Common Dental Emergencies Which may be Encountered by the Family Physician

Robert N. Ryan, DDS
William H. Ware, DDS
San Francisco, California

Dental emergencies are common in everyday practice, and the family physician may frequently be called upon to evaluate and, at times, to provide initial care for such problems. This article acquaints the family physician with diagnosis and treatment of the most common dental emergencies: disorders secondary to trauma, including soft tissue laceration, fracture or displacement of teeth, and bone fractures; and severe pain related to acute alveolar infection.

The establishment of family practice as a specialty, the increasing emphasis on comprehensive medical care, and the tendency of many recent medical graduates to locate in rural areas all increase the likelihood that the physician may occasionally be called upon to provide emergency care for injuries to the teeth and oral tissues. Traumatic oral injuries occur with relative frequency and usually require some degree of prompt attention. Oral trauma is seen most often in young persons, from the infant just learning to walk to the older child engaged in running, cycling, contact sports, fisticuffs, and the like. Automobile accidents are a major cause of oral injury in people of all ages.

The purpose of this article is to acquaint the physician with the most common oral-dental emergencies, and to outline simple procedures for providing symptomatic relief in the absence of adequate dental facilities. In general, dental complaints for which patients seek immediate care consist of: (1) fractures or lacerations of oral structures, secondary to acute trauma; (2) traumatically displaced or avulsed teeth, or mobility of traumatized teeth; and (3) severe pain related to acute alveolar infection.

From the Department of Oral Biology, University of California, School of Dentistry, San Francisco, California. Requests for reprints should be addressed to Dr. Robert N. Ryan, Assistant Clinical Professor of Oral Biology, University of California, School of Dentistry, San Francisco, Calif 94143.

Soft Tissue Lacerations

Because intraoral mucous membranes are relatively fragile, lacerations are common in traumatic injuries. Lacerations may be due to direct contact with foreign objects, but most frequently they are the result of contact with the teeth. Hence, the wound edges are often jagged and of irregular depth.

Debridement of the wound is necessary prior to closure. Only completely devascularized tissue should be removed; all viable tissue should be retained. A local anesthetic containing a vasoconstrictor injected into the submucosa adjacent to the lesion will provide adequate hemostasis and anesthesia for cleansing of the tissues and subsequent wound closure. On occasion, a tooth fragment will be imbedded in the wound. If clinical examination suggests that possibility, a radiograph of the soft tissue is indicated prior to wound closure. Normal saline in a bulb syringe may be used to irrigate and cleanse the area.

Care must be taken in suturing intraoral tissues, as the vascular bed is extensive. Meticulous work will minimize hemorrhage and reduce scar formation. Deep tissues may be rejoined with 4/0 or 5/0 plain gut. Mucosal edges may be approximated with either 4/0 silk, plain gut, or polyglycolic acid (Dexon®) sutures. Special attention should be given to precise approximation of tissues near the mucocutaneous junction of the lip. Skin suturing should be done with interrupted 5/0 or 6/0 nylon monofilament sutures on curved, atraumatic cutting needles.

Care should be taken to avoid ligating the major salivary ducts when suturing the buccal mucosa or floor of the mouth. Severed parotid or submaxillary ducts may be kept functional by suturing a Penrose drain from the proximal end of the severed duct into the mouth.

Because of the highly vascular nature of oral tissues, they are normally quite resistant to infection. However, each case must be considered individually. The need for antibiotic and/or anti-tetanus therapy can be determined from the wound and immunization history.

Fractures of Teeth

Fractured teeth are found most commonly in the maxillae of males aged nine to 13 years.[1,2] Persons with maxillary protrusion are five times more susceptible to these types of injuries than are persons with normal occlusion.[3]

Dental fractures may involve the enamel only, both enamel and dentin, or may involve the pulp of the tooth. Root fractures are not uncommon and may go unnoticed without an adequate radiograph. (Figure 1)

Any traumatic blow to a tooth, whether or not it produces a fracture, may ultimately result in its devitalization. This occurs as a result of injury to the vessels which enter through minute foramina at the root apex and supply blood to the pulp of the tooth. A sharp blow may directly damage these vessels, or may cause edema of the tissues near the root apex and result in strangulation of the vessels and subsequent necrosis of the dental pulp. Pulpal death and infection may also occur as a result of salivary bacterial invasion directly through the fracture site.

The younger the patient, the better the prognosis for pulpal vitality in traumatized teeth. The large pulp chambers and large open, foramen of incompletely formed young roots enhance the prognosis for vascular recovery.

The process of devitalization may occur covertly over an extended

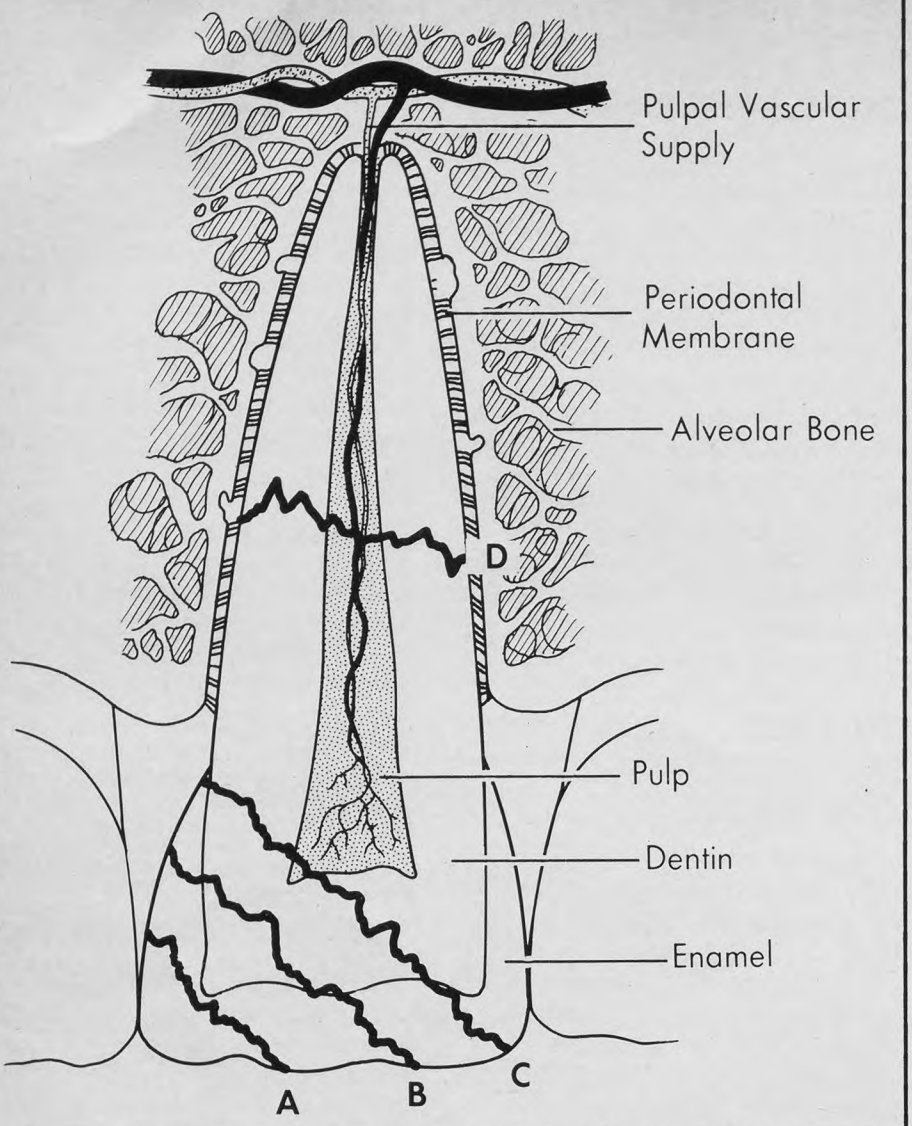

Figure 1. The common types of dental fractures are outlined above. A, Fracture of Enamel; B, Fracture of Enamel and Dentin; C, Fracture Involving the Pulp; D, Fracture of the Root. Suspected root fractures may be confirmed by x-ray.

period of time. Chronic alveolar abscesses are often linked to prior trauma which had gone unnoticed by the patient. In dental practice, it is important to evaluate recently traumatized teeth and gather baseline data (radiographs, response to vitality tests, etc) for future reference. Comparison of follow-up radiographs and vitality tests with those taken at the time of injury provide a basis for early detection and treatment of chronic infection.

Treatment

Fractures of the enamel. Enamel is a densely calcified material of ectodermal origin. It is normally white in color, avascular, and without innervation. There is no avenue of communication with the dental pulp. Smoothing of the jagged, sharp edges is all that is necessary to repair this type of fracture. In dentistry, carborundum stones or sandpaper discs, mounted in a dental handpiece are used for this purpose. A coat of dental varnish (Copalite®) may be placed over the exposed fracture surface to insulate it against thermal stimuli.

Fractures involving dentin. Dentin is yellow-brown in color and is of mesodermal origin. It is composed of microscopic, calcified tubules which lie side by side and run perpendicularly from the dentin-enamel junction toward the dental pulp. It is thought that these tubules contain protoplasmic processes from cells of the pulp which "innervate" the dentin and cause it to be sensitive to mechanical probing, thermal changes, chemical assault, and like stimuli. These tubules may communicate directly with the pulp and provide a pathway for ingress of bacteria.

In treatment, sedative dressings are applied directly to the freshly exposed overlying dentin. The dentinal tubules are sealed from the oral environment and the pulp is insulated from thermal changes. In dentistry, plastic or metal temporary crowns or stainless steel orthodontic bands are used to contain an insulating sedative dressing (zinc oxide – eugenol mixture) when it is placed over the fractured area. (Note: Zinc oxide and eugenol are available as a powder and a liquid, respectively. When mixed together, they harden to a fairly firm consistency in a matter of minutes.)

Shallow fractures which just barely involve the dentin may require only a coat of dentin tubuli sealant (Copalite®) to protect the pulp from bacterial invasion and thermal changes.

Fractures involving the pulp. Occasionally, fractures of the crown of a tooth will expose the pulpal tissue directly. In adults, this usually necessitates total pulpectomy and endodontic therapy to retain the tooth. However, in primary teeth, or in incompletely formed permanent teeth, pulpal vascularity is such that recovery from injury is much more likely. Calcium hydroxide has been shown to stimulate the formation of a bridge of reparative dentin over the vital pulp exposed. It is used in the form of a dry powder or as a paste mixed with methyl cellulose (Pulpdent®). If the exposed area of pulp is large (>1 mm^2), it is usually advisable to amputate the pulp within the pulp canal as it converges toward the apex. This reduces the surface area to be treated, thereby increasing the prospects for successful formation of a dentin bridge.

A protective and insulating layer of zinc oxide-eugenol sedative dressing is placed over the calcium hydroxide. Periodic reevaluation is necessary for several weeks before a decision as to further treatment is made.

Root fracture. Complete fractures of roots within the alveolar process may occur. Usually the tooth is quite mobile and is painful to palpation. The fracture may occur with or without loss of the coronal portion of the tooth. Complete, spontaneous repair of a horizontal fracture of a tooth root

by callus formation of cementum has been known to occur.

It is necessary to take periapical radiographs of the tooth, as the prognosis depends on the level of the fracture. The coronal fragment must contain enough root structure to provide stability when the tooth has healed. Teeth or tooth fragments that cannot be stabilized will be lost. Stabilization may be accomplished by securing the fractured tooth to adjacent teeth, using stainless steel wires and orthodontic bands. Other methods of stabilization include application of quick cure acrylic (methyl methacrylate) or surgical cement (zinc oxide-eugenol) around the injured and adjacent teeth. Occlusal contact with the injured tooth should be avoided.

Traumatic Displacement of Teeth

Displacement of teeth may range from a slight change in tooth position to total luxation from its bony socket. (Figure 2)

Traumatically displaced teeth often suffer a loss of pulpal vitality and will require endodontic therapy. Other possible sequelae are internal and external root resorption and ankylosis.

It is always advantageous to retain the tooth in the arch, if possible. Treatment of tooth displacement (except intrusion) involves returning the tooth to its original position and securing it in place. Teeth and displaced alveolar fragments may be repositioned with gentle digital manipulation under either local or general anesthesia. (Figure 3) Wire or acrylic splinting should be performed to limit mobility. (Figure 4)

Intruded teeth should be left in position. Reeruption will often occur without mechanical intervention. Attention should be given to accompanying soft tissue injuries, including careful cleansing of the area to reduce the potential for infection.

Complete avulsion of teeth. Frequently, a completely avulsed tooth can be replanted in its socket. The prognosis for retained vitality is very poor but, properly treated, non-vital teeth may still be very useful in the dental arch.

It is critical that replantation occur as soon as possible, at most within two hours of the accident. It is important that the surface of the tooth be kept clean and moist. Placing the tooth in its socket or under the tongue temporarily, until more definitive care is available, may be most practical.

Before replantation, the tooth should be cleansed in sterile saline solution. Debris and clotted blood should be removed from the socket. Antibiotic therapy should be initiated and continued for at least a week following replantation. It is advisable to stabilize the tooth for four to six weeks, depending on the post-treatment course. Failure of the procedure is generally indicated by continued mobility, or by symptoms of infection.

Fractures of the Jaw

Fracture of the alveolar process. The alveolar process is that portion of the jaw which rises from the basal bone to invest the teeth. The alveolar ridges are covered with connective tissue and mucosa and serve to support the teeth. The teeth are firmly attached to the alveolar process by the fibers of the periodontal ligament. A forceful blow may break a portion of the alveolus, and the teeth it contains, away from the body of the jawbone. This will be represented clinically by an irregularity in the contour or

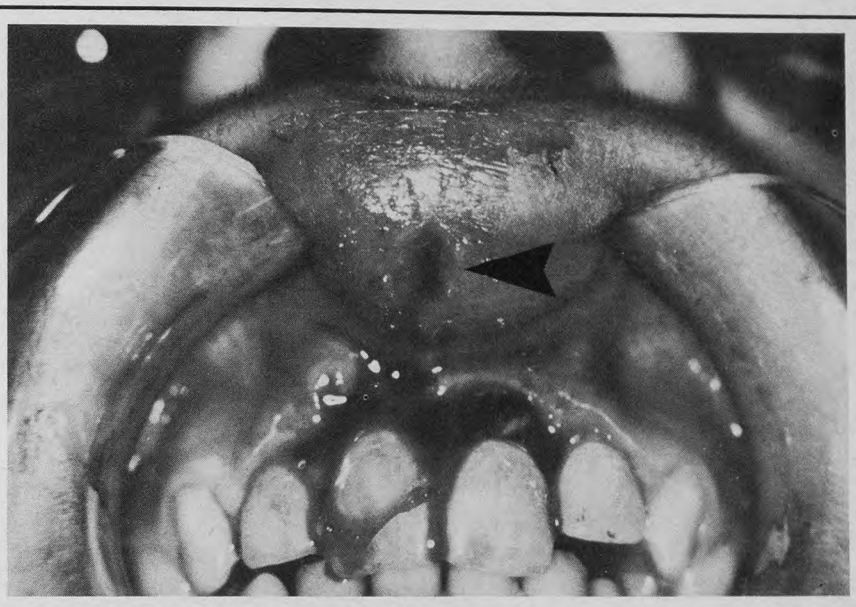

Figure 2. A typical example of dental trauma. The maxillary incisors have been partially avulsed and displaced lingually. Also note the soft tissue laceration (arrow) of the upper lip.

Figure 3. The maxillary incisors (shown in Fig 2) have been repositioned by gentle, digital pressure.

occlusal level of the arch. The fragment will likely be mobile and the teeth in the area may or may not be fractured.

The occlusion may be used as a guide in reducing the fracture. A full arch acrylic splint or arch bar should be ligated in position to provide firm stabilization. Immobilization of the mandible, via interarch wiring, may be necessary if the fragment is subject to displacement during chewing. A liquid or mechanically soft diet is necessary until the fracture has united. Mild analgesics or sedatives may be necessary for the immediate post-surgical period. Antibiotics are ordinarily indicated until mucosal healing is completed.

Fracture of the maxilla or mandible. Complete fractures of the maxilla or mandible may be seen on occasion. As with alveolar fractures, the signal feature is usually altered occlusion. This may be accompanied by edema, ecchymosis, and pain upon attempting to occlude the teeth. Careful x-ray survey and clinical examination are necessary to assess the extent and location of jaw fractures, since the changes are often subtle. This is especially important with young children, in whom condylar fractures of the mandible are frequently overlooked.

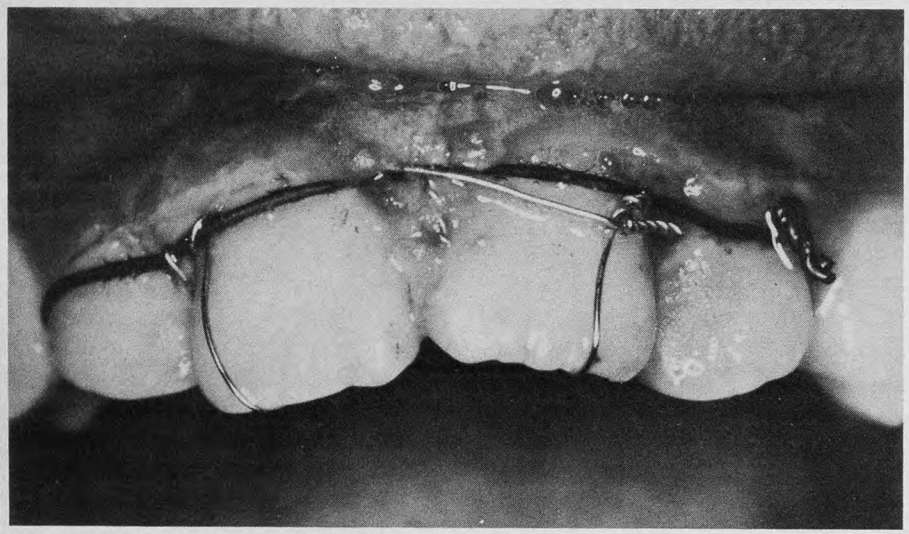

Figure 4. The traumatized teeth shown in Figs 1 and 2 have been secured in place after repositioning. Stainless steel ligature wire was used to splint the teeth to adjacent sound, lateral incisors.

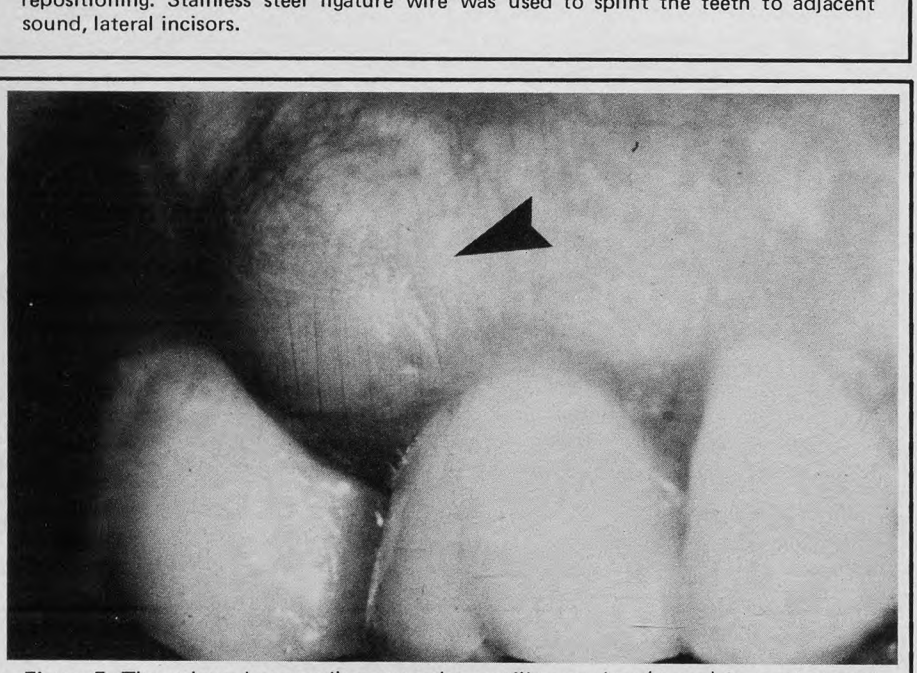

Figure 5. The enlarged mass adjacent to the maxillary molars (arrow) is a periodontal abscess. Incision and drainage usually provides temporary relief. Subgingival root planing and curettage and/or surgical elimination of periodontal "pockets" is usually necessary to prevent recurrence.

Treatment is consistent with that for fractures of other bones, ie, reduction of the fractured parts and stabilization to allow bony healing. Proper occlusion must be reestablished initially. Stabilization may require the application of dental arch appliances and immobilization of the mandible via interarch wiring of the jaws. A four to eight-week period is usually necessary to allow for bony healing of the fragments. During this time, a liquid diet must be utilized to maintain nutrition.

Dento-Alveolar Infection

The dental symptom which most often prompts people to seek relief is severe, acute pain. Pain associated with the traumatic situations mentioned previously is an obvious occurrence and is usually readily controlled with analgesics. A more common cause of oral pain is dento-alveolar infection, usually resulting from one or more bacterial strains normal to the mouth. In general, dental infection may be classified as either pulpal pathosis or periodontal infection.

Pulpal pathosis. Pulpal infection usually begins in dental pulp which is experiencing degenerative change, often following one of the traumatic incidents we have described. Bacteria may gain access to the pulp at fracture sites, through carious lesions, via migration along the periodontal membrane, or even by hematogenous routes. The clinical course depends upon the virulence of the causative organisms. Infections limited to the dental pulp may cause intense pain which the patient may not be able to localize. The pulp of a tooth contains free nerve endings which transmit only sensations of pain; there are no known proprioceptive fibers. As a result, as long as the excitatory factors remain within the unyielding walls of the pulp chamber, the pain may not be identified with the causative tooth or it may be referred to some other area innervated by the trigeminal nerve. Further necrosis of the pulp will frequently decrease the severity of the pain even as the infection progresses. When the inflammatory process advances into the periodontal membrane and periapical tissues, proprioception makes localization of the pain more obvious.

Clinically, signs and symptoms of pulpal pathosis range from unlocalized pain, as in pulpitis, to swelling, indura-

tion, tenderness and erythema of surrounding tissues. In instances of extension into the fascial spaces of the neck and subglottic region, edema may cause dysphagia and airway obstruction. Regional lymphadenopathy and fever are common. Septicemia or intracranial extension (by way of connecting venous channels) are possible profound sequelae, particularly in infections of the maxilla.

Periodontal infection. Most dento-alveolar infections are self-limiting and abscess formation proceeds rapidly (usually within one to three days). The usual clinical manifestation is localized swelling of the periodontal tissues adjacent to the involved tooth. This is particularly true in infections which occur as a result of accumulation of bacteria and food debris in periodontal "pockets." A "pocket" is a deepening of the normal gingival sulcus, caused by loss of alveolar bone and an apical migration of the gingival attachment to the tooth. This process is stimulated by toxic secretions of bacteria which have accumulated in the gingival sulcus. Dentists refer to this inflammatory situation as periodontal disease, and a periodontal infection (periodontal abscess) is an occasional, acute exacerbation of this chronic process. (Figure 5)

Dento-alveolar abscess may also be evidenced by the presence of a parulis. (Figure 6) This is a small lesion, usually adjacent to the apex of a tooth, which represents the orifice of a fistulous tract, through which products of a suppurative process are drained from the periapical area. It is generally seen as a chronic manifestation of dental infection.

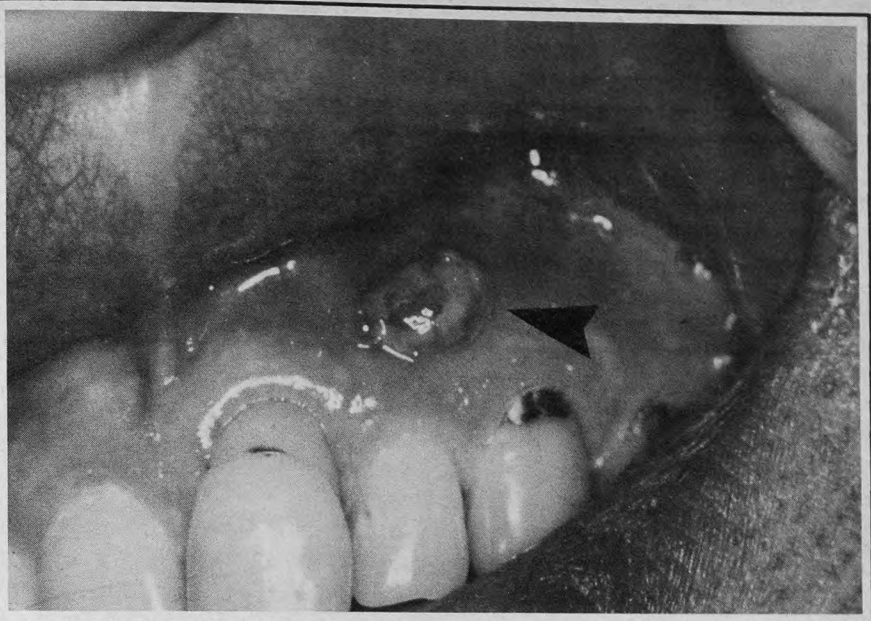

Figure 6. A parulis (arrow) is present opposite the apex of a maxillary incisor. Suppurative exudate can usually be expressed from the lesion by gentle manipulation of the adjacent tissues.

Treatment of Dento-Alveolar Infection

Early treatment of infected teeth and periodontal lesions lessens the potential for widespread disease. It is a common procedure in dentistry to remove an infected dental pulp before the disease process has spread to the periapical tissues. Localized periodontal abscesses may be incised and drained to provide temporary relief.

If the infection has spread to the surrounding tissues, symptomatic care should be initiated. Application of moist heat packs for 20 minutes per hour and administration of antibiotics serve to localize and limit extension of the infection. Penicillin has been found to be the antibiotic of choice for most oral infections. It is often used empirically, as it is difficult to obtain appropriate material for culture which is free of cross-contamination from saliva. Immediate administration of antibiotic therapy may prevent rapid extension of the infection to the fascial planes of the head and neck. Oral penicillin (penicillin G or V or phenethicillin) 50,000 to 100,000 u/kg/24 hrs, divided into four equal doses, or procaine penicillin, 600,000 to 1,200,000 u/24 hrs intramuscularly, are commonly used. Analgesics may be administered as necessary. Hot saline rinses every two hours will help to localize the infectious process and maintain hygiene in the area. A liquid or mechanically soft diet will reduce irritation from masticatory action and allow the maintenance of nutrition. Fever is usually low-grade (99.5 to 102 F).

One should be alert for signs and symptoms of airway obstruction when facial or cervical cellulitis is observed. Rapid extension of dento-alveolar infections is not uncommon. Space abscesses, should they occur, require incision and drainage, along with antibiotics. When possible, a sample of exudate should be obtained for microbiologic identification and antibiotic sensitivity determination.

Prophylaxis

Most emergency dental situations can be prevented or minimized by early recognition and treatment of developing disorders.

The physician may have the opportunity to observe young children with obvious maxillary protrusion, or with finger sucking habits which cause protrusion. Since these patients are predisposed to dental injury and loss of teeth, early referral for orthodontic care can minimize later trauma to teeth and lips.

In contact sports, the wearing of mouth guards greatly reduces the chance of injury to oral structures. Likewise, use of automobile seatbelts and shoulder harnesses will prevent many of the facial injuries sustained in collisions.

Finally, prompt restoration of carious teeth and treatment of bleeding or sensitive gingivae will impede most dento-alveolar infection.

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