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# ENDODONTICS

COLLEAGUES FOR EXCELLENCE

## Endodontic Retreatment

### A Chance to Rewrite History

Your grandparents probably didn't expect to reach retirement with a full set of natural teeth. But young people today think a perfect smile is a birthright, not a luxury.

This shift in attitude reflects the tremendous advances that have occurred in dentistry over a single generation. Dentists are challenged to save teeth that in another era would have been extracted without question.

Endodontics plays a significant role in raising the standard of oral health. With advances in the techniques and technology for cleaning, shaping, and obturating root canals, clinicians can successfully treat increasingly difficult cases. This new knowledge can also improve or correct earlier efforts. Endodontic retreatment is an opportunity to resolve problems with state-of-the-art solutions. In other words, we can rewrite history.

Clinicians in the 90s can work more three-dimensionally within the root canal than ever before. They have a deeper understanding of anatomy and biology, more precise diagnostic skills, and instruments that enhance vision, illumination, and clinical techniques. It is now possible in most cases to remove posts and other restorative materials without sacrificing the tooth structure necessary for a solid restoration.

All dentists can better serve their patients and improve practice productivity through a broader understanding of endodontic retreatment. This issue of *ENDODONTICS: Colleagues for Excellence* explores new developments in non-surgical endodontic retreatment. Advances in endodontics mean that a failed root canal may have a second chance. We invite you to call on your endodontist colleagues as a resource. Working together, we can help patients rewrite their dental history.

## How the past impacts your future

In the last 35 years, the number of endodontic cases treated per year in the United States has risen from 2.5 million to as many as 40 million by some estimates. Over the years, studies have shown a wide range of success rates for root canal treatment reflecting the complex nature of endodontics. Outcomes vary based on the clinician's experience and expertise, the type of tooth involved, and a myriad of other clinical and biological factors.

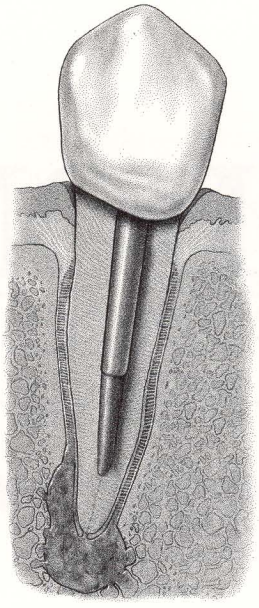
Millions of teeth receive endodontic treatment each year. Even with an optimistic 90 percent success rate, many failing cases will need retreatment. Up to one-third of an endodontist's practice may be devoted to retreatment. As more dental patients choose to retain their teeth, understanding endodontic retreatment will be increasingly important for dentists everywhere.

# Analyzing what happened

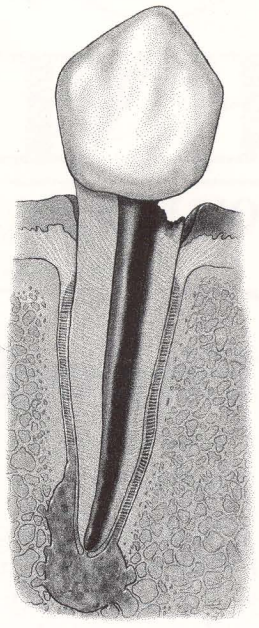
Inadequate cleaning and shaping is a major cause of endodontic failure. The complex and infinitely variable root canal system challenges every treatment outcome. New anatomical features are being observed in clinical practice and in research. For example, dentists once believed that most maxillary first molars had three canals, but studies revealed that as many as 75–80 percent have four canals. Similarly, more than one-third of lower incisors have two canals. Understanding root canal anatomy helps every practitioner to successfully prepare and obturate the root canal system.

**Common reasons for endodontic failure include:**

- **Missed canals**
- **Coronal leakage**
- **Post placement errors**
- **Blocks, ledges, perforations, and transportations**
- **Restoration failures**
- **Fractures**
- **Inadequately filled canals**
- **Separated instruments**



Incomplete root canal treatment is a common cause of endodontic failure.



Decay can lead to bacterial contamination of the root canal filling and a new infection.

Although there have been many advances in current root canal therapy, success still depends on a sound restoration. Coronal microleakage caused by caries or a failing restoration will allow bacteria-laden saliva to enter the canal, undoing even the most thorough root canal treatment.

# Charting a new course

Careful treatment planning sets the stage for a successful outcome. A win-win treatment plan is a strategy in which everyone—the patient, the restorative dentist, and any specialists involved—collaborates. A comprehensive assessment of a patient's dental health enables practitioners to evaluate failing endodontics and determine whether to watch, retreat, perform endodontic surgery, or extract. Biological, clinical, esthetic, functional, and financial factors must also be considered.

### Should this tooth be saved?

Prior to undertaking retreatment, it is important to assess the tooth's overall health and restorability, as well as its significance in the comprehensive treatment plan. Even if the patient is asymptomatic, consider retreating teeth with questionable root canal fillings if a new restoration is planned. Prosthetic intervention can precipitate endodontic problems although the case may have been successful for many years. Retreatment is always more challenging than the initial procedure. If no new restoration is planned, however, and clinical or radiographic evidence of pathosis is absent, it may be prudent to defer retreatment.

*The following guidelines can help you to develop your treatment plan:*

## Evaluate the periodontal status

The ability to distinguish an endodontic problem from a periodontal problem is essential. Before initiating endodontic retreatment, determine the status of the supporting tissues. Look for any periodontal tissue defects. Assess the pocket depth, mobility, and crown-to-root ratios before a treatment plan is finalized. Be sure that the attachment apparatus is sound.

If a pocket exists because of periodontal disease, even an excellent retreatment result will not improve a questionable periodontal prognosis. On the other hand, if a pocket is the result of failing endodontic therapy, healing is likely when endodontic retreatment is performed.

## Evaluate restorability before retreatment

Except in cases of a fractured or split root, most teeth can be successfully retreated. It is important, however, to have a predictable restorative treatment plan. If retreatment is chosen, this decision should be as good or better than any other treatment options. Although modern tooth replacements can be very effective, nothing is as good as a natural tooth.

Determine the amount of tooth structure that is available above the gingiva to establish a restorative margin. Placement of a crown margin on sound tooth structure provides stabilization of the crown against displacement forces. Crowns must not be cemented on core foundations without completely covering the core and extending at least 2 mm onto sound tooth structure—the ferrule effect. Likewise, crowns must not be cemented solely on core restorative materials. Restorations that are not supported by an adequate ferrule will eventually fail.

## Consider the impact of retreatment on the overall treatment plan

If this tooth were extracted, how would the overall treatment plan change? Will the restored tooth function for this patient? If the patient is a bruxer or clencher, will the additional burden on the dentition be detrimental? Will the retreated tooth be an adequate support for the final restoration?

Post placement errors can cause the loss of teeth with otherwise successful root canal treatments.

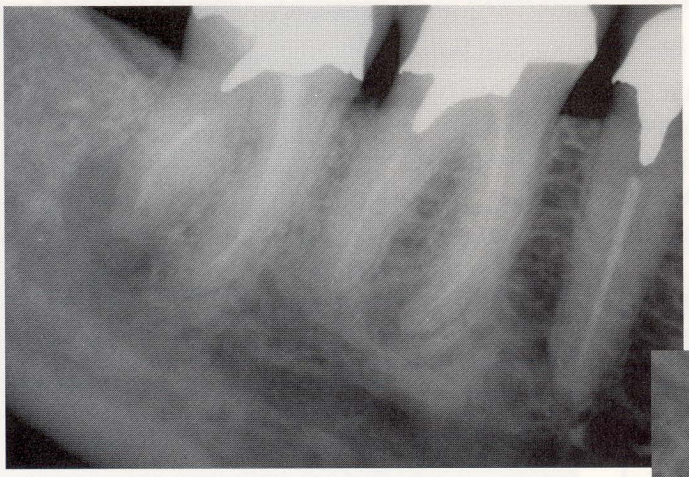
Electron micrograph of pulp debris left in the root canal that can continue to support the growth of bacteria.

## Assess the patient's concerns

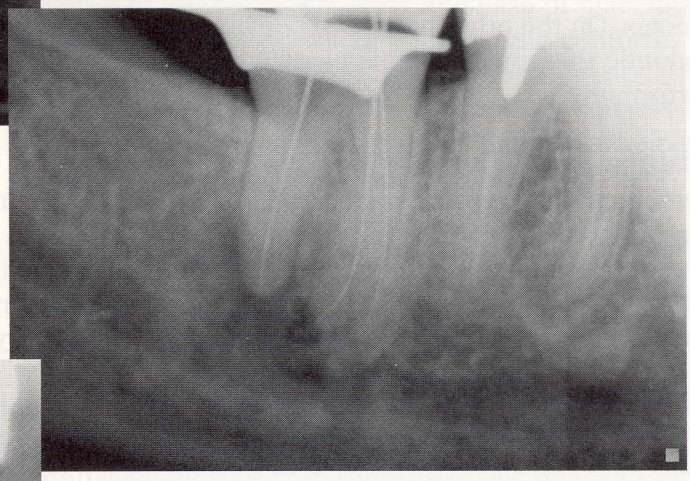
Will the patient be happy following treatment? The treatment results should also justify the expense both from your perspective and from the patient's point of view. Retreatment can be more cost-effective and time-saving than extraction and replacement. Determine the value the patient places on his or her dental health. If the patient is not likely to complete all the steps in the treatment plan, endodontic retreatment may not be the best choice. An effective restoration is imperative to prevent tooth fracture or leakage.

## Consider practice productivity

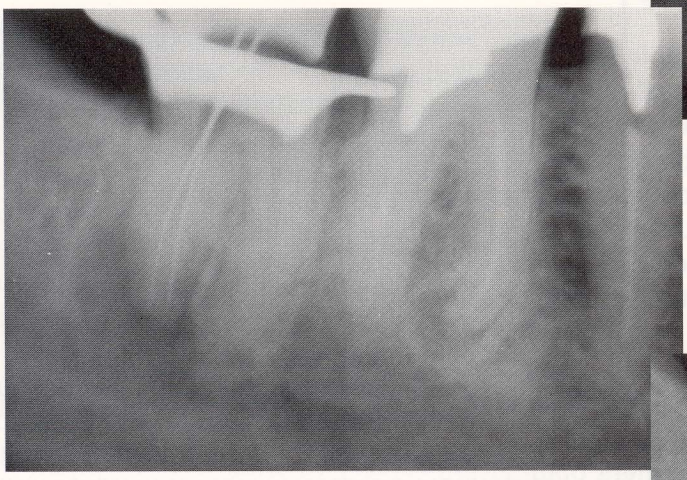
There are no shortcuts. Although cases vary in the level of difficulty, retreatment is always exacting and labor-intensive. Insurance plans seldom adequately reimburse dentists for the removal of crowns, posts, gutta percha, or silver points during retreatment. In addition, retreatment often involves special problems such as separated instruments, perforations, ledges, and obstructions. A team approach with referral to an endodontist is a viable option for dentists who may choose to devote their time to other treatment areas.



Teeth #30 and #31 with previous, failing root canal treatment.

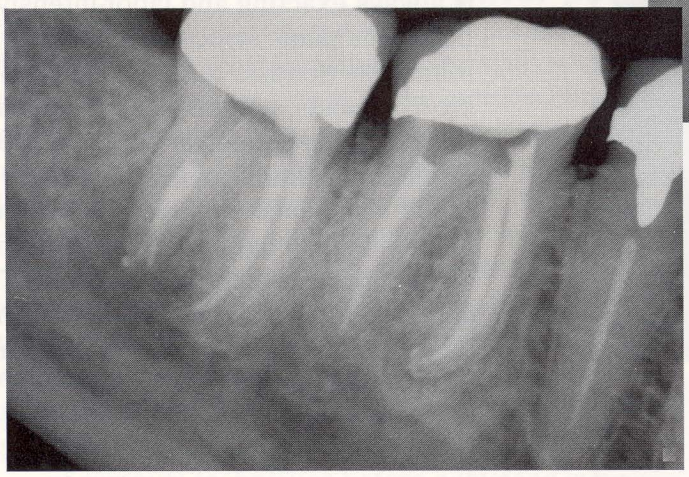


Tooth #31 is dismantled—removal of crown, post and core, and gutta percha. New file lengths are established.



A previously untreated distal-lingual canal is found.

The entire root canal system of #31 is cleaned, shaped, and obturated.



Completed endodontic retreatment of teeth #30 and #31.

# Communication leads to successful decision-making

Make your patient a partner in the treatment plan. Discovering that a tooth needs to be re-treated may cause patients anxiety. Communicating and sharing information will help to allay fear or skepticism. Working in conjunction with other members of the dental team, such as endodontists and periodontists, will help you to arrive at a sound diagnosis and appropriate treatment choices.

### Present the facts objectively

Dentists, as trained caregivers, are eager to help their patients. Resist the urge to allow a patient's fears or treatment biases to influence the information you present. Honesty and a comprehensive review of the issues are the most important considerations. Explain the diagnosis. Discuss the treatment options and the probability for success over time. Listen carefully and guide patients toward solutions that are appropriate for them.

### Evaluate the challenges

Can you perform the necessary procedures at an adequate skill level? Have you mastered the technology that will assure the best result? Treatment plans should anticipate a worst case scenario. Your patient will thank you for providing the highest quality dental experience.

### You are the captain of the dental team

Surround yourself with expert players whose support and cooperation can educate your patients and motivate them to follow your treatment plan. A well-coordinated treatment strategy will reinforce your patient's confidence. If you refer a patient, review the case with your colleague prior to the patient's appointment.

# Clean canals are essential with or without surgery

Even with advances in endodontic surgical techniques, surgery cannot fully eliminate bacteria and their by-products from the root canal system. If surgery is performed and the root canals are not clean, the prognosis is compromised. Retreatment offers the opportunity to address anatomical complexities that were not managed initially.

New technology makes non-surgical retreatment, when feasible, the option of choice. Treatment that was once more difficult or impossible is now facilitated by enhanced illumination and magnification, ultrasonics, apex locators, engine driven nickel-titanium instruments, variably tapered shaping instruments, contemporary filling techniques, and devices to remove intracanal obstructions. However, endodontic surgery may still be necessary even after a non-surgical retreatment.

Sometimes surgery is the only alternative. If the canal has been blocked, ledged, perforated, or transported, or if there are canal filling materials/posts that cannot be removed, surgery may be indicated. If retreatment might compromise a strategic restoration or bridge, then surgery may also be considered. Consultation with a specialist will help you evaluate these issues.

# Take a step back to move forward

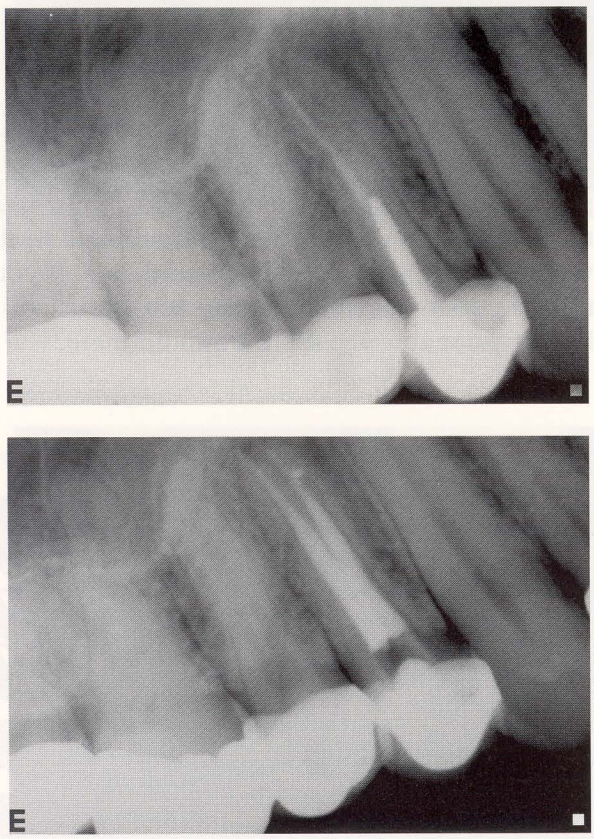
The difference between routine endodontic treatment and retreatment is the difference between building a new house and renovating an old one. Improvements must be made on a solid foundation. There are important decisions at each step in the process. Builders learn to expect the unexpected when they tear down an old structure. As a restoration is dismantled, dentists must also be prepared to resolve problems that were not visible on radiographs.

Removing restorations to access the root canals can reveal caries, restoration failures, complete and incomplete fractures, leakage, missed canals, blockages, ledges, and perforations. Preparation of the access cavity is also improved by removing the restoration.

Exciting new technologies are available to dismantle restorations. Ultrasonics, crown and bridge removers, as well as instruments to loosen and remove posts, have expanded treatment options. On the other hand, the cost of replacing a complex restoration may be a concern. Leaving the restoration in place may also be important for patient comfort, dental function, esthetics, or to facilitate isolation with a dental dam during treatment.

# Removal of obturation materials

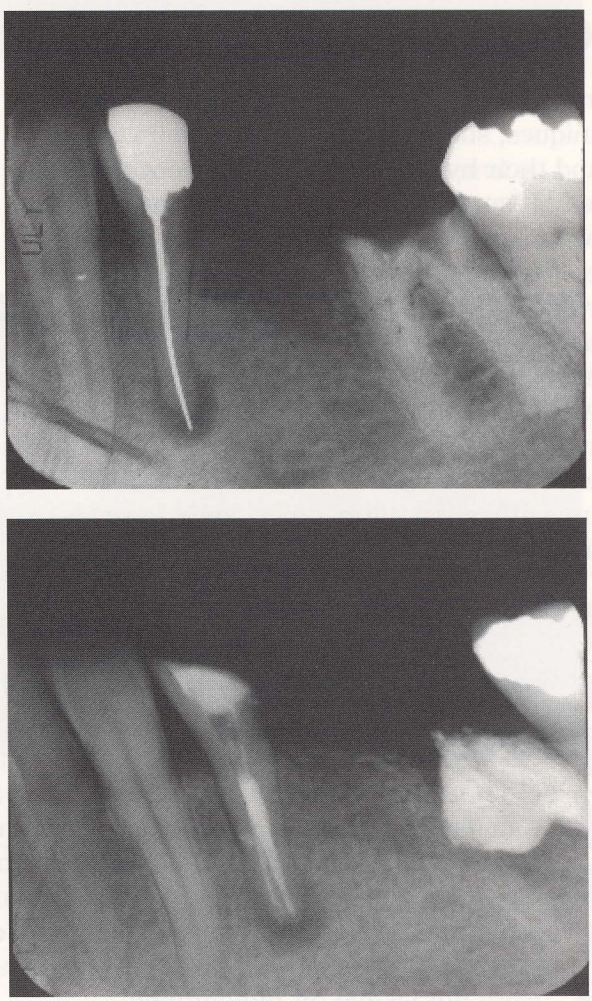
Before the canals can be cleaned and shaped, old obturation materials must be removed. Once again, retreatment imposes conditions that are not encountered in routine endodontic therapy. Obturated canals offer more resistance to instruments. Care must be taken to avoid ledging, perforating, or stripping the canal when removing previous root fillings.



Gutta percha retreatment requiring post removal in order to clean, shape, and fill both roots. An accessory canal was filled in the previously untreated palatal root.

## Gutta percha

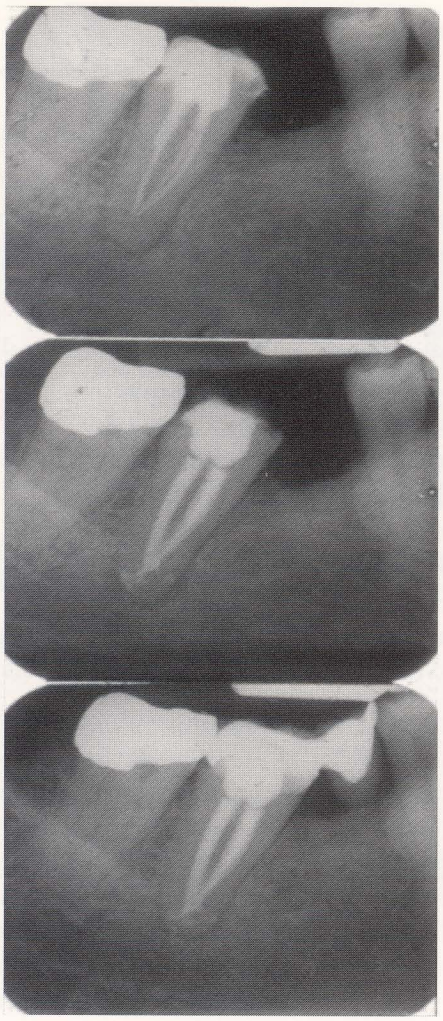
Gutta percha has been in use since the 19th century and continues to be the material of choice for obturation because of its biocompatibility and ease of placement. When heated or compacted, gutta percha conforms readily to canal morphology. Rotary instruments, heat, ultrasonics, hand instruments with heat or solvents can all be used to remove gutta percha. Selecting the best technique depends on the shape of the canal, the quality of the obturation, and whether objects such as broken instruments are present. Canals that were filled short of their apices, are sharply curved, or are obstructed pose the greatest challenge.



Silver point retreatment—A second canal and an accessory canal were obturated.

## Silver points

Clinicians today may encounter silver points in teeth needing retreatment. Variation in the size, retention, and position of silver points in the canal is common. Many techniques have been developed to remove them. The points cannot be extracted unless they are accessible. Restorative materials must be removed with care to avoid severing the head of the point and making it very difficult to retrieve. The heads of the silver points are usually surrounded by cement, amalgam, or other restorative material. Clinicians who are skilled at using enhanced magnification and illumination, as well as ultrasonic instruments, will have a tremendous advantage. Clinicians may have to experiment with a variety of removal techniques before achieving success.



Three carrier-based obturators were removed from this lower molar.

After the root canal system was thoroughly cleaned and shaped, significant apical anatomy was obturated.

Healing of the apical radiolucency was observed at a six-month recall examination.

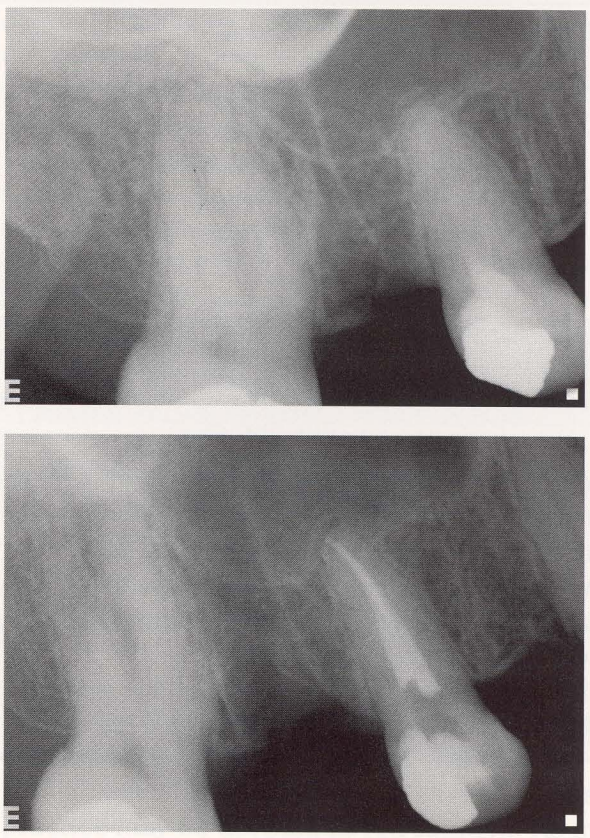
## Carrier-based obturators

Obturation with carrier-based gutta percha has steadily gained popularity. Carrier-based obturators are rigid cores coated with gutta percha. The obturators are heated to soften the gutta percha for placement in the canal.

Techniques for removing carrier-based obturators and silver points are similar. Clinicians must remove both the carrier and the gutta percha. The obturators used to carry gutta percha into the canal have evolved from metal to plastic. Metal carriers are more difficult to remove because their flutes can engage dentin. Although some plastic carriers contain a built-in groove designed to allow removal with a file, retrieving the carrier in this manner is not always possible. Plastic carriers smaller than size 40 are insoluble, but carriers size 40 or larger can be softened in some solvents.

## Paste

Root canal obturation with paste originated in Europe as an inexpensive alternative to traditional techniques. Practitioners may encounter two common types of paste. White, eugenol-based paste is typically soft and penetrable within the canal. The reddish-brown, resin-based paste, commonly used in Russia, Eastern Europe, and the Pacific Rim, is brick-hard and extremely difficult to remove. Solvents for many types of paste are available to aid in their removal. To choose the correct solvent, the practitioner must be experienced in paste identification. Flare-ups, canal blockages, and apical resorption are commonly encountered by clinicians who remove paste fills.



A white, eugenol-based paste filling was removed with solvents and files. Two canals with a common apex were retreated with gutta percha.

# In Summary

Patients today expect to retain their natural dentition for a lifetime. Dentists today are challenged to save teeth that in another era would have been extracted without question. Advances in endodontic retreatment allow practitioners to meet this challenge more predictably than ever before.

The practitioner's ability to accurately assess the restorative, endodontic, and periodontal outcomes will result in successful retreatment plans. Clearly communicating the option of retreatment will offer patients a rewarding alternative to extraction. Strengthening relationships with specialists on the dental team will increase your practice productivity. Together, we can rewrite history.

The information in this newsletter is meant to aid dentists in evaluating their treatment options when faced with failure of previous endodontic treatment. Practitioners must always use their best professional judgment, taking into account the needs of each individual patient. The AAE neither expressly nor implicitly warrants any positive results nor expressly nor implicitly warrants against any negative results associated with the application of this information.

If you would like more information on retreatment considerations, call your local endodontist or contact the American Association of Endodontists, 211 E. Chicago Avenue, Ste. 1100, Chicago, Illinois 60611.

# Comments?

Did you enjoy this issue of *ENDODONTICS*? Did the information have a positive impact on your practice? Are there topics you would like *ENDODONTICS* to cover in the future? We want to hear from you! Send your comments, questions, and suggestions to:

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**Bibliography for Spring/Summer 1998 *ENDODONTICS: Colleagues for Excellence***
***Endodontic Retreatment: A Chance to Rewrite History***


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