

Management of Weakened Anterior Teeth Using Customised Anatomical Post: A Case Report

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ABSTRACT

Aesthetic restoration of endodontically treated anterior teeth with less than 50% coronal structure with widely flare root canal anatomy and thin dentinal wall is a challenge to dentistry field. Restoration of such teeth requires a post and core to retain a final restoration and additional support. Metal cast post and core systems had been widely used traditionally. The major disadvantage is their high modulus of elasticity that causes uneven stress distribution between the post and remaining radicular dentinal wall leading to root fracture and it is not esthetic. For aesthetic purpose fiberpost is best indicated as it is radiopaque, noncorrosive, fracture resistance, ease to use. In cases of teeth with thin dentinal radicular wall and widely flare root canal, customised anatomical post by relining the fiberpost technique can be employed. It reduces the chances of shrinkage and gap formation between radicular dentin and post if greater amount of resin cement is use and it provide strength and support to the final restoration. This case reports on severely mutilated anterior teeth with widely flare canal and thin radicular dentinal wall case that was successfully treated

using customised anatomical fiberpost relined by direct, light cured composite resin and final cementation was carried out using dual cure composite resin technique.

Keywords: Customised Anatomic Post, Composite Resins, Post and Core Technique.

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INTRODUCTION

Severely mutilated teeth may result from caries, trauma or previous large restoration. Restoration of such severely damage anterior teeth aesthetically is a challenge to aesthetic dentistry. Teeth with evident short vertical clinical crown would not be able to retain final restoration without some additional support. For retaining and supporting future restoration placement of post and core following endodontic treatment become necessary.¹ Post may be of variety of material including metal, resin composite, and biologic material.² In the recent year due to increasing demand for tooth coloured post for aesthetic purpose, nonmetallic post gradually has replaced metal post. The introduction of fiberpost revolutionized in field of aesthetic dentistry by providing a reliable substitute to metal post. There are advantage of fiberpost over metal post like fiberpost has modulus of elasticity (20Gpa) much closer to dentin (18Gpa) in contrast to metal post (200Gpa) which increases the fracture resistance of the tooth, fiberpost are white and translucent, radiopaque which is more favorable for aesthetic demand for all ceramic crown as compared to metal post. Metal post causes shadowing of the soft tissues adjacent to tooth root surface which will adversely affect aesthetic.³ Due to the uneven and wider root canal space and fragile dentinal walls, custom

made posts are preferred over prefabricated post and cast metal post. Chair side fiberpost customized by relining it with direct, light cured composite resin mimics the canal anatomy. It also provides superior retention and aesthetics.^{4,5} In order to restore the teeth in the aspect of aesthetic and masticatory function in such case of fragile root, customised post plays important role and have gained favourable prognosis.⁶

This case report presents the treatment of severely mutilated anterior upper teeth with thin fragile widely flared root canal tooth using anatomical customised post.

CASE REPORT

A 24-year-old male patient reported to the department of conservative dentistry and endodontic, Dr. Ziauddin Dental College And Hospital, AMU, UP with a chief complaint of pain and unaesthetic appearance of right upper central and lateral incisor. The patient had a history of trauma to the maxillary anterior region at the age of 19 years. Clinical examination revealed significant coronal destruction of the maxillary right central and lateral incisor [Figure 1]. On intraoral examination, there were no lacerations or evidence of alveolar bone fracture or any gingival inflammation.

Teeth were found to be tender on percussion. The right maxillary central and lateral incisors showed a class III fracture. Teeth were not mobile. The teeth were nonvital, with no response to the electric pulp test and other vitality tests. Radiographic examination showed completed root end development in both the involved teeth. At a careful examination of the pre-operative periapical radiograph, the teeth seemed to have a very widely flared canal and thin remaining radicular dentinal wall [Figure 2]. His medical history was noncontributory. Root canal treatment followed by customised anatomical post and core was planned. The patient was informed about the procedure and informed consent was taken.

After administration of local anaesthesia with 2% lignocaine with epinephrine (1:100000), the tooth no.11,12 was isolated with rubber dam and clamp. Using endo access bur (DENTSPLY maillefer, Switzerland) access opening was done on the both tooth no.11,12 working length was determined using apex locator and was confirmed by radiograph, root canal was enlarged to ISO size 60 at working length, complete biomechanical preparation was performed using step back technique, and thorough irrigation was done with 2.5% sodium hypochlorite during the preparation, master cone was confirmed by radiograph and obturation was done using cold lateral condensation technique. Post obturation radiograph was taken [Figure 3].

In the next appointment, after completion of the root canal treatment post space preparation was done by using paeso reamer and removed gutta percha from the coronal two third of the canal leaving 5mm guttapercha apically undisturbed in both the teeth. As the canal was widely flare, the available largest

diameter prefabricated fiber post was tried but still there was wide space left uncovered between fiber post and radicular dentinal wall, so it was decided to reline the fiberpost to fill the space between the post and dentinal wall that would simulate the anatomy of the canal. After the canal was thoroughly cleaned, the fiber post (Parapost-Fibre lux, Coltene Whaledent) was inserted and the fit was verified. A separating medium was applied to the post space, on the prebonded post lightcured composite was coated then it was inserted into the canal to adapt with the canal anatomy. Composite was light cured inside the canal and then removed from the canal. Incremental addition of composite was continued till the post had an adequate fit inside the canal [Figure 4,5]. Post adaptation and fit inside the canal was confirmed by radiograph. For verifying the position and correct orientation of the post during customization the labial surface of the post was marked with a pencil. The canal was thoroughly rinsed to remove the separating media. Canal was etched (PrevestDenpro) and rinsed and dried by using paper point. Bonding agent (ADPER SINGLE BOND2, 3M ESPE) were applied inside the canal. Light curing was done for 20 sec. [Figure 6]. Cementation of relined fiberpost was done with dual cure resin cement (Multilink, Ivoclar, Vivadent).The tooth surface was etched, rinsed, and bonded. Then, the core material was adapted to form the core and lightcured. Postoperative radiograph was taken [Figure 7]. Tooth preparation was done, impression was taken. Subsequently, crown fabrication was done in both upper right central and lateral incisors [Figure 8]. At the 1-year follow up, the tooth was clinically and radiographically healthy and the crown was aesthetically satisfactory.



Fig 1: Preoperative photograph



Fig 2: Preoperative Radiograph



Fig 3: Post Obturation Radiograph



Fig 4: Relining of fiber post with composite



Fig 5: Relined post



Fig 6: Light curing of the customised post



Fig 7: Postoperative Radiograph



Fig 8: Postoperative Photograph

DISCUSSION

Aesthetic restoration of endodontically treated anterior teeth is a big challenge to an aesthetic restorative dentistry. Teeth with less than half coronal tooth structure with widely flare root canal and thin fragile root wall makes the restoration more difficult which can implicate in a poor prognosis to the long-term functionality of the restored tooth. Various factor should be considered before

restoring a endodontically treated teeth like amount of remaining sound tooth structure, retention of the restoration, masticatory forces, aesthetic. Endodontically treated teeth require special considerations for the final restoration, particularly when there has been extensive loss of tooth structure. This would require a post to increase core retention and strength for the final restoration and maximum resistance to tooth fracture⁷. In this case report patient

reported with symptomatic fracture discoloured upper right central and lateral incisor teeth with widely flare canal with more than half of the coronal tooth structure was absent, so root canal treatment followed by customised anatomical post and core was planned.

Cast metal post-and-core is one of the treatment of choice for endodontically treated teeth as these custom metallic posts offer a good fit to the canal providing high retention and thin cement layer. However because of its high elastic modulus and stiffness, they do not flex with the tooth potentially leads to catastrophic root fracture.

After the introduction of prefabricated glass fiber posts, it became popular in restorative dentistry, and they had been used as a more aesthetic and biologically favorable alternative to cast metal post. Nonmetallic post like glass fiber post has several advantage over metallic post like it has modulus of elasticity similar to that of dentin (~20 GPa), which allows the post to flex slightly with the tooth and dissipate stress hence reduces damage to the root⁷⁻¹⁰, resistant to galvanic or corrosion activity which is responsible for a high percentage of failures with cast posts¹¹, available in translucent and tooth-colored versions which are aesthetically indiscernible under crowns. The transmission of light through the post also makes it possible to light-cure the resin cement and the bonding system in only one clinical step.^{13,14}

In this case, available coronal residual structure was found to be less than half and due to the uneven and wider root canal space, more than 50% greater than largest available fiberpost, custom made anatomical posts was decided to use. Because the wide space left uncovered between radicular dentinal wall and the available largest diameter prefabricated fiber post would filled with luting agent and a thick layer of luting cement is detrimental to bond quality and predisposes to adhesive failure and debonding of the post^{15,16} and risk of tooth fracture due to polymerization shrinkage related to resin cements. Because in thick layer chances of voids and bubbles are more and it signify the weakest area within the luting material.¹⁷

Chair side post customized by relining fiberpost with direct, light-cured composite resin that mimics the canal anatomy as well as it provides superior retention and aesthetics and also fill the space between the post and dentinal wall. It also reduces the thick layer of luting cement. In contrast, classic post and core system, direct and indirect, requires at least two visits and a laboratory phase but in this technique it can be completed in single visit.

An alternate treatment modality as suggested by Lui et al. for such wider canal and thin remaining dentinal wall is to relining the internal root canal walls with a chemically cured composite after etching and bonding the canal wall dentin to reinforce the remaining tooth structure. The limitation in such a technique is the inability to control the polymerization reaction in the apical areas of the canal space.^{18,19}

Customised anatomical post is the technique to reduce the amount of resin cement as it is associated with polymerization shrinkage, stress associated with c factor and s factor. This technique minimizes shrinkage in flared canal and gap formation, reduces removal of extra dentin, reduces the thickness of cement and increases fracture resistance. In order to restore the teeth in the aspect of aesthetic and masticatory function in case of fragile root due to presence of thin dentinal structure customised anatomical post play a important role and have favourable prognosis.

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