

Esthetic Rehabilitation Of Endodontically Compromised Teeth Using Glass-Fibre-Reinforced Posts: A Case Series

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Abstract: Endodontically treated teeth with excessive loss of tooth structure would require to be restored with post and core to enhance the strength and durability of the tooth and to achieve retention for the restoration. Improvements in bondable dental glass fiber systems which contain polymer (PMMA) and resin impregnated (Bis-GMA) unpolymerized glass fiber post, has few advantages over metallic or prefabricated posts like, high flexural strength and elasticity very similar to dentin. It is flexible so adapts to the morphology of canal. Thus the purpose of this case series is to discuss functionally weakened tooth restored with the unpolymerized glass fibre post in order to maintain esthetic and functional integrity of dentition. The restoration made it possible to maintain the remaining tooth structure in a good occlusion and resulted in an esthetic restoration in single visit.

Keywords: Glass fiber reinforced post, anterior restoration, post and core, trauma.

I. Introduction

Complicated crown fractures having incidence ranges from 2 to 13% seen most commonly in the maxillary central incisors.^[1,2] Traditionally, the complicated crown fractures have been restored using conventional post- core and crown. Unfortunately several disadvantages associated with cast post and core such as loss of retention of the post.^[3]

Tooth is potential for root fracture and corrosion when different metals were used in the system. Although several factors are involved, mechanical properties of the post plays very important role in these failures. So the cast metal post and cores are more and more being replaced by prefabricated post which is ready to use and reduce chair side time.^[4] Varieties of materials are used for post construction including metal, resin composite and biological material into variety of shapes and surface design.^[3]

Because high risk of root fracture present with prefabricated metal posts, nowadays prefabricated FRC posts with biomechanical advantages are preferred. However, also prefabricated FRC posts require preparation of the root canal to fit the shape of the post, which leads to loss of dentin and makes it vulnerable to root fracture.^[4] Large root preparation can be avoided by using polymer (PMMA) and resin impregnated (Bis-GMA) unpolymerized glass fibre post (everStickPost, GC America INC. USA), individually formed glass fibre post is soft, flexible and can be customized thus can adapt to the morphology of the canal giving best choice for curved, oval and large root canal. It has flexural strength after light curing and elasticity very similar to natural elasticity of the dentin. Thus stresses of occlusion will be evenly distributed on the root surface. Because of this the risk of root fracture can be minimised.^[5]

Thus the purpose of this case series is to discuss functionally weakened tooth restored with the unpolymerized glass fibre post (everStickPost, GC America INC. USA) in order to maintain esthetic and functional integrity of dentition.

II. Case Presentation

2.1) CASE -I

25 years old male patient came to the department having a chief complain of dislodged cap with upper front teeth region & pus discharge with the same. Medical history was not significant. History of trauma caused by cycling accident about 2 years back. Patient gave a history of root canal treatment with maxillary right central incisors 6 month back. Pain was throbbing in nature which aggravates on eating of hot food stuffs.

An extra oral examination revealed no significant finding. On intra oral examination dislodged crown seen with both maxillary central incisors. “[Fig -1A]” Attempted root canal treatment with pus discharge was seen through left central incisor. Temporary restoration seen with right central incisor. Both central incisors

were tender on percussion. On thermal and electrical pulp testing left central incisor and both laterals were non-vital. On radiographic examination right central incisor was under-obtured, 2mm short of apex. Periapical radiolucency was seen with both central and lateral incisors. “[Fig -1B]”

After taking written informed consent, root canal treatment was carried out with both maxillary lateral incisors and left central incisor using standardized root canal protocol and calcium hydroxide as a intra canal medicament until canal was dry and significant periapical healing observed on the radiograph. “[Fig -1C]”

Re-treatment was started with right central incisor and after complete removal of gutta percha and caries, remaining dentin thickness was very less. So intra canal rehabilitation with glass fiber reinforced post (everStickPost, GC America INC. USA) was planned. After cleaning and shaping when the tooth was asymptomatic sectional obturation was performed by keeping gutta percha at the level of apical 5mm to maintain a good seal. “[Fig -1C]”

Tooth was isolated using rubber dam. Canal was irrigated with distilled water and dried with paper point. Depth of the canal was measured by using k file and stopper was adjusted 2 mm short of estimated crown height. Cut the post together with silicone sheet to a suitable length using sharp scissor. 1.5 size everStickPost (GC America INC. USA) was inserted and in upper portion of canal it was laterally condensed. Intra oral periapical radiograph was taken to confirm the placement of the post up to the desired length and density. Post was removed from the canal, for cementation low viscosity dual cure cement (ParaCore® Core Build-Up, Coltène/Whaledent USA) was used according to manufacturer’s instruction and post was slowly inserted into the canal. After removing excess cement post was light cured for 40 sec. “[Fig -1 D & E]” Core build up was carried out using composite. Then tooth preparation was done in relation to concerned tooth and full coverage porcelain fused to metal crown were luted using glass ionomer cement. (GC FujiCEM, GC India) “[Fig -1F]”.

2.2) CASE -II

32 years old male patient was came to the department having a chief complain of fractured tooth in upper front teeth region. Patient gave history of accidental trauma 2 months back followed by root canal treatment with maxillary left central incisors 1 month ago. Patient was asymptomatic. On clinical examination fractured crown seen with maxillary left central incisor with reduced overjet in anterior region. “[Fig -2A & B]” Radiographic examination revealed good root canal filling with fractured crown with maxillary left central incisor. “[Fig-2 C]”

Post and core followed by crown was planned. As patient was having reduced overjet, post which can be angulated was needed to get sufficient clearance. So everStickPost, (GC America INC. USA) was selected. Gutta percha was removed leaving apical 5mm of filling material. everStickPost (GC America INC. USA) placement was carried out, as per manufacture’s instruction mentioned in case I. “[Fig -2D]” Then tooth preparation was done in relation to concerned tooth and full coverage ceramic crown was luted using glass ionomer cement (GC FujiCEM, GC India). “[Fig -2E]”

2.3) CASE -III

42 years old male patient was came to the department having a chief complain of discoloured tooth in upper front teeth region. Patient gave history of accidental trauma 4 year back, and root canal treatment were started 1 year back with the same. Intraoral examination shows Ellis class I fracture with discoloration of maxillary left central incisor. “[Fig -3A]” Tenderness was positive on percussion. On radiographic examination root resorption with open apex was seen. And remaining dentin thickness was very less. “[Fig -3B]” So apexification by using MTA and intracanal rehabilitation by using glass fibre reinforced everStickPost (GC America INC. USA) followed by crown was planned.

After complete cleaning and shaping of the canal, apexification was done using MTA to create 5mm apical plug. Intracanal rehabilitation was done using everStickPost (GC America INC. USA) as manufacture’s instruction mentioned in case no I. “[Fig -3D]” Then tooth preparation was done in relation to concerned tooth and full coverage ceramic crown was luted using glass ionomer cement (GC FujiCEM, GC India) “[Fig -3C]”

III. Figures



Figure 1- A) Pre operative intraoral photograph, B) Pre operative intra oral periapical radiograph, C) After caries removal & sectional Obturation, D) Post placement, E) Intraoral periapical radiograph after post placement, F) Post operative intraoral photograph after crown cementation.



Figure 2- A) - Pre operative intraoral photograph, B) Maxillary left central incisor with reduced overjet, C) Pre operative intra oral periapical radiograph, D) Intraoral periapical radiograph after post placement, E) Post operative intraoral photograph after crown cementation.



Figure 3- A) Pre operative intraoral photograph, B) Pre operative intra oral periapical radiograph, C) Post operative intraoral photograph after crown cementation. D) Intraoral periapical radiograph after post placement.

IV. Discussion

Because of superior mechanical properties of Cast posts and cores they were widely used in the past, conversely there are reported incidence of root fracture seen in various clinical studies on metal post and core restorations.^[6,7] Metal post may lead to discoloration and shadowing on the gingival and cervical areas in the anterior esthetics region because of the colour and opacity of the metal post.^[8] For the esthetic purpose fibre posts are commonly used in anterior teeth. Good long-term clinical performance of the endodontically treated teeth seen with a combination of fibre post and composite resin core in combination to dentin bonding.^[9]

However, another study has reported lower long-term survival rates of the composite resin core, due to fracture especially in high stress-bearing areas.^[10] For better performance of the post, fabricating material should have certain physical characteristics, such as modulus of elasticity close to dentine and strength which are important factors with respect to preservation and fracture strength of remaining tooth structure. To save remaining dentine thickness, diameter of the post should be minimized but it should be sufficient enough to resist functional forces.^[11] The selection of core materials depends on the capability of transmitting the functional stress effectively. From this point of view, the use of similar material as post-core complex would be beneficial. So using E-glass fibre as fillers could reinforce the composite resin to maintain loads of post-core restorations.^[12]

Case I & III presented uniqueness in problem that the root walls were very thin, restoring the same with the traditional method would have resulted in the chance of fracture of root. And restoration with the pre-fabricated post would have resulted in obturation of the large defect with the cementing medium, which creates a very weak area in the entire post-core-crown-tooth complex.^[13] When everStickPost (GC America INC. USA) was used, preparation of the root canals need not be as extensive as with traditional posts. Thus, the dentine was saved and the risk of perforation was reduced. The pulp chamber of the root canal was completely filled with fibres instead of cement.^[14] In 2004, Anil Kishen et al., suggested that the structure of remaining radicular dentin is less mineralized and more collagenous, hence possess low modulus of elasticity.^[15] It is proposed in the literature that to prevent root fracture at least 1 mm of dentin be maintained around the entire circumference of the channel.^[16] So it was a necessity to place a everStickPost (GC America INC. USA) which reinforces the canal and transfer the occlusal load equally through out the canal. Good adhesion between post and cement and cement and dentin is one of the important factor in load transfer, so Everstick post was used because the monomers of the adhesive resins and cements can diffuse into the linear polymer phase, causes swelling of it, and by polymerization, it form inter-diffusion bonding which is called as secondary semi-IPN structure.^[17,18] Improved bonding allows transfer of loads from the crown-core system to the root trough the root canal post.^[4]

Case II The individual everStickPost (GC America INC. USA) were chosen because of the angle between the root and the crown part of the incisor with reduced overjet. The pre-manufactured fibreglass posts would not have been as effective as they do not allow any individual shaping of the post.^[5]

The restoration using Everstick post made it possible to maintain the remaining tooth structure in good occlusion and resulted in an esthetic restoration in single visit followed by crown.

V. Conclusion

Use of everStickPost (glass-fibre reinforced composite root canal posts) can be a simple and efficient procedure for the treatment of anterior traumatized teeth. And endow with excellent esthetic and functional results in single sitting. The treatment described in this case report is very simple and effective and helps to accomplish patient's esthetic and functional requirement.

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