Primary Surgery

Volume One

Non-Trauma

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Chapter 25. The ear, nose, and throat

25.1 Introduction

The ear, nose, and throat have been particularly neglected in primary care, both by community health workers and in health centres. Most of the workers who provide it don't even possess an otoscope, let alone any batteries for one, and very few can even see the eardrum. So do what you can to improve their standards. Here we are concerned with the patients they refer to you. A third of these may need a foreign body removed. You can also treat otitis media (25.3), and open the mastoid cortex to allow pus to drain, or perhaps do a cortical mastoidectomy (25.4). Unfortunately, a radical mastoidectomy for the many serious complications of acute-on-chronic mastoiditis is an expert's task.

You can treat a patient's bleeding nose (25.6), remove foreign bodies from it (25.5), treat frontal and maxillary sinusitis (25.7), and remove nasal polypi (25.10). About the only surgery you can do on the throat is to remove foreign bodies and drain pus (5.6, 5.7). Don't try to remove tonsils and adenoids; this is seldom justified, unless you are able to give plenty of blood if necessary. If you are skilled, and have a bronchoscope, you may be able to remove foreign bodies from his bronchi (25.13) and oesophagus (25.14).

Here are some of the common mistakes to avoid: (1) Don't use penicillin powder or drops in the ear: they cause sensitivity too easily. (2) Be very careful in using streptomycin or gentamicin parenterally; both are ototoxic, and may cause deafness and giddiness.

This is the equipment you will need:

- **Headlight**, with forehead band and cords, 6 volt 3 watt bulb, and pin terminals to use with battery, one only. ALSO, 25 spare bulbs. This is less effective than the ENT surgeon's traditional type of head mirror, but is easier to use.

- **Head Mirror**, with webbing or fibre headband, one only.

- **Examination Lamp**, Chiron, on base with castors, with Bedford Russell extending arm, one only (optional). Ideally, you need this special spotlight with a head mirror, but you can use an ordinary 100 watt light bulb.

- **Anglepoise Lamp**, preferably with internally reflecting bulb giving a parallel beam, one only.

- **Otoscope,** Keeler, new standard halogen type, with rechargeable handle, with: (a) 5 nylon specula, (b) mini-charger, state voltage (normally 240 volts), (c) adaptor for disposable specula, (d) box of disposable (but reusable) 3 mm specula, one outfit only. This is the new Keeler standard otoscope with a rechargeable handle, a charger, and some disposable specula which you can reuse.

- **Tuning Fork,** Hartmann's, with foot, 512 Hz, one only.

- **Probe,** Jobson Horne, 178 mm, with one serrated and one ring end, one only. Remove wax with the ring end, and wrap cotton wool round the serrated one.

- **Hook,** wax, St. Bartholomew's pattern, one only. Remove wax and foreign bodies with this.

- **Hook,** Quire's, one only. This marvellous instrument is sadly neglected, because it is so little known. You can use it in the nose, and sometimes in the ear, where it works better than an ordinary hook, because it does not have to be rotated to be inserted.

- **Syringe,** aural, Bacon's, for one-hand use, one only. 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 20 ml 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,** aural, alligator, Hartmann's, one pair only.

- **Forceps,** aural, Wilde, one only. These are standard ear dressing forceps.

- **Forceps,** aural, Omerod, elongated cup, crocodile action jaws, one only.

- **Forceps,** nasal, dressing, Tilley, one only. You will need long narrow forceps to reach into the ear.

- **Speculum,** nasal Thudichum, Mark Hovell modification, size 7, five only Use these for examining the nose. Dangle one on the distal IP joint of your index finger, and control it between the sides of your middle and ring fingers.

- **Suction Tube,** Lempert, one only.

- **Trocar,** antral, stainless steel with metal handle, Luer fitting, size 7, Tilley Lichwitz, one only. ALSO, rubber syringe with male mount for use with the antral trochar, one only. Use this for washing out a patient's antrum. If the rubber bulb perishes, use a 20 ml syringe and attach this to the trocar with a piece of catheter.

- **Mirror,** laryngeal, with metal stem, boilable, 24 mm, one only. You will need these to look at the larynx.

- **Mirror,** rhinoscopic, with metal stem, St Clair Thompson boilable, 14 mm, one only. Use this for examining the nasopharynx.

- **Lamp,** spirit, one only. This is to warm a laryngeal mirror.

- **Snare,** polypectomy, nasal, Glegg's, (a) one snare only. (b) Five spare wires for the snare. Using topical anaesthesia, pass the wire loop of this snare round the base of a polyp, gently pull it out and cut it off. If you don't have one, you can use Luc's forceps (see below).

- **Forceps,** nasal turbinate, Luc's, one only. If you fail to remove a polyp with a snare (unusual), you may need these.

- **Tongue Depressor,** Lack, adult, one only.

- **Dressings and Drugs.** (1) 5 mm selvage ribbon gauze, 50 metres only. (2) Magnesium Sulphate Paste BPC (magnesium sulphate 38% in phenol 0.5% in anhydrous glycerol), 1 kg only. The gauze is for packing the ear, impregnated with magnesium sulphate for boils.

For nausea and vertigo: (1) Tab prochlorperazine ('Stemetil') 5 mg. Give 5 to 10 mg three times daily. Ampoules 12.5 mg in 2 ml. Give 12.5 mg intramuscularly 6-hourly. (2) Tab Cinnarizine ('Stugeron') 15 mg, one or two tablets three times daily.

Silver nitrate applicator stick, for epistaxis (AVO), packet of 50 applicators, one packet only.

Drugs acting on the nose: (1) Ephedrine nasal drops BPC (ephedrine hydrochloride 1%). Put a half-full dropper into each nostril. (2) Beclomethasone dipropionate (a steroid) in metered 50 microg dose aerosol; 200 dose applicator. Three puffs into each nostril three times daily.

Bull TR, 'A Colour Atlas of ENT Diagnosis', Wolfe Medical.
Ludman H, 'ABC of ENT', British Medical Association 1971.
Bull PD, 'Lecture notes on Diseases of the Ear, Nose and Throat', (6th edn), Blackwell Scientific Publications.

Deafness

Severe deafness cripples a patient's mind by preventing him communicating with other people. It is thus a serious handicap, and, alas, a neglected one. About 5 million people in the world are profoundly deaf and a further 200 million partly so; as usual, most of them are in the developing world. Try to find out the incidence of deafness in your district, and the common causes for it. The most common one will probably be chronic suppurative otitis media of the tubotympanic, mucosal, or 'safe' type.

Deafness can be: (1) Conductive, due to disease in the external canal and middle ear cavity, up to the oval window. (2) Sensorineural, due to disease of the cochlea, eighth nerve or brain.

Much conductive deafness in the rural tropics is the result of chronic suppurative otitis media, which persists because of a patient's poor general health and nutrition. His middle ear becomes acutely infected, and his drum perforates. He fails to get the prompt, short (2 day), high doses of antibiotic (preferably ampicillin) that would cure him. Instead, his acute otitis media fails to resolve, his drum does not heal, his ear continues to discharge, and its ossicles are damaged. This is less likely to happen with the common tubotympanic 'safe' type of chronic otitis media, than it is with less common attic, bony, or 'unsafe' type (25.3). Unfortunately, chronic middle ear disease is not suited to the 'eye camp' approach, which is so successful in treating blindness due to cataracts.

Sensorineural deafness is usually high-tone and incurable, but a properly fitted hearing aid helps. You are unlikely to have an audiometer, so make good use of a tuning fork.

Prevent deafness by making sure that: (1) Middle ear disease is diagnosed and treated in primary care. (2) Anyone working in a very noisy environment wears ear plugs, or muffs. (3) In areas where genetic, early, progressive sensorineural deafness is common, as it is in parts of India, do what you can to discourage cousins from marrying one another.

Very many deaf people, of any age from infancy onwards, can be helped by a modern hearing aid, which usually helps conductive deafness, if there is not too much high frequency loss and no discharge. Unfortunately, hearing aids are expensive, and need to be fitted carefully; heat and moisture rapidly inactivate them, and batteries are difficult to get. One health worker advertised for second-hand ones in Europe, and received a hundred, mostly working. This source, and methods of finding, selecting, and importing the most suitable second-hand ones for particular patients, needs following up.

A useful source of information, and of hearing aids, is: The Commonwealth Society for the Deaf, 105 Gower Street, London WE1E 6AH.

Deafness Examination (adults)

Always do the next two tests as a pair; separately they will not give you the information you need. Unlike an audiometer, a tuning fork is robust.

Rinne's Test. Strike a tuning fork (512 Hz) 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; press with sufficient pressure to need your other hand to support the other side of his head. Then place the fork, still vibrating, with the flat side of its tines towards his ear canal. Ask him 'Which sound is loudest?' If air conduction is better than bone conduction, sound is being conducted normally to his cochlea, but he may still have a sensorineural loss. If bone conduction is better than air conduction, he has a problem with sound conduction (middle ear disease).

Caution! Beware of the false negative Rinne test. If he has severe sensorineural deafness in one ear, bone conduction may be better than air conduction (wrongly indicating conduction deafness or middle ear disease), because the sound is conducted through his head, so that he hears it in his other ear. Weber's test will distinguish this.

Weber's Test. Strike the tuning fork against your knee, place its foot on the top of his head, and ask him to say which ear hears the sound loudest. If he has conductive deafness in one ear (a negative Rinne's test, bone conduction heard better than air conduction), he will hear the tuning fork better in that ear. If he has sensorineural deafness, the sound will be loudest in his better functioning cochlea.

Examination (children)

In a child under 3 years neither a tuning fork nor an audiometer are useful. Unless you have special equipment you have to use: (1) His parents' account of an abnormal behaviour response, or his 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 his mother's knee facing your assistant. Meanwhile, remain out of sight behind his 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 60 cm from the child's ear, and level with it, while you remain out of his sight. A normal child immediately turns towards the source of the sound. Reward him with some encouragement. Now test his 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 his ears alternately.

If there is no response, try louder sounds. Then try a visual or tactile stimulus. If he still does not respond, suspect mental retardation, or some non-audiological problem. If he does respond, repeat the sound stimuli at 2 or 3 metres, first in a louder voice,, and then in a normal one.

Caution! (1) This is a very reliable test - if you do it carefully. Otherwise, you can easily get false positives, and false negatives. (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 his mother does not give him any clues, consciously or unconsciously. (5) You will get a false positive if you show yourself, or let him see the test object either directly, or reflected in a window, or some reflective object, or give him some tactile clue. You will get a false negative if he is bored, tired, or distracted by other things. If this happens, don't persist; try again later.

The Management of Deafness

The above tests should tell you where the lesion is. Here is a guide as to what it is.

In the External Ear conductive deafness can be caused by wax, and foreign bodies (25.5), or external otitis. Rarely, a tumour is responsible, or a child is born with a closed external canal.

In the Middle Ear conductive deafness is caused by fluid in the middle ear (often associated with a cold), and acute or chronic otitis media. Otitis media is indicated by a discharging ear.

If he has conductive loss and his drum is normal, suspect otosclerosis, especially if he has a family history. This is not found in pure West Africans (or Japanese), and is rare in other Africans, but is not uncommon in Indians. A hearing aid is safer than stapedectomy by anyone but a real expert. 'Dead ears' are not uncommon, even after the 'best' surgery.

In the Cochlea and Beyond sensorineural deafness is often congenital, but may be due to mumps, measles (not uncommon), rubella, other viruses, bacterial meningitis, and excessive noise ('boilermaker's deafness', 'disco deafness'; all Trinidad steel band players are profoundly deaf over 2 kHz). Commonly, it is due to old age (presbyacusis), sometimes Ménière's syndrome (deafness, vertigo, and tinnitus), and very rarely to an acoustic neuroma. This probably never occurs in Africans - look for signs of involvement of his fifth and seventh nerves, and for imbalance due to involvement of his cerebellum.

In children, the severest acquired deafness follows meningitis. The deafness that follows mumps is usually unilateral, so it is not much of a handicap.

Difficulties with Deafness

If a **baby is born deaf,** this will usually be suspected by his family. A mother who says that her baby is deaf is usually right. Don't ignore her. His intelligence will probably be normal, and an 'island' of residual hearing may remain. His 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 he will later find easiest. Speak slowly and clearly, and indicate familiar objects as you name them. If necessary, repeat the word close to his ear. Show you are pleased, whenever he tries to use a word, however indistinctly. Include him 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 heave special teaching, from their parents, or someone else, from as early in life as possible.

25.3 Otitis media and externa

Otitis externa exists in two types. A patient may have: (1) An infected hair follicle near the entrance of his meatus (a staphylococcal boil), which is very painful, because the skin here is tightly bound down to the perichondrium of the elastic cartilage of his ear. His boil is always near the entrance to his meatus, because there are no hair follicles to become infected in the deeper bony part. (2) A diffuse inflammation of his whole ear canal resembling eczema. The common causes are: (a) excessive self-cleaning of the ear, (b) 'stress' and (c) excessive humidity.

Acute otitis media is typically a disease of children. A child presents with acute earache, and fever; if he is very young, he may vomit, or have fits. At first, the margin of his drum and the handle of his malleus are red; later, his entire drum is red and bulges, so that

it obscures his malleus. A few hours later his drum may burst, and give him instant relief. Otitis media is most common in children under one, and is often recurrent. Haemophilus influenzae or Streptococcus pneumoniae are usually responsible. Antibiotics are effective, if you give them in good doses promptly. There is no need to continue them beyond 48 hours.

Chronic otitis media is usually the result of failure to treat the acute stage. It too exists in two types.

The tubotympanic type is much more common, and is also known as the mucosal or 'safe' type, because it rarely leads to serious complications. The patient has a profuse mucopurulent discharge from his ear, without a very bad smell; he has a central perforation of his drum (a hole surrounded on all sides by drum), and moderate deafness. This type is the result of a low resistance to infection, due to poor health and nutrition.

The attic, bony type is also known as the 'unsafe' type, because it is more likely to lead to complications if the disease becomes advanced. A cyst lined with epidermis develops in the upper part of the patient's middle ear, and fills with scales to form a 'cholesteatoma'. This is surrounded by inflammatory tissue, and may erode through the bony walls of his middle ear and create a pathway for infection. He has a perforation on the edge of his drum, in its pars flaccida, or in its posterosuperior region. He has a small volume of very smelly discharge, and is usually severely, but variably, deaf. This type is common in India and South East Asia, but is less common elsewhere. Erosion and infection may spread: (1) Into his labyrinth, causing giddiness. (2) Through the roof of his middle ear, causing an extradural or subdural abscess in his temporal lobe, or in his posterior fossa. (3) To his lateral sinus, which may thrombose, and make him very ill with a high fever. (4) To his meninges; this is uncommon because infection is usually well localized. (5) To involve his facial nerve. Refer all these complications; he needs expert surgery, including a mastoidectomy, perhaps with tympanoplasty,, to preserve his hearing, and perhaps his life.

Otitis

The Differential Diagnosis of acute otitis media is mainly otitis externa (particularly a boil in the ear), and in young children, 'teething'.

Suggesting otitis externa - the patient is an adult with normal hearing (unlike otitis media), no fever or only a low fever, less malaise and prostration than with otitis media. He has pain when his pinna and canal are moved. He may also have a swollen, tender node just behind his ear. Don't confuse this with the tender bone of mastoiditis.

Otitis Externa

If he has a boil in his ear, give him a strong analgesic, and a high dose of an intravenous or intramuscular antibiotic, effective against penicillin-resistant staphylococci. Apply an ear wick of magnesium sulphate or glycerine and ichthammol.

Caution! (1) Don't incise a boil unless it is clearly fluctuant, because there is a danger of perichondritis and collapse of his pinna. (2) A boil in the ear is very painful, so don't forget the analgesics.

If he has the diffuse form of otitis externa, keep his ear clean. Syringe it, and be sure to mop it dry afterwards. Give him antiseptic steroid ear drops. If he is a 'self-cleaner', treat the condition that is causing him to touch his ear, and persuade him to leave it alone.

If it is subacute or chronic, clean his ear with boracic or 50% spirit drops. If he also has a low-grade skin infection, give him a broad spectrum antibiotic systemically.

Acute Otitis Media

Treatment. Give antibiotics early. Give him a high dose of ampicillin or amoxycillin for 2 days. Or, less satisfactorily, give him penicillin. Aim for good compliance over this short period. If he is very unwell, give the antibiotic intramuscularly. Avoid chloramphenicol as a first choice, and use erythromycin only if he is allergic to penicillin. Relieve his pain, and apply local heat to his ear (the mother of one contributor, who had otitis media as a child, used to wrap a hot baked potato in a woolly sock and apply this to his ear - marvellous!). As soon as he is well, and his drum is no longer bulging, stop the antibiotics.

If his pain and fever continue, and his drum is still bulging after 24 hours of treatment, the organism is probably insensitive to the antibiotic you are giving him, or you are not giving him enough. Change the antibiotic or increase the dose.

If acute otitis media fails to resolve after 5 days of antibiotic treatment, change to another one. If this fails, stop: don't persist with antibiotics indefinitely. Some surgeons incise the drum (see below) when pain has not improved after 3 days of antibiotic treatment.

If you see a child after his drum has already perforated, and is discharging, culture the discharge and give him penicillin for a week. If necessary, change the antibiotic when the result becomes available. Teach his parents, or a nurse, to dry-mop the discharge with cotton wool ('Primary Child Care' Section 17.5). If this is not done often enough, otitis externa and a persistent discharge may follow. Monitor his hearing. If it does not return to normal, refer him. In the developed world, where otitis media is normally treated early, a persistent discharge after acute otitis media already suggests mastoiditis. It may not do so elsewhere.

If his mother has difficulty getting cotton wool to swab his ear, ask her to put a toilet paper wick (assuming she has any) into it for a minute, three times, and to repeat this three times a day.

Caution! Don't attempt myringotomy (incising the drum) - it is not for the occasional operator, because you can easily dislocate the incudo-stapedial joint. The only absolute indication for it is acute otitis media, with a facial palsy (see below).

Chronic Otitis Media

Diagnosis. This is the patient with a perforated ear- drum which discharges continuously or intermittently, and who may or may not give a history of a previous acute attack. Smell the discharge. An offensive, thick, pasty discharge is characteristic of a cholesteatoma, and thus of serious disease. His prognosis, and the urgency of referral, depend on where the perforation is in his drum, rather than on how big it is.

If the perforation does not extend to the edge of his drum, and does not involve its pars flaccida (the superior part of his drum), it is central and is not dangerous, because a cholesteatoma is rare. He complains of increasing deafness, recurrent discharge, and occasionally earache, but pain is rare. Referral is less urgent. Teach him the importance of a careful aural toilet.

If the perforation extends to the edge of his drum, and particularly if it involves the pars flaccida, it is marginal and is dangerous, because it implies bone destruction. A cholesteatoma is common. Try to refer him.

Treatment for Chronic Otitis Media. Mop out his ear canal, and try to see the peforation. If there is much discharge, rinse out his ear with warm sterile water or saline; mop his 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 his ear mopped dry with cotton wool, in the hope that the perforation in his drum will heal. Spirit drops may dry it out.

He may develop any of the many complications listed under 'Difficulties with chronic otitis media' below.

Difficulties with Acute Otitis Media

If he has **severe earache, with a normal drum,** suspect referred pain from dental caries, or an impacted wisdom tooth. If these are not responsible, suspect referred pain from his pharynx, or his temporomandibular joints. If an adult has earache, a normal drum, and an enlarged node in his neck, suspect that he has carcinoma of his pharynx (32.28), or larynx.

If you see a **fluid level** or **bubbles** in a child's ear, with an indrawn drum, he has **serous otitis media** (secretory otitis media). This may be the result of obstruction of his Eustachian tube by enlarged adenoids, and is common in children recovering from otitis media, or it may occur spontaneously. He usually has no pain, and little hearing loss. If there are bubbles or a fluid level, enough air remains to maintain his hearing; with all the air gone, deafness is more marked. Middle ear effusions usually resolve spontaneously, so wait several weeks if necessary. If his effusion persists, it may it may alter his behaviour, and impair his speech, even if it does not cause marked hearing impairment. If his school behaviour or progress is poor, or the acquisition of speech is affected, consider referring him for myringotomy, perhaps with the insertion of a grommet for ventilation.

If he has acute otitis media, and develops a FACIAL PALSY, myringotomy is essential. Refer him. Distinguish this from herpes zoster of the geniculate ganglion, which is excruciatingly painful, and is accompanied by vesicles in his meatus and on his drum.

If he has **tenderness,** redness, and swelling over his mastoid process, he has ACUTE MASTOIDITIS. This is usually accompanied by persistent fever, and a red, bulging drum, with pus discharging through a perforation. Tenderness is acute high on the mastoid proces. Note that a meatal boil (furuncle) may also produce postauricular swelling, due to the infection of an adjacent lymph node. If he is an infant, acute mastoiditis causes a swelling above and behind his ear, displacing it outwards and downwards. If he has a boil in his

meatus, the swelling is evenly distributed up and down his postauricular groove, displacing his ear outwards, but not downwards.

If **an adult develops serous otitis media** for the first time, consider the possibility of obstruction of his Eustachian tube by a nasopharyngeal tumour.

If your workers delivering primary care are **not allowed to use antibiotics,** and so cannot use them to treat otitis media, instruct them like this. Clean the ear, syringe it with a rubber rat-tailed syringe, using water or, better, 30% spirit in saline. Then insert drops of 50% spirit. With the ear held uppermost for 2 minutes, insert 2 or 3 drops twice daily after cleaning. Although attic disease and a cholesteatoma should not be syringed, the risks in the routine use of this treatment are small.

Difficulties With Chronic Otitis Media

If he has a **tender swelling over his mastoid,** he has **acute-on-chronic mastoiditis,** and needs a radical mastoidectomy. If you cannot refer him for this, do a cortical one (25.4). Temporary drainage may be lifesaving, and allow you more time to refer him.

If he has chronic otitis media, and has earache, this is ominous. Pus is gathering under pressure somewhere, and, unless it is released, it may track internally, with serious results. If he also has fever, he needs referral for a radical mastoidectomy soon, even if he has no signs of other complications. Antibiotics alone will cure none of the complications; but always start them before you refer him.

If he has earache and fever with bilateral chronic discharge, the side with the ache is the side on which he has acute-on-chronic mastoiditis.

If **permanent deafness** develops as the result of bilateral chronic otitis media, he will need a hearing aid.

If he has chronic otitis media and develops a **facial palsy,** a cholesteatoma is invading his facial nerve. Refer him for radical mastoidectomy.

If he has a chronically discharging ear and suffers from **severe vertigo,** perhaps with **vomiting,** he has **labyrinthitis.** These symptoms are worse when he moves his head. He usually also has fever and is unwell. Look for a fine horizontal nystagmus, and see if this is made worse when you close his ear canal with your finger, and gently press it (the fistula sign). Admit him, and give him penicillin in high doses, as described below, with chloramphenicol and metronidazole. He needs a radical mastoidectomy, as soon as his labyrinthitis has settled.

If he has a chronically discharging ear which suddenly becomes **painful,** and he has **headaches, vertigo, neck stiffness,** or **loss of consciousness,** his condition is serious, because the infection has spread from his middle ear to his dura, meninges, or brain. Admit him, give him penicillin with chloramphenicol and metronidazole, and refer him rapidly.

If he becomes **very ill** with severe headache, vomiting, and fever, he has **meningitis.** Neck stiffness, photophobia, and a positive Kernig's sign will soon follow. Confirm the diagnosis by lumbar puncture. Examine his CSF by Gram's method, and culture it.

Either give him 600 mg penicilllin G intramuscularly every 4 hours for 3 days, then 6-hourly. And inject 10 000 units intrathecally every day. And give him chloramphenicol and metronidazole, as in Section 2.9.

Or, if you have no chloramphenicol, combine the penicillin with metronidazole and sulphadiazine 2 g 4-hourly.

Continue these drugs for 2 weeks, but stop the intrathecal penicillin after 3 days. Make sure he has an adequate fluid intake. When his meningitis has settled, he needs a radical, or failing that, a cortical mastoidectomy.

If, in addition to the signs of meningitis (above), he develops **nominal aphasia** (difficulty in naming familiar objects), or **pyramidal signs,** suspect a **brain abscess.** Refer him: he is best treated by drainage through a burr hole (a hazardous operation because of the nearness of the sigmoid sinus) and antibiotics, followed by a radical mastoidectomy.

If he has **rigors,** and is comparatively well in between, suspect **lateral sinus thrombosis.** Do a lumbar puncture, and when the manometer is in place compress his jugular vein, first on one side, and then on the other. If his CSF pressure rises on the normal side, but not on the side on which he has ear symptoms, his lateral sinus is thrombosed on that side (Queckenstedt's test). Give him high doses of penicillin, and refer him.

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 his ear continues to discharge pus in increasing quantity through a perforation in his drum.

If acute mastoiditis complicates chronic otitis media, the patient has: (1) A dull nagging pain; this may either be a new pain, or an increase in an old pain. (2) Increasing discharge; he is so used to a discharge anyway, that he does not usually complain about this. (3) Increasing deafness. Chronic otitis media will already have made him deaf, and he may not notice that his deafness has been getting worse. (4) Tenderness over his mastoid process. (5) Sometimes, oedema of the skin over his mastoid process, due to underlying infection, giving it a 'velvety feel'. (6) A swelling in the posterosuperior wall of his meatus. (7) Anterior rotation of his pinna, so that his ear sticks out more on the affected side than on the normal one. This is a very characteristic sign, and should make you suspect the diagnosis, as you see him walking through the outpatient department; it can however also be caused by a swollen postauricular lymph node, by a meatal boil, or by cellulitis of his scalp.

Four operations are possible: (1) If pus has gathered under his periosteum you can simply open this and drain the pus. (2) You can open his mastoid cortex to allow pus to drain. (3) You can remove all the cortex overlying his mastoid antrum, and saucerize the opening, by removing some or all of the air cells of his mastoid (cortical mastoidectomy). Depending on how many air cells you open, this is potentially much more dangerous than simply opening his mastoid cortex - his dura, his sigmoid sinus, and his 7th nerve are all at risk. (4) If he has chronic mastoiditis, an expert can do a radical mastoidectomy.

Acute mastoiditis x-rays are seldom necessary. Normal mastoids differ greatly in the number of air cells they contain, so compare both sides for differences in density and structure. The early sign is diffuse haziness of the cells. After about 2 weeks the bony septa between them break down.

If a mastoid is sclerotic and its air cells poorly developed, suspect that the mastoiditis is acute-on-chronic. This makes mastoidectomy less urgent, which is fortunate, because it is more difficult.

The differential diagnosis includes inflammation of the postauricular node, a boil in the patient's external auditory canal, and inspissated wax in his ear.

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

Caution! The mastoid is always tender during the first few days of an attack of otitis media, before the drum has burst. Only diagnose acute mastoiditis, when tenderness and fever appear in a patient who has had a discharge for several weeks (mastoiditis is uncommon in acute otitis media).

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

Suggesting a boil (furuncle) in his external auditory meatus (25.3, rare in a child) - swelling in the outer cartilaginous part of his meatus, and his mastoid is not tender. His hearing is diminished if his meatus is blocked, but becomes normal if you are able to open it by pulling his pinna upwards and backwards. Pain on pulling his ear and on chewing, a history of other boils, thick scanty discharge. If you can see his drum, it is normal. If the boil is on the posterior wall of his meatus, his pinna may be pushed forwards. X-rays show a normal mastoid.

Draining the Periosteum for Acute Mastoiditis

If pus has already found its way to the surface of his mastoid, and is lying under his periosteum, there is no need to do a cortical mastoidectomy. Incise the skin and periosteum close behind his ear as in A, Fig. 25-3, but stop there. Insert a drain for a few days. If his infection does not resolve, deeper drainage or cortical mastoidectomy will be necessary.

Draining the Mastoid Cortex for Acute Mastoiditis

If you cannot refer him and do not feel able to do a cortical mastoidectomy, be content with draining his mastoid cavity. This could be life-saving! Incise behind his ear, as described below, and open his periosteum - there may be pus under it. Then use a gouge to open the cortex of the bone for about 1 cm, and expose some of his mastoid air cells, which will be full of pus. Dress the wound as described below.

Cortical Mastoidectomy for Acute Mastoiditis

Indications. Acute mastoiditis. Draining the mastoid is not quite the urgent operation that it was in the days before antibiotics, so give them and try to refer him. If you cannot refer him, give him antibiotics for 2 to 4 days, and operate when his infection has settled a little. His mastoid must be drained soon, to reduce the risk of infection spreading to cause thrombophlebitis of his lateral sinus, or a brain abscess.

Antibiotics are necessary. The most suitable ones are likely to be chloramphenicol with metronidazole.

The equipment includes bone gouges and a mallet, a periosteal elevator, a self retaining retractor, a headlight and suction (both essential), curettes (preferably Collier and Morris), and bone wax (3.1) to control bleeding.

Caution! Use a gouge; the angle of a chisel is more likely to enter his dura or his lateral sinus.

Anaesthesia. (1) Ketamine (A 8.1). (2) General anaesthesia (A 10.1).

Incision. Shave the hair behind his ear. Lay him on his back, with his head on a sandbag, turned towards the other side. Put two towels under his head, and fold the upper one round it. Feel for the site of his suprameatal triangle, just inferior to the posterior end of his zygomatic process. Make a curved incision about 0.5 cm behind his pinna, and following the same curve. Start it just beyond his zygomatic process superiorly, and extend it just beyond the tip of his mastoid inferiorly.

Caution! (1) Don't extend the incision beyond the tip of an infant's mastoid, because his facial nerve is very superficial just there, and you may cut it. There is no real mastoid tip in a baby; the incision must be high. (2) Don't include his temporalis muscle in the upper part of the incision, because it will bleed unnecessarily.

Deepen the incision down to the bone. You will see his temporalis muscle at the upper end of the wound, and his sternomastoid at the lower end. Use a periosteal elevator to raise them both, with his periosteum. Elevate his periosteum forwards, as far as the lateral end of his posterior bony meatal wall, backwards for a few millimetres, and upwards with his temporalis muscle, to the level of the upper attachment of his pinna. Expose a wide enough area of bone to identify the following three landmarks:

(1) Henle's spine, at the junction of the superior and posterior bony walls of the meatus. Define the edge of the canal carefully, and you will find this spine. It overlies the entrance to the mastoid antrum, which lies about 12 mm below the surface in an adult: follow the posterior meatal wall inwards to find it.

(2) The suprameatal ridge, which is a posterior prolongation of the zygomatic process, and marks the lower limit of the dura of his middle fossa.

(3) His antrum lies under a well-defined pitted triangle, the suprameatal (MacEwen's) triangle (C, Fig. 25-2) formed: (a) Superiorly by his suprameatal ridge (and the superior tangent of his external auditory meatus); (b) Anteriorly by an oblique tangential line across his posterior meatal wall at the spine of Henle; and (c) Posteriorly, by a vertical tangent to the posterior wall of his meatus.

Insert a self-retaining retractor to keep the flaps away from the field of operation, and to help control bleeding.

Remove the cortex of his mastoid with a gouge and hammer in the directions shown in E, Fig. 25-2. Remove chips of bone little by little. Chip forwards towards his external auditory meatus, away from the place where his lateral sinus is nearest the surface. If you chip too far backwards, you will enter it. Start working widely and shallowly with the largest gouge, and gradually deepen the cavity with smaller ones, until you reach his antrum. The bone usually changes colour as you reach it. You may have to chip away quite a lot of bone. If pus is working its way to the surface, his antrum will be easier to find.

Caution! (1) As long as you keep below the superior tangent of his external auditory meatus, you will be safe. There is not always a very clear depression in the suprameatal triangle, but if you work into its centre behind Henle's spine, you will reach the antrum. (2) Remember that the antrum lies about 12 mm deep in a adult, but is only a few millimetres deep in an infant. (3) If you reach his dura, STOP! Don't remove any more bone, or you may damage it. If you do, you may cause meningitis, or uncontrollable bleeding from his lateral sinus. (4) Take special care not to damage the medial, or the anteromedial, wall of his antrum, because you may damage his lateral semicircular canal, or his facial nerve. (5) Remember that the tip of the long process of his incus is in the floor of the entrance to his antrum[nd]don't disturb it. (6) Preserve his posterior meatal wall, and don't dissect the skin from it.

As soon as you remove the cortex of his temporal bone, pus may flow from his mastoid air cells. Use swabs and a curette to carefully remove all pus, granulation tissue, and loose pieces of necrotic bone from his antrum and mastoid air cells. Chip and scrape away bone containing air cells, including his antrum, which is the deepest area to be cleaned.

Make the bony cavity saucer-shaped, so that the flaps will fall into it and obliterate it. Syringe it with warm saline, insert a corrugated drain, and start to shorten this after 48 hours.

25.5 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 drum, total deafness, and a facial palsy, or all three. So refer the patient if you can. The middle (isthmus) 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. Try syringing first. If this fails and you cannot refer him, and you have to use instruments, be sure to anaesthetize him first, especially if he is a child. The foreign body may be a seed, a live cockroach, a piece of paper or a broken matchstick. Two-thirds of patients are usually under five years.

Mohammed Aslam (10 years), the son of a local VIP was admitted with a ball-bearing in his ear. The consultant ENT surgeon was on leave, and so a junior took the case over. It seemed a pity to give the child a general anaesthetic, and as he seemed co-operative, it was 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 his malleus, his incus, and his stapes. Lessons. (1) If you are inexperienced, simpler methods may be safer, even if they are less dramatic. Syringing is not clever, 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.

Foreign Bodies in the Ear

First try to syringe the patient's ear, if necessary under ketamine, as if you were removing wax. Use a 20 ml syringe, or an ear syringe containing water at body temperature. Pull his ear upwards and backwards, and direct the stream of water up along the roof of his ear canal, so that it gets behind the foreign body and pushes it out. Syringing will remove most foreign bodies.

If syringing fails (rare), try gentle suction with a piece of catheter on the end of the sucker. If this too fails, refer him.

If you cannot refer him, admit him and always anaesthetize him. Ketamine is ideal. A foreign body is seldom urgent, so you have time to starve him.

Lay him down, and use a forehead mirror, and a good source of light. Or use an auriscope with a large speculum and an open lens. Rest your hand on his head. Use an aural hook, a cerumen hook, or a paper clip bent exactly as shown in Fig. 25-4, smoothed with a file or on a stone, and held in mosquito forceps. Put the hook into his auditory canal, so that it lies against the wall. Then, when it is past the foreign body, twist it, so that it lies behind it, and allows you to pull it out.

Caution! Be very gentle so as: (1) Not to push the foreign body beyond the isthmus of his auditory canal, and (2) not to damage his tympanic membrane. (3) Don't try to use dissecting forceps.

If it has gone beyond the isthmus, so that you cannot remove it with a hook, make a small vertical incision from the back of his pinna at its attachment to his mastoid, through into his ear canal; hold his pinna forwards, and remove the foreign body under direct vision. An incision like this does not get you a long way in, but it may help. Inspect his drum and close the incision with 2 monofilament sutures. Then pack his canal with ribbon gauze to prevent oedema and granulations. If possible impregnate the gauze with 'BIPP' (Bismuth and Iodoform Paste). Remove the pack in 5 days.

Difficulties with Foreign Bodies in the Ear

If there is an **insect in his ear,** put a few drops of oil into his ear to kill it, then try syringing it out. If this fails, which is seldom, anaesthetize him.

If a **vegetable foreign body swells,** and jams in the canal, leave it and try again later.

If his **tympanic membrane is ruptured,** try to prevent infection, and let it heal spontaneously. Keep it completely dry for 6 weeks. Don't dust it with antibiotics, or pack the canal. Mopping is unnecessary, unless his middle ear discharges; if so treat him as for otitis media. A drum may rupture during unskilled attempts to remove a foreign body, or as the result of an explosion, or a blow, or by penetration with a sharp object.

Caution! Don't syringe a ruptured drum, and do as few manipulations as possible.

25.6 Epistaxis

A bleeding nose can be a very unnerving emergency; if you don't treat a patient correctly, it can be fatal. The measures described here will control the severest bleeding, but it commonly recurs.

Nose bleeds are rare in infancy, common in childhood, uncommon in young adults, and more common again in the elderly. Most bleeding is easily controlled, and has no obvious cause. Blood usually comes from the anterior septal vessels in the front of the nasal septum (Little's area, F, in Fig. 25-5). You can see these with a nasal speculum and a good light (try the sun) behind you; you will see them better with a head mirror. When bleeding comes from anywhere else, it usually comes from far back in the patient's nose. This is difficult to get at, and he is usually both elderly and hypertensive.

Try the simpler methods first. If you teach them 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).

Nose Bleeding

Examination. Sit the patient upright looking straight ahead. Ask an assistant to stand behind him, and hold his head. If he is bleeding from the anterior half of his nasal cavity, most of the blood will come from his nostrils. If he is bleeding from the posterior half, much of it will be trickling down his pharynx.

A child is almost certainly bleeding from his 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 his nostrils, or his nasopharynx? This will be some help in deciding where he is bleeding. Apart from obvious hypertension, there is usually no time to speculate on the cause. Other causes include trauma, a foreign body, tumours, onyalai, leukaemia, scurvy, purpura, and the prodromal stages of diphtheria, measles, varicella, and scarlet fever.

Immediate Treatment. Sit him forwards a little, drape him in a mackintosh, 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.

Squeeze his nose, so that you press its soft mobile parts against his septum, while he breathes with his mouth wide open. Do this yourself, or delegate a nurse to do it. If bleeding is more than minimal, keep pressing for 5 minutes by the clock. If it is minimal, ask him 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 his mucosa.

If you decide that bleeding is not going to stop, put up a drip, take blood for cross-matching, and give him pethidine 50 or 100 mg intramuscularly, or slowly intravenously. He will now tolerate your manipulations more easily. Proceed with anterior packing.

Anterior Bleeding from the Nose

Anaesthesia. All packing, intranasal manipulation or cauterization needs local anaesthesia, either by spray (A 5.8), or on a gauze or wool swab wet with 4% lignocaine.

Anterior packing aims to provide a focus for the development of a firm clot close to the bleeding point. You will need a head mirror, with a good light shining on to it from behind his shoulder, a nasal speculum, and dressing forceps, preferably Tilley's. If you don't have a head mirror, a good light behind you will do. For each side of the nose you will need about a metre of 13 mm gauze packing, or a 13 mm roller bandage. To make this easier to remove later, smear it with vaseline, or 'BIPP' (4.11). If you lack BIPP, soak it in 1/100,000 adrenalin solution.

Pack the nostril which is bleeding most. Sit him upright, and ask an assistant to stand behind him and hold his head. Warn him that he will find the procedure very uncomfortable. Clear his nasal cavities by asking him to blow his nose, or clear his bleeding nasal cavity with

a sucker and cannula. Your previously applied lignocaine pack should have produced some anaesthesia.

Focus your light on the speculum, and put it into his 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 his nasal cavity in an orderly way in horizontal layers, starting on its floor and working towards its roof. This is difficult, and you will probably find yourself putting gauze wherever it will go, until his nose is full. Leave both ends of the gauze protruding from his nostrils. If necessary, pack both sides of his nose, and secure all the four ends of the gauze with a safety pin. Strap a pad of folded gauze across the front of his nose, and wait a few minutes.

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

If an anterior pack does not control bleeding, remove it, insert a posterior one, and then repack his anterior nasal cavity as above.

Cauterization (optional). Soak a small piece of ribbon gauze in 4% lignocaine and adrenalin solution, squeeze out the excess, and apply this to the bleeding area for 10 minutes, 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. His mucosa will turn white.

If you fail to control bleeding, reinsert the lignocaine and adrenalin pack. If this too fails, hold a silver nitrate stick over the bleeding area for a few moments, and then roll it away to one side before you remove it (if you pull it off, bleeding may restart).

If you fail again, try a galvanocautery 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 general anaesthesia. Leave the scab, and dress it with vaseline.

Caution! (1) Don't cauterize both sides of his nasal septum at one time with silver nitrate or heat, because it may perforate.

Posterior Bleeding from the Nose

Posterior packing may be necessary if: (1) An anterior pack fails to control anterior bleeding. (2) There is severe posterior bleeding.

Take him to the theatre. Spray his pharynx and palate with 4% lignocaine.

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

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

Use a pack of folded or rolled gauze sponges of sufficient bulk to plug his posterior nares. If possible give him a general anaesthetic, and intubate him. You will need two packs, of at least 5 cm square for an adult. Tie 50 cm of soft string, or umbilical tape, to a small (18 Ch) rubber catheter, as in B, Fig. 25-5. Put this into one nostril, and pull it out of his 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 third piece of string to it. Pull the pack up into the back of his nose, and press it into place with your finger in his throat. Make sure that it has gone behind his soft palate, and that this has not folded upwards.

Then pack his anterior nasal cavity, as above.

Tie the nasal ends of the string over some gauze. Let the third string protrude from the corner of his mouth, and tape it to his 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 48 hours. Don't leave any pack or catheter, either anterior or posterior, in his nose for longer than this, or you will increase the risk of suppuration, especially in his sinuses. The only possible exception is a pack impregnated with 'BIPP' (4.11), which you can leave for a week. 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 the theatre, with a light and the necessary equipment ready, so that you can if necessary repack without delay.

Because epistaxis may recur when you allow him 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 he has lost. If he has been bleeding severely, watch for signs of shock. Keep him propped up in bed. Give him aspirin or paracetamol, if necessary. Pethidine or morphine can be helpful. Monitor his blood pressure, his respiration, and his haemoglobin. Most severe epistaxes are precipitated by infection, so give him a broad-spectrum antibiotic (ampicillin or chloramphenicol and metronidazole, 2.9) for at least 5 days. If you have to transfuse him, use fresh blood.

Difficulties with Epistaxis

If anterior and/or posterior **packing fails,** make sure that the packs have not become loose. If so, replace them. Use not less than a metre of ribbon in each nostril. It is not possible to bleed through proper packing.

If he has been properly packed and **continues to bleed** whenever the packs are removed, anaesthetize and intubate him (you should be removing them in the theatre anyway). Failure of packs to control bleeding on one occasion is common, but they usually work eventually. The ultimate measure is to tie the arteries supplying his nose: (1) Start with his anterior ethmoidal, which is the easiest. (2) Alternatively, tie his external carotid (3.3). There is such an extensive collateral circulation that this often fails to help. (3) His internal maxillary artery can also be clipped, behind the posterior wall of his antrum, but this is an expert's task.

To tie his anterior ethmoidal artery, make a small incision 1 cm medial to his inner canthus. Cut down to bone, raise his periosteum, particularly posteriorly, so as to make a passage along the medial wall of his orbit. As you raise his periosteum, you will find it tethered at the point where his anterior ethmoidal artery crosses from his orbit to enter bone. Carefully dissect it. Diathermy it, clip it, or tie it with a small suture.

If he **bleeds persistently,** check for signs of a bleeding disorder. Look for petechiae, ecchymoses, and a large spleen. If possible, measure his clotting (16.13) and bleeding times, his prothrombin index, and his blood urea. If you find any abnormality, investigate him further. He may have leukaemia or thrombocytopenia, etc. Don't pack his nose. Instead, control the ooze by soaking oxidized cellulose sponges in topical thrombin solution (if you have it), and place these in his nose. If this fails or you cannot do it, you will have to pack his nose. He may die.

If he is elderly, suspect that his bleeding nose may be serious. Enquire carefully for a history of illness, trauma, medication, or a bleeding disorder. If he is hypertensive, bleeding may be difficult to stop. He too may die.

25.7 Blocked Nose and the General Method for Sinusitis

The sinuses lead off the nose, so that disease in them usually follows disease in the nose. Sinusitis has some common features, regardless of which particular sinus is infected, so we will discuss these first, and deal with frontal (25.8) and maxillary (25.9) sinusitis later.

The common presenting symptoms in a patient's nose are: (1) discharge, (2) obstruction of his nasal airway, and (3) facial discomfort or pain.

Nasal obstruction is usually due to engorgement of the erectile vascular tissue in the mucosa over his inferior turbinates due to: (1) Labile control of his mucosal vessels, as the result of a wide variety of 'constitutional' and environmental factors. His mucosa swells and obstructs his airway, often with a watery nasal discharge, and bouts of sneezing. Psychosomatic factors may also affect the nose ('honeymoon rhinitis'). (2) An inherited atopic

state. (3) Reaction to a specific allergen. (4) A foreign body can also obstruct his nose (25.11), as can (5) infection and (6) nasal polypi (25.10).

Facial pain or discomfort may be due to sinus disorders. Engorgement of his nasal mucosa may obstruct the natural ventilation of his sinuses, and cause a feeling of pressure in his cheeks, or forehead.

Acute sinusitis often follows a viral upper respiratory infection, and usually involves one of a patient's sinuses only. He presents with fever, a copious purulent discharge, and: (1) Pain, or a sense of pressure in his cheek (sometimes wrongly thought to be 'toothache'). (2) Obstruction of his nasal airway, often without the discharge of mucus or pus. (3) Swelling of his face (this is much more likely to be due to a dental abscess, 5.8). Tenderness over an infected sinus is not a useful sign.

Chronic sinusitis may follow acute sinusitis, if his resistance is low, or if he has nasal polypi, which prevent his sinuses draining. Pain is not a major feature, but he may have a dull ache in his face, usually later in the day. Bending his head forward can be uncomfortable.

Blocked Nose and Sinusitis

Blocked Nose

See also frontal (25.8) and maxillary sinusitis (25.9).

Diagnosis. Exclude polypi (25.10) and foreign bodies (25.11).

Management. Enquire for psychosomatic factors and do your best to allay them.

If there is no more treatable cause, try a nasal steroid spray (beclomethazone, 'Beconase', or budesonide, 'Rhinocort') puffed into each nostril 3 or 4 times twice daily. Continue for 2 weeks before assessing its benefit. Try this for 3 or 4 weeks, and only continue it if there is improvement.

Acute Sinusitis

Treatment. Give him a broad-spectrum antibiotic (ampicillin or amoxycillin), and an analgesic (sinusitis is painful). Nasal decongestant drops are not helpful, and are uncomfortable to instil in the head-down position.

Chronic Sinusitis

Examination. Look for: (1) Obstruction (usually on one side only). (2) A discharge from the front of his nose, and a bead of yellow pus high above his inferior turbinate. (3) Pus on the dorsum of his soft palate. (4) Also, look at his handkerchief (if he has one), which may be stiff from dried pus (this does not happen with a watery discharge).

Treatment. Give him a broad-spectrum antibiotic, and encourage him to blow through his nose without pinching it to restrict his airway. The Venturi effect of doing this will draw

pus out of his infected sinus. If he does not improve, wash out his antrum under local anaesthesia (25.9).

Difficulties with the Nose

If he presents with dull red mucous membranes, and his nose contains many dried crusts, suspect **chronic atrophic rhinitis.** There is little you can do for him, except not to mistreat him. This mostly means not giving him vasoconstrictor sprays and drops (including ephedrine), and persuading him not to buy them himself. They will only give him temporary relief, after which his symptoms will get worse. He will get some relief from a saline solution, sniffed as many times a day as is practical.

Frontal Sinusitis

Frontal sinusitis starts with localized pain above a patient's eye. If he presents late, he may have gross orbital swelling, proptosis, and diplopia. If large doses of penicillin, chloramphenicol, and metronidazole do not control his symptoms rapidly, you may have to drain his frontal sinus. Frontal sinusitis is always secondary to maxillary sinusitis and obstruction of his frontonasal duct, so be sure to wash out his antrum.

Frontal Sinusitis

See also Sections 5.5 (infections in the orbit), 7.14 (osteomyelitis of the cranium), and 24.11 (proptosis).

Examination. Examine the patient's nasal cavity for pus, a deflected nasal septum, and signs of past surgery. Look for associated abnormalities in his maxillary antrum by transillumination (25.9). Antral puncture may reveal pus in it.

X-rays. Take an erect film, and look for increased density of the shadow of his frontal sinus on the abnormal side, and a fluid level. A bilateral opacity suggests mucosal thickening, a unilateral one is more likely to be pus.

Non-operative treatment. Give him large doses of penicillin and 0.5% ephedrine nose drops instilled in the Moffat position (25-8). Inhalations of tincture of benzoin, or menthol and eucalyptus, will give him useful symptomatic relief.

To drain his frontal sinus, if you cannot refer him, give him a general anaesthetic, incise under his eyebrow from a point above his pupil to beside his medial canthus. Tie his angular vein. Use a small gouge, or dental drill, to cut a hole in the floor of his frontal sinus, to expose its lumen. Insert a small drain. Also, wash out his maxillary antrum through a cannula inserted through his inferior meatus (25.9). If necessary, refer him for definitive surgery.

To remove frontal sequestra see Section 7.14.

Caution! Wash out the maxillary antra of all patients with frontal sinus infections, because this is often the primary source of infection.

25.9 Maxillary Sinusitis

If the ostium of a patient's maxillary sinus is blocked, he has pain in his cheek. If it is full of pus he has fever, and perhaps signs of inflammation on his cheek. Ephedrine nose drops may open his blocked ostium, but if his sinus is chronically full of pus, it needs puncturing and washing out, which is not difficult. Opinions differ as to whether a Caldwell-Luc operation should be in the repertoire of the generalist, so try to refer a patient who needs one. Fortunately, it is rarely necessary. Its main indication is chronic infection of the antrum which fails to respond to non-operative treatment.

Maxillary Sinusitis

Transillumination needs to be interpreted with care, because antra are often asymmetrical. Take the patient into a darkened room, shine a small torch with a bright beam on to his hard palate, and close his lips around it. If his maxillary antrum is normal, his cheek on that side glows red. If one antrum transilluminates less well than the other, it may contain thickened mucosa, pus, blood, a tumour, a polyp, or a foreign body.

X-rays tell you more than transillumination. Take an AP film with his head tilted backwards. If you take an erect film, you may be able to see a fluid level.

Blocked Ostium. Give him 0.5% ephedrine nose drops in the head-down position, so that they run into the higher part of his nose. Lay him on his back with his head over the end of the couch, as in Fig. 25-8, and let him sniff them up during 10 minutes.

Antral Washouts for Sinusitis

Indication. Pus in the maxillary antrum.

Method. Ask an assistant to stand behind him to steady his head. Obtain good local anaesthesia, especially under his inferior turbinate where the trocar will penetrate: (1) Anaesthetize the anterior end of his inferior turbinate with lignocaine 4%, applied on gauze, or as a spray. (2) Twist cotton wool on to the serrated end of a Jobson Horne probe. Load this with cocaine paste, or soak it in 4% lignocaine. Gently paint under his inferior turbinate. Or, (3) use a long thin needle to inject lignocaine into it. Give the local anaesthetic a few minutes to act.

Take an antral trocar. Grasp the side of his head with your fingers behind it and your thumb over his zygoma. With your finger along the trocar to prevent it going in too far, push it along the floor of his nose, under his inferior turbinate. Slide it along the wall, then push it laterally towards the outer canthus of his eye, until it will not go any further. About 5 cm should go inside.

Aspirate the contents. In most diseased antra aspiration is impossible, because the ostium is blocked. If you aspirate air, it suggests that his antrum is normal. Ask him to lean

forwards over a bowl, and to breathe through his mouth. Pump saline through the needle with a 20 ml syringe, or a Higginson's syringe, and let it run out through the ostium into the bowl.

If his ostium is sufficiently blocked to prevent the saline draining (rare), insert a second needle to let it drain.

Caution! (1) Don't go right through his antrum into his cheek. You should be able to waggle the tip of the trocar slightly when it is inside his antrum. (2) Keep the Higginson's syringe full of saline. If you blow air in, and his ostium is blocked, he may possibly die of air embolism (very rare).

Caldwell-Luc Operation

Indications. (1) Chronic infection of the antrum which fails to respond to non-operative treatment. (2) Exploration. (3) To obtain a biopsy, and reduce the bulk of the tumour, in suspected carcinoma of the maxillary antrum. Refer him if you can.

Anaesthesia. (1) General anaesthesia with tracheal intubation and a pack in his throat. (2) Intravenous ketamine.

Method. Using a dental syringe and cartridge, infiltrate his mucosa with an adrenalin containing local anaesthetic to reduce bleeding. Starting over his canine tooth, make a 5 cm incision through his mucous membrane and his periosteum, in the sulcus between his gum and his lip, well above the sockets of his teeth. Raise the periosteum and reflect flaps upwards and downwards. Reflect the upper flap to just below the floor of his orbit. As you do so, find and preserve his infraorbital nerve. If you damage it, he will have numbness of his lip and cheek. Reflect the insertions of his facial muscles with his periosteum.

Use an osteotome to open the anterior wall of his antrum - well above his tooth sockets, and the floor of his antrum. Start by making a small hole, and enlarge it with nibblers, a punch, or bone forceps. Use a small dissector to remove all damaged mucous membrane. Remove benign tumours and cysts with forceps and scissors.

Caution! (1) Take care when you approach the the roof of his antrum, because the bony covering of his infraorbital nerve is thin and easily damaged. It supplies sensation to an area of his cheek and upper teeth. Remove all bony fragments. (2) Don't try to clear the sinus blind, try to see into it. Don't damage the roots of his teeth, which often project into it.

If the cavity is severely infected, with very diseased muscosa, make an opening from the medial wall of his antrum through into his nasal cavity, under his inferior turbinate (intranasal antrostomy, B, 25-6). The medial wall of his antrum bulges inwards, so you can do this easily. Use a small gouge to lift away the bone and reveal the mucosa of the inferior meatus of his nose. Incise this anteriorly, superiorly, and posteriorly, to allow an inferiorly hinged flap to fall into his antrum.

If you have difficulty controlling bleeding, pack his antrum (seldom necessary) with the tail of the pack coming through his antrostomy into his nose. Impregnate the pack with

'BIPP' (4.11), or, less satisfactorily, gauze soaked in saline. 48 hours later remove the pack through his nose

Close the wound in his oral mucosa with several small absorbable sutures. If you don't close it securely, he may develop an oro-antral fistula.

25.10 Nasal Polypi

A patient with nasal polypi is usually an adult, who presents with long standing nasal obstruction, which becomes complete from time to time, with or without a nasal discharge. He has grey fleshy masses in both his nasal cavities. When you remove them, they look like skinned grapes. Polypi are common and treatable. Try non-operative treatment first, and if this fails, remove as many as you can surgically. Some polypi of the maxillary antrum are so large that they project through the ostium into his nasopharynx, and have to be removed through his mouth. If a polyp is on one side only, it may be malignant (or, very rarely a meningocele), so treat it as such, until you have proved it is benign.

Nasal Polypi

Non-operative Treatment. Ask the patient to place 2 drops of betamethasone (50 [gm]g) into each nostril twice daily for 4 weeks, while he is in the Moffat position in Fig. 25-8, and ask him to remain in this position for three minutes afterwards.

Removing Polypi under Local Anaesthesia. Premedicate him thoroughly. Sit opposite him, and ask a nurse to stand behind his head. Spray or douche his nose with lignocaine 2% with adrenalin 1/100,000. Be careful not to exceed the maximum dose (A 5-1). Wait for 5 minutes.

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

Repeat the process, until you have removed as many polypi as you can. If he feels pain, spray more anaesthetic and wait another 5 minutes. If he bleeds excessively at the end of the operation, pack his nose as for epistaxis (25.6).

Removing Polypi under General Anaesthesia enables you to remove them more completely than under local anaesthesia, but there will be more bleeding. Avoid ketamine, because the laryngeal and pharyngeal reflexes are partly preserved, and cause trouble. Give him a general anaesthetic, intubate him, and pack his throat with a large pack. Be sure the throat pack is visible all through the operation, or has a stout thread fixed to it. Have good suction available. Large clots can form in his pharynx, and be aspirated when you remove the tube. So clear his throat first, and remove the pack with care.

When you have removed all the polypi you can, pack his nose with an anterior pack each side (25.6). Send him back to the ward lying on his side.

25.11 Foreign Bodies in the Nose

If a child puts something, such as a maize seed or a bean, into his nose, it will have to be removed, or it will cause chronic suppuration and obstruction. Removing it is seldom an emergency, and is easier and much less dangerous than removing a foreign body from the ear. Commonly, the child or his parents know that there is a foreign body inside, and know where it is. Suspect one when: (1) One side of a child's nose only (usually the right) is blocked or discharges (common). A unilateral foul-smelling bloody nasal discharge, with obstruction is a foreign body unless it is a tumour (rare in most communities). (2) He has a perforation of his palate (rare).

Foreign Bodies in the Nose

Clear his nose and try to see the foreign body. If you cannot see it (rare), take a lateral X-ray. Try to get the child to blow or sneeze the foreign body out. Close his other nostril and tickle his nose to make him sneeze.

Caution! (1) If you suspect a foreign body, assume it is there, until you are absolutely certain it is not. (2) Don't believe a negative X-ray.

Anaesthesia. (1) Local anaesthesia is suitable, if you can see it, it is not too far back, and he is reasonably co- operative. It will minimize the risks of inhalation, if your anaesthetist is not skilled. (2) Intravenous ketamine, if local anaesthesia is unsuitable. (3) Give him a general anaesthetic. Pass a tracheal tube, and pack his pharynx to prevent him inhaling 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 auriscope, and remove its back lens.

The Method varies, depending on the anaesthesia you use.

If you are using local anaesthesia, spray his nose well with local anaesthetic solution (without exceeding the dose, see A 5-1), and wait for 5 minutes. Ask his mother to sit him on her lap, hold his legs between hers, and to put her arms round him. Ask a nurse to hold his head. Put your chair close to his mother's, with your legs outside hers. Either use a head mirror, or have a good light behind you.

If you are using general anaesthezia, lay him on his side, so that if you push the foreign body into his pharynx, it will not go into his airway.

Try to bring the foreign body out anteriorly - if you push it posteriorly, he may inhale it (this should not happen if his throat has been adequately packed).

If the object 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 his nose, and away from its roof. Then use angled forceps to

remove it. A foreign body is most likely to impact in the roof of his nose. Here it is dangerously close to the floor of his anterior cranial fossa and the medial wall of his orbit.

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

If he bleeds, use gentle suction. Packing (25.6) is seldom necessary.

Caution! Make sure there are no more foreign bodies present.

25.11a Laryngoscopy

A laryngoscope, which enables you to look directly at the larynx, and push a tube through it, is one of the most useful of all instruments, but don't forget the advantages of indirect laryngoscopy, with an angled mirror. Its great advantages are that you can do it on an outpatient, it needs only simple equipment, and it can be very informative. But it is not easy, and you will have to do it fairly often, if you are going to become competent with it. The main indication for indirect laryngoscopy is to examine the vocal cords in order to: (1) Distinguish chronic laryngitis from a polyp or carcinoma. (2) Check the movement of the cords, when one of them is suspected of being injured, as after thyroidectomy, or by a carcinoma of the bronchus on the left side.

Laryngoscopy

Direct Laryngoscopy. Do this as for tracheal intubation, see A 13.2. You can more easily get a good view; take a biopsy with Magill's forceps or straight alligator forceps, but be careful not to damage the patient's cords.

Indirect Laryngoscopy

Indications. Hoarseness lasting more than 4 weeks. He is more likely to have laryngitis, but he may have a polyp, or carcinoma.

Equipment. A good light coming from behind him and slightly to one side. A head mirror with a band, laryngeal mirrors and a spirit lamp, 4% lignocaine in a laryngeal spray.

Method. Sit opposite him, and arrange the light so that it comes from over his shoulder.

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

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 his soft palate, push a little and look down at his larynx. Identify his cords.

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.

Ask him to say 'Eee...' and note the movement of both his cords.

To examine his nasopharynx, depress his tongue with some soft instrument, and place a smaller (14 mm) rhinoscopic mirror in his pharynx, so that your line of sight passes up behind his soft palate.

25.12 Bronchoscopy: Inhaled Foreign Bodies in the Larynx and Tracheobronchial Tree

If a patient flexes his neck, and extends his head sufficiently, he can align his mouth with his trachea or oesophagus, so that a rigid tube can be passed down them. This is the 'sword-swallowing position', and is the basis of rigid bronchoscopy 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 such skill, that it is one of the most difficult procedures we describe, and is at the very limits of 'Primary Surgery'. Anaesthesia is difficult, and the skill of your anaesthetist is the main determinant of success. You need a range of intruments to cover all sizes of patient, and also a variety of forceps. There are many opportunities for disaster, particularly tearing the patient's lower trachea and bronchi if he struggles, so causing mediastinal emphysema and mediastinitis. Many hospitals don't have bronchoscopes; this is for those that do. If you have other instruments with fibre-optic illumination, make sure that your bronchoscope is compatible with that system. You will need good suction.

You will find bronchoscopy useful for: (1) Sucking out a patient's stomach contents from his trachea, if he has been unfortunate enough to aspirate them during a general anaesthetic (A 16.3). 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 (9.11). (3) Removing foreign bodies, especially peanuts inhaled by children. This is more difficult than the other two indications, so don't start with it, if you can avoid doing so. (4) Diagnosing carcinoma, and other diseases of the larger airways.

Inhaled foreign bodies in the larynx and tracheobronchial tree, particularly peanuts or watermelon pips, are common. If a child is lucky, his first immediate bout of coughing expels the nut. If he is not so lucky, wheezing and coughing 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 his bronchial tree. This latent interval is then followed by fever, a cough, and the symptoms of chest infection. Antibiotics may relieve his symptoms temporarily, but they always return when treatment stops. He is often misdiagnosed as having tuberculosis.

If coughing, or the 'upside down thump' 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. Yet if you cannot refer him, and leave it inside him, suppuration and chronic disability, or death, are certain.

Bronchoscope, rigid, Negus, conventional lighting, distal illumination, complete with cords, Wappler fitting, battery box, two lamp carriers and 2.5 v lamps with 10 BA thread, (a) infant lumen 5.4x4.1 mm, (b) child 7x5.7 mm, (c) adolescent small 8x6.7 mm, one only of each size, (optional). ALSO, 25 spare bulbs. If you are going to remove foreign bodies from the lower respiratory tract, you will need these. This is not the complete range, which includes the adolescent large, 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 voltages which shorten their lives.

Forceps, for bronchoscope, (a) Chevalier Jackson, 2/2 teeth on 50 cm shaft, one only, (b) Haslinger tubular shaft or sliding shaft type for small bronchoscopes (both optional). If you have bronchoscopes, you will need forceps for them. Mark the shaft of the forceps with tape, so that you know when the tip is beyond the bronchoscope.

Bronchoscopy

Indications. See above.

Caution! This is not an easy procedure, so refer the patient to an expert, or call one in, if you can. Usually, this is impossible, so that, if you don't bronchoscope a patient, nobody else will. You will need a good anaesthetist and a good nurse.

Bronchoscopy under Local Anaesthesia. Premedicate him. Give an adult chlorpromazine 50 mg, and atropine 0.6 mg. Sit him up and inject 5 ml of 4% lignocaine into his trachea with a short stiff fine-bore needle; aim to produce a fine spray. Go through his cricothyroid membrane (A 13.5). Check that you are in his trachea, by aspirating before you inject. Before you pass the instrument, spray his cords with more lignocaine and wait 2 minutes.

Caution! Don't exceed the dose of lignocaine, particularly in a small child (A 5-1). 10 ml of 4% lignocaine is the absolute maximum for an adult.

Bronchoscopy under General Anaesthesia. Give him a general anaesthetic and a short-acting relaxant.

Bronchoscopy for the Aspiration of Stomach Contents

He will probably be in the theatre, and be partly or completely anaesthetized already, so there is no need for anaesthesia. He will not resist for long. Insert the bronchoscope, as rapidly as you can, and aspirate with a long sterile catheter.

Bronchoscopy for the Retention of Secretions

Indications. He is likely to be a very sick adult, who has been unable to cough his airway clear of secretions postoperatively (see Section 9.11). His breathing is bubbly, and parts of his lungs may have collapsed. He is so ill that he will die, unless his lower respiratory tract is cleared.

Method. If you cannot call in anyone who is more expert, take him into a side ward, or better, the theatre. Have an anaesthetist and a competent nurse to help you. Sit him up in bed with pillows behind his back. Use local anaesthesia as above. Blindfold him, and wear spectacles to protect yourself from showers of sputum. Stand behind him on a firm chair, with the bronchoscope and sucker ready. Ask him to look upwards.

Now pass the bronchoscope gently behind his tongue. Look for his uvula and his epiglottis. This will lead you in the midline to his vocal cords, as when intubating. As soon as you see them, aim the bronchoscope in the same direction as his trachea. Slip its beak between his cords and advance it downwards, sucking out the secretions as you do so. Clear his airway and remove the instrument. This will produce a paroxysm of coughing - which will benefit him greatly.

Caution! (1) Make sure you are not going down his oesophagus (you must recognize his cords on entry). (2) Very little movement should be possible between the bronchoscope and the patient. 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 his upper front teeth, and keep his lower lip out of the way with a gauze swab, held in your ring finger. If you hold the bronchoscope against his teeth like this, it and his head will turn as one and less damage is likely.

Alternatively, demonstrate his cords with a laryngoscope, before you pass the bronchoscope.

Foreign Bodies in the Bronchi

Immediate Treatment - the 'Upside down Thump'. If you are present when a child inhales a foreign body, turn him upside down and bang the back of his chest - he may cough it out. This is a very valuable procedure (and once saved the editor's life!).

History and Examination. If he presents later, take a careful history, look for impaired movement on one side of his chest, and listen for localized wheezing.

X-rays. 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, believe her, she is almost certainly right. (2) Most plastics are radiolucent, so you will not see them on an X-ray film. (3) Negative X-rays never exclude a foreign body, unless everyone is sure it is radio-opaque.

Bronchoscopy for the Removal of a Foreign Body

Equipment. A suitable size of bronchoscope. A long piece of bent wire with a hook on it (see below). Switch on the light, insert the grasping forceps, and practise picking up peanuts from an assistant's hand before you start.

Anaesthesia must abolish the child's cough reflex; local anaesthesia alone will not do this adequately: (1) Ketamine or thiopentone followed by intermittent suxamethonium (A 14.2), with oxygen intermittently introduced into the bronchoscope through an uncuffed tube. Be sure you have a drip up. (2) Suxamethonium followed by a long-acting relaxant, if the anaesthetist is skilled.

Caution! Be sure to spray the child's larynx with lignocaine, because this will prevent laryngeal spasm as you pass the bronchoscope, and minimize difficult airway problems as he recovers.

You will need two tracheal tubes, 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 him while the bronchoscope is in place, if his pulse rate falls, or if he becomes cyanosed. There is usually some leakage, so you will need a good flow of oxygen. Blow oxygen into him intermittently, watching his pulse rate meanwhile. A falling pulse is a sign of anoxia. Only proceed to remove the foreign body, if his pulse is satisfactory. Oxygen through the side tube will not by itself ventilate him adequately, if he is paralysed. The anaesthetist and the surgeon share the patient. The anaesthetist is in charge, and decides when he must give oxygen.

Caution! (1) His chest must expand during ventilation. If it does not, remove the bronchoscope, intubate him, and then try to bronchoscope him again.

Method. Lay him flat on his back, with his head raised on the flap of the table (if it will raise), or on a cushion. Ask a nurse to stand on his right, to hold his head with the palms of her hands over his ears, and to move his head from left to right as required.

Spray his larynx (see above), anaesthetize him, and intubate him. When he is intubated, ask the anaesthetist to show you his cords with the laryngoscope. Holding the bronchoscope as described above, put your left thumb on his upper incisor teeth, guide it forwards over the dorsum of his tongue, obliquely across his mouth from the right. His palate is a useful guide to the midline. Lift it so as to draw his lower pharynx forwards, as if you were passing a laryngoscope, taking care not to injure his teeth.

Slowly flex his neck into the 'sword-swallowing position' as you pass the bronchoscope (the position is the same as for oesophagoscopy in B, and C, Fig. 25-10). As the bronchoscope goes down, you will need more extension of his head, then flexion of his neck. You should see his uvula first, then his epiglottis, and then his larynx with its cords. Pass the bronchoscope through them (they will remain open under general anaesthesia). Turn it through 90[de] as you do this, so that its bevel is in the long axis of his glottis. When you are through his glottis, turn it back again. Aim it in the line of his trachea.

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

If his 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 his head to the right as you do so.

With luck you will see the foreign body, and perhaps the bronchi to particular lobes. If it is up a side bronchus (unusual) there is no way you can get it out. Try to bring it out on the end of the sucker. If this fails, grasp it with the forceps. If it will come up the bronchoscope, good. If it will not, gently 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 he moves, it will move with him, instead of injuring his respiratory tract. (2) Take care not to damage his teeth. (3) Remove it promptly if he struggles. (4) If you fail, and the anaesthetist says 'That's enough', obey him, he is master of the team!

If you want to identify his bronchi, on the right, look for his right upper lobe bronchus in the 2 or 3 o'clock position, his apical lower lobe bronchus at 6 o'clock, and his right middle lobe bronchus at 12 o'clock. Then look into the bronchi of his lateral, anterior, posterior, and medial basal lobes.

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

Difficulties with Bronchoscopy

If he is **suffocating and blue** from the procedure, wait and try again next day. 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 his cords, try again. If necessary, squirt a little saline down the bronchoscope with a syringe.

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.

If the **foreign body rolls up and down his trachea,** but you cannot get it past his 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.

25.13 Foreign Bodies in 'the Throat'

A patient with a foreign body in his pharynx, or oesophagus, usually knows what has happened and is usually right. It can stick in his tonsils, his vallecula, his pyriform fossa, or in his postcricoid region.

Most fish bones stick in accessible regions, usually the back of the tongue or tonsils. Foreign bodies seldom stick in the larynx itself, except when an affluent, elderly, and often

intoxicated diner gets a piece of steak caught in his larynx, as a result of which he gasps and collapses. Treat him immediately, as described below.

Foreign Bodies in 'the Throat'

Emergency treatment. If a patient is obviously choking, and you are present at the time, sit him up, grasp his tongue with gauze, pull it forward, and ask him resist retching. Hook it out with your finger.

If there is a piece of food in his larynx, try Heimlich's manoeuvre - immediately, like this: Stand behind him, put your fist under his xiphoid and give a short sharp upward push, at the same time that you compress his chest with your arms. This will rapidly compress his lungs, and may push out the food.

If he is asphyxiating, put your finger into his larynx, and try to hook the foreign body out. If you fail, insert a wide-bore needle (or a blade) through the cricothyroid membrane of his larynx (52.2) to create an airway (not to remove the foreign body!).

Early Presentation. This is the patient 'with something in his throat' who presents within 2 or 3 hours without severe dyspnoea. Take a careful history. Where and how severe is his pain? Feel his neck. Surgical emphysema? Take X-rays, especially a lateral view. Look for air in his tissues. If a large fish bone has stuck, you should see it, but you will not see a small one.

If there is no convincing evidence that it has lodged in his pharynx, and pain is mild, it probably only scratched him and passed on. Treat him expectantly. Persuade him to eat dry bread. A small sharp object may enter his oesophagus and pass on through him.

If you can see it, or there is air in his tissues, or if for any other reason you suspect it has lodged in his pharynx, examine his pharynx under general anaesthesia with tracheal intubation. Or, less satisfactorily, use intravenous ketamine and intermittent suxamethonium and oxygen (A 14.2). Have good suction available. Use a laryngoscope to carefully search his tonsils, his valleculae, and the back of his pharynx. Take the opportunity to have a look at his larynx, even though a foreign body here does cause different symptoms (25.12). Grasp it with Magill forceps.

Caution! (1) Relaxants are dangerous unless you can inflate his lungs (A 13.1). (2) Keep his head well down all the time.

If you don't find it, proceed to oesophagoscopy.

If there is a perforation of the wall of his pharynx, spreading aerobic and anaerobic infection may be dangerous. If there is a large wound, try to suck it out (difficult). If necessary, consider opening up the tissues of his neck (also difficult). Refer him, or get more experienced help if you can. Give him chloramphenicol and metronidazole.

If symptoms are severe enough to threaten his life, do an urgent tracheostomy (52.2). It may save his life until you can refer him. The smaller he is the more difficult this will be,

especially in an emergency. Try inserting a wide (1.8 mm) needle first to establish an airway. Follow this by laryngoscopy, and bronchoscopy, as soon as possible. Avoid passing the bronchoscope through the tracheostomy, which is difficult and dangerous. Only attempt it if the bronchoscope will not pass his cords.

If possible, refer him. Only attempt to remove a foreign body yourself, if his respiration is so distressed that referral is impossible.

Late Presentation (3 hours to several days later). If the foreign body has not caused a wound, his symptoms should have settled. If there is a wound, there will be signs of air in his tissues and/or infection, especially after 24 hours. Refer him if you can. Give him antibiotics and metronidazole. If you cannot refer him, proceed as above.

25.14 Oesophagoscopy

Passing an oesophagoscope, even more so than passing a bronchoscope, might be considered to be outside the range of Primary Surgery. It is however the easier of these two procedures. An oesophagoscope looks like a bronchoscope except that it has no side tube for oxygen, and no ventilation holes at its distal end, because the patient does not need to breathe through it.

Fortunately, most ingested foreign bodies pass through the gut, but if they stick, they have to be removed. 90% stick in its upper 5 cm, just below the cricopharyngeus muscle before the oesophagus enters the thorax. This is fortunate, because this is the easiest place from which to remove them. They are commonly coins, buttons, safety pins, or bones. The patient may have almost no symptoms, or he may be distressed, refuse food, drool saliva, choke, gag, or cough (typically in paroxysms). If he is a child he may merely 'fail to thrive'. If he is older, he may complain of pain, or the sensation of a foreign body behind his sternum. If it is large enough to compress his trachea, he may have stridor, or episodes of cyanosis and recurrent pneumonitis (unusual). If he is very young, or mentally incompetent, there may be no history that he has swallowed anything. Symptoms may have lasted hours or years. The diagnosis is usually obvious, but a foreign body which is missed, can cause persistent dysphagia and loss of weight, so that you may suspect a carcinoma.

A True Story. The examining surgeon at a nurse's training school (St Francis Hospital, Katete, in its early days): 'What instrument would you use for oesophagoscopy?' Enrolled nurse: 'A sigmoidoscope'. When it was explained that this was wrong, she repeated (correctly) that this was indeed the instrument that she had seen used at her rural hospital! Lesson. If necessary improvise.

Oesophagoscope, (a) infant, (b) child, (c) adult, with forceps and suckers that are long enough to go through them. One only of each. If you don't have an oesophagoscope, you may be able to use a bronchoscope to remove coins from the oesophagus, or bougie a carcinoma, before passing a Celestin tube. The more protruding beak of a bronchoscope is, however, more likely to perforate the oesophagus.

Bougies, oesophageal, neoprene, standard set, alternate sizes only, one set only. The old fashioned gum elastic ones are satisfactory.

The Secret Is to Flex His Neck and Extend His Head.

Oesophagoscopy

Indications. (1) The removal of foreign bodies. (2) To check the nature of a stricture, whether fibrous or malignant after a barium swallow, and to take a biopsy. (3) Bouginage for carcinoma of the oesophagus. (4) Bouginage for a stricture.

Anaesthesia. (1) General anaesthesia with a short-acting relaxant and tracheal intubation. (2) Ketamine is a poor second.

Position. Keep the patient's head on a pillow throughout. This will flex his neck. Then extend his head on his neck to bring him into the 'sniffing position' shown in A 13- 7. This position will allow you to pass the oesophagoscope into the deepest part of his thoracic kyphosis. The most common reason for failure is insufficient flexion of his neck, and extension of his head.

If you need to view the very lowest part of his oesophagus (unusual), straighten, or slightly extend, his neck, so that his pharynx and his oesophagus are in a straight line to let the oesophagoscope pass (the 'sword-swallowing position'). Otherwise, keep it flexed. If your table does not have a headpiece that drops down, ask an assistant to hold his head over the end of the table, to control its movement - this is not easy, and is dangerous!

Insertion. Aim the oesophagoscope vertically downwards at his uvula. Angle it so as to pass the base of his tongue (aim at the foot of the pedestal of the table). When his larynx comes into view, avoid the midline, and pass it laterally, through one or other pyriform fossa, to reach his oesophagus, which is again in the midline.

Going through his cricopharyngeus is the difficult part. It should look like the the anus: aim for the centre of the pit. If you have difficulty, pass a tube or bougie first, and use this to guide the oesophagoscope through.

Caution! (1) Never advance the oesophagoscope blind, or you may perforate his oesophagus. (2) Keep the lumen of his oesophagus in the centre of your field of view, as you slide the instrument down.

Oesophagoscopy for Removing a Foreign Body

The X-ray diagnosis may be straightforward, if the foreign body is opaque. In the oesophagus coins lie in the coronal plane, so that you see their full diameter in a PA film. In the respiratory tract they lie sagittally, so that you see them end-on. A barium swallow may be useful, but it makes oesophagoscopy soon afterwards more difficult; diatrizioate meglumine ('Gastrografin') is better.

Caution! (1) A normal X-ray does not exclude a radiolucent foreign body. (2) If he has swallowed a foreign body that may cause trouble, X-ray his whole abdomen and his pelvis also.

Method. First try laryngoscopy. You may be able to feel the foreign body with a probe, and remove it with a long clamp.

If laryngoscopy and simpler methods fail, pass the oesophagoscope, as above. As soon as you can see the foreign body clearly (usually a coin), pass the biopsy forceps and grasp it firmly. If it moves distally, withdraw the forceps, pass the oesophagoscope a little further, and try to grasp it again. When you have grasped it, bring it and the oesophagoscope out together.

Caution! (1) The great danger is perforating his oesophagus: (a) usually at the level of his cricopharyngeus, which keeps the entry closed, or (b) at a lower level where the foreign body impacts - beware of his aorta! (2) Safety pins, bones, and lumps of food, such as meat, should, if possible, be removed by an expert - they are particularly difficult, and dangerous. (3) Don't advance the oesophagoscope, if you cannot see the lumen of his oesophagus beyond it.

Difficulties with Oesophagoscopy for Removing a Foreign Body

If you **don't have an oesophagoscope,** you may be able to use a sigmoidoscope (as the nurse saw done in the story above). After you have identified his cricopharyngeus, use the obturator to negotiate it. If the foreign body is blunt, you may be able to pass a Foley catheter beyond it, inflate the balloon and pull it out with that (difficult).

If a **foreign body is too large to remove whole,** as with an impacted denture, you may be able to break it and remove the pieces.

If you **fail to remove a foreign body,** refer him, probably for its open removal through the side of his neck.

If, soon after he is back in the ward, he develops **pain** in his neck, behind his sternum, or in his back, with dyspnoea, suspect **perforation of his oesophagus.** Look for air in his neck, pleural cavity or mediastinum (the earliest sign is a translucent crescent overlying the aortic knuckle). Consider giving him some contrast medium ('Gastrografin' not barium) and taking another film. Refer him for an immediate pharyngotomy (if the tear is in his cervical oesophagus) or thoracotomy. Delay is likely to be fatal.

If the above symptoms are delayed, he has **fever** and his chest X-ray is normal, suspect **mediastinitis.** Antibiotic treatment is more likely to succeed. Do a temporary gastrostomy to rest the abrasion in his oesophagus.

If an **empyema** develops, evacuate all fluid and air, insert intercostal drains (65-2), give him nothing by mouth, and consider a feeding jejunostomy (9.7, a gastrostomy is less effective because feed can reflux into his oesophagus).

If he develops a **retropharyngeal abscess,** treat him as in Section 5.7.

If he develops a **stricture,** treat him as in Section 25.15.

Oesophagoscopy for Investigating a Stricture

Pass the instrument with care, using one of small diameter first. Suck out and advance the instrument under direct vision. If entry is easy, and vision is poor, with a small instrument, withdraw it, and try a larger one. Continue distally under direct vision, until you see the lesion, sucking out any fluid you find.

Oesophagoscopy for Carcinoma of the Oesophagus

Give him a general anaesthetic and a short-acting relaxant, intubate him, and control his ventilation. Pass the oesophagoscope, suck out the debris, then pass it further distally. Try to dilate him with graduated bougies. Take two biopsies for histology.

25.15 Corrosive Oesophagitis, and Oesophageal Strictures

Corrosive oesophagitis is not uncommon in some communities, as the result of a patient swallowing caustic soda (for making soap), sulphuric acid, or some other corrosive chemical. You will have to treat him in the acute stage, and if necessary in the other stages also. It is useful to be able to oesophagoscope him, but you may be able to manage without doing so. If you don't have the correct bougies, try to improvise them. For malignant strictures, see Section 32.24. *Bouginage is always dangerous!* Do it with *infinite care*, if you want to avoid perforating his oesophagus, and killing him.

Martinson FD, 'Corrosive oesophagitis in Nigeria', Tropical Doctor 1978;8:123-126.

Corrosive Oesophageal Strictures

The Acute Phase

After swallowing a corrosive substance, a patient has immediate retrosternal or abdominal pain, he drools, and he may vomit food or blood. He may also have stridor, or symptoms due to the poisonous nature of the substance he has ingested. You may see patches of burnt mucosa on his lips, mouth, or pharynx.

Find out what he took and when. Give him an analgesic. If you see him *within 6 hours*, when the corrosive agent is still present, lavage his stomach *urgently!* If there is delay, avoid lavage. Add the antidote to the lavaging fluid. For a corrosive acid, use magnesia, chalk, or washing soda. For an alkali, use vinegar, or the juice of 5 lemons.

If he is unconscious (unlikely in corrosive poisoning), intubate him first.

To lavage his stomach, lay him prone with his head over the end of the bed, remove any false teeth, and preferably insert mouth gags on each side of his mouth. Pass a safety pin through the wall (not the lumen) of a large rubber stomach tube (10 mm for an adult, 8 mm for a child under 2 years), to mark the distance it should pass (adult 50 cm from the tip, 25 cm in a child under 2 years). Pass tepid water into his stomach, never more than 500 ml at time in an adult, and 250 ml in a child. Send the first washouts for analysis. Continue washing out with 500 ml at at time, until you have used 5 litres.

Caution! Check the volume of fluid you have used. A marked discrepancy suggests that his stomach has perforated.

After you have lavaged his stomach, pass a small nasogastric tube (14 to 19 Ch). This will maintain a lumen, reduce adhesions, and let you to feed him.

Set up a drip, and give him an antibiotic. Don't oesophagoscope him now! In a few days, he will be able to swallow round the tube, as the latent stage is approached.

You may be able to persuade a child to swallow a piece of string coated whith honey, one end remaining outside, while the other goes into his stomach. This will maintain a lumen, however small, and may be a useful way of performing retrograde bouginage later.

If possible refer him, if not proceed as follows.

The Latent Stage

If he has no severe complications immediately, his pain and dysphagia improve, and he may think himself cured. However, during the next 6 weeks (or much longer), the granulation tissue in his oesophagus steadily contracts, and become densely fibrous.

You may be able to oesophagoscope him at 14 days. Don't try to inspect the whole length of his oesophagus with a rigid instrument.

If you cannot refer him, bougie him after 2 weeks and repeat this with care. How often you should bougie him, whether or not you should replace the nasogastric tube, and the time you should leave it in, will depend on how he progresses. Do a barium or 'Gastrografin' swallow, and X-ray his chest.

The Chronic Stage

If he has not been bougied in the latent stage, he will notice a reversal of the improvement he previously enjoyed. His dysphagia gets worse, but because he has no pain, he does not seek treatment, until he finds he cannot swallow fluids. He is hungry and thirsty, he loses weight, and may vomit due to the obstruction in his oesophagus or stomach. The overspill of his oesophageal contents, held up above the stricture, may cause pulmonary symptoms.

Continue to bougie him as often as is necessary, until you can pass a large bougie (preferably 40 Ch), at 4-monthly intervals, over the period of a year. Most patients will not bougie themselves, and permanent gastrostomies are not accepted, except by patients with malignant strictures, who hardly ever return for follow-up.

Difficulties with Corrosive Oesophageal Strictures

If you **cannot pass a bougie** through his mouth, and you cannot refer him, do a gastrostomy (11.8), and pass a fine Jackson or filiform bougie, with a strong silk thread attached to it, up through his oesophagus, and out through his mouth. Or, use the piece of

string he swallowed previously, to pull graded Gabriel[nd]Tucker bougies up his oesophagus to dilate the stricture. After reasonable dilatation, pull a nasogastric tube of appropriate size, as well as a fresh piece of string, up and out of his nose. Use the string for further retrograde bouginage later.

Insert a large de Pezzer or Foley catheter (28 or 30 Ch) through the gastrostomy to keep it open for the same purpose, until you can restart bouginage orally. After a few weeks the acid from his stomach will eat through the balloon, so you will have to replace it.

If all this fails, or if he has a long tight stricture, or multiple ones, he will have to be referred for a stomach, jejunum or colon bypass operation.

Remember, Bouginage Is Exquisitely Dangerous!

25.16 Other Problems in the Ear, Nose, and Throat

Here are some other ENT problems which you might meet; most of them are rare. Respiratory obstruction will cause you much anxiety. Dysphagia and hoarseness come second. Some laryngeal emergencies are part of a general illness.

Other Ent Problems

For carcinoma of the maxillary antrum, see Section 32.39.

The Ear

If a patient develops **slowly progressive deafness in one ear,** becomes unsteady on his 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 his CSF. Refer him.

The Nose and Paranasal Sinuses

If a patient has a **swelling on his nasal septum** it may be a **haematoma** or an **abscess.** The same incision is suitable for both. Move the tip of his nose from side to side; you will see that swelling is continuous with the columella on both sides, and is fluctuant. Soak a length of 1 cm ribbon gauze in 4% lignocaine, mixed with a few drops of adrenalin, and place it over the red mucosal part of his 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. Or try aspirating it.

The Larynx - Stridor

Here are some causes of stridor with the most important causes first. The later ones are all rare. Stridor is always worse on inspiration, unless otherwise stated. Remember also retropharyngeal (5.7) and peritonsillar abscesses (5.6).

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 cure him. Tracheostomy may occasionally be necessary, but avoid it if possible, especially in a young child. If there is a membrane in his throat, he is likely to have a streptococcal infection (common), or **diphtheria** (uncommon).

If a child, particularly, has **progressive dysphagia,** continual drooling from his 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. Give him chloramphenicol or ampicillin intravenously. Be prepared to intubate him, followed if necessary by tracheostomy. If he is not rapidly and correctly treated, his chances of death are considerable.

If a patient of any age has **slow progressive hoarseness,** leading to STRIDOR which is worse on expiration, suspect a papilloma of his larynx, or a carcinoma in older smokers (both not uncommon, 32.39). Tracheostomy and endoscopic removal may be necessary. Biopsy an adult's lesion, and look for malignant change. Recurrence is more common in children, and deaths have occurred.

If a patient of any age has **sudden stridor,** particularly on inspiration, **after ingesting food,** suspect a foreign body (not uncommon). Remove it (25.12).

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.** Give him antibiotics and oxygen. Feed him through a small nasogastric tube, and aspirate his pharynx periodically to remove blood and slough. Mortality is high.

If a baby has **stridor soon after birth,** worse on any exertion or crying, but he looks well and his 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 his parents that he will probably recover spontaneously between 3 and 5 years.

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. Give him parathyroid hormone and calcium between attacks, and his prognosis will be good.

If a child has had **stridor** and **dyspnoea on exertion since birth,** perhaps with hoarseness which is progressive with his growth, suspect a **laryngeal web** (rare). Symptoms depend on the degree of stenosis. Tracheostomy may be necessary. Expert surgery can give good results.

If a patient of any age has **sudden stridor,** worse on expiration, following food, medicine or a sting, suspect **angioneurotic oedema** (rare). Give him an antihistamine or intravenous hydrocortisone. Tracheostomy may be necessary. His prognosis with treatment is good.

If a patient of any age has **sudden severe stridor,** usually without much hoarseness (rare), suspect **laryngeal paralysis** due to infection, trauma, poliomyelitis, or nutritional deficiencies. Give him vitamin B complex. Occasionally, a permanent tracheostomy is necessary.

The Oesophagus

If, after a heavy meal, a patient, who is usually between 20 and 40, **vomits, and has an intense pain in his left** (rarely his right) **chest** radiating to his neck, suspect that he has **ruptured his oesophagus** during the act of vomiting. Feel and listen with a stethoscope for surgical emphysema (a fine crackling) in his neck or chest. He is intensely thirsty, but sips of water make the pain worse. If one lung is hyperresonant with no breath sounds, his pleura has perforated, and he has a hydropneumothorax. One differential diagnosis is a perforated peptic ulcer, but here the pain comes before the vomiting. When he ruptures his oesophagus the pain comes as he vomits. Other differential diagnoses include a spontaneous pneumothorax, acute pancreatitis, and coronary thrombosis. Take a chest X-ray; it may show a pneumothorax, perhaps with a fluid level; if so aspirate this. Confirm a rupture by asking him to swallow 10 or 20 ml of 'Gastrographin', avoid barium. This may show a leak. Many of these patients are mistakenly operated on for a perforated peptic ulcer.

Caution! (1) His upper abdomen is usually rigid. (2) Early, he has no clinical or X-ray signs in his chest; these come later when treatment may be too late.

Before you refer him, resuscitate him and pass a nasogastric tube (check radiologically that it is not in his mediastinum). Insert a chest drain with an underwater seal (65.2).

If you cannot refer him, a feeding gastrostomy (11.8) will keep him alive, and a wide bore intercostal tube will evacuate his pleura, and hopefully allow it to seal on to his oesophageal tear.

If you ever find a **distal tear** in the oesophagus, consider mobilizing the stomach, suturing it over the tear as a diamond-shaped patch, and then wrapping the stomach round the oesophagus and suturing them as in Fig. 25-12.