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Failed Root Canals: The Case for Extraction and Immediate Implant Placement

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Preservation of teeth has been the treatment of choice and a fundamental principle of dentistry. In contrast, the extraction of natural teeth has been considered undesirable because of the often limited long-term success of the alternate prosthodontic replacements.[1] To this end, heroic efforts have been made to preserve teeth, ranging from advanced endodontic and periodontal therapy (including hemisections, root resections, and apicoectomies), in conjunction with more conventional procedures (including post and core fabrication and crown lengthening). Endosseous implants, based on the biologic and functional principles of osseointegration and functional ankylosis, provide a predictable and well-documented means of supporting tooth replacements, and as such have become a routine alternative for treatment of missing teeth. When one compares the predictability of endodontically treated teeth and implants as foundations for restorative dentistry, it is clear that the literature supports a distinct advantage of implants.

The decision to extract, versus endodontically restore, a natural tooth depends on the following: quality of support the tooth will provide for planned restorations, predicted longevity, and its role in the overall rehabilitation, functionally, esthetically, and financially.[2,3] Before any definitive treatment decisions are made, it is important to assess the quality of tooth support compared with that provided by implants.

The reported success of nonsurgical endodontic therapy is variable. When performed by specialist endodontists, success rates have been found to be between 70% and 95%.[4] This differs from published success rates achieved by general dental practitioners, which can be substantially lower; in the range of 64% to 75%.[5] Endodontic therapy alone does not guarantee successful retention of the tooth or prevent its future loss, as most failures associated with endodontically treated teeth are not endodontic in nature. Recurrent dental caries, root fracture, and periodontal disease, in conjunction with apical periodontitis, have been associated with these failures.[6-8] These studies suggest that such factors are indications for tooth extraction more frequently than endodontic failure itself.

Endodontically treated teeth are often associated with one or more of these factors, as they are often heavily and repeatedly restored, and as such are associated with substantial loss of tooth structure. The loss of tooth structure is directly related to the ability of the tooth to resist fracture.[9] Further, the presence of restorative margins, particularly those positioned subgingivally, has been consistently associated with dental caries and periodontal disease.

Caplan and Weintraub[6] evaluated the loss of teeth following nonsurgical endodontic therapy and found a survival rate of 67% at 5 years and 56% at 8 years. Of the failed teeth, the indications for extraction were periodontal disease (22%), vertical root fracture (20%), dental caries (16%), nonrestorable tooth fracture (10%), and unknown (32%).[6]

When conventional endodontic therapy fails, it is typically linked to failure to meet accepted clinical standards.[10] Teeth with curved and narrow canals make complete obturation difficult to achieve. Multirooted teeth present challenges to instrumentation and obturation, with lateral and curved roots creating obstacles to treatment success. Retreatment in these cases can be difficult, whether surgical or nonsurgical

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methods are used. In the majority of instances, endodontic failure is associated with persistent or secondary intraradicular infection in the apical portion of the root canal system.[10] While modern therapy using microscopic techniques has greatly improved the predictability of endodontic therapy in these cases, failures are still noted and associated with extraradicular and/or intraradicular infections and intrinsic or extrinsic nonmicrobial factors, as previously noted.[10–12] Re-treatment of failed endodontic therapy is often complex. These procedures, in addition to being time-consuming and expensive, expose the patient to a significant decrease in the long-term predictability of any planned restoration(s) as valuable tooth structure has been lost leading to decreased structural integrity.

As with conventional endodontic therapy, long-term success of implant-based treatment varies depending on the experience of the clinicians, location, technique, and system.[13] However, long-term implant survival rates better than 90% are well supported by the literature.[14–18] Modern implant surfaces provide more predictable integration (measured by bone-implant contact, removal torque, and resonance frequency) at all time intervals, making the implant a predictable treatment foundation for the long-term restoration of missing teeth. When one compares the predictability of endodontically treated teeth versus implants as foundations for restorative dentistry, it is clear that the literature provides a clear advantage for implants. This is most likely related to their obvious resistance to dental caries, periodontal disease, and structural deficiencies.

Single-rooted teeth with structural integrity and intact coronal structure are the best candidates for traditional endodontic treatment, especially in instances where the esthetic outcome is important for the patient. The loss of vitality in these teeth is often related to trauma. In contrast to this, typical teeth requiring endodontic therapy present with a significant caries and restorative history, resulting in substantial coronal structural loss. Most of these teeth require additional restorative care as part of the long-term treatment, and this further compromises the retained structure and periodontal and caries status.

Treatment in the esthetic zone, tooth or implant-based, requires restorative margins to be positioned within the gingival sulcus. Such margins are associated with plaque retention and often violate the principles of biologic width.[19,20] Implant-based restorations benefit from the use of machined components, ensuring greater marginal integrity and a reduction in the presence of plaque and rough edges. Screw-retained crowns allow for the absence of cement, further increasing gingival health. Correctly placed implants, positioned in idealized sites, with the use of appropriately timed provisional restorations to shape the surrounding soft tissue, can be associated with comparable (and often superior) esthetic results to fixed prosthodontic restoration on natural teeth.[21]

Immediate placement of dental implants to support replacements of single teeth, even in esthetic sites, is now very predictable.[22–24] Immediately placed implants have numerous advantages over delayed placement techniques, including maintenance of the existing gingival embrasure form and marginal contour, preservation of the existing bone, reduced surgical procedures, and shorter treatment times.[25,26] The long-term ability of the implant to retain a crown is superior to that of a natural tooth, particularly one that is endodontically treated and supporting a post and core.

The spiraling costs of saving endodontically re-treated teeth, when extraction is a common endpoint, begs the question of whether such teeth should be sacrificed early. Should such teeth be removed and restored from the outset with an implant-based restoration? The financial cost of extrusion, surgery, endodontic re-treatment, post and core, and crown is often significantly more than extraction and implant-supported restoration. This is especially true with single missing teeth, where the possibility of immediate implant placement exists. The cost of implant treatment for single teeth compares favorably with the cost of traditional restorative care, especially when considering the average life span of crowns on natural teeth.

Immediate implant placement is a predictable and widely practiced procedure with demonstrated efficacy for the long-term restoration of missing teeth. It is thus possible to consider early removal of teeth and placement of implants and implant-based restorations as a favorable treatment option compared with the majority of endodontically treated teeth. Emphasis, as always, should be on planning and assessment of each individual circumstance to identify the treatment most appropriate for each patient.

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