

The Endo-Restorative Interface: Current Concepts

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The primary goals of endodontic treatment are straightforward: to debride and disinfect the root canal space to the greatest possible extent, and then seal the canals as effectively as possible. The materials and techniques change somewhat over time, but not the ultimate goals. The primary goals of restorative treatment are to restore teeth to function and comfort and in some cases, aesthetics. Once again, the materials and techniques change, but not the ultimate goals of treatment. Successful endodontic treatment depends on the restorative treatment that follows. The connection between endodontic treatment and restorative dentistry is well accepted, but the best restorative approaches for endodontically treated teeth have always been somewhat controversial. The topic is no less controversial today, despite the massive (and ever growing) amount of information available from research, journal articles, courses, “expert” opinions, and various sources from the Internet. In fact, information overload contributes to the controversy because so much of it is contradictory.

With the emergence of implants into the mainstream of dentistry, there has been more emphasis on long-term outcomes and on evaluating the “restorability” of teeth prior to endodontic treatment. Patients are not well served if the endodontic treatment is successful but the tooth fails. The long-term viability of endodontically treated teeth is no longer a “given” in the implant era. In consequence, some teeth that might have received endodontic treatment in the past are now extracted and replaced with implant-supported prostheses if they are marginally restorable or it makes more sense in the overall treatment plan. It is not possible to review in one article all the literature on the restoration of endodontically treated teeth. This article therefore focuses primarily on current concepts based on the literature from the past 10 years or so, and provides treatment guidelines based on that research.

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THE RELATIONSHIP BETWEEN ENDODONTICS AND RESTORATIVE DENTISTRY

Long-term success of endodontic treatment is highly dependent on the restorative treatment that follows. Once restored, the tooth must be structurally sound and the disinfected status of the root canal system must be maintained. Because microorganisms are known to be the primary etiologic factor for apical periodontitis¹ and endodontic failure,² contamination of the root canal system during or after restorative treatment is considered an important factor in the ultimate success or failure. Exposure of gutta-percha to saliva in the pulp chamber results in migration of bacteria to the apex in a matter of days.³ Endotoxin reaches the apex even faster.⁴ The importance of the coronal restoration in successful endodontic treatment has been shown in several studies.^{5,6} Delayed restoration has been shown to result in lower success rates.⁷

Successful restorative treatment is also greatly influenced by the execution of the endodontic procedures. Radicular and coronal tooth structure should be preserved to the greatest possible extent during endodontic procedures.⁸⁻¹⁰ Root canal preparations should attempt to preserve dentin in the coronal one-third of the root. There is no reason to prepare a “coke bottle” type of canal preparation (Fig. 1) that weakens the tooth unnecessarily. Access preparations similarly should be made in such a way that cervical dentin is preserved. The roof of the pulp chamber should be removed carefully, preserving the walls of the chamber as much as possible. The chamber walls should be prepared only to the extent that is necessary for adequate access for endodontic treatment.

Many, if not most endodontically treated teeth today are restored with adhesive materials. Adhesive materials provide an immediate seal and some immediate strengthening of the tooth. These materials are generally not dependent on gross mechanical retention, so tooth structure can be preserved. The sections that follow discuss basic principles of adhesive dentistry and some of the limitations, pitfalls, and special problems presented by endodontically treated teeth.

BONDING TO ENAMEL

Enamel is a highly mineralized tissue that is often present along the margins of access preparations of anterior teeth and sometimes in posterior teeth. Effective bonding



Fig. 1. This radiograph shows canals prepared with a “coke bottle” design. Excessive dentin was removed in the cervical one-third of the root and the apical preparations are thin.

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