

# 29 The ear, nose and throat

## 29.1 Introduction

Ear, nose and throat (ENT) disease is common in primary care. It is said that 1:3 of all patients coming to primary care are coming because of an ENT problem. Patients come with a sore throat, poor hearing, noises in their ears, bleeding from the nose, blocked nose and many other symptoms. In some ways, ENT symptoms are often neglected in primary care because they are often thought not to be so important: they do not usually kill people but they do make life unpleasant and uncomfortable, and these areas of the body can be difficult to examine. Sometimes there is indeed something serious, such as a cancer or a blocked airway, so it is important to be able to perform an ENT examination and to recognise common and serious conditions. To see the eardrum, or the larynx or the inside of the nose, it is necessary to have equipment. This equipment does not have to be sophisticated and expensive. A torch, even a simple one, can allow you to look at the throat, up the first part of the nose and into the ear canal. However, to see the whole of the inside of the nasal cavities, to see the eardrums and to see the back of the tongue and voice box, you need to have some equipment such as an otoscope, a head light and a mirror. You also need forceps and a suction machine for treatment.

This chapter will describe common surgical ENT conditions, and how to manage them with limited resources. In primary care, your health care worker should be able to:

- (1) do a basic ENT examination,
- (2) remove most foreign bodies of the ear and nose, and some of those in the throat,
- (3) diagnose common infective conditions of the ear,
- (4) clean the ear safely of wax or pus,
- (5) estimate hearing loss and understand if the hearing loss is conductive or sensori-neural,
- (6) drain pus,
- (7) recognise an obstructed airway and carry out emergency surgery to help the patient breathe,
- (8) deal with bleeding noses,
- (9) recognise cancers of the throat,
- (10) treat sinusitis,

This is the equipment you will need:

*LIGHT SOURCE*, either a head light (better) or torch  
*OTOSCOPE*, of which there are many types, and which can be used either with rechargeable batteries or with a charger.  
*TUNING FORK*, Hartmann's, 512Hz, or musical tuning fork of 440 Hz for tuning musical instruments (much cheaper)  
*WAX HOOK* (a hair pin or long lumbar puncture needle with the sharp end broken off & the end 2mm bent through 90°)  
*PROBE*, such as the Jobson-Horne,  
*COTTON WOOL* wound around thin tooth pick to mop out an ear (normal cotton buds are usually too large).

*AURAL SYRINGE*, Bacon's, for one-hand use. This has a rubber bulb, a tube, and a valve. It delivers a steadier stream of fluid than a metal syringe, and can be used with one hand. If you don't have an ear syringe, use an ordinary 20ml syringe with an eccentric nozzle. If you wish, you can fix a small plastic cannula to its tip, and cut it short to prevent it being pushed in too far.

*FORCEPS* of different sizes for use in the ear canal, nasal cavity and mouth.

*NASAL SPECULUM* such as the Thudichum's, Mark Hovell modification, size 7. Use this for examining the nose. Dangle one on the distal IP joint of your flexed index finger, and control it by holding the limbs together between your middle & ring fingers.

*SUCTION* motor or foot-driven and suction nozzles.

*MIRRORS* for examining the throat and larynx: laryngeal mirrors. N.B. dental mirrors are usually concave (not flat like laryngeal mirrors) and therefore impossible to focus on the larynx.

*SNARE* for removing nasal polyps.

*TONGUE DEPRESSORS*: wooden (preferably) or metal; the handle of an ordinary table spoon will do (sterilised after each use).

*ELECTRO-CAUTERY*.

*RIBBON GAUZE* 1cm width for packing the nose; 0.5cm width for packing the ear.

*FOLEY CATHETER* Ch12,14, or 16 for posterior epistaxis.

*PASTES FOR DRESSINGS*: (1) BIPP (bismuth iodoform paraffin paste) gauze, for packing the ear. (2) Simple Vaseline for lubricating ribbon gauze for the nose.

*SILVER NITRATE CAUTERY STICKS*.

*SALINE FOR IRRIGATING THE NOSE* to keep it clean of pus and crusts  
*OLIVE OIL* is useful for softening wax.

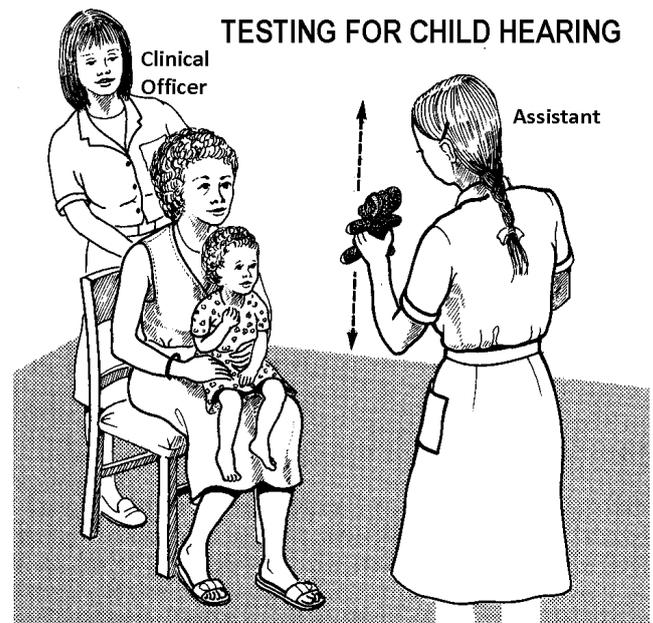


Fig. 29-1 TESTING FOR CHILD HEARING.

Sit the child on the mother's knee facing your assistant. Meanwhile remain out of sight behind the mother. The distraction test is described later (29.2).

## 29.2 Deafness

Severe deafness cripples the mind by preventing communication with other people. It is thus a serious handicap, and, alas, a neglected one. Some 360 million (1:20) worldwide have moderate to profound hearing loss, of whom 80% live in low- and middle-income countries, and would in 50% have been preventable. Current production of hearing aids meets only 10% of the world need, and <1:40 people who need them have them.

**People with moderate hearing loss** have difficulty hearing normal conversation.

**People with profound hearing loss** are unable to hear shouted speech when standing just 1m away.

Try to find out the incidence of deafness in your district, and the common causes for it.

Chronic ear infection leads to hearing loss, as can meningitis, measles and mumps. Other common causes included exposure to excessive noise, head and ear injury, ageing and the use of ototoxic drugs (especially gentamicin, streptomycin and some cytotoxic drugs). Congenital hearing loss can occur with maternal rubella, syphilis, and HIV disease; low birth weight and birth asphyxia, and neonatal jaundice as well as drugs are other common causes.

The ear is made up of the:

- (1) outer ear: external auditory meatus, pinna, ear canal,
- (2) middle ear: tympanic membrane (eardrum), three small bones (ossicles: *malleus, incus & stapes*),
- (3) inner ear: labyrinth (3 semicircular canals, vestibule & cochlea with the VIII<sup>th</sup> cranial (auditory, acoustic or vestibulo-cochlear) nerve).

Hearing involves sound coming to the ear, being directed down the ear canal, with the sound vibrations being transmitted to the eardrum and then through the ossicles to the cochlea. In the cochlea, the mechanical sound vibrations are transformed into electrical impulses which are transmitted along the auditory nerve to the brain stem and then to the cerebral cortex and consciousness.

In **conductive hearing loss**, there is failure of transmission of sound to the cochlea.

In **sensori-neural hearing loss**, there is disease of the cochlea or of the auditory nerve.

CONDUCTIVE HEARING LOSS can be due to:

- (1) failure of development of the external ear
- (2) the ear canal being full of wax (this is unusual unless people use ear buds, which pushes the wax into the ear, rather than helping it to come out)
- (3) infection of the ear canal (otitis externa) leading to blockage of the canal by swelling and infective debris
- (4) problems with the eardrum, especially with a perforation (hole) in the eardrum
- (5) damage or stiffness to one or more of the 3 ossicles, usually because of chronic infection, cholesteatoma or injury, sometimes by congenital or hereditary illnesses
- (6) fluid or 'glue' in the middle ear (secretory otitis media or middle ear effusion) or pus in the middle ear (suppurative otitis media)

SENSORINEURAL HEARING LOSS can be due to:

- (1) Damage to the cochlea, due to infection (viral infection such as mumps, herpes simplex, herpes zoster, measles, meningitis), injury (fracture of base of skull), loud noise and ageing.
- (2) Damage to the auditory nerve, due to infection (more common) or tumour (rare)

*N.B.* CENTRAL HEARING LOSS, where there is a problem in the cerebral cortex, is rare.

**Conductive hearing loss** is potentially curable *e.g.* by removal of wax, drainage of middle ear fluid, repair of damaged eardrum or ear bones, treatment of otitis externa, or otitis media.

Hearing aids can also help many forms of conductive hearing loss (as long as there is no active infection). They need to be fitted properly, require supplies of batteries and it is necessary for patients to be taught how to use them. *Hearing aids will not help hearing in ears that are infected and discharging pus. If used in an infected ear, the hearing aid will usually make the infection worse.*

**Sensori-neural hearing loss** is most often irreversible and requires hearing aids (in one or both ears), though if very severe can be cured by cochlear implantation (a procedure which involves placing electrodes into the cochlea, and is both expensive and requires a prolonged rehabilitation for success).

A special form of hearing aid is bone-anchored, which can be used in infected ears, but this is expensive and sophisticated technology, like the cochlear implant.

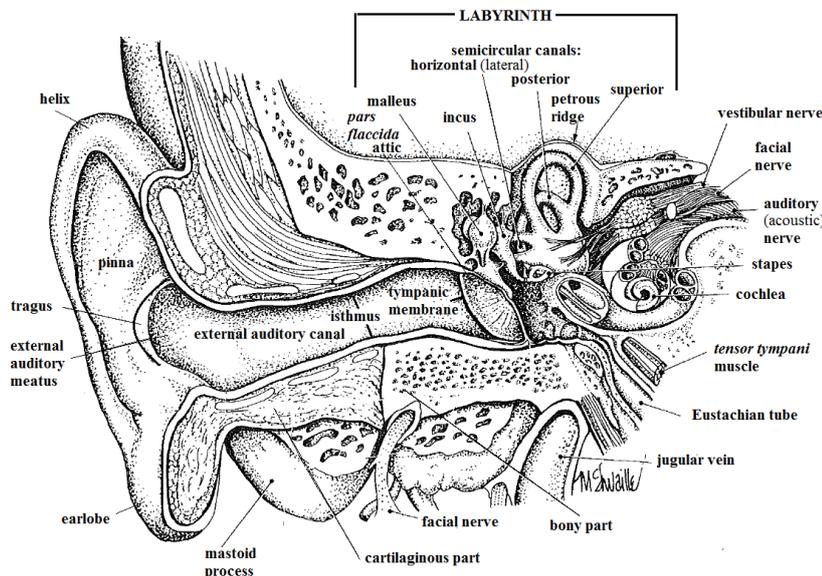


Fig. 29-2 ANATOMY OF HEARING PATHWAYS

Hearing loss is classified into two important types:

- (1) conductive, or
- (2) sensori-neural.

Some patients have both.

## OTOSCOPY

Prevent deafness by helping to ensure:

- (1) congenital infection, such as by rubella, is prevented by maternal vaccination programmes,
- (2) prompt, effective treatment of neonatal infections,
- (3) prompt diagnosis and effective treatment of meningitis in children,
- (4) vaccination programmes exist against meningococcal meningitis,
- (5) treatment of ear infections before they develop into chronic middle ear disease, which destroys the middle ear,
- (6) early diagnosis of prelingual deafness,
- (7) protection against noise damage,
- (8) proper dosage of ototoxic drugs, especially of gentamicin and streptomycin.

Prelingual deafness is deafness in children who have not yet learned to speak. Make every effort to identify such children and help them (by hearing aids and/or surgery) to become familiar with sound, since if the brain is not exposed to sounds by the age of 5yrs, the child may never speak at all.

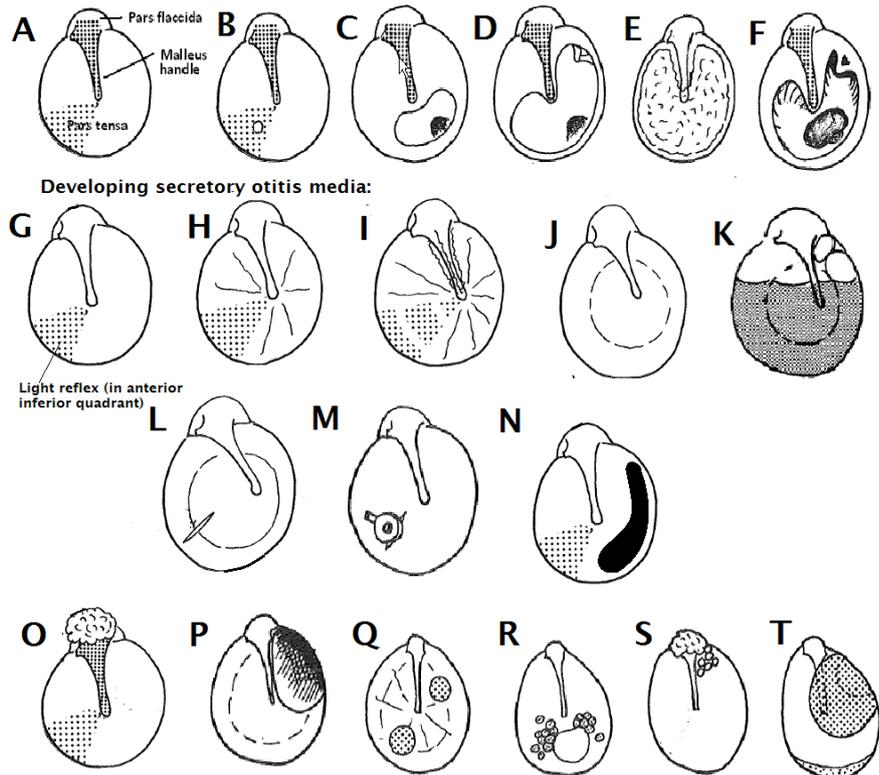
A child may however learn lip-reading and sign language at an early age; remember that this is different in each country. Gestuno, the International Sign Language, is heavily influenced by languages of rich countries.

Damage to hearing by loud noise is an important cause of deafness. Anyone who works in a very loud environment should wear ear plugs or muffs to protect their ears from noise damage. A working rule to identify if noise is too loud is as follows. If, in a noisy environment, you cannot really hear what someone, standing just 1m away, is saying when they shout to you, then the noise is too loud and potentially damaging. In such circumstances, the ears must be protected. Children and adolescents (and adults) who listen to very loud music are also at risk of damage to hearing, especially if they use intra-aural (earbud) earphones.

### TESTING FOR HEARING

There are two ways to test for hearing: clinically and by audiology. Clinical testing is useful but has limitations. Audiology is more accurate and important for epidemiological studies but requires an audiometer, which can measure hearing levels in each ear. If you are serious about offering services for hearing, then an audiometer and some training in audiology is essential.

*Even without an audiometer however, clinical testing of hearing is possible.*



**Fig. 29-3 OTOSCOPIIC APPEARANCES (LEFT EAR).**

A, normal. B, small perforation. C, central perforation revealing the round window at the back of the inner ear. D, subtotal perforation revealing the incudo-stapedial joint. E, tympanosclerosis resulting from chronic adhesive otitis media. F, perforated drum adherent to the medial wall and incudo-stapedial joint.

**Developing secretory otitis media:** thin fluid exudate in obstructed Eustachian tube (29.5) (G); prominent blood vessels ('bicycle spokes', H); break-up of light reflex (I); bulging eardrum with increasing opacity (J); fluid level in middle ear (K).

L, site of antero-inferior myringotomy (left ear) avoiding ossicles. M, grommet tube (29.4) inserted for aeration. N, calcified drum of tympanosclerosis (29.4). O, superior (attic) perforation with cholesteatoma (29.4). P, retraction posterior-superiorly from suppurative chronic otitis media. Q, bullous myringitis. R, central perforation with granulations. S, superior (attic) perforation with granulations. T, aural polyp.

*After Metcalfe S, Annotated ENT. Wilderness, Guildford, 1980.*

### EXAMINING THE EAR

- (1) Look at the outer ear: are there any abnormalities (a deformed or absent outer ear is usually associated with a congenital abnormality of the middle and/or inner ear).
- (2) Look behind the ear and feel for the mastoid bone: is it swollen or tender as in mastoiditis or a mastoid abscess?
- (3) Examine the ear canal: is it blocked?
- (4) Examine the eardrum (29-3). For this you need an otoscope. Pay attention to the position of the eardrum and to the handle of the *malleus*. Look for any holes in the eardrum (29-3B-D). See if the eardrum is retracted (29-3E,F). Look at the colour of the eardrum. Fluid or glue in the middle ear makes the eardrum look greyish or dull (29-3J). If the ear is painful and the eardrum is bulging, then there is likely to be pus in the middle ear (acute purulent otitis media). Look for cholesteatoma (abnormal skin in the middle ear: 29-3N)

(5) Examine if the eardrum moves inwards momentarily when the patient swallows, or outwards if he carries out a Valsalva manoeuvre (holding the nose and blowing the cheeks out): this proves the Eustachian tube (29-5) is not blocked.

*N.B.* The light reflex is always in the anterior inferior quadrant; *its absence does not necessarily signify pathology.*

## CLINICAL TESTING OF HEARING

### EXAMINATION (adults).

Always do the next 2 tests as a pair; separately they will not give you the information you need.

### RINNE'S TEST.

Strike a tuning fork gently against your knee or elbow (*not against a hard surface*, or unwanted overtones will be produced). Place the foot of the vibrating fork firmly on the patient's head, just above and behind the ear to be tested; apply sufficient pressure so that you need your other hand to support the other side of the head. Wait till he no longer hears the sound and then immediately place the fork, still vibrating, beside the ear canal. Normally he should still hear the fork vibrating, (+ve Rinne test). If he does not hear the sound any more, (-ve Rinne test), his bone conduction is better than air conduction, and there is a problem with sound conduction of at least 20dB (middle ear disease).

**CAUTION!** *Beware if there is severe sensori-neural deafness in one ear*, this may give a misleading -ve Rinne test because the sound is conducted through the head and heard in the other ear. Weber's test will distinguish this.

### WEBER'S TEST.

Strike the tuning fork against your knee, place its foot on the middle of the forehead, and ask which ear hears the sound loudest. If there is conductive deafness in one ear (a -ve Rinne's test), because bone conduction is heard better than air conduction, the tuning fork is heard better in that ear. If there is sensori-neural deafness, the sound will be loudest in the better functioning cochlea.

*Do not be fooled that speech defects arise from 'tongue tie' (31.9)!*

## CLINICAL TESTING OF ADULT HEARING LEVEL

The Rinne and Weber test help tell you whether a hearing loss is conductive or sensori-neural, but do not indicate what the level of hearing is.

Hearing is measured in decibels (dB). The more decibels a sound is, the louder it is. A whisper is around 30dB, the spoken voice around 60dB and a shout 90dB. Jet engines are in the region of 120dB. Being able to hear levels  $\leq 30$ dB is generally satisfactory. The human ear should be able to hear a mosquito flying in a room 3m away.

*N.B.* *The scale is logarithmic: 31dB is ten times as loud as 30dB.*

To measure hearing, stand behind, and slightly to the side of the patient, to the side that you are testing. If you are testing hearing in the left ear, stand behind and to the left side of the patient. Your opposite, right, hand is outstretched, and touching the right ear of the patient. With the index finger of the right hand on the patient's right ear, the right hand touching the back of the skull, and with the right arm straight, you are now about one metre behind and to the side of the patient.

With the right index finger, generally stroke the ear. Try this on your own ear, and you will hear a noise.

This noise helps to 'mask' the hearing in the ear that you are not testing. Now whisper a number and see if the patient can repeat that number. If the patient can hear the number whispered at one metre away, then the hearing is normal or close to normal. Then swap sides and hands, and stand behind and to the other side of the patient.

Another simple method is to ask a patient if he can hear the ticking of a wrist-watch held up to the ear. Alternatively, rub the index finger and the thumb together. This produces a slight noise.

## CLINICAL TESTING OF HEARING IN CHILDREN

In a child <3yrs neither a tuning fork nor an audiometer are useful. Unless you have special equipment you have to use:

(1) the parents' account of an abnormal behaviour response, or the failure to make proper speech sounds. Or, (2) the distraction test, which is effective in most young children.

THE DISTRACTION TEST is a valid screening method. Find a sensitive and understanding assistant, and practise making the test noises, which are the syllables of the word "shoe", spoken separately as two tests, a high-pitched "Shsh....." and a low, sung "Ooo.....". Make them softly, just loud enough for your assistant to hear.

Sit the child on the mother's knee facing your assistant (29-1). Meanwhile, remain out of sight behind the mother. Ask your assistant to gain the child's attention a little, by moving a toy up and down in a vertical line, while making the test sound. Then, ask him to hide the toy and break eye contact. At this exact moment, make a "Sh....." sound about 60cm from the child's ear, and level with it, while you remain out of the sight. A normal child immediately turns towards the source of the sound.

Reward the child with some encouragement. Now test the other ear with an "Ooo....." sound, before returning to the first ear with an "Ooo....." sound, and then the second ear with a "Sh...." sound. To avoid false results, be sure to test the ears alternately.

**If there is no response**, try louder sounds. Then try a visual or tactile stimulus. If there is still no response, suspect cerebral disability, or some non-audiological problem. If there is now some response, repeat the sound stimuli at 2 or 3m, first in a louder voice, and then in a normal one.

CAUTION! These tests should tell you on which side to find the lesion.

- (1) This is a very reliable test, *if you do it carefully*. Otherwise, you can easily get false results.
- (2) Before the test itself, practise both the manner of attracting the child's attention, and the sound to be made.
- (3) Timing is critical.
- (4) Make sure the mother does not give away any clues, consciously or unconsciously.
- (5) *You will get a misleading +ve* if you show yourself, or make visible the test object either directly, or reflected in a window, or some reflective object, or give some tactile clue. *You will get a misleading -ve* if the child gets bored, tired, or distracted by other things. If this happens, *don't persist*; try again later.

## MANAGEMENT OF CONDUCTIVE DEAFNESS

### A OUTER EAR (EXTERNAL CANAL)

1. **Wax.** It is important to understand that most wax is healthy and finds its own way out of the ear canal. *Leave most wax alone.* Wax can cause deafness, however, when it gets impacted into the ear canal. The most common reason for this is the use of cotton buds, which pushes the wax into the canal (rather than removing it). You can remove wax carefully by using a thin hooked metal wire (but be careful not to damage the ear), by cotton wool wrapped around a thin wooden stick, by suction (but this requires a micro-sucker) or by syringing. Sometimes the wax can be too hard to remove, in which case ask the patient to put 3-4 drops of vegetable oil (thick olive oil is best) in the ear tds for 1wk.

*N.B. It is legitimate to remove wax which is hiding an eardrum you need to inspect.*

**Syringing the ear.** Make sure that there is no infection in the ear, and no perforation in the eardrum. Take a 20ml syringe filled with warm water, and gently flush out the ear canal, aiming the end of the syringe up or down but not directly at the eardrum.

*N.B. Never point a needle into the ear canal!*

2. **Otitis externa** (29.3). Infection in the ear canal can cause its wall to become swollen and filled with debris. It may then be necessary gently to re-open the canal by daily application of antibiotic and acetic acid. *Use steroids only for psoriasis.* Occasionally the canal needs clearing, if the eardrum is intact. More rarely necrotizing infection ensues which needs radical debridement. Otitis externa pain can be severe indeed.

3. **Foreign body.** This does not usually cause deafness unless associated with a blocked canal, infection or has caused damage to the eardrum and ossicles.

4. **A tumour** (rare).

### B. MIDDLE EAR

1. **A hole in the eardrum** (a perforated tympanic membrane). The hole may be small or so large that it is easy to miss (you will look straight at the inner wall of the middle ear, and not see any eardrum: 29-3B,C,D). Hearing loss in ears with perforated eardrums is usually due to infection producing damaged, scarred and immobile ear ossicles. So always treat discharging ears promptly with antibiotics, but if discharge from the ear continues despite antibiotics, then it is likely that the patient has chronic middle ear disease that needs surgery. If an ear with a hole in the eardrum keeps getting infected, again surgery can be useful by repairing (and closing) the hole.

2. **Fluid or 'glue' in the middle ear.** This is due either to a recent ear infection or to a blocked Eustachian tube (29-5). Recognising middle ear fluid can be difficult but the eardrum may look opaque (29-3G-K); you can sometimes see an air-fluid level behind the eardrum, or you notice that the eardrum does not move on swallowing or on the Valsalva manoeuvre. In most cases the fluid absorbs by itself, though this can take many months. Alternatively, a myringotomy (29-3L), making a hole in the eardrum, will release the fluid. *Be careful to do this antero-inferiorly*, because you can easily damage the ossicles of the ear.

Fluid and 'glue' in the middle ear is usually the result of a problem in the nose: enlarged adenoids in children, rhinosinusitis, or sometimes (in adults, and even young people), a nasopharyngeal cancer. If due to rhinosinusitis, treating this will allow middle ear fluid to resolve.

3. **Chronic middle ear disease.** This is disease of the middle ear which may be due to long term tympanic perforation, scarred ear ossicles or a **cholesteatoma**. This is a white, skin-like debris that grows into, fills and destroys the middle ear (29-3N), sometimes spreading out to damage the facial nerve and erode into the inner ear and even into the brain. Though not a malignant condition, it acts locally like one and so is dangerous, destroying hearing and may be fatal. This needs skilled surgery requiring operating microscopes and micro-drills.

Chronic middle ear disease is an important cause of deafness, important because all too often it results from acute (and simple) ear disease not being treated adequately. Chronic middle ear disease will be prevented only if you can train up otologists to do audiological testing but much can be done by treating infected ears early with antibiotics.

4. **Otosclerosis** results when the ear ossicles do not vibrate, because they are stuck together by bone. It causes a conductive hearing loss but when you look at the ear and eardrum, everything looks normal. Treatment is by a hearing aid. Surgical correction needs a real expert, and failure will result in a 'dead ear', *i.e.* an ear with no hearing at all.

5. **Trauma.** Conductive hearing loss can result from a tympanic perforation caused by trauma, either a sudden loud noise, *e.g.* a gunshot close-by (acoustic trauma), or by sudden change in air pressure, *e.g.* a slap on the ear with the palm of the hand (barotrauma) or by a penetrating injury.

*N.B.* When you see a perforated eardrum resulting from trauma, it is best to leave it completely alone and not even prescribe any antibiotics; almost all heal naturally and spontaneously.

#### MANAGEMENT OF SENSORI-NEURAL DEAFNESS

1. **Congenital cochlear hearing loss**, due to mumps, measles, rubella and other virus diseases, or due to inherited genetic abnormalities.

2. **Bacterial meningitis** can be complicated by sensorineural deafness due to infection passing from the meninges to the inner ear.

3. **Over-dosage with aminoglycoside drugs**, especially gentamicin.

4. **Trauma: head injuries**, leading to skull fractures through the temporal bone destroying the cochlea.

5. **Sudden inflammation within the cochlea or along the auditory nerve** (known as vestibulo-neuronitis, or auditory neuronitis), sometimes due to herpes simplex or herpes zoster infection.

6. **Excessive loud noise** due to industrial noise, the noise associated with construction and road building, and noise from too loud music ('disco deafness'). Exposure to loud noise destroys the tiny cochlear hair cells whose movement transmits a signal to the brain. Many rock band players are badly deaf over 4kHz.

7. **Ageing.** As we age, just as muscles get weaker and hair turns grey, so hearing can deteriorate though it seems that this deterioration is worse in the loud urban and industrial environments of modern life. This type of deafness is called presbycusis ('hearing of old age'). Hearing is lost first and foremost in the high frequency range.

Apart from **speech training** and **lip reading**, **hearing aids** are usually the only help available in sensori-neural hearing loss, but are important. They amplify sound but children with small ear canals may feel pain at volumes as low as 10dB. Better hearing aids can amplify only a selected range of frequencies to avoid increasing the background noise that often makes hearing more difficult. A child should not be forced to wear hearing aids if managing without, although beware that he may then risk harm because he misses environmental cues. Aid in the management of all forms of deafness. Maintenance and repair of hearing aids is a skill which needs training and equipment. Many hearing aids simply do not work because there is no battery; others because they are not adapted.

**If a baby is born deaf**, this will usually be suspected by the family. A mother who says that her baby is deaf is usually right. *Don't ignore her.* The baby's intelligence will probably be normal, and an 'island' of residual hearing may remain. The parents and older siblings must make the most of this. Instruct them like this: 'Let him watch you speaking. Use speech and signs together, because you will not know which the child will later find easiest'. Speak slowly and clearly, and indicate familiar objects as you name them. If necessary, repeat the word close to the ear. Show you are pleased, whenever the child tries to use a word, however indistinctly. Include the child in as much play, and as many activities, as you can. As always, 'success builds on success'.

**CAUTION!** Children who are born deaf cannot learn to speak unless they have special teaching, from their parents, or someone else, from as early in life as possible.

### 29.3 Otitis externa

Otitis externa exists in 4 types:

(1) A furuncle (an infected hair follicle), usually *staphylococcal*, near the entrance of the external auditory canal (29-2). This is very painful, because the skin here is tightly bound down to the perichondrium of the elastic cartilage of the ear. It occurs here because there are no hair follicles to become infected in the deeper bony part of the canal.

(2) A diffuse inflammation of the whole ear canal resembling eczema. The common causes are:

- (a) excessive self-cleaning of the ear,
- (b) excessive humidity,
- (c) associated general skin infection,
- (d) eczema or psoriasis

This may produce swelling and blockage by debris of the ear canal, and rarely necrosis.

(3) A vesicular eruption of herpes zoster of the canal and pinna, sometimes associated with a facial palsy, dizziness or hearing loss, owing to involvement of the VII<sup>th</sup> & VIII<sup>th</sup> cranial nerves (the Ramsay Hunt syndrome), often related to HIV disease.

(4) In an area endemic with leishmaniasis, a well-demarcated ulcer from which may cause tissue destruction.

#### DIAGNOSIS.

There is pain on moving the pinna or pressing the tragus. There is a purulent discharge from the ear canal, which may be blocked. Sometimes there can be an associated swollen, tender lymph node behind the ear.

*Don't confuse this with the tender bone of mastoiditis.*

## DIFFERENTIAL DIAGNOSIS OF OTORRHOEA

This is fluid discharging from the ear.

You can make reasonable deductions from its nature:

**Suggesting otitis externa:** non-offensive purulent.

**Suggesting otitis externa:** serous,

**chronic:** with severe otalgia.

**fungal:** musky-odour with mild otalgia.

**eczematous:** with itching.

**Suggesting cholesteatoma:** offensive, thick, & pasty.

**Suggesting chronic otitis media:** offensive & purulent.

**Suggesting bullous myringitis, an aural polyp, chronic eardrum perforation with granulations, or petrous bone fracture:** blood stained.

**Suggesting skull fracture:** CSF, or fresh blood.

## TREATMENT

(1) **If there is a furuncle (pustule) in the ear,** use ibuprofen, and a high dose of IV or IM cloxacillin, Apply an ear wick of BIPP.

CAUTION! *Don't incise it unless it is clearly fluctuant,* because there is a danger of perichondritis and collapse of the pinna.

(2) **If there is diffuse otitis externa,** keep the ear clean and dry. Use ear drops of cloxacillin or antifungal agents with aluminium acetate 8% antiseptic freshly prepared, as appropriate. *Avoid neomycin or gentamicin drops,* as they may cause hypersensitivity and deafness. If the patient is a 'self-cleaner', treat the condition that is causing him to touch his ear, and persuade him to leave it alone. If the canal is blocked, use ketamine and suction the canal with a soft curette under direct vision till you can see the eardrum. If it is intact, irrigate with diluted hydrogen peroxide, and dry the canal thoroughly afterwards. Put a wick soaked in antibiotic and steroid drops tds into the ear canal. *Never leave a wick in for >3days.* If there is necrosis, use IV antibiotics and arrange a debridement under ketamine. *Use steroids only for eczema or psoriasis but never for prolonged periods.*

(3) **If there is herpes zoster oticus,** use aciclovir orally 200mg x5 daily and antiseptic ointment locally.

(4) **For leishmaniasis,** use miltefosine if you can (29.18).

## 29.4 Otitis media

Acute otitis media is typically a disease of children. A child presents with acute earache, and fever; and if very young, with vomiting or fits. At first, the margin of the eardrum and the handle of the malleus are red; later, the entire eardrum is red and bulges, so that it obscures the malleus. A few hours later the eardrum may burst, giving instant relief. Otitis media is most common in children <1yr, and is often recurrent. *Haemophilus influenzae* or *streptococcus pneumoniae* are usually responsible. Antibiotics are effective, if you use them in adequate doses promptly. *There is no need to continue beyond 48hrs.*

## ACUTE OTITIS MEDIA

### TREATMENT.

Use a high dose of oral amoxicillin for 2 days. Aim for good compliance over this short period. If the child is very unwell, use IV antibiotics. As 1<sup>st</sup> choice, avoid chloramphenicol and use erythromycin only in penicillin allergy.

Relieve the pain, and apply local heat to the ear. As soon as there is improvement, and the eardrum is no longer bulging, stop the antibiotics.

**If the pain and fever continue, and the eardrum is still bulging >24hrs of treatment,** the organism is probably insensitive to the antibiotic you are using, or you are not using enough. If the dosage was correct, use cefuroxime.

**If acute otitis media fails to resolve after 3days of antibiotic treatment,** consider myringotomy and change to erythromycin or azithromycin. If this fails, *don't persist with antibiotics indefinitely.* Search for infection in the nose, sinuses, nasopharynx or mastoid.

### MYRINGOTOMY (GRADE 2.3).

Incise the eardrum (tympanic membrane) if pain has not improved after 3days of antibiotic treatment, especially with a facial palsy. You can do this best using a spinal needle.

Make sure you use ketamine, and make the perforation in the antero-inferior quadrant to avoid the stapes (29-2, 29-3L). *Don't make the incision too close to the eardrum edge* or the pus will not drain properly. Make an adequate incision if the pus is thick *but do no more than perforate the thin eardrum membrane,* and irrigate the middle ear gently. Take a pus swab.

CAUTION! *Don't attempt myringotomy* unless you have good equipment and light, because you can easily dislocate the incudo-stapedial joint.

**If you see a child after the eardrum has already perforated, and is discharging,** culture the discharge and use ampicillin for 1wk. If the discharge is smelly, add metronidazole. Instil hydrogen peroxide drops for 1min, then syringe gently with warm sterile water. Teach the parents, or a nurse, to dry-mop the discharge with cotton wool. If this is not done often enough, otitis externa and a persistent discharge may follow. Monitor hearing. A persistent discharge after acute otitis media may sometimes suggest mastoiditis.

*N.B.* Continuing pain suggests extension of the disease. You may need to supply cotton wool to swab the ear and to repeat this tid. Acute otitis media may be followed by a middle ear effusion (sometimes known as glue ear or secretory otitis media) in which case there may be poor hearing and recurrent earache.

## DIFFICULTIES WITH ACUTE OTITIS MEDIA

If there is severe earache, with a normal eardrum, suspect referred pain from dental infection, or an impacted wisdom tooth. If these are not responsible, suspect referred pain from the pharynx, or the temporo-mandibular joints. If an adult has earache, a normal eardrum, and an enlarged node in the neck, suspect that there is carcinoma of the pharynx (29.16), or larynx (29.17).

If you see an indrawn straw-coloured opaque eardrum with a fluid level or bubbles behind it, this is SECRETORY (SEROUS) OTITIS MEDIA. This is the result of obstruction of the Eustachian tube usually by enlarged adenoids, and is common in children recovering from otitis media; it may occur spontaneously. There is usually no pain, and little hearing loss. If there are bubbles or a fluid level, enough air remains to maintain hearing; with all the air gone, deafness is more marked. Middle ear effusions usually resolve spontaneously, so wait several weeks if necessary. If the effusion persists, it may alter behaviour, and impair speech, even if it does not cause marked hearing impairment.

If school behaviour or progress is poor, or the acquisition of speech is affected, consider myringotomy, perhaps with the insertion of a grommet for ventilation (29-3M).

*N.B.* The grommet is a tube not intended for fluid drainage: it is simply a Eustachian tube bypass for air! It has lips at its end so it will not slip out.

If there is acute otitis media and facial palsy, myringotomy is essential. Distinguish this from herpes zoster of the geniculate ganglion (the Ramsay Hunt syndrome, 29.3).

If there is tenderness, redness, and swelling over the mastoid process, ACUTE MASTOIDITIS (29.5) is present. This is usually accompanied by persistent fever, and a red bulging eardrum, with pus discharging through a perforation. Tenderness is severe, high on the mastoid process. Note that otitis externa may also produce post-auricular swelling, due to the infection of an adjacent lymph node. In an infant, acute mastoiditis causes a swelling above and behind the ear, displacing it outwards and downwards. If there is a pustule in the meatus, the swelling is evenly distributed up and down the postauricular groove, displacing the ear outwards, but not downwards.

If an adult develops secretory otitis media for the first time, consider the possibility of obstruction of the Eustachian tube by a nasopharyngeal tumour (29.16).

*N.B.* Instruct your primary care workers to clean the ear, syringe it with a rubber rat-tailed syringe, using water or, better, 30% spirit in saline. Then to insert drops of 50% spirit and with the ear held uppermost for 2mins, to insert 2-3 drops bd after cleaning. (Try to train them to recognize attic disease and a cholesteatoma which should not be syringed).

## CHRONIC OTITIS MEDIA

This is usually the result of failure to treat the acute stage. It exists in 2 types:

(1) Associated with a 'safe' central tympanic perforation, which may be small or large. Periodically the ear becomes infected and discharges pus. Infection results either from outside the ear, usually when the ear gets wet, or infection spreads up the Eustachian tube (29-5) from the nasopharynx during upper respiratory tract infections or chronic rhinosinusitis. The infections lead to damage to the ear ossicles and moderate deafness.

(2) Associated with an 'unsafe' peripheral perforation within which dead skin from the ear canal accumulates. This is called a cholesteatoma. The perforation may be small but is usually in the upper part of the ear or at the back of the eardrum. Often there is little ear discharge but when present it can be very smelly. The cholesteatoma grows and, although not malignant, destroys the ear ossicles so that hearing loss can be severe.

Erosion and infection may spread:

- (1) into the labyrinth (29-2), causing vertigo,
- (2) through the roof of the middle ear, causing an extradural or subdural abscess in the temporal lobe, or in the posterior cranial fossa,
- (3) into the lateral cerebral venous sinus (29-4), causing thrombosis, high fever, and maybe death (29.5),
- (4) to the meninges; this is uncommon because infection is usually well localized,
- (5) to involve the facial nerve.

All these complications need at least a mastoidotomy to deal with the underlying sepsis, perhaps with a tympanoplasty, to preserve hearing, and perhaps life.

## DIAGNOSIS.

Look for a perforated eardrum (29-3) which discharges continuously or intermittently, in a patient who may or may not give a history of a previous acute attack. Look carefully at the perforation. Is it surrounded by eardrum? This may be difficult to work out since the perforation may be large and the surrounding eardrum may be scarred and be calcified (**tympanosclerosis**, 29-3N).

However, if you do see the edge of the eardrum all around the perforation, then this must for that reason be centrally placed.

Is the perforation at the edge of the eardrum? Is it in the roof of the ear? Does it extend to the back of the eardrum? Such perforations may be small but dangerous. Look for the white, thick pasty, pearl-like material of cholesteatoma. If present, then the disease will progress. The prognosis, and the urgency of definitive treatment, depend on where the perforation is in the eardrum, rather than on how big it is.

If the perforation does not extend to the edge of the eardrum, and does not involve its *pars flaccida* (the superior part of the eardrum), it is central (29-3C) and is unlikely to be dangerous. There is increasing deafness, recurrent discharge, and occasionally earache, but pain is rare. Teach the importance of a careful aural toilet.

**If the perforation extends to the edge of the eardrum, and particularly if it involves the *pars flaccida* (29-3N),** it is peripheral and dangerous, because it implies bone destruction. A cholesteatoma is common.

#### TREATMENT.

Mop out the ear canal, and try to see the perforation. If there is much discharge, rinse out the ear with warm sterile water; mop the ear dry, and you will then be able to examine it.

You can syringe a discharging ear, *but it is probably wise not to syringe one with a cholesteatoma*. Try to keep the ear mopped dry with cotton wool, in the hope that the perforation in the eardrum will heal.

#### DIFFICULTIES WITH CHRONIC OTITIS MEDIA

Although the definitive treatment is a radical mastoidectomy, this is difficult and delicate surgery. Mastoidotomy (29.5) will buy you time for the following situations:

**If there is a tender swelling over the mastoid,** this is ACUTE-ON-CHRONIC MASTOIDITIS

**If there is EARACHE,** this is ominous. Pus is gathering under pressure somewhere, and, unless it is released, it may track internally, with serious results.

**If there is severe vertigo & loss of balance, perhaps with vomiting,** this is LABYRINTHITIS. Symptoms are worse on moving the head. There is usually also increased hearing loss. Look for a fine horizontal nystagmus, and see if this is made worse when you close the ear canal with your finger, and gently press it. Use ampicillin in high doses, with chloramphenicol IV and metronidazole PR. There is a danger of meningitis if infection does not settle. Try then to drain the mastoid cortex.

**If there is severe illness, headache, vomiting, fever, with neck stiffness, photophobia & restlessness,** this is MENINGITIS. A +ve Kernig's & Brudzinski sign will be present. Confirm the diagnosis by lumbar puncture. Examine the CSF by Gram's method, and culture it, before immediately starting antibiotics.

Use ampicillin in high doses, with chloramphenicol IV and metronidazole PR. When the meningitis has settled, arrange a mastoidotomy.

**If there is hemiparesis, cerebellar signs, dysphasia or depressed level of consciousness,** the condition is serious, because the infection has spread to the brain. The presence of pyramidal signs (spasticity and upgoing toes) suggests a poor prognosis. Start ampicillin in high doses with chloramphenicol IV and metronidazole PR, prior to drainage of a brain abscess, possibly extradural (6.5). Check the HIV status.

**If there is bilateral discharge from the ears,** treat the side with pain first.

**If there is fever,** antibiotics alone will cure none of the complications, but always start them.

**If there are fever, rigors, headache, and photophobia with ophthalmoplegia,** suspect LATERAL SINUS THROMBOSIS. Use high doses of broad-spectrum antibiotic IV. Check the HIV status.

**If permanent deafness develops as the result of bilateral chronic otitis media,** supply a hearing aid and arrange proper follow-up.

**If facial palsy develops,** a cholesteatoma is invading the facial nerve. Try to arrange a radical mastoidectomy.

## 29.5 Acute mastoiditis

Acute mastoiditis is typically a disease of children, and may complicate neglected acute or chronic otitis media. It is rare where primary care is good. In babies, it occasionally presents as a swelling over the mastoid process.

**If acute mastoiditis complicates acute otitis media** (uncommon), the child continues to have fever, and the ear continues to discharge pus in increasing quantity through a perforation in the eardrum.

**If acute mastoiditis complicates chronic otitis media,** there is:

- (1) A dull nagging pain; this may either be new, or an increase in chronic pain.
- (2) Increasing discharge; if the discharge is chronic anyway, it is usually difficult to quantify.
- (3) Increasing deafness: again the change may be subtle.
- (4) Tenderness over the process.
- (5) Oedema of the skin over the mastoid process, owing to underlying infection, giving it a 'velvety feel'.
- (6) Swelling in the postero-superior wall of the meatus.
- (7) Anterior rotation of the pinna, so the ear sticks out more on the affected side than normal. This is a very characteristic sign, and should make you suspect the diagnosis; it can however also be caused by a swollen postauricular lymph node, by a meatal pustule, or by cellulitis of the scalp.

**If pus has gathered under the periosteum,** simply open this and drain the pus, or later it may be necessary to open the mastoid cortex to allow the pus to drain.

The more radical operation of mastoidectomy, to remove all the cortex overlying the mastoid antrum, and saucerize the opening, is a highly complex operation because of the close proximity of important structures *with the danger of serious damage to hearing, the facial nerve and the brain.*

## MASTOIDOTOMY

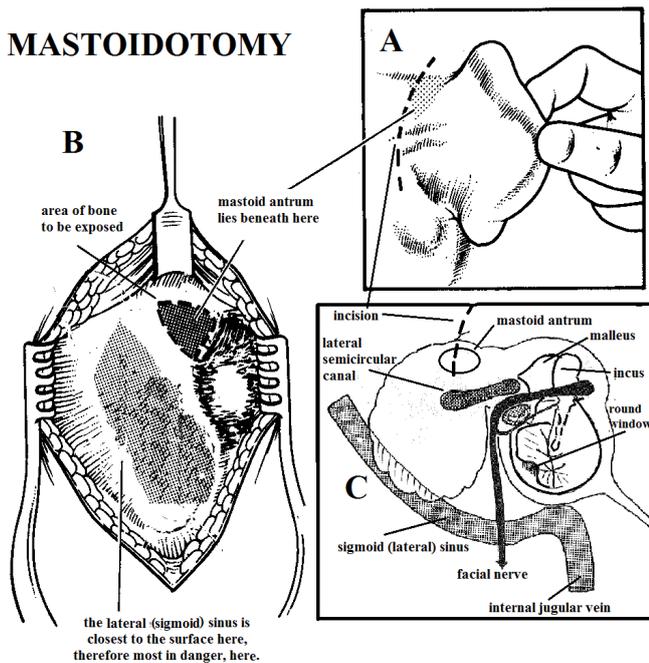


Fig. 29-4 DRAINING THE MASTOID.

A, retro-auricular incision. B,C, position of mastoid antrum and lateral (sigmoid) cerebral venous sinus. *Take great care not to damage this!*

### DIFFERENTIAL DIAGNOSIS

**Suggesting mastoiditis:** no pain on pulling the ear. Pain on deep pressure over the *upper* part of the mastoid at 11 o'clock in relation to the right external auditory meatus. *Don't test for tenderness over the tip of the mastoid.* A profuse mucopurulent discharge, a swelling on the inner bony part of the meatus at 11 or 12 o'clock, marked middle ear (conductive) deafness, and cloudy mastoid air cells on radiographs.

**CAUTION!** *The mastoid is always tender during the first few days of an attack of otitis media, before the eardrum has burst.*

**Suggesting postauricular lymphadenitis** and swelling of the tissues round it: some septic lesion on the scalp or neck, particularly infected ringworm or impetigo, or following lice in the scalp; the pinna may be pushed forwards; no discharge or deafness, a normal eardrum. Swollen lymph nodes are usually at 8 or 9 o'clock in relation to the right ear, whereas the swelling of mastoiditis is maximal at about 11 o'clock.

**Suggesting a pustule (furuncle) in the external auditory meatus** (29.3, rare in a child): swelling in the outer cartilaginous part of the external auditory meatus, and the mastoid is *not* tender. Hearing becomes normal by pulling the pinna upwards and backwards. There is pain on pulling the ear and on chewing, a history of other abscesses, and a small thick discharge. The eardrum looks normal, although you may have difficulty seeing it. Radiographs show a normal mastoid.

## MASTOIDOTOMY FOR ACUTE MASTOIDITIS (GRADE 2.5)

Incise behind the ear, retract the *temporalis* muscle superiorly and the *sternomastoid* anteriorly; open the periosteum (29-4A): there may be pus under it: if there is, *stop there!* If not, keeping superiorly & anteriorly to *avoid the lateral sinus*, use a gouge (7-5) to open the cortex of the bone for about 1cm, over the mastoid antrum, and expose some of the mastoid air cells (29-4B), which will be full of pus. Insert a drain and administer chloramphenicol with metronidazole. *You do not usually need to do a cortical mastoidectomy: it is difficult surgery, and you might damage the auditory canal, the lateral sinus and cause uncontrollable bleeding, or the facial nerve.* Be content with draining the mastoid cavity. This could be life-saving!

## 29.6 Foreign bodies in the ear

Foreign bodies in the ear are more difficult and dangerous to remove than those in the nose; the dangers include a perforated eardrum, total deafness, and a facial palsy, or all three. The middle (isthmus, 29-2) of the auditory canal is narrower than either its outer or its inner end.

**If a foreign body is impacted outside the isthmus**, removing it should not be difficult. Always try syringing first. Only if this fails and you have to use instruments; be sure to use GA or ketamine, especially in a child. The foreign body may be a seed, a live insect, a piece of paper or a broken matchstick. Most (70%) patients are children <5yrs.

## REMOVAL OF A FOREIGN BODY IN THE EAR (GRADE 1.2)

First try to syringe the ear, if in a young child under ketamine, as if you were removing wax. Use a 20ml syringe, or an ear syringe containing warm water at body temperature (37°C). Pull the pinna upwards and backwards, and direct the stream of water up along the roof of the auditory canal, so that it gets behind the foreign body and pushes it out. Syringing will remove most foreign bodies.

*N.B. Never direct the jet of fluid directly at the eardrum!*

**If syringing fails** (rare), use GA. Ketamine is ideal. Extracting a foreign body is seldom urgent, so you have time to prepare. Lay the patient down, and use a headlamp or, better, an auroscope with an open lens, and aural speculum. Rest your hand on the patient's head.

Try gentle suction with a piece of soft rubber tubing on the end of the sucker. If this too fails, try using suction with the syringe.

Use an aural hook, a cerumen or crochet hook, or a paper clip bent as shown (29-5), held in mosquito forceps (3-3). Put the hook into the auditory canal, so that it lies against the wall. Then, manoeuvre the hook past the foreign body, twist it, so that it now lies behind the foreign body, and allows you to pull it out.

## REMOVING A FOREIGN BODY FROM THE EAR

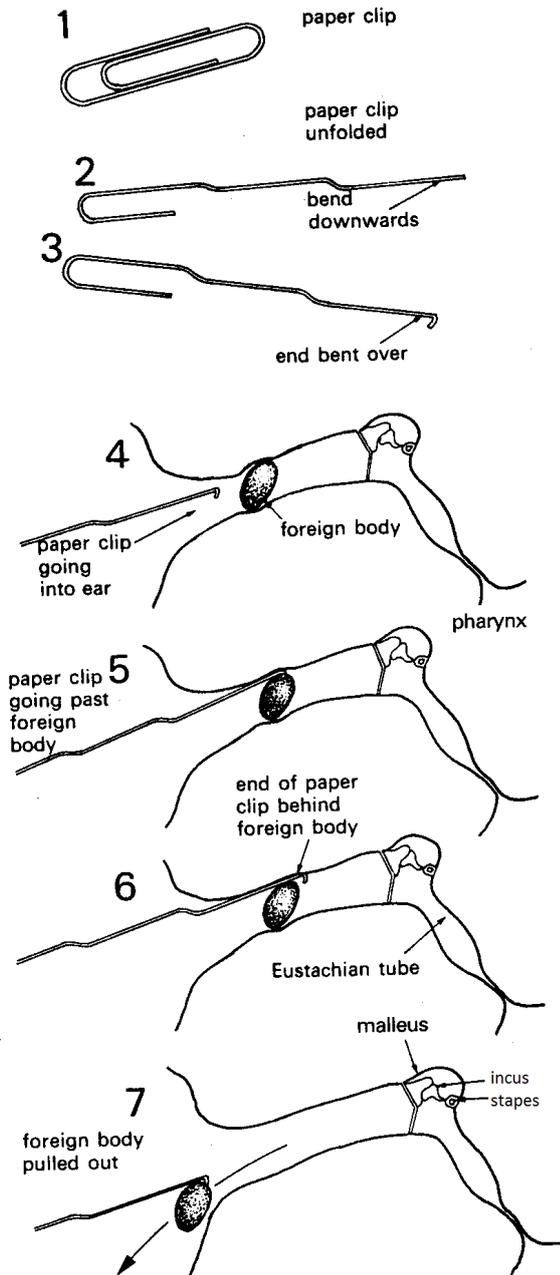


Fig. 29-5 REMOVING A FOREIGN BODY FROM THE EAR.

Lie the patient down with the affected ear uppermost. Start by trying to syringe it out. If this fails, use GA or ketamine. Make sure you have a good light. A,B,C, if you don't have the proper hook, bend a paper clip. Smooth its ends with a file or stone. Bend it exactly as shown and hold it in mosquito forceps. Take special care not to rupture the eardrum. D, gently introduce the hook into the auditory canal, along its superior wall, and E,F, edge the end of the hook past the foreign body. Do not do this if it is wedged against the eardrum! If you can hook the foreign body, G, gently ease it out, if necessary with more syringing.

MOHAMMED (10yrs), the son of a local VIP was admitted with a ball-bearing in the ear. The consultant ENT surgeon was on leave, and so a junior took over the case. It seemed a pity to give the child a GA, and as he seemed co-operative, he decided to remove the ball-bearing with a wax hook. Unfortunately, after two unsuccessful attempts, during which the ball-bearing was driven deeper in, some bleeding began, which rather obscured the view, but the ball-bearing was eventually removed. However, in the blood clot were found the remains of the malleus, the incus, and the stapes.

LESSONS (1) If you are inexperienced, simpler methods may be safer, even if they are less dramatic. Syringing is not sophisticated, but it is 'brilliant' compared with inadvertent stapedectomy. (2) The less experienced you are, the more necessary is it to remove a foreign body under general anaesthesia. A struggling child is no subject for delicate surgery. (3) Don't try removing a round metal object with a hook! Using a magnet may have worked!

CAUTION! Be very gentle:

- (1) don't push the foreign body beyond the isthmus of the auditory canal, and
- (2) don't damage the tympanic membrane.
- (3) don't try to use dissecting forceps.

## DIFFICULTIES WITH FOREIGN BODIES IN THE EAR

If the tympanic membrane is ruptured, try to prevent infection, and let it heal spontaneously. Keep the ear completely dry for 6wks. Don't dust it with antibiotics, or pack the canal. Mopping is unnecessary, unless the middle ear discharges; if so treat as for otitis media.

N.B. Direct trauma may rupture an eardrum: unskilled attempts to remove a foreign body, an explosion or blow, or penetration with a sharp object.

CAUTION! Don't syringe a ruptured eardrum, and do as few manipulations as possible.

If there is an insect in the ear, put a few drops of oil and lidocaine in the ear to kill it, then syringe it out.

If a vegetable foreign body swells, and jams itself tightly in the canal, leave it and try again later, initially with syringing. You can try using warm diluted hydrogen peroxide.

If the foreign body has passed beyond the isthmus, so that you cannot safely remove it with a hook, try syringing again at least twice. Remember this is not an emergency.

## OPEN EXTRACTION OF AN AURAL FOREIGN BODY (29.3)

If the foreign body remains *in situ*, make a small vertical incision from the back of the pinna at its attachment to the mastoid, through into the auditory canal. Control bleeding with small clips or diathermy.

Hold the pinna forwards, and remove the foreign body under direct vision. You must have suction or else bleeding will totally obscure the view. The incision is not deep but it must demonstrate the auditory canal. Inspect the eardrum, remove the foreign body and close the incision with 2 monofilament sutures. Then pack the canal with ribbon gauze to prevent oedema and granulations. If possible impregnate the gauze with BIPP (4.11). Remove the pack in 3days.

## 29.7 Epistaxis (Nose bleeding)

Nose bleeds are rare before 2yrs, common in childhood, uncommon in young adults, and more common again in the elderly. You can control them easily in most cases.

Most bleeding from the nose is from the anterior nasal septal vessels (Little's area or Kesselbach's plexus, 29-6F) and by pressing on the soft, cartilaginous part of the nose, it usually stops. You can see the bleeding point with a nasal speculum and a good light (try the sun) behind you; you will see the vessels better with a headlamp. When bleeding comes from anywhere else, it usually comes from far back in the nose. This usually occurs in the elderly and hypertensive, and may present as haemoptysis or haematemesis, or even just nausea and anaemia.

Start with the simpler methods first. If you teach these to your nurses and auxiliaries, they will be able to treat most patients. You will need suction, and if possible a headlight and BIPP (4.11).

**CAUTION:** Epistaxis can, in rare cases, be caused by a cancer or nasal tumour. If you examine the nose in a patient with epistaxis and see an abnormal mass, consider it a cancer until proven otherwise. Other signs that suggest a cancer are neck nodes and middle ear effusion. A very rare, but serious cause of epistaxis in male children is a haemangiofibroma. For some reason this occurs only in boys and blocks the back of the nose.

### EXAMINATION.

#### **Clear the airway if bleeding is profuse.**

Get IV access. Sit the patient upright looking straight ahead. Ask an assistant to stand behind him, and hold the head. If there is bleeding from the anterior half of the nasal cavity, most of the blood will come from the nostrils.

If there is bleeding from the posterior half, much of it will be trickling down the pharynx.

**If the blood does not form clots**, check its clotting time.

A child is almost certainly bleeding from the anterior septal vessels; so are most adults. In the remaining cases, the bleeding is posterior, and is occasionally caused by a systemic disease.

### DIFFERENTIAL DIAGNOSIS.

Did the blood come first from front or the back of the nose? Which side? First time or recurrent? Medications taken? Trauma or foreign body? Apart from obvious hypertension, there is usually no time to speculate on the cause. Other causes are: tumours, leukaemia, scurvy, purpura, onyala (haemorrhagic bullae in the oropharynx with thrombocytopenia, seen in Central Africa) and the prodromal stages of diphtheria, measles, varicella, and scarlet fever. All these causes are rare.

### IMMEDIATE TREATMENT.

Sit the patient forwards a little, drape him in a waterproof cloth, and hold his nose over a receiver. Tell him not to swallow the blood, but to spit it out. *Avoid a stomach full of blood!*

**If he cannot sit up**, lay him on his side. Get suction ready.

**A. BLEEDING FROM THE FRONT OF THE NOSE** (where it is usually from the anterior part of the nasal septum): squeeze the nose, so that you press its soft mobile parts against the septum, while he breathes with the mouth wide open. Do this yourself, or delegate a nurse to do it. If bleeding is more than minimal, keep pressing for 5mins by the clock. If it is minimal, ask the patient to do it himself. If necessary, sedate him. If squeezing fails, try it again. If you wait long enough the bleeding will usually stop, and you will have done nothing to damage the mucosa.

**If the bleeding does not stop with simple pressure**, take some cotton wool soaked in a vasoconstrictor (such as diluted 1:100,000 adrenaline) and place this up against the bleeding area and again press.

**If adrenaline soaked cotton wool does not stop the bleeding**, consider cautery. This can be done by silver nitrate sticks or by electrocautery. *Be careful with cautery not to make too deep a burn* and thereby cause a hole in the nasal septum. *Do not to cauterise a nasal septum on both sides at the same time*, for the same reason that it is possible to cause a septal perforation.

**If the bleeding still does not stop**, then treat as for posterior nasal bleeding.

**B. BLEEDING FROM THE BACK OF THE NOSE** (*i.e.* you cannot see the source of bleeding): infuse IV saline, cross-match blood, and administer pethidine (or sedation) 50-100mg IM, or slowly IV to facilitate your manipulations. Administer 1g tranexamic acid tds orally. Proceed with anterior packing.

### ANAESTHESIA.

All packing, intranasal manipulation or cauterization needs *at least LA*, either by spray, or on a gauze or wool swab wet with 4% lidocaine. Use ketamine or GA for simultaneous anterior and posterior packing.

### ANTERIOR PACKING OF THE NOSE (GRADE 1.1).

You will need a headlamp, or head mirror with a good light shining on to it from behind your shoulder, a nasal speculum, and dressing forceps, preferably Tilley's. For each side of the nose you will need 1m of 13mm gauze packing, or a 13mm gauze roll. To make this easier to remove later, smear it with petroleum jelly, or BIPP (4.11). If you lack BIPP, use 1:100,000 adrenaline solution.

Pack first the nostril which is bleeding most. With the patient sitting upright, ask an assistant to stand behind and hold his head. Warn him that this procedure may be very uncomfortable. Clear the nasal cavities by encouraging blowing of the nose, or clear the bleeding nasal cavity with a sucker and cannula. Your previously applied lidocaine pack should have produced some anaesthesia.

## NOSE BLEEDING

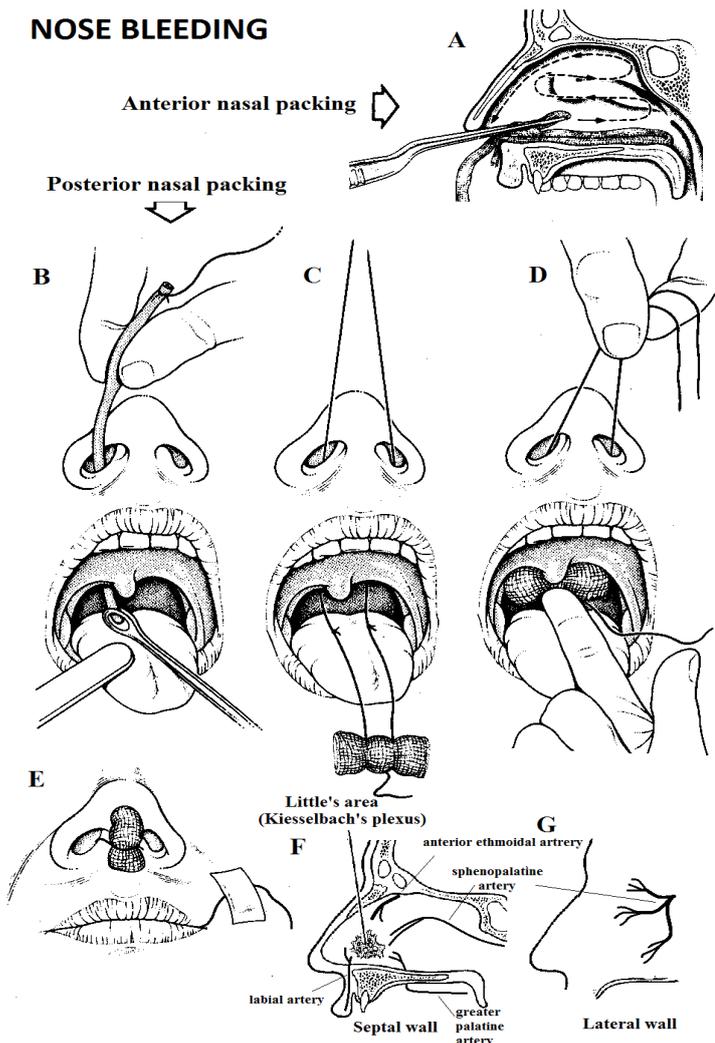


Fig. 29-6 EPISTAXIS.

A, insert an anterior nasal pack. B-E, inserting a posterior nasal pack. B, passing a catheter. C, gauze roll ready to be pulled into place. D, push the gauze roll into place. E, tie a gauze roll in place. F, vessels in (Little's area or Kiesselbach's plexus), from the anterior ethmoidal, labial, greater palatine and sphenopalatine arteries are the source of the bleeding in 50%. G, bleeding from the lateral wall is mainly from the sphenopalatine artery. After Loré JM, *An Atlas of Head and Neck Surgery*, Saunders Plate 51, with kind permission.

Focus your light on the speculum, and put it into the bleeding nostril. Grasp the end of the gauze with forceps and place it as high and as far back as you can. Try to pack the nasal cavity in an orderly way in horizontal layers, starting on its floor and working towards its roof (29-6A). This is difficult, and you will probably find yourself putting gauze wherever it will go, until the nose is full. Leave both ends of the gauze protruding from the nostrils. If necessary, pack both sides of the nose, and secure all 4 ends of the gauze with a safety pin. Strap a pad of folded gauze across the front of the nose, and wait 5mins.

If an anterior pack controls bleeding, leave it in place for 48hrs. Then gently remove it, preferably early in the day, so that you can more easily repack the nose if necessary. Observe carefully for 24hrs before discharge.

If an anterior pack does not control bleeding, try CAUTERIZATION (optional). Soak a small piece of ribbon gauze in 4% lidocaine and 1:100,000 adrenaline solution, squeeze out the excess, and apply this to the bleeding area for 10mins, or use a local anaesthetic spray. Use a nasal speculum, or a wide-bore aural speculum, and a good light, to find the bleeding vessels in Little's area. Touch them along their course with an applicator that has had a bead of silver nitrate fused to its tip: the mucosa will turn white.

If you fail to control bleeding, reinsert the lidocaine and adrenaline pack. If this too fails, hold a silver nitrate stick over the bleeding area for 5secs, and then roll it away to one side before you remove it (if you pull it off, bleeding may restart). Don't use this in both nostrils at the same time, as septal perforation may result.

If you fail again, try a galvano-cautery with a hot wire loop. If necessary, use any thin wire heated in a spirit lamp. Gently touch the bleeding area. You can also use diathermy, preferably under GA. Leave the scab, and dress it with vaseline.

CAUTION! Don't cauterize both sides of the nasal septum at one time with silver nitrate or heat, because it may perforate.

If anterior packing and cautery does not control bleeding, remove the pack, insert a posterior one, and then repack the anterior nasal cavity again.

POSTERIOR PACKING OF THE NOSE (GRADE 1.2) may be necessary if:

- (1) An anterior pack fails to control anterior bleeding.
- (2) There is severe posterior bleeding.

Spray the pharynx and palate with 4% lidocaine.

Try using a Foley catheter (often very effective). Start with this. Pass a size Ch12 or 14 Foley catheter, with a reasonably sized balloon, gently through the anaesthetized nostril, until you see its tip just behind the soft palate. Inflate the balloon with air (usual maximum 20ml), and gently withdraw the catheter, so that the balloon impacts in the posterior nasal opening. Tape it to the cheek, then pack the nose from in front as described above.

CAUTION!

- (1) Don't inflate the balloon inside the nasal cavity, because this can quickly cause pressure necrosis of the mucosa, which may make bleeding worse.
- (2) The tube of the catheter can ulcerate the rim of the nasal entrance, so spread out the pressure by putting a little gauze pad under it.

If posterior combined with anterior packing and cautery does not control bleeding, pack the nose under GA. Use a pack of folded or rolled gauze sponges of sufficient bulk to plug the posterior nares. You will need 2 packs, of at least 5cm<sup>2</sup> for an adult. Tie 50cm of soft string, or umbilical tape, to a Ch16 or 18 rubber catheter (29-6B).

Put this into one nostril, and pull it out of the mouth, leaving the string in place.

Do the same thing on the other side. Tie the oral ends of the strings to the pack, and tie a 3<sup>rd</sup> piece of string to it. Pull the pack up into the back of the nose, and press it into place with your finger in the throat. Make sure that it has passed behind the soft palate, *and that this has not folded upwards*. Then pack the anterior nasal cavity, as before. Tie the nasal ends of the string over some gauze. Let the 3<sup>rd</sup> string protrude from the corner of the mouth, and tape it to the cheek. Or keep it in place with a plastic umbilical cord clamp.

#### CAUTION!

(1) Insert packs with great gentleness: you can easily cause more bleeding as you insert them.

(2) Withdraw the packs, or the Foley catheter, slowly after 48hrs.

*Don't leave any pack or catheter, either anterior or posterior, in the nose for longer than this, or you will increase the risk of suppuration, especially in the sinuses.* The only possible exception is a pack impregnated with BIPP (4.11), which you can leave for 1wk. If you are using a Foley, deflate it a little first to see if bleeding is controlled.

(3) Remove a pack slowly, bit by bit.

**When you remove a posterior pack**, do so in theatre under ketamine, with a light and the necessary equipment ready, so that you can, if necessary, repack without delay. Because epistaxis may recur when you allow a patient home, make sure he knows how to hold his nose, to breathe through his mouth, and to sit forwards in the correct position.

#### GENERAL MEASURES FOR EPISTAXIS

Try to estimate how much blood has been lost. If there is severe bleeding, infuse IV saline and cross-match blood. Keep the head propped up. Use paracetamol, *not aspirin*, as this reduces platelet aggregation. Pethidine or morphine can be helpful. Monitor blood pressure, respiration, and haemoglobin. Most severe epistaxis is precipitated by infection, so use ampicillin or chloramphenicol and metronidazole for at least 5days. With hypertension, bleeding may be difficult to stop unless you control the blood pressure: nifedipine is useful.

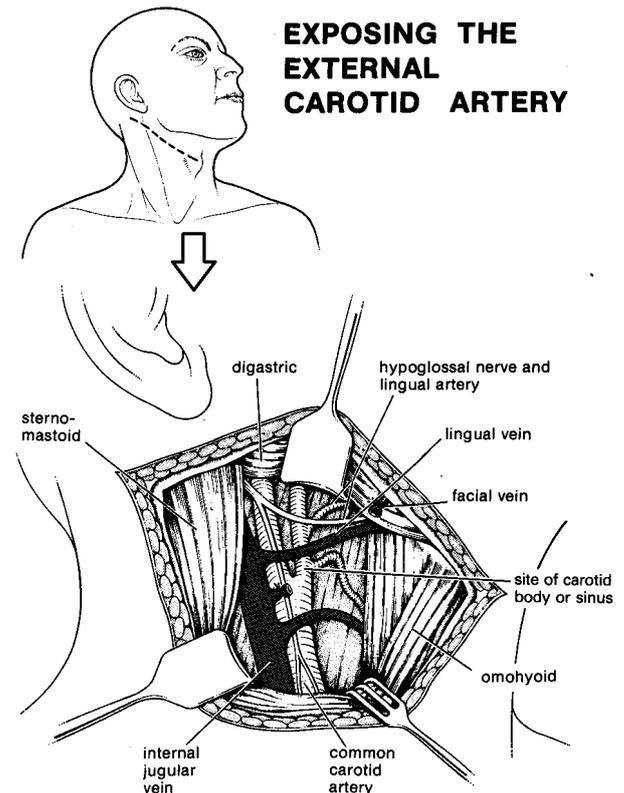
#### DIFFICULTIES WITH EPISTAXIS

**If there is sudden pallor with shock whilst you are packing the nose**, suspect a vasovagal attack, especially if there is a bradycardia. Put up IV saline and administer atropine.

**If there is persistent bleeding**, look for petechiae, ecchymoses, and a large spleen. Measure the clotting and bleeding times, the prothrombin index, and the blood urea. There may be leukaemia, thrombocytopenia, or other clotting disorder. *Bleeding may prove fatal.*

**If you have properly packed the nose and it continues to bleed whenever the packs are removed**, the ultimate measure is to tie the anterior ethmoidal arteries in the medial wall of the orbit.

**If the bleeding is arterial and not arising from Little's area**, it arises from the sphenopalatine artery (29-6G), a branch of the maxillary which arises from the external carotid. Clipping the internal maxillary artery behind the posterior wall of the maxillary sinus is an alternative, but unless you have experience in dissection, leave these this operation for experts.



**Fig. 29-7 EXPOSING THE RIGHT EXTERNAL CAROTID ARTERY. Exposure and anatomy.** Adapted from Rintoul RF (ed) Farquharson's Textbook of Operative surgery. Churchill Livingstone, 1978 with kind permission.

#### EXTERNAL CAROTID ARTERY LIGATION (GRADE 3.2)

The external carotid artery via its maxillary branch supplies  $\frac{1}{2}$  the blood supply of the nose. Ligating the external carotid artery in the neck can help epistaxis. This can be done under LA. It is essential, however, that you ligate the external carotid *not the internal carotid*. The external carotid artery is recognised by having branches. It arises from the common carotid artery at the upper edge of the thyroid cartilage. It runs upwards behind the neck of the mandible, and ends by dividing into the maxillary and superficial temporal arteries. It lies under the posterior belly of the *digastric* muscle (29-7), and its upper part lies deep to the parotid gland.

Tilt the table 10° head up to minimize venous bleeding, but not more, because this increases the risk of air embolism. Turn the patient's head to the opposite side, and extend it slightly. Make an oblique incision from just below and in front of the mastoid process, almost to the thyroid cartilage.

Divide the *platysma* and deep fascia in the line of the incision, and dissect flaps upwards and downwards. Free the anterior border of the *sternomastoid* and retract it posteriorly. You will see the common facial vein. Divide this between ligatures. Carefully retract the internal jugular vein backwards, in order to see the common carotid artery bifurcating to form the internal and external carotid arteries.

If you have difficulty in deciding which artery is which, find some branches of the external carotid and follow them backwards to the main stem (*the internal carotid artery has no branches in the neck*). Pass an aneurysm needle round it, tie it with zero non-absorbable, but *don't divide it*. Tie it as close to its origin as you can.

**CAUTION!**

(1) Tie the external carotid just proximal to the origin of the lingual artery.

(2) *Avoid the hypoglossal nerve*, which crosses the external and internal carotid vessels and then runs anteriorly to lie on the *hyoglossus* muscle in company with the lingual vein.

(3) *Avoid irritating the carotid sinus and body* in the bifurcation of the internal and external carotid vessels, because this may trigger profound bradycardia.

## 29.8 Rhino-sinusitis

The paranasal sinuses lead off the nose, so that disease in them usually follows disease in the nose itself. Sinusitis has some common features, regardless of which particular sinus is infected. The common presenting symptoms in the nose are:

- (1) discharge,
- (2) obstruction of the nasal airway,
- (3) facial discomfort or pain.

**Acute sinusitis** often follows a viral upper respiratory infection, and usually involves one of the sinuses only. It may follow a dental infection.

Presentation is with fever, copious purulent discharge, and:

- (1) pain, or a sense of pressure in the cheek (sometimes wrongly thought to be 'toothache'),
- (2) obstruction of the nasal airway, often without the discharge of mucus or pus,
- (3) swelling of the face (this is much more likely to be due to a dental abscess, 6.9). *Tenderness over an infected sinus is not a useful sign.*

**Chronic sinusitis** may follow acute sinusitis, or as a result of nasal polyps, which prevent the sinuses draining. Pain is not a major feature, but there may be a dull ache in the face, usually later in the day. Bending the head forward can be uncomfortable. Distinguish this from hypertension.

### TREATMENT OF ACUTE RHINOSINUSITIS

No treatment may be necessary. Most cases of upper respiratory infection are viral and resolve spontaneously after 2-3wks, and require only analgesia.

**If there is fever for more than a few days, or if there is severe facial pain**, then consider:

- (1) broad spectrum oral antibiotics,
- (2) nasal decongestants; but *do not use these for >5 days*. If you do, the nasal mucosa becomes accustomed to them and when you stop them, there is rebound effect, which results in swelling of the nasal lining resulting in a blocked nose!

### TREATMENT OF CHRONIC SINUSITIS

Chronic rhinosinusitis is defined as disease lasting for >6wks. Examine the nose to look for nasal polyps, a deviated nasal septum or, rarely, a tumour. Use:

- (1) broad-spectrum antibiotics for 2-3wks,
- (2) saline nasal douching: washing the nose out with salt water (this can be made at home using 1l of clean water with 3 teaspoons of salt) and either sniffed up from the palm of the hand or sprayed into the nose using a 20ml syringe,
- (3) steroid nasal sprays: these sometimes help, since they dampen down the swelling and inflammation in the nose.

### DIFFICULTIES WITH RHINOSINUSITIS

**If swelling around the eyes develops with fever**, this is **ORBITAL CELLULITIS** (6.6, 28.11).

This is serious: start IV cloxacillin or chloramphenicol, and add nasal decongestant drops (ephedrine 0.5%).

**CAUTION!** *Chronic use of vaso-constrictive or cocaine nasal sprays can lead to septal perforation.*

Watch for development of a **subperiosteal abscess**, which needs draining.

**If there is localized pain above the eye**, suspect **FRONTAL SINUSITIS**. Later, gross orbital swelling, proptosis, and diplopia may develop. If large doses of IV ampicillin, chloramphenicol & metronidazole do not control symptoms rapidly, you may have to drain the frontal sinus. Frontal sinusitis is always secondary to maxillary sinusitis and obstruction of the fronto-nasal duct, so be sure to wash out the maxillary sinus also. Infection may spread to the frontal bone, causing **FRONTAL OSTEITIS**. Sometimes the pus may break through the anterior skull wall of the frontal sinus and under the skin, leading to swelling of the tissues of the forehead and an abscess under the skin. This is known as a 'Pott's puffy tumour'. It requires incision and drainage of both the subcutaneous abscess and of the frontal sinus. Infection may also lead to meningitis or a frontal extradural or intracerebral abscess.

If there is **ophthalmoplegia, proptosis & diminished consciousness**, this is a **CAVERNOUS SINUS THROMBOSIS**. It will probably involve both eyes. Early vigorous treatment may avoid death. Use high dose IV penicillin with chloramphenicol or a cephalosporin, *together with diuretics* (furosemide or mannitol) *to reduce cerebral oedema*.

If a **facial cyst-like swelling grows, displacing the eye**, this is a **SINUS MUCOCOELE**, which is a late complication arising from either the frontal or ethmoid sinus. Drainage of the sinus is blocked by scarring from previous infection; the sinus lining continues to secrete mucus and produces the cyst.

#### DRAINAGE OF SINUSES

If you have a thin endoscope, it is possible to wash out and drain the sinuses elegantly; however you can still do this without such equipment.

#### RADIOGRAPHS.

An erect plain radiograph will show an opacified sinus or a fluid level within the sinus. Use the occipito-frontal (Caldwell/Worms) view for the maxillary sinuses, and the occipito-mental (Waters/Blondeau) view for the frontal sinuses, and a lateral view for both to make sure. If you are in doubt, reposition the head and take another radiograph to see if the fluid level shifts.

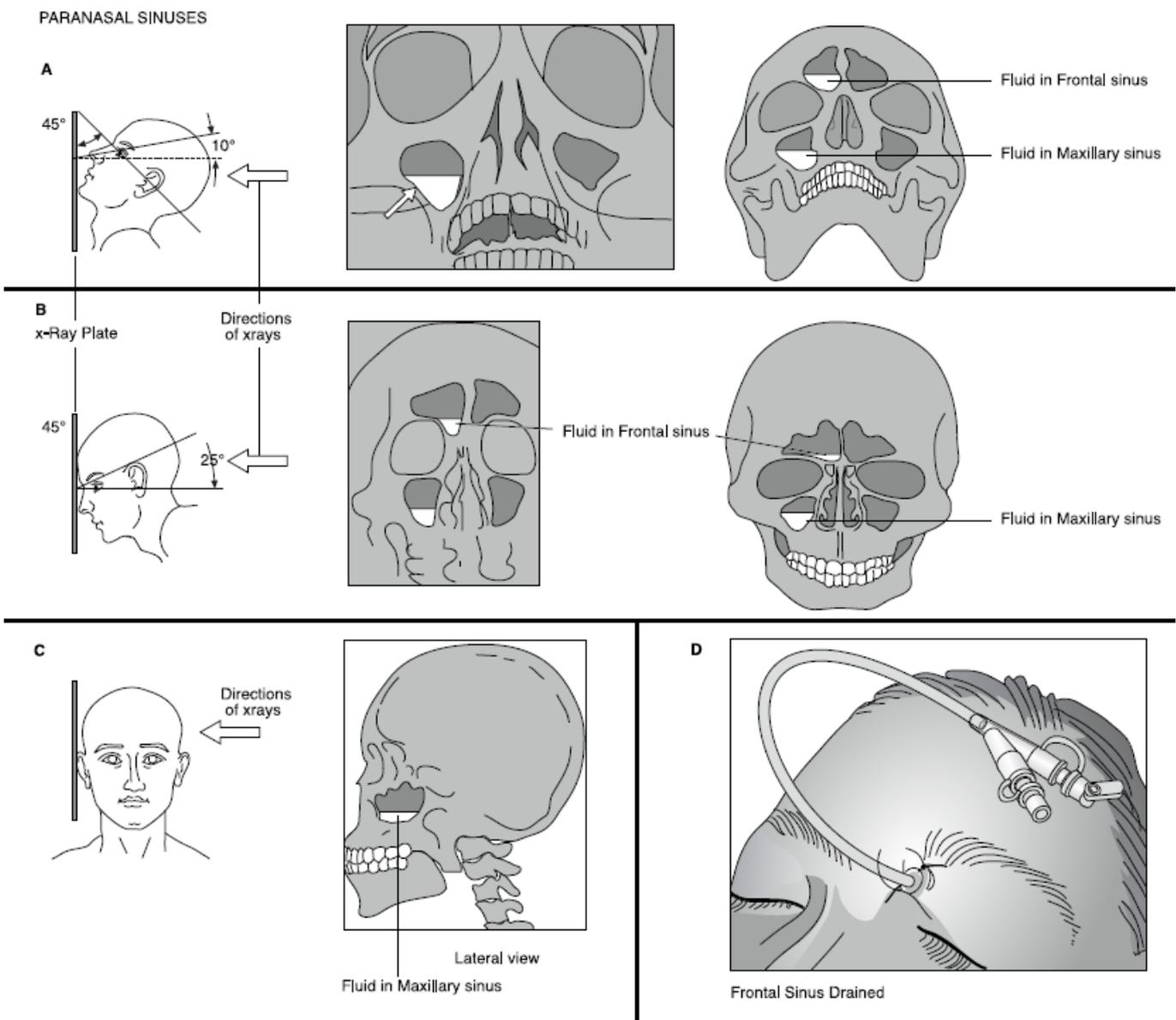


Fig. 29-8 IMAGES OF THE PARANASAL SINUSES.

A, occipito-mental (Waters/Blondeau) view (best for the maxillary sinus) showing fluid levels in maxillary and frontal sinuses. B, occipito-frontal (Caldwell/Worms) view (best for the frontal sinus) showing the same fluid levels. C, lateral view showing fluid in the maxillary sinus. D, frontal sinus drain using a Ch8 Foley catheter through a 3mm endotracheal tube.

After Ismail H, Bowden J, Hellier WP, et al. A frontal sinus drain. *Ann R Coll Surg Engl* 2004; 86: 306-7.

#### A. DRAINING THE FRONTAL SINUS (GRADE 1.5)

Infiltrate with 2% lidocaine mixed with 1:100,000 adrenaline and incise 1cm lateral to the midline along a line level with the upper limit of the orbit. Use a dental drill to cut a hole in the floor of the frontal sinus, and insert a cannula attached to a syringe half-filled with saline.

Aspirate: you should see air bubbling out together with some purulent fluid. Insert a small drain. The best type is a 3mm endotracheal tube through which you have passed a Ch8 paediatric Foley catheter. This arrangement allows you to syringe out the sinus through the Foley catheter (29-8D) and the fluid can drain along its side out of the outside tube. Also, wash out the maxillary sinus through a cannula inserted through the inferior meatus.

Definitive surgery with removal of the anterior wall of the frontal sinus and its entire lining (7.13) may be necessary later.

**CAUTION!** *Do not do this if the air cavity of the frontal sinus is situated much higher than the level of the orbit.*

*N.B. Remember to wash out the maxillary sinus of all patients with frontal sinus infections, because this is often the primary source of infection.*

**If there is increasing pain in the cheek** against a background history of rhinosinusitis, suspect maxillary sinusitis. If there is chronic repeated infection or a fluid level on a radiograph (29-8C), this needs draining.

#### B. DRAINING THE MAXILLARY SINUS (ANTRAL WASHOUT) (GRADE 1.4)

Obtain good LA, *especially under where the trocar will penetrate; wait at least 10mins.*

You may need add sedation with ketamine also.

(1) Infiltrate the anterior end of the inferior turbinate (concha: 29-12) upwards & backwards with lidocaine 2% mixed with 1:100,000 adrenaline, applied on gauze, or as a spray.

(2) Twist cotton wool on to the serrated end of a probe. Load this with cocaine paste, or soak it in 4% lidocaine. Gently paint under the inferior turbinate.

(3) Use a long thin needle to inject lidocaine into it.

Take a 2mm antral trocar and slide it along the nasal cavity, under the inferior turbinate and along the wall of the maxillary sinus, until it rests at a natural depression on the wall of the maxillary sinus. Now angle the trocar so that it is facing the tragus of the external ear and then with controlled movement, push the trocar through the wall of the maxillary sinus. As soon you feel the trocar give into the sinus, stop advancing it and check that it moves gently within the sinus. Attach a 20ml syringe, containing 10ml of saline, to the trocar and aspirate. You should aspirate either air or pus. Either indicates that you are in the sinus. If pus is obtained, aspirate all the pus, and then gently flush the sinus with warm saline until there is free flow of saline into the nasal cavity.

**If the ostium is sufficiently blocked** to prevent the water draining (rare), insert a second trocar to let it drain.

**CAUTION!**

(1) *Don't go right through the maxillary sinus into the cheek.* You should be able to wiggle the tip of the trocar slightly when it is inside the sinus.

(2) Keep the syringe full of saline. *Don't blow air in if the ostium is blocked;* this may push air into cerebral veins and prove fatal!

## 29.9 Nasal obstruction

Typical signs are snoring, nasal obstructed speech, rhinorrhoea and secondary sore throats.

*N.B. Look out for secretory otitis media (29.4)!*

Nasal obstruction can be due to:

(1) Swollen nasal turbinates (29-12) due to allergic rhinitis. The patient often has asthma as well. The turbinates tend to be swollen and pale.

(2) Swollen nasal turbinates due to occupational exposure to wood dust, latex, animals, grains or mould. The nose often feels dry and looks crusted.

(3) Swollen nasal turbinates due to idiopathic rhinitis. The turbinates look swollen and reddish.

(4) Deviated nasal septum: the nasal septum is not in the midline and is bent or twisted. There may also be an external deformity of the nose. This may be idiopathic or traumatic.

(5) Nasal polyps (29.10)

(6) Rhinosinusitis (29.8)

(7) Nasal tumours, rare but should not be missed.

(8) Septal haematoma. Following injury to the nose, the nasal septum may swell up due to haemorrhage under the perichondrium. The swelling is soft. Infection can then lead to a septal abscess.

*Do not operate for NASAL OBSTRUCTION unless you have some experience;* then only when simple methods fail; otherwise the outcome may be of no benefit.

#### A. ELECTROCAUTERY FOR SWOLLEN NASAL TURBINATES. (GRADE 1.3)

*Take care not to cauterise both the turbinate and the nasal septum which could then result in adhesions. Also be careful not to cauterise too deep or too far posterior since by doing so there is a risk of serious bleeding. If there is excessive bleeding, pack the nose as for epistaxis (29.7).*

#### B. SEPTOPLASTY

Correcting a deviated septum is delicate surgery that requires training and experience: *it is easy to cause collapse of the nose or a hole in the nasal septum.*

#### C. DRAINAGE OF NASAL SEPTAL HAEMATOMA (GRADE 1.3)

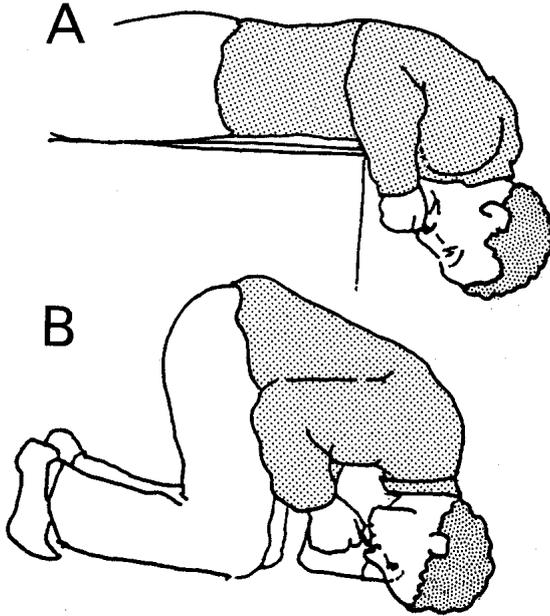
Do this in order to avoid collapse of the nose due to pressure-induced necrosis. You can use LA. Incise through the mucosa over the septal swelling and release the blood clot. Pack the nose to push the perichondrium back to touch and adhere to the cartilage. Remove the pack after 3days.

## 29.10 Nasal polyps

Nasal polyps usually present in adulthood with long-standing nasal obstruction, which becomes complete from time to time, with or without a nasal discharge. There are grey fleshy masses in both the nasal cavities.

*N.B.* You can mistake the anterior end of the inferior turbinate (29-2) for a nasal polyp, so get used to examining the nose.

### THE MOFFAT POSITION



**Fig. 29-9 MOFFAT POSITION FOR PUTTING DROPS IN THE NOSE.** A, over a table. B, on the floor. If a patient inserts drops in either of these positions, and remains in them for 3mins afterwards, the drugs they contain are more likely to remain in contact with the mucosa for long enough to be effective.

When you remove them, they look like skinned grapes. Polyps are common and treatable. Some polyps are so large that they project through the back of the nose into the nasopharynx, and have to be removed through the mouth. If a polyp is on one side only, it may be malignant (or, very rarely a meningocoele, 33.11), so treat it as such, until you have proved it is benign.

*N.B.* Some polyps may be due to *leishmaniasis* (29.18).

### MANAGEMENT.

Try non-operative treatment first, using:

(1) A short course of oral steroids, 30mg of prednisolone for 1wk, which will often dramatically reduce the size of polyps; however, the polyps often return. So, following an oral course of steroids, use steroid drops to the nose. *Avoid long and repeated courses of oral prednisolone.*

(2) Nasal steroid drops alone or following oral prednisolone. Put 2drops of betamethasone (50µg) into each nostril bd, while the patient is in the Moffat position (29-9), and ask him to stay like this for 3mins afterwards. Do this for 4wks. Steroid drops are absorbed into the blood stream *so, again, do not use them for more than a month.*

(3) Nasal steroid sprays (beclomethazone, or budesonide) puffed into each nostril x3-4 bd. Try this for 4wks, and only continue if there is improvement. Steroid sprays are, however, not absorbed into the blood stream and in general are safe to use for long term, but are expensive.

### NASAL POLYPECTOMY (GRADE 1.4)

Premedicate the patient thoroughly; use LA. Sit opposite him, and ask a nurse to stand behind his head. Spray or douche the nose with lidocaine 2% with 1:100,000 adrenaline. Be careful not to exceed the maximum dose. Wait for 5mins.

With a good light shining over your right shoulder, open the nostrils with a nasal speculum. Pass a polypectomy snare, manoeuvre the loop to catch a polyp round its base, and remove it. If polyps do not come out with the snare, pull them out piecemeal with angled forceps.

Repeat the process, until you have removed as many polyps as you can. If there is pain, spray more anaesthetic and wait another 5mins. If there is excessive bleeding at the end of the operation, pack the nose as for epistaxis (29.7).

If you use GA, *this* enables you to remove polyps more completely than under LA, but there will usually be more bleeding. Avoid ketamine, because the laryngeal and pharyngeal reflexes are partly preserved, and cause trouble. Insist on endo-tracheal intubation, and put a large pack in the throat. Be sure it is visible throughout the operation, and has a strong thread fixed to it. Have good suction available. Large clots can form in the pharynx, and be aspirated when you remove the tube. So clear the throat first, and remove the pack with care. *It is not necessary to remove all polyps, only the larger ones blocking the main part of the nasal cavity.* Afterwards, pack the nose with an anterior pack each side (29.7). Make sure recovery from GA is in the lateral (coma) position.

**CAUTION!** *Do not go too high up the nose when removing polyps:* the brain is separated from the nasal cavity by a very thin piece of bone. Be careful when removing polyps from the lateral wall. Again the bone separating the nasal cavity from the orbit and eye (the *lamina papyracea*) is paper thin and it is easy to start pulling out orbital fat.

**If you perforate the orbital wall, there is risk of damage to the optic nerve and bleeding into the orbit.**

*N.B.* Polyps often recur after surgery but usually after a few years. In children they may be the result of aspirating human papilloma virus from the mother's birth canal.

### NASAL TUMOURS AND CANCERS

Be suspicious about polyps that are unilateral and do not have the characteristic grey, oedematous, smooth appearance of common polyps. If you are concerned, carry out a biopsy: usually this can be done under LA but be careful not to biopsy a haemangiofibroma (29.7), a rare vascular tumour of male children.

## 29.11 Foreign bodies in the nose

Foreign bodies in the nose are not uncommon in children. The child is usually brought to clinic with **unilateral nasal discharge**, not nasal obstruction. In fact, it is wise to consider all unilateral nasal discharge in children as due to a foreign body until this has been ruled out by careful examination under GA. The discharge associated with a nasal foreign body is often foul-smelling.

### REMOVING A FOREIGN BODY FROM THE NOSE

It is rare that a child will let you remove a foreign body from the nose without general anaesthetic and a foreign body (unless a small watch battery which will release alkali into the nose) is not an emergency operation.

Clear the nose and try to see the foreign body. Try to get the child to blow or sneeze the foreign body out. Close the other nostril and tickle the nose to make him sneeze.

**CAUTION!** If you suspect a foreign body, assume it is there, until you are absolutely certain it isn't.

**ANAESTHESIA.** LA is suitable, if you can see the foreign body, it is not too far back, and the patient is reasonably co-operative. IV ketamine is especially useful in children. If you use GA, insist on endotracheal intubation and pack the pharynx to prevent inhalation of the foreign body.

**EQUIPMENT.** You will need a good light, suction, angled forceps, and some kind of hook, such as a Eustachian catheter, a bent probe, or a bent paper clip held in a haemostat. Put a large speculum on an otoscope, and remove its back lens.

### EXTRACTION OF A FOREIGN BODY IN THE NOSE (GRADE 1.2)

Either use a headlamp or mirror with a good light directed onto it.

Try to bring the foreign body out anteriorly: if you push it posteriorly, it may be inhaled (this should not happen if the throat has been adequately packed).

**If the foreign body is firm**, pass your chosen hook beyond it, usually above it, turn the hook behind it and deliver it. *Don't try to grab it with forceps*, or you will push it further in. Try to draw it towards the floor of the nose, and away from its roof. You may be able to apply suction directly to the foreign body, especially if it is round and then use an angled scoop to remove it. A foreign body is most likely to impact in the roof of the nose. *This is dangerously close to the floor of the anterior cranial fossa and the medial wall of the orbit.*

**If the foreign body is soft**, use forceps. You may be able to suck small foreign bodies out. Otherwise, use small alligator forceps, or any forceps with blunt angulated tips.

**If there is bleeding**, use gentle suction. Packing (29.7) is seldom necessary.

**CAUTION!** *Make sure there are no more foreign bodies present after you have removed an initial one.*

## 29.12 Tonsillitis

Acute tonsillitis is common, especially in children <10yrs, and is usually due to *streptococcus*. It responds to mouth gargles, and penicillin. More serious cases are caused by the Epstein-Barr virus in glandular fever (with lymphadenopathy), and *corynebacterium* in diphtheria (grey membrane on the tonsils). In scarlet fever, the *streptococcus* produces a toxin resulting in a high fever, rash and prostration.

Infection from tonsillitis may spread to the ear (otitis media: 29.4), around the tonsil (quinsy: 6.7), to the lungs (pneumonia), and in the blood-stream (rheumatic fever). It may also result in an allergic glomerulonephritis.

Acute tonsillitis does occur in adults, and is much more common in HIV disease; *it may then not respond to simple penicillin therapy.*

Sometimes the attacks of tonsillitis are frequent and debilitating; also the tonsils themselves may enlarge significantly, especially in general lymphadenopathy from other causes (17.1), *e.g.* HIV disease, tuberculosis, lymphoma and Kaposi sarcoma.

Very occasionally, in small children, large tonsils may almost meet in the midline and make eating difficult, as well as causing dyspnoea at rest, mouth breathing, otitis media, snoring at night, and even sleep apnoea.

### TONSILLECTOMY (GRADE 2.4)

#### INDICATIONS.

- (1) Frequent, debilitating, recurrent attacks of tonsillitis (>6 attacks in 1yr), especially if causing otitis media.
- (2) Tonsillar enlargement causing airway obstruction.

#### CONTRA-INDICATIONS.

- (1) Current inflammation or abscess formation.
- (2) Untreated HIV-disease (5.6).
- (3) Suspicion of a bleeding disorder: *you must investigate this first.*
- (4) A local epidemic of poliomyelitis: *though now rare, this may still exist in certain parts of the world* (32.7).

#### METHOD.

*This is not a trivial operation*, and carries the risk of fatal haemorrhage and airway obstruction; so weigh carefully the pros & cons! Make sure you can arrange blood transfusion if you need it.

The patient should be at least 3wks away from the last attack of acute tonsillitis. *You need an experienced anaesthetist who can reliably intubate children. A throat pack is essential, and a mouth gag almost indispensable.*

## TONSILLECTOMY

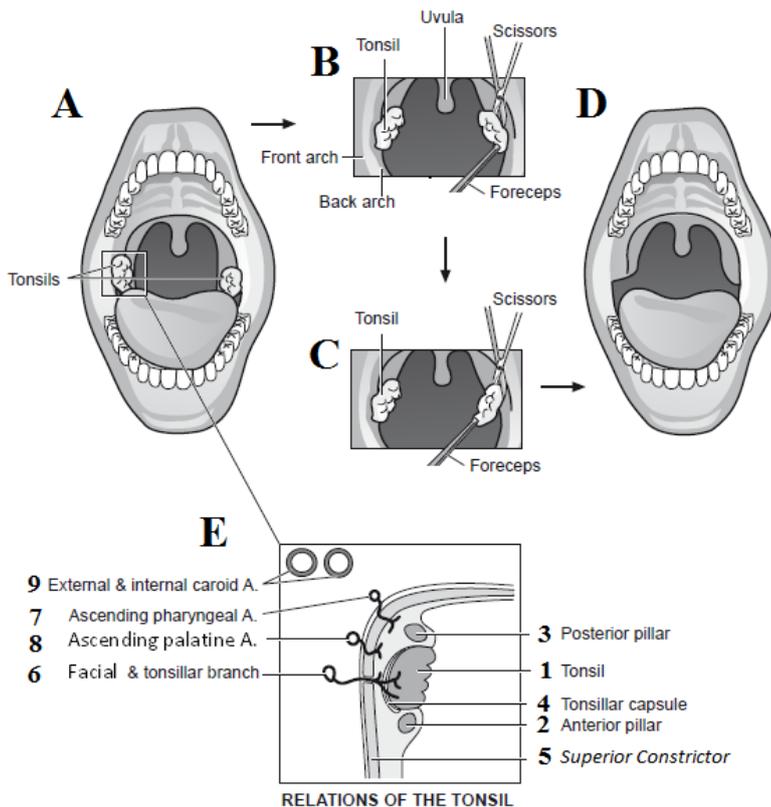


Fig. 29-10 TONSILLECTOMY.

A, view of the tonsils. B, dissecting out the tonsil. C, ligating the pedicle. D, final result. E, horizontal section: (1) tonsil. (2) anterior pillar (*palatoglossus*). (3) posterior pillar (*palatopharyngeus*). (4) tonsillar capsule. (5) *superior constrictor* muscle. (6) facial artery & tonsillar branch. (7) ascending palatine artery. (8) ascending pharyngeal artery. (9) External & internal carotid arteries. After Ellis H. *Clinical Anatomy*, Blackwell 5<sup>th</sup> ed 1972 p.265 Fig 174.

Make sure the head is extended and you are sitting at the end of the operating table. Insert the mouth gag to get a good view of the back of the mouth. Make sure the light and suction are optimal.

Incise the mucosa of the anterior pillar (or palato-glossal fold: 29-10B) immediately in front of the tonsil and identify the capsule of the tonsil. Use blunt dissection and so separate the tonsil from its bed (the superior constrictor muscle of the pharynx: 29-10E) until it remains attached only by its pedicle (a branch of the facial artery: 29-10F) near its lower pole. Tie the pedicle with mounted ligatures and finally remove the tonsil.

There may occasionally be feeding vessels from the ascending pharyngeal and ascending palatine arteries (29-10G,H) which you will need to ligate separately. Observe the patient carefully: keep him nil orally till 6hrs post-operatively; then start oral fluids. Avoid opiate sedation. Use mouth gargles; chewing-gum and sweets are useful adjuncts to keep the mouth clean.

*N.B. Some referred ear pain and fibrin over the tonsillar bed are normal postoperative consequences.*

*N.B. Soluble aspirin is useful in adults, but don't use it in children.*

## DIFFICULTIES WITH TONSILLECTOMY

**If blood oozes from the mouth and nose or there is excessive swallowing post-operatively, assume there is haemorrhage.** Take the patient back to theatre. Check blood clotting times and cross-match blood. Make sure you have good light and suction, hydrogen peroxide, and ligatures. Sedate the patient and remove the blood-clot in the tonsillar fossa. Apply pressure with a swab soaked in hydrogen peroxide. If the bleeding is not controlled, re-anaesthetize and re-intubate the patient.

Occasionally, **if bleeding persists**, especially in a secondary haemorrhage, suture the anterior and posterior pillars (29-10E) together over a swab and add IV cloxacillin. Remove the swab after 48hrs.

*Do not persist in trying to control haemorrhage in an unanaesthetized patient! In the case of secondary haemorrhage (3.5), do not wait if the bleeding stops spontaneously but examine the patient critically in theatre and be ready to suture the tonsillar pillars.*

## 29.13 Naso-pharyngo-laryngoscopy

Examination of the throat is essential in most patients with ear, nose and throat symptoms, and one of the most useful instruments is the fiberoptic endoscope. This comes in 2 forms, a rigid and flexible endoscope (29-11A,B). If you are fortunate to have one, take care of it; clean it properly after each use and store it carefully. You can transmit infection from one person to the next with the instrument, and you can easily damage the optic fibres. These work by internally reflecting light by way of systems of lenses and crystals: these unfortunately break up with time and use.

Alternatively, you can use an angled mirror and a headlight; *but this method (indirect laryngoscopy) is not easy*, so you will have to do it fairly often, if you are going to become competent with it.

FIBROPTIC ENDOSCOPES for looking at the nose, the throat and voice box are different from those used to look at the bronchi, oesophagus and stomach, since *they have no channels*; there is no suction and no biopsy channel. They are used simply to look. They are therefore narrower and simpler to clean and sterilize.

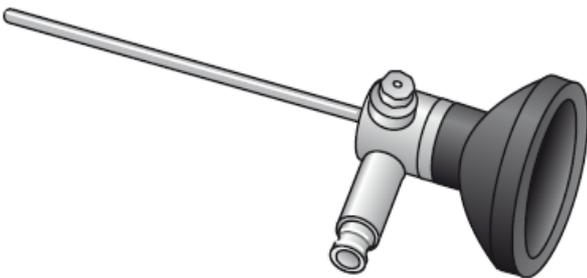
But like other fiberoptic endoscopes, they are not cheap and need a special light source.

## FIBRE-OPTIC ENDOSCOPES

### A. FLEXIBLE-NASO-PHARYNGO-LARYNGOSCOPE



### B. RIGID NASENDOSCOPE



**Fig. 29-11 NASO-PHARYNGO-LARYNGOSCOPES:**  
A, flexible fiberoptic B, rigid.

#### USING A FLEXIBLE FIBREOPTIC NASOPHARYNGO-LARYNGOSCOPE

The flexible fiberoptic nasopharyngolaryngoscope (usually abbreviated to FO endoscope) is some 30cm long with a handle and controls that allow you to focus the image and move the tip of the scope up or down. Connect it by a cable to a light source or to a battery pack.

- (1) Check that the scope is clean, that the light source is working and that the image is focused.
- (2) Explain to the patient what you are going to do. Decide whether he requires LA spray to the nose and/or throat. Most patients do not, but if a patient is anxious or has a narrow nose, then local spray of lignocaine or co-phenylcaine can help.
- (3) Stand in front of the patient; examine one nostril and then the other with the scope, and decide which nostril is wider and will allow easier passage of the tube to the back of the nose. He should be sitting, preferably on a chair with a headrest, so that the head remains steady in one position. Get a nurse to steady his head.

(4) There are 4 ways to the back of the nose: the right or left nostril, and on each side either below the inferior nasal turbinate or above the inferior nasal turbinate (29-12), and there is no predicting which way will be easiest. The narrowest part of the nose is generally at the back of the nose just before you enter the nasopharynx.

(5) As you pass through the nasal cavity, take note of the anatomy of the nose: the inferior and middle nasal turbinates and the nasal septum (often bent). Take note of any polyps (not uncommon) or cancers (rare). Benign nasal polyps are pale, oedematous, smooth and bilateral. Cancers are red, friable, irregular or bleed and almost always unilateral.

(6) At the back of the nose is the nasopharynx. Here, you will see the opening of the Eustachian tube (and by moving the end of the scope you can usually see both Eustachian tube openings whichever nasal passage you go down). Take note of any abnormality in the nasopharynx: an abnormal swelling here may be a nasopharyngeal carcinoma.

(7) Ask the patient to breathe through the nose. This opens up the passage from the nasopharynx to the oropharynx and, by manoeuvring the tip of the scope downwards, you will be able to enter the oropharynx. You can now see the back of the tongue, the larynx and the hypopharynx from above (29-13). Often there is some mucus or saliva on the tip of the scope preventing a view. If so, angle the tip of the scope against the back wall of the oropharynx and ask the patient to swallow. This usually 'cleans' the end of the scope. Often you have to keep repeating this instruction, till eventually you get a good view.

(8) Look carefully at the base of the tongue, the epiglottis, the vocal cords and the pyriform fossae (29-14). Ask the patient to stick his tongue out in order better to see the base of the tongue and the vallecula (the space between the epiglottis and the base of the tongue).

(9) Ask the patient to take a deep breath in, so as to see the vocal cords move outwards and then ask him to say, "eee" or to count to 5 to see the vocal cords come together (29-14).

(10) Remove the scope and then pass it into the opposite nasal cavity to examine that nasal cavity; *there is no need to pass it further on the second side.*

(11) Check the patient is breathing well *and has no stridor.*

(12) Clean and sterilize the scope in preparation for the next patient.

### LOWER ROUTE THROUGH THE NOSE

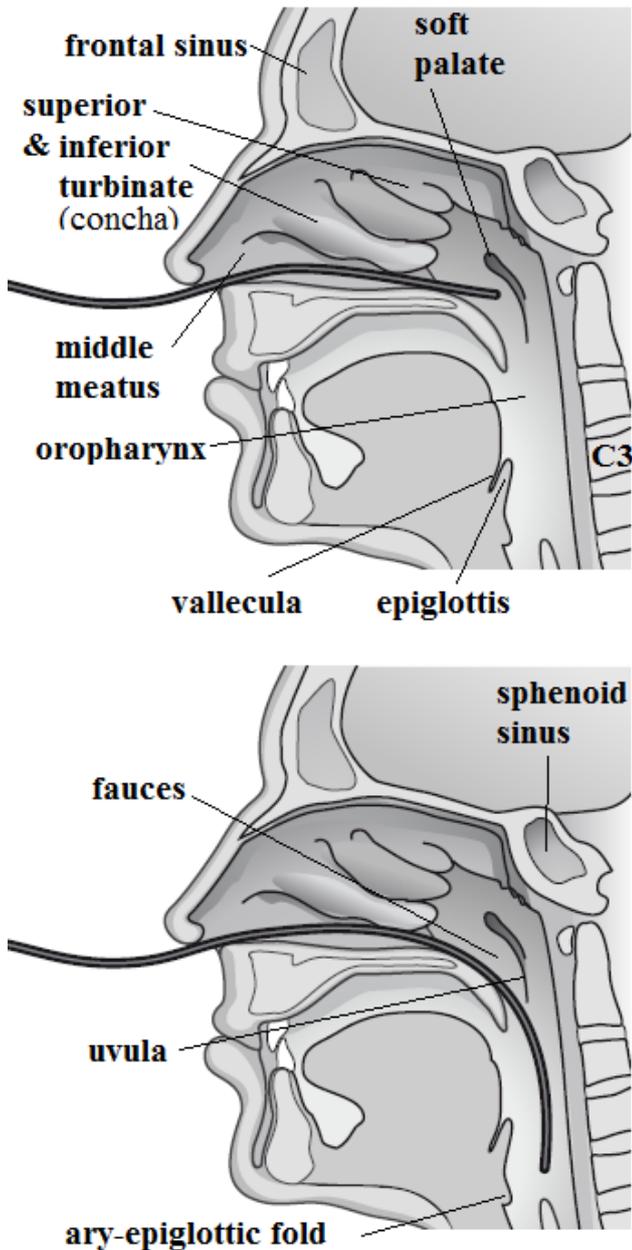


Fig. 29-12 LOWER ROUTE THROUGH THE NOSE (below the inferior turbinate)

### USING A RIGID ENDOSCOPE

This is generally used to examine the nasal cavities. It is often narrower scope than the flexible scope and therefore allows closer examination of the complicated anatomy of the nasal turbinates and meatuses, especially the middle meatuses.

The rigid scope can also be used to examine the larynx, in which case it is used like the laryngeal mirror. Hold the tongue with one hand and slide the scope over the back of the tongue to look down onto the larynx and hypopharynx from above (29-13). *You need a GA to do this effectively; you share the airway with the anaesthetist.*

**If you do this for hoarseness and airway obstruction, intubation can be difficult and even dangerous, as on waking there is the danger of laryngospasm and obstruction from secretions or blood.**

### VIEW LOOKING FROM NASO- TO HYPO-PHARYNX

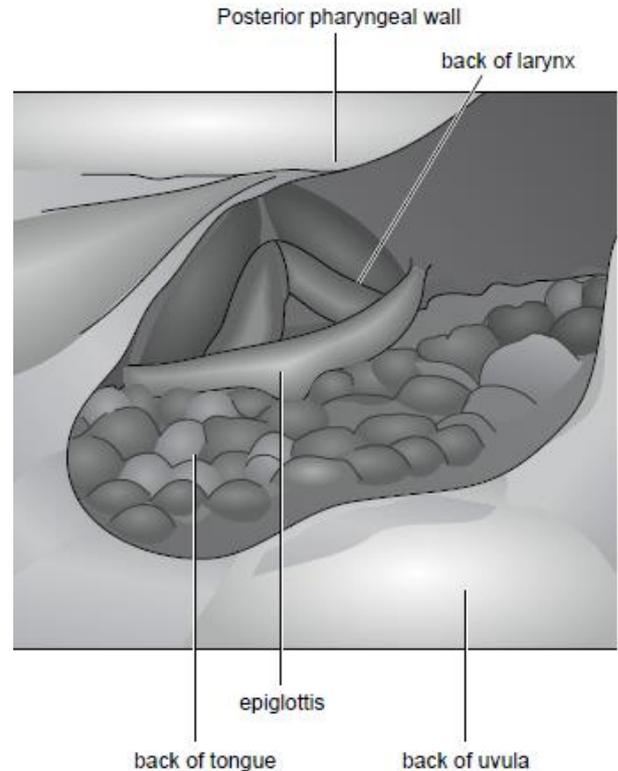


Fig. 29-13 VIEW FROM NASO- TO HYPO-PHARYNX, as seen through an endoscope introduced as in 29-12.

### VIEW LOOKING DIRECTLY AT THE LARYNX

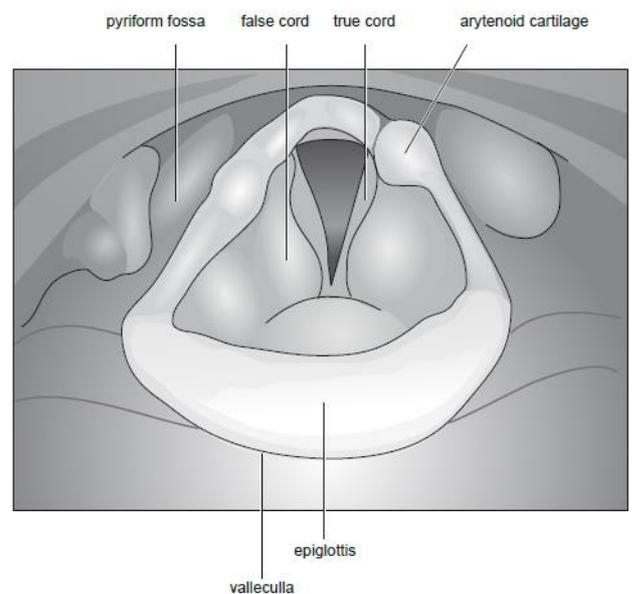


Fig. 29-14 DIRECT VIEW OF THE LARYNX (as seen through an endoscope introduced as in 29-12)

## DIRECT LARYNGOSCOPY

### INDICATIONS.

- (1) Examination when you intend taking a biopsy.
- (2) Assessing if a laryngeal tumour is operable.

*N.B. Remember flexible bronchoscopy includes direct laryngoscopy!*

### METHOD.

You need good communication with your anaesthetist for this. Position the patient, with the neck flexed and head slightly extended on a pillow. Get an assistant to hold his right palm against the patient's head, and hold the thumb against the underside of the mandible. This gives vertical and lateral control.

Have the laryngoscope ready in your hand, and when you are sure the patient is anaesthetized, pass the laryngoscope into the mouth, *avoiding using the teeth as a fulcrum*. Press the laryngoscope against the back of the tongue until the epiglottis comes into view. With a curved laryngoscope blade, pick up the epiglottis with the point of the instrument, revealing the base of the arytenoids. Push the laryngoscope forwards with its handle: this flattens the tongue and brings the cords into view. Examine the oropharynx including the back of the tongue, and the hypopharynx including the pyriform fossa. Carefully examine the supraglottis, including the epiglottis and aryepiglottic folds. Pass the rigid scope into the larynx and examine the false cords, true cords and subglottis. Biopsy any abnormalities, but *do not disturb minor abnormalities of the vocal cords* as they are delicate

structures and big biopsies of small lesions will make the voice worse.

When you have finished, allow the anaesthetist to ventilate the patient with oxygen to prevent bronchospasm.

### CLEANING AND STERILIZING.

*Do not leave this task to an untrained member of staff. Do not put off this job until hours after the endoscope has been used.*

The 3 stages are cleaning, disinfection, rinsing. For flexible endoscope, follow instructions as for the OGD (13.2). For rigid instruments, a multi-enzyme detergent agent is useful where immersion sinks are unavailable.

## INDIRECT LARYNGOSCOPY

**EQUIPMENT.** A good light coming from behind the patient and slightly to one side. A head lamp, laryngeal mirrors and a spirit lamp, 4% lidocaine in a laryngeal spray.

*N.B. This is a dying art, but still very useful in places where there is lack of advanced equipment; nonetheless the success rate is only around 60% but practice makes perfect!*

**METHOD.** Sit opposite the patient, and arrange him and the light so that it shines down his throat.

Wrap gauze round the protruding tongue, and pull it forwards with your left hand. Spray the fauces, soft palate and pharynx with lidocaine.

Warm an angled mirror in the flame of a spirit lamp, and test its temperature on the back of your left hand; it should feel just warm, *but not hot*. Place the back of the mirror against the soft palate, push a little and look down at the larynx. Identify the cords.

## INDIRECT LARYNGOSCOPY

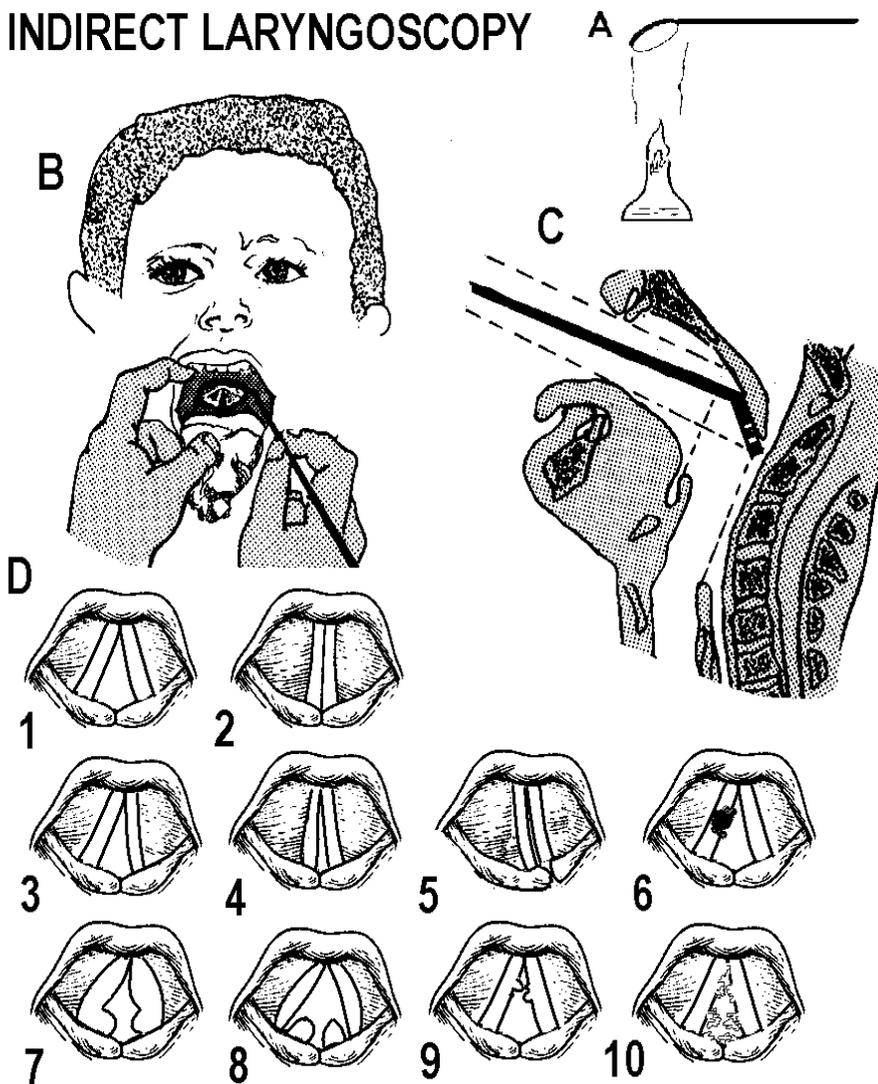


Fig. 29-15 INDIRECT LARYNGOSCOPY.

A, warming the mirror. C, light path to the larynx. D, views of the larynx: normal cords in inspiration (1), in phonation (2). Left vocal cord palsy in inspiration (3), in phonation (early, before 6wks, 4), and in compensated phonation (late, 5). (6), carcinoma (early & treatable). (7), swollen cords and arytenoids of laryngitis. (8), arytenoid oedema or granulomas (post-intubation, or radiotherapy). (9), laryngeal polyps or singers' nodes. (10), papillomas.

Normal cords are white. Laryngitis makes them red, and chronic laryngitis also makes them swell. If you see a lump, it is probably a polyp. A ragged ulcer is likely to be a carcinoma. Note the movement of both the cords by asking the patient say, "eee". To examine the nasopharynx, depress the tongue with some soft instrument, and place a smaller (14mm) rhinoscopic mirror in the pharynx, so that your line of sight passes up behind the soft palate.

#### SOME CONDITIONS VISIBLE IN THE NOSE

**Benign oedematous nasal polyps:** in some populations very common. These are bilateral and pale, often filling the nasal cavities (29.10).

**Nasal septal perforation:** usually at the front of the nasal septum and secondary to trauma (picking of the nose with finger tips) but can be due to cancer, syphilis, leprosy, connective tissue diseases. cocaine & chronic use of ephedrine nose drops.

**Nasal carcinoma:** if a polyp bleeds or is irregular, suspect cancer (29.16). This may arise from leather tanning, lacquer paint, soldering, or welding fumes, and nickel or chromium exposure.

**Foreign bodies:** determine if they are solid or not, and whether you can easily grasp them (29.11).

#### SOME CONDITIONS VISIBLE IN THE PHARYNX:

**Adenoids:** midline, usually seen in the young.

**Naso- or hypo-pharyngeal carcinoma:** asymmetric, granular or ulcerating lesions (29.16).

**Carcinoma of the base of tongue:** an ulcer or an irregular bleeding, exophytic mass.

#### SOME CONDITIONS VISIBLE IN THE LARYNX:

**Supraglottitis:** swelling of the epiglottis.

**Laryngitis:** swollen, red vocal cords, usually symmetrical. oedematous vocal cords (29-15D7)

**Laryngeal papillomatosis:** laryngeal warts, sometimes very large (29-15D8).

**Laryngeal carcinoma:** an early cancer is a small white plaque (leukoplakia) but as it grows, it can become thickened, ulcerating and a large mass that eventually blocks the airway (29-15D6, 29.17).

**Vocal cord paralysis:** the vocal cord does not move outwards on inspiration (29-15D3), and does not move inwards on speaking or saying "eee" (29-15D4).

**Foreign bodies, e.g.** dentures, a pen top, or a peanut.

**Ascaris worms:** these may occasionally be aspirated when there is intestinal obstruction and profuse vomiting of a bolus of worms (12.5).

## 29.14 Bronchoscopy: inhaled foreign bodies

If the neck is flexed, and extended sufficiently, the mouth can align with the trachea or oesophagus, so that you can pass a rigid tube. This is the 'sword-swallowing position', and is the basis of rigid bronchoscopy (29-16) and oesophagoscopy. In theory, these are simple procedures; the traditional type of bronchoscope is merely a long tube with a light at one end. In practice, however, removing a foreign body with one requires much skill. *Anaesthesia is difficult, and the skill of your anaesthetist is the main determinant of success.* You need a range of instruments to cover all sizes of patient, and also a variety of forceps. *There are many opportunities for disaster*, particularly obstructing the airway, or tearing the lower trachea and bronchi especially if the patient is not properly sedated, so causing mediastinal emphysema and mediastinitis. If you have other instruments with fiberoptic illumination, make sure that your bronchoscope is compatible with that system. You will need good suction.

**If you have a fiberoptic flexible bronchoscope, you can use this under LA quite readily. *It is much, much safer!***

Bronchoscopy is useful for:

- (1) Sucking out a patient's stomach contents from the trachea, if there he has been unfortunate enough to aspirate during a GA. Make this your first priority, especially if you are new to bronchoscopy.
- (2) Sucking out the secretions which have gathered in the bronchi of a desperately sick patient postoperatively (11.11).
- (3) Removing foreign bodies, especially peanuts inhaled by children. This is more difficult than the other indications, so if you are new to bronchoscopy, *don't start with this*, if you can avoid doing so.
- (4) Diagnosing carcinoma of the trachea, carina and upper bronchi, and other diseases of the larger airways.

Inhaled foreign bodies in the larynx and tracheobronchial tree, particularly peanuts or watermelon seeds, are common. If a child is lucky, the first immediate bout of coughing expels the nut.

Otherwise, wheezing and coughing usually stop without expelling it. This may be followed by a latent interval, during which there are no signs, especially if the nut has gone far down the bronchial tree. This latent interval is then followed by fever, a cough, and the symptoms of chest infection. Antibiotics may relieve the symptoms temporarily, but they always return when treatment stops. A misdiagnosis of TB is common.

If coughing, or the 'upside down thump' or Heimlich manoeuvre described below, fail to remove a foreign body, it has to be removed through a bronchoscope. Even if you can successfully pass one, removing a foreign body is difficult, and sometimes impossible. *Leaving it inside, however, results in suppuration and chronic disability, or death.*

## BRONCHOSCOPY

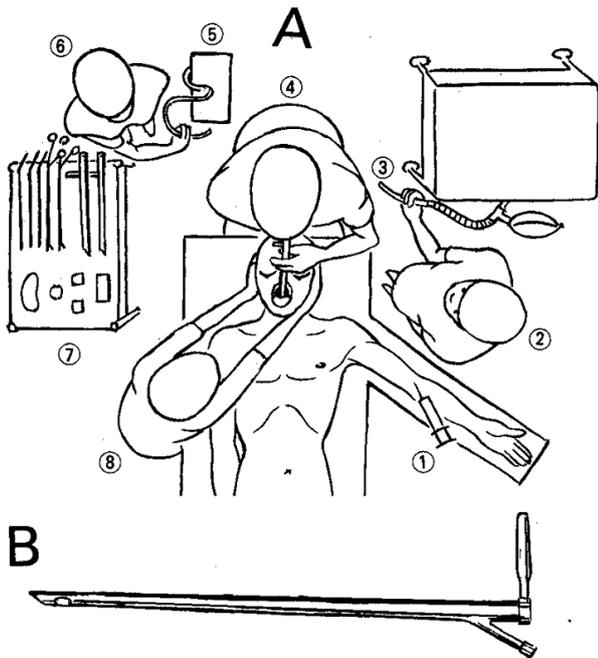


Fig. 29-16 ARRANGEMENTS FOR BRONCHOSCOPY.

A, after induction the anaesthetist moves to the patient's left. (1), cannula in a vein. (2), anaesthetist. (3), oxygen supply. (4), endoscopist. (5), suction. (6), trolley nurse. (7), trolley with instruments & tubes. (8), assistant holding the head in the midline. B. rigid bronchoscope.

### FOREIGN BODIES IN THE BRONCHI

#### IMMEDIATE TREATMENT:

If you are present when a child inhales a foreign body, turn him upside down and bang the back of the chest: he may cough it out. Alternatively, especially in an adult, hold him tight from behind and thrust suddenly and very firmly under the xiphisternum (the Heimlich manoeuvre: 30.1)

#### HISTORY AND EXAMINATION.

If presentation is not acute, take a careful history, look for impaired movement on one side of the chest, and listen for localized wheezing.

#### RADIOGRAPHS.

Look for a radio-opaque object, localized collapse, pneumonitis, consolidation of a segment or an entire lobe; and mediastinal shift. There will be obstructive emphysema if a foreign body allows air into a bronchus, but not out of it.

#### CAUTION!

- (1) If a mother comes to you saying that her child has inhaled a peanut or other foreign body, believe her, as she is almost certainly right.
- (2) Most plastics are radiolucent, so you may not see them on a radiograph.
- (3) A radiograph which does not show a foreign body does not prove it is not there, unless its nature is known and it is definitely radio-opaque.

N.B. Ultrasound can help decide if the object is in the bronchus or oesophagus.

**BRONCHOSCOPE**, rigid, Negus, conventional lighting, distal illumination, complete with cords, Wappler fitting, battery box, two lamp carriers and 2.5V lamps, (a) infant lumen 5.4x4.1mm, (b) child 7x5.7mm, (c) adolescent small 8x6.7mm. If you want to remove foreign bodies from the lower respiratory tract, you will need these. This is not the complete range, which includes the large adolescent, the small adult, the adult, and several for the lower bronchus. Darken the theatre so that you do not have to use the bulbs at high voltages which shorten their lives.

N.B. The flexible bronchoscope does not require GA. Keep some spare bulbs for it

**FORCEPS**, for bronchoscope, (a) Chevalier Jackson, 2/2 teeth on 50cm shaft, (b) Haslinger tubular shaft or sliding shaft type for small bronchoscopes. If you have bronchoscopes, you will need forceps for them. Measure a length on the shaft of the forceps the same as the length of the bronchoscope; then you will know when the tip is beyond the length of the bronchoscope.

**SPARE BULBS**: keep a reserve in stock!

### BRONCHOSCOPY (GRADE 2.5)

**CAUTION!** This is not an easy procedure. You will need a good anaesthetist and a good nurse.

Have a good suction ready, several sized bronchoscopes (the one suitable for a child will be of smaller diameter than the child's little finger), as well as a variety of foreign body and biopsy forceps, and a wire hook to remove a foreign body. Maintain oxygenation of the patient throughout.

**Under LA.** Add premedication. Use ketamine, with atropine 0.6mg for an adult. In the sitting position, inject 5ml of 2% lidocaine into the trachea with a short stiff fine-bore needle, aiming to produce a fine spray, by perforating the cricothyroid membrane. Check that you are in the trachea, by aspirating before you inject. The liquid will initiate a cough reflex. Before you pass the instrument, spray the cords with more lidocaine and wait 2mins.

**CAUTION!** Don't exceed the dose of lidocaine, particularly in a small child: 20ml of 2% lidocaine is the absolute maximum for an adult.

**Under GA.** Use a short-acting relaxant as well as GA and rigid bronchoscopy for removal of a foreign body.

**CAUTION!** Be sure to spray a child's larynx with lidocaine, because this will prevent laryngeal spasm as you pass the bronchoscope, and minimize difficult airway problems upon recovery.

You will need 2 connections, one for 'normal' intubation between attempts at bronchoscopy, and a larger one which fits snugly into the end of the bronchoscope, so that you can ventilate while the bronchoscope is in place, if the pulse rate falls, or if there is cyanosis. There is usually some leakage of gas, so you will need a good flow of oxygen.

Blow oxygen into the scope intermittently, watching the pulse rate meanwhile. A falling pulse is a sign of anoxia. Only proceed to remove the foreign body, if the pulse is satisfactory. Oxygen through the side tube will not by itself provide adequate ventilation, especially if the patient is paralysed.

The anaesthetist and the surgeon share the patient. *The anaesthetist must be in charge, and decides when he must give oxygen.*

**CAUTION!**

The chest must expand during ventilation. *If it does not, because you have passed the bronchoscope into the oesophagus, remove it, let the anaesthetist intubate the child, wait and then try to bronchoscope him again.*

**INDICATION**

- (1) Aspiration of stomach contents
- (2) Retention of secretions
- (3) Removing a foreign body
- (4) Biopsy of a bronchial lesion
- (5) Diagnosis of tuberculosis

**METHOD.**

Lie the patient flat with pillows behind the back. Use LA as above. Wear spectacles to protect yourself from showers of sputum. Stand behind the patient, hyper-extend his neck, and have the bronchoscope and sucker ready.

Now pass the rigid bronchoscope gently behind the tongue. Look for the uvula and the epiglottis. This will lead you in the midline to the vocal cords, as when intubating. As soon as you see them, aim the bronchoscope in the same direction as the trachea. Slip its beak between the cords and advance it downwards, sucking out the secretions as you do so.

If you have a flexible bronchoscope, pass this through one nostril (which you have anaesthetized with lidocaine spray or pack), and then keeping in the midline, through the vocal cords.

**CAUTION!**

- (1) *Make sure you are not going down the oesophagus* (you must recognize the cords on entry).
- (2) Very little movement should be possible between the sides of the trachea and the bronchoscope. So hold its handle in your right hand. Hold its shaft between the index and middle fingers of your left hand. Rest your left thumb on the upper front teeth, and keep the lower lip out of the way with a gauze swab, held in your ring finger. If you hold the bronchoscope against the teeth like this, it and the head will turn as one and less damage is likely.

Look for the foreign body in the bronchi: the common site is just distal to the carina in the right main bronchus. This is shorter, more vertical and wider than the left. Most foreign bodies enter the right side.

If the carina is normal, pass the bronchoscope down one or other bronchus, preferably the normal one first. When you withdraw from the right main bronchus and enter the left one, you will have to move the head to the right as you do so.

With luck you will see the foreign body, and perhaps the bronchi to particular lobes. Try to bring the foreign body out on the end of the sucker. If this fails, grasp it with the forceps.

**If you cannot grasp the foreign body**, try to pass down a Fogarty balloon catheter beyond it, and inflate the balloon below the foreign body, as in an embolectomy. It is usually best then to withdraw the bronchoscope and the foreign body together. If there is much pus, suck that out too.

**CAUTION!**

- (1) Hold the bronchoscope lightly in your fingers, so that if the patient moves, it will move with him, instead of injuring the respiratory tract.
- (2) *Take care not to damage the teeth.*
- (3) Remove it promptly if the patient struggles.
- (4) If you fail, and the anaesthetist says, "That's enough", *don't persist in your probably futile endeavours!*

To identify the bronchial tree (11-23): on the right, look for the right upper lobe bronchus in the 2 or 3 o'clock position, the apical lower lobe bronchus at 6 o'clock, and the right middle lobe bronchus at 12 o'clock. Then look into the bronchi of the lateral, anterior, posterior, and medial basal lobes.

On the left, look for the left upper lobe bronchus in the 10 o'clock position, the apical lower lobe bronchus at 6 o'clock, and then into the bronchi for the lateral, anterior, and posterior basal lobes.

**DIFFICULTIES WITH BRONCHOSCOPY**

**If the patient is suffocating and blue from the procedure**, wait and try again later. If he is suffocating because of the foreign body, you will have to persist.

**If a foreign body breaks into pieces**, bring it up bit by bit. If it slips off while you are withdrawing it through the cords, try again. If necessary, squirt a little saline down the bronchoscope with a syringe, and use suction.

**If the foreign body rolls up and down the trachea**, but you cannot get it past the cords, tip the table steeply head down, and manipulate it past them with the piece of hooked wire that you have prepared for this eventuality.

**If the foreign body is up a side-bronchus**, you will only reach it with a flexible scope, or if it shifts with vigorous physiotherapy.

**If you are looking for a carcinoma**, look for abnormalities of the wall, and biopsy any growth. It will be easier to remove a piece from the carina. Suck out the blood afterwards.

**STORAGE**

Hang flexible endoscopes vertically in a lockable cupboard with good ventilation; *they should not be stored curled up in their transportation case. Biopsy forceps wires easily get tangled, and caught in doors; make sure they hang nicely on separate hooks.*

## DOCUMENTATION

Produce a regular form (13-10) with patient details, instructions, consent, indications for the procedure, and findings. Make sure you fill these correctly for each patient.

### 29.15 Tracheostomy & cricothyroidotomy

If respiration is obstructed and you cannot relieve it by simpler methods or by intubation, you may occasionally have to open the respiratory tract below the obstruction. You can enter it through the cricothyroid membrane, or the trachea. In an emergency, pass 2 to 4 large bore (>1.5mm) short cannulae through the cricothyroid membrane. In an adult (but not in a child) you can open the cricothyroid membrane with a sharp knife.

If necessary, you can do this in  $\leq 30$ secs: it *may be so* urgent that you do not *have time to sterilize the knife*. As an emergency procedure in an adult this is simpler and safer than the other alternative, which is an emergency tracheostomy. Permanent impairment of the voice or airway is unusual after a cricothyroidotomy. But it is a temporary procedure only, so perform a formal tracheostomy later.

If possible *anticipate* the need for an emergency tracheostomy and do it as an elective procedure under LA, ketamine, or tracheal anaesthesia. It will:

- (1) Provide immediate relief for upper airway obstruction.
- (2) Reduce the dead space by 100ml and nearly double the alveolar ventilation.
- (3) Provide an opening through which you can suck out secretions.
- (4) Provide an airway that can be continued indefinitely.

But, a tracheostomy will also:

- (1) Greatly diminish the effectiveness of the cough reflex.
- (2) Short circuit the humidifying effect of the upper respiratory tract, and so dry the tracheal mucosa and make the bronchial secretions more viscid.
- (3) Make infection of the lower respiratory tract much more likely, so careful aseptic procedures are essential.
- (4) Occasionally cause severe bleeding.
- (5) Carry the risk of tracheal stenosis later, especially in a child.

Intubation is almost always possible, so that tracheostomy is only very rarely necessary if intubation fails or is unsatisfactory, has to be prolonged for >7days, and there is no other way of maintaining the airway.

**If the tracheostomy proves to be unnecessary later, you can close it. If it was necessary, it was life-saving. Even so, a tracheostomy has serious risks, especially when nursing care is poor.**

#### Fig. 29-17 EMERGENCY CRICOTHYROIDOTOMY.

A, position of the patient, feeling for the cricothyroid membrane. B, insertion of cannulae. C, making the incision. D,E,F, anatomy of cricothyroidotomy compared to tracheostomy.

#### EMERGENCY CRICOTHYROIDOTOMY (GRADE 1.4) INDICATIONS

Any indication for a formal tracheostomy when the patient is in immediate danger of death, and *there is no time to perform a formal tracheostomy*.

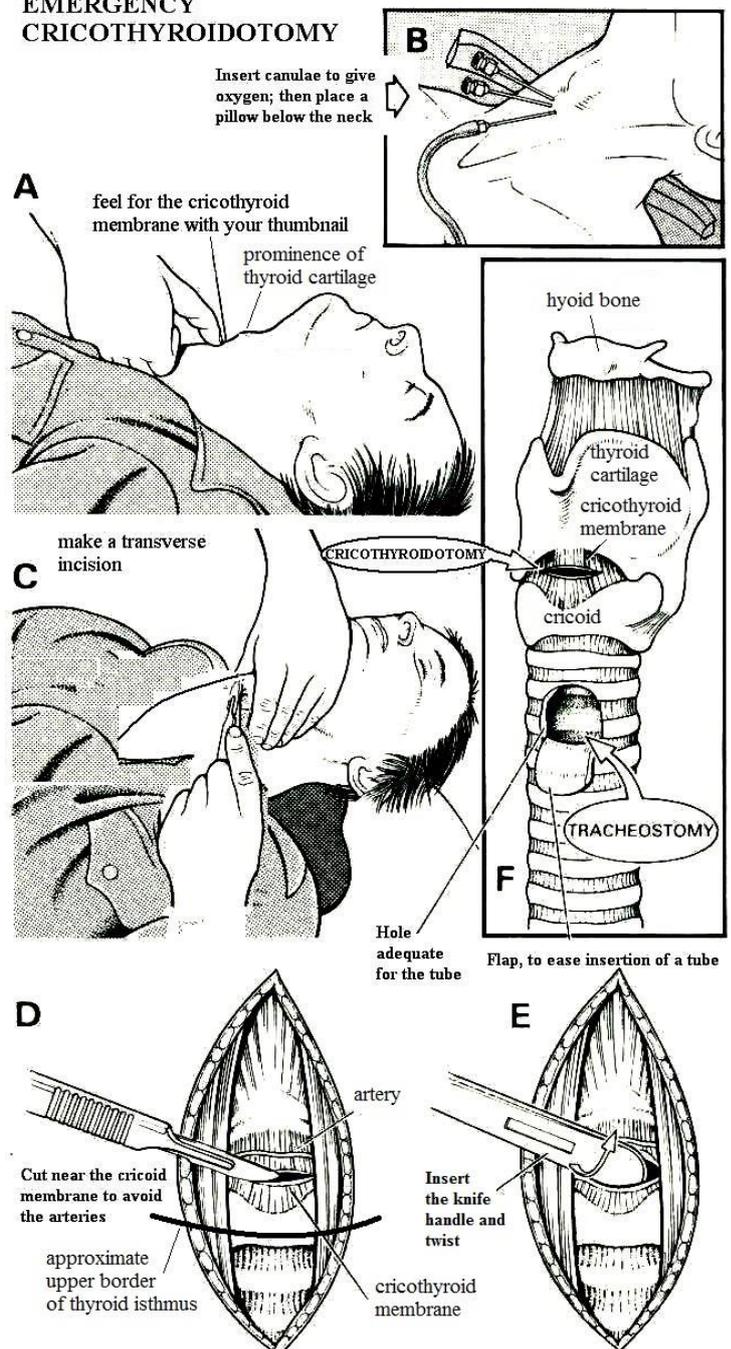
#### CONTRA-INDICATIONS

Children (where the cricothyroid membrane is too small)

#### METHOD

Make sure there are already nasal cannulae in place to supply oxygen. Place a pillow behind the neck to extend it, and bring the larynx forward. Find the prominence of the thyroid cartilage in the midline, and follow it downwards to the prominence of the cricoid cartilage (29-17). Feel these landmarks on your own throat now.

#### EMERGENCY CRICOTHYROIDOTOMY



Use your finger nail to mark the depression formed by the cricothyroid membrane in the midline between the thyroid and cricoid cartilages.

Insert 2 to 4 short wide bore (>1.5mm) cannulae through the cricothyroid membrane (29-18B). Give oxygen through one of them if necessary. You can use a knife in patients >10yrs. *There is usually no time to make a vertical midline incision over the thyroid and cricoid cartilages.* If there is, insert the tip of a solid bladed knife horizontally through the cricothyroid membrane as near the cricoid cartilage as you can. This will avoid the cricothyroid arteries which run across the membrane superiorly. Twist the blade slightly and place any convenient tube into the hole (e.g. a ballpoint pen sheath). *Make sure this tube does not fall out! Make sure the tube is not too small to fall into the hole and then block the airway further!*

OMARI (36yrs) was crushed by some heavy scaffolding in a sugar factory. He was dyspnoeic with paradoxical movement on the left side of the chest, which had no breath sounds and diminished vocal resonance. It was resonant anteriorly, and dull at the base posteriorly. The trachea and apex beat were shifted to the right. Radiographs confirmed the diagnosis of multiple fractured ribs with a flail chest and a left haemopneumothorax. A chest drain connected to an underwater seal was inserted in the left mid-axillary line, and oxygen was administered by mask. Much air and a litre of blood flowed into the drain bottle, but he remained distressed and cyanosed. The chest was too painful to allow him to cough. Secretions began to accumulate, so a bronchoscopy was performed and copious sputum sucked out. Unfortunately, bronchoscopy was too traumatic to be repeated. Further radiographs showed diffuse mottling throughout both the lung fields. A tracheostomy was performed, and the trachea was repeatedly aspirated, after which his general condition improved and the cyanosis disappeared. Eight days later the tracheostomy tube was removed and 3wks after discharge, he returned to work.

HAMID (25yrs) heard a lion chasing his cows. He went out with a spear, but the lion leapt at him, biting his throat, and penetrating the larynx. He arrived in hospital at the point of death, with blood bubbling from the mouth. It obscured the oedematous distorted larynx, so that intubation was impossible. A tracheostomy was performed with some difficulty under LA. He immediately began to breathe normally. Much blood was sucked from the trachea, and blood stopped coming from the mouth. He recovered completely.

STEPHEN (18yrs) hit a rock on the road while riding his motorbike, flew over the handlebars landing on his chin. The impact split it in two, lacerating the tongue down the middle. Fortunately he was brought to hospital lying on his side because every time he moved onto his back, he would stop breathing as the detached tongue fell back. A tracheostomy was done under LA with difficulty in the lateral position, and then all his facio-maxillary injuries repaired. He made a full recovery.

#### EQUIPMENT

An efficient suction machine is vital. Choose a tracheostomy tube of the size of the endotracheal tube (if present) or smaller (gauge this using the size of the patient's *N.B.* little finger as a guide). Use a cuffed tube if you want to ventilate the patient.

Insert a double (outer & inner) tube if the tracheostomy is likely to be long-term: you can then take out the inner tube and clean it in the sink. *Don't use too small a tube.* If it is too long, it may reach the carina and block one of the bronchi. An incorrectly fitting tube may erode an artery and cause severe bleeding. *You don't need a special tracheal retractor or hook.*

*N.B.* Before any tracheostomy, warn the patient that he will not be able to talk immediately after the operation

#### TRACHEOSTOMY IN A CHILD



**Fig. 29-18 EMERGENCY TRACHEOSTOMY IN A SMALL CHILD.** A, place the child on your lap holding the hanging head extended. B, incise vertically midway between the cricoid and the suprasternal notch. After Marsden AK, in Rutherford WH et al. *Accident & Emergency Medicine*, Churchill Livingstone 1989 p.120 Fig 10.26.

#### FORMAL TRACHEOSTOMY (GRADE 2.3)

##### INDICATIONS

- (1) Failed or unsatisfactory intubation, with no other way of maintaining the airway.
- (2) Prolonged intubation (>7days).
- (3) After cricothyroidotomy.
- (4) Acute respiratory infection in children, especially epiglottitis, laryngo-tracheo-bronchitis, or diphtheria.
- (5) To ease suction of secretions.
- (6) Respiratory obstruction following thyroidectomy (25.7).
- (7) Presence of an obstructing laryngeal tumour (29.17), foreign body, or *ascaris* (12.5).
- (8) Ludwig's angina (6.11) or angio-oedema.
- (9) Tracheal damage.

**CAUTION!** Stand clear as you cut, you may be showered with droplets of blood and secretions from coughing through the tracheostomy wound.

For prolonged intubation, fashion a formal elective tracheostomy as soon as you can. If you delay, perichondritis, stenosis, and subglottic oedema may follow.

*N.B.* You may need tracheostomy equipment in a hurry, so have a set ready sterilized in the theatre.

## ANAESTHESIA

Use LA by preference. Its use on a struggling patient is difficult and you may then need some sturdy helpers. Adrenaline infiltration (1:100,000) will reduce troublesome bleeding. IV ketamine is the safest GA, unless the patient already has an endotracheal tube. A laryngeal mask is useful as it leaves the trachea free.

**POSITION** the patient with the head on a soft ring support, and a cushion under the shoulders, so that the neck is extended. Make sure the head and body are lined up straight, so *you know where the midline is*.

## INCISION

Make a transverse incision 4cm long 2cm below the border of the cricoid cartilage (29-19A). Cut through the subcutaneous fat, and the cervical fascia (29-19C).

*N.B. In an emergency, lie a small child on your lap with the head held hanging, and make a vertical incision midway between the cricoid and the suprasternal notch.*

There is a fibrous median *raphe* between both right and left *sternohyoid* muscles. The *sternothyroid* muscles lie slightly deeper. Cut *in the midline* down to the tracheal rings, retracting the muscles laterally. You will now see the isthmus of the thyroid gland which varies considerably in size.

If the isthmus of the thyroid is large and interferes with your approach to the trachea, divide it. Make a small horizontal incision through the pre-tracheal fascia over the lower border of the cricoid cartilage. Put a small haemostat into the incision and feel behind the thyroid isthmus and its fibrous attachment to the front of the trachea (29-19D).

When you have found the plane of cleavage, use blunt dissection to separate the isthmus from the trachea. Put a large haemostat on each side of the isthmus, and divide it (29-19E). Later, oversew the cut surfaces (29-19G).

Make sure you have the correct size tracheostomy tube ready. *Test the cuff* if you are putting in a cuffed tube. Check that the suction is working. If there is an endotracheal tube *in situ*, ask the anaesthetist to suction the airway and squirt some lidocaine down the tube, and withdraw it just above the cricoid. Alternatively inject 2ml lidocaine directly into the trachea: you can confirm you are in the right space by aspirating air into a syringe filled with fluid.

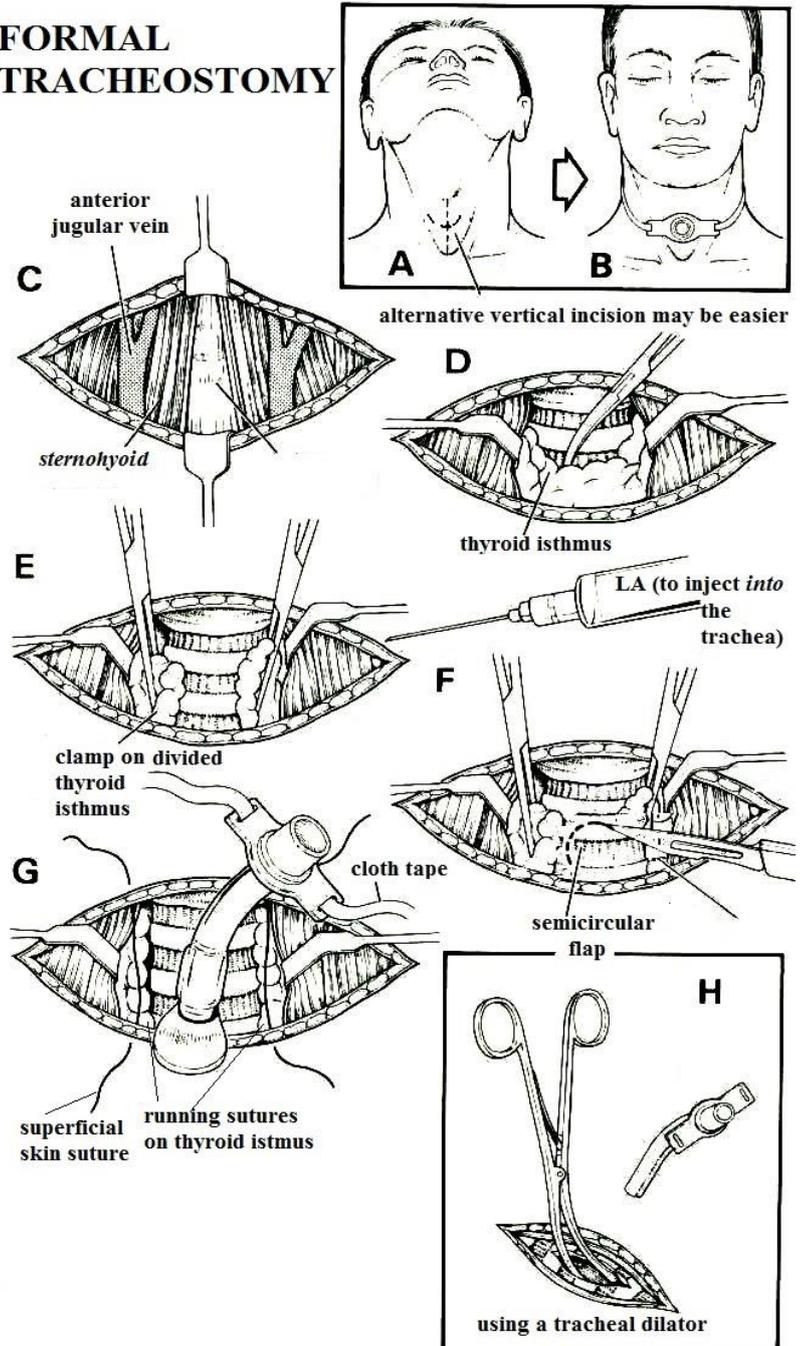
## Fig. 29-19 FORMAL TRACHEOSTOMY

A, incisions. B, tube finally in place. C, incise the skin and pre-tracheal fascia. D, after cutting in the *midline*, pass a haemostat behind the thyroid isthmus, if necessary. E, clamp the cut thyroid. F, cut a flap in the 3<sup>rd</sup> tracheal ring. G, insert the tracheostomy tube, sew up the cut edges of the thyroid isthmus, and insert superficial sutures. H, demonstrating the use of a tracheal dilator.

**CAUTION!** Control all bleeding before you open the trachea. *Do not use diathermy once the trachea is open because oxygen used for ventilation may cause a fire!*

If you have a sharp hook, insert it below the cricoid and get an assistant to pull the trachea forwards. Cut an inverted U-flap (29-19F) containing the 3<sup>rd</sup> & 4<sup>th</sup> tracheal rings and insert the tube. The flap will act as a guide to direct the tube into the trachea and will make changing it easier. A flap largely eliminates the great danger of a tracheostomy, which is inability to replace the tube quickly when it has come out accidentally.

## FORMAL TRACHEOSTOMY



*N.B. It might be unwise to excise a flap in a child; a simple vertical incision of adequate length may be better, but re-insertion of the tube can be difficult.*

**CAUTION!**

- (1) *Stand clear.* If there is blood in the trachea, coughing will expel it everywhere.
- (2) *Don't disturb the first tracheal ring.*
- (3) *Don't remove any of the trachea.*
- (4) *Don't incise more than 40% of the circumference of the trachea, or severe stenosis may follow.*

**If you have a percutaneous tracheostomy set**, proceed as above to puncturing the trachea; then pass a guide wire at the 12 o'clock position into the trachea making sure it does not slip through the side hole of an endotracheal tube still *in situ*. Along this guide wire, pass the dilator 'seated' correctly on its cannula. Then withdraw the cannula and guide wire, and pass the tracheostomy tube over the dilator, finally removing the dilator.

The patient tolerates the tube more easily when the mucosa is anaesthetized with 2ml lidocaine. *The tube must not slip out*, so tie the tube in place with tapes round the neck. Tie it with the head well flexed, or the tapes may become slack when the patient sits up in bed with his head forward. Pack petroleum jelly gauze round the tube, and bring the edges of the skin incision together. Leave a little space round the tube, to minimize the danger of subcutaneous emphysema.

**CAUTION!**

- (1) *Don't suture the skin tightly or leave it too loose round the tube.* Surgical emphysema can be caused by closing the skin too tightly round the tube (causing air to be pushed into the tissues on coughing round a partly blocked tube), or closing it too loosely, enabling air to be drawn into the tissues when on panic inspiration through a blocked tube.
- (2) *Don't let the tube become blocked.*

**If you use a cuffed tube**, avoid too short a cuff or too high a pressure inside it. Deflate the cuff 4hrly for 15mins to reduce the risk of pressure necrosis on the trachea.

**POSTOPERATIVE CARE OF A TRACHEOSTOMY**

*Blockage of the tracheostomy by crusts, especially in the first days after insertion, is a serious danger for all patients.*

The reason for the crusting is that air is not longer being warmed and moistened by the nose, and so cold and dry air is entering and irritating the trachea and bronchi. Secretions quickly build up which then dry and block the tracheostomy. Therefore, keep the patient in a steamy room to prevent crusts forming in the tube. If necessary use a steam kettle or squirt a fine spray of saline into the tube every 15mins. Use humidified oxygen. Suck out secretions with a soft sterile catheter. If viscid secretions have formed, loosen them by injecting 3ml of sterile saline solution and then aspirate.

*Avoid prolonged or too frequent suction.*

**If the tracheostomy has an inner tube**, remove it regularly for cleaning (at least every 4hrs for the first few days). Arrange vigorous chest physiotherapy.

**CAUTION!** *Suck out the trachea aseptically.*

This is no less important than catheterizing the bladder aseptically. Use a fresh, sterile catheter each time. Remove and clean the *inner* tube of a double tube every 4hrs during the first few days.

Deflate the tracheostomy cuff regularly for 15mins every 4hrs for the first 24hrs. Then deflate it permanently. Only keep the cuff inflated for >24hrs, if there is still oozing or bleeding from the wound edges, or the patient is aspirating when drinking or eating, in which case inflate the cuff only on eating or drinking.

Change the tracheostomy tube regularly to clean it or to insert one that allows the patient to speak.

**CAUTION!**

- (1) Try not to change the tracheostomy before the 4<sup>th</sup> postoperative day. If you take it out too soon, it may be difficult to replace. Check the tension of the tapes regularly.
- (2) Minimize the risk of infection by sucking out the trachea regularly under careful aseptic precautions.

**TRACHEOSTOMIES AND SPEECH**

A patient who has just had a tracheostomy will not be able to speak if the tracheostomy cuff is inflated, as all air is coming out through the tracheostomy. A patient with a tracheostomy can only talk if air can be breathed out through the mouth.

There are 2 ways for this to happen:

- (1) a narrow tracheostomy tube will allow air to pass alongside the tube up into the larynx;
- (2) a special tracheostomy tube with a fenestration (hole) at its bend will allow air up into the larynx. If, when the patient breathes out and at the same time occludes the tracheostomy by putting his finger over the tube, then the exhaled air will travel up to the back of the mouth and allow speech.

**REMOVING TRACHEOSTOMY TUBES**

If you think that a patient no longer needs a tracheostomy tube, then change the tube for a narrower diameter tube, so that he can breathe around it.

Then occlude the opening of the tracheostomy with a cork or tape. The patient will then breathe with air passing around the tracheostomy. If he remains comfortable over 24hrs, then you are safe to remove the tracheostomy. Afterwards, apply a dressing to the stoma wound and within 2 weeks, the majority of tracheostomy sites will have completed healed.

#### DIFFICULTIES WITH A TRACHEOSTOMY

**If there is fierce bleeding while you are inserting a tracheostomy tube** the blood may be coming from:

- (1) The anterior jugular veins (29-19C).
- (2) The isthmus of the thyroid.
- (3) The wall of the trachea. If blood enters the trachea round the tracheostomy tube, immediately insert a cuffed tube. Get suction ready. Then open the wound and tie any bleeding vessels.

**If you are not sure the tracheostomy is in the right place,** check air entry in the lungs, or if possible using a flexible bronchoscope through the tracheostomy. However, if you are still in doubt, pull the tube out and start again.

**If the tracheostomy tube slips out:**

- (1) it is in the wrong place.
- (2) you have used the wrong shape of tube.
- (3) the tapes round the neck were badly adjusted.
- (4) the tube was not properly secured.

It may be difficult to re-insert; make sure you have suction, and a tracheal spreader ready! Change the tube for one with a better shape. With the obturator in the tube, place it in the trachea. You will find this easier if you use the tracheal spreader (29-19H). Then *do not forget to remove the obturator!* If necessary, take a soft tissue lateral radiograph of the neck, to show how the tube is lying in the trachea.

**If the tube blocks,** change it, humidify the inspired air, and suck regularly. *N.B. As the patient cannot talk, he may just become agitated and restless, or even confused and violent when the tube blocks. He may die if you ignore a blocked tracheostomy tube.* If you are called to see a patient fighting for breath because the tracheostomy is blocked, *you must remove it immediately,* then keep the tracheostomy wound open by forceps, until you have another tube to put in (either a new tube or the old one cleaned).

**If the trachea becomes stenosed,** it has probably done so because you left a cuffed tube in too long, or allowed the unsupported weight of attached anaesthetic tubing to rest against the trachea, or put the tracheostomy too high in the subglottic region.

**If the patient cannot tolerate the removal of the tube,** make sure the U-flap is not falling back inside the lumen of the trachea to block it. Otherwise, the reason may be psychogenic.

In an adult, gradually reduce its size, then cork it for progressively longer periods before removing it.

**If there is dyspnoea with a patent tracheostomy,** there may be a pneumothorax (especially in a child): insert a chest drain (9.1).

## 29.16 Nasopharyngeal & maxillary antral carcinoma

CARCINOMA OF THE NASOPHARYNX is important on a world scale. In Southern China it is a very common cancer. It is fairly common in Southeast Asia and North and East Africa.

It is strongly associated with the Epstein-Barr virus, but, unlike cancers in other parts of the pharynx, not with either alcohol or tobacco.

It is more common in males, and has a peak age incidence between 40-50yrs, but is sometimes seen in older children. Some 10% of nasopharyngeal tumours are lymphomas. They spread locally by direct extension, regionally to neighbouring nodes, and distantly in the bloodstream. Distant metastases to the lung, bone, and liver occur more often from the nasopharynx than from any other site in the head and neck.

Carcinoma of the nasopharynx presents one or more of the following:

(1) Hearing loss due to a middle ear effusion secondary to a blocked Eustachian tube. *Any middle ear effusion, which cannot be explained by a recent upper respiratory tract infection,* in an adult, especially in ethnic group epidemiologically at risk, must be presumed to be due to a nasopharyngeal cancer until proven otherwise.

(2) An upper neck enlarged lymph node. Some 80% of nasopharyngeal cancers already have  $\geq 1$  enlarged cervical lymph nodes on presentation (usually unilateral but sometimes bilateral). Often the patient comes with an enlarged neck node and no other symptoms.

(3) Nasal obstruction

(4) Cranial nerve involvement due to infiltration of cancer along the skull base. There can be vocal cord palsy (due to involvement of the X<sup>th</sup> (vagal) nerve), diplopia, facial pain and numbness, or facial palsy (due to involvement of any of the II<sup>nd</sup> to VII<sup>th</sup> cranial nerves).

#### EXAMINATION.

Carefully palpate the entire neck for enlarged nodes. Feel particularly for the uppermost internal jugular node, just below the tip of the mastoid process. This is often the first node to be involved when the primary is silent. Observe the soft palate for asymmetry due to displacement by a tumour. If you are skilled, examine the nasopharynx with a mirror (29.13) or flexible scope.

BLIND BIOPSY is less satisfactory than open biopsy, but is possible under LA, using a long narrow forceps pushed along the floor of the nose.

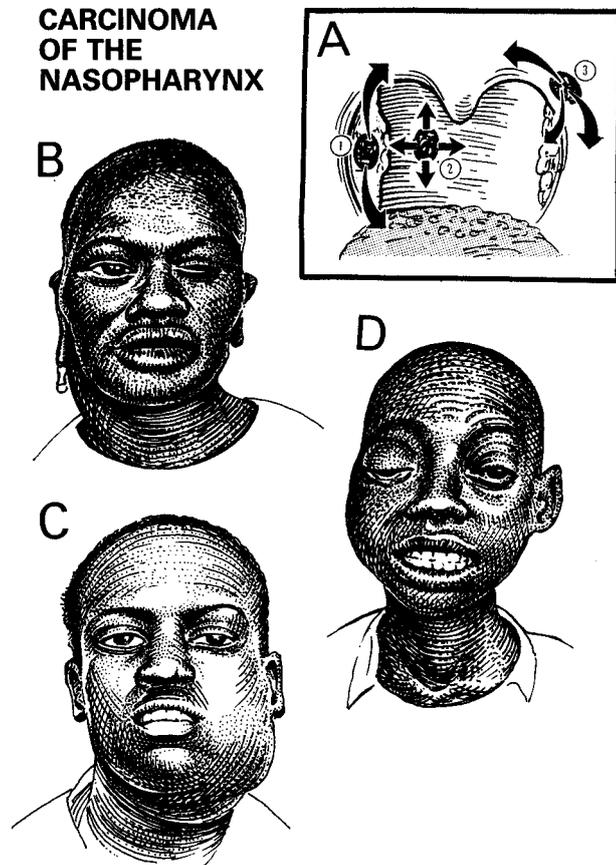
OPEN BIOPSY. (GRADE 1.5) Use GA and endotracheal intubation. Use the tonsillectomy position, lying supine with a pillow under the shoulders and with the head extended.

Insert a mouth gag. Pass a catheter through the nose and out through the mouth. Use this to retract the palate.

Using a warmed laryngoscopy mirror, inspect the pharynx and remove suitable pieces for biopsy.

If there is a suspicious node in the neck and you can see no obvious primary (unusual), take specimens from several suspicious-looking areas in the nasopharynx.

RADIOGRAPHS may show involvement of the base of the skull.



**Fig. 29-20 CARCINOMA OF THE NASOPHARYNX.**  
 A, directions of spread of carcinoma from (1) the tonsil, (2) the posterior pharyngeal wall, and (3) the soft palate. B, 45 year old with cervical metastases and paralysis of the left II<sup>nd</sup>, III<sup>rd</sup>, IV<sup>th</sup>, V<sup>th</sup>, & VI<sup>th</sup> cranial nerves. C, 14yr old boy with enlargement of the left cervical glands, but no cranial nerve lesions. D, 12yr old boy with severe trismus ('lockjaw') from *masseter* spasm, bilateral proptosis, ophthalmoplegia and right-sided blindness from an anaplastic carcinoma of the nasopharynx, but without involvement of the cervical glands. A, after Copeland III EM, *Surgical Oncology* Wiley 1982 p.127 Fig 5 with kind permission. B,C,D, after Clifford P. E *African Med J* 1965;42:381.

STAGING is a guide to prognosis:

TIS carcinoma *in situ*.

T1 tumour confined to one site in the nasopharynx, or no tumour visible (+ve biopsy only).

T2 tumour involving two sites (both posterosuperior and lateral walls).

T3 extension of the tumour into the nasal cavity, or oropharynx.

T4 tumour invading the skull, or involving the cranial nerves.

TREATMENT.

The role of surgery is limited to biopsy. If there is a lymphoma, treat for it (17.6). If there is a carcinoma, try to refer for chemo-radiotherapy.

Treatment of nasopharyngeal cancer is highly specialised and needs to be given in centres with appropriate experience and facilities.

PROGNOSIS.

Local control is possible in 60-90% of cases. 5-yr survivals range from 30% (nasopharyngeal carcinomas) to 60% (lymphomas). Prognosis is dependent upon facilities for chemoradiotherapy.

CARCINOMA OF THE MAXILLARY SINUS usually presents with one or more of the following symptoms and signs:

- (1) a slowly progressive swelling of the cheek
  - (2) jaw pain which is not alleviated by tooth extraction
  - (3) a foul bloodstained discharge from the nose.
  - (4) malignant ulceration of the upper jaw or hard palate
- Look for swelling of the palate, epiphora (due to obstruction of the lachrymal duct), and enlarged lymph nodes behind the angle of the jaw.

Radiographs may show an increase in the size of the sinus, and later erosion of its walls.

Biopsy any polyps and send them for histology.

A definitive operation will usually require a total excision of the maxilla, with or without radiotherapy, for cure. The 5yr survival rate is 30-60%.

### 29.17 Laryngeal carcinoma

The larynx is divided into 3 parts, the glottis (the vocal cords), the supraglottis (larynx above the vocal cords) and subglottis (larynx below the vocal cords).

**Glottic carcinoma** is the most common and usually presents early with hoarseness for >2wks. It has a 95% chance of 5-yr survival with radiotherapy, so refer such.

*N.B. Hoarseness in a middle-aged smoker is carcinoma of the glottis until proved otherwise.*

**Supraglottic carcinoma** often presents late with minimal symptoms until it is advanced (because there is a fair amount of room for the cancer to grow into). Then there is hoarseness, a feeling of something in the throat, unexplained pain in the ear (because of a common sensory nerve pathway), or swollen neck nodes.

**Subglottic carcinoma** presents early with stridor, and airway obstruction.

However, all laryngeal cancers may ultimately cause hoarseness and all laryngeal cancers will ultimately cause airway obstruction and stridor.

TREATMENT OF LARYNGEAL CARCINOMA is by surgery and/or radiotherapy. Treatment for cure is likely to require laryngectomy but may only be appropriate for <10% of patients. However an early (T1) lesion confined to the true cord has a 95% 5yr survival with radiotherapy alone. Where there is airway obstruction and stridor, palliative permanent tracheostomy (29.15) will help.

### 29.18 *Leishmaniasis* of the nose and lips

There are a number of *Leishmania* species which are transmitted through the bite of the sandfly, principally in tropical and subtropical Central & South America, the Mediterranean basin, and western Asia from the Middle East to Central Asia.

They cause single or multiple skin ulcers, and complications ensue when the parasite spreads later, usually >2yrs, but maybe up to 30yrs, to the nasopharyngeal mucosa, resulting in tissue destruction.

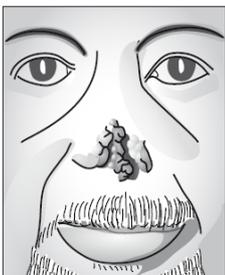
In the non-ulcerative form, persistent oedema, mucosal hypertrophy and upper lip fibrosis result in characteristic facies. The nasal bridge and tip collapse as the septum is destroyed, and nasal polyps may be present. Intense hypertrophy can lead to massive rhinophyma (29.20, 29-21).

In the ulcerative form, there is rapid destruction of the nasal septum from the front, and invasion of the *alae nasi*, as well as lips, tongue, palate, oropharynx and larynx. This is more common if there is also concomitant HIV disease.

LEISHMANIASIS



A



B



C

Fig. 29-21 LEISHMANIASIS OF NOSE AND LIPS.

Some examples: A, ulcerative form affecting glabella, nose, cheeks and lips. B, non-ulcerative form with hypertrophy of nasal skin and rhinophyma. C, destruction of nasal septum and of the *alar nasae*.

After Cohen RV, Aun F. *Tropical Surgery*, Karger Landes 1997.127-9, Fig 19.1a,2a,3a.

DIAGNOSIS is confirmed by smears from skin and mucosa or biopsy, but signs are so characteristic in endemic areas that this may not be necessary

TREATMENT. Miltefosine 100mg od for 4wks is the best choice. Otherwise, liposomal amphotericin at 3mg/kg IV daily for 5days with another single dose of 3mg/kg 6days later is preferable because of resistance to antimony compounds.

RECONSTRUCTIVE SURGERY is often required after the lesions have healed with extensive scarring.

### 29.19 Bronchial carcinoma

As the result of the greed of multinational companies and the inertia of governments, cigarette smoking is widely prevalent all over the world. An epidemic of smoking-related diseases has already started, among them carcinoma of the bronchus. About 75% of tumours involve the main bronchi, 10% are peripheral, and a few arise near the apex of the lung, whence they may spread to involve the sympathetic chain and the brachial plexus (Pancoast's tumour). About 50% are squamous cell, 30% are anaplastic (small cell), and 20% are adenocarcinomas: most peripheral tumours are of this latter kind, and their prognosis after surgery is relatively good.

The patient, who is usually an older man, presents with:

- (1) A persistent cough.
- (2) Haemoptysis.
- (3) A low-grade pneumonia, as the result of a blocked bronchus.
- (4) Pneumonia which fails to resolve.
- (5) A solid lesion on a radiograph. Bronchoscopy is the critical investigation, and even with a rigid bronchoscope (29.14) it is possible to see and biopsy the lesion in about 75% of cases.

In countries where the disease is common and patients are aware of it, only about 20% of them are operable when they present, and of those who do survive radical surgery, only about 30% are alive 5yrs later. The chances of your being able to refer a patient for either radical surgery, or radiotherapy, are small. Radiotherapy is a useful palliative. Present combinations of cytotoxic drugs are of limited value.

You will probably find that most patients are inoperable when they present. So,

- (1) Differentiate carcinoma of the bronchus from other more treatable diseases, which it may closely resemble, both clinically and radiologically, particularly *tuberculosis*.
- (2) Select the few 'coin-like' peripheral lesions amenable to surgery.
- (3) Palliate and comfort the dying and their families.

## INVESTIGATIONS.

Get an antero-posterior *and a lateral* radiograph of the chest, and a PCR test for tuberculosis (5.7).

Send sputum (after physiotherapy) for culture & AAFB's.

Aspirate a pleural effusion for culture & AAFB's.

Take a pleural biopsy (9.1).

Perform a bronchoscopy (29.14).

THE DIFFERENTIAL DIAGNOSIS includes:

- (1) pulmonary tuberculosis,
- (2) low-grade or partly resolved pneumonia
- (3) pulmonary fibrosis,
- (4) lung abscesses
- (5) other solid tumours of the lung.

## OPERABILITY.

The most favourable cases are those with a peripheral 'coin-like' lesion (usually an adenocarcinoma, but may be a tuberculoma, or a developing lung abscess). These may benefit from thoracotomy. Signs of inoperability include: involvement of the chest wall, involvement of the laryngeal or sympathetic nerves (Horner's syndrome: miosis, ptosis & hemifacial anhidrosis), widening of the mediastinum in a chest radiograph, secondary deposits (as in the cervical nodes), bony metastases, and a small cell carcinoma on biopsy.

Bronchoscopic signs which suggest that a patient is not operable include: widening or flattening of the first 1.5cm of the main bronchus, widening of the carina, and distension of the trachea.

CHEMOTHERAPY has a low priority. If there is an oat cell carcinoma, it will produce a remission and prolong life for 6-12months. A few patients with small cell tumours survive much longer. Untreated, patients are likely to die in 2 months.

## 29.20 Other problems in the ear, nose & throat

### THE EAR

**TINNITUS** is a persistent noise, usually high-pitched, in the ear and is very frequently associated with hearing loss. Some medications, especially NSAIDs and anti-depressants may be the cause. You can help patients mask the sound by advising to put a ticking clock near the ear at bed-time, or to play music from a radio. *Sedatives are no help.* Very occasionally a specific pathology (an aneurysm or tumour) is the cause.

**If a patient develops slowly progressive deafness in one ear, becomes unsteady on the feet, and has rare attacks of severe vertigo,** suspect an ACOUSTIC NEUROMA (rare). Look for a loss of corneal sensation, slight facial paralysis, and an increased protein in the CSF. This needs expert intervention.

## THE NOSE AND PARANASAL SINUSES

**If a patient has a swelling on the nasal septum** it may be a HAEMATOMA or an ABSCESS. The same incision is suitable for both. Move the tip of the nose from side to side; you will see that swelling is continuous with the inferior margin of the nasal septum (the *columella*) on both sides, and is fluctuant.

Soak a length of 1cm ribbon gauze in 4% lidocaine, mixed with a few drops of 1: 100,000 adrenaline, and place it over the red mucosal part of the septum. Wait a few minutes, and then make a vertical incision over the swelling. Remove a small piece of mucosa to enlarge the hole, and insert a drain, which you can remove the next day.

**If there is a grossly thickened swollen nose,** this is RHYNOPHYMA: the nose is oedematous, lumpy and irregularly swollen because of hypertrophy of sebaceous glands. Here you can shave off excess tissue and smooth it off using a sterilized disposable shaver, but *do not apply a skin-graft*. In endemic areas, this may be *leishmaniasis* (29.18): take smears and a biopsy. Alternatively it may be *mucormycosis* which responds well to amphotericin B.

**If there is a smelly nasal discharge with maggots, and epistaxis,** this is myiasis from the deposition of eggs by flies attracted by pre-existing nasal diseases, especially those with HIV disease. Facial cellulitis, palatal perforation, excoriation of nose and lips, and sinusitis may result. After using gentamicin and penicillin IV, spray the nose with 4% lidocaine and an ether nasal douche to paralyse them and use a turpentine oil to drown them; then remove the maggots manually. This is much helped if you have a nasal endoscope as the maggots may number hundreds and migrate to the deep recesses of the nasal anatomy! Often you need several removal sessions.

## THE THROAT (LARYNX)

### STRIDOR

There are 3 sounds of airway obstruction: stridor, stertor and wheeze. Listen carefully to the sounds of a patient with airway obstruction and try to differentiate these 3 sounds.

STRIDOR is due to obstruction of the larynx, subglottis or cervical trachea. It can be both inspiratory and expiratory but is always worse in inspiration. It is a harsh sound.

STERTOR is another word for 'snoring' and is due to obstruction at the base of the tongue. It may be due to something simple, such as secretions in the patient who is unconscious and unable to clear his throat, or something serious, such as a carcinoma of the base of the tongue.

WHEEZE is expiratory and high pitched and due to small airway obstruction as in asthma and chronic obstructive pulmonary disease.

**If a patient of any age has the rapid onset of hoarseness and stridor, worse on inspiration,** suspect ACUTE LARYNGITIS (not uncommon). Steam and antibiotics will usually achieve a cure. Tracheostomy may occasionally be necessary, but avoid it if possible, especially in a young child.

**If there is a membrane in the throat,** there is likely to be a streptococcal infection (common), or DIPHTHERIA (uncommon).

**If a patient of any age has slow progressive hoarseness, leading to stridor which is worse on expiration,** suspect a papilloma of the larynx, or a carcinoma in older smokers (both not uncommon, 29.17). Tracheostomy and endoscopic removal may be necessary. Biopsy an adult's lesion, and look for malignant change.

Recurrence is common in children, where the disease is related to aspiration of virus from genital condylomata. Symptoms may be confused with asthma, and deaths have occurred from asphyxia.

**If a patient has stridor and increasing dyspnoea following extubation after having been previously intubated,** suspect a tracheal stenosis. You may be able to dilate this endoscopically, but it usually needs excision.

**If a patient of any age has sudden stridor, particularly on inspiration, after ingesting food,** suspect a foreign body (not uncommon: 29.14).

**If a patient of any age has sudden stridor, worse on expiration, following food, medicine or a sting,** suspect ANGIONEUROTIC OEDEMA, causing soft tissue neck & laryngeal swelling). If there is stridor, use 1ml adrenaline (1:1000) IM. Otherwise, use an antihistamine or 200mg hydrocortisone IV. Tracheostomy may be necessary. The prognosis with treatment is good. Rarely, if there is no response, infuse 2 units of FFP, which contains the missing C1-esterase inhibitor. Advise patients about avoidance of the particular allergen, if known. Try to provide an 'epinephrine-pen' (auto-injector of adrenaline) for emergency home administration.

**If a patient of any age has sudden severe stridor, usually without much hoarseness,** suspect LARYNGEAL PARALYSIS due to infection, trauma, poliomyelitis, or nutritional deficiencies.

If he has had a thyroid operation, suspect recurrent laryngeal nerve damage. Unilateral vocal cord palsy produces a characteristic prolonged wheezy cough. Re-intubation or a tracheostomy (29.15) may be necessary.

**If a patient of any age develops a swollen oedematous neck related to dental sepsis,** suspect LUDWIG'S ANGINA (6.11).

**If a child, particularly, has progressive dysphagia, continual drooling from the mouth, stridor, cough, a red swollen epiglottis, and is ill and febrile,** suspect ACUTE EPIGLOTTITIS (not uncommon), which is much more serious than acute laryngitis. If he is old enough to speak, he may have the characteristic 'hot potato' speech, which is different from the hoarseness of laryngitis. Use chloramphenicol or ampicillin IV. Be prepared to intubate him, followed if necessary by tracheostomy. *If he is not rapidly and correctly treated, the chances of death are considerable.*

**If a child develops stridor with tonsillitis,** suspect a peritonsillar abscess (6.7)

**If a child develops stridor after ingesting an impacted fishbone,** suspect a retropharyngeal abscess (6.8)

**If a child (usually) has hoarseness and variable progressive stridor of rapid onset after fever, with severe dysphagia and a bleeding mouth and nose** (rare), suspect GANGRENOUS PHARYNGITIS. Use IV antibiotics and oxygen. Feed him through a small nasogastric tube, and aspirate the pharynx periodically to remove blood and slough. Mortality is high.

**If a child has had stridor and dyspnoea on exertion since birth, perhaps with hoarseness which is progressive with growth,** suspect a LARYNGEAL WEB, a rare membrane across the laryngeal lumen close to the level of the vocal cords. Symptoms depend on the degree of stenosis. Tracheostomy may be necessary. Expert surgery can give good results.

**If an infant or young child has sudden, spasmodic stridor, usually at night, which ends spontaneously with another deep inspiratory effort and collapse,** suspect LARYNGISMUS AND TETANY (rare). He is normal between attacks. Use parathyroid hormone and calcium between attacks, and the prognosis will be good.

**If a baby has stridor soon after birth, worse on any exertion or crying, but looks well and the cry is normal,** suspect LARYNGOMALACIA (rare). Endoscopy shows a markedly folded epiglottis, with its aryepiglottic folds sucked in towards the larynx during inspiration to cause stridor. Reassure the parents that he will probably recover spontaneously between 3-5yrs.