Current Practice

PRACTICAL PROBLEMS

Emergency Dentistry for the General Practitioner—II. Treatment of the Primary Conditions Causing Pain

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(Last week's article described the dental diseases which cause pain. This week the treatment of these conditions is discussed.)

Pulpitis

A patient with transient pain, provoked only by a stimulus, is best served by an early appointment with a dental surgeon. If in special circumstances a medical practitioner finds himself responsible because there is no local dental help, and the cause of the pain is a carious cavity, then the cavity can be partially cleaned and sealed with a temporary dressing.

The difficulty, for one unused to it, lies in examining the teeth with mirror and probe to find the offending cavity. With an enamel chisel the opening into the cavity can be enlarged, and the soft caries scooped out with a spoon excavator (Fig. 2 and also Fig. 1 in the previous article). The resulting cavity should be larger than the opening in the enamel. Zinc-oxide powder is spatulated into a small drop of eugenol on a glass slab or glazed tile, and mixed until a stiff putty-like paste is formed. The usual error is to incorporate too little powder into the eugenol. The zinc-oxide-eugenol mix is packed into the cavity with a "plastic" (Fig. 3).

Should a patient present with the pain of irreversible pulpitis a simple analgesic should be prescribed and an urgent appointment made with the dental surgeon. Again, if special circumstances necessitate further treatment, a dressing can be inserted in the tooth or the tooth can be extracted. With pain of this degree, if the cause of the pulpitis is caries the cavity is usually more easily seen.

The opening is enlarged with an enamel chisel, and a considerable amount of the caries is removed with a spoon excavator. The excavation should be done piecemeal and without pressure towards the pulp, as there is likely to be a large breach of the dentinal wall of the pulp cavity under the caries (an "exposure"), and pressure on the pulp will cause further pain. A mix of carbolized resin and zinc oxide applied to the cavity will often give the patient comfort for some days—but not always. The carbolized resin mix, which is sticky, can be tamped into place with damp cotton-wool held in dressing forceps once it has been inserted into the cavity with a plastic. The glass slab and instruments can be cleaned with ether, which dissolves the resin. This procedure is not suitable if further treatment will be delayed more than a few days: under these circumstances extraction is preferable.

Frequently patients in pain will say they have lost a filling. This is often not so: the enamel over a large cavity suddenly collapses under masticatory stress, and the hole becomes apparent to the patient. Fragments of hard enamel are felt in the patient's mouth, and he jumps to the conclusion that a filling has been lost. With collapse of the enamel a piston-like force is applied to the underlying caries and exposed pulp, and an

acute pulpitis results. Alternatively, a cavity may start in an unfilled surface of a tooth and undermine a filling in another surface. When the overlying enamel collapses the filling comes away as well. In such patients the cavity is obviously carious, the pain is of the irreversible pulpitis type, and the tooth may be dealt with as above.

If a filling really has come out without further gross caries being present the tooth should be dressed with zinc oxide and eugenol. Carbolized resin must not be used if the tooth is to be saved. While it will relieve pain, it does so at the expense of further damage to the pulp. If in doubt use zinc oxide and eugenol.

Apical Abscess

Once a periapical infection is established a decision has to be made between root-canal treatment and extraction. This is

FIG. 2.—Diagrams illustrating the use of a spoon excavator to remove the caries from a carious cavity.

FIG. 3.—Diagrams illustrating the insertion of a zinc oxide and eugenol dressing into a cavity.

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beyond the scope of the present paper. One must also decide whether extraction of the tooth with drainage of any soft-tissue abscess will suffice, or whether antibiotics should be administered as well. Should the decision be to extract the tooth, a choice must be made between local and general anaesthesia. But, in the present context, a further decision has to be made between the simple administration of an analgesic or the institution of some other form of treatment, depending on the circumstances.

Provided there is no soft-tissue swelling, or at most some collateral oedema, simple extraction of the tooth is sufficient. Again, if a soft-tissue abscess is present, extraction of the tooth and incision of the abscess is all that is necessary. Should there be either an indurated soft-tissue swelling without pus formation or grossly enlarged lymph nodes, then an antibiotic should be given in addition to extraction of the tooth.

For almost all oral infections the first choice of antibiotic is still intramuscular penicillin, which is effective in the majority of cases. A frequent second choice is tetracycline, but this is best avoided in young children and pregnant women, because tetracyclines form a lake with calcium salts and are deposited in bones and teeth. In the teeth they produce unsightly brown staining, which can be recognized by the characteristic fluorescence in ultra-violet light.

When skilled dental treatment is readily available cases which can be treated by extraction or by the incision of a sulcus abscess should, as an emergency measure, be given analgesics only, because antibiotics will not normally be required, and if a course is started it might not be continued. Where there is an indurated swelling and no pus, however, there is a risk of the infection spreading in the soft tissues, and an antibiotic should be administered.

Where the doctor has to assume full responsibility for the case he must decide whether to try to abort the infection with the aid of antibiotics alone, or whether to attempt the complete treatment of the condition. Treatment of an apical abscess purely with an antibiotic is not without risk, principally because, once pus has formed, the infection is difficult to abort without drainage, and for a while *the pus is confined within the bone*. Until the pus has penetrated the cortical bone and pointed in the soft tissues the only way of draining a periapical abscess (except via the root canal) is by extraction of the tooth. Further, even if antibiotic treatment successfully aborts the acute infection, it will be several days before the patient is relieved of pain, and a chronically infected tooth which will require extraction later is left *in situ*. Nevertheless, under certain circumstances treatment with antibiotics alone is justifiable.

Once a soft-tissue abscess is present, particularly if it points in the buccal sulcus, more effective treatment can be provided without recourse to the extraction of the tooth. In an emergency the abscess can be opened, using topical ethyl chloride as the anaesthetic.

A jet of ethyl chloride is directed on to the swelling from a distance of about 18 in. (45 cm.). Soon after the surface moisture has become frosted by the cooling effect of the spray the top of the swelling is slit open with a scalpel, taking care to direct the edge towards the jaw rather than the depths of the sulcus, because, though the abscess cavity should be opened boldly, deeper structures should not be incised. If drainage can be provided in this way the acute episode will subside, particularly if an antibiotic is given as well.

Extraction of Teeth

The skilful extraction of teeth is not a simple business, even though by a fortunate chance those of *Homo sapiens* are attached to the jaws in such a way that many can be avulsed with forceps. Nevertheless, some simple instructions can be given to enable readers to perform this service with some degree of success:

First, one must choose between local and general anaesthesia. Provided there is no visible or palpable swelling in the sulcus and

no gross soft tissue swelling, a local anaesthetic can be used, but if the inflammatory process involves the soft tissues a general anaesthetic should be employed.

Unless a proper dental chair is available extraction is best carried out with the patient lying flat on a table, a firm examination couch (Figs. 4 and 5), a stretcher, or even the floor. An assistant should be available to hold the head steady, for only when the head and body are firmly supported can the tooth be manipulated precisely. An ordinary chair—even an armchair with a back long enough to

FIG. 4.—To show how the extraction of teeth on the lower right may be performed with the patient on an examination couch. The operator stands at the head of the couch, and an assistant stands by the side of the patient in order to steady the head. Notice how the jaw is held for extractions in this quadrant.

support the head—will not provide the required resistance to the extraction movements. For extraction under local anaesthesia the patient lies on his back; for extraction under general anaesthesia he should lie on his side with, if possible, the side of the jaw containing the offending tooth uppermost. In this position it is possible to operate on the tooth without restraint, yet any blood or saliva will gravitate into the opposite cheek rather than into the throat. An efficient sucker is an important piece of equipment for tooth extraction with general anaesthesia, even under emergency conditions.

Local anaesthesia for extraction of any tooth other than the lower molars can be produced by two injections—one outside the alveolar process and one inside. While ordinary glass-barrelled syringes can be used for these injections, the dental cartridge syringe (Fig. 6) has a number of advantages. For example, the needle hubs screw on and are not liable to be forced off by the injection pressure; the syringe is long enough for the hand to stay well outside the mouth so as not to obscure the operator's vision; and the small quantities of solution which the oral tissues will tolerate can be given with precision. A cartridge syringe, a 42 mm. 27-gauge disposable needle, and cartridges of local anaesthetic solution are required. Prilocaine 3% with adrenaline 1 part in 300,000, or lignocaine 2% with adrenaline 1 part in 80,000 are suitable solutions. The choice of a long needle might seem odd if deep injections are not to be given; but, because the shorter pre-sterilized disposable needles are thinner and more flexible, being only 30-gauge, they are less easy to manage for those unused to dental injections. The syringe is sterilized, a needle is screwed on to the end, a cartridge of local anaesthetic solution is inserted, and a small quantity of solution is ejected to clear air out of the needle and test its patency, and to ensure that the plunger is working smoothly.

To give a buccal or labial injection, the lip or cheek is lifted away from the alveolar process until the sulcus tissues are taut, then the needle is inserted through the sulcus tissues and directed towards the outer surface of the bone at about 45° to the alveolar process. The bevel should face the bone, and only about $\frac{1}{4}$ in. (9.6 mm.) of needle need be inserted; 1 ml. of solution is now deposited over the surface of the jaw.

To give a palatal injection, the needle is advanced at right angles to the surface of the palate from the opposite side of the mouth. With the bevel facing the bone, the needle is inserted at the mid-point between the mid-line of the palate and the gingival margin.

FIG. 5.—To show how the extraction of an upper tooth can be performed with the patient on an examination couch. Observe the stance of the operator, with the feet wide apart to give a stable posture. The extracting arm should be almost straight and the extraction movements made from the shoulder.

FIG. 6.—A cartridge syringe fitted with a pre-sterilized disposable needle shown together with five pairs of forceps. The forceps are suitable for the extraction of (from left to right) upper incisors and canines; upper premolars; upper molars; lower incisors, canines, and premolars; and lower molars.

For premolar and molar teeth this point is just inside the soft mucous-gland-containing part of the palate. The injection is given just on the gingival margin side of the anterior palatine nerve. Because the palatal soft tissues are relatively thin, the needle should be pushed in until it touches the bone, lest the bevel be incompletely buried so that the solution will escape into the mouth. On the other hand, the needle should not touch bone with such force that it bends. 0.5 ml. of solution is sufficient, and it should be given slowly into the dense palatal tissues.

To inject the lingual aspect of the lower alveolar process, first retract the tongue with a spatula and then insert the needle into the floor of the mouth about $\frac{1}{4}$ in. (3.2 mm.) away from the alveolar process. Again it is inclined towards the bone and advanced about $\frac{1}{4}$ in. before 1 ml. of solution is deposited.

To anaesthetize a lower molar both buccal and lingual injections are given, but with these alone pulpal and buccal alveolar bone anaesthesia will be incomplete, because the thick cortex prevents adequate diffusion of the drug, and the buccal infiltration must be reinforced by a periodontal membrane injection. The gingival crevice is sterilized with tincture of iodine, and the needle is steadily but firmly introduced into the buccal periodontal membrane half way along the buccal side of the tooth, opposite the bifurcation of the tooth roots. 0.25–0.5 ml. of solution is given slowly. Great care should be taken not to force the needle too far into the periodontal membrane so as to risk breaking it.

The techniques described above are not always the best or the most sophisticated ways of producing anaesthesia, but they are the simplest for the occasional operator. More elaborate methods are found in all standard textbooks.

For general anaesthesia a nitrous-oxide oxygen fluothane mixture is probably safest. The advantages to patient, operator, and anaesthetist of the adequate dependable level of anaesthesia with full oxygenation which is obtainable with this mixture are great, and one hopes that, even under emergency conditions, the administration of nitrous oxide with limitation of the oxygen supply is now a thing of the past. Intravenous anaesthesia is attractive under emergency conditions because of the simple equipment required, but it is not without difficulties and dangers, which need not be elaborated upon here. If a general anaesthetic is used, one end of a sixfold bandage should be packed into the lingual sulcus and around the tongue in such a way that the pharynx is properly shut off from the mouth.

Five pairs of forceps, with which most teeth can be extracted, are shown in Fig. 6; they may not always be the choice of a skilled dental surgeon, but limiting the selection to these makes for simplicity.

The extraction of a tooth has three stages: application of the forceps, loosening of the tooth, and removal of the tooth. The forceps' beaks are carefully inserted into the gingival crevice and pressed into the periodontal membrane, keeping the blades aligned along the long axis of the tooth. The tooth is gripped firmly and then swung inwards and outwards—that is, lingually or palatally and buccally or labially—with an even application of force and using a short arc of swing until the tooth begins to move (Fig. 7 and 8). Once the tooth is really loose, it is raised in its socket by levering outwards. It is important not to let the forceps' beaks slip on the tooth during these manoeuvres, lest a bending strain be applied and the root be fractured off. These movements will remove most teeth, but upper central incisors and lower premolars are best loosened by rotation about the long axis of the root (Fig. 7 and 8), and lower third molars are best removed from the socket by inwards or lingual rather than outwards or buccal leverage.

With a right-handed operator, teeth on the patient's lower right are extracted while standing behind and to the right of the patient (Fig. 4). All the others are extracted with the operator facing the patient (Fig. 5).

Gingivitis

There is no satisfactory specific treatment for acute herpetic gingivo-stomatitis, but in older children and adults 1% aqueous gentian violet may be applied sparingly to the lesion not more than twice a day, and for not more than 7 days. (Gentian violet applied frequently over a long period will eventually cause ulceration.) It is best for the patient to rinse the mouth

with warm sodium-bicarbonate solution first, to clear away mucus from the saliva. Such treatment will give some comfort and will limit secondary infection of the ulcers, but unfortunately it is not easily applied to younger children and infants. As an alternative a solution, made by dissolving 250 mg. of chlortetracycline in half a tumbler of water, can be swabbed on to the ulcers or used as a mouthwash four times a day. Steroids must *not* be applied, as they cause exacerbation of the ulceration.

The mother should be given advice on a soft diet and the need to maintain a reasonable fluid intake, even if the child is unwilling to eat. Strained baby foods can solve the feeding problem. The disease is self-limiting and clears up in 7 to 14 days, but it is important to instruct the parents that the disease is contagious and might be spread to other children. In particular, care should be taken to avoid the spread of the condition to infants, as the disease is distressing in the very young. That infection can be spread

to the eyes of other people—either from close contact with a patient with herpetic stomatitis or even from someone with the more common labial lesions—is of the greatest importance. If parents are subject to herpes labialis the possibility of transmitting the virus from an active lesion to their children, especially by kissing, should be explained.

In the acute stage Vincent's gingivitis may be treated as an emergency by systemic penicillin only; but correct oral treatment should be given by a dental surgeon as soon as it can be arranged, and every effort should be made to see that the patient attends the dentist for the proper follow-up treatment. Active Vincent's infection starts in areas of poor oral hygiene—under a wisdom-tooth gum-flap, under the edges of supra-gingival calculus, around grossly irregular teeth, or against carious cavities. Even the triangular intervals left because of the destruction of the interdental papillae by Vincent's gingivitis can act as stagnation areas for further attacks. Complete treatment therefore involves attention to all these details.

These two common forms of gingival or oral ulceration are but two of many types of stomatitis. Differential diagnosis is not always easy, even for the expert, and it can be almost impossible where attempts to treat lesions have caused an alteration in the appearance. Thus, where it is reasonable to do so, referral without treatment is preferable.

Even where the ulceration appears to have a simple cause, such as rub from the flange of a denture, the temptation to treat the patient by easing the denture should be resisted, because, if this is not done skilfully, the undue pressure may merely be transferred to another place. If an early appointment with the dental surgeon who made the dentures is not possible the patient should meanwhile leave the dentures out. If the lesion really is due to the dentures it will then heal completely, establishing the correct diagnosis, but the plate should be worn on the day of the appointment so that the area of friction will be apparent.

Pericoronitis

The danger of pericoronitis around a lower third molar lies in the many tissue planes of the face, floor of mouth, and neck into which the infection can spread. While the infection is localized to the area of the gum-flap, therefore, treatment is by local measures; but once there is evidence of soft-tissue or lymphatic spread systemic antibiotics must be administered as well.

Local treatment involves extraction of the upper third molar if this is biting on to the gum-flap, irrigation of the pericoronal space under the flap to remove debris and pus, introduction of a *bland* antiseptic (like 1% aqueous gentian violet) into the pericoronal space, and incision if an abscess has formed in the adjacent soft tissues. Irrigation of the space under the gum-flap is best performed with a record syringe and a No. 1 intravenous needle, the point of which has been ground off. Dilute Eusol is a suitable irrigation solution. The gentian-violet solution is picked up, by means of capillary attraction, with the closed tips of fine-pointed dressing forceps, and introduced under the flap.

In an emergency an analgesic should be prescribed and also an antibiotic if there are signs of spread of the infection; the flap should be irrigated if the circumstances warrant this. The lower third molar should on no account be extracted during an attack of pericoronitis, not only because such an extraction may require special skill and training but also because experience shows that dangerous spread of the infection follows such a procedure. Extraction of a tooth when the socket is inflamed leads to resolution of the inflammation; but when the infection is pericoronal and the socket uninflamed spread of the infection into the bone is highly probable.

Post-operative Complications

The important principles of treating infected tooth sockets are (1) to irrigate the socket to remove the fragmented and

FIG. 7.—The method of holding a pair of upper forceps. The forceps are applied to an upper central incisor, and the method of supporting the alveolar process with the left hand is shown. Both palatolabial and rotational movements are indicated by the arrows.

FIG. 8.—The method of holding a pair of lower forceps. The forceps are applied to a lower second premolar, and the method of supporting the alveolar process with the left hand is shown. Both linguo-labial and rotational movements are indicated by the arrows.

infected clot, and then to irrigate it as often as necessary to remove accumulations of food debris; and (2) to provide relief of pain. Only if the infection is spreading in the bone, or likely so to spread, are antibiotics of value. Even if the pain of the socket is very severe, properly applied local measures will give more relief than systemic antibiotics. Some pain persists until the thin fragments of infected bone are resorbed or sequestered and the socket becomes lined with granulation tissue: this process commonly takes 10 to 14 days.

A simple glass syringe with a curved nozzle and rubber bulb is suitable for irrigating the socket, and Eusol or saline are suitable irrigating solutions. Pain may be relieved both by systemic analgesics and by packing the socket with a paste containing a poorly soluble—and therefore persistent—local anaesthetic. A mild antiseptic is usually added to the paste to prevent attack by organisms. Such a paste also prevents food debris from accumulating in the socket; but, while it reduces the number of active treatments needed, it should not persist so long that it delays healing or even becomes incorporated in the granulation tissue. Benzocaine and iodoform, in equal parts, mixed to a stiff putty-like paste with balsam of Peru can be used.

Dressings containing essential oils like eugenol should no longer be employed: though the essential oil relieves pain, it probably does so in part by producing further aseptic necrosis of the socket wall, particularly if used in excess. The oil-contaminated bone has then to be sequestered before final healing occurs—a process which, if much of the socket wall is involved, can be protracted.

A point to bear in mind concerning the post-operative care of wounds in the oral cavity is that the use of mouthwashes is often stressed to the extent that the patient omits to clean the teeth with a toothbrush to the best of his ability. While mouthwashes are valuable they do not clean the teeth, and masses of adherent food debris soon become foul, with increased risk of infection of the adjacent wound.

The diagnosis of a needle-track infection is not easy, principally because several other causes of limitation of opening can follow dental procedures. If such a diagnosis is made, however, remember that these infections respond to tetracycline but not to penicillin. It is best to send the patient back to the dentist, so that, if referral to an oral surgeon becomes desirable, full details of the original procedure can be made available.

Spreading Infections

However extensive a localized abscess may be, there is rarely any danger if it is drained promptly and effectively, although

antibiotics are usually given as well for large abscesses of the anatomical compartments of the face and neck.

Where there is no localized pus which can be drained, as in a cellulitis, or where adequate drainage is difficult, as in osteomyelitis, early and effective doses of antibiotics can make a considerable difference to the final outcome: this is particularly true of osteomyelitis. Fortunately, most infections of the face and jaws of oral origin are still sensitive to penicillin, which should be given intramuscularly for maximum effect.

A condition which many general practitioners must see, particularly at the end of the winter in young children, is infection of the submandibular or submental lymph nodes, usually with considerable cellulitis of the surrounding tissues. The source of the infection is often obscure, especially if there are no carious teeth. A more careful history and examination, however, will reveal that a primary tooth has just been shed or a permanent tooth has just cut the gum in the appropriate quadrant. Almost certainly these are the sites of entry of the organisms. Occasionally no such cause is found, but the child complains of a sore throat. Even though the submandibular nodes are involved in these cases, and not the more usually affected upper deep cervical nodes, the association seems to be too often repeated not to be one of cause-and-effect.

Some lymph-node infections, particularly in children, seem to reach a *status quo* on antibiotics alone. Constitutional signs largely but not completely disappear, and the surrounding cellulitis regresses, but the nodes remain as an enlarged matted mass. If the antibiotic is withdrawn the infection progresses again; if it is continued no further improvement occurs, but, should a poultice be applied in addition, rapid resolution often takes place, or if not a small quantity of pus is formed and resolution follows drainage.

Finally, it must be stressed that the management of spreading infections of the face, neck, and jaws requires considerable experience and judgement, and even poultices should not be applied without adequate knowledge of the pros and cons. Hence, in emergency, give intramuscular penicillin and refer the patient with some degree of urgency to an oral surgeon.

(This article will be continued next week.)

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ANY QUESTIONS?

We publish below a selection of questions and answers of general interest.

"Water on the Knee"

Q.—What is the best treatment for "water on the knee" arising in middle-aged or elderly people without any history of trauma?

A.—"Water on the knee" arising in middle-aged or elderly people with no history of trauma is almost always secondary to degenerative arthritis. The condition is particularly common in women at or just after the menopause, when in addition to the fluid in the joint the synovial membrane can be felt to be thickened. The best treatment is support to the joint by a crêpe bandage, restriction of walking, and quadriceps exercises. If the effusion is a large one it should be aspirated. In menopausal women repeated

effusions can sometimes be controlled by x-ray therapy.

Stimulants in Exposure and Exhaustion

Q.—Could central nervous stimulants such as amphetamine play any part in cases of exposure and exhaustion in mountain and cave accidents by enabling the victim to help himself and thus reach safety in a shorter time than would be possible by stretcher?

A.—The effects of central nervous stimulants such as amphetamine, phenmetrazine, or diethyl propion hydrochloride are too unpredictable to be of any real use in the

vast majority of mountain and cave accidents or cases of exposure occurring in the hills.

The majority of accidents on the hills involve fractures of the limbs and head injuries.¹ This is also true of caving accidents. In these cases the victim, even if stimulated for a period of several hours, would run the risk of making matters worse by attempting to hurry to base. Furthermore, amphetamines produce a clouding of judgement and may cause a victim of a relatively minor accident—for example, a fracture of the upper limb—to attempt a further hazardous course and possibly convert a minor accident into a fatal one.

In cases of exposure consciousness may well be affected to some extent before amphetamine, nikethamide, etc., are taken by the victim, who again may be stimulated into taking a mistaken action.^{2,3} Similarly alcohol is contraindicated, because of giving a false sense of well being and a peripheral vasodilatation, and thereby a loss of essential body