



ORIGINAL RESEARCH PAPER

Conservative Dentistry

ENHANCING THE ENDODONTIC TREATMENT OUTCOME WITH PRE-ENDODONTIC BUILDUP - A CASE SERIES

KEY WORDS: Cervical Margin Relocation, Doughnut Technique, Canal Projection, Immediate Esthetic Buildup.

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ABSTRACT

Present-day endodontic treatments make an effort to eliminate microorganisms from the cavity while also removing bacteria, infected tissue, and dentin. Endodontists think about preendodontic restoration for the most effective rubber dam isolation and increased irrigation space before commencing root canal treatments. This procedure makes postendodontic restoration easier by preventing fractures in poor tooth structure. In addition, it facilitates effective interappointment execution, minimizing medication seepage, gingival ingrowth, and bacterial microleakage. This case series explores different techniques used in restorative dentistry for pre-endodontic buildup with particular emphasis on the Cervical Margin Relocation Technique, Doughnut Technique, Canal Projection Technique, Immediate Esthetic Buildup for tooth isolation. These techniques are explained in detail, alongside their respective procedures and it also emphasizes that the choice of technique and restorative material should be carefully considered depending on the specific needs and conditions of the tooth to be restored.

INTRODUCTION

Endodontic therapy is a type of dental care designed to safeguard natural teeth from severe deterioration, painful infections of the pulp, or irreversible pulpitis. Dental pulp, the active tissue with blood vessels, nerves, and connective tissue in the center of a tooth, can be damaged by trauma, fractures, previous dental work, or decay, leading to discomfort and abscesses. Endodontic therapy aims to remove diseased or inflammatory pulp from root canals, limiting the progression of infection and discomfort. This method offers benefits over extractions by retaining dental structure, maintaining chewing function, reducing tooth movement, and maintaining natural esthetics.[1]

A four-walled access cavity, which enables effective cleaning, shaping, and filling of root canals, is essential for the success of RCT. However, when teeth needing RCT have significantly lost structural integrity as a result of trauma or decay, gaining this access might be difficult. A pretreatment technique is frequently required to remedy this. Using dental tools, this phase entails eliminating caries or damage and making a suitable access cavity.[2-4]

In order to avoid contamination from oral secretions during RCT, a rubber dam (RD) must be used.[3] A preendodontic restoration permits efficient interappointment temporization for preventing seepage of intracanal medicaments, gingival ingrowth into the cavity or bacterial microleakage.[3]

Preendodontic buildup minimizes fractures during or after root canal operations by adding a durable substance to the tooth's coronal structure, significantly improving the treated tooth's long-term success and function. In addition, it prevents vertical root fractures by distributing chewing forces uniformly and providing crown support, lowering the likelihood of catastrophic fractures and the necessity for extraction [3,4]

Current Concepts and Decision-making Flowchart

The decision to perform pre-endodontic restoration is multifactorial and should be individualized based on the specific needs of each patient. Factors include the extent of structural compromise, aesthetic requirements, the presence of periapical pathology, root damage, complexities in the root canal system, and proximity to adjacent anatomical structures, the patient's oral hygiene habits, and the overall stability of the tooth. Adhesive restorative methods play a key role in preendodontic restoration. Surgical and orthodontic techniques are also valuable tools in pre-endodontic restoration (crown lengthening or soft tissue grafting). (Figure 1)

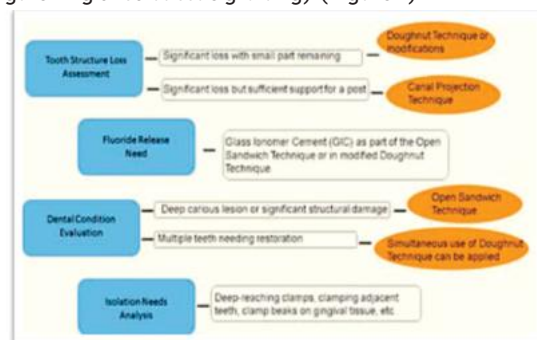


Figure 1. Pre-Endodontic Restoration Techniques: Current Concepts and Decision-Making Flowchart

Advantages

1. Strengthening of weakened tooth structure: The reinforcing of compromised tooth structures is one of the primary advantages of preendodontic build-up.[5]
2. Prevention of vertical root fractures: Vertical root fractures are a grave issue that may arise in teeth with structural damage, and preendodontic buildup can be helpful in

avoiding them.[6]

3. Improved access and visibility during RCT: Preendodontic buildup enables more substantial access and visibility for the endodontist during the root canal execution by regaining the tooth's crown to its legitimate structure and function.[7]
4. Enhanced predictability of endodontic treatment: A tooth with damage to the structure and inadequate preendodontic buildup might present difficulties during root canal therapy.[8]
5. Preservation of natural dentition: Preendodontic buildup prevents tooth extraction in situations of severe structural damage, preserving the original dentition.[9]
6. Improved long-term prognosis: Preendodontic buildup paves the way for effective root canal therapy and considerably improves the long-term outlook for the treated tooth.[3]
7. Enhanced esthetics: Preendodontic buildup can enhance the appearance of the tooth by using contemporary dental materials.[10]
8. Application of RD: A correctly applied preendodontic buildup restores the tooth's coronal structure, giving RD clamps a solid and unbroken surface to be securely fitted to. This improved stability makes it easier to isolate the tooth properly, guaranteeing that the RD stays firmly in place throughout the treatment. [11,12,13]

This paper's main goals are to present different types of preendodontic buildup cases as a series with their techniques to help clinicians achieve these same advantages.

Cervical Margin Relocation

Dietschi and Spreafico [14] are credited with coining the term "cervical margin relocation" (CMR), which describes the relocation of a deep cervical margin to a supragingival position using resin composite. Other scholars also refer to this technique as "deep margin elevation" or "proximal box elevation." This method is especially advantageous in cases of a localized deep margin with sufficient enamel for bonding when planning an adhesive final restoration. The approach enables immediate dentine sealing (IDS) before margin relocation, preventing contamination, enhancing bond strength, and allowing for a second IDS after endodontic treatment.

Procedure: In CMR, a temporary crown or an adhesive restoration is placed on the tooth before endodontic therapy, extending coronally to relocate the margin. Once the endodontic treatment is completed, the temporary restoration can be replaced by a permanent one. The CMR procedure creates a favorable environment that aids in better isolation and control of bleeding during the endodontic procedure. (Figure.2)



FIGURE 2. CERVICAL MARGIN RELOCATION 2A: AFTER CARIES REMOVAL AND ORIFICES OF CANAL BLOCKED WITH TEFLON; 2B: RUBBER DAM ISOLATION; 2C: PREENDODONTIC BUILDUP DONE WITH CMR APPROACH; 2D: IOPAR AFTER BUILDUP

This technique helps to maintain periodontal health, achieve better control of the operative field, and facilitate the placement of the final restoration and prevents damage to periodontal tissues that can occur if traditional crown lengthening procedures are used.

However, it's important to note that CMR is a technique sensitive procedure and requires meticulous planning and execution. It is not suitable for all cases and should only be considered when other non-surgical restorative measures are not sufficient. [15]

Doughnut Technique

For nonadhesive final restorations, such as conventional

crowns, the doughnut technique may be used in cases where multiple walls are missing, and there is a significant margin into dentine, making matrix stability unachievable.

Procedure: This involves a circumferential buildup of cavity walls and a suitable barrier to prevent blockage of root canal orifices, using either free-hand or two-step preendodontic core buildups as an interim solution before definitive crown preparation. While the technique is relatively simple and maintains access to the root canal system, concerns exist about marginal adaptation and overhang management, especially when applied free-hand [4] (Figure.3).

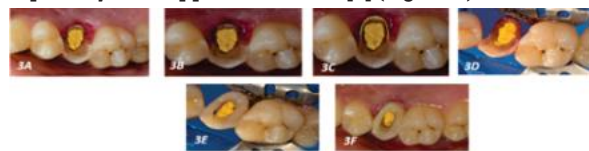


FIGURE 3. DOUGHNUT TECHNIQUE 3A: AFTER CARIES REMOVAL AND ORIFICES OF CANAL BLOCKED WITH TEFLON; 3B: LASER GINGIVECTOMY DONE AND HEMORRHAGE IS CONTROLLED; 3C: THE SULCUS IS PACKED WITH TEFLON FOR FURTHER FLUID CONTROL; 3D: RUBBER DAM ISOLATION; 3E: PREENDODONTIC BUILDUP DONE WITH DOUGHNUT APPROACH; 3F: POSTOPERATIVE IMAGE

Canal Projection Approach

Canal projection is an alternative approach to core build-up that involves projecting root canal orifices from the pulp chamber floor to the cavosurface.

This method provides improved visualization and straight-line access to the canals, individualizes canal orifices, and enhances hydraulic condensation of obturation materials for adequate sealing and reinforcement of the chamber floor or perforation repair materials.

Procedure: The technique can be performed using a Projector Endodontic Instrument Guidance System, hypodermic needles, or Greater Taper gutta-percha points. However, it is more time-consuming than the doughnut technique, as each projected canal needs to be temporized separately. A modified version of this method can also be used for preendodontic restoration of cervical lesions with pulp involvement [3,16] (Figure.4).



FIGURE 4. CANAL PROJECTION TECHNIQUE 4A: AFTER CARIES REMOVAL AND ORIFICES OF CANAL BLOCKED WITH TEFLON; 4B: CANALS BLOCKED WITH GLYCERINE COATED GUTTA PERCHA; 4C: PREENDODONTIC BUILDUP DONE WITH CANAL PROJECTION APPROACH

Immediate Esthetic Buildup

Immediate root canal therapy on anterior and premolar teeth often leads to esthetic compromise, particularly when multi-visit treatment is needed or coronal structure is significantly damaged.

The clinical significance of IEB protocol centers on its ability to concurrently support two essential pretreatment goals: preventing contamination and ensuring a secure coronal seal. Unlike conventional provisional methods, which often lack the durability, marginal seal, and satisfactory esthetics required in these time-sensitive cases [17,18], IEB technique directly addresses this deficiency. A durable, esthetic provisional restoration protects the endodontic space from bacterial ingress and irrigant percolation.

Procedure: Anterior or a tooth in an esthetic zone with adequate remaining coronal structure is prepared. Any existing carious tissue or compromised restoration is completely removed and a precisely sized, glycerin-coated gutta-percha cone is placed passively into the canal orifice to serve as a non-adhesive access projector, ensuring the tip is seated below the level of the future coronal seal. Flowable

and/or packable composite material is applied incrementally to the buccal aspect, fully stabilizing the cone and initiating the restoration of the tooth's anatomical contour. The restorative material is cured and fully polished, completely encasing the cone. The resulting provisional restoration provides excellent esthetics, marginal seal, and function. The gutta-percha cone is removed using an excavator or gentle instrument, revealing a precise, pre-defined access cavity that is fully protected by the durable composite margin. The access is now ready for subsequent endodontic treatment (Figure.5).



FIGURE 5. IMMEDIATE ESTHETIC BUILDUP
 5A: PREOPERATIVE IMAGE OF A CENTRAL INCISOR REQUIRING ENDODONTIC INTERVENTION;
 5B: AFTER CARIES REMOVAL AND RUBBER DAM ISOLATION ;
 5C: CANAL BLOCKED WITH GLYCERINE COATED GUTTA PERCHA AND BUILDUP DONE WITH ANTERIOR MATRIX;
 5D: PALATAL VIEW AND ACCESS CAVITY REFINED AND TEMPORIZED;
 5E: POSTOPERATIVE IMAGE OF PREENDODONTIC BUILDUP DONE WITH IEB APPROACH

CONCLUSION

The importance of a pre-endodontic buildup in the overall prognosis of the endodontically treated tooth cannot be overemphasized. Various techniques can be utilized for restoring the tooth prior to start of endodontic treatment. Upon analyzing the available literature on the subject of tooth isolation techniques in restorative dentistry and endodontic procedures, it is evident that several techniques have been used to overcome the challenge of tooth isolation and this case series is an attempt to highlight just that, and it has to be noted that the overall goal remains the same - to restore oral function while preserving the integrity of the patient's natural dentition as much as possible. By succeeding in this, dental professionals not only enhance oral health but also greatly improve their patients' well-being and self-esteem.

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