

Restoration of an endodontically treated tooth with fibre post in the aesthetic zone: A clinical report

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Abstract

The long term prognosis of an endodontically treated tooth depends on the strength of the remaining tooth structure and the prosthetic restoration of the same. The use of aesthetic materials becomes mandatory while restoring the teeth in the aesthetic zone. A restoration of an anterior tooth with Glass fibre post, along with dual cure composite core followed by a Lithium Disilicate crown is presented. The restoration addressed the patient's chief complaint of a broken and ugly anterior tooth while preserving maximum remaining tooth structure and achieving optimum aesthetic results. This allowed a smooth transition from an unaesthetic, fractured tooth to an interim restoration in a single appointment, followed by the definitive metal free crown on a subsequent date.

Keywords: Glass fibre post, Lithium disilicate crown, Fractured anterior tooth.

Introduction

An aesthetic restoration of an endodontically treated tooth in the anterior segment, has seen an ever increasing demand by the patients in the new era of social media. In such a scenario, it becomes mandatory for the clinician to consider the use of highly aesthetic materials while maintaining the longevity of the restoration. The longevity of the restoration of a coronally fractured, endodontically treated tooth can be improved by the selection of an adequate post.¹ The factors influencing post selection are root length, tooth anatomy, root width, canal configuration, amount of coronal tooth structure, torquing force, stresses, development of hydrostatic pressure, post design, post material, material compatibility, bonding capability, core retention, retrievability, esthetics, and crown material.²

In the aesthetic zone, it is preferable to use a glass fibre post because of its various advantages which are its (1) Young's modulus which is similar to natural dentin³ (2) increased post retention via dentin bonding² (3) increased stress distribution by the bonding material² (4) better aesthetic result under an all ceramic crown (5) parallel-tapered design for better retention and preservation of tooth structure at the apical end of the post.² When the Young's Modulus of elasticity is comparable to dentine, the stress transmitted to the root is reduced, thereby reducing the risk of root fracture.⁴

This clinical report demonstrates the restoration of a fractured maxillary right central incisor with a glass fibre post, composite core build up followed by a lithium disilicate crown.

Case Report

A 34 year old female visited the Department of Prosthodontics, Seema Dental College and Hospital Rishikesh with the chief complaint of a broken anterior tooth. She gave a history of endodontic treatment 2 years

back which included root canal treatment and apicoectomy with respect to the Maxillary right central incisor. The intra oral examination revealed an Elli's Class III fracture. The remaining coronal tooth structure was more than 2mm from the gingival zenith and was grossly discoloured. On Occlusal examination, an 3mm overbite and a 0.5 mm overjet was reported (Fig. 1). The tooth was non-tender on percussion. The radiographic examination revealed a healthy periodontium and an absence of any active periapical lesion. (Fig. 2).



Fig. 1: Pre operative view

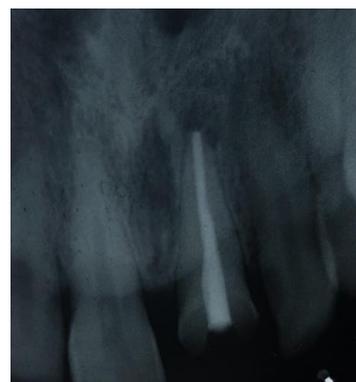


Fig. 2: Pre operative radiograph

Since the patient was highly concerned about her esthetics, but was not willing to pay for a Zirconia post

and crown, it was undermined to restore the tooth with a glass fibre post, a composite build up and an lithium disilicate crown.

On a subsequent appointment, the shade was selected for the crown before beginning the post space preparation. Following the principal of minimum preparation, Size 1 (0.11 mm) glass fibre post [Reforpost, #1, Angelus, Brazil] was selected. A corresponding size #1 peeso reamer [MANI.INC, Japan] was used to prepare the canal space until 5mm gutta percha was left in the apical third of the root canal. The length of the prepared post space was anticipated with the help of radiographs, as the precise measurement of the working length was not available. The glass fibre post was checked for adequate fit, retention, and space for bonding material.

The canal was copiously irrigated with 3% Sodium Hypochlorite solution. It was carefully dried with paper points. The tooth was dried and isolated. The self-etching dental adhesive [Xeno IV, DENTSPLY Caulk, USA] was applied throughout the canal space with the help of root canal applicator tips [DENTSPLY Caulk, USA] and light cured according to manufacturer's instructions. Same adhesive was applied on the the glass fibre post and light cured. The canal was filled with Endodontic post cement [Fluorocore 2+, DENSPLY Caulk, USA] and the post was carefully inserted to the full length of the post space. The core was light cured as per the manufacturer's instructions. The entire core was built up around the post using the dual cure core build up material [Fluorocore 2+, DENSPLY Caulk, USA].

The tooth was then prepared according to the principals of an all ceramic crown, having a 2 mm shoulder margin. The procedure was verified radiographically. The tooth was isolated and the gingival retraction cord (non-impregnated, knitted) of size 00 [Sure Cord, Sure Dental Corporation, Korea] was placed in the sulcus. After 10 minutes, the displacement cord was gently removed and the impression was made with heavy body-light body combination technique using automix technique⁵ for mixing the light body [Imprint II Garant, 3M ESPE, Korea] and hand mixing putty [Soft Putty, 3M ESPE, Korea]. An impression was made using reversible hydrocolloid Zelgan 2002, Dentsply India Pvt Ltd] for the interim cast and poured in Type III dental Stone [Kalastone, Kalabhai Karson Pvt Ltd, India]. The tooth was restored with an interim restoration made with a tooth coloured polymethyl methacrylate resin [Self Cure, tooth Moulding Material, DPI, India].

The definitive cast was poured in Type IV dental stone [Kalrock, Kalabhai Karson Pvt Ltd, India]. The base of the cast was ground flat. The anticipated position of the die pins was marked and a pindex system was used to drill holes at these sites. The die pins were cemented in place using cyanoacrylate resin. The sleeves were placed over the pins and the second pour was done with Type III dental stone [Kalastone, Kalabhai Karson Pvt Ltd, India] in a mould. The die was separated by sawing.

The die was trimmed below the finish lines. The die spacer was applied on the die leaving 1 mm from the finish line.

The wax pattern for the lithium disilicate crown was made using Type II wax and invested using phosphoate bonded investment material [Bellasun and Begosol, BEGO Bremer Goldschlagerel, Germany] The wax was burnt out using the lost wax technique⁶. It was then placed in a hot press furnace where the cold, precerammed ingot [IPS EMAX Press, MO 1, Ivoclar Vivadent, liechtenstein] was pre heated and pressed into the mold cavity. It was then cooled and divested. The ceramic coping was then finished to remove minor imperfections. The layering technique was used to add on the remaining thickness of ceramic dentine and enamel [B2 and T1,IPS E.max Ceram, Ivoclar Vivadent, liechtenstein] and fired. The crown was then finished and add on glaze was used in the last firing.

The definitive crown was checked for adequate esthetics and occlusion was adjusted in all mandibular excursions in the patient's mouth. After adequate adjustments, It was then cemented with a resin modified glass ionomer cement [Rely X U200, 3M ESPE, Korea]. (Fig. 3-6).



Fig. 3: Core build up

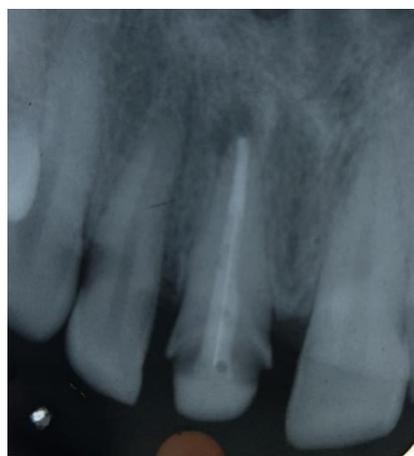


Fig. 4: Radiographic verification of Post and Core



Fig. 5: Interim Restoration



Fig. 6: Final restoration

Discussion

Restoration of a fractured tooth that had undergone extensive endodontic treatment previously, becomes challenging due an already failed attempt at its prosthetic rehabilitation. In this clinical report, the patient was very concerned about aesthetics and expressed dissatisfaction with her previous metal-ceramic crown. The all ceramic crown supported by a glass fibre post and composite core was a valid and a relatively economical option. The recommended principals of post length, post diameter, post design and bonding material were followed to achieve a long lasting and aesthetic restoration⁷. The definitive crown was made with lithium disilicate ceramic and cemented with resin modified glass ionomer cement. Using this two step approach for its complete rehabilitation, we have left scope for replacement of the crown or the retrieval of the post in case of crown or post fracture.⁸

Conclusion

Adequate selection of post and core material followed by a crown, has been described. The remaining tooth structure plays an important role in the success of the post and core restoration. Adequate post design, post retentive features, and aesthetic considerations have a major role to play in patient satisfaction and longevity of the restoration. Each step beginning from post selection, tooth preparation, bonding materials, and crown selection play a major role in reducing the risk of failure of the restoration.

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