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Research Article

**ENDO-RESTORATIVE RELATIONSHIP**

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**Abstract:**

**Introduction:** The primary goal of endodontic therapy is to prevent and treat apical periodontitis. Proper cleaning and shaping of canals, irrigation, and coronal seal are essential to achieving this goal while restorative dentistry aims to restore teeth to comfort, function and aesthetics. The relationship between restorative dentistry and endodontic has been established although the concepts related to treatment plans is ambivalent. With the advent of advanced dentistry, emphasis should be given on restorability of teeth before endodontic treatment.

**The aim of work:** The review focuses on the decision in treatment planning and endodontic-restorative interface to best restore teeth following endodontic treatment.

**Methodology:** We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, January 1985, through February 2017. The following search terms were used: Endodontic treatment, Restorative dentistry, Post and Core

**Conclusion:** With the emergence of advanced dentistry such as implants, more emphasis is given on long-term outcome of treatment thus evaluation of restorability of teeth before endodontic treatment is important. The treatment is not well served if tooth fails despite successful endodontic treatment.

**Keywords:** Endodontic treatment, Restorative dentistry, Post and Core.

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**INTRODUCTION:****Association between Endodontics and restorative dentistry**

The success of endodontic treatment is highly dependent on restorative treatment that follows. Post-restoration the tooth must be structurally sound and disinfected root canal system must be maintained since the microorganism invasion is the primary etiological factor in apical periodontitis and endodontic failure. [1,2]

Any contamination of the root canal system during or after restorative treatment decides the ultimate success or failure. Saliva exposure to gutta-percha in the pulp chamber can migrate the bacteria to apex in few days and endotoxins to apex, even faster. [3,4] Successful restorative treatment depends on the

timing and execution of the endodontic procedure. Delayed restoration shows lower success rate while the preservation of both radicular and coronal tooth structure shows a higher success rate. [5]

Many preparations such as “coke bottle” type canal preparation removes cervical dentin unnecessarily. Thus attempt should be made to preserve dentin in coronal one-third of the root and cervical dentin. Similarly, the roof of the pulp chamber should be removed carefully to preserve walls for better adaptability of restoration. Many endodontically treated teeth are restored with adhesive material these days which provide immediate seal and strengthening of the tooth. Tooth structure can be preserved since these materials does not require gross mechanical retention. [6]



**Figure 1** showing radiograph with “coke bottle” type prepared root canals with excessive removal of dentin in cervical one-third of the root, and apical preparation is thin. [6]

**METHODOLOGY:****• Data Sources and Search terms**

We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, January 1985, through February 2017. The following search terms were used: Endodontic treatment, Restorative dentistry, Post and Core

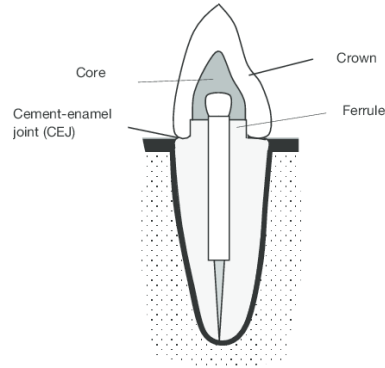
**• Data Extraction**

Two reviewers have independently reviewed the studies, abstracted data, and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

The study was approved by the ethical board of King Abdulaziz University Hospital

**Principles for Restoring Endodontically Treated Tooth**

In many situations restoration of endodontically treated teeth remain controversial, the best document principle is cuspal coverage which has 6 times greater survival rate than teeth without cuspal coverage.<sup>[7,8]</sup> The other important principle is tooth preservation; the coronal tooth structure should be preserved as much as possible for core buildup.<sup>[9]</sup> Similarly, radicular tooth structure should be preserved to receive posts better. A wide general agreement states that “ferrule effect” is important. Ferrule (1-2mm) refers to a cervical portion of tooth structure which provides retention and resistance form to restoration and prevents the fracturing of restoration. A study stated that ferrule of 1mm of vertical tooth structure doubled the resistance to fracture compared to the restoration without ferrule. If the height of remaining dentin is not good enough to create ferrule, crown lengthening, orthodontic extrusion or extraction may be indicated. [10]



**Figure 2** showing 1-2 mm of ferrule given to provide retention and resistance to the core and avoid fracture of restoration. [11]

### Post Placement and Core Buildup

There is a substantial loss of tooth structure during endodontic treatment and requires a core buildup. In most cases where resistance and retention of the core are compromised, a post becomes necessary for better outcome and longevity of restoration. Custom made, and prefabricated posts and cores remain standard for decades. With advancement, fiber-reinforced composite posts have gained popularity.

Placement of a post should not be random. The risks to restorative procedures include disturbance to seal of root canal filling leading to microleakage, root fracture, and perforation. [12,13]

### Types of Posts

Posts are classified by composition, modulus of elasticity, fabrication process, shape and surface texture. [6]

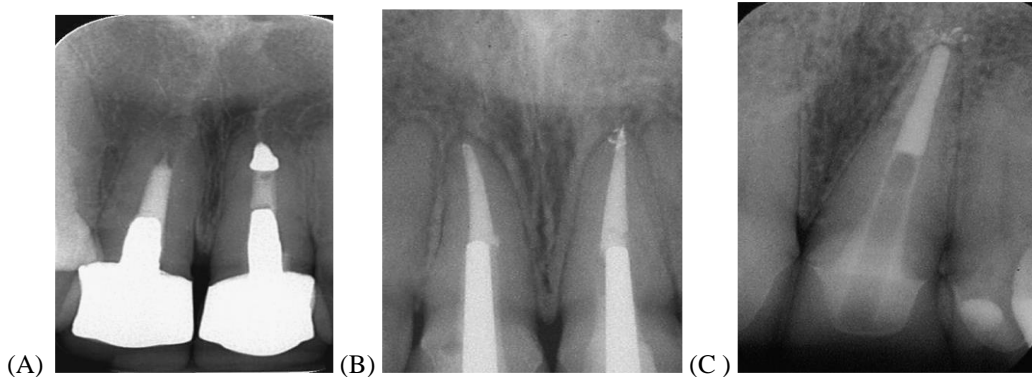
#### Rigid Post System

- Metal
- Custom Made
- Prefabricated
- Zirconium and Ceramic

#### Non-Rigid Post System

- Carbon Fiber
- Glass Fiber
- Quartz Fiber
- Silicon Fiber

The light transmitting fiber posts would transmit light for enhancement of cure deeper in the canal. The use of this system reported increasing the depth of resin cure in several vitro studies while some other proof minimal or no benefit. [15,16]



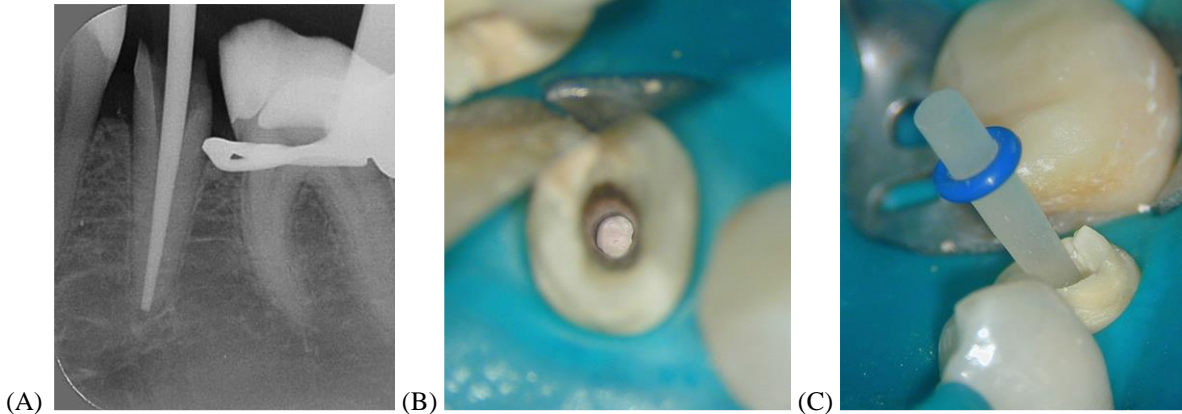
**Figure.3** showing (A) Custom cast metal post (B) Zirconium Post (C) Radiolucent Glass fiber post with a radio-opaque outline. [6]

### Clinical steps for Fiber Post cementation and Core Buildup

Immediate post placement after endodontic treatment is advantageous in many ways. It is essential to use rubber dam isolation, good illumination, and magnification to carry out a successful root canal treatment and adhesive bonding. Gutta-percha is to be removed using chemical and heat method, but rotary instruments are the easiest and most efficient

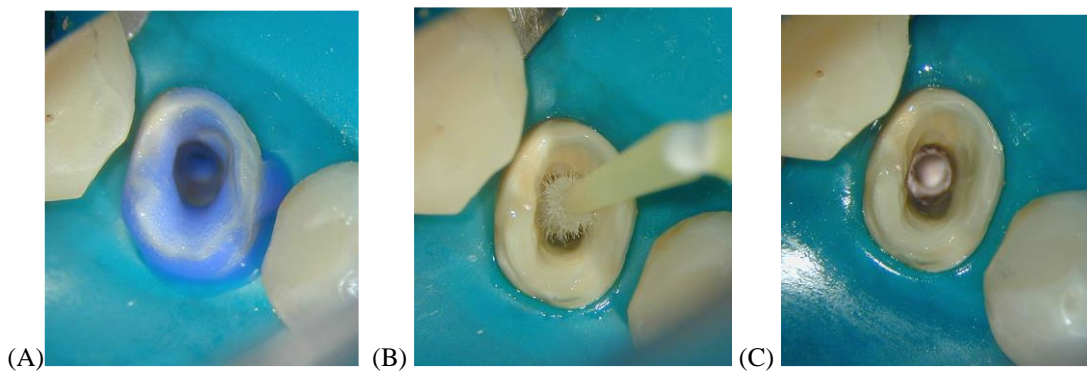
#### Clinical Sequence:

- Rubber dam isolation
- Removal of root filling and temporary material using small micro-brushes.
- Air abrasion cleaning of pulp floor.
- Selection of post that passively fit in post space
- Cut back the pre-fit post to coronal or apical end to accommodate post channel



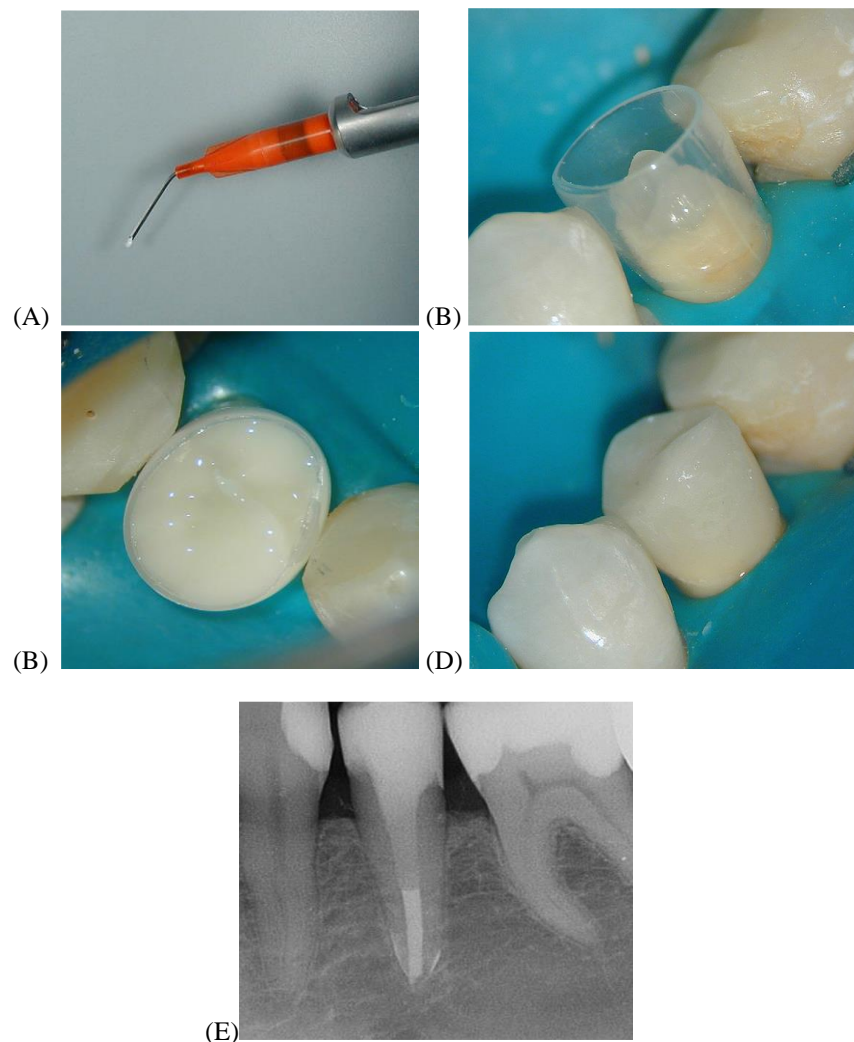
**Figure 4** showing (A) Cone-fit radiograph (B) Post channel free of remnants of root canal material (C) Post-fit in Post space. [6]

- Air abrasion of the post surface with 50- $\mu$ m alumina particle for 5 seconds.
- Acid-etching the surface including enamel if present, with 37% phosphoric acid, rinse and dry.
- Saline application to post surface.
- Primer is applied using small micro-brush that can be used with self-cure or dual-cure core.
- Application of self-cure or dual-cure core dental adhesive material to dentin



**Figure5** showing (A, B) Acid-etching and primer placement with micro brush (C) Adhesive material [6]

- Needle tube is used to inject self-cure or dual-cure composite in post space.
- Insert post into post channel filled with composite with use matrix to prevent bonding of core material to adjacent teeth as well as to enhance adaptation.
- The remaining composite is added to the placed post.
- Light-cure composite until it has completely set.
- Occlusion adjustment and contouring
- Finishing and polishing of restoration
- Take a final radiograph.



**Figure 6** showing (A) Needle tube for delivering composite (B) Matrix placement to prevent bonding of core material (C) Composite core placed in newly placed core in bulk fill (D) Core contoured and finished (E) Post-restoration final radiograph. [6]

#### CONCLUSION:

The success of endodontic treatment depends on the

restorative treatment that follows. The symbiosis between endodontic treatment and restorative dentistry is well accepted, but the best restorative approached post-endodontic treatment has always remained controversial. Evaluation of restorability before endodontic treatment, preservation of radicular and coronal dentin, ferrule effect, selection of appropriate post and a core according to the case and loss of tooth structure, stress distribution, fracture resistance and the possibility of micro-leakage and bacterial invasion are important factors to be considered for the best outcome of final restoration post-endodontic treatment.

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