this condition and therefore eventually appears shorter than the adjacent teeth, a jacket crown can be fabricated to alleviate undesirable esthetics. The periodontal ligament space is absent or near absent on the radiograph, and periapical bone appears to attach directly to root surface. Probably some root resorption took place before the area filled in with bone.

Some teeth will exhibit both resorption and ankylosis. However, it is only the progressive resorption that will ultimately dictate loss of the replant and replacement by prosthetic means. As long as the tooth remains relatively firm, it will do its part and be worth the effort to retain it.

At the 6-month recall appointment, it is wise to take radiographs of the teeth adjacent to the treated teeth (see Figure 3-15, *E*) and the matching teeth in the opposite arch (Figure 3-18). Often when trauma occurs and an acute phase is noticed and treated, some residual chronic response shows in these members of the arches. If these problems are not discovered and treated promptly, changes may occur that resist endodontic treatment: dystrophic calcification, which may make canal location very difficult, or advanced resorption, either external or internal.

Ultimate Long-term Prognosis for Replanted Teeth

There is no area of endodontics, or perhaps in all of dentistry, where more anecdotal information is available than on the subject of replantation. This fact is verified at dental society lectures when the subject is replantation, and a member of the audience rises to describe a case treated many years ago, in total defiance of the present suggestions for treatment—and sometimes without any treatment at all, other than reinsertion of the tooth—and yet the tooth is perfect in every way. Articles are published in the more local journals describing similar situations.

I do not want to disparage the authenticity of these reports, but the observers of events should realize that such results are a very small fraction of the total attempts to treat in these ways. The huge majority of such treatment regimens have been abysmal failures, and teeth were extracted early in the game. The reason that these successful cases are still brought up is because of their rarity rather than their frequency.

The long-term prognosis for replantation is still poor, although the recent efforts by Andreasen and Trope and their colleagues, Camp, and others have undoubtedly caused a significant increase in the success rate. The clinician should be aware that these teeth sometimes do well for long periods, and then, for no apparent reason, problems arise. I have had many cases where I replaced the calcium hydroxide paste several times with ultimate success, and yet, in the same mouth, other teeth responded well with a single application (see Figure 3-17). In some instances, teeth assumed to be responding properly were filled with gutta-percha, but after several years resorptive defects were noted, and further treatment was required.

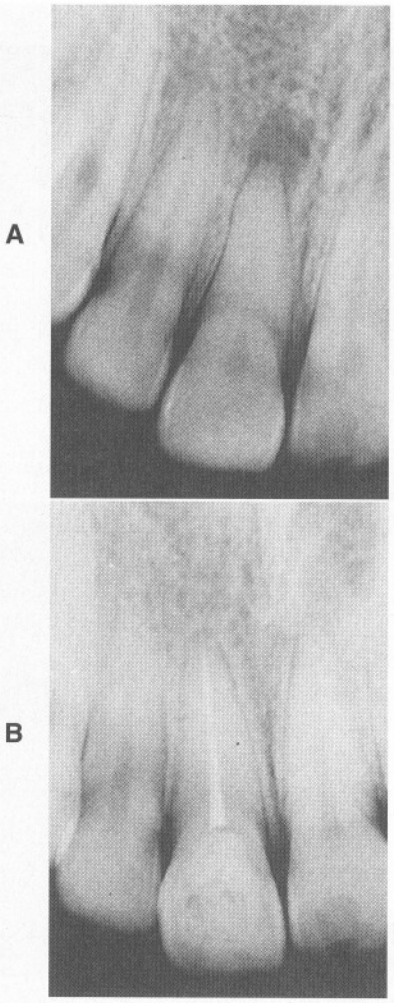


FIGURE 3-18 **A,** Radiograph of maxillary central incisor of patient shown in Figure 3-15, who had an accident causing avulsion of two mandibular anterior teeth and the need for endodontic treatment on an adjacent tooth. One year after initiating treatment of those teeth, the patient had returned for a recall appointment. Not only were the treated teeth evaluated, but also those teeth adjacent and occluding were examined and radiographed. This film indicates a periapical lesion associated with the right central incisor and considerable decrease in width of the root canal space. No symptoms were present. **B,** Canal had been located, prepared and at a second appointment filled with laterally condensed gutta-percha and Wach's paste, with some excess sealer being pushed past the apex. This film was taken 2 years later, demonstrating perfect healing of the lesion and a small strand of sealer still present. Had the lesion not been noted in the radiograph, the canal probably would have continued to become more narrow, making location at a later time more difficult. This might have led to a perforation or the need for surgical treatment. It was so much easier to treat at the time that the lesion was first discovered.

When treating avulsions, the patients must be kept on perpetual recall, requiring a radiograph every 6 months. If an insurance coverage or legal event is involved, the patient or parents of the patient should be encouraged to wait until the long-term outlook is clearly understood,

which is often impossible to assess. Insurance companies realize that these cases can be in therapy for many years with extended costs and therefore are anxious to settle the claims quickly. If one calculates the initial charges, perhaps several changes of paste, filling with gutta-percha, observation periods, perhaps loss of the tooth in 5 to 15 years, subsequent replacement by a fixed bridge, and then, depending on the patient's age, replacement with fixed bridges in the future, it is easy to see why the insurance companies are anxious to settle quickly.

When treating an avulsed tooth, the best advice that I can give to the operator is to be prepared for any event or eventuality and expect the unexpected.

Intentional Replantation

Perhaps this subject should be listed in Chapter 9 because it is really a surgical rather than an emergency endodontic procedure. However, because the sequelae, splinting, and other procedures are often similar to those employed during a replantation that follows traumatic injury, intentional replantation will now be described.

Intentional replantation implies that a tooth requiring endodontic treatment is purposely removed from its alveolar housing, some type of canal or apical preparation and/or filling is performed, and the tooth is returned to its original socket. Two extensive studies, by Grossman and by Deeb, have been reported with rather good results.

Deeb intentionally replanted 274 teeth and stated that only 26% showed resorption after 5 years. However, at the Fourth International Conference on Endodontics, he disclosed some variances from his original report. He stated that among anterior teeth in which the periodontal ligament was curetted, 26% were lost after 5 years in those patients who returned for recheck examination. No estimate was made of retention ratio for all patients treated.

Having ascertained that curetting of the periodontal ligament was harmful, Deeb then did a further study concerning canal filling materials and methods while the ligament was allowed to remain. In a group of posterior teeth filled by apical preparation and amalgam filling, 54% displayed resorption. In anterior and posterior teeth when canals were filled with gutta-percha, the resorption rate was 60%.

Grossman's study reported on 45 replants, averaging 5.6 years, with an 82% success rate. However, files on some patients with replants were lost, and the sampling included only those who returned to the University of Pennsylvania for further dental treatment. It was possible that results would differ if all those treated by intentional replantation were surveyed.

Because the success ratio for intentional replantation is far below that for routine or surgical endodontic therapy, it was concluded by the Fourth International Conference that the procedure should be attempted only when every other possible technique had failed or was impractical. Only when extraction was the only alternative could intentional replantation be considered the treatment of choice.

Therefore the indications for intentional replantation would include situations described as follows.

1. When routine endodontic treatment of teeth is impractical or impossible, as in patients who are unable to keep their mouths open for the necessary length of time
2. When an obstruction of a canal is present, such as a broken instrument or a calcification, or a periapical radiolucency is present, yet routine surgery is impractical, as in a mandibular molar with the mandibular canal in proximity
3. When perforating internal or external resorption is present, yet surgery is impractical
4. When a foreign body, such as molten metal, is in the periodontal ligament or periapical tissue but surgery is impractical
5. When previous treatment has failed but nonsurgical retreatment or surgery is impractical

If a choice exists between periapical surgery and intentional replantation, the former should be selected because it has by far the better prognosis. As listed in the indications, mandibular molars, in which periapical surgery may be complicated, provide the highest percentage of potential cases (Figure 3-19).

Before the surgical procedure the root canals should be filled, preferably with gutta-percha, as far as possible in a partially obstructed canal and to the apical foramen in those completely negotiable. The anesthetic required for periapical curettage is administered. With maximum care used to prevent fracture of the tooth, which would make the entire procedure a failure, the tooth is extracted. There can never be too much time spent in performing the extraction, with slow buccolingual movement necessary and no attempt made to remove the tooth until it is very loose. Because the central portion of the tooth is weakened from the previous therapy, no squeezing of the forceps should be exerted, which might cause fracture.

When the tooth is finally luxated, it is immediately placed in a solution of sterile saline while the socket is packed with sterile gauze. If the canals have not been filled to the apex, the tooth is held in a saline-saturated gauze (2 by 2 inches) while the apices are trimmed with a fissure bur. A small Class I cavity preparation is made with an inverted cone bur, and the canals are sealed with amalgam. If the canals have been filled, any excess filling material is removed with the fissure bur. The tooth is then replaced in the sterile saline until it is time for replantation.

The gauze is removed from the socket and any necessary curettage performed. The tooth is replaced into the socket and stabilized by any of the acceptable methods. Biven et al suggest a method for fabricating an acrylic splint for use with an intentional replantation procedure.

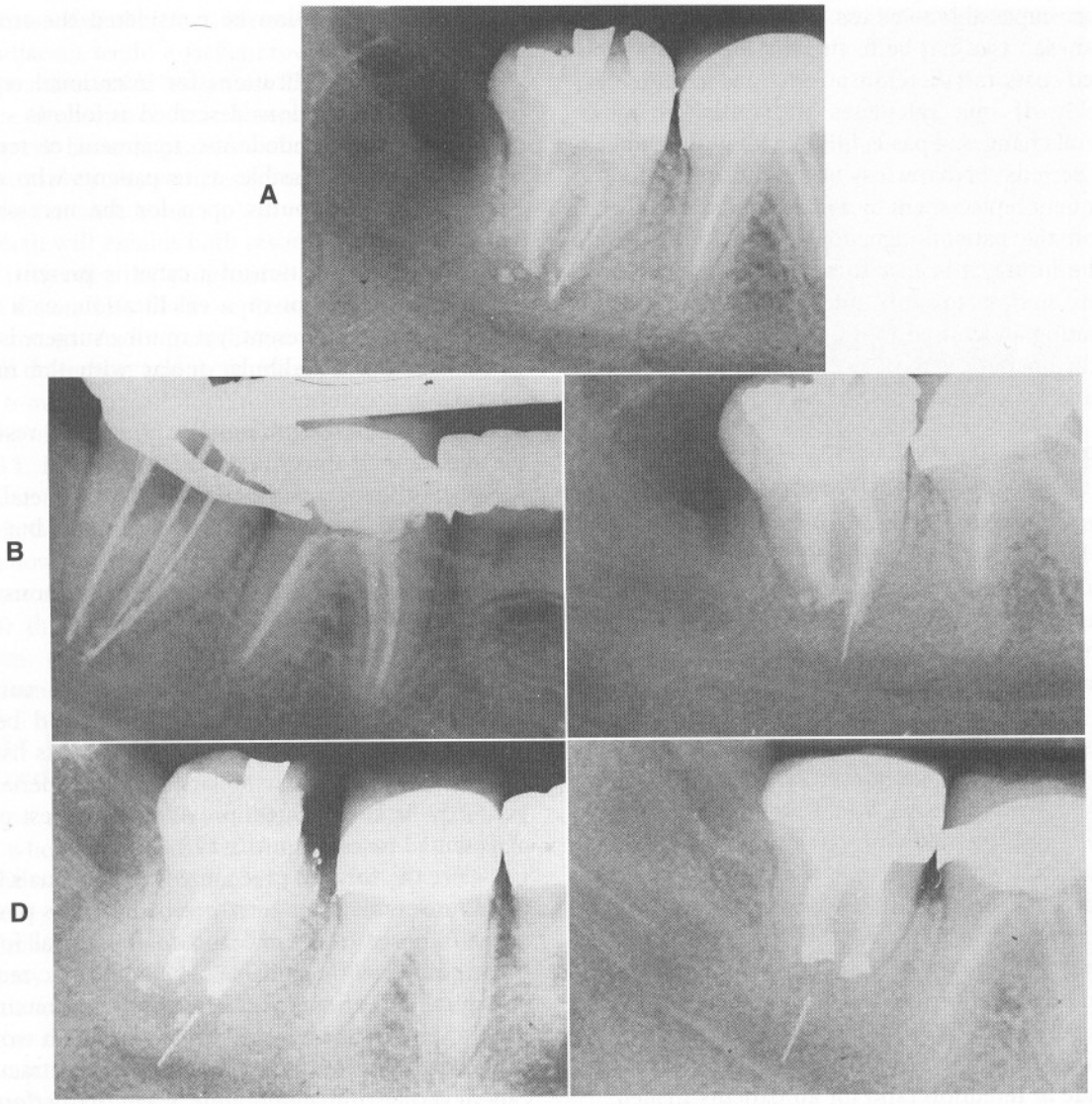


FIGURE 3-19 **A,** Mandibular molar region of a 15-year-old girl. I had treated the first molar 3 years earlier, but the parents chose someone else to treat the second molar. Canals were filled with a paste material, and two separated files were present in the mesial canals. Tooth was tender to percussion. **B,** An attempt was made to remove the separated instruments. One was retrieved, but the other was pushed further out the apex. **C,** Canals were refilled with laterally condensed gutta-percha and Wach's paste. It was decided to perform an intentional replantation procedure because tooth remained tender to percussion. **D,** Tooth was extracted, and apices were trimmed and reverse filled. However, the file had slipped from the tooth and could not be located through the socket. To keep the tooth out of the mouth as short a time as possible, we replanted it with the file still in the mandible. **E,** Forty months after replantation, area has healed well and symptoms are completely absent. (Surgery by Dr. Charles Neach, Chicago, and myself.)

At a prior appointment, alginate impressions are taken and stone models poured. Heavy-gauge stainless steel wire (0.03 inch) is adapted to the model around the most posterior tooth in the arch and surrounded by quick-cure acrylic. No plastic covers the posterior segment, allowing for a spring action to the splint. Holes are drilled interproximally so that ligature wire may be used to further support the tooth after replantation.

It is strongly suggested that two operators be involved in an intentional replantation case. All the studies seem to agree that time out of the mouth is critical in the prognosis for such treatment. Having two people present and able to perform the procedures allows for a minimal time for the tooth to be out of the mouth. One operator may extract the tooth, hand it in a sterile moist gauze pad to his colleague, and curette the area or otherwise prepare the socket. Meanwhile the other operator will be trimming the apices and probably placing reverse fillings or cutting back to previously placed gutta-percha.

Postoperative instructions are the same as those used for any surgical procedure.

Prognosis for Intentional Replantation. The outlook for an intentionally replanted tooth is superior to

that for a traumatically avulsed replanted tooth. The time during which the tooth is out of the mouth, which is certainly critical, is greatly reduced, and the replant is kept moist during the needed manipulation. Venting is provided by the trimming of the root end or curettage of the periapical area. No curettage of the periodontal ligament attached to the tooth is performed. Therefore all the criteria for successful replantation are adhered to, which is not always the case after trauma.

EMERGENCY THERAPY FOR INTRATREATMENT PAIN

In the course of routine endodontic therapy, emergency treatment may be required to relieve pain, whether or not the originating need for the endodontic care involved emergency appointment. Based on the same general diagnoses listed in Table 3-1, the correct emergency treatment will now be described.

Even though flare-ups can and do occur even with best therapy, carefully considered treatment will decrease these annoying occurrences. Attempting to treat flare-ups causes considerable inconvenience, as well as often initiating mental anguish to both the patient and the dentist. Therefore, when endodontic therapy is performed, considerable thought should be given to each step to verify the efficacy of that treatment. Also, sufficient time should be allowed to reach a satisfactory stopping spot, as suggested by the tables in Chapter 16. It has been my experience that many flare-ups occur when improper treatment is rendered or when insufficient time is allowed for specific modalities in therapy.

Apical Periodontitis Secondary to Treatment

It is upsetting to both the patient and the dentist when the tooth involved in endodontic therapy becomes sensitive to percussion during the course of treatment. This is particularly true when the symptom was not present before treatment. Secondary apical periodontitis may be extremely uncomfortable and cause a throbbing, gnawing, and/or pounding pain. The preoperative condition of the pulp usually is either chronic or acute pulpitis. If the access cavity is opened, no productive exudate or escape of gas is noted, and culture tests may be negative because no infection is present.

The cause of secondary apical periodontitis is most frequently overinstrumentation, but the condition may occur as a result of overmedication (too caustic or too much intracanal medicament) or of forcing debris into the periapical tissues. A simple test is available to confirm whether the apical tissues have been overinstrumented. With the rubber dam in place and the access cavity opened, a sterile paper point is selected that is thin enough in width to reach the apical portion of the preparation. The point is grasped with cotton pliers at a point approximately 2 mm more than the total working length of the tooth and inserted into the canal. If the apex is overinstrumented, the point will extend easily past the working length without obstruction. On withdrawal, the tip of the point will disclose a reddish or brownish color, indicating inflamed tissue in the periapical region and absence of a stop in the apical preparation.

To give symptomatic relief in this condition, a corticosteroid–antibiotic medication is used. An anesthetic generally is not needed to provide relief. With the rubber dam still on, a paper point that will reach the periapical tissue is dipped into the medicament, which has a salve-like consistency. The point is placed in the canal with a pumping action, injecting the inflamed periapical tissues with the anti-inflammatory agent. The antibiotic is present to prevent any possible overgrowth of microorganisms that might proliferate when the inflammatory response is lessened. The access is sealed with ZOE.

In a report by Van Cura and Remeikis, pain and hypersensitivity disappeared within an hour in 86% of patients treated with a cream composed of triamcinolone, nystatin, neomycin, and gramicidin. Ehrmann and other authors have separately reported excellent results with particularly rapid relief of pain when using similar combinations. My own experiences with these methods have been equally beneficial.

After this emergency treatment, routine endodontic therapy may be continued within 2 to 5 days. If the operator thought that the apex had not been violated but the telltale signs of overinstrumentation are verified, further adjustment of the canal working length should be made. Radiographs taken at various angles with a file in place may disclose that the apical foramen is exiting from the root surface at an unexpectedly coronal position.

Incomplete Removal of Pulp Tissue

When treatment during the initial appointment for endodontic therapy has consisted of pulpotomy or partial pulpectomy after a diagnosis of acute or chronic pulpitis, the patient may experience pain due to incomplete removal of inflamed pulp tissue. When an acute pulpitis is present without apical periodontitis, usually the inflammation is confined to the coronal pulp, which is removed during the pulpotomy. However, in a chronic pulpitis and in some cases of acute pulpitis as well, the inflammation may have already extended into the radicular pulp. Although initially a pulpotomy might relieve such pain, discomfort frequently returns. The symptoms of such pain may be sensitivity to hot and/or cold or pain to percussion.

This condition is confirmed when the access is reopened after local anesthetic administration and rubber dam application. A sterile paper point is placed in the canal, definitely short of the apical foramen. When withdrawn, the point will display the brownish discoloration indicative of inflamed seeping tissues. Radiographs are taken to determine canal length, and the remaining pulp

tissue is removed. A sterile cotton pellet is placed, and the access is sealed with ZOE.

If any chance of overinstrumentation has occurred and the tooth was tender to percussion, a corticosteroid–antibiotic combination should be used as previously described.

Recrudescence of a Chronic Apical Periodontitis

Most teeth with necrotic pulps and apical lesions are asymptomatic, and the periapical condition is referred to as chronic apical periodontitis. They are usually noticed when routine full-mouth radiographs are taken, at which time endodontic therapy is often advised. Although most teeth with this condition are successfully treated uneventfully, a low percentage of the chronic lesions become acute after the first endodontic appointment. This condition is then referred to as a recrudescence (defined as breaking out anew) or a phoenix (rebirth) abscess.

The exact reason for the condition is merely an object of speculation. Some point out that facultative anaerobic organisms, multiplying slowly in the low-oxygen environment of the periapical tissues, suddenly receive air when the canal is opened by endodontic therapy. With the improved conditions present, the bacteria supposedly fulminate violently and produce an acute reaction. This particular theory, however, has a few holes. In some cases, culturing of the tooth reveals no bacterial growth. In other cases the bacteria recovered by culture do not grow as facultative anaerobes.

However, the change in the environment within the root canal probably does have something to do with a recrudescence. Multiple strains may be harbored in a particular lesion. After initial canal instrumentation, some strains are severely reduced, whereas another may be relatively unaffected. Because there are fewer organisms with which to compete, a virulent strain may then begin rapid multiplication. Those cases of recrudescence without organisms being recovered may be due to faulty culture technique, to the culture medium used being unable to grow the causative organisms in a reasonable time, to the acute reaction being caused by overinstrumentation, or to necrotic debris being forced through the apex with an area of low resistance present.

The symptoms of a recrudescence are identical to those of an acute periapical abscess: mobility, tenderness to percussion, and swelling. The same emergency treatments in Table 3-1 for an acute abscess, incision and drainage through the root canal, may be used (Figure 3-20). If there is time and a chair is free, the tooth may be left open with a rubber dam in place and then reclosed when all the exudation has ceased. The initial exudation may be encouraged by irrigation with warm sterile saline or water. Generally the patient gains relief, and no further complication will occur. The tooth is completed one or two appointments later.

If the drainage refuses to stop or if there is not time or space to allow for drainage, the tooth may be left open and the patient dismissed. The tooth may be reclosed, without filing, when all the symptoms have disappeared 2 to 5 days later. Such cases may be closed with no medicament or with powdered sulfonamide on a paper point, plus ZOE.

To accomplish this, the rubber dam is applied and the access opened (Figure 3-21, *A*). Generally a heavy exudate will drain. A sample is taken to culture for possible antibiotic sensitivity testing when the exudate changes to a bloody discharge. The canal is irrigated with warm sterile water or saline solution and gently enlarged, without forceful exertion of the instrument against the canal wall. The canal should be left open with the dam still in place for at least 15 minutes, until the exudation has ceased or a slight clear serum drains. The canal is irrigated with sodium hypochlorite, dried with sterile paper points, and a dry cotton pellet placed in the chamber. A thick mix of ZOE closes the access (Figure 3-21, *B*).

The patient should be contacted within the next 24 hours to ensure that the tooth has remained quiet. A short appointment is scheduled within a week for a dressing change and slight additional canal enlargement. If symptoms remain absent, the canal is filled according to the normal schedule.

Recurrent Periapical Abscess

This condition refers to a tooth with an acute periapical abscess, relieved by emergency treatment, after which the acute symptoms return. Even with the access left open, packing of food debris or foreign objects such as segments of a toothpick, toothbrush, or chewing gum may prematurely stop the drainage. When an open tooth is both filed and closed at the same appointment, the abscess may recur. In still other cases the symptoms of an abscess return a few days after the access is closed, without any intervening treatment.

The emergency and follow-up treatments are also the same as those used to treat the acute periapical abscess. In some cases the abscess may recur more than once. This is usually due to microorganisms of high virulence or to poor host resistance. When a particular tooth has two exacerbations, it may be best treated with periapical surgery. However, if the indications for surgery are poor, as with mandibular molars or a debilitated patient, nonsurgical treatment must still be pursued.

As will be discussed in Chapter 13, cultures and antibiotic-sensitivity tests should be taken from the exudate of a recrudescence or a recurrent periapical abscess. It will normally take 48 to 72 hours to receive a bacteriologic report disclosing the antibiotics to which the microorganisms found are particularly sensitive. If an abscess recurs a second time, the patient should receive premedication with the effective antibiotic, with four doses taken before the access is closed, commencing the

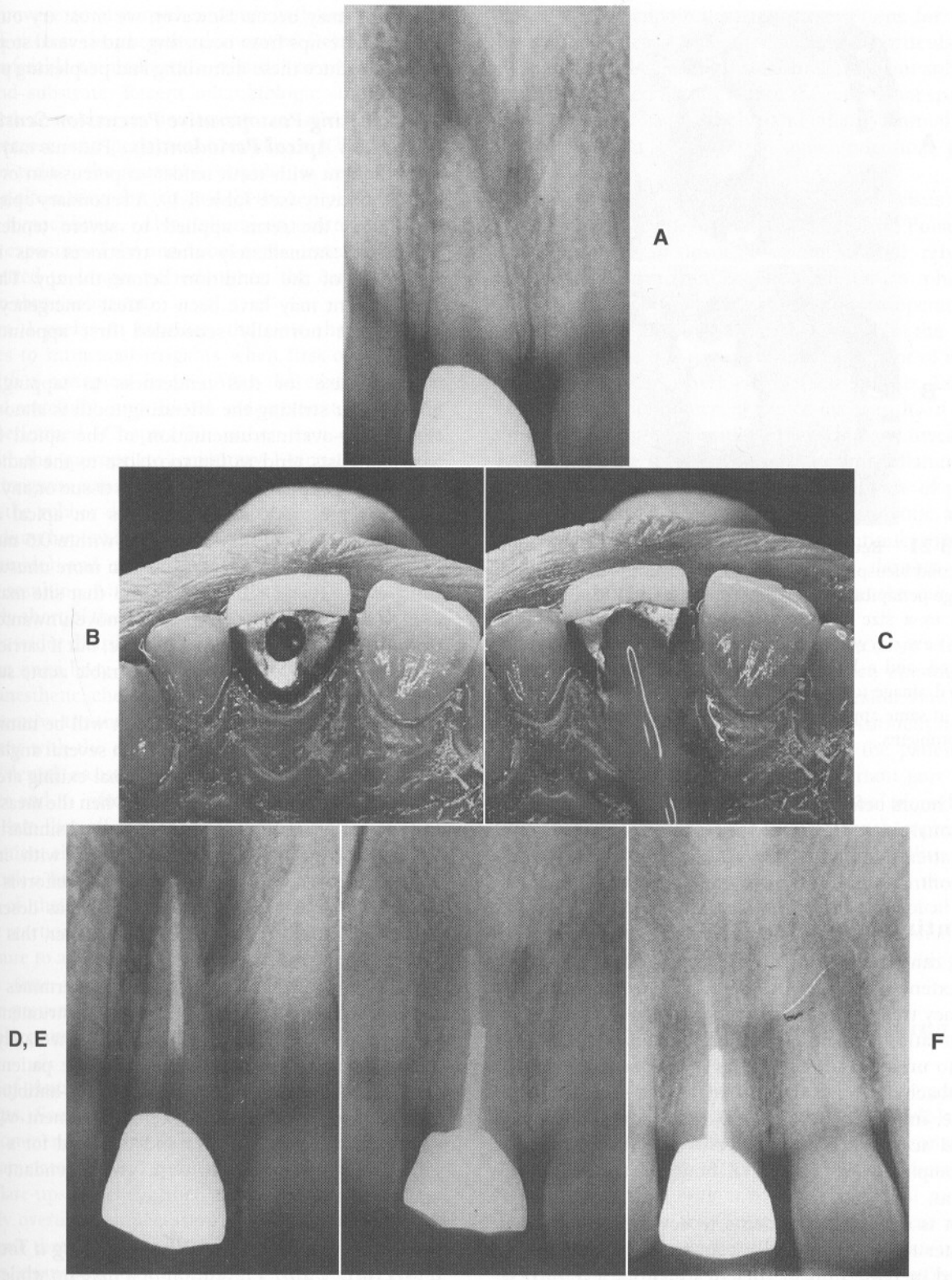


FIGURE 3-20 **A,** Preoperative radiograph of maxillary central incisor. Large periapical lesion, history of trauma, completely asymptomatic. **B,** Tooth was opened, canal prepared, and a temporary placed at the first appointment. Next day the patient experienced severe pain followed by a large swelling. The temporary was removed. **C,** An aspirator was applied to lingual access and a heavy purulent exudate discharged. The tooth was left open and reclosed a few days later. **D,** After several appointments, tooth is symptom free. A canal filling has been placed. **E,** Eleven years after original treatment, lesion exhibits perfect healing. **F,** Twenty-two years after original treatment, perfect healing demonstrated. (Restoration by Dr. Emory Bryant, Jr., Ft. Wayne, Ind.)

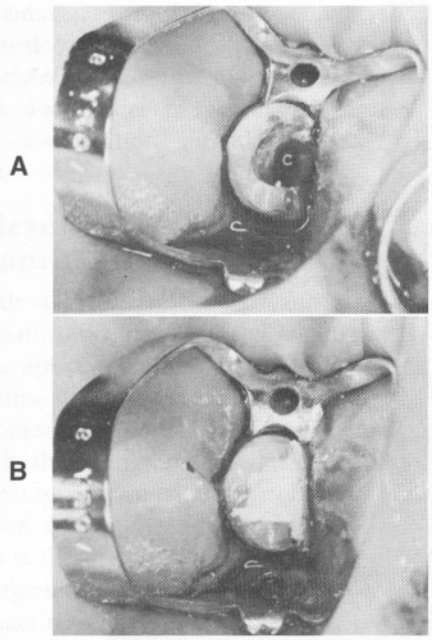


FIGURE 3-21 Reclosing a recrudescent abscess. A, Mandibular second bicuspid had been asymptomatic before treatment, but a large periapical radiolucency was present. Canal had been enlarged to a size 40 at previous appointment, but patient returned next day with severe swelling and pain. Rubber dam was placed, and a heavy bloody exudate discharged. **B,** After allowing drainage to subside, I irrigated the canal, dried it, and reclosed at same appointment. Therapy was completed without further problems.

drug 20 hours before the appointment and continuing for 3 additional days. This gives the body defenses additional help in attempting to keep the evidently virulent bacteria under control and may prevent the need for surgery.

Preventing Flare-ups During Treatment

Patients can accept that pain may continue or linger to a lesser extent when they come to the dental office for emergency treatment of a toothache. Following the often-used quotation, "Rome was not built in a day," the patient is able to understand that just as it took several days for the toothache to build up, so may it take several days to dissipate. Interestingly, if Table 3-1 is followed with great care and accuracy, a huge percentage of toothaches are gone completely within several hours of the emergency treatment.

What is difficult for patients to comprehend is when they enter the office virtually pain free but experience a sustained increase in pain after treatment or, even worse, when they have little or no pain before therapy but then encounter an explosive flare-up after the dental appointment.

As stated earlier, pain may follow even the best treatment and should not cause any patient/dentist problems if a good relationship exists before the flare-up, especially when the patient has been warned that such a change for the worse may occur. However, we must try our best to prevent flare-ups from occurring, and several steps can be taken to reduce these disturbing and perplexing problems.

Preventing Postoperative Percussion Sensitivity—Secondary Apical Periodontitis. Patients may come in for treatment with teeth tender to percussion or without such sensitivity (see Table 3-1). A secondary apical periodontitis is the term applied to severe tenderness to percussion immediately after treatment was initiated, regardless of the condition before therapy. The initial appointment may have been to treat emergency pain or merely the normally scheduled first appointment of therapy.

The cause for this tenderness to tapping, eating, chewing, or striking the offending tooth is almost always the same—overinstrumentation of the apical foramen. Many dentists tend to file too close to the radiographic apex to ensure that all residual pulp tissue or any necrotic debris is removed. All the studies on apical anatomy endorse the concept that any filing within 0.5 mm of the radiographic apex is too long, and in more unusual cases, filing even several millimeters from that site may be too long (Chapter 6). The desire to remove unwanted tissue from the canal is most commendable, but if carried to any extreme, it may lead to the undesirable acute secondary apical periodontitis.

The occurrence of this condition will be minimized if accurate radiographs are taken from several angles before any treatment and if the sites of canal exiting are located before any instrumentation. Then, when the measurement films are taken with files in place, several similarly angled views should be taken and analyzed with increased magnification (Chapter 6). If a concerted effort is made to file canals to the apical constriction or, as described by Kuttler (Chapter 6), to the minor diameter, this problem becomes minimal.

Most importantly, if the operator determines that the apex has been severely violated by overinstrumentation, it is mandatory to take remedial steps immediately at that appointment rather than waiting for the patient to call with pain. The use of the corticosteroid–antibiotic combination paste is used at the appointment when the overinstrumentation occurs and the need for a separate emergency appointment with the attendant painful episode is avoided.

Preventing Flare-ups When Treating a Tooth with a Necrotic Pulp. Prevention of a flare-up while treating a tooth with a necrotic pulp is much more difficult than when treating a tooth with a vital pulp. Generally the former already has some periapical breakdown, and thus the multiple immunologic and inflammatory factors are in place that might elicit the undesirable response. Even so, some logical choices in treating such cases will decrease the number of flare-ups that do result.

It is unwise to use medicaments with immunologic potential, such as the phenolic derivatives. Debridement is much preferable to medication in order to remove gross tissue and substrate. Recent microbiologic studies have implicated anaerobes as important causative agents in pulpal necrosis and periapical breakdown (Chapter 13). Efforts to reduce the anaerobic population seem logical, including alternating the irrigants hydrogen peroxide and sodium hypochlorite. Also, short appointments with minimal exposure of the anaerobes to the irrigants should be converted to longer periods when the canal may be bathed in these solutions.

In fact, I prefer to lengthen the time that I expose anaerobes to intracanal irrigants when first opening the tooth with a periapical lesion. After the canal has been measured carefully and initial enlargement, including flaring performed (Chapter 5), rather than closing the tooth with the appropriate temporary, I increase the time that the irrigants remain in the canal.

With the rubber dam still in place, obviously, I place some sodium hypochlorite and peroxide (either hydrogen or carbamide) and allow them to react, with oxygen foaming resulting. Minimal manipulation of a small file, absolutely short of the apex, further enhances the foaming and gives wider distribution of the oxygen.

If I am quite busy, I may have my next patient seated, give an anesthetic, check a recall appointment, or perform a postoperative treatment. If I leave the treatment room of the patient with the endodontic case still open, I have a reliable dental assistant remain with the patient for assurance and to inform me if anything untoward occurs (rubber dam flies off, patient becomes ill, etc.). I explain to the patient that I am "soaking the canal," just as they might soak a finger, foot, blister, or sore site on another portion of their body. I rarely, if ever, have had any negative reaction to this, and I believe that this added time of exposure to antianaerobic treatment has been valuable.

Extra time in ensuring well-debrided and cleaned canals to prevent flare-ups is much preferable to the need for extra appointments for patients in pain.

Use of Antibiotic and Other Agents to Prevent Flare-ups. Some reports have been published recently that recommend the use of antibiotics, antihistamines, anti-inflammatories, and other agents to prevent endodontic flare-ups. I believe that most of these substances are vastly overused, unnecessary, and potentially dangerous. I agree that patients with certain systemic conditions (diabetes, connective tissue disorders, tendency to retain water, history of flare-ups after endodontic treatment, etc.) are best covered by antibiotics. Some of the nonsteroidal anti-inflammatory drugs (NSAIDs) (Chapter 17) have been shown to be valuable when taken before an endodontic appointment to prevent postoperative pain.

However, in the vast majority of endodontic cases, postoperative pain serious enough to require an additional unanticipated appointment or prescriptions for relief of severe pain occurs infrequently. This is particularly true when canal debridement has been carried out sufficiently that the inflamed tissues within the pulp canal space have been removed adequately and that minimal or no instrumentation beyond the cementodentinal junction has occurred.

In a wide ranging study (946 patient visits), considering multiple types of cases, Walton and Fouad (from the University of Iowa, a dental school relying on adequate instrumentation as opposed to pharmacotherapeutics) reported the incidence of postoperative pain to be 3.17%. In this illuminating study the highest number of flare-ups occurred after treatment of an acute periapical abscess, where types of closure (see Table 3-1) and other factors of recrudescence may result. In cases of chronic apical periodontitis, for which many investigators recommend the use of antibiotics or anti-inflammatories, the flare-up problem occurred in only 3.4% of patients. Considering the problem of possible antibiotic allergies, the difficulty in selecting the correct antimicrobial agent, and the strong information that the flare-up will be extremely infrequent, it would seem that the use of these agents is without efficacy.

Again, I wish to state emphatically, there are a few cases when an antibiotic should be used when opening up an asymptomatic tooth with a periapical lesion, but I do not believe that this should be a constant treatment modality.

Selden has reported that informing the patient about the possibility of a flare-up is an important part of postappointment instructions after initiation of endodontic therapy. I strongly agree with this. Rather than prescribing in advance for a condition that in all probability will not occur, it is better to maintain contact with the patient (e.g., after initial treatment of an acute periapical abscess or, if one wishes, after treatment of an asymptomatic tooth with a periapical lesion) and then prescribing when warranted.

Significance of a Chronic Draining Sinus

The presence of a chronic draining sinus tract (often erroneously referred to as a fistula) is a favorable sign at the start of endodontic therapy. It is of considerable diagnostic aid (Chapter 2) and may be the indication that forces a patient to seek much-needed dental treatment. The closure of the tract after the debridement appointment is an excellent indication that there is an initiation of healing. This sign is equally obvious and impressive to the patient as well.

However, to the dentist the tract ensures that emergency therapy for intratreatment pain will not be needed, except when the apex is severely overinstrumented. Should any inflammatory products or microorganisms start to build up, they simply "blow out" through the sinus tract and prevent an exacerbation.

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