

Recent advancement for endodontically-treated teeth restoration

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ABSTRACT-Developments in materials and techniques, geographical locations, age, specialty, and affiliations of dental practitioners affect the preference of post-endodontic restoration. The restorative component of endodontic treatment should optimise the tooth's survival with a good coronal seal, cuspal protection where required and prevention of further primary disease. It is also important to remember that the prognosis of endodontically treated teeth depends not only on endodontic treatment success itself, but also on the amount of remnant tooth tissue and the definitive restoration that will be placed onto the dental element. This article outlines the available evidence for the restoration of root filled treated teeth.

KEYWORDS- Fiber-Reinforced Composite Materials, Silorane-Based Composite Materials, Silorane-Based Composite Materials

INTRODUCTION

The endodontic triangle consisting of access opening ,biomechanical preparation and complete obturation of the canal space remains the basis of endodontic therapy. When considering endodontically treated teeth, the quality of the restoration is important from the outset. It influences the outcome of future endodontic treatment¹.

The endodontic treatment is effected by several factors, and in that, microorganisms contamination is one of the major causes of endodontic failure. The canal walls both apically and laterally must seal by root canal filling to prevent microorganisms or tissue fluids from entering the canal space².

The stiffness of teeth by 5% reduced in posterior teeth after endodontic treatment, and in occlusal restoration reduced stiffness by 20% and the presence of a mesio-occluso-distal restoration reduced tooth stiffness by 63%.³ It is the loss of the marginal ridges and occlusal isthmus that leads to weakening of teeth^{3,4}.

Composite Resin Materials- Direct restoration with composite resin provides more resistance against tooth fracture than amalgam, as well as providing intra-coronal reinforcement⁵. The results of a retrospective study confirm that cavities with up to three surfaces can be restored successfully with composite restoration using adhesive techniques (FIGURE 1).



Figure 1. Composite Resin Materials

Fiber-Reinforced Composite Materials- As a result, fiber reinforcement of composite resin restorations with polyethylene or glass fiber material is a well-accepted method for saving the remaining tooth structure while performing direct composite restorations in root-filled teeth(FIGURE 2)⁶.



Figure 2.Fiber-Reinforced Composite Materials

Silorane-Based Composite Materials-Silorane-based composites have been marketed as an alternative to traditional methacrylate monomer-based composite resin restoratives⁷. These hybrid systems contain both silorane and oxirane-based monomers and have two main advantages: low polymerization shrinkage and increased hydrophobicity (FIGURE 3).



Figure 3.Silorane-Based Composite Materials

Bulk-Fill Flowable Base Materials- In an effort to simplify clinical procedures, simplified dental adhesives, bulk-fill flowable base materials, and bulk-fill resin restorative materials have been developed^{8,9}. Based on the results of randomized controlled studies, these low- and high-viscosity (sculptable) materials have proved successful; however, information regarding their performance in restoring root-filled teeth is lacking(FIGURE 4).



Figure 4. Bulk-Fill Flowable Base Materials

Short-Fiber-Reinforced Composite Resin Materials- Another base filling material option for restoring nonvital posterior teeth in high-stress-bearing areas is the short-fiber-reinforced composite^{10,11}. According to Garoushi et al, randomly oriented E-glass fibers significantly affect the mechanical properties of the material and serve as a crack-stopper layer¹².

Yasa et al. (2015) compared nano-hybrid composite resin, bulk-fill flowable composite, and short-fiber-reinforced composite in the absence/presence of retention slots¹³. According to their study results, a short-fiber-reinforced composite with retentive slots may offer an alternative for preventing cuspal fracture of endodontically treated teeth with MOD cavities(FIGURE 5).



Figure 5. Short-Fiber-Reinforced Composite Resin Materials

CONCLUSION-The material for restoration of endodontically treated teeth (ETT) is a challenging task that usually involves the treatment of teeth with significant loss of tooth structure^{14,15}. the success of restored ETT relies on residual tooth structure, extension for prevention concepts should be avoided.

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