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RESEARCH ARTICLE

RECREATION OF SMILE USING BIOLOGICAL RESTORATION

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ABSTRACT

The most common problems in childhood and adolescence leading to structural damage of primary and young permanent maxillary anterior teeth include early childhood caries and dental trauma. It causes difficulty in mastication and also poor phonetics. With recent advancements in technologies there are various restorative materials available for reconstruction of such damaged teeth. Use of natural tooth is a good alternative to other restorative materials as suggested by various literatures. The present case report shows the successful use of biological post and crown with the follow-up period of 1 year. **Methods:** A freshly extracted permanent mandibular central incisor is sterilised and prepared as biological post for restoration of fractured maxillary permanent central incisor after its root canal treatment. **Results:** There was no complaint of discomfort with the treated tooth. The follow-up of the patient was continued after every three months for 1 year. **Conclusion:** Biological post is an excellent alternative over pre-fabricated commercially available posts for the aesthetic and functional rehabilitation of severely mutilated teeth. This case study reports successful management of fractured endodontically treated teeth with biological post.

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INTRODUCTION

The most common type of traumatic injuries that children and adolescents go through is fracture of anterior tooth. [1] During this age of adolescence, the child is very conscious about his/her looks and mutilated anterior tooth may lead to psychological stress which may affect overall lifestyle of the child. [2] 16–30% of children and adolescents sustain dental trauma more than once according to reports by Onetto et al. [3] Aesthetic and functional rehabilitation of such mutilated tooth is quite difficult. The treatment depends upon the amount of tooth structure lost. When half or more than half of the coronal tooth structure is lost the best choice of treatment for rehabilitation is post and core treatment. [4] With newer advancements in dental materials there are variety of posts available for intra-canal restorations such as fibre, glass, nickel, chromium, ceramic and carbon fibre. [5] Posts can be custom made or pre-fabricated. Ideal characteristics of post include:

- Modulus of elasticity similar to dentin
- Thermal expansion similar to dentin
- Compressive strength and aesthetics that are similar to dentin.

However no synthetic material can replace the tooth structure. With greater demands of aesthetic requirements use of biological post or dental post is quite a feasible option. [6] Various literatures and case reports have suggested successful treatment with biological post which is obtained from extracted tooth. In 1991 the term "BIOLOGICAL POST" was used for the first time. [7] Advantages of biological post include:

- Less stress on dentinal walls
- Total biocompatibility with tooth structure providing greater strength
- Greater retention than the pre-fabricated posts.
- Resilience comparable to original tooth
- Greater adhesion to tooth structure and composite resin.
- Internal dentinal walls are preserved
- Economical [8]

This case report presents a successful aesthetic rehabilitation of a mutilated permanent maxillary left central incisor using a biological post obtained from extracted deciduous mandibular central incisor followed by porcelain fused to metal crown (PFM).

CASE REPORT

A 14 year old male patient reported to Department of Paediatric and Preventive Dentistry with a chief complaint of fractured maxillary left central incisor. Patient's medical history was non-contributory. Dental history revealed that maxillary incisor got fractured due to trauma by falling down 1 year ago.

Clinical and Radiographic Examination: On clinical examination our provisional diagnosis was Ellis Class IV fracture associated with maxillary left central incisor with the palatal side of the crown covered with palatal soft tissue. After checking the vitality of the tooth the fractured teeth was found non-vital. The fractured tooth did not show any mobility and no tenderness on percussion. Intra-oral periapical radiograph (IOPAR) was advised for the incisors. The IOPAR showed oblique crown fracture in tooth 21. The final diagnosis was Ellis class IV fracture with respect to maxillary left central incisor (FIG 1).



Fig. 1. Pre-operative photograph, radiograph and crown lengthening

Treatment Plan: The treatment proposed for the fractured maxillary left central incisor included crown lengthening on the palatal side of the tooth followed by root canal treatment, biological post and core made from extracted permanent mandibular central incisor and PFM crown. After explaining the patient about the whole treatment procedure a consent form was duly signed. Crown lengthening was done on the palatal side of the fractured teeth under local anaesthesia using electrocautery and co-pack was applied (FIG 1) Patient was recalled after one week after crown lengthening.

After application of rubber dam access cavity was prepared using high speed NSK air rotor handpiece using Endo access burr and then with Endo z burr (Dentsply Maillefer, Switzerland). After radiographic estimation of the working length with initial file ISO #25 biomechanical preparation was done using hand protaper upto ISO F3 (Dentsply Maillefer, Switzerland). Copious irrigation was done using 5.25% sodium hypochlorite solution and EDTA before obturation with guttapercha.

Post Space Preparation: In next appointment minimal post space was prepared upto peeso reamer no. 4 by leaving 6mm of guttapercha in the apical region (FIG 2). This was followed by estimating the width of the post space and length of the post from intra oral periapical radiograph by using a divider. The extracted permanent mandibular central incisor was sterilised and autoclaved at 121 degree



Fig 2. Post space and post preparation from pre-extracted permanent mandibular central incisor



Fig. 3. Post and core cementation and post-operative photograph and radiograph

Celsius for 15 minutes. Access cavity was prepared in extracted tooth using round diamond bur (FIG 4b) Cleaning and shaping of the canal was done upto ISO #25 hand file. Then the canal was etched with 37% phosphoric acid and then light cured after application of bonding agent (Fusion Bond DC). It was followed by filling the canal with dual cure nano-hybrid flowable composite and then light cured (Fusion Flow, PrevestDenPro). The prepared extracted tooth was then trimmed according to post space using a high speed air-rotor handpiece and tapered fissured diamond bur under continuous water flow. The post prepared was then checked for snug fit in the post space.

Cementation of Post and Core Build Up: The prepared post was then conditioned with 37% phosphoric acid for 30 seconds followed by the washing, drying, and application of the bonding system (Fusion Bond DC) with a microbrush in two coats, gently air dried and light cured for 15 seconds. The root canal walls were etched, bonding agent applied and light cured. The root canals were completely filled with dual curing composite resin cement (Fusion Flow, Prevest Den Pro) using auto mixing tips and the posts was cemented into the canal under constant digital torque pressure until the end of the cement polymerization.

Core build-up was done with light cured composite cement (SOLARE X, GC India) and a radiograph was taken to confirm.

Crown Cutting for PFM Crown and Cementation: Patient was recalled after one week for initial follow up. There was no discomfort experienced by the patient. Tooth preparation for PFM crown was done after placement of retraction cord. Shade was matched using VITA shade guide and impression were taken using light body impression material and sent for laboratory processing. Later the PFM crown was cemented using dual curing composite resin cement (Fusion Flow, Prevest Den Pro). The patient was recalled after one month for post-operative follow up. There was no complaint of discomfort with the treated tooth. The follow-up of the patient was continued after every three months for 1 year.

DISCUSSION

This case report has proved functional rehabilitation of a damaged endodontically treated tooth using a biological post. With increasing demands of aesthetics among patients, the functional and aesthetic rehabilitation of a mutilated anterior tooth is a challenge. Use of natural tooth or tooth fragments for management of fractured anterior teeth has become a feasible option due to advancements in adhesive technology and restorative armamentarium.^[9] Various post systems like fibre posts, metal posts, cast posts, ceramic posts are commercially available but none of them can fulfil all the mechanical or biological requirements.^[10] Only material that can have all the properties is the tooth or tooth fragment itself. The biological crown and post is a cost effective alternative which makes use of a recycled precious biological tissue. Posts made of steel or titanium have higher modulus of elasticity than dentin and on the other hand fibre posts have lower modulus of elasticity than dentin. Biological posts made from extracted tooth provide better stress distribution found by Belli *et al.*^[11] The biological crown and post is a cost effective alternative which makes use of a recycled precious biological tissue. In a study done by Memon *et al* it was found that stress in the cervical area of dentin is more with FEA as compared to dentin post.^[12] A case report published by Corrêa-Faria *et al.* reported successful use of biological dentin posts and biological crowns to recover the aesthetics and functions of extensively damaged maxillary central incisors with 1-year follow-up.^[13] However, there are few limitations of biological posts like acceptance by the patient, availability of extracted tooth with similar structure and colour.^[14] It is quite a technique sensitive procedure. Moreover, patient consent is utmost important.

CONCLUSION

Within the limitations, it seems that biological post is an excellent alternative over pre-fabricated commercially available posts for the aesthetic and functional rehabilitation of severely mutilated teeth. This case study reports successful management of fractured endodontically treated teeth with biological post. However, further studies and research are needed to assess the long-term biomechanical behaviour of the biological posts to make it more acceptable and viable treatment options for economically weak group of patients and other large count of population.

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