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## The Use of Fiber Reinforced Composite Post in Restoring a Wide and Compromised Canal: A Case Report

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### ABSTRACT

*Excessive removal of the tooth tissue during retreatment leads to thin wall and wide canal, which is not suitable neither for prefabricated post nor cast metal post. Alternatively, the use of soft fiber reinforced composite post helps in providing a good adaptation between the post and the canal. Hence, it reduces the number of clinical visit. This case report highlighted the use of fiber reinforced composite post in badly broken teeth with wide canal together with some esthetic adjustment to the final crowns shape and size.*

**Keywords:** Fiber reinforced composite post, Endodontics, Post and core, Wide canal.

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### INTRODUCTION

Endodontically treated teeth are considered weaker due to the fact that it has loss some structural integrity during canal preparation or from the caries itself [1,2]. Retreatment may cause additional loss to tooth tissue during the procedure and further weaken the tooth structure [3]. Preparations of the canal to receive prefabricated parallel post resulted in more tooth structure loss and weaken the remaining tooth tissue [4]. Selection of post system in canal with a thin wall will become a challenge as canal configuration and post adaptability are among factors that need to be considered when dealing with intracanal restoration [5] apart from the remaining tooth tissue left [6]. A large canal with minimal amount of tooth tissue left is not an ideal candidate for prefabricated post as it will not match the shape of the canal [7]. A fiber reinforced post system which has flexibility close to

dentine was reported to provide better adaptation and resist fracture better [8]. Survival rate of a fiber reinforced post was reported to be better than a metal post [9].

In order to ensure an intracanal restoration is successfully carried out, a strong bond between the dentine, cement used and the post itself is crucial [10]. A canal with extensive tooth tissue loss was not a good candidate for a prefabricated fiber post. In the past, modification of the canal by adding composite resin to the wall has been introduced [4]. However the problem with adding composite into the canal is the ability of light curing unit to polymerase the material inside the canal as the light intensity decreased apically [11-13]. Fiber posts were also reported to have superior esthetic and mechanical properties compared to prefabricated metal and cast metal post [14-17].

### CASE REPORT

A 22-year-old female was referred to our clinic, as she was not happy with the appearance of her upper front teeth. She has no medical illness. On further history, she had root canal treatment (RCT) done for teeth 11 and 21 in 2010. Teeth 11 and 21 appeared to have short clinical crown with large composite restorations (Figure 1). As the obturation quality was poor with evidence of periapical pathology on radiograph, retreatment was carried out in Hospital Universiti Sains Malaysia. She was then referred for post and core crown treatment. Tooth 11 has a complete bite with the opposing dentition. Periapical radiograph showed thin distal wall on tooth 11 approximately about 0.5 mm (Figure 2).

As the amount of residual dentine on distal wall of tooth 11 was thin, further removal of the tooth structure on that area will lead to fracture of the tooth. The decision was made to use fiber reinforced composite (FRC) post (everStick®, Stick Tech Ltd, Turku, Finland) for this tooth.

The procedures for post placement involved gutta percha (GP) removal with gates glidden leaving only 5 mm of the GP apically (Figure 3). A size 1.2 mm FRC was placed inside the canal and then was light cured with a light-curing device (Mini L.E.D OEM®, France, 420-480 nm), for 20 seconds. After that, the FRC post was removed from the canal and further light-cured for 40 seconds outside the canal. Additional bundle was added and light cured to fit the remaining space left inside the canal until the post fitted the canal (Figure 4). An x-ray was taken to confirm the fitting of the posts inside the canal.

The post was then cemented with dual cure glass-reinforced composite (ParaCore Coltene®, Switzerland). Composite core build up was done using resin composite shade A3 (Filtex Z350®, 3M ESPE, USA). Final x-ray was taken (Figure 5). Tooth 22 was treated with prefabricated fiber post (ParaPost Fibrewhite®, Coltene Whaledent, USA) prior to treatment of 11.

The treatment then continued with crown lengthening surgery from tooth 13 to tooth 22. Post surgical photographs are as seen in Figure 6. Tooth preparation for porcelain bonded to metal (PBM) crowns was carried out on tooth 11 and 21 after 2 months when healing were achieved (Figure 7). The margins for the crowns were prepared 0.5mm subgingivally. Impression was recorded with heavy body material (Aquasil Ultra® (DENTSPLY, Denmark) and light body (Examix NDS®, GC, USA). Temporary crowns were constructed with Protemp Plus® (3M ESPE, USA) (Figure 8). The shape and size of the teeth 11 and 21 were altered according to the wax up in order to close the median diastema. Final crowns were cemented using glass ionomer based cement (Ketac Cem®, 3M ESPE, USA) (Figure 9).



**Figure 1:** Pre treatment photographs of tooth 11 and 21.



**Figure 2:** Pre operative periapical radiograph of tooth 11 and 21.



**Figure 3:** Coronal view of tooth 11 after GP removal.



**Figure 4:** An everStick® post inside the canal.



**Figure 5:** Periapical radiograph of tooth 11 and 21 after cementation of posts and composite build up.



**Figure 6:** Clinical photograph of tooth 11 and 21 two months after crown lengthening surgery. The margin of the restorations is now located at supragingival area.



**Figure 7:** Crowns preparation and retraction cords placement.



**Figure 8:** Immediate placement of temporary crowns.



**Figure 9:** Immediate view after cementation of permanent crowns.

## DISCUSSION

Over preparation of the canal especially in retreatment cases can be one of the treatment complications. As adaptation of a prefabricated post in a wide canal is difficult, further reduction of remaining tooth tissue is needed in order to shape the canal prior to placement of prefabricated post [14]. This will compromise the integrity of the tooth itself. Poorly adapted post to canal wall will lead to failure of restoration later [18,19].

It is crucial to add esthetic consideration when planning for intracanal restoration for anterior teeth. Both aspects of maintaining the integrity of the restoration and providing good esthetic outcome at the end of the treatment were being considered when planning the final treatment for this patient. EverStick® is a type of fiber reinforced composite post made of individually formable and unpolymerised glass fiber post, which is moldable at the chairside. These soft and moldable properties allow it to follow the shape of the canal. The material also allows operator to add on or cut the bundle to cater the size of the canal at the chairside.

Owing to a greater similarity in elastic properties with dentine, FRC posts allow relatively uniform stress distribution to the tooth and the surrounding tissues, thus yielding a protective effect against root fracture [20,21]. Studies reported the fracture line of a fiber post is at the favorable site when compared to cast metal post [20-23]. This allows repair if failure occurs and will retain the tooth longer in the mouth [21]. Ferrule is another factor that needs consideration in planning intracanal restoration. As the amount of tooth tissue left is minimal in tooth 11, ferrule effect was compromised. The downfall of using a less rigid material as an intracanal restoration was the amount of stress will be greater [24], thus ferrule should be preserved. This factor was taken into consideration when deciding to perform crown lengthening surgery apart from the fact that the appearance of the gumline on this tooth was a bit low compare to the remaining dentition. The result from this gum surgery is shown in Figure 6. After the surgery, the restoration margin was clearly visible and no longer located subgingivally. It was reported that ferrule helps in distributing better stress, thus resulting in better clinical outcome [25]. Apart from helps to ease crown preparation and impression procedure, it will also ease cleaning later.

The appearance of the gingival tissues surrounding the teeth plays an important role in the esthetics of the anterior maxillary region of the mouth. Abnormalities in symmetry and contour can significantly affect the appearance of the natural or prosthetic dentition. It is generally accepted that crown-lengthening surgery helps to relocate the alveolar crest at a sufficient apical distance to allow room for adequate crown preparation and reattachment of the epithelium and connective tissue. Furthermore, by altering the inciso-gingival length and mesio-distal width of the periodontal tissues in the anterior maxillary region, the crown lengthening procedure will create a better appearance and improve the symmetry of the tissues.

## CONCLUSION

The use of fiber reinforced composite post helps in restoring the endodontically treated teeth with minimal tooth tissue left. Fiber reinforced composite post allows maximum area of the canal to be filled with post material and increase the adaptation of the post to canal.

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