

Endodontics vs Implants: Treatment Planning Decisions



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Endodontic therapy provides preservation of the natural dentition which is a primary goal of dentistry. Yet endodontic success is closely linked to the restorability of the coronal aspect of the tooth. Being able to identify, instrument and obturate the canals is important but if the tooth cannot be predictably restored then treatment will not provide clinical success. A lack of sufficient coronal structure to retain a restoration returning the tooth to natural anatomy often leads to dislodgement of the restoration during function, failure of the coronal seal of the canal system and subsequent failure of the endodontic obturation.

When a patient presents with significant coronal breakdown of a tooth this presents clinical challenges with regard to treatment planning decisions for that tooth. If the practitioner performs Endodontic treatment in their practice, do they treat the tooth and augment that treatment with crown lengthening to permit sufficient ferrule (a band of natural tooth that is circumferentially grasped by the crown that prevents lateral displacement of the crown from the tooth) of the remaining root structure to allow restoration, or is it more prudent to extract the tooth and place an implant? If the practitioner is an Endodontist who is being referred the patient for treatment, are they assuming the referring general dentist has determined that sufficient tooth structure is present to restore the tooth predictably following endodontic treatment? We have to understand that endodontics is a restorative treatment with an endodontic component and evaluation in that regard needs to be accomplished prior to initiating any endodontic treatment.

With regard to indirect restorations such as full coverage crowns and onlays, the literature has suggested that a 1.5-mm to 2-mm ferrule is minimally necessary to prevent fracture of the endodontically treated tooth and provide resistance to displacement of the fixed restoration.¹⁻⁵ Today with improvements in adhesive dentistry, the emphasis has drifted away from the principle of restorative ferrule. Practitioners may be relying too heavily on adhesive bond strength to retain fixed prosthetic restoration margins sealed. Thus, thought should be given to how much coronal structure remains when deciding if a tooth should be treated endodontically or replaced with an implant. Those restorative decisions need to be made prior to the initiation of endodontic treatment. The practitioner must determine which additional procedures will be necessary to achieve the restorative goals required and how those procedures will affect the tooth being treated and adjacent teeth.

Raise the Bridge or Lower the Water?

A patient presents with a broken-down tooth that has pulpal issues or would require intentional endodontics to allow restoration. The restorability of that affected tooth needs to be the first consideration in deciding how and what treatment is required for predictability long-term. When analyzing how that tooth may be restored following endodontic treatment, one has to determine if sufficient root length remains to allow stability of the tooth once it is restored. Is adequate supracrestal tooth structure present to provide a restorative ferrule? What ancillary procedures may help increase supracrestal tooth structure to ferrule?

Osseous Crown Lengthening to Improve Restorative Ferrule

Traditionally, when insufficient tooth structure presents supracrestally, osseous crown-lengthening procedures have been employed to increase the available coronal tooth structure to achieve a restorative ferrule.^{6, 7} This presents challenges in treatment with regard to adjacent teeth. Osseous crown lengthening will require the removal of crestal bone on the adjacent teeth to create osseous slopes that will allow soft tissue maintenance. One cannot just remove bone around an individual tooth which leads to isolated pocketing and abrupt slopes in the bone. This then leads to adjacent bone loss as the body attempts to create gentle crestal osseous slopes that it can maintain over time. So, to create adequate coronal tooth structure for restorative purposes the periodontal structures adjacent to that tooth may have to be compromised.

The removal of crestal bone additionally may expose furcation's on posterior teeth that can complicate homecare exposing areas that may be difficult to maintain over the long-term by the patient. This may also be a factor in the maxillary first premolars, which typically have a mesial root concavity that can create restorative challenges. When the tooth being treated has a short cervical trunk or the furcation is already at or just coronal to the crestal margin, removal of additional bone may be contraindicated and extraction of the tooth and subsequent replacement with an implant may be a more prudent treatment option. Some studies have reported lower long-term survival in those endodontically treated teeth that underwent osseous crown lengthening and this should be a consideration in decisions that may incorporate that into the treatment plan.⁸⁻¹⁰

Forced Orthodontic Eruption

An alternative to osseous crown lengthening when additional tooth structure is needed restoratively is the use of forced orthodontic eruption.^{11, 12} Following completion of endodontic treatment, orthodontic forces are used to erupt the tooth coronally, exposing more root structure upon which a ferrule may be placed.¹³⁻¹⁵ When this option is considered, one needs to assess how much root length will remain within the osseous housing following forced orthodontic eruption and whether this allows an adequate crown-to-root ratio to maintain tooth stability over time. This approach is more ideally suited for single rooted teeth than multi rooted teeth.^{16, 17} As with crown lengthening, forced eruption of multi-rooted teeth may create furcation issues and may be a contraindication to this treatment modality.

Orthodontic extrusion involves slow forces of low intensity that are exerted on the tooth and as the tooth extrudes, the crestal bone and gingival apparatus move together coronally. When heavier traction forces are exerted, as seen in rapid extrusion, coronal migration of the tissues supporting the tooth is less pronounced. As rapid movement exceeds the capacity for physiologic adaptation, the

tooth erupts coronally beyond the crestal bone.^{18, 19} Following rapid extrusion an extended period of retention to allow remodeling and adaptation of the periodontium to the new tooth position.^{20, 21}

Clinical Decisions For Single-rooted Teeth



Figure 1 A single-rooted tooth that has lost coronal structure to the crestal margin of bone with insufficient tooth structure coronal to the crestal bone has a lack of tooth structure to achieve ferrule.

A patient presents with coronal breakdown of a single-rooted tooth that is at or close to the crestal bone margin. (Figure 1) The length of the root subcrestally must be determined. Is there sufficient root length that movement of the crestal margin in relation to the coronal of the remaining tooth structure will not compromise the crown-to-root ratio of the restored tooth?



Figure 2: To achieve a restorative ferrule, osseous crown lengthening may be performed but this requires removal of bone from the adjacent teeth to create the proper contours that compromises the adjacent teeth periodontally.



Figure 3 An alternate treatment to achieve a restorative ferrule without affecting the adjacent teeth periodontally is orthodontic forced eruption of the affected tooth.

If the answer is “yes,” then two options are considered: clinical crown lengthening (Figure 2) or orthodontic extrusion. (Figure 3) Should the answer be “no,” then extraction and replacement with an implant is the treatment that is indicated.

Clinical Decisions for Multi-rooted Teeth

A common clinical occurrence involves the presentation of a molar with significant coronal breakdown either because of fracture or decay (Figure 4). The presence of a furcation presents unique variables compared to single-rooted teeth.

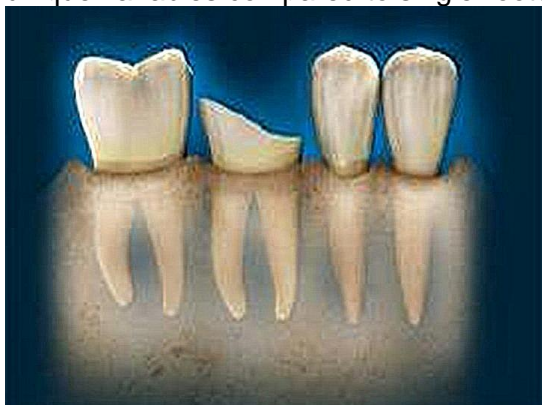


Figure 4: A multi-rooted tooth with coronal breakdown close to the osseous crest presents that would require Endodontic treatment but lacks sufficient restorative ferrule in its current state.



Figure 5 Osseous crown lengthening may be performed to achieve a restorative ferrule which requires recontouring of the bone on the adjacent teeth, possibly leading to furcation exposure on the affected or adjacent teeth.



Figure 6 An alternative treatment is forced orthodontic eruption of the multi-rooted teeth which can lead to exposure of the furcation and complicate patient home care and long-term survivability of the tooth.

When analyzing the restorability of a molar, practitioners need to consider: Will repositioning the crestal bone margin either through osseous crown lengthening (Figure 5) or extrusion (Figure 6) expose the furcation and complicate long-term patient homecare and tooth maintenance? Teeth with short cervical areas (portion of the tooth superior to the start of the furcation) limit what treatments may be performed to provide restorative ferrules. Teeth with long cervical areas or fused roots may be better suited to those procedures, providing clinical outcomes that can be maintained over the long-term by the patient. When these objectives cannot be met, extraction and implant placement offer a better prognosis.

Conclusion

Dentistry is restoratively driven, supplemented by endodontic and surgical components. When a tooth cannot be restored, then it does not matter whether endodontic treatment can be or is rendered, long-term survival of that tooth cannot be predictably achieved. Treatment planning decisions need to focus on the restorability of the tooth when deciding what treatment will provide reasonable long-term success. The patient's age plays a factor in those treatment planning decisions. A patient with the same lack of restorative ferrule that is their 80's presents less long-term considerations than a similar tooth on a patient that is 70 or younger in better health. If the tooth can be restored, then pursuing endodontic treatment is the best treatment decision. But when this cannot be accomplished or the restorative prognosis cannot provide reasonable long-term success, then extraction and implant placement is the more prudent treatment option.

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