

# Posts - Common Factors to Consider? : A Review

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## Abstract

**R**esurrection of endodontically treated teeth has traditionally involved post, core and crown. Use of post system for the rehabilitation of endodontically treated teeth requires traditional planning for function of the restoration as well as structural and aesthetic strategy. Contemporary material options have greatly expanded the clinician's ability to rehabilitate the coronaradicular complex.

The growing demand for esthetic restoration in dentistry has led to development of tooth colored metal free post system. This paper attempts to provide an overview of various posts system available for treatment of endodontically restored tooth in today's world.

**Keywords:** Post, Endodontically treated tooth, Pulpless.

## Introduction

A plethora of articles have been written in the dental literature regarding the prosthodontics management of endodontically treated teeth. Many of these papers have discussed techniques of fabricating posts and cores, whereas others have presented clinical and laboratory data that help answer difficult questions regarding the best prosthodontics treatment for these teeth. The purpose of this report is to address some of these difficult questions by reviewing the dental literature of the past 25 years and providing a summary opinion based on the reviewed scientific studies.

## Are Endodontically Treated Teeth Different?

Several classic studies have proposed that the dentin in endodontically treated teeth is substantially different than dentin in teeth with "vital" pulps.<sup>1,2</sup> It was thought that the dentin in endodontically treated teeth was more brittle and prone to fracture because of water loss and loss of collagen cross-linking. However, more recent studies dispute this finding.<sup>3,4</sup> They concluded that endodontically treated teeth are not brittle. They found that neither dehydration nor endodontic treatment caused degradation of the physical or mechanical properties of dentin.

## Do Post-Cores "Reinforce" Endodontically Treated Teeth?

Earlier there was myth that all root canal treated teeth should be restored with post. But recently it was found that post do not strengthen roots. Only purpose is to retain core.<sup>1,5</sup> Post are necessary when there is insufficient remaining coronal tooth structure. Placement of post may in fact increase chances of root fractures and treatment failures due to oversized post channel preparation, apical & lateral root

perforations, strip perforations.<sup>6</sup>

## Should Crown's be Placed on Endodontically Treated Teeth?

Retrospective study of 1,273 teeth endodontically treated 1-25 years previously compared the clinical success of anterior and posterior teeth.<sup>7</sup> It was determined that coronal coverage did "NOT" significantly improve the success of endodontically treated anterior teeth. This finding supports that crowns are indicated only on those endodontically treated anterior teeth when they are-

- Structurally weakened by large restorations
- Multiple coronal restorations
- Color changes that cannot be effected by bleaching, resin bonding and porcelain laminate veneer.

Significant increase in clinical success was noted when cuspal coverage crowns were placed on maxillary and mandibular premolars and molar. Restorations that encompass the cusps, that have interdigitation with opposing tooth.

Crowns should be placed on endodontically treated posterior teeth that have occlusal interdigitation with opposing teeth (wedging). Crowns do not enhance the clinical success of anterior endodontically treated teeth.<sup>8</sup>

## With pulpless teeth, do posts improve long-term clinical prognosis or enhance strength?

Most laboratory studies have shown that placement of a post and core does not increase the fracture resistance of endodontically treated extracted teeth when a force is applied via a mechanical testing machine. Lovdahl and Nicholls<sup>9</sup>, Lu<sup>10</sup> and others stated that posts and core fails to increase the fracture resistance or decrease the fracture resistance of endodontically treated teeth.

Hunter et al<sup>11</sup> in a photoelastic stress analysis found that if walls of a root canal are thin owing to removal of internal root caries or over instrumentation during post preparation, increases stress post "may" STRENGTHEN THE TOOTH.

The primary purpose of a post is to retain a core that can be used to retain the definitive prosthesis. Posts do not reinforce endodontically treated teeth and are not necessary when substantial tooth structure is present after teeth have been prepared.

## What Are the Most Common Types of Post and Core Failures?

Sorensen & Martinoff<sup>8</sup> determined that parallel, serrated showed highest success whereas tapered cast post and cores had higher failure rate and more catastrophic failures. Bergman et al<sup>12</sup> did 6year follow up of 96 tapered posts & cores placed by dental

students and reported 9 failures (90.6% success rate). Weine et al<sup>13</sup> reported a finding of 10 year retrospective study (138 teeth) restored with tapered, smooth cast posts and cores and found 9 failures (6.5%).

From a retention standpoint, the laboratory evidence indicates that threaded posts are the most retentive followed by cemented, parallel-sided posts. Serrations increase post retention. Cemented, tapered posts are the least retentive, but some clinicians reported that they have successfully used this design and did not have retention problems.

## Which Post Design Produces the Greatest Retention?

There have been many laboratory studies on post design and retention. Parallel-sided, threaded posts have been found to be the most retentive.<sup>14</sup> Cemented, parallel-sided posts have been found to be more retentive than cemented tapered posts. Cemented, parallel-sided posts with serrations are more retentive than cemented, smooth-sided parallel post. Clinically, Weine et al<sup>13</sup> reported no retention problems when they evaluated their experience with cemented, tapered posts over 10 years or more. In a clinical study of cemented tapered posts placed by dental students, Bergman et al<sup>12</sup> stated that this design can be strongly recommended.

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## Factors in Post Selection

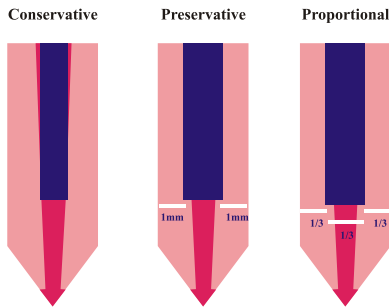
### Post Length

- Post length is dictated by length & shape of remaining root. Length is directly proportional to retention & stress distribution.
- The standard parameter for selecting post/ dowel length in a tooth with normal PDL support is
  - i. 2/3<sup>rd</sup> length of canal.
  - ii. An amount equal to coronal length of tooth.
  - iii. Half the length of root supported by bone.
- Minimum 5mm of apical gutta percha should be for apical seal.
- Ideal post length should be at least 8mm.

### Post Width

There are various philosophies regarding post space preparation.<sup>16</sup> One group, "the conservationists," advocates the narrowest diameter that allows the fabrication of a dowel to the desired length. A second group, "the proportionists," recommends a dowel

space with an apical diameter equal to one third the narrowest dimension of the root diameter at the terminus of the dowel space. The third group, "the preservationists," advises that at least 1 mm of sound dentin should surround the entire surface of the



dowel.

#### Ferrule concept

- **Rosen (1961):** A sub gingival collar or apron of gold which extends as far as possible beyond the gingival seat of the core and completely surrounds the perimeter of the cervical part of tooth"
- **Sorensen and Eagleman(1990) :** A 360° metal collar of the crown surrounding the parallel walls of the dentin extending coronal to the shoulder of the preparation.

#### Fiber Posts Types

The restorative procedures for endodontically treated teeth with metal free and physiochemically homogenous material that have mechanical properties similar to properties of dentin has become a major objective in dentistry. There are various post systems available now

- Carbon fiber reinforced epoxy resin
- Fiberkor Post
- DT light Post
- Dentatus luscent anchor
- Ribbond/Woven fiber composite post

#### Why Fiber Posts?

- Fiber posts are newer generations post system. They are biocompatible, corrosion resistant. They have ability to bond. Fiber posts are esthetic and easy to retrieve.
- Fiber post allows reconstruction in extreme situations such as flared roots, wide canals, internal resorption, thin

walled canals, severe destruction by caries, trauma etc.

- Fiber post bonds both to dentin & core.
- Fiber Posts are available in various forms.
- Fiber Posts have low failure load value.
- Glass Post transmits light which allows complete polymerization of resin cement.

#### Luting Cements

Any of the current luting cements can be used successfully with a post if the proper principles are followed. The most common luting agents are zinc phosphate, resin, glass ionomer, and resin modified glass-ionomer cements.

The recent trend has been toward resin cements, because they increase retention<sup>17,18</sup> tend to leak less than other cements<sup>19,20,21</sup> and provide at least short-term strengthening of the root. Junge et al<sup>22</sup> reported that posts cemented with resin cements were more resistant to cyclic loading than those cemented with zinc phosphate or resin-modified glass-ionomer cement.

Bonded resin cements have been recommended for their strengthening effect in roots with thin walls. Unfortunately, resin cements have some disadvantages. Resin cements are more "technique sensitive" and require extra steps such as preparing the canal walls with acid or EDTA and placing a dentin-bonding agent. Contamination of the dentin or post, predictable delivery of etchants and adhesive materials deep into the canal space also can be problematic.

No clear data showing one cement is better than another cement. But it should be remember that no cement can overcome the inadequacies of a poorly designed post.

#### Conclusion

Myths should be put to sleep forever. Endodontically treated teeth are not brittle. Post primarily serves to retain core. Sound principles of post restoration remains the key to success irrespective of type of post used. Selection of post should be made as per the requirement & presentation of the case.

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