

Case Report

Biological posts and crown: An esthetic recovery of smile

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ABSTRACT

Anterior teeth fracture is a common form of dental trauma that mainly affects children and adolescents. Maxillary incisors are the most commonly affected teeth. Loss of coronal tooth structure might affect esthetics and function. In recent decades, dentistry has shown many scientific and technological advances in restorative materials. However, no synthetic restorative material can replicate the natural tooth structure. Hence, the use of natural tooth as a restorative material has been suggested in literature and is termed as a biological restoration. The present case report represents the successful use of biological post and crown and was adequate with respect to adhesion, function, and esthetics with the follow-up period of 1 year. Hence, it may be concluded that the biological restoration, if feasible, is a cost-effective way to restore a damaged tooth with acceptable esthetics and tooth functions in the stomatognathic system.

Key Words: Biological, fracture, maxillary central incisors

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INTRODUCTION

Anterior teeth fracture is a common form of dental trauma that mainly affects children and adolescents,^[1,2] and maxillary central incisors are the most commonly affected teeth.^[3] Loss of coronal tooth structure might affect esthetics and function.^[1]

In recent decades, dentistry has shown many scientific and technological advances in restorative materials.^[4] However, no synthetic restorative material can replicate the natural tooth structure. Hence, the use of natural tooth as a restorative material has been suggested in literature and is termed as biological restoration.^[5]

The following case report represents a clinical case performed by means of a biological post and crown by reattachment of fractured crown using biological post with 1-year follow-up.

CASE REPORT

A 21-year-old male patient was referred to the department of conservative and endodontics after sustaining a complicated crown fracture on his permanent maxillary left central incisor in a road traffic accident, while riding a bike.

Clinical and radiographic examination

Clinical examination revealed complicated Ellis class III fracture of maxillary left central incisor with retained fractured segment and Ellis class II of maxillary right central incisor and lateral incisor [Figure 1a]. Maxillary right central and lateral incisor showed no tenderness on percussion and no mobility. Intraoral periapical radiograph (IOPAR) was advised with respect to maxillary incisors.

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IOPA revealed an oblique crown fracture in tooth 21 [Figure 2a].

Treatment plan

Proposed treatment to restore maxillary left central incisor included root canal treatment followed by flap refection and placement of biological post, made from the root cutting of extracted canine as well as the subsequent adaptation of patient's own crown fragment and direct composite restoration for maxillary right central incisor and lateral incisor. After agreeing upon the proposed treatment, a consent form was duly signed.

Fractured segment was removed from maxillary left central incisor [Figure 1b] and stored in artificial saliva until cementation. Single-visit endodontic treatment of maxillary left central incisor was completed [Figure 2a-d]. In next visit, postspace was prepared using peeso reamers (Mani) till size #3 and 5 mm of apical seal was preserved [Figure 2e], followed by intraradicular impression with addition silicone (President). Finally, impression was poured with die stone to obtain a model, which served as a guide during the making of the post.

The making of dentin post and core

A freshly extracted permanent maxillary canine was collected and thoroughly cleaned to remove soft tissues and then autoclaved at 121C for 15 min.^[6] Using a diamond disk, tooth was sectioned mesiodistally along the long axis of the tooth and then cementum was removed using tapered fissure diamond bur under

coolant to obtain a dentin post [Figure 3a, b]. Model was used as a reference in orienting shape, thickness, and length of the dentin post which was verified radiographically [Figure 3c, d].

Preparation of fractured crown fragment

The internal surface of crown segment was prepared to receive dentin post [Figure 3e]. Finally, both biological dentin post and crown were autoclaved just before cementation.

Cementation of biological post and crown

In the next visit, flap surgery was planned to expose the fracture line which was subgingival on distopalatal aspect. After administration of local anesthesia (2% lignocaine with 1:80,000 adrenaline), flap was raised to expose the fracture line [Figure 4a], ViscoStat (Ultradent) was used for hemostasis, then retraction cord (#000, Ultradent) was inserted to assist the restorative procedures. The dentin post, inner surface of crown, and the root canal were conditioned with 37% phosphoric acid for 15 s, followed by the rinsing, drying, and application of dual cure-bonding agent (Adhesive [A + B] of Paracore, Coltene) [Figure 4b]. Finally Paracore (a dual cure resin cement) was injected into the prepared post space and the dentin post was inserted into the root canal. Simultaneously crown segment was also reattached in place followed by curing for 40s on each surface. [Figure 4c, d]. Then all margins were polished and the flap was repositioned with the sutures and the necessary occlusal adjustments were made. Postsurgical instructions were given to the patient. After 7 days, sutures were removed, and the patient was rescheduled for the next appointment for direct restorations of 11 and 12. In the final visit, direct composite buildup was done using layering technique in 11 and 12 [Figure 4e, f].

After 1-year follow-up, the clinical and radiographic findings [Figure 5a-d] showed that the adaptation of reattached crown and biological post as well as the esthetics and the tooth function was preserved. The treatment outcome of this case so far could be

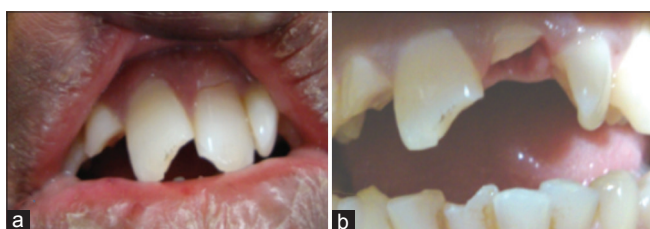


Figure 1: (a) Preoperative, (b) after removal of fractured fragment.

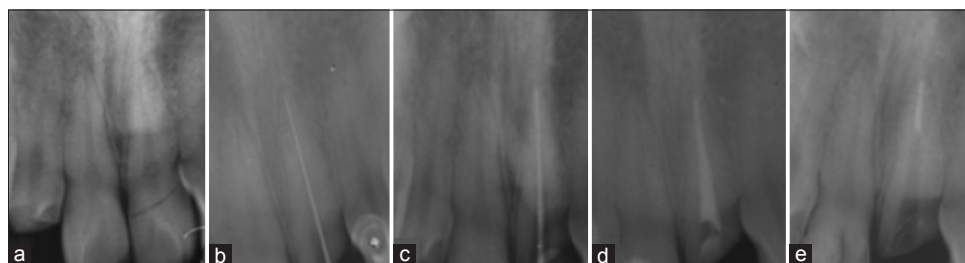


Figure 2: (a) Preoperative intraoral periapical radiograph, (b) working length intraoral periapical radiograph, (c) master cone intraoral periapical radiograph, (d) obturation intraoral periapical radiograph, (e) postspace preparation.

considered a success based on the characteristics of clinical and imaging outcomes given by Estrela *et al.* in 2014. Clinical examination included the absence of tooth pain, absence of periodontal pocket, tooth with retained definitive restoration and in masticatory function, while imaging aspects included the absence of periapical radiolucency.^[7]

DISCUSSION

Sometimes, remaining tooth structure requires

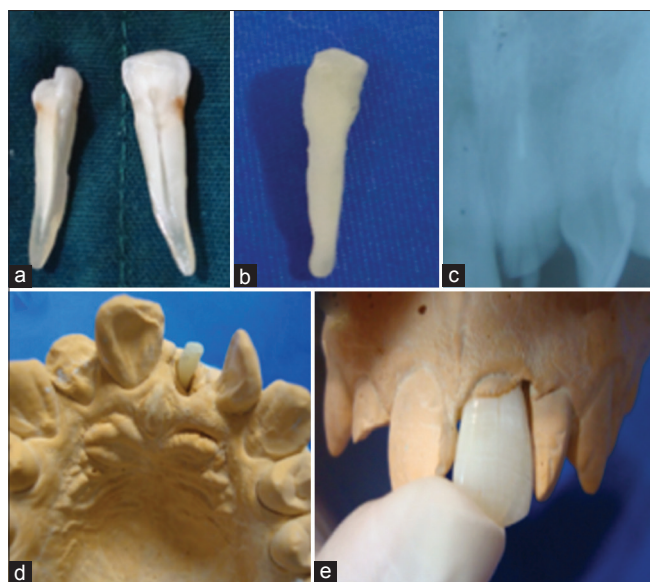


Figure 3: (a) Sectioned maxillary canine, (b) fabricated dentin post, (c) verification of dentin post inside patient mouth with intraoral periapical radiograph, (d) model used as a reference during fabrication of post, (e) seating of crown fragment over dentin post.

additional intraradicular retention,^[3] to achieve this, various post systems can be used, such as custom-made post or prefabricated post made of fiber glass, carbon fiber, metal, or ceramics. However, no commercially available posts fulfill all the mechanical and biological requirements. The only material that can have all these properties is none other than the dentin itself.^[8] Hence, the use of biological dentin post and biological crowns have been suggested in the literature.^[1,2,9,10]

In the present case, since the coronal destruction extended to the cervical third of tooth, the use of intraradicular retention was deemed necessary. This retention was achieved with biological posts,^[11] and esthetics was maintained by reattaching patient's own crown fragment.

Although the tooth fragment reattachment is usually done with more predictable results in simple cases with clinically visible fracture line, this case report with a 1-year follow-up demonstrated that this procedure can be performed even in complex crown fractures where the biologic width is violated, corroborating Peixoto *et al.*,^[12] Durkan *et al.*,^[13] and Rajput *et al.*^[14] However, periodontal health is an important determinant in the success of these cases. Peixoto *et al.* presented a case with an oblique crown fracture in the maxillary right lateral incisor, extending from the buccal to palatal side, as well as biological width invasion. Hence, the reestablishment of biological width was obtained by periodontal surgery to achieve clinical crown lengthening and tooth fragment reattachment with a glass fiber post

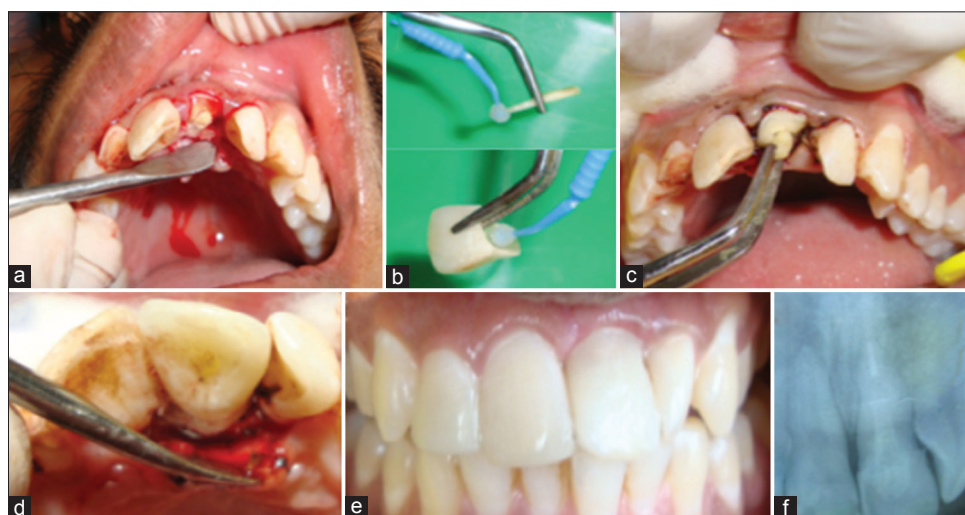


Figure 4: (a) Flap reflection, (b) adhesive treatment of dentin post and crown, (c) cementation of dentin post, (d) cementation of crown, (e) postoperative clinical view after 1 week, (f) postoperative intraoral periapical radiograph.



Figure 5: (a) Preoperative view, (b) postoperative view, (c) 1-year follow-up, (d) 1-year follow-up intraoral periapical radiograph.

to increase retention. After 3 years of follow-up, the rehabilitated lateral incisor remained in good condition, with satisfactory esthetic and periodontal health.^[12] However, long-term follow-up visits should be planned for clinical and radiographic confirmation of good esthetics, function, and periodontal health. Hence, the success rate of the technique is case dependent. Furthermore, advanced imaging techniques like cone-beam computed tomography could be considered for further evaluation of the treatment outcome.

Corrêa-Faria *et al.* published a case report of successful use of biological dentin posts and biological crowns to recover the esthetics and functions of extensively damaged maxillary central incisors with 1-year follow-up.^[1] Vaz *et al.* reported a case of fractured maxillary central incisors restored with the use of biological post followed by direct composite restoration of maxillary right central incisor, while maxillary left central incisor was restored with prefabricated fiberglass followed by direct composite restoration.^[4]

Biological dentin post has several advantages as it exhibits similar mechanical properties and esthetics as that of dentin.^[11,15] This is a low-cost procedure and could be accepted as a useful technique for cost-conscious patients with good oral hygiene and satisfactory periodontal health.^[11] However, it has some limitations such as patient acceptance, difficult retrieval, availability of teeth with similar structure, and similar tooth color.^[16] Furthermore, adaptation of

the post to the root canal may be less accurate. Hence, CAD-CAM may be used in future research to achieve the accurate dimensions of biological posts as that of post space.

CONCLUSION

The present case study represents the successful use of biological post and crown and was adequate with respect to adhesion, function, and esthetics with the follow-up period of 1 year. Hence, it may be concluded that the biological restorations, if feasible, is a cost-effective way to restore a damaged tooth with acceptable esthetics and tooth functions in the stomatognathic system.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

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