Primary Surgery

Volume One

Non-Trauma

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Chapter 26. Dental and oral surgery

26.1 Introduction

In this chapter we consider those parts of the expertise of the dentist, periodontologist, and oral surgeon that are within your scope. Dental abscesses are described elsewhere (5.8), and so is your role as a maxillofacial surgeon (62.1). Don't forget that a hospital can play a key role in dental health education - improved oral hygiene is one of the main ways to combat caries, and periodontal disease, and to keep the community's teeth in its mouth. When treatment is needed, dental auxiliaries are the main way of giving the community the care it needs at a cost it can afford.

Anaesthesia for operations round the mouth. As so often, much of what you can do will be limited by your anaesthetic skills, or those of your assistant. You can however do much with local infiltration, and with maxillary or pterygopalatine blocks (A 6.3 and 6.4). You can also do many procedures under ketamine (A 8.1), and although this is not usually recommended for work in the mouth, it is likely to be safer than an inexpert general anaesthetic, especially for babies and children under 2 years, as an alternative to intubation. If a patient as small as this is to be intubated, the tiny tracheal tube that he needs is easily blocked. When you use ketamine, you must share with the anaesthetist the critical task of clearing blood from his airwway whenever necessary, and have a swab on dissecting forceps, and a sucker, with a catheter at its tip, instantly ready (see also A 8.1).

Here is the basic equipment you will need:

- **Chair,** operating dental, one only. A dental chair is expensive. If you don't have one you may be able to adapt a strong chair, and fit it with a rest to support the patient's head, when it is pushed firmly backwards, especially when you extract upper teeth.

- **Dental Mirror,** serrated handle, with No. 4 size plane head, one only.

- **Dental Probe,** single-ended, as Ash No. 14, one only.

- **Dental Dressing Tweezers,** Guttman, as Ash No. 13, one only.

- **'Plastic Instrument'** Ash No. 6, one only. This is for inserting filling material into a cavity.

- **Spatula,** metal, for mixing filling material, one only.

- **Scaler,** dental, Cumine, as Ash No. 152, one only.

- **Dental Materials,** clove oil for dental use, 100 ml only. Zinc oxide powder, 1 kg only. When mixed together on a glass slab with the spatula listed above, these make an effective analgesic and a mildly antiseptic dressing for a dental cavity.

Halestrap DJ, 'Simple dental care for rural hospitals, (4th edn 1981). The Medical Missionary Association, 6 Cannonbury Place, London N1 2HJ.

26.2 Gum disease

The gums of healthy teeth are close up round their necks, and extend up between them. If gums are diseased by periodontitis, they recede down the necks of the teeth, which ultimately become loose and are lost. Besides causing sore, bleeding gums, periodontal disease causes more lost teeth in many communities even than caries.

Periodontal disease is the result of a vicious circle. Food particles and plaque accumulate between a tooth and its gum, and cause the gum to slowly recede. This makes the pocket larger, so that food accumulates even more easily. In more severe cases the diseased gums swell, bleed easily (gingivitis), and discharge pus (pyorrhoea), often with severe fetor.

The prevention, and most of the treatment, is improved oral hygiene - better tooth-brushing, and, when necessary, scaling to remove calculus (hardened plaque) that has accumulated in the crevices.

You will not find yourself scaling many teeth yourself, but there must be someone in your hospital who does this, and you should be able to teach him how to do it.

Preventive Dentistry

Cleaning Teeth

Explain to the patient that he should always start with his toothbrush (or toothstick) on his gums, and move it up over his lower teeth, and down over his upper ones, at least 10 times, during at least 2 minutes. This is not easy behind the lower front teeth, and needs much practice. After this, he should rinse out his mouth. If he does not have toothpaste, he can use common salt, or nothing - brushing is more important than paste.

Scaling Teeth

Indications. One of the causes of bleeding gums is plaque (tartar) round the teeth. Measure the depth of his gum pockets. If these are less than about 5 mm, scaling may be all he needs, but if they are deeper than this, refer him for gingivectomy. If this is impractical, consider extraction.

Use the spoon end of a scaler to remove deep calculus (hardened plaque, J, in this figure). This starts just below the gum. Removal may be difficult, because the calculus may stick so firmly to his teeth that scraping it off can cause mild pain and bleeding. Use the point

of the scaler to remove plaque from between his teeth. Ask him to rinse his mouth out thoroughly, and then show him how to clean his teeth.

Caution! The most important part of the treatment is to show him how to clean his teeth effectively.

26.3 Extracting Teeth

You should be able to extract a patient's teeth, either for severe toothache due to irritation of his dental pulp, or abscess formation, or less often, for periodontal disease. This makes teeth so loose that they almost fall out.

Try to remove his tooth with all its roots, and without damaging anything else in his mouth. The secret of success is to force the beaks of the forceps over the visible crown of his tooth, and under his gums, between the periodontal membrane and the alveolar bone, so as to grip its roots firmly. Then, while still grasping his tooth firmly, gently rock it or rotate it depending on the kind of tooth you are removing. This will break down the periodontal membrane, and widen its socket. The common idea of 'pulling teeth' is false - the important movement is the early one of pushing the beaks of the forceps into his jaw around the root of his tooth.

Each forceps has handles, a hinge and a pair of blades. Forceps for the upper jaw are straight, or slightly curved; those for the lower jaw have blades at right angles to their handles.

Ideally, forceps should avoid the crown, and fit the whole surface of the neck and root of a tooth. The blades must be sharp, so that they can easily slide between a tooth and its gum. If necessary, sharpen them on the outside of their tips.

If a tooth has one root, you can loosen it by twisting it. The teeth which have one root are: the upper incisors and canines, and the lower incisors, canines, and premolars. All other teeth have more than one root, so you cannot twist them. Instead, you have to rock them. You will need two forceps for upper molars - one for the right and another for the left. Upper molar forceps are curved, so as to avoid the lower lip. The buccal blade with a beak on it is designed to grip the two outer roots, and the palatal blade is designed to grip the one inner root. One pair of lower molar forceps is enough.

Forceps, dental, set of six with the following Ash numbers: (a) Upper anteriors (Nos. 1 or 2). (b) Upper right molars (Nos. 17 or 94). (c) Upper left molars (Nos. 18 or 95). (d) Upper premolars and roots (No.7). (e) Lower molars (Nos. 73 or 22). (f) Lower anteriors and roots (No. 74N). One only of each.

Alternatively, **Forceps,** dental, universal, set of two, upper universal (No. 36), and lower universal (No.74), one only of each. Dental forceps are expensive, so you may have to manage with these two universal forceps, but they are not so easy to use.

Elevators, dental, (a) upper jaw, straight inclined plane, Coupland, (b) and (c) set of two lower jaw, Cryer's, mesial and distal. One only of each. Coupland's elevator is a small

gouge on a metal handle. You will need it to remove roots; if you don't have one you may be able to use the narrow blades of anterior forceps.

Prop, dental, one only. You may find this useful to keep a patient's mouth open while you extract his teeth.

Extracting Teeth

Indications. A patient with: (1) A painful, severely carious tooth. (2) A periapical abscess. (3) A periodontal abscess. (4) Severe periodontal disease.

If he has severe periodontal disease and his teeth are firm, but have swollen gums round them, leave them until other remedies have failed - you may be able to save them. But if one or more of his teeth are loose in their sockets, and his gums are red and swollen, and bleed easily on light pressure, remove them.

Contraindications. Don't try to extract: (1) Buried or impacted teeth. Refer him. If you cannot refer him, see Section 26.4. (2) Displaced teeth. (3) Teeth which have no visible crown. (4) Teeth in very dense bone. Some of these will give you and most dentists much difficulty. (5) Teeth from a patient with a personal or family history of excessive bleeding, particularly bleeding after a previous tooth extraction - refer him. (6) A tooth with an apical abscess, from a patient with heart disease. Refer him; if impossible, proceed as below.

If a small hole in the tooth seems to be responsible for the pain, consider non-operative treatment, and refer him. Clean out the cavity. Use a mixing spatula on a glass surface to make a paste of zinc oxide powder, clove oil and cotton wool fibres. Dry the hole and pack it off with cotton wool to keep it dry. Pack the mixture into the cavity with a plastic hand instrument (D, 26-1), or some substitute for it.

Children's Teeth. If he is aged 6 to 12, be very careful when you remove a deciduous tooth, lest you remove or damage the permanent tooth under it.

Medical History. Don't forget this. If he has any form of heart disease, extract his teeth under antibiotic cover.

Which Tooth? If he has toothache, he usually knows which tooth is causing it. Occasionally, when the pain is referred, he is wrong even about which jaw it is in. So don't necessarily remove the tooth which he thinks is at fault. The offending tooth may: (1) Have a large hole in it. If you cannot immediately see any carious areas, use a dental mirror to look for them on the adjacent surfaces of his teeth. (2) Be broken, black, or brown. (3) Look grey under its enamel. (4) Be loose, and surrounded by severe periodontal disease. (4) Be tender on gentle tapping. Tap each tooth in turn with the handle of a dental mirror. The most sensitive one is likely to be the cause of his toothache.

X-rays. If a tooth is displaced or impacted, X-ray it.

Antibiotics. If he has an apical abscess (5.8), give him an antibiotic for 24 hours beforehand, and continue it for three days afterwards.

Anaesthesia. Use local anaesthesia (A 6.3). Make sure that a tooth is properly anaesthetized, by pushing a blunt probe into the gingival crevice on its buccal and lingual surfaces. If he feels pressure but not pain, anaesthesia is adequate. If he feels pain, inject more anaesthetic.

Position. Sit him down so that his head is level with your chest as you stand. Position yourself and him correctly. The stance of the operator in the figure is ideal.

If you are extracting a lower tooth, use right-angled forceps and press downwards. First, where to stand and how to position him:

If you are extracting a lower front tooth or a lower left molar or premolar, sit him upright in the chair, and low enough for his mouth to be level with your elbow. If he is too high stand on something. Grip his alveolus between the first and second fingers of your left hand, and put your thumb under his mandible.

If you are extracting a lower right premolar or molar tooth, stand behind him.

If you are left handed, stand behind him for extracting all lower left premolar and molar teeth. For all others, stand in front of him, but to the left of his legs.

Lower teeth. The beaks of lower molar forceps are both pointed to fit between the two flattened roots. Use small rotating movements combined with a sideways movement between his tongue and his cheek. Use constant downward pressure, and support his jaw in your other hand.

To extract a lower incisor tooth, stand in front of him, push the beaks of the forceps down round the root, and apply a gently backwards and forwards movement.

To extract a lower canine, which has a more rounded root, use gentle rotating movements (D, 26-5).

To extract lower left premolars, turn his head towards you and use gentle rotating movements.

To extract lower right premolars, move to his right, or even stand behind his right shoulder.

To extract a lower right molar, stand behind his right shoulder, and use a side-to-side rocking action (E, 26- 5).

If you have difficulty extracting his lower third molar, this may be because its roots are deformed, and need to be dissected out with bone chisels - see Section 26.4.

If you are extracting an upper tooth, tilt his head backwards. If your chair does not have a head rest, support his head against a wall, or ask your assistant to support it. Stand in front and to the right of the patient's legs. For all upper teeth, put the finger and thumb of your left hand on either side of his gums.

Caution! (1) Make sure that the long axis of the blades is in the long axis of the tooth. (2) Don't grasp his tooth and his gum together. (3) Carious teeth are brittle and will break, if you put too much sideways pressure on them - don't use the forceps as a 'nut cracker'. (4) Don't start extracting movements when you have only grasped the crown of his tooth. (5) When you rock a tooth, feel if it is responding to reasonable pressure; if it does not respond and seems very firmly fixed, refer him.

An upper incisor, or an upper canine has a single conical root, so rotate the tooth at the same time as you press it firmly in the direction of its tip. Finally, tilt it outwards.

An upper premolar has delicate roots (the first premolar often has two), so be as gentle as you can. So make small side to side and rotating movements while you push upwards with considerable force. When the tooth is loose, pull it downwards.

An upper molar has three roots, two on the buccal side, and a single large one on the inside next to the palate. The roots of the third molar are sometimes fused together. Choose the correct molar forceps (right or left), so that the pointed blade slips down outside the crown between the roots on the buccal side. Press upwards firmly until the beaks are beside the roots, while you make slight side-to-side rocking movements to loosen it (E, 26-5). Finally, increase these movements, and exert pressure in an outward direction, until you can draw the tooth out of its socket into his cheek.

Caution! Make sure you support his alveolus firmly between your finger and thumb, because you can easily break off part of it, especially when you extract a third molar, and break his maxillary tuberosity.

After any extraction, examine the tips of the roots you have removed. If they are not complete, see below.

Postoperatively After Tooth Extraction

Allow him to rinse out his mouth *once only*. Remove loose bits of bone and tissue. Push the lingual and labial sides of his empty socket together. Place a tight ball of gauze over his socket, and tell him to bite on this for 15 or 30 minutes - make sure it presses on to the socket. When you remove it 15 minutes later, bleeding should have stopped. If it has not, see below.

Ask him not to spit, or wash to out his mouth again for 24 hours - it may wash away the blood, which should be clotting in his empty socket. The following morning, he can start rinsing out his mouth with saline, using a small spoonful of salt to a cup of water. If his empty socket does not bleed after you have removed his tooth, use a dental probe to scratch around inside it until it does bleed. A socket which does not bleed is more likely to become infected (see below under 'dry socket'). Tell him not to meddle with the socket.

Caution! If you have extracted his tooth for an abscess, make sure he returns for antibiotic treatment if his swelling does not rapidly improve.

Difficulties During Tooth Extraction

If there is a constant **oozing** during the operation, swab, suck, and apply packs. If necessary, press a dry pack over the wound for 2 minutes timed by the clock.

If his tooth is **immovable,** and fails to yield when you apply reasonable force with forceps, or an elevator, it probably needs dissection. So stop and refer him: it may have curved roots or be ankylosed.

If the crown or a **root breaks** as you extract a tooth, examine it carefully to see how much you have left behind. What you should do depends on how much is left.

If it is only a root apex, less than 5 mm in its greatest dimension, removing it is going to need much dissection. Leave it. If he is healthy, the retained apex of a vital tooth is unlikely to cause trouble.

If the root is larger than 5 mm, try to extract the fragment of the broken root with a Coupland's inclined plane elevator. Wiggle the elevator between the root and its socket.

Caution! (1) Hold the elevator with your index finger near its tip in case it slips. (2) The roots of the upper premolar and molars are very close to the antrum, so that you can easily push a root into it.

If his **alveolus breaks** as you remove his tooth, examine the socket. Remove any bony fragment which has lost over half its periosteal attachment. Grip it with haemostatic forceps, and dissect off the soft tissues.

If you **displace a tooth into his antrum,** refer him. If you cannot refer him, see below.

If, while you are extracting an upper molar, you feel **supporting bone move with his tooth,** you have **fractured his maxillary tuberosity,** and are in danger of opening his antrum. If only a small piece of tuberosity has broken off, remove it. If a larger piece has broken, refer him. Removing the tooth and the detached fragment will open his antrum. He will need to have a mucoperiosteal flap made to cover the gap. Warn him that if he has the same teeth extracted on the other side, the same thing may happen again.

If, when you remove his upper molar, **you suspect you have made a fistula,** ask him to grip his nose and to try to blow air through it. This will raise the pressure in his antrum, make blood in his socket bubble, and deflect a wisp of gauze if you hold it over the socket. Refer him to have the fistula closed with a flap. If you cannot refer him, see below. Meanwhile, don't allow him to rinse out his mouth until the defect has been repaired, and don't put any instrument through the fistula - you may infect his antrum.

If extraction of a tooth has **caused a fistula,** you see him within 24 hours, and cannot refer him, close it immediately, by incising the periosteum, and advancing a buccal mucoperiosteal flap over the defect, and sew it in place. Postoperatively, give him an antibiotic and inhalations of tincture of benzoin.

If you see him after 24 hours, the edges of the wound will probably be infected, so that if you close it now, the suture line will probably break down. Allow the area to heal, excise the fistulous tract, and close the fistula with a buccal flap.

You can remove most teeth or roots from the antrum through the original defect enlarged if necessary. Failing this, the Caldwell-Luc approach will give you better access (25.7).

If you **lose a tooth** while you are extracting it, immediately bring his head forwards, and hope he will cough it out. X-ray the socket and his chest. If he has inhaled it, refer him to have it removed by bronchoscopy during the next few days, before a lung abscess develops. If you cannot refer him, you may have to bronchoscope him yourself (25.12).

If you **break his mandible** (62.7) or dislocate it (62.6), treat these injuries as described elsewhere.

If you **injure his tongue,** and the wound is small, it needs no treatment except mouth washes. If it is larger, pull it forwards and suture it.

If he has an **extra tooth,** it is usually conical, and may present almost anywhere on his jaw, and even in a nostril. Removing it may call for skill and ingenuity. If necessary use a dental elevator to clear away the soft tissues of his gum before you apply forceps.

Bleeding after Tooth Extraction

His socket may bleed too much or, more rarely, not enough. If it fails to bleed adequately, it is more likely to become infected (see below). Bleeding during the first few hours is likely to be reactionary haemorrhage. Later bleeding is the result of infection.

After any tooth extraction, squeeze his gums between your finger and thumb for a few minutes. Then allow him to rinse gently with clean water. If he continues to bleed, follow these steps in order. If one fails, try the next.

(1) Ask him to bite on a pad of damp cottonwool, or gauze, for 15 minutes.

(2) Ask him to bite on it for a further 30 minutes. Make sure the pad really does press on to the socket this time.

(3) Soak a small ball of cotton wool in the contents of a 1 mg ampoule of adrenalin. Press this into his bleeding socket for 30 minutes.

(4) Stitch his gums. Use a half-circle cutting needle in a needle-holder and 3/0 black waxed silk, or any suitable suture material, to hold a plug of haemostatic gauze over his bleeding socket. If you don't have haemostatic gauze, use cotton wool; but be sure to remove it in 48 hours.

Alternatively, bring the edges of his gum together. If they will not come together, chip away the bone from the crests of the socket until they do. This will put his gum under tension, and make it less likely to bleed. Send him home biting on the pack.

Caution! Don't be content with inadequate suturing, it will only cause more problems later.

Infection after Tooth Extraction

He may return some days after a tooth extraction complaining of:

(1) **Pain and Bleeding.** His empty socket is probably infected. Irrigate it, remove clot and food debris, pack it with haemostatic gauze, and suture it. Place a firm gauze pack on it and ask him to bite on this. Give him an antibiotic. Don't let him rinse out his mouth, which may restart the bleeding; instead, clean it with wet gauze. If you don't have any haemostatic gauze, suturing it without gauze is probably better than suturing it over ordinary gauze.

(2) An acutely **painful empty socket,** without any clot in it. He has a **dry socket.** This is a local osteitis of the condensed bone that lines it. The danger is that osteomyelitis may follow. If you cannot refer him, irrigate it with warm saline and remove any food and degenerating blood clot. Under local anaesthesia, scratch around inside it to make it bleed. Try to excise any sharp bone spurs. When it has bled, and a clot has formed, it will probably heal. A dry socket is very painful, so make sure you give him adequate analgesics.

(3) **Fever** and a very painful socket, a mandible which is exquisitely tender, and perhaps numbness of his lips (due to involvement of his mental nerve). He has acute **osteomyelitis.** Admit him and treat him as in Section 7.14a.

Broken Roots after Tooth Extraction

If a **root breaks off** as you remove a tooth, leave a small piece (less than a third of a root) in place. Remove a larger piece. You may be able to do this with the narrow blades of a pair of anterior forceps, or by passing Coupland's inclined plane elevator between the root and its socket. Try to push the elevator towards the bottom of the socket, while you press it firmly and rotate it a little each way. As you do so, hold it with your thumb near its tip, to prevent it doing any unnecessary damage (B). It should act like a wedge and move the root out of the socket. You can also use this elevator for loosening very firm teeth.

If you **fail to remove a root,** destroy its pulp by pushing a dental probe down it, cover it with a zinc oxide and oil of cloves dressing, and explain that you have left a root behind. Ask him to return in a few weeks time. Then try again; removing it this time may be easier.

Caution! Don't try to remove a fractured maxillary root by passing instruments up the socket. You may enter his antrum and cause a fistula. This is much more likely to occur with molars and premolars, than with incisors and canines.

Other Difficulties with Carious Teeth

If he presents with a **small granuloma** with a discharge and underlying thickening, on his lower face, jaw, or chin, or inside his mouth on the surfaces of his alveoli, it is probably a **dental sinus.** An abscess around an infected residual root has caused an abscess in the bone under it, which has tracked through his soft tissues, to discharge on his gums or on the surface of his face. X-rays show a carious tooth, or a residual root, opposite the sinus. Give him a general anaesthetic, or ketamine, and remove the root with a dental elevator and forceps. Curette away the granulation tissue on his face. The discharge will stop in 48 hours, and the granuloma will not recur. If X-rays show signs of osteomyelitis, give him an antibiotic.

26.4 Impacted Third Molars ('Wisdom Teeth')

A lower third molar sometimes fails to erupt because it faces forwards, or lies horizontally impacted against the second molar. A pocket or flap of gum (operculum) may overhang it, so that food is trapped and inflammation results. The patient, who is usually a young adult, but who may be an old one, complains of pain, which may be referred to his ear, and sometimes trismus. Secondary infection may follow.

Impacted Third Molars

Gently syringe the space between the crown of the patient's unerupted tooth, and the flap of gum over it, with warm saline. Then insert a pledget of cotton wool soaked in oil of cloves under the flap. Give him an antibiotic, and ask him to use hot saline mouth washes. His infection may settle down.

If his infection does not settle, and you cannot refer him, you may be able to incise the gum round the edge of the apex of his tooth, so that food no longer packs around it.

If a third molar is pressing on the gum flap, and making his condition worse, refer him to have it removed, when the acute infection has subsided. If necessary, control infection and trismus with mouth washes, syringing, and antibiotics. If this fails, refer him. If you cannot refer him, give him an inferior alveolar and lingual nerve block (A 6.3).

If his second molar is carious, remove it to leave space for his third.

If his second molar is normal, and his impacted third molar is at a nearly normal angle, use bone forceps or dental forceps to nibble away his jaw behind it.

If his third molar is completely horizontal, split it with a chisel, and then extract it in two parts, with any convenient forceps.

26.6 Cancrum Oris

Cancrum oris is now rarely seen in the industrial world, but in many developing countries it is not uncommon. It is a gangrenous process of the mouth, which starts suddenly, rapidly involves the adjacent tissues of the face, quickly becomes well demarcated, and then spreads no further. It most often affects one or both sides of the jaw, and occasionally the

front of the face (mouth, lips, nose, and chin). Fusiformis and Borrelia are largely responsible, but it is not contagious. It resembles Fournier's gangrene of the scrotum (23.30), and may be associated with simultaneous extraoral gangrenous lesions of the limbs, perineum, neck, chest, scalp, or ear, etc.

Although cancrum oris can occur at any age, you will see it most commonly in a malnourished child between 1 and 5, whose general health has been further weakened by some infectious disease, usually measles, but also malaria, gastroenteritis, typhoid, whooping cough, tuberculosis or leukaemia, etc. Sometimes, there is no antecedent infection.

The lesion starts inside a child's mouth, in association with acute ulcerative gingivitis, and then spreads to his lips and cheeks. The earliest stage, which is seldom seen, is a painful red or purplish-red spot, or indurated papule, on his alveolar margin, most often in his premolar or molar region. This lesion rapidly forms an ulcer, which exposes his underlying alveolar bone. If you see him at this stage, he has a sore mouth, a swollen, tender, painful lip or cheek, profuse salivation, and an extremely foul smell, with purulent discharge from his mouth or nose. Within the next 2 or 3 days, a bluish-black area of discoloration appears externally on his lips, or cheek. The gangrenous area is cone-shaped, so that much more tissue is destroyed inside his mouth, than his external wound might indicate. After separation of the slough, his exposed bone and teeth rapidly sequestrate.

Quite extensive superficial lesions can heal suprisingly well. But destruction of his deeper tissues, teeth and skeleton can produce such appalling disfigurement that you have to refer him for expert plastic surgery - if he is lucky. This may include: the correction of gross mutilation, 'dental anarchy', trismus (particularly difficult) and a salivary leak. You can however treat him during the acute stage, as described below. Untreated cancrum oris is almost always quickly fatal, due to the associated illness (measles, typhoid, diarrhoea etc.) or a complication, such as septicaemia or aspiration pneumonia. Secondary haemorrhage is most unusual. and cavernous sinus thrombosis (5.5) has never been reported.

Tempest MN, 'Cancrum oris'. British Journal of Surgery, 1966;53:11, 949-69.
Tempest MN, 'Cancrum Oris'. Tropical Doctor 1971;4:164-169

The Acute Stage of Cancrum Oris

Start emergency treatment immediately, and aim to build up the child's general resistance. If possible admit him. There is no need to isolate him. If admission is impractical, outpatient treatment is possible.

Feeding and electrolytes. You can usually correct his protein energy malnutrition, by feeding him by mouth. If his mouth is too sore, feed him through a nasogastric tube.

Correct his anaemia; give him folic acid, iron, ascorbic acid, and the vitamin B complex, particularly nicotinic acid.

Antibiotics. Give him penicillin in large doses and metronidazole.

Care for the lesion by repeatedly irrigating it with saline. Chewing raw pineapple, or slices of orange, will help to clean his mouth. Pack cavities with gauze pads soaked in hypochlorite ('Eusol'), saline, or BIPP. Change these dressings often, and keep them moist by adding more solution to the outer layers. Avoid vaseline gauze (which acts like a foreign body), especially when it has been impregnated with antibiotics.

If he is fit enough for surgery, cut away any separating sloughs, and remove any loose teeth or sequestra. When quite large sequestra are ready to separate, you may be able to remove them under ketamine.

If he is too ill for surgery, allow the dead tissues to separate spontaneously. Sequestra occasionally drop out. More often, they have to be removed after 3 or 4 weeks, when his condition has improved enough for surgery to be safe.

Caution! There is no place for radical surgery at this stage, except to control bleeding (rare).

Refer him for repair at 3 to 6 months, before marked trismus develops. This will allow his scars to mature, his local tissues to become soft and pliable, and his health to improve. Meanwile, do your best for his nutrition, and for his oral hygiene.

26.7 Jaw Swellings

Lesions which make the jaws swell are comparatively more common in the developing world than they are elsewhere. Apart from trauma (62.1), the jaws can swell as the result of conditions which include: (1) Infection: an alveolar abscess (5.8), a dental sinus which is sometimes misdiagnosed as an early jaw tumour (26-8), and osteomyelitis (7.14a). (2) Any of the cysts described below. (3) Tumours: Burkitt's lymphoma (32.3), ameloblastoma (see below), carcinoma, salivary tumours (32.23), and giant cell tumours (D, 26-12, A, 32-1). (4) A complex group of fibro-osseous lesions which will not be discussed further here.

In managing tumours, and particularly cysts of the jaw, be aware of the possibility of: (1) A giant cell tumour which is only locally invasive, but may grow very large if it is not treated. (2) An ameloblastoma (adamantinoma). This arises inside the jaw from the enamel organ of a tooth, and slowly destroys the surrounding bone. It may be solid or cystic, it is locally invasive like a basal cell carcinoma, and does not metastasize. You are unlikely to miss an ameloblastoma if you remember that: (a) The radiolucent lesions it produces are commonly multilocular (the cysts below are mostly unilocular). (b) The solid tissue from around any 'cyst' should be sent for histology, which is the only certain way of making the diagnosis (the cysts below are filled with liquid). If you think that a patient might have an ameloblastoma, refer him for its radical removal.

The following cysts originate from the teeth, and present as smooth, slowly enlarging, painless swellings, usually on the buccal surface of the lower jaw, or on either surface of the upper one. They may be hard, tense, or fluctuant. If the bone over a cyst is thin it may crackle like an eggshell when you press it. Tenderness and pain are signs that a cyst has become infected. These cysts are benign, they can be treated without too much difficulty, and with the exception of an odontogenic keratocyst, they seldom recur.

A dental cyst forms round the apex of a chronically infected, and usually non-vital, tooth, commonly in an older patient. Chronic infection causes the epithelial remnants in the periodontal membrane to grow, and become cystic. Dental cysts are usually quite small, and are commonly symptomless. Occasionally, they grow large enough to expand the alveolus in which they arise. In the maxilla they may encroach on the antra, or the nasal fossae. The fluid they contain is usually clear, but may contain cholesterol crystals. X-rays show a clearly defined, well corticated, unilocular radiolucency, unless the cyst is infected, which causes it to lose its cortex.

A dentigerous cyst usually arises in a young adult from the follicle of a normal unerupted, or erupting, permanent tooth. It expands the outer table of his jaw while the stronger inner one prevents a pathological fracture. The tooth which forms the cyst usually fails to erupt, and you can see that it is missing from its normal place in his mouth. X-rays show a well corticated unilocular radiolucency containing the unerupted tooth. If this tooth is normally placed, opening the cyst may allow it to erupt. Often, it is so misplaced that it cannot erupt, and you will have to enucleate it.

An odontogenic keratocyst (rare) is filled with keratinized epithelial squames. These make the contents creamy, so that it looks like pus, and can only be distinguished from pus microscopically. Don't confuse this cyst with an abscess; there are no signs of infection. X-rays show a well corticated uni- or multi-loculated radiolucency. These cysts are particularly likely to recur after they have been removed (20-60%), so refer him.

Developmental cysts (rare) are not associated with teeth. The commonest one is a nasopalatine cyst, which develops from epithelial remnants in the incisive (nasopalatine) canal, immediately behind the upper front teeth. If it is causing problems it should be enucleated. If this is impractical you may have to marsupialize it, taking care not to injure his incisor teeth and the vessels to them.

Although dental cysts are more common, they are usually small and symptomless, so that dentigerous cysts are more likely to present to you for treatment. There are several ways of treating cysts, and each type of cyst has its preferred method: (1) You can marsupialize a cyst, by removing the mucosa over it, together with the immediately underlying bony wall and lining, washing it out, and then suturing the lining of its floor to the surrounding mucoperiosteum. This relieves tension, stops further expansion, allows drainage, and lets the space the cyst occupied slowly fill up from the bottom. (2) You can pack a cyst open. (3) You can decompress a dentigerous cyst, by opening it, and allowing the tooth in it to erupt. (4) An expert can enucleate a cyst by reflecting a periosteal flap, opening it, removing all its lining, and then replacing the flap. This is more difficult than the preceding methods, and is not described here. (5) An expert can can also excise a piece of jaw with the lesion. This is the treatment of choice for an ameloblastoma, a giant cell tumour, an odontogenic keratocyst, an ossifying fibroma, a carcinoma, and also for fibrosarcoma. Although resected jaw can be replaced with bone or metal, this is not absolutely necessary, because life without a mandible is still worth living, because a patient's tongue is strong enough to crush his food against his palate.

Swellings of the Jaws Particularly Cysts

Examination. Stand exactly in front of the patient and inspect his face carefully for asymmetry, especially of his mouth, nostril, and the level of his inner canthi. Feel the mass carefully. Most dental cysts which arise from an apical infection are small ([lt]1 cm), most dentigerous cysts are quite large (3-8 cm). Examine and count his teeth.

If a tooth is missing (and has not fallen out), it may be hidden in a dentigerous cyst.

If one tooth in a line of permanent teeth is much smaller than the others, it might be a persistent milk tooth, with the missing permanent one hidden in a dentigerous cyst.

Aspirate and examine the fluid from the swelling with a wide-bore needle. If you withdraw clear yellow fluid it is a cyst. If you withdraw a substance that looks like pus, it is either true pus from an infection, or a mixture of keratinous squames from an odontogenic keratocyst. Microscopy will tell you which of these it is. Look for dental sinuses (26-8) on his gums or face.

X-RAYS. Take films in two planes. Compare the density of the sinus shadows on either side. A cyst is an area of radiolucency surrounded by a radio-opaque line. If there is a tooth in the cyst it is dentigerous, otherwise it is probably dental.

Caution! (1) Be careful to distinguish a cyst in the maxilla from a normal part of his antrum - this can be difficult. (2) The signs that indicate that the lesion is not a simple dental cyst, but a more aggressive lesion are: (a) A multilocular ('honeycomb') radiolucency, indicating an ameloblastoma, an odontogenic keratocyst, or a giant cell tumour. (b) A loss of cortex, indicating an aggressive lesion, particularly a carcinoma. If a benign cyst is infected, it may also lose its cortex.

Management depends on the type of cyst.

If a dental cyst is small and symptomless, leave it.

If it is small but is causing symptoms, remove the tooth and curette the cyst.

If a dental cyst is large, and especially if it is in his upper jaw (unusual), refer him if you can. The danger is that you may create a fistula between his mouth and his nose or his antrum. He may need to have the fistula closed surgically.

If he has a dentigerous cyst which is smaller than about the end of your thumb, you may be able to operate on it, especially if it is in his lower jaw.

Marsupializing a cyst indications. (1) An easier alternative to enucleation for a larger dental cyst. (2) A dentigerous cyst. (3) An elderly patient, in whom there is a risk of pathological fracture.

Anaesthesia. Use a combination of local infiltration and pterygopalatine (A 6.4), and mandibular blocks (A 6.3). Thoroughly clean his mouth first.

Incision. You can approach all cysts from inside his mouth, unless his jaw is to be resected (not described here).

Approach the cyst from the side of the jaw on which the swelling is greatest. If it is equal both sides, approach it from the buccal side. Reflect a large mucoperiosteal flap. Remove bone over the same site. Remove the superficial part of the lining, so as to expose the cavity widely, and render the deeper part of its lining continuous with his oral mucosa. Wash out the cyst, and examine its lining for signs of neoplastic changes. If there is more than a little tissue in it, suspect that it might be an ameloblastoma. Send any material you remove for histology.

If you are marsupializing a dentigerous cyst, be sure to remove all the epithelium, or it may grow again. To do this, remove all the soft tissues on the outside of the bony cyst wall. Remove the tooth at the same time. Leave it open to granulate.

If a dental cyst is related to a permanent tooth, it is likely to be non-vital. It might be saved by root canal treatment, but you will probably have to remove it. If it is related to a deciduous tooth (unusual), remove the tooth.

If the bone is much expanded and the bony wall of the cyst is thin, consider compressing it to reduce its size.

Pack the cavity, and remove the pack at 48 hours or earlier. Continue with thorough mouth washes until it has healed. Ask him to wash out his mouth after meals.

Caution! (1) Be sure to make a wide opening. If it is too small, it will close, and the cyst will recur. Ideally, it may need an acrylic obturator to stop it closing over; failing this pack it.

Packing Open a Cyst

Indications. An infected or 'messy' cyst, with a lining which you cannot completely remove, or a flap which has to be sacrificed.

Method. Remove the tooth associated with a dental cyst, unless it can be root-treated. Open the cyst, remove as much of its lining as you can, and then pack it with BIPP impregnated gauze, or plain gauze. Reduce the bulk of this over several weeks, to allow the cavity to granulate slowly from its base.

The Decompression of a Cyst

Indications. A dentigerous cyst which is small enough for this to be practical (unusual).

Method. Remove the surface of the cyst and allow the tooth to erupt.

Enucleating a Cyst

If possible, refer the patient. General anaesthesia with tracheal intubation is essential. Approach a cyst in his upper jaw through the labial aspect of his alveolus. Approach a cyst in his lower jaw through an incision 1 cm below the lower border of his mandible, or inside his mouth, through the labial side of his alveolus. Infiltrate the tissues with adrenalin in saline (3.1). Clear the bony covering of the cyst, fracture its eggshell surface, and remove a piece of bone from its most prominent part. Nibble away more bone, and push the cyst off the bony wall of the cavity in which it lies. If it is a dentigerous cyst, its lining will be held round the tooth it contains.

26.8 Cleft Lip and Palate

If milk comes from a baby's nose as he sucks, suspect that he has a cleft palate. You will not be able to repair either a cleft lip or a cleft palate, but you should know how to manage a child who has one, and when to refer him.

Cleft lips are not too difficult to repair well. They may be: (1) incomplete, (2) complete, (3) premaxillary, (4) complete with a cleft palate. (1) and (2) cause no problem with breast feeding, and (3) seldom does, but (4) makes breast-feeding very difficult. If a baby cannot suck, get him on to breast milk with a cup and spoon. Refer him for repair when he is 5 kg.

Cleft palates are much more difficult to repair. This should be done at 12 to 18 months, before he tries to speak, and when he should be fit enough for a major operation, if he has been adequately fed. Breast-feeding is a major problem, except for minor clefts of the soft palate only, which need no treatment. Try a cup and spoon. If this fails, he will have to be fed through a nasogastric tube, until he is stronger, when cup and spoon feeding may be possible. Some contributors are against all feeding bottles at any time anywhere!

A special plate, supported by two wire arms on his cheek, can be constructed in the first few days of life, to bridge the gap in his cleft palate.

26.9 Other Dental and Oral Problems

The range of possible oral pathology is large, so that we can only describe a few of the conditions you might might see. Some of the more important ones are tumours. Cysts of the jaw have been described in a previous section. An epulis is a mass arising from the gum. If you take a biopsy, be sure to take samples from different parts of the lesion.

Other Dental and Oral Problems

Ulcers of the Mouth

If a patient has a recent, shallow, painful **ulcer** in his mouth, it is likely to be an **apthous ulcer,** or a recurrent **herpetic ulcer** (both very common). The distinction between them is not important, since there is little you can do about either of them, and they will resolve spontaneously. Advise mouth washes, and try folic acid 5 mg weekly, both as

prevention and treatment. These ulcers are more common in people taking proguanil ('Paludrine')

If he has a **ragged ulcer** of his gums, cheek or the floor of his mouth, suspect that he has a **carcinoma** (uncommon), especially if it has a raised edge. Send tissue for histology and refer him for deep radiotherapy, or radical surgery. See also Section 32.22.

Lumps Arising from the Alveolus

Consider also carcinoma of the mouth (32.22).

If he has a **firm lump on his gum,** it is probably a **fibrous epulis** (common). Some of these lesions are fast-growing, and if a lump is soft, bluish, and grows rapidly it may be a sarcoma (very unusual). Excise it, or treat it by diathermy (if small, unusual), and send tissue for histology. If it is very extensive, try to refer him to an expert periodontologist (if you can find one!) or a maxillofacial surgeon. It may be one of a wide range of obscure, rare, fibro-osseous lesions.

If a patient has a **soft swelling on his** (or her) **gum,** between two teeth, or on the palate, and associated with chronic infection, it is probably a **pyogenic granuloma** (granulomatous epulis, 34.2, common) and is particularly likely to occur during pregnancy (pregnancy epulis), when it is often very vascular, and may simulate a malignancy. Pyogenic granulomas are common inside the mouth, and can also occur on the tongue. If a patient is pregnant, leave the lesion and don't try to excise it. Otherwise, excise it, and provided the infection is eradicated, it will not return. Send any material you obtain for histology. Make sure there is no underlying osteomyelitis (7.14a); if there is, treat it.

If a **child in the 'burkitt zone'** has a **loose tooth,** with a swollen jaw, or **swellings of his jaw,** suspect that he has **Burkitt's lymphoma** (32.3). Typically, his teeth are displaced.

Lumps Arising Elsewhere in the Mouth

If he has a **pedunculated swelling** on his cheek (or tongue), it is probably a **fibroepithelial polyp** or a fibroma. This is commonly associated with irritative trauma, particularly that from an ill-fitting denture. Excise it and it will not recur, provided the trauma is removed.

If he has a **papilloma** (wart) inside his mouth, it may be viral (verruca vulgaris), and he may have similar lesions on his hands. If necessary, excise his oral lesion.

If he has an **expanding tumour of his mandible,** with an X-ray showing large loculi and a honeycomb appearance, suspect that he has an **ameloblastoma** (rare). See Section 26.7.

Cysts of the Mouth

If he has a bluish, translucent, **raised vesicle** several millimetres to a centimetre or more in diameter, it is probably a **mucous retention cyst** (C, 26-13, common). These cysts may arise from the mucous glands anywhere inside his mouth, including his tongue, but are

most common inside his lower lips. They may arise in a few days, persist for months, periodically discharge their contents, and then recur. Try to excise the lesion; if you merely incise it, it is likely to recur.

If a **child** has a circumscribed, fluctuant, often **bluish swelling** of his alveolar ridge, over the site of an erupting tooth (common), it is probably an eruption cyst. This is usually symptomless, and bursts spontaneously to allow the tooth under it to erupt. If it does not, give him ketamine, grasp it with toothed forceps, and excise it. A little dark blood will escape, and the underlying tooth will erupt during the next few months.

If he has a slowly enlarging painless **mass** on one side of the **floor of his mouth,** with normal mucosa over it, it is probably a **ranula** uncommon. This is a particular form of retention cyst, arising from the inferior aspect of the tongue, and caused by blockage of the submandibular duct. If you remove it entirely by careful dissection, it will not recur. If this is difficult, deroof it; it will probably not recur.

It may also be a **sublingual dermoid cyst,** which is a developmental cyst in the line of fusion of the first branchial arches. The epithelium lining it is thicker than that of a ranula. Although it arises in the midline, it usually displaces the tongue to one side. Dissect it out cleanly, and take care not to injure his submandibular duct.

If he has a midline swelling in the roof of his mouth, it is probably a **nasopalatine cyst** rare, which may have become secondarily infected. More likely, it is a pleomorphic adenoma (mixed salivary tumour) in an ectopic site.