthly review with symptom diary recording vertigo (spinning) episodes and the length of each episode.

Surgical intervention

Patients whose symptoms are not improved by maximum medical therapy will require active intervention.

▶ *Principles of intervention*

All treatments balance the control of vertiginous episodes with the risk of hearing loss and the associated morbidity of the procedure.

Treatment should not be undertaken for non-vertiginous symptoms. Care should be undertaken when dealing with the better hearing ear.

Factors affecting the choice of intervention

- Patient choice
- Surgeon's preference
- Cost of treatment
- Hearing level in affected ear
- Patient fitness

Measuring success

Guidelines from the American Academy of Otorhinolaryngologists and Head and Neck Surgeons (AAOHNS) measure success as comparing number of vertiginous episodes in 6 months prior to treatment with the number of episodes 6 months after treatment and followed up for 2 years.

Table 14.3 Interventional treatments for Menieres disea

Procedure	Indications	Control of Vertigo	Hearing Loss	Cost	Risk
Transtympanic gentamicin injection	Hearing loss <50dB	85%	5%	Low	Lov
Endolymphatic sac decompression	Fluctuating SNHL	65%	<5%	Medium	Lov

Total labrynthectomy	Hearing loss >60dB	95%	Total Loss	Medium	Lov Me
Vestibular Nerve Section	Longstanding disease. Hearing loss <50dB	90%	<5%	High	Me

Vascular causes of inner ear dysfunction

Vascular occlusion of the labyrinthine artery can cause the sudden onset of vertigo and hearing loss. This occlusion leads to widespread necrosis of membranous structures and labyrinthitis ossificans. The patient may have a prior history of transient ischaemic attacks (TIA's) —62% of TIA patients have episodic vertigo. Compensation usually occurs in 4-6 months.

Occlusion of anterior vestibular artery

Produces hearing loss and vertigo.

As the posterior circulation remains intact, the patient may simply present with a BPPV like symptom complex.

Recurrent vestibulopathy/vascular loop syndrome

Seven per cent of vertigo patients experience this syndrome. It is believed to occur as a result of an abnormally placed blood vessel impacting upon the vestibular nerve in the internal auditory meatus.

Females with this syndrome outnumber males by a 2:1 ratio. The usual age is 35-55 years old. The patient has usually had symptoms of episodic vertigo for 3 years at presentation. 80% have had episodic vertigo within the previous year and 10 per cent have BPPV. PTA high-frequency loss is found in 50% of patients and a middle frequency loss in 20%. The resulting histological abnormality is axonal loss and

endoneurial fibrosis.

Investigations

- Full neurotological examination
- Spontaneous nystagmus
- Non Classical Dix Hall Pike test—no fatigue
- Pure tone audiograms
- MRI/MRA

Treatment

Vestibular suppressants—Stemetil 5mg sub-buccal tds for vertigo. Consider microvascular nerve decompression.

Temporal bone fractures

These can occur as the result of serious head injury. Patients with this injury often present late to the ENT surgeon. Other injuries usually take precedence.

Types of fracture

These fractures are described according to their orientation to the axis of the temporal bone. Most fractures are complex and do not fit with the standard patterns:

- 80% are longitudinal
- 20% are transverse

Management

Treat head injury and other trauma according to the ATLS protocol. As part of a secondary survey:

- Examine behind ear for bruise (Battle's sign)
- Examine EAC for blood/CSF/step

- Examine TM for disruption of annulus
- Test facial nerve function.

Investigations

CT scan—often a head injury scan will not show a fracture.

Doing a CT scan of the temporal bone with fine cut bony windows gives the best diagnostic information and prognosis for hearing loss.

Classical pattern of temporal bone fractures

Longitudinal fracture

- Blood in EAC
- Haemotymapnum
- Disruption of annulus
- SNHL only temporal
- Facial nerve injury rare—it can occur if not exactly longitudinal Statistically this type of fracture causes more facial nerve palsies

Transverse fracture

- EAC normal
- Haemotympanum
- SNHL permanent
- Facial nerve injury in 50%
- Vertigo and nystagmus

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 15

The Skull Base

Overview

The skull base is a specialized area of clinical work. The ENT surgeon is actively involved in this area, often as part of a team including a neurosurgeon or plastic/craniofacial surgeon.

Access to these difficult areas has increased with the development of image guidance systems and the ability to extend endoscopic sinus surgery approaches via the sphenoid to the skull base.

Acoustic neuroma

An acoustic neuroma is a benign, slow growing tumour. It is more correctly called the vestibular schwannoma, because of its origin on the vestibular nerve. Post mortem data shows that this tumour is underdiagnosed. An acoustic neuroma may be an incidental finding on MRI.

Acoustic neuromas account for 6% of all intracranial neoplasms, the majority of which are sporadic (95%). 5% are genetic—part of the inherited condition of NF2 (neurofibromatosis Type 2) on chromosome 22.

Presentation

The patient may experience some of the following:

- Sudden SNHL or progressive high frequency SNHL.
- Vertiginous episodes—but these are rare as the patient unknowingly compensates.
- Symptoms of raised intracranial pressure such as headache or visual disturbance.
- Brainstem compression—ataxia is a late symptom of this.

Investigations

- PTA.
- MRI scan with gadolinium contrast.
- Full otoneurological exam.
- Hitselbergers sign—postauricular numbness due to facial nerve compression.
- Reduced corneal reflex.
- Unterberger's test positive—patient marches on the spot with the eyes closed. A positive test is a rotation to one side or the other.

Management

Management options balance the risk of hearing loss, facial nerve palsy and surgical morbidity. There are several possibilities:

- Watchful waiting—with serial MRI scans for slow growing tumours.
- Retrosigmoid approach—preserves the hearing
- Translabyrnthine approach—destroys the hearing but is an easier approach. It is useful if there is little hearing to preserve.
- Middle fossa approach—is technically challenging as it involves opening the middle fossa. No driving for one year due to the risk of fitting.
- Intracapsular removal—useful to decompress large rumours in elderly patients with brainstem compression.

- Stereotactic radiosurgery—this multiplanar radiotherapy is useful in small tumours as it avoids surgery.

Complications

- Any intracranial procedure e.g. craniotomy—carries a 1% risk of mortality.
- Facial nerve palsy.
- Total hearing loss

Box 15.1 Differential diagnosis of cerebello-pontine angle (CPA) tumour

Acoustic neuroma 80%

Meningioma

Epidermoid cyst

Cholesterol granuloma

Arachnoid cyst

Posterior cerebellar artery (PCA) aneurysm

Nasopharyngeal carcinoma (NPC)

There are two distinct types of this cancer of the back of the nose:

- Undifferentiated non-keratinizing squamous cell carcinoma (SCC)—this is more common in people from southern China and Chinese people from Hong Kong. It is associated with EBV.
- Differentiated keratinizing SCC—this has similar at risk groups to the majority of head and neck cancers.

Presentation

- Epistaxis
- Nasal obstruction
- Lymph node metastasis

- Middle ear effusion
- Extensive tumours can involve the skull base and cause cranial nerve palsies.

Investigations

Patients will be given a CT and/or an MRI scan.

▶ *Important*

Every patient presenting with a unilateral middle ear effusion must have their postnasal space visualized to exclude an NPC.

Treatment

Radiotherapy is given for all stages. Neck dissection may be necessary if there are extensive lymph node metastases.

Juvenile angiofibroma

This is a rare tumour almost exclusively seen in males. (If the patient is female consider chromosomal analysis.) It originates from the sphenopalatine foramen and is locally invasive but not malignant. It is a combination of fibrous tissue with endothelial spaces in vascular tissue.

Presentation

- Recurrent epistaxis in young male (average age 14)
- Large posterior nasal mass
- Pulsatile mass palpated prior to adenoidectomy
- Nasal obstruction.

Investigations

- Clinical examination with endoscope

- CT scan and MRI
- Angiography
- *Do not* do a biopsy for fear of life threatening haemorrhage

Management

The treatment is surgical removal, with pre-operative embolisation to reduce the blood loss during the operation. There are several ways to gain access to the area, but the most common is via the midface in an operation called midfacial degloving.

Sinonasal malignancy

This term describes a diverse group of malignant tumours affecting the nose and sinus system. SCC account for 70% of sinonasal malignancy, adenocarcinoma 10%, and adenoid cystic carcinoma 10%.

Nickel workers are at risk of developing SCC, woodworkers are at risk of adenocarcinoma. This is often delayed up to 20 years after exposure. The prognosis is poor with less than 50% of patients surviving for 5 years.

Common sites for sinonasal malignancy are:

- Maxillary sinus
- Nasal cavity
- Ethmoid sinus.

Presentation

Some or all of the following features may be seen:

- Nasal obstruction
- Epistaxis
- Sinusitis
- Maxillary symptoms

- Loose teeth
- Ulcer on palate
- Cheek swelling

- Ethmoid symptoms
  - Unilateral obstruction
  - Diplopia
  - Headache.

Investigations

- CT and/or MRI
- Endoscopy and biopsy
- FNA if cervical metastases.

Treatment

Surgical resection and/or radiotherapy may be required. Treatment decisions should be made by an MDT in a specialist head and neck clinic taking into account the type of tumour and the staging.

TNM Staging of sinonasal malignancy

Maxillary sinus

- T1—Tumour limited to antral mucosa.
- T2—Tumour causing erosion or destruction into hard plate/lateral nasal wall.
- T3—Tumour eroding posterior wall/subcutaneous/cheek/medial orbit.
- T4—Intracranial extension/orbital apex/skin of nose.

Ethmoid sinus

- T1—confined to ethmoid.
- T2—Extends to nasal cavity.
- T3—Extemds to anterior orbit/maxillary sinus.
- T4—Intracranial extension.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 16

Common Operations

The consent process

General principles

The GMC has issued clear guidelines to assist the consent process. Its recommendations are summarized below:

- Patients must be given sufficient information—in a way that they can understand—to enable them to exercise their right to make informed decisions about their care.
- Patients' rights are protected by law.
- Effective communication is the key to informed consent.

Consent to investigation and treatment

A doctor who is undertaking a procedure or investigation will need to obtain consent from the patient. If this is not possible, then consent can be obtained by a nominated person who is suitably trained and qualified, who understands the risks involved, and who has sufficient knowledge of the proposed investigation or treatment.

It is important that patients make their own decisions about treatment. Ensuring voluntary decision making involves giving the patient a balanced view of the options and explaining the need for informed consent.

Forms of consent

Consent can be either express or implied consent.

Implied consent—is when the patient's actions may be, but are not necessarily an agreement to treatment.

Express consent—is written consent. It must be obtained and documented in the notes when:

- the treatment or procedure is complex, or involves significant risks and/or side effects.
- providing clinical care is not the primary purpose of the investigation or examination.
- there may be significant consequences for the patient's employment, social or personal life.
- the treatment is part of a research programme.

In an emergency, when no consent can be obtained, life-saving treatment can be given without consent.

Reviewing consent

Previously obtained consent must be reviewed prior to investigation or treatment, and especially where:

- significant time has elapsed between obtaining consent and the start of treatment.
- there have been material changes in the patient's condition, or in any aspects of the proposed treatment plan, which might invalidate the patient's existing consent.
- new, potentially relevant information has become available, about the risks of the treatment, for example, or about other treatment options.

Consent to research

See Research section, p.14.

Giving patients sufficient information

- Answer questions honestly, accurately, and objectively.
- Give details of the diagnosis and prognosis, including the likely prognosis if the condition is left untreated.
- Say if there are any uncertainties about the diagnosis, including options for further investigation prior to treatment.
- Give options for treatment or management of the condition, including the option not to treat.
- State the purpose of a proposed investigation or treatment, give details of the procedures or therapies involved, including subsidiary treatment such as methods of pain relief.
- Tell the patient how they should prepare for each procedure and give details of what they might experience during or afterwards, including common and serious side effects.
- Explain the likely benefits and the probabilities of success for each option, discuss any serious or frequently occurring risks, including any lifestyle changes which may be necessary as a result of the treatment.
- Say if a proposed treatment is experimental.
- State how and when the patient's condition and any side effects will be monitored or re-assessed.
- Give the name of the doctor who will have overall responsibility for the treatment and, where appropriate, give the names of the senior members of his or her team.
- State whether doctors in training will be involved, and the extent to which students may be involved in an investigation or treatment.
- Remind patients that they can change their minds about a decision at any time and that they have a right to seek a second opinion.
- Give details of any costs or charges which the patient may have to meet.

- Only withhold information that could cause a patient harm. Any information withheld from the patient shall be recorded in the notes.

Presenting information to patients

- Where possible, use up-to-date written material, visual and other aids to explain complex aspects of investigation, diagnosis or treatment.
- Make arrangements to meet particular language and communication needs wherever possible. This could involve translations, independent interpreters, signers, or the patient's representative.
- Where appropriate, discuss with patients the possibility of bringing a relative or friend, or of making a tape recording of the consultation.
- Use accurate data to explain the probabilities of success, the risk of failure of, or any harm associated with their treatment options.
- Be considerate when giving distressing information. Give patients information about counselling services and patient support groups.
- Allow patients sufficient time to reflect, before and after making a decision, especially where the information is complex or the risks are serious.
- Where patients have difficulty understanding information, or where there is a lot of information to absorb, provide it in manageable amounts over a period of time, alongside written or other back-up material. You may need to repeat it.
- Involve nursing staff or other members of the health care team who may have valuable knowledge of the patient's background or particular concerns. They could help in identifying what risks the patient should be told about.
- If treatment is not to start until some time after consent has been obtained, the patient should be given a clear route for reviewing their decision with the person providing the treatment.

Establishing capacity to make decisions

Fluctuating capacity

Patients who have difficulty retaining information, or are only intermittently competent to make a decision, should be given assistance to reach an informed decision. Record any decision made while the patient is competent, including the key elements of the consultation. Review these decisions at appropriate intervals before treatment starts, to establish that this decision can be relied on.

Mentally incapacitated patients

If patients lack the capacity to make an informed decision, you may carry out an investigation or a treatment that is judged to be in their best interests—including treatment for any mental disorder—provided that they comply with it.

Advance statements

Living Wills or Advance Directives must be respected if they are relevant to the current circumstances.

Children and consent

At 16 years old a young person can be treated as an adult and can be presumed to have the capacity to make an informed decision. A child under 16 may have the capacity to make an informed decision, depending on their ability to understand what is involved.

Where a competent child refuses treatment, a person with parental responsibility or the court, may authorize an investigation or treatment which is in the child's best interests. The position is different in Scotland, where those with parental responsibility cannot authorize procedures a competent child has refused. Legal advice may be helpful on how to deal with such cases.

Box 16.1 ‘Best interests’ principle

This involves looking at the following questions;

- Are there any alternative options for treatment or investigation which are clinically indicated?
- Is there any evidence of the patient's previously expressed preferences, including an advance statement?
- What is your own and the health care team's knowledge of the patient's background, such as cultural, religious, or employment issues?
- What are the views about the patient's preferences given by a third party who may have knowledge of the patient, for example the patient's partner, family, carer, tutor-dative (Scotland), or a person with parental responsibility?
- Which option least restricts the patient's future choices, where more than one option (including non-treatment) seems reasonable in the patient's best interest?

Applying to the court

Application to the court may be needed if a patient's capacity to consent is in doubt or if there are differences of opinion over the patient's best interest. This can occur for non-therapeutic or controversial treatments such as organ donation, sterilisation or turning off life support.

Complications of ear surgery

There are risks with all surgical procedures. The degree of risk is related to both the specific procedure and to the underlying pathology. The patient should be given an indication of the likely risk in a sensitive way, so that they are not frightened into abandoning surgery.

A full explanation of the underlying condition will highlight the risks of leaving an ear disease untreated. Risks should be documented in the case notes and on the consent form.

The list of complications for CSOM is similar to that of the operation—the untreated disease carries similar risks as the operation. These are:

- Hearing loss—temporary and permanent. Always obtain an audiogram at least within 3 months of surgery, but preferably nearer to surgery and perform pre-op tuning fork tests and document your findings
- Tinnitus—temporary and permanent
- Vertigo or unsteadiness—temporary and permanent
- Facial nerve palsy—temporary and permanent
- Wound infection
- Need for further surgery
- Formation of mastoid cavity
- Need for ongoing care e.g. aural toilet for mastoid cavities.

Inter-operative considerations

These can be avoided by taking precautions, e.g. always setting up and checking items such as facial nerve monitors yourself. The precautions undertaken in theatre, such as the use of a facial nerve monitor, should be recorded on the operation note. Any inter-operative unusual findings or complications should be witnessed and recorded by a senior colleague if available.

Immediate post-operative period

Check for facial nerve palsy in recovery.

Post-operative ward review

Facial nerve function should be checked, along with the eye movements for nystagmus. Webber's tuning fork test should be done. The patient should localise to the operated ear.

Complications of nasal surgery

Nasal surgery includes a large range of procedures on both the external and the internal nose. Procedures on the sinuses are also included.

Complications of external nose surgery

- Imperfect cosmetic result
- Poor healing of incisions/granuloma and keloid formation
- Bruising
- Ecchymosis
- Need to wear a nasal splint for a week
- Swelling
- Need for packing.

Complications of internal nose surgery

- Bleeding and need for packing
- Infection
- Change in nasal shape e.g. supratip depression with sub-mucus resection (SMR)
- Persistence of nasal blockage for 3 months
- Need for adjunctive medication.

Complications of sinus surgery

- Bleeding
- Infection
- Orbital damage
- Optic nerve damage
- CSF leak
- Orbital haematoma.

Prevention of complications

Intra-operative considerations

- Good vasoconstriction to maximize vision in operative field and prevent blood loss
- Head up position to improve venous drainage
- Using preoperative CT scans displayed during surgery to avoid unexpected anatomical variations
- Use of steroids to reduce oedema in rhinoplasty
- Swab samples for infected sinus problems.

Post-operative problems

- Observation for bleeding—repack if necessary
- Check for orbital haemorrhage
- Check for visual disturbance.

Complications of head and neck surgery

These procedures are often prolonged. They can have high morbidity rates and sometimes an associated mortality. The patient group is older and the co-morbidities associated with heavy smoking and alcohol abuse make the risks even higher.

Major risks

- Death
- Cardiovascular complications
- MI
- DVT
- Chest infections
- PE
- Flap failure.

Pre-operative considerations

- Prophylactic antibiotics
- Thromboembolic prophylaxis
- Chest physiotherapy
- Pre-operative nutrition—involve dietician
- Stop smoking
- Admit early for assessment and alcohol detox if necessary.

Post-operative considerations

- Continued thromboembolic prophylaxis and early mobilisation
- Antibiotics
- Chest physiotherapy
- Balance between analgesia and respiratory depression
- Early removal of central and peripheral lines
- Removal of urinary catheter
- Tracheostomy care
- Avoidance of pressure sores
- Early action if suspected complication
- Postoperative care on ITU for selected patients
- Nursing protocols and flap observations (see p.368).

Tonsillectomy

Indications

- Recurrent acute tonsillitis
- Chronic tonsillitis

- Obstructive sleep apnoea syndrome
- Oropharyngeal obstruction
- Following 2 quinsies
- Suspected malignancy
- Diagnosis of variant CJD.

Pre-operative checks

Confirm that the operation is still needed and examine the ENT system for associated features. Discuss the surgery, complications, and the need for time off work or school.

Procedure

Give the patient a GA and keep them supine with a bolster under shoulder and their head in a head ring. This position extends head on body. The postnasal space is lower than the oropharynx, so blood collects there (Fig. 16.1). Insert a Boyle-Davis gag with Doughty modification for anaesthetic tube. Place the Draffin bipod to suspend gag. Incise the mucosa over the anterior pillar.

The tonsil is removed by dissection in the peritonsillar space. Ensure that there is adequate tonsil bed haemostasis.

Post-operative care

Give appropriate pain relief and encourage the patient to move around. Give food as and when it is tolerated. Monitor the patient for blood loss. Major blood loss is obvious, but minor loss in a young child manifests itself as a rising pulse without increasing pain.

Complications

- Primary haemorrhage <1%
- Secondary haemorrhage 5-10%
- Infection

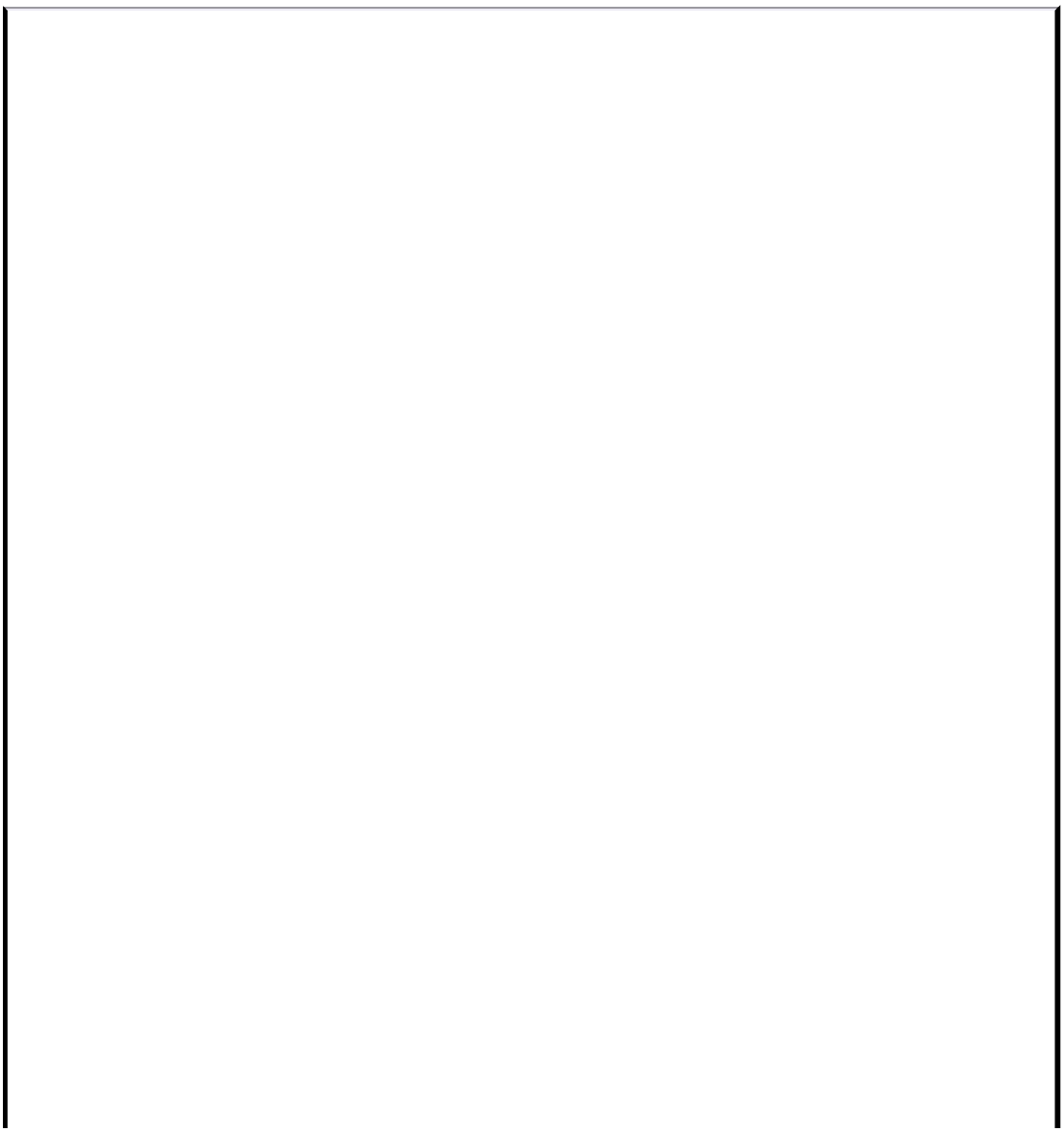
- Poor pain control.

Length of stay

Depends on the unit, the patient may stay in for the day, or overnight.

Discharge advice

Regular analgesia should be taken as the pain often increases around five to seven days after the operation. Give the patient contact details and advice in case of haemorrhage. They should stay off work or school for two weeks and avoid boisterous activity for two weeks.



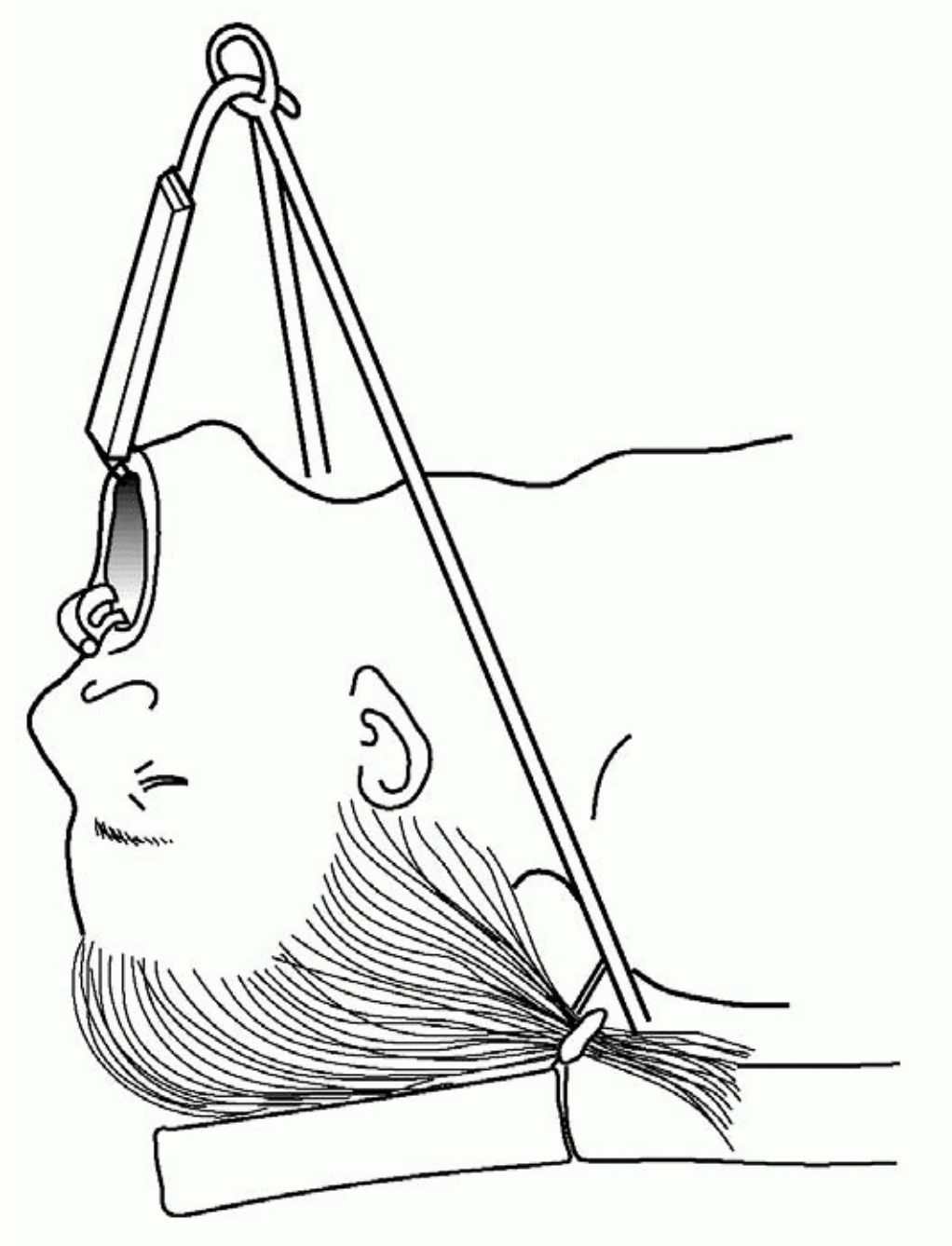


Fig. 16.1. Diagram showing tonsillectomy position

Adenoidectomy

Indications

The patient may have adenoid problems as a result of, or alongside glue ear treatment. Removal of the adenoids aids the resolution of glue ear. Patients may experience recurrent adenitis or obstructive sleep apnoea syndrome.

Pre-operative checks

- Confirm the diagnosis and the presence of glue with tympanometry.
- Discuss the surgery, complications, and need for time off work or school.
- Examine the ENT system for associated features and check the palate for bifid uvula.

Procedure

- Administer the patient a general anaesthetic.
- Position them supine with the cervical spine straight. If the spine is extended as in a tonsillectomy position, the vertebral body of C2 is very prominent and can lead to excess bleeding from PNS after curettage if inadvertantly damaged.
- Check for bifid uvula or submucous cleft.
- Insert an adenoid curette through the mouth into the PNS—curette the adenoidal pad.
- Alternatively, the adenoid can be removed under direct vision with suction monopolar diathermy.
- Haemostasis with pressure from swab placed in PNS.

Post-operative care

Give the patient analgesia and observe them for primary haemorrhage.

Complications

Primary haemorrhage is rare at less than 1%. If it is uncontrolled it needs a PNS pack, sedation and an ITU stay for very young children.

A hyper nasal voice (called rhinolalia aperta) may occur if there is a defect in the soft palate. Subtle malformations such as submucous cleft can be easy to miss and should be looked for before performing an adenoidectomy.

Length of stay

An adenoidectomy is usually a daycase, with the patient discharged after 4 hours, unless it is with a tonsillectomy.

Discharge advice

Advise the patient to take regular analgesia and stay off school for 1 week.

Grommet insertion

Indications

The patient may present with glue ear, recurrent acute otitis media and/or persistent middle ear effusion. They may have Eustachian tube dysfunction. Rarely, the patient may be undergoing hyperbaric oxygen therapy and cannot equalize pressure.

Pre-operative checks

Check that the operation is still required and check tympanometry ± audiogram. Examine the patient's EAC to check access if the operation is being done under local anaesthetic.

Procedure

- Use a local or a general anaesthetic.

- If a local anaesthetic is used, EMLA cream should be instilled under microscope control. Wait for 60 minutes (send the patient for a cup of tea). Remove the cream by microsuction.
- Using a microscope, insert an ear speculum and identify the anteroinferior segment. Perform a radial myringotomy using a myringotome. Enough fluid is aspirated to allow the grommet to be inserted. The grommet is placed in the myringotomy hole with crocodile forceps, and then adjusted with a needle as required.
- If bleeding occurs, use steroid drops to help prevent the grommet blocking.

Post-operative care

Use minimal analgesia and give a course of steroid ear drops if there is bleeding at the time of insertion.

Complications

This procedure has very few complications. Occasionally, there may be an infective discharge. Treat this with antibiotic and steroid drops for 1 week.

Length of stay

This procedure is done as a daycase.

Discharge advice

Avoid swimming for 2 weeks. Many children will swim with grommets in place and have no problem, however precautions should be taken if discharge follows swimming. Use vaseline and cotton wool earplugs with a swimming hat when bathing. Use similar ear plugs for hair washing. Request a grommet check—community audiogram after 6 weeks—to see if there has been any improvement in hearing.

Septoplasty

Indications

The patient may present with nasal obstruction or may be having treatment for epistaxis. A bent septum can limit surgical access to the sinuses—a septoplasty may be needed to correct this before sinus surgery.

Pre-operative checks

Discuss the surgery, complications and the need for time off work with the patient. Examine their ENT system for associated features of rhinitis. Discuss their need for possible continuing treatment for associated rhinitis.

Procedure

Give a general anaesthetic, or a local anaesthetic if the patient is very infirm. Lay the patient supine with their head flexed on head ring. The patient's head should be tilted up.

The local anaesthetic and adrenaline mixture should be infiltrated into the septum. Approach the septum via a hemitransfixion incision. The mucoperichondrial flaps should be elevated and the cartilage repositioned. Resect gross deviations. The 1cm dorsal and anterior struts should be preserved to keep support. The incision should be sutured and the nose packed if necessary.

Post-operative care

Advise the patient to keep their head up and to avoid blowing their nose for 1 week. They should undertake minimal activity for 2 weeks.

Complications

There may be some bleeding.

Length of stay

Daycase or overnight stay.

Discharge advice

Avoid strenuous activity for 2 weeks. Nasal toilet with saline sniffs should be performed 4 times a day for 2 weeks.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 17

Ward Care

Pre-operative care

Pre-assessment

The process of pre-assessment has become established. In many units nurse-led pre-assessment clinics can identify problems ahead of the planned surgery date, thus avoiding costly delays in the operating schedule. These clinics can only run efficiently if there is good communication between the doctor, nurse, and the anaesthetist.

Protocols have been developed to ensure that only appropriate investigations are ordered, to avoid unnecessary expense.

Clerking

- Effective documentation is important for improved care and to fulfill medico-legal requirements.
- The minimum standard is a confirmation of the need for the surgery or investigation, an ENT examination, a list of medications with known allergies and a list of the results from any investigations ordered.
- Documentation of the consent process is usually provided by the consent form, which is kept in the patient's notes.

Investigations

- Any investigations ordered should be based on the protocol, and discussed with the anaesthetist
- The first step is ordering investigations; but most important is finding and documenting the results of the investigations.

Special considerations

Deep vein thrombosis (DVT) prophylaxis

The risk of DVT for all surgical patients should be classified as low/medium/high. This is determined by the length of surgery, the patient's underlying condition and their past thromboembolic history.

Low	Compression stockings
Medium	Compression stockings + LMW heparin + intra-operative compression boots
High	Stockings + LMW heparin/pneumatic + intra-operative compression boots.

Box 17.1 Low molecular weight heparin e.g. dalteparin sodium

Medium risk	2500U 1-2 hrs pre-op
	2500U every 24hrs until ambulatory
High risk	2500U 1-2 hrs pre-op
	5000U every 24hrs

Antibiotic prophylaxis

Antibiotics may be given to patients with pre-existing cardiac problems such as valve problems, or for patients who have had major head and neck surgery, to reduce the risk of post-operative infection and fistula formation.

- Cefuroxime 1.5g 8hrly for 5 days
- Metronidazole 500mg PR 8hrly 5 days

Diabetic patients

Diabetic patients should be placed first on the operating list. Take regular BM-stix to monitor sugar level. Use a sliding scale insulin regime until eating if insulin dependent.

Post-operative care

Documentation

It is important to document the patient's daily progress and ward round instructions. Any important changes during the day should also be documented. Use a system approach for major head and neck patients e.g. CVS/RS/nutrition etc.

Drain care

Monitor drainage for a 24 hour period. Remove when it has drained less than 30ml in a 24 hour period. If the drain loses its vacuum or becomes ‘devacced’, examine drain position, change the drain bottle for a new one, and consider pressure to the wound or connect the drain to continuous low pressure wall suction.

Nutrition/fluid balance

Involve dietician for long term feeding requirements.

Fluid and electrolytes

Calculate 24 hour maintenance fluid requirements by the patient's weight:

- 0-10kg 100ml/kg per 24hrs
- 11-20kg 1000ml + 50ml/kg/24hrs

- 20kg+ 1500ml + 20ml/kg/24hrs

This volume of fluid requires a composition of 1-2 mEq of Na^+ and 0.5 mEq K^+ per kg/24hrs.

- 1 litre N/saline contains 154mEq of Na^+
- 1 litre D/saline contains 77mEq of Na^+

Maintenance is best undertaken with dextrose/saline to avoid sodium overload plus addition of 20mmol/L of K^+.

- **Properly kept fluid balance charts are essential in order to monitor the patient's fluid input and output.**

Calories

Post-operative patients require between 40 and 70 Kcal per kg per day. Most ENT patients will be able to be fed either via the mouth or via a nasogastric tube—enteral feeding.

Monitoring intake of calories and other vital substances

- Check weight daily
- Keep a food record chart
- Do regular urinalysis for glucose
- Check levels of FBC, calcium, magnesium, phosphate, zinc, LFTs, U+Es as required.
- Vitamins trace elements screen.

Box 17.2 How to unblock a blocked nasogastric tube

- Flush with water
- Flush with soda water
- Flush with a 5% sodium bicarbonate solution
- Aspirate tube with empty syringe

- Flush tube with smaller syringe
- Use Creon powder with sodium bicarbonate to flush the tube.

Care of myocutaneous flaps

It is very important to monitor the viability of these flaps accurately. Often patients are nursed on wards with limited plastic surgery expertise.

- Ask your local plastic surgeon about the post-operative protocol for the care of free flaps.

General principles

- Maintain intravascular volume
- Maintain oxygen carrying haematocrit but not polycythaemia
- Monitor flap appearance by using a flap chart
- Monitor blood supply e.g. Doppler flow.

Protocol example

- Keep pulse <100
- Maintain systolic BP >100mmHg
- Keep urine output >35ml/hr
- Aim for haemoglobin level of 8.5-10.5g/dl
- If haematocrit <25 give blood
- If haematocrit >35 give colloid

Flap observations

- Doppler and colour observations
- Every 30 min for the first 4 hours, then
- Every hour for the next 48 hours, then

- Every 2 hours for the next 48 hours

Tracheostomy care

The formation of a tracheostomy causes some physiological problems; mainly because it bypasses the nose. The initial requirements of inspired air are humidification, warming and filtering. After 48 hours the mucous glands in the trachea hypertrophy and help in this process.

Irritation caused by the tube

- The presence of the tube can cause coughing and excess secretion from the bronchopulmonary tree.
- Regular suction and inner tube cleaning may be needed as often as every 30 minutes in the initial stages.

Securing the tube

The first tube is usually sutured to the skin to prevent dislodgement. Tapes are then applied, unless there is a free flap where the feeding vessels may be occluded.

In the first week after a tracheostomy the tube should be treated very carefully to prevent dislodgement. The tract between the skin and the trachea is poorly developed and tube displacement during this time could be catastrophic.

▶ *Important*

Always keep a spare tracheostomy tube and tracheal dilators by the bedside of tracheostomy patients.

Communication with patients and relatives

This is a very important area and one that can cause difficulties. Always treat patients and relatives as you would expect to be treated in a similar situation.

Communication is not just about sitting down and talking with a

patient. It can be as informal as saying good morning in the corridor, or smiling at a patient in a bed near the nurses' station.

Basic principles

- Read the patient's notes thoroughly and be prepared before any formal talk with a patient or their relatives.
- Speak to the nurse looking after the patient for any relevant information.
- Take the nurse with you as a witness or mediator.
- Always speak plainly and try to be honest.

▶ If you are kind and courteous you will have few problems.

P.374

Discharge planning

- There is always pressure to discharge patients from the ward with the greatest of haste. Prior planning, often before surgery, can help with this process.
- Nursing staff have good protocols—so liaise with them and seek their advice.

General points

Consideration of the following questions will help in planning effective discharge:

- Is the patient fit to leave—are they orientated, mobile and pain free?
- Is the patient's nutritional support catered for?
- Is their wound satisfactory?
- Does the patient need transport?
- Do they have enough medication—both that prescribed in hospital and their regular medication?
- Do any medications need monitoring—such as warfarin?

- Does the patient's GP need to know that the patient is leaving hospital before the discharge letter arrives?
- Is a district nurse required?
- Is outpatient follow up organised?

Authors: Corbridge, Rogan; Steventon, Nicholas
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Chapter 18

Allied Health Professionals

Who are allied health professionals?

This term covers a number of different professional groups including:

- Audiologists
- Hearing therapists
- Speech and Language Therapists (SALT)
- Head and Neck Specialist Nurses
- Dietician
- Aural Care Nurse.

They all have different roles and these are explained in the following pages.

Modern ENT practice has become multidisciplinary and the involvement of these professionals, alongside members of the medical team, has enhanced patient care significantly.

There are many other personnel who are equally important to patient care such as physiotherapists and occupational therapists. These are not discussed in this handbook.

▶ It is important to use these professional services properly. Get to know the names of the staff in your department, and find out their particular skills and interests. Try to sit in on their clinics to obtain first hand knowledge of their areas of expertise.

Communicate with these other professionals and give them the respect that their expertise deserves.

The audiologist

The majority of an audiologist's work is with older people and young children. These age groups comprise the majority of hearing problems. The audiologist has a wide-ranging role, encompassing many aspects of patient care.

The main duties of an audiologist are:

- To assess hearing problems
- To rehabilitate hearing loss with aids
- To assess balance disorders
- To rehabilitate balance disorders
- To give counselling for hearing problems.

Many audiologists specialise within the field of audiology. Particular specialities include:

- Paediatric audiology
- Cochlear implant rehabilitation.

The role of the audiologist is extended to allow for liaison with peripatetic services in the community. A child of school age will require support in school if their hearing loss has an educational impact. The audiologist can provide an effective route of communication between the school and the ENT department.

▶ You will need to understand audiological tests and investigations, as they are an important aspect of ENT care. Audiologists are able to offer advice on appropriate tests and their interpretation.

Every practicing otolaryngologist should be able to perform an audiogram and a tympanogram. This is important for clinical practice, in particular, for out of hours assessment when no audiological staff are available. Watching an experienced audiologist perform an

audiogram is a good way to become familiar with the technique.

The hearing therapist

This profession has evolved from duties previously undertaken in the audiology department. Many hearing therapists are fully trained audiologists.

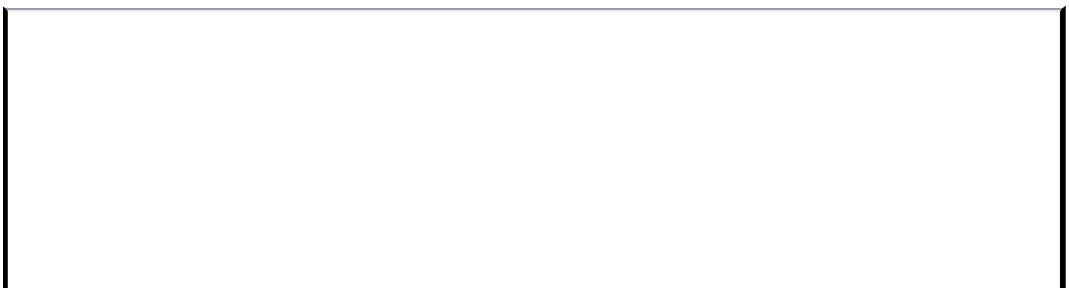
The duties of a hearing therapist can include:

- Tinnitus counselling
- Auditory training
- Counselling for people with hearing impairment
- Supportive counselling for families
- Providing lipreading advice.

The hearing therapist can spend a considerable amount of time with each patient. This allows for an in-depth discussion of a person's difficulties. This can help to improve the quality of life of affected individuals.

Vestibular rehabilitation

Many patients have vestibular dysfunction arising from the causes discussed in Chapter 13. Central compensation for these problems is often complete and unaided. However, a large number of patients have problems in fully compensating for this type of problem. Their symptoms are often compounded by psychological problems caused by the fear of experiencing a vertigo attack. Targetted exercise programmes combined with counselling by a hearing therapist can overcome these difficulties.



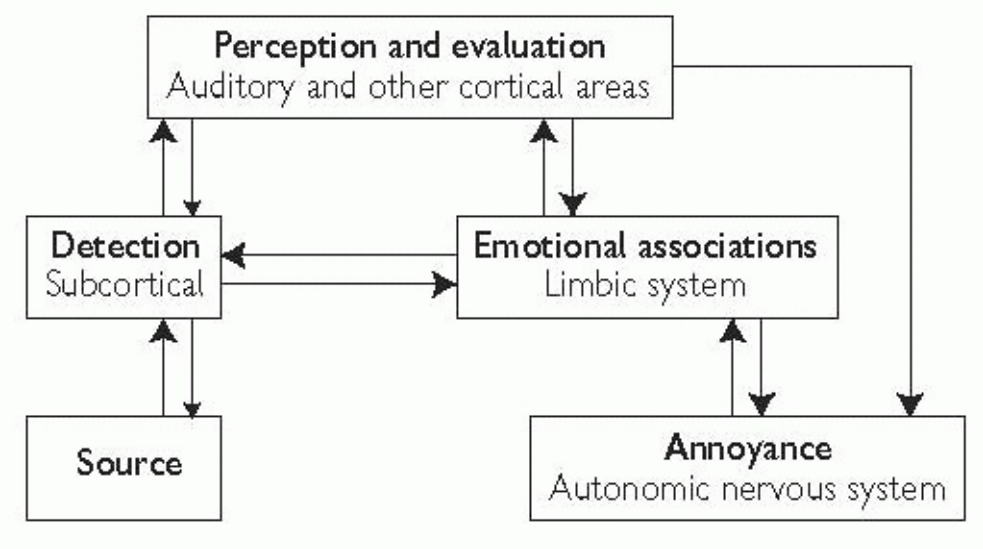


Fig. 18.1. Tinnitus retraining-diagram of model

Speech and language therapists (SALT)

Speech and language therapists have an important role to play in some ENT conditions. Many patients who are under the care of the ENT department will need specialist input from the SALT team. A major component of their work is dealing with swallowing disorders.

The main duties of a speech and language therapist are:

- Managing communication disorders. This includes:
  - Assessing the communication capacity of a patient
  - Helping to determine the prognosis for regaining speech
  - Determining the patient's need for communication and the aids required
  - Providing appropriate advice.
- Managing dysphagia. This includes:
  - Assessing the type of swallowing problem
  - Assessing the risk of aspiration

- Assessing possible interventions.

As well as their general duties, the SALT team form part of the multidisciplinary team managing patients with head and neck cancer and voice disorders.

Voice rehabilitation after laryngectomy

Patients undergoing laryngectomy often fear that they will be unable to communicate after surgery. SALTs may help by introducing patients who have already undergone surgery to demonstrate the range of options for rehabilitation. The options for communication after surgery can include:

- Pen and paper
- Magnetic writing tablets such as Etch-a-sketch
- Oesophageal speech
- Electric larynx
- Tracheo-oesophageal valves.

The head and neck specialist nurse

This nurse specialist is often the glue which holds the head and neck cancer multidisciplinary team together. The role of the head and neck specialist nurse spans the whole of patient care from diagnosis to pre-operative planning to follow up.

These nurses are uniquely placed to manage patient care; their job flexibility allows them to be active in the community and to extend their care into the home environment. Patients will often view the head and neck nurse as their first point of contact. They are involved early on at the diagnosis stage, up to the patient's final discharge from the clinic.

The main duties of the head and neck specialist nurse are:

- Counselling the patient and their family
- Explaining and giving information on every aspect of care

- Liaising with other members of the multidisciplinary team
- Assessing the suitability of care options—for example, how the patient might cope with radical surgery
- Mobilising support from the family and community services.

Background of head and neck specialist nurses

These are usually very experienced senior grade nurses from head and neck specialties. They will have had previous responsibility, usually at ward sister/charge nurse level. They will have have a degree level qualification and experience in head and neck or oncological care.

They will also have good counselling skills and the personality to cope with this demanding job.

Extended roles

A head and neck specialist nurse may also have additional roles:

- Nurse trainer
- Research co-ordinator
- Protocol design
- Independent follow-up clinics.

Dietician

From a nutritional point of view, head and neck cancer patients present a wide variety of challenges. The dietician is an extremely important member of the multidisciplinary team.

The main duties of a dietician are:

- To assess the nutritional status of patients
- To identify specific nutritional concerns
- To plan dietary interventions
- To monitor the patient's response to an intervention.

On-going research is often an important part of a dietician's role. For example, the role of salicylates in patients with ASA triad and nasal polyps.

Specific problems and areas of work dealt with by a dietician:

- Pre-operative malnutrition
  - Due to dysphagia from primary tumour
  - Cachexia of malignancy
  - Associated alcohol abuse
- Planning pre-operative feeding regime
- Planning pre-operative route of nutrition such as PEG/NG tube
- Post-operative nutrition
  - Avoiding re-feeding syndrome
  - Managing nutrition in the absence of swallowing
  - Non functioning alimentary tract
  - Intolerance to enteral nutrition
  - Electrolyte disturbance
- Discharge planning
- On-going care including liaising with community nurses and the patient's family
- Dietary review in outpatients.

Box 18.1 Houseman's tip

Dieticians often have essential knowledge of electrolyte replacement and supplementation. This expert knowledge can help in planning nutritional requirements for the optimum care of patients. They will also give advice about the frequency and type of investigations needed to monitor these parameters.

Aural care nurse

Aural care nurses provide an important service in the management of ear disorders and have taken on many aspects of otological care. They are trained to recognise problems in the ear canal and the tympanic membrane. They are also skilled in using the operating microscope. Shared care of patients is important and these nurses should be supervised by, or in close contact with, an otologist.

Areas of expertise of an aural care nurse include:

- Wax removal
- Pre and post-operative care of patients undergoing ear surgery
- Continued aural care for chronic ear disorders
- Diagnosis and management of otitis externa
- Treatment of mastoid cavity problems.

The aural care nurse's efficient management of these conditions—which represent a large amount of clinical otological practice—has led to increased capacity in the outpatient department.

Aural care nurses are graded 1-3 depending on their level of experience. Grade 3 aural care nurses are able to undertake the full range of aural care from a simple de-wax to the maintenance and cleaning of complex ears with distorted anatomy.

Areas of potential for extending the role of aural care nurses are:

- Direct referral from GP or A&E
- Nurse prescribing
- Research and development
- Guideline and protocol development.

▶ Time spent working and learning from an aural care nurse can help you develop the skills necessary to perform ear surgery. Experience in using instruments with the operating microscope significantly enhances hand and eye co-ordination.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 19

Practical Procedures

How to cauterize the nose

Always ensure that you have performed adequate first aid steps before attempting to pack or cauterize the nose (see Chapter 20, p.418).

Procedure

- Apply one or two cotton buds or a dental roll soaked in 1:200,000 adrenaline or 5% cocaine solution to the area, and apply pressure for at least two minutes.
- Silver nitrate sticks may be applied to the bleeding point for one or two seconds at a time. Avoid using this form of cautery if the nose is actively bleeding since the blood will simply wash the chemical away. In addition to being ineffective, this will cause unwanted burns to the lip, nose or throat. Instead, wait for the vasoconstrictive effects of the cocaine to work, then apply pressure to the bleeding point. This will nearly always stop the bleeding temporarily before cautery.
- Apply the silver nitrate in a circle starting a few mm from the bleeding point. This will allow any feeding blood vessels to be dealt with prior to cauterizing the main bleeding vessel.
- It may be necessary to reapply the adrenaline or cocaine soaked cotton wool to reduce the bleeding between attempts at cautery.
- If the nose is still bleeding reapply pressure, and consider packing

the nose.

- Electro or hot wire cautery may be used to good effect in experienced hands.

How to pack the nose

N.B. always ensure that you have performed adequate first aid steps before attempting to pack or cauterise the nose (see Chapter 20, p.418).

When packing the nose, the aim is to put pressure on the bleeding vessel and prevent an active haemorrhage, so that the normal thrombotic mechanisms can act. Nasal packs are usually left in place for 24-48 hours. They must be secured anteriorly to prevent them falling back into the airway. Prophylactic antibiotics are often used. Patients should be admitted and are often lightly sedated. Different methods and materials are used to pack the nose.

Anterior nasal packing

Nasal tampons

Nasal tampons are the simplest way to pack the nose (see Fig. 19.1.). They consist of a dry sponge, which is placed into the nasal cavity and then hydrated with water or saline. The sponge then dramatically increases in size, putting pressure on the bleeding area. The nasal tampon should be lubricated with a little antibiotic cream (Naseptin). Then simply lift the tip of the nose and slide the tampon into the nasal cavity ensuring that it is passed parallel to the floor of the nose and not towards the top of the head. A little water or saline is then dripped onto the tampon, which is secured by taping the attached string to the face.

BIPP packing

In this procedure, bismuth iodine and paraffin paste is used to impregnate a length of ribbon gauze. This mixture is antiseptic. Some skill and a good light is needed to place this form of nasal pack

effectively. Topical analgesia such as cocaine spray is essential prior to packing.

Posterior nasal packing

Epistaxis balloon or urinary catheter

A variety of special nasal balloons are available (see Fig. 19.2.). They are easy to insert and are particularly helpful when the bleeding point is posterior. A Foley urinary catheter is also effective. This is passed into the nasopharynx, inflated and then pulled anteriorly so that it occludes the posterior choana. It is prevented from slipping back into the nasopharynx or mouth by means of a clamp, which is placed at the nasal vestibule. It is important to put some padding between the skin and a clamp to ensure no pressure damage is caused. Additional anterior nasal packs may be inserted as above where needed.

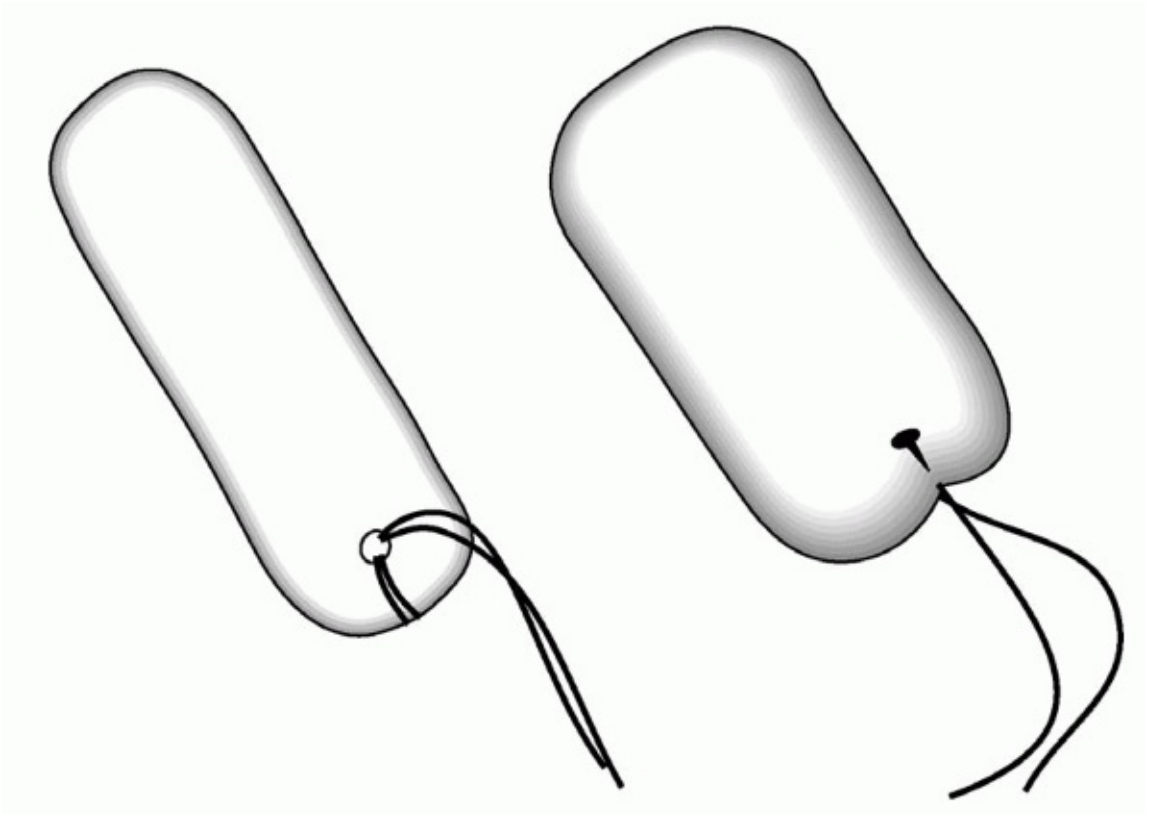


Fig. 19.1. Nasal tampons

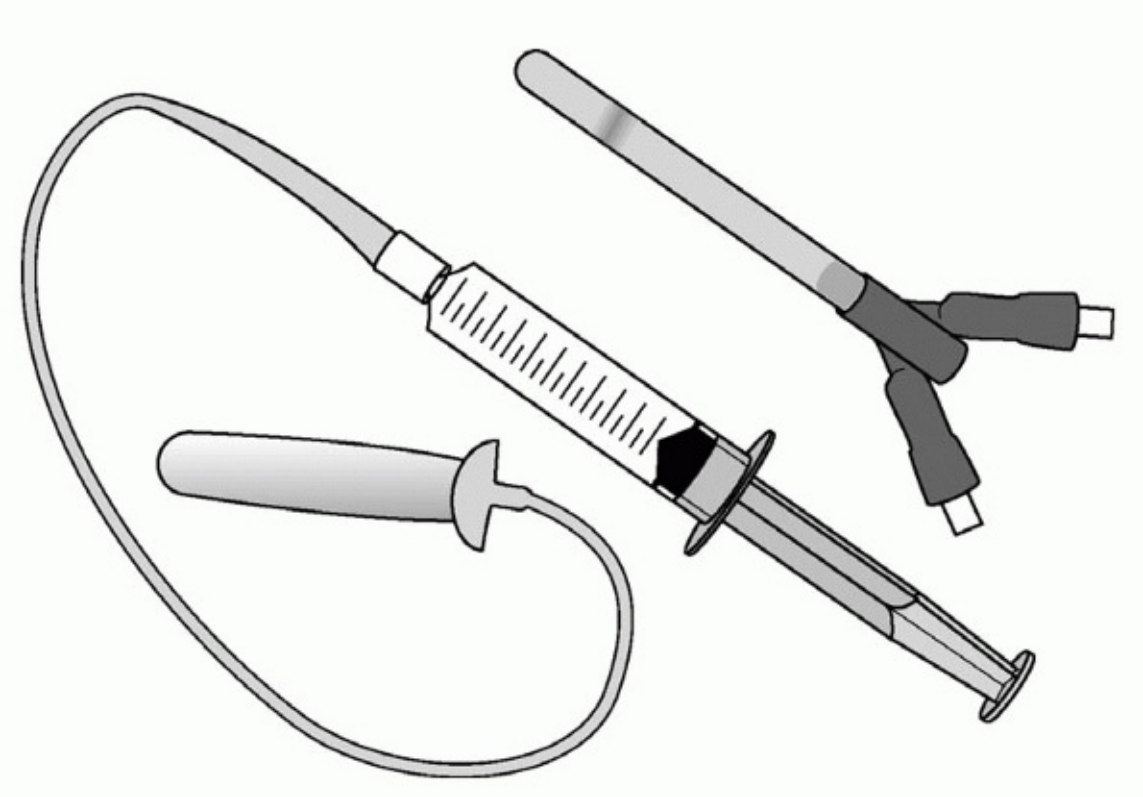


Fig. 19.2. Epistaxis balloons

How to remove foreign bodies

You will need

- A good light
- A cooperative patient
- Good equipment.

The first attempt will usually be the best tolerated. If you are not confident that you will be able to remove the foreign body, refer to ENT for more experienced help.

Foreign bodies in the ear

Signs and symptoms

- Pain
- Deafness
- Unilateral discharge
- Bleeding
- May be symptomless.

Management

- Children will usually require a general anaesthetic unless they are remarkably cooperative.
- Insects may be drowned with olive oil.
- Syringing may be used if you can be certain there is no trauma to the ear canal or drum.
- Use a head lamp or mirror, an operating auroscope or an operating microscope.
- Soft foreign bodies such as cotton wool may be grasped with a pair of crocodile or Tilley's forceps.
- Solid foreign bodies such as a bead, are best remove by passing a wax hook or Jobson-Horne probe beyond the foreign body and gently pulling towards you.

Refer to senior staff ± GA if:

- Failed attempt
- Uncooperative child
- Suspected trauma to the drum.

Foreign bodies in the nose

Signs and symptoms

- Unilateral foul smelling discharge
- Unilateral nasal obstruction
- Unilateral vestibulitis
- Epistaxis.

Management

- An auroscope can easily be used to examine a child's nose.
- Ask the child to blow their nose if they are able.
- Solid foreign bodies such as beads are best removed by passing a wax hook or Jobson-Horne probe beyond the foreign body and gently pulling it towards you. Avoid grasping the object with a pair of forceps, since this may simply push it further back into the nose or airway.
- Soft foreign bodies may be grasped and removed with crocodile or Tilley's forceps.

Refer to senior staff if:

- Failed removal
- Uncooperative child.

Foreign bodies in the throat

See also Oesophageal foreign bodies, Chapter 20, p.428. The cause is often fish, chicken or lamb bones.

Signs and symptoms

- Acute onset of symptoms (not days later)

- Constant pricking sensation on every swallow
- Drooling
- Dysphagia
- Localised tenderness in the neck, if above the thyroid cartilage then look carefully in the tongue base and tonsil regions
- Pain on rocking the larynx from side to side
- Soft tissue swelling.

Management

- Use a good light to examine the patient.
- Anaesthetise the throat using Xylocaine spray.
- Try feeling for a foreign body (FB) even if you cannot see one in the tonsil or tongue base.
- Flecks of calcification around the thyroid cartilage are common on X-ray.
- Perform an AP & lateral soft tissue X-ray of the neck looking for foreign bodies at the common sites (see Fig. 19.3.). Pay particular attention to the:
  - Tonsil
  - Tongue base/vallecula
  - Posterior pharyngeal wall.
- Tilley's forceps are best for removing foreign bodies in the mouth.
- McGill's intubating forceps may be useful for removing foreign bodies in the tongue base or pharynx.

Refer for endoscopy under GA in case of:

- Airway compromise—**URGENT**
- Failed removal

- Good history but no FB seen
- X-ray evidence of a FB.

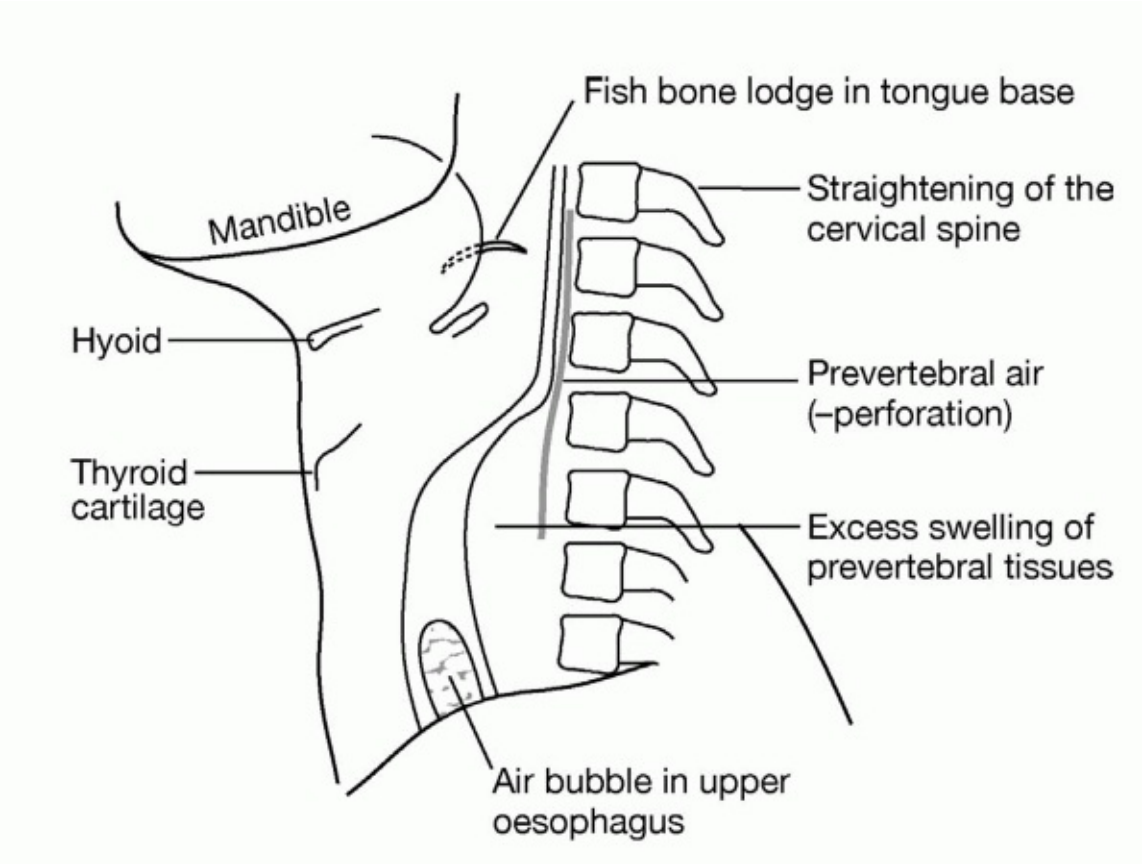


Fig. 19.3. Lateral soft tissues X-ray of the neck

How to syringe an ear

See Fig. 19.4. Check that the patient has no previous history of TM perforation, grommet insertion, middle ear or mastoid surgery.

Procedure

- Warm the water to body temperature
- Pull the pinna up and back

- Use a dedicated ear syringe
- Aim the jet of water towards the roof of the ear canal
- STOP if the patient complains of pain.

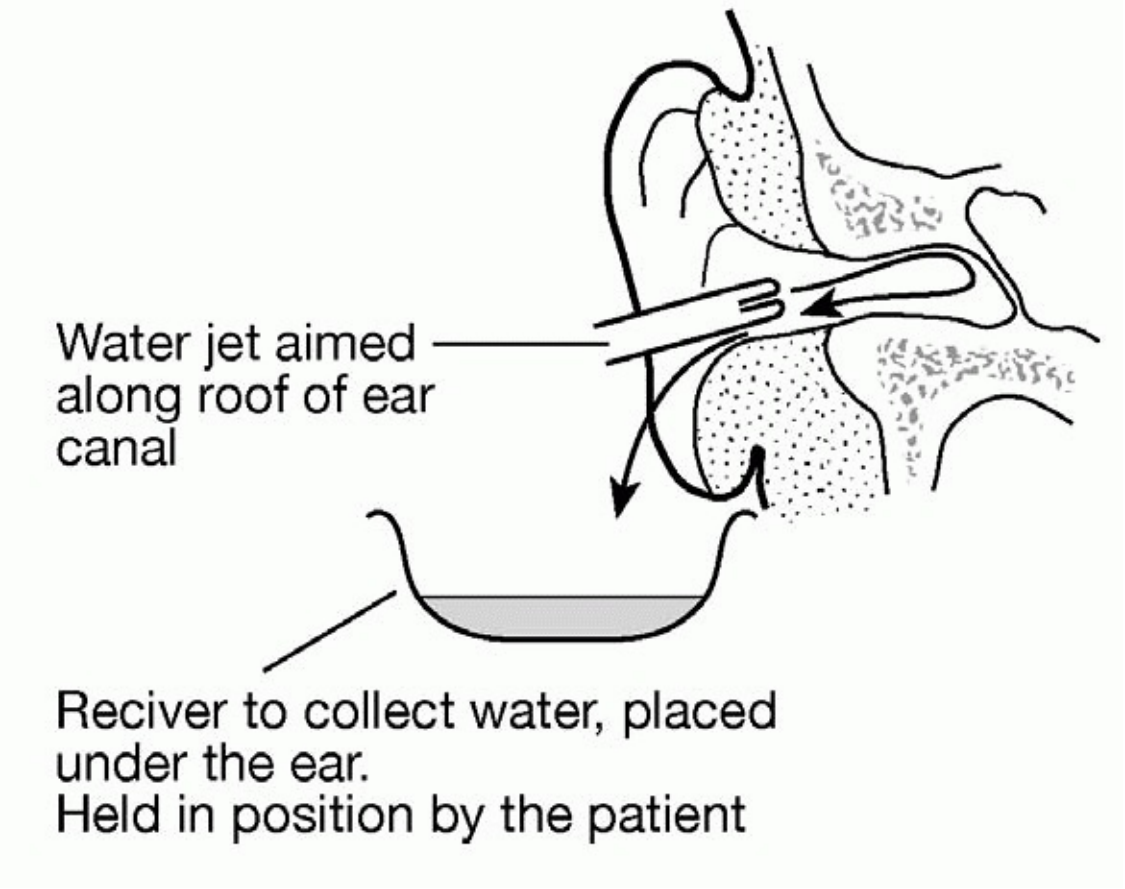


Fig. 19.4. How to syringe an ear

How to dry mop an ear

A dry mop should be performed in any ear which is discharging, before topical antibiotics and steroid ear drops are instilled.

Procedure

- Tease out a clean piece of cotton wool into a flat sheet
- Twist this onto a suitable carrier such as an orange stick, a Jobson-Horne probe, or even a clean matchstick see Fig. 19.5
- Gently rotate the soft end of the mop in the outer ear canal
- Discard the cotton wool and make a new mop—continue until the wool is returned clean

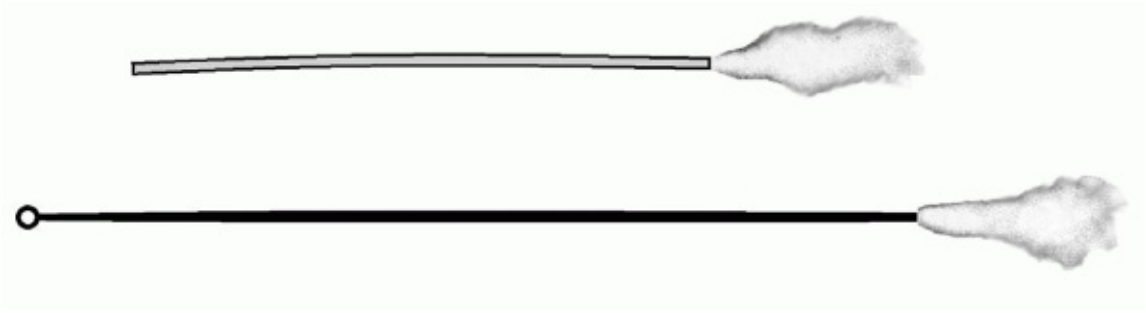


Fig. 19.5. Diagram of an ear mop

How to instill ear drops

See Fig. 19.6.

Procedure

- Lie the patient down with the affected ear uppermost
- Straighten the ear canal by pulling the pinna up and back
- Squeeze in the appropriate number of drops
- Use a gentle pumping motion of your finger in the outer ear canal. This will encourage the drops to penetrate into the deep ear canal.

Consider using an ‘otowick’. This is like a preformed sponge and it acts

as a reservoir, helping to prevent the drops leaking out of the ear canal. An otowick is particularly useful in otitis externa.

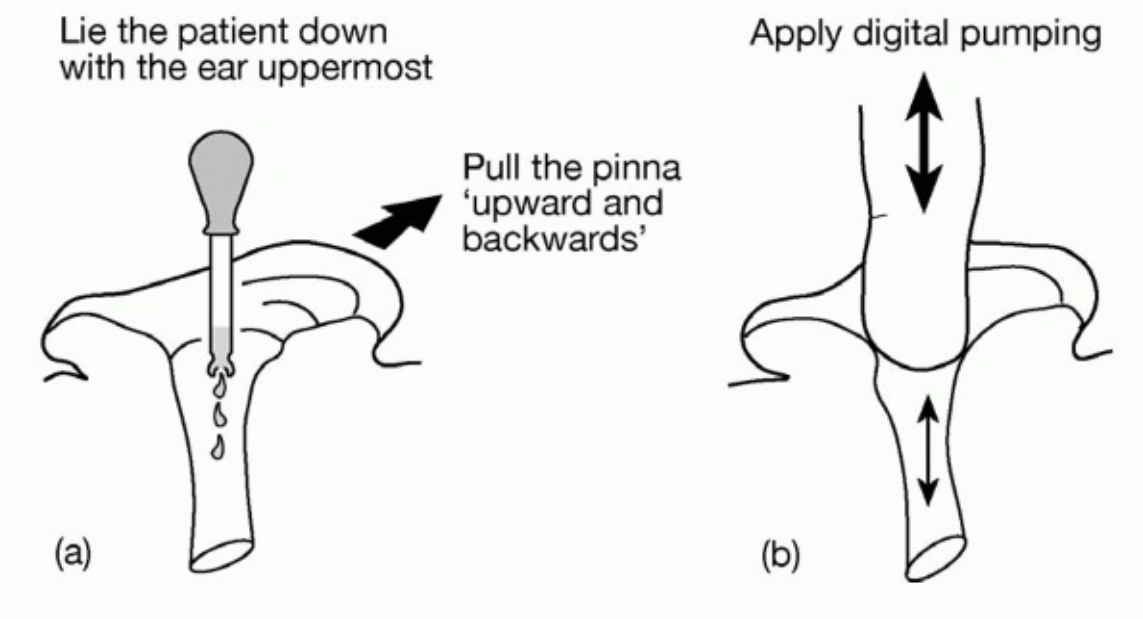


Fig. 19.6. How to instill ear drops

How to drain a haematoma of the pinna

This usually occurs after direct trauma to the pinna. It is often caused by a sports injury such as boxing or rugby. If left untreated it may leave a permanent deformity such as a 'cauliflower' ear.

Do not neglect the associated head injury which may take priority over the ear injury.

Procedure

- Aspiration may be satisfying, but the collection nearly always reforms, so it is probably best avoided.
- Refer for drainage in sterile conditions.
- Incise the skin of the pinna under local anaesthesia in the helical

sulcus (see Fig. 19.7.).

- Milk out the haematoma.
- Do not close the wound.
- Apply pressure to the ear to prevent recollection. Either by packing the contours of the ear with proflavine or saline soaked cotton wool, and apply a head bandage. Alternatively use a through and through mattress suture tied over a bolster or dental roll.
- Give antibiotics.
- Review in 4-5 days.

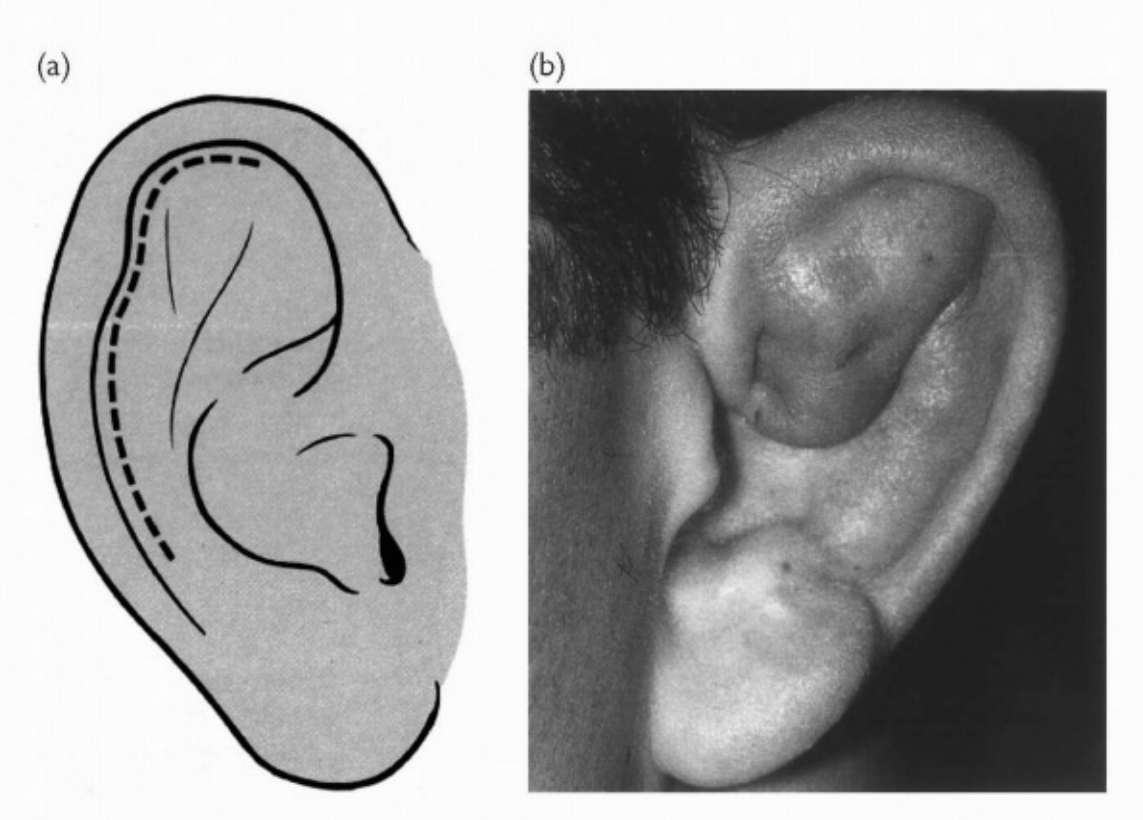


Fig. 19.7. Haematoma pinna incision

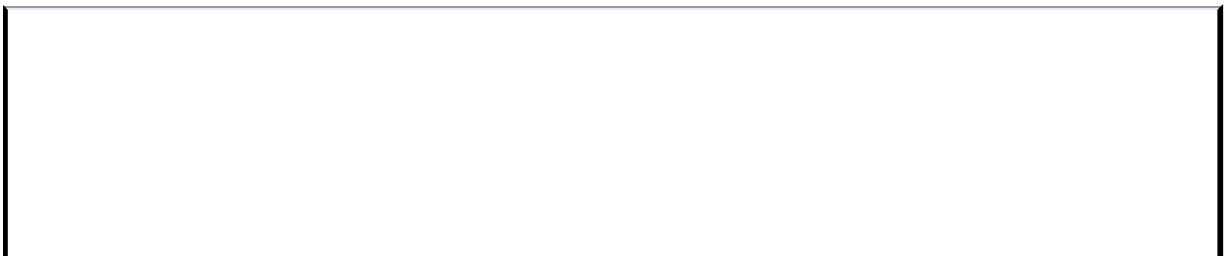
How to drain a quinsy

Signs and symptoms

- Sore throat—worse on one side
- Pyrexia
- Trismus
- Drooling
- Fetor
- Peritonsillar swelling
- Displacement of the uvula away from the affected side (see Fig. 19.8.).

Procedure

- This procedure usually requires admission.
- Re-hydrate with IV fluids.
- IV antibiotics.
- Spray the throat with xylocaine or inject lignocaine into the mucosa as shown.
- Lie the patient down.
- Get a good light and a sucker.
- Use a 5ml syringe and a large bore needle or IV cannula to perform 3 point aspiration (see Fig. 19.8.).
- Send any pus obtained to microbiology.
- Reserve incision for those cases which recur or fail to resolve within 24 hrs.



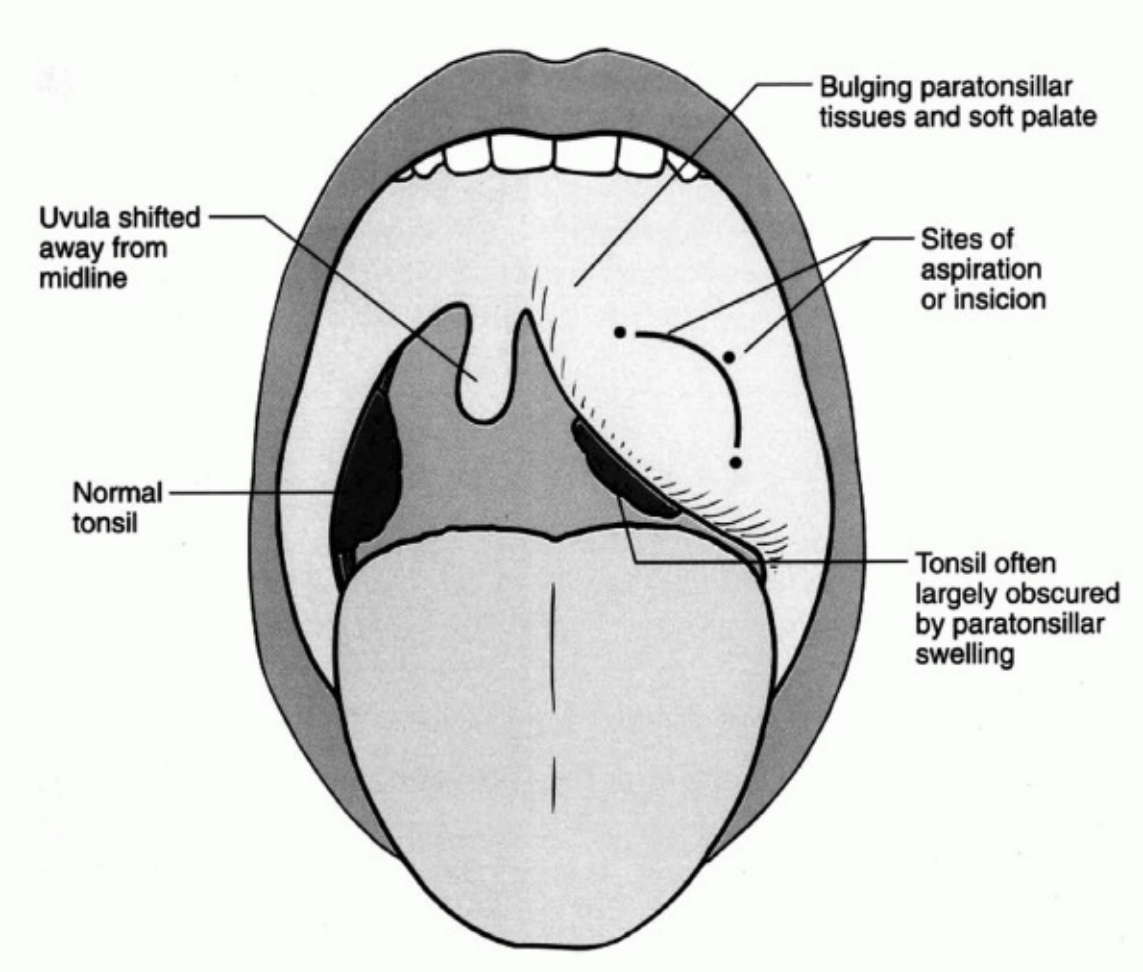


Fig. 19.8. Quinsy/incision/aspiration

How to perform fine needle aspiration cytology (FNAC)

Procedure

- Lie the patient down
- Clean the skin with alcohol
- Fix the lump between finger and thumb
- Use a fine needle (blue or orange) attached to a 10ml syringe

- Pass the needle into the lump
- Apply suction
- Move the needle back and forth through the lump using small vibration type movements—this can prevent contamination by sampling other tissues
- Make some rotary movements in order to remove a small core of tissue
- Release the suction
- Then remove the needle
- Detach the needle from the syringe and fill it with air
- Replace the needle and expel the contents onto a microscope slide
- Remove the needle and repeat as necessary
- Check the inside of the barrel of the needle for any tissue which may have become lodged there
- Take a second slide and place it on top of the first, sandwiching the sample between the two
- Briskly slide the two apart, spreading the sample thinly and evenly
- Fix and label the slides.

Emergency airway procedures

(See Chapter 8, p.184)

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 20

ENT Emergencies

Epistaxis

Epistaxis, or a nosebleed, is a common problem, which will affect most of us at sometime in our lives. It is usually mild and self-limiting.

Causes of epistaxis

Local causes

- Nose picking
- Idiopathic
- Trauma
- Infection
- Tumours.

Systemic causes

- Hypertension
- Anticoagulant drugs
- NSAIDs
- Coagulopathy (haemophilia, leukaemia, DIC, Von Willebrand's disease)

- Hereditary haemorrhagic telangiectasia (an inherited condition with a weakness of the capillary walls leading to haemangioma formation).

The anterior part of the nasal septum is the most frequent site for bleeding. It has a rich blood supply and a propensity for digital trauma. This part of the nose is known as Little's area (see Fig. 20.1.).

Firstaid for epistaxis

See Fig. 20.2. The patient should be advised to:

- Lean forward
- Pinch the fleshy part of the nose (not the bridge) for 10 minutes
- Avoid swallowing the blood
- Put an icepack on the nasal bridge
- Suck an ice cube.

Resuscitation

- Assess blood loss
- Take the pulse
- Measure the blood pressure
- Gain intravenous access
- Set up intravenous infusion
- Full blood count
- Group and save.

See How to cauterize/pack the nose, pp.394-6.

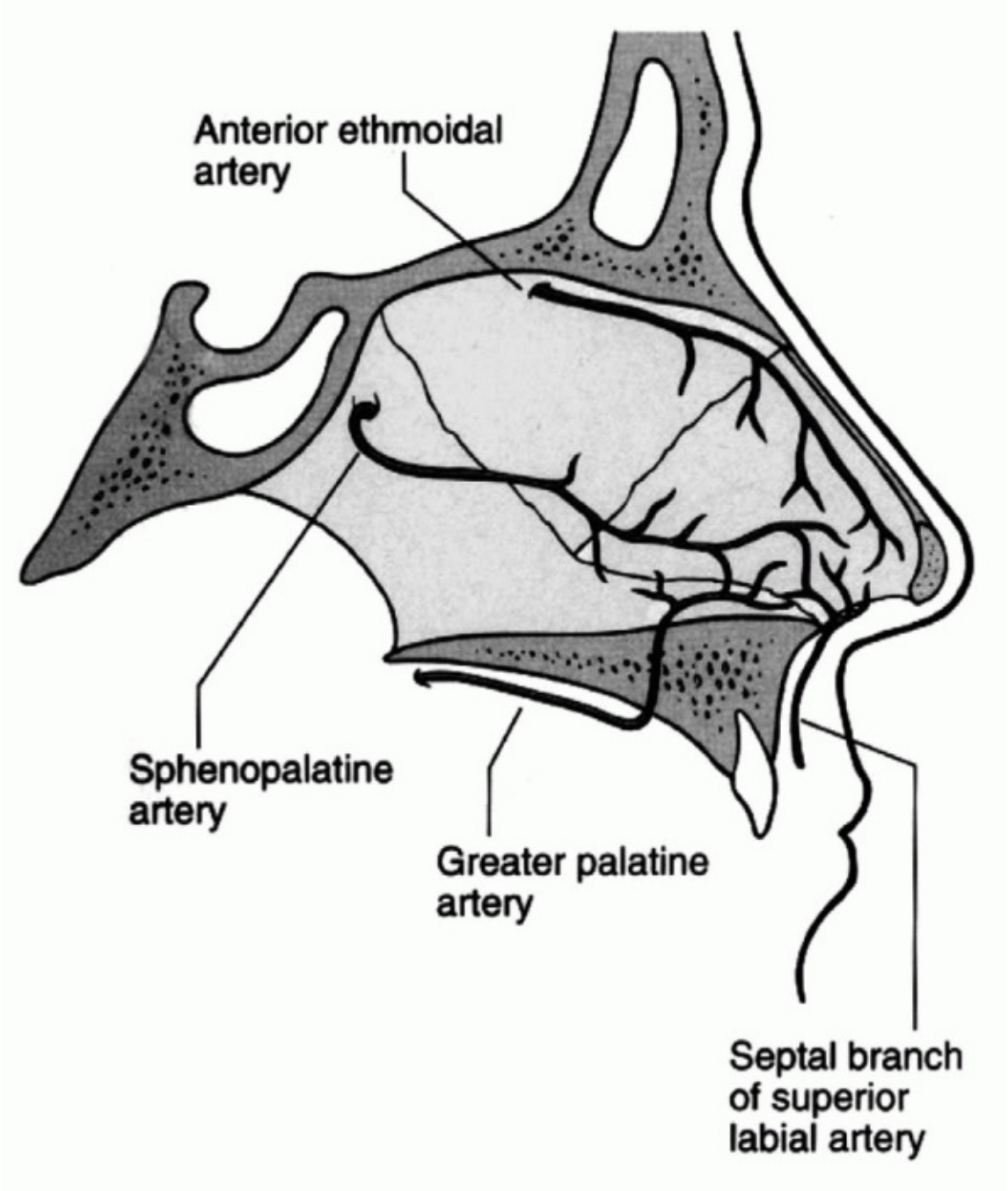


Fig. 20.1. Little's area

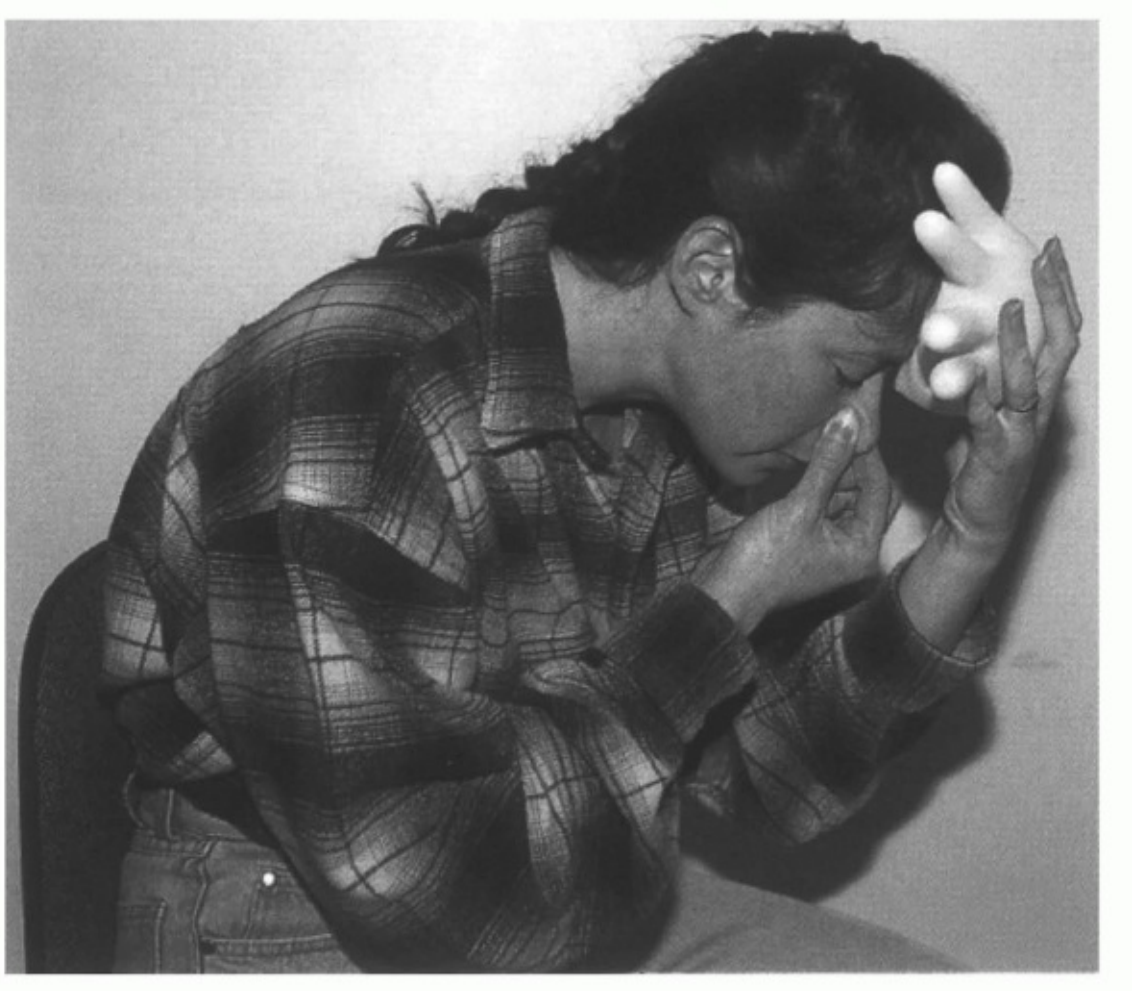


Fig. 20.2. Epistaxis first aid

Sudden onset hearing loss

Acute sensorineural hearing loss (SNHL) is an ENT emergency. It usually has an acute onset and is sometimes associated with balance disturbance.

Investigations

- Take a full drug history
- Exclude head or acoustic trauma

- Check the ear canal to exclude wax
- Check the ear drum to exclude glue ear
- Tuning fork tests:
  - Weber goes to other ear
  - Rinne AC>BC in affected ear
- Audiogram confirms hearing loss and no air/bone gap
- ESR and auto-antibodies—may be abnormal if there is an auto immune cause for the hearing loss
- MRI to exclude acoustic neuroma—request this as a routine priority unless there is associated neurology.

Management

If the patient presents within 24-48 hours of onset try empirical treatment as below, but there is little evidence base to support it:

- Admission for bed rest
- Oral steroids (prednisolone 60mg)
- Oral betahistine
- Acyclovir
- Carbogen gas (a mixture of CO_2 and O_2 given for 5min inhalation per waking hour)
- Daily audiograms.

If there is any improvement in the hearing at 48 hours, continue with the treatment. If not, discharge on a reducing course of prednisolone and acyclovir.

- Give a two week outpatient assessment and re-test the hearing.
- Chase blood and/or MRI results. Consider a hearing aid referral.

Facial palsy or VII nerve palsy

Examination of the patient will reveal if the palsy is upper or lower motor neurone type. The House-Brackmann scoring system is frequently used to record the degree of facial weakness (see Box 20.1).

Upper motor neurone palsy

- Usually as part of a stroke (CVA)
- Forehead spared
- Look for other neurological signs.

Lower motor neurone palsy

- The entire face is affected, including the forehead
- Taste disturbance may be present as taste fibres run with the chorda tympani branch of the facial nerve.

Management

- General neurological and cranial nerve exam—to exclude other neurology
- Exclude serious head injury—fracture of the temporal bone may lead to disruption of the facial nerve in its intra-temporal section.
- Examine the ear—looking for cholesteatoma, haemotympanum or disruption of the drum or canal.
- Test the hearing.
- Check the parotid for lumps.

Causes of LMN facial palsy

- Bell's palsy
- Ramsay Hunt syndrome
- Acute otitis media
- Cholesteatoma

- CPA tumours such as acoustic neuroma
- Trauma
- Parotid gland malignancies

Bell's palsy: probably viral in origin, but the diagnosis is made by excluding the other causes shown above. Starting prednisolone (40-60mg) within 48 hours improves recovery rates. Prognosis is good, 80% of patients fully recover, although returning to full function may take months. As with other causes of facial palsy, the failure of complete eye closure can lead to corneal ulceration so eye drops or lubricating gel and an eye pad at night may be required. Refer the patient to ophthalmology.

Ramsay Hunt syndrome*:* due to herpes zoster infection of the facial nerve. The features are similar to Bell's palsy with the addition of vesicles on the drum/ear canal/pinna/palate. The prognosis is less good.

Box 20.1 House-Brackmann grading of facial palsy

1. Complete eye closure, normal movement
2. Complete eye closure, mild weakness, barely perceptible
3. Complete eye closure, obvious weakness
4. Incomplete eye closure, obvious weakness
5. Incomplete eye closure, flicker of movement
6. Incomplete eye closure, no movement.

Periorbital cellulitis

This is a serious and sight-threatening complication of ethmoidal sinusitis. Treatment should be aimed at the underlying sinus infection, although a combined approach should be followed with input from ENT and Ophthalmology.

Presentation

- Preceding URTI

- Swelling of the upper lid and periorbital tissues
- Difficulty opening the eye
- Pain around the eye
- ± nasal discharge.

Investigations

Look for:

- Proptosis
- Pain on eye movement
- Reduced range of eye movement
- Diplopia
- Change in colour vision (red goes first)
- Change in visual acuity.

Management

- Have a high index of suspicion. If you are concerned, get a CT scan
- Get an Ophthalmic opinion
- Take a nasal swab
- Start IV broad spectrum antibiotics (e.g. Augmentin)
- Order a CT sinuses coronal (and axial views through the orbits)
- Any compromise in visual acuity/colour vision or suggestion of an intra-orbital abscess requires urgent surgical intervention.

If you are treating conservatively, ensure that regular eye observations are performed, as these patients can progress quickly towards blindness.

Fractured nose

Any patient with a fractured nose must have sustained a blow or an

injury to the head. Direct trauma to the nose or face is usually from a punch, a clash of heads or a fall. Brisk but short lived epistaxis is common afterwards.

In patients with a nasal fracture always consider a head injury and/or cervical spine injury.

Investigations

The diagnosis is made on finding a new deformity to the nose, often with associated epistaxis, facial swelling and black eyes. Ask the patient if their nose has changed shape as a result of their injury. In the first few days after a nasal injury it can be difficult to assess if there is a bony injury due to the degree of associated soft tissue swelling.

- Try examining the patient from above and behind and looking along the nose from bridge to tip. See Fig. 20.3.
- X-rays are not required to make the diagnosis, but may be helpful in excluding other bony facial fractures.
- Exclude a septal haematoma by looking for a boggy swelling of the septum, which will cause total or near total nasal obstruction. This will require urgent treatment by incision and drainage in theatre.

Treatment

- Treat the head injury appropriately
- Administer first aid for epistaxis (see p.418)
- Consider nasal packing if the bleeding continues (see p.396)
- Clean and close any overlying skin injuries
- Make an ENT outpatient appointment for 5-7 days time. By then, much of the soft tissue swelling will have resolved, allowing assessment of the bony injury. If manipulation under anaesthetic (MUA) is required it can be arranged for 10-14 days after the original injury.

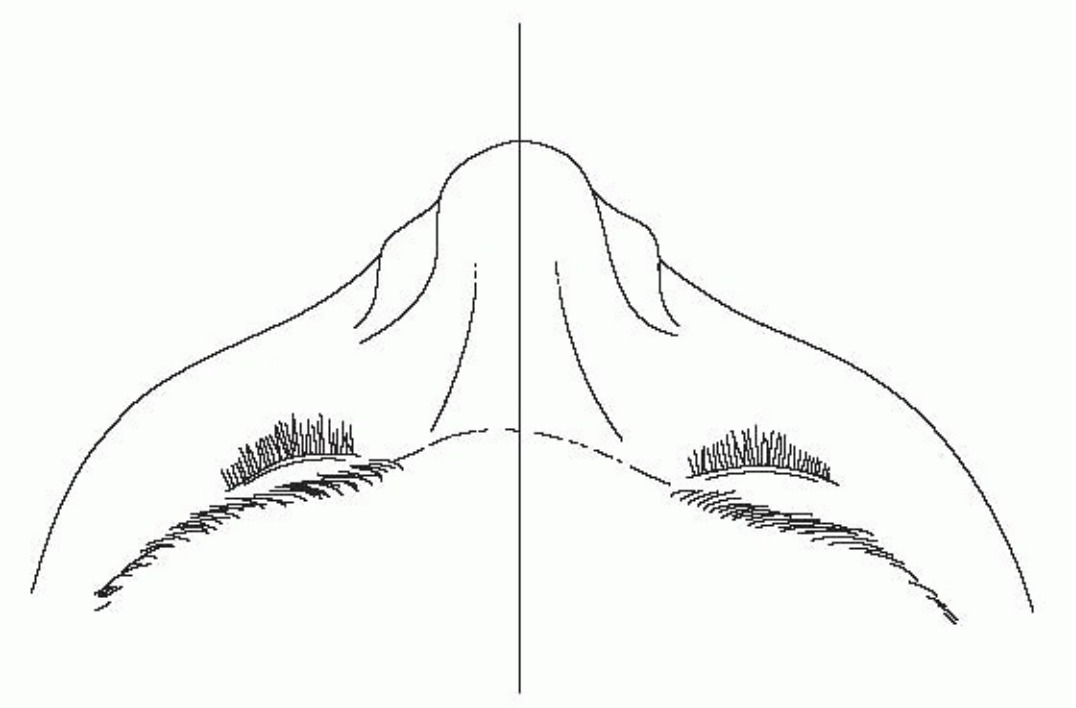


Fig. 20.3. Fractured nose examination (Nasal deformity is best appreciated by examining the patient from above + behind.)

Oesophageal foreign bodies

Foreign bodies often impact in the oesophagus. Most pass harmlessly, but hazardous and potentially life-threatening complications may arise. These include: para-oesophageal abscess, mediastinitis, airway obstruction, stricture formation and tracheo-oesophageal fistula.

Sharp foreign bodies carry a much higher risk of perforation. Take a good history to establish if the patient could have ingested a bone or something similar.

Signs and symptoms

- Immediate onset of symptoms
- Early presentation—hours not days

- Pain—retrosternal or back pain
- A feeling of an obstruction in the throat
- Drooling or spitting out of saliva
- Point tenderness in the neck
- Pain on rocking the laryngeal skeleton from side to side
- Hoarseness—rare
- Stridor—rare but serious.

X-ray findings (see Fig. 19.3, p.400)

- Order a plain soft tissue X-ray of the neck—lateral and AP.
- Not all bones will show on X-ray—so look for soft tissue swelling in addition to a radio-opaque object.
- Look for an air bubble in the upper oesophagus.
- Look for soft tissue swelling of the posterior pharyngeal wall—more than half a vertebral body is abnormal above C4 and more than a whole vertebral body below C4.
- If there is prevertebral air—the oesophagus has been perforated.
- Surgical emphysema is a sign of perforation.
- Loss of the normal cervical spine lordosis suggests inflammation of the pre-vertebral muscles due to an impacted foreign body or an abscess.

Treatment

Endoscopic removal under GA is often required, and is mandatory if there is any suggestion of a sharp foreign body. If the obstruction is a soft bolus, a short period of observation is appropriate with a trial of a fizzy drink (e.g. Coke-a-cola) and IV smooth muscle relaxants (Buscopan).

Secondary tonsillar haemorrhage

Bleeding which occurs 5-10 days after a tonsillectomy operation is known as a secondary tonsillar haemorrhage. (A primary haemorrhage is bleeding in the first 24 hours after surgery.) A secondary haemorrhage occurs in less than 10% of cases and may result from an infection of the tonsillar fossa. This condition should not be underestimated.

- Admit the patient
- Gain intravenous access
- Give antibiotics and IV fluids.

Occasionally surgical intervention may be needed to achieve haemostasis.

Authors: Corbridge, Rogan; Steventon, Nicholas
Title: *Oxford Handbook of ENT and Head and Neck Surgery, 1st Edition*

Chapter 21

Glossary of ENT Terms and Eponyms

Glossary of ENT Terms and Eponyms

Acoustic neuroma

(vestibular schwannoma): A benign tumour of the eighth cranial nerve

ANCA:

Anti nuclear cytoplasmic antibody: +ve in Wegeners granulomatosis

Anosmia:

Loss of the sense of smell

Antrostomy:

An artificially created opening between the maxillary sinus and the nasal cavity

A's:

Adenoids/adenoidectomy

BAWO:

Bilateral antral washouts

BINA:

Bilateral intranasal antrostomy

BINP:

Bilateral intranasal polypectomy

BNF:

British National Formulary

BOR:

Branchial-oto-renal

BPPV:

Benign paroxysmal positional vertigo

BSER:

Brainstem evoked response—an objective test of hearing

Cachosmia:

The sensation of an unpleasant odour

Caloric tests:

Tests of labyrinthine function

CAT:

Combined approach tympanoplasty. A type of mastoid surgery, usually performed for cholesteatoma in which the posterior canal wall is left intact, unlike a modified radical mastoidectomy.

CHL:

Conductive hearing lose

CJD:

Creutzfeldt-Jakob disease

CSOM:

Chronic suppurative otitis media

CT:

Computerized tomography

CXR:

Chest X-ray

Dohlman's operation:

an endoscopic operation on a pharyngeal pouch

DL:

Direct laryngoscopy

DO:

Direct oesophagoscopy

DP:

Direct pharyngoscopy

EAC:

External auditory canal

EAM:

External auditory meatus

ENG:

Electronystagmography

ENT:

Ear, nose, and throat

ESR:

Erythrocyte sedimentation rate

EUA:

Examination under (general) anaesthesia

EUM:

Examination under the microscope—usually of the ears

FBC:

Full blood count

FESS:

Functional endoscopic sinus surgery

FNAC:

Fine needle aspiration cytology

FOSIT:

Medical shorthand for a feeling of something in the throat

Free flap:

The movement of a piece of tissue (skin ± muscle ± bone) with a supplying artery and vein from one site in the body to another. The blood supply is connected to local blood vessels via a micro vascular anastomsis. This is most frequently performed in reconstructing surgical defects following resection of head and neck malignancies.

Freys syndrome:

Gustatory sweating, a complication of parotidectomy.

GA:

General anaesthetic

GORD:

Gastro-oesophageal reflux disease

Globus:

A sensation of a lump in the throat, when on examination no lump can be found. (see also FOSIT)

Glottis:

Another name for the vocal cords

Glue ear:

A common cause of conductive hearing loss, due to Eustachian tube dysfunction. The middle ear fills with thick sticky fluid, hence its name. Also known as otitis media with effusion (OME) and secretory otitis media (SOM)

Grommet:

A ventilation tube placed in the eardrum in the treatment of glue ear also known as ‘G's’, ‘tympanostomy tubes’ or ‘vent tubes’

HHT:

Haemorrhagic telangiectasia

HIB:

Haemophyllus influenza type B

HME:

Heat and moisture exchanges

HPV:

Human papilloma virus

IJV:

Internal jugular vein

IV:

Intravenous

Ludwigs's angina:

Infection of the submandibular space

MDT:

Multi disciplinary team

MLB:

A diagnostic endoscopy. Microlaryngoscopy and bronchoscopy

ML/Microlaryngoscopy:

Microscopic surgical examination of the larynx using a suspended rigid laryngoscopy and a microscope

MMA:

Middle meatal antrostomy. A surgical enlargement of the natural maxillary sinus ostium. See FESS

MOFIT:

Multiple out fracture of the inferior turbinate. See also SMD and TITs

MRI:

Magnetic resonance imaging

MRM:

Modified radical mastoidectomy. Mastoid surgery performed for cholesteatoma.

MRND:

Modifed radical neck dissection

MUA:

Manipulation under anaesthetic

NARES:

Non-allergic rhinitis with eosinophilia

NIHL:

Noise induced hearing loss

od:

Once daily

OME:

See glue ear

OSA:

Obstructive sleep apnoea

Ostiomeatal complex (OMC):

The area between the middle turbinate and the lateral nasal wall. The maxillary, frontal and anterior ethmoid sinuses drain into this area—the final common pathway.

Otorrhea:

Ear discharge

Panendoscopy (Pan):

Full ENT examination performed under general anaesthetic in order to evaluate/exclude a malignancy of the upper aerodigestive tract.

Pec:

Pectoralis major myocutaneous flap. Frequently used to reconstruct surgical defects in the head and neck region.

PEG:

Percutaneous endoscopic gastrostomy

PND:

Post nasal drip

po:

Per oral

post-op:

Post-operative

PPI:

Proton pump inhibitor

pre-op:

Pre-operative

Presbycusis:

The common hearing loss of old age, high frequency, bilateral and sensorineural in type.

PSCC:

Posterior semi circular canal

Quinsy:

Paratonsillar abscess

Ramsay Hunt Syndrome:

Herpes zoster infection of the facial nerve.

Reinkes oedema:

Benign oedema of the vocal cords caused by smoking.

Rhinorrhoea:

Nasal discharge

SALT:

Speech and language therapist

SCC:

Squamous cell carcinoma

Second look:

A planned staged operation to ensure that cholesteatoma has not recurred in the mastoid after CAT.

Secretory otitis media (SOM):

Glue ear

Serous otitis media (SOM):

Glue ear

SHO:

Senior House Officer

SMR:

Sub mucus reception

SMD:

Submucus diathermy to the inferior turbinates, performed to reduce the nasal obstruction associated with inferior turbinate hypertrophy.

SNHL:

Sensorineural hearing loss

SOHND:

Supra omohyoid neck dissection. A type of selective neck dissection

SPR:

Specialist Registrar

STIR:

Short tau inversion recovery

T's:

Tonsils/tonsillectomy

tds:

Three times daily

TITs:

Trimming of the inferior turbinates. A surgical procedure performed to reduce the nasal obstruction associated with inferior turbinate hypertrophy, sometimes associated with spectacular heamorrhage!

TM:

Tympanic membrane

TMJ:

Temporo mandibular joint

TSH:

Thyroid stimulating hormone

T-tube:

Long term grommet

TTS:

Temporary threshold shift

Tympanometry:

The indirect measurement of the middle ear pressure or compliance of the ear drum.

Tympanostomy tube:

A grommet

URT:

Upper respiratory tract

URTI:

Upper respiratory tract infection

VOR:

Vestibulo-ocular reflux

WS:

Waardenburg's syndrome