

# Post core restoration after an endodontic treatment

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## ABSTRACT

*Disorder after an endodontic treatment of the crown portion of a tooth, needs efforts to restore its function and aesthetic. To support the intention for a restoration, a strengthener and an optimal retention in the root canal become necessary. A strengthener in the root canal is a fabricated dowel which can be directly applied. This technique has been developed by using a fiber substance. A restoration as an effort to return the function of mastication, can also suffer a failure. With a right design, among others the posthole preparation, post-choosing, and the core design, any unfavorable situation can be limited.*

**Key words:** endodontic treatment, post core restoration

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## INTRODUCTION

At first, the coverage of restoration was emphasized upon returning the mastication function and dental anatomical repair. In this advanced era, people give more attention to function and aesthetic. Supported now by more sophisticated materials and dental restoration equipments, the restoration covers emergency care, even after trauma or post endodontic treatment.<sup>1</sup>

The crown portion disorder caused by caries or trauma can result in losing teeth before its due time. The extent of the hard tissue defect, determines the dental measures to be taken. The severity of the damage has prohibited the operator to have enough retention to do the restoration. These cases can be handled by optimizing retention in the root canal.<sup>2,3</sup>

It is necessary to improve the quality of dental service, particularly post endodontic treatment by using a fabricated dowel as a root canal retention. That way, an aesthetic restoration with optimal expected retention can be achieved.

### Mastication load and rotation force

A restoration measure, with a sole objective to improve the mastication function of the existing crown portion, or simply for an aesthetic purpose, can diminish more dental structures during the preparation. For instance, during endodontic treatment, making access to the cavity entrance or the existence of a caries will weaken the dentin in the middle of the crown portion. Should the operator restore it directly, there is a possibility that it will not be strong enough to receive a mastication load.<sup>1,2</sup>

The anterior upper teeth receive a mastication load with a movement outside the curve towards the labial side. The load is concentrated to the labial marginal gingiva. While the anterior lower teeth bring the load to the dental apex

and towards the inside of the dental curve. For the posterior teeth, the load is more concentrated to the center of the crown, causing a crack or fissure at the rest of the buccal or lingual crown portion.<sup>4</sup>

The rotation point has formed a rotating force at the bucco gingival crown portion or at linguo gingival part away from the crown. The crown's movement is caused by the load hitting the dental cusp, especially for the posterior teeth i.e. at the fossa fissure of buccal cusp. Up to a certain limit, the load can cause a crack at the remaining crown portion. To delete the fracture point, the heavy load should be spread along the dental root till the dental apex. Thus, the remaining crown portion support -in a fabricated dowel form as a strengthener- although it is not a compulsory usage, can be greatly considered.<sup>1</sup>

### The risk of a dowel placement in the root canal

A dowel is essentially required for a restoration with a root canal retention to form the strength and integrity of the remaining crown portion and the dental root, to stay firm at its position. A mispositioned dowel placement will give an unexpected result. An excessive canal preparation is a dowel with a huge size weakening the remaining of dental root structures.<sup>5</sup>

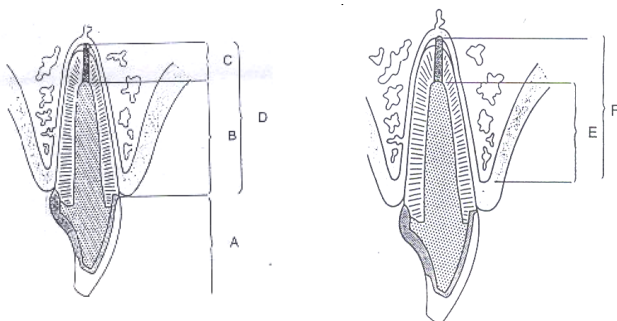
Molded dowel in flat root canal, will automatically form a flat dowel with less strength. On the other hand, a cylindrical or parallel dowel with unsuitable size to a small dental root, will eventually cause a fracture at the tip of the dowel. A fabricated cylindrical dowel can easily rotate after a masticating load, where an anti rotation preparation is required. A short dowel performs risks such as easily levered, small retention, easily detached and a crack at the cervical part of the remaining root.<sup>3,4</sup>

A successful treatment is backed up by more cautious measures during the root canal filling, taking out the guttap

and during the preparation of widening the canal for the dowel.

### Principles for the preparation of the canal for the dowel restoration

A dowel restoration is gravely needed to maintain optimally the remaining structure of the crown portion, particularly one third of the crown gingivally. The canal hole for the dowel should be made conservatively, sufficient and adequate. Attention should be given to one third of the dental root plane at the cervical side especially when a molded dowel is going to be placed. The length of the canal must be in accordance with the requirement and a good obturation at the dental apex. Part of the dowel which enters the canal, minimally must be the same length with the crown, whereas the height of the dowel outside the root is two third of the cervico incisally.



**Figure 1.** The proportion of the planned dowel.

Explanation: A: Core length, B: Dowel length, C: Remaining guttaperch, D: Root length, E: Alveolar bone

At best, the border of the preparation at the cervical part should be well formed for the placement of the artificial crown. The possibility of lateral perforation should be avoided, especially at flat dental roots.

For flat roots, it is best to choose a fabricated dowel. Careful choices of the right dowel, must be done. An X-ray photo will help to choose the right size, the exact dowel length to enter the preparation, and the size of the dowel against the dental root plane. A good dowel placement will obtain an optimal physical characteristics.<sup>4,5</sup>

It is important to prepare thoroughly the canal for the dowel, prior to preparation by differentiating the types of the dowels. For an active dowel or a graved dowel, the preparation of the canal must be smaller than the dowel plane. While for a passive dowel, the canal must be bigger than the dowel itself. The preparation should be done according to the sequence of the numbers to avoid broken equipments inside the root canal.<sup>3</sup>

Canal widening for the dowel is  $\pm$  one third of the dental root plane. For anti rotation the preparation should be made ovaly. The minimal length of the dowel is the same with the clinical crown length. During the process of taking out the guttapercha, one can use pessoreamer, glide glidden drill, or with a heated reamer. It is hoped that during

this widening process, no diverted preparation-course take place. What must be prepared is the anatomical dental root problem towards the preparation of the canal. In general, the anatomical shape of the dental root is conical. Thus, should the dowel to be placed is cylindrical with a broader plane, risk will emerge in the form of a weak dental root, exactly at the tip of the dowel. A good dowel can form a precise, initial fit, with an adequate plane matching to the restored dental dowel hole. Besides, the distance of the teeth with their antagonist, the curvature of the core and its parallelly, all should be examined meticulously.<sup>2</sup>

### The failure of the dowel restoration

Several reasons of the failure are due to reckless preparation plan, the choice of the dowel and the crown, all contributes to the catastrophe.<sup>1</sup> The failure can be: 1) a dowel detachment as a result of the incompatibility of dowel and dowel hole; 2) a dowel fracture, if the dowel size is too small, without a site; 3) a root fracture, due to a too big dowel size; 4) a crown detachment as a result of non-forming parallelity, and 5) a crown fracture, if the load is too big and the planning for the crown is not right.<sup>1</sup>

The utilization of dowel can provide beneficial services to the patient with a shorter length of treatment and a direct application technique is also an advantage for the operator. The direct dowel restoration technique has been developed with fiber materials.

The latest development of the dowel, is the use of fiber reinforce composite as a replacement of metal dowels. The fiber post system is a root canal dowel using a carbon fiber material, strengthened with an epoxy matrix at the exterior. Because the lateral part and the core of the dowel is made of composite resin, it is generally named as composite post. This dowel type is already fabricated with a cylindrical form, sized 1.4 to 2 mm. The application of this type is directly, initiated by choosing the right size. After the preparation of the root canal, a test was performed, followed by primary covering of bonding A and B that mixed together. The covering formed a thin layer, done up to the crown's roof. The carbon fiber dowel was also bonded by using a paper point. The next stage was filling the dowel hole preparation, with bis-core-build-up composite (core flo composite) by mixing base and catalyst and put them in a syringe. Before setting, the carbon fiber post was inserted as soon as possible. The excess composite can be used to form the core.<sup>6,7</sup>

Another post fiber system is a product of Nulite F. Australia. The dowel is self-made using a fiberspan or a Poly Alkane Fiber. Several fibers are taken in accordance to the dowel hole plane, and then strengthener by covering with BIS.GMA URETHANE DIMETHACRYLATE or NSI.RESIST. Show that it can be proved in the canal according to its length. The core was formed by adding Resin Composite NSI F.2 Microrod Reinforced, and the crown can be made at once. After finishing, the crown is covered with microglazing, resulting in a smooth, shining crown surface (Nulite System International Information).

## DISCUSSION

The dental crown disorder can be caused by a fracture or dental caries. If the damage is more than two third of the crown, an endodontic treatment is a necessity. This is due to the lessening of the inner dental tissue after a root canal treatment, where the tooth is not vital and turns to be more fragile. This condition requires an effort to prevent more severe impairments by placing a dowel in the root canal and making the restoration. The management of placing a dental restoration with a dowel is to form resistance and an optimal retention in the root canal. This is the importance of the proportion of the dowel's length in the root canal towards the core's length, so as to prevent the failure of the dowel's restoration caused by a changed form of the dowel, or a broken dowel. The alveolar bone as a support of the dental restoration must not be destructed at the apical part by having not less than two third of the dental root length.

Choosing the dowel, must be done carefully under certain conditions i.e. the size of the dental root plane, and the expected aesthetic goal. As an example, for improving position or crown angulation, the operator can select a molded dowel. For a small/flat root canal, a prefabricated dowel from metal or fiber composite post can be chosen.

The above matter was explained by Shillingburg.<sup>4</sup> A molded dowel restoration needed a preparation of a wide-enough root canal, that was two third of the dental plane. If the dental root was flat as the anterior lower molar, a preparation could weaken the dental root, even a perforation to the lateral side. For flat root teeth, there must be adequate, never an excessive preparation. The best dowel is a metal fabricated one.

From the discussion, a conclusion was derived that to be able to maintain the remaining tooth post endodontic treatment, a strengthener inside the root canal in a dowel form was required. To have an optimal endurance, the dowel should be retentive, stable, and proportional, with a prerequisite of the dowel's length inside the root canal minimally the same length with the crown's restoration. The dental root length receiving a dowel, should be supported by two third of the alveolar bone.

To obtain the expected optimal quality of the restoration, all clinicians should comply to proportional principles of the restoration plan.

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