International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 5 Issue 9, September 2018

ISSN: 2394-4404

Post And Core In Endodontics – A Review

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Abstract: ***Endodontic treatment is required for restoration of a grossly decayed tooth .when there is less tooth structure present we often require an endodontic post before placing an artificial crown. The main reason for using post is to enable rebuilding of the tooth structure prior to crown restoration. Endodontic posts provide strength to root and builds up restoration around the post for crown restoration. The purpose of this article is to review the ideal requisites of post and importance of ferrule The fundamental posts requirements include high tensile strength, high fatigue resistance to occlusal and shear loading and a good distribution of the forces affecting the tooth root.***

Keywords: post, core, diameter, length, ferrule

I. INTRODUCTION

After endodontic therapy, a tooth will require a restoration. These clinical situations include the restoration of root canal access openings, the build up of lost tooth structure in direct restorations with deep preparations, and the replacement of insufficient tooth structure to support a fixed restoration, among others. In some of these instances, if a tooth lacks the structure to support a core, a post may be required. Therefore, the primary purpose of a post is to retain a core that in turn will support a final restoration. According to Stockton,as a rule, there are two indications for post placement and both must be present to justify its use: the remaining coronal tooth structure is inadequate for retention of the restoration and there is sufficient root length to accommodate the post while maintaining an adequate apical seal.

II. CLASSIFICATION

Since past, cast or prefabricated metal posts have been used exclusively as foundations for indirect restorations. But with the emphasis on aesthetic outlook, posts and core with composite and ceramic materials having dual function and double taper have been introduced as alternatives. Posts can be classified in a number of different ways:

- ✓ Active or Passive
- ✓ Parallel or Tapered
- ✓ By their material composition

Depending on how retention is achieved, posts can be divided into two main subgroups-

- ✓ Active posts
- ✓ Passive posts

Active posts derive their primary retention directly from the root dentine by the use of threads whereas Passive posts gain retention as their name suggests by passively seating in close proximity to the post hole walls, and rely primarily on the luting cement for their retention.

According to its general shape, each post can be divided into either

- ✓ Tapered or
- ✓ Parallel sided

In general, active posts are more retentive than passive posts of a similar method of configuration, and parallelsided posts are more retentive than tapered posts.

BASED ON COMPOSITION

Other classification of posts is based on composition.

- ✓ Composite Materials
- ✓ Ceramics

BASED ON COMPOSITE MATERIALS

Composite materials are composed of fibers of

- ✓ CARBON
- ✓ SILICA

These fibers are surrounded by a matrix of polymer resin, usually an epoxy resin. They also include light transmitting posts & ribbon fibre post.

The various types of composite materials post can be grouped as:

SILICA FIBRE POST

- ✓ Aestheti Post
- ✓ Aestheti Plus
- ✓ Para Post
- ✓ Snow Post

LIGHT TRANSMITTING POST

- ✓ Double Taper Light Post
- ✓ Luscent Anchor Post
- ✓ Twin Luscent Anchor Post

RIBBON FIBRE POST

- ✓ Ribbond

BASED ON CERAMICS

- ✓ Cosmopost

CHARACTERISTICS OF AN IDEAL POST

- ✓ A post must be as long as the crown (post/crown ratio)
- ✓ It have parallel sides with a maximum convergence of 3-5°
- ✓ It should achieve a precision fit in the canal.
- ✓ A post should require minimal preparation, have resistance to fatigue, an elastic modulus that equals dentin and be non-corrosive.
- ✓ The post should also be easy to fit and adjust, radiopaque, allow easy removal and the post body and head should be highly retentive.

POST SPACE PREPARATION

Knowing the root anatomy of different teeth is important before attempting to prepare any canal space for post installation. For instance, clinicians must be aware that root diameter may differ in the facial-lingual and mesio-distal dimensions. To determine the appropriate post length and width to avoid root perforation, clinicians must consider conditions such as root taper, proximal root invaginations, root curvatures and angle of the crown to the root during the mechanical preparation of a post space. The thermal method of removing gutta-percha using heat pluggers is safer but more time-consuming. When mechanical preparation is preferred, it has been established that Gates-Glidden drills and P-type reamers used on low speed are the safest instruments. Use of one of these instruments should precede the use of any post drill that comes with the prefabricated post kit. A combination of removing gutta-percha by heat pluggers followed by the post drill should be considered by inexperienced operato rs to minimize the risk of perforation.

POST DESIGNS.

In addition to the custom cast post and core, many commercially available prefabricated posts exist. For example, the axial form is either tapered or parallel, and the surface can be smooth, serrated with or without vents, or threaded using taps or self-threading. Caputo and Standlee categorize these different design features into three basic combinations:

- ✓ tapered, serrated or smooth-sided, cemented into a post space prepared with a matched-size post drill;
- ✓ parallel-sided, serrated or smooth-sided, cemented into matched cylindrical channels prepared by a post drill;
- ✓ parallel-sided, threaded and inserted into pre-tapped channels.

In general, parallel-sided posts are more retentive than tapered posts, and threaded posts are more retentive than cemented posts. With respect to their installation mode, all posts are referred to as either active or passive. Active posts engage dentin within the root canal space and transfer more stress to the remaining root structure. Passive posts, even though they do not engage dentin in the root canal space, still transfer stress to the remaining root structure, but to a lesser extent.

POST LENGTH

Many authors have offered guidelines for determining the desired post length. It is not difficult to understand that the longer the post in the canal, the more retentive it is. However, increased post length also increases risk of fracture and perforation of the remaining root. It generally is accepted that the apical 3 to 6 mm of gutta-percha must be preserved to maintain the apical seal. Acceptable guidelines for determining the post length include the following:

- ✓ The post length should be equal to the clinical crown length
- ✓ The post length should be equal to one-half to two-thirds of the length of the remaining root

- ✓ The post should extend to one-half the length of the root that is supported by bone.

POST WIDTH

In general, the post width should not exceed one-third of the root width at its narrowest dimension, and clinicians should bear in mind that most roots are not perfectly rounded. A minimum of 1 mm of sound dentin should be maintained circumferentially, especially in the apical area where the root surface usually becomes narrower and functional stresses are concentrated.

III. PROPERTIES OF DIRECT CORE BUILD-UP MATERIALS

Based on the evidence, composite appeared to be the best choice for core buildup material. The reasons for the advantages of composite are its high compressive strength, ease of manipulation, rapid polymerization, and ability to bond to dentin. There are disadvantages as well including polymerization shrinkage and poor dimensional stability, however these disadvantages have been eliminated with the use of hybrid and universal nano-composite flowables. Hybrid composite appears to be one of the best materials for a core buildup. In a study by Burke, et al. prepared core buildups using a "hybrid composite material provided the highest fracture resistance".

In addition to correct material selection, the core preparation has two primary requirements: cuspal coverage and ferrule. Simply stated, cusp coverage and the ferrule are both required to prevent fracture. Cusp coverage is achieved by virtue of crown or onlay fabrication and design. A ferrule is a band that prevents the end of an object from splitting.

IV. FERRULE

The ferrule provides bracing or a casing action to protect the integrity of the root. Crowns whose margins encompass a ferrule alter the distribution of forces. These restorations have a sub-gingival collar, that acts as a 'hugging" action and prevents vertical fracture of the tooth. To be effective, the margin must encompass at least 1.5-2.0mm of tooth structure.

Because root fracture is one of the most serious complications following restoration of endodontically treated teeth, it is worth evaluating the effect of a crown ferrule on the fracture resistance of endodontically treated teeth restored with prefabricated posts. In a study by Pereira, a comparison was made "of the fracture strengths using posts and cores and variable quantities of coronal dentin located apical to core foundations with corresponding ferrule designs incorporated into cast restorations". It was found that "an increased amount of coronal dentin significantly increased the fracture resistance of endodontically treated teeth".

V. CONCLUSION

For a successful post and core systems, the clinician should keep in mind about the ideal requirements, proper length and width of the post. Ferrule is a must given for fracture resistance. Clinician should always keep in mind to preserve radicular dentine as much as possible.

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