

Direct Anatomic Post for Rehabilitation of an Endodontically Treated Tooth-A Case Report

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Abstract

The aim of this case report is to emphasize the successful clinical outcome following rehabilitation of an endodontically treated tooth with severe coronal destruction and weakened root structure. Despite constant advances in dentistry, restoring an endodontically treated teeth remains a challenge when associated with extensive tooth loss. The residual thin root wall after endodontic treatment makes the restoration more difficult, affects the long term functionality of the teeth leading to complete fracture of the tooth. Direct anatomic post is a technically simple and effective treatment procedure to obtain aesthetically favorable and biomechanically superior results in weakened roots, thereby preserving the structural integrity of teeth.

Keywords: Anatomic post, Cast post, prefabricated fiber posts

INTRODUCTION

Despite present day advances in dentistry, challenges still exist in the rehabilitation of an endodontically treated tooth if associated with severe coronal destruction and thin residual dentinal wall¹. Extensive loss of dentin may be attributed to dental caries extension, over preparation, trauma, immature development, internal resorption or removal of previously placed post and core². For a long time, cast post was the treatment of choice for such clinical situations without taking into account the quality and quantity of the remaining tooth structure. Although it provided good adaptation of root canal morphology and superior retention, it was not aesthetically satisfactory, required greater clinical time for fabrication and had high modulus of elasticity compared to root dentin resulting in fracture of teeth³.

In recent times, fiber reinforced posts have emerged as a beneficial and alternative treatment option for restoration of Endodontically treated tooth. They are aesthetically superior, has modulus of elasticity similar to dentin and prevents catastrophic failure of tooth unlike cast posts⁴. However being prefabricated, the glass fibre posts do not always adapt to morphology of

Root canals when they are wide and spacious leading to adhesion failures⁵. In such situation, direct anatomic post (composite resin associated with a prefabricated glass fibre post) is an alternative treatment option to minimize the adhesive failure, biomechanically reinforce the weakened tooth structure and enhance the fracture resistance of tooth⁶.

This case report highlights the clinical steps in the fabrication of direct anatomic post and successful clinical outcome following rehabilitation of an endodontically treated tooth with severe coronal destruction and weakened root.

CASE REPORT

A male patient in his late twenties reported to the Department of Endodontics with a complaint of broken and discolored upper front tooth. The patient gave a history of trauma five years back and had got the emergency treatment done with respect to left central incisor which he did not follow up. On clinical examination Ellis Class IV fracture was observed with respect to 21 (upper left central incisor) and Ellis Class II fracture with respect to 11 (upper right central incisor) (11, 21 -Federation Denature International Notation).

Pulp sensibility test was performed for 11 and 21 using cold test (Endo Frost-Colten Whale dent, Pvt Limited) and electric pulp tester (Sybron Endo Vitality Scanner Pulp Tester; Kavo Kerr) which elicited no response. On radiographic examination incomplete root canal treatment and excessively flared root canal was observed with respect to 21 and a large radiolucent lesion was observed around the apex of 11 (Figure 1a). Following clinical and radiographic evaluation, non-surgical endodontic treatment approach for 11 & 21 was planned (Figure 1 m,n). Treatment procedure was explained to the patient and informed consent was taken.

Following rubber dam isolation, the access cavity was prepared for 11 using Endo Access Bur & Endo-Z Tungsten Carbide (DENTSPLY Maillefer, Ballaigells Switzerland). Working length was determined for 11 and 21 using a #20 K file (MANI, INC JAPAN) (Figure 1e). Chemo mechanical preparation was done to a #55K file for 11 and #70 k file for 21 as the canal was flared and irrigated with 10 ml of 3 % sodium hypochlorite followed by 10 ml of saline in between instrumentation and further activated with Endo Activator (DENTSPLY, Maillefer Ballaigeus Switzerland). Final irrigation was done using 5 ml of 17 % EDTA according to irrigation protocol for non-vital teeth [7]. Calcium hydroxide powder (Merck, Germany) was mixed with sterile distilled water to form a paste and was placed into the canal of 11 using a lentulo spiral and temporized. Two weeks later the patient was recalled and was found asymptomatic. The canals were once again debrided and disinfected. The apical fit of the master cone was checked for 11 and 21 (Figure 1 f,g) and the obturation was completed using gutta percha and AH plus sealer (De Trey-DENTSPLY, Konstanz, Germany) (Figure 1 h) using a lateral condensation technique. At the subsequent visit the access cavity of 11 was restored with glass ionomer cement (Fuji IX, Japan) and the post space preparation was done for 21 using peeso reamers for structural reinforcement (MANI, Japan) (Figure 1 i). A size 4 glass fiber post was chosen and fit was checked. Owing to the poor fit in the canal, decision was made to fabricate direct anatomic post to provide anatomical adaptation and

biomechanically reinforce the tooth. The canal was coated with Glycerin separating medium (Figure 1 k). The selected fiber post was treated with silane (Ultra dent, USA) for 1 minute. A nano hybrid composite (Tetric N ceram, Ivoclar Vivadent, USA) was adapted to the post, which was then seated into the canal to reproduce the canal anatomy. (Figure 1 m). The anatomic fiber post was then light cured inside the canal for 20 seconds followed by extra oral curing for additional 20 seconds (Figure 1 n) and checked for proper fit. Prior to cementation the canal was thoroughly rinsed with 5 ml of 17 % EDTA for 1 minute to remove the smear layer. Conditioning was done with 37 % phosphoric acid (Ivoclar Vivadent) for 15 seconds followed by rinsing and drying of the canal for additional retention. Two step self-etch and rinse adhesive (Ivoclar Vivadent, Tetric -N -Bond) was coated into the canal and excess removed using paper points. This was light cured for 20 seconds. The canal and post surface was coated with a dual cure resin cement (Rely-X, 3M, ESPE) and the post was firmly seated into the canal (Figure 1 o). After cementation the core build up and crown preparation was completed (Figure 1 q) for 21 and impression was made using addition silicone (Aquasil, DENTSPLY). Ceramic facing crown was fabricated owing to the lack of clearance (Figure 1 q) and a direct composite veneer was done with respect to 11.

DISCUSSION

Teeth associated with loss of substantial amount of crown structure, wide root canals, weak root canal dentin often poses a challenge to the clinician. Commercially available prefabricated fiber posts does not simulate the root canal anatomy completely if it is wide and spacious. Direct anatomic posts have emerged as an alternative and an effective treatment option for precise adaptation to root canal anatomy. It has decreased polymerization shrinkage, superior aesthetics, and better retention and biomechanically reinforces the teeth⁷. Also they form a monobloc with the tooth structure, thereby protecting the teeth from wedging effect unlike cast posts⁸. Current studies have shown good results for anatomic posts as they have better adhesive capability due to penetration of resin

into demineralized dentin leading to a more uniform hybrid layer⁹.



Fig 1 a)-Pre operative radiograph. 1b) –Pre –operative clinical picture. 1c) –Maxillary arch .1d) - Working length radiograph .1 e)-Master cone for 11. 1 f) - Master cone for 21. 1 g)-Obturation .1h) - Post space preparation for 21.



Fig 1i)- Picture showing the wide root canal of 21. 1j) - Glycerine separating agent application. 1k) - Fit of fiber post checked .1 l and m) -Anatomic post .1 n)-Radiograph after cementation of anatomic post .1 o)-Core build up done .1 p and q) - Tooth preparation for 21 & Direct composite veneer for 11 . 1r and s)-Post operative picture

In this study, the fiber post was pretreated with silane coupling agent for better adhesion of composite resin. Also two step etch and rinse adhesive systems are considered superior to one step self-etch systems¹⁰. The advantage of using Nano hybrid composite is that it has superior physical and mechanical properties, high color stability when compared to micro filled composites. This case report highlighted that with advances in biomaterials, even a structurally compromised teeth can be retained with optimal biomechanics and favorable aesthetics.

Conclusion

Excessively flared and wide root canals often poses a challenge to the clinician due to thin root canal walls and increased susceptibility to fracture .Direct anatomic posts are alternative treatment option for such cases as they biomechanically reinforce the weakened tooth structure and provide aesthetically favorable results even in a structurally compromised teeth .

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