CASE REPORT

Biological Posts: Natural Alternatives in Restoring Smile

[1]Antriksh Azad, [2]Hemant R Chourasia, [3]BS Hema, [4]Ipsita Sharma, [5]Rahul Bhartia, [6]Rohit Raghuvanshi

ABSTRACT

Traumatic injuries leading to severely mutilated anterior teeth are common in dentistry. These injuries may leave a severe impact when they affect endodontically treated teeth as strength of such teeth is compromised. Proper functional and esthetic rehabilitation of such badly broken teeth is a challenge. Dealing with the patient's mental suffering and their impatience to regain the natural smile back makes the treatment even more challenging. An effective treatment plan including a suitable and cost-effective choice of post is very much necessary in such conditions. Biological posts obtained through extracted teeth from another individual represent an economic option and alternative technique for the functional recovery of extensively damaged teeth. All-ceramic crowns further add to enhanced esthetics. This paper presents a case where biological posts with composite core build up followed by all-ceramic crown adaptation have been used with successful outcome.

Keywords: Anterior tooth fracture, Biological posts, Biological restorations, Traumatic injuries.

How to cite this article: Azad A, Chourasia HR, Hema BS, Sharma I, Bhartia R, Raghuvanshi R. Biological Posts: Natural Alternatives in Restoring Smile. J Orofac Res 2015;5(2):61-64.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Modern dentistry aims at preserving pulpal vitality and post/core is considered as last treatment option in restoring a damaged crown.[1] Endodontically treated teeth are found to be weaker and more prone to fracture because of desiccation or premature loss of moisture supplied by vital pulp.[2] Studies conducted by Habekost et al[3] and Hussain et al[4] have proven that endodontically treated teeth are generally weaker than sound teeth due to loss of tooth structure caused by caries and/or endodontic procedures.

Fracture of anterior teeth by trauma is the most frequent type of injury in the permanent dentition, especially among children and adolescent affecting up to 25% of this patient population.[5] This is due to sports, leisure activities, and carious lesions which lead to functional, esthetic, and psychosocial problems reducing the patient's quality of life.[6]

Dentistry, nowadays has achieved advances in restorative and adhesive materials but no restorative material can replace natural dental structures. Several authors have suggested the use of natural teeth fragments as an efficient method for restoring fractured anterior teeth.[6] Fragment reattachment using natural teeth is a technique known as 'biological restoration' and provides excellent results regarding surface smoothness, esthetics, and the maintenance of the incisal guide in dental structures that cause physiological wear.[6,7] Thus, the combination of tooth structure, adhesives, and restorative materials available today provides a good functional and esthetic result and an alternative treatment in the restoration of extensively damaged fractured teeth.

Posts made from several materials, such as fiber glass, carbon fiber, metal, and ceramic are commercially available. However, no premanufactured post meets all ideal biological and mechanical properties.[6] The use of biological posts for the strengthening of the root canal thus presents the potential advantages of not promoting dentin stress, preserving the internal dentin walls of the root canal, presenting biocompatibility, favoring greater tooth strength and greater retention of these posts as compared to premanufactured posts, presenting resilience comparable to the original tooth, and offering excellent adhesion to the tooth structure and composite resin and at a low cost.[6,8]

The use of biological posts, however, present limitations, such as the difficulty of finding teeth with a similar color and shape as that of the destroyed element, or the patient may refuse to accept a tooth fragment obtained from another patient, which prevents the execution of the

[1,4-6]Senior Lecturer, [2]Professor, [3]Reader

[1,3]Department of Conservative Dentistry and Endodontics Rishiraj College of Dental Sciences and Research Centre Bhopal, Madhya Pradesh, India

[2]Department of Conservative Dentistry and Endodontics People's College of Dental Sciences and Research Centre Bhopal, Madhya Pradesh, India

[4]Department of Oral and Maxillofacial Pathology, RKDF Dental College and Research Centre, Bhopal, Madhya Pradesh, India

[5,6]Department of Conservative Dentistry and Endodontics Mansarovar Dental College and Research Centre, Bhopal Madhya Pradesh, India

Corresponding Author: Antriksh Azad, Senior Lecturer Department of Conservative Dentistry and Endodontics Rishiraj College of Dental Sciences and Research Centre Bhopal, Madhya Pradesh, India, Phone: 9713545714, e-mail: antriksh02@gmail.com

restoration.[6,9] This paper presents a case where biological posts with composite core build-up followed by all ceramic crowns have been used with successful outcome.

CASE REPORT

A 24-year-old female patient was referred to the Department of Conservative Dentistry and Endodontics, with the complaint of fractured maxillary central incisors because of road traffic accident 3 months back (Fig. 1A). The patient's medical history was noncontributory. Dental history included root canal treatment with 11 and 21 followed by metal-ceramic crown adaptation 9 years back. The clinical and radiographic examinations revealed loss of tooth structure extending to the cervical third (Figs 1A and G). Patient was a tobacco and areca nut chewer. Both crowns were stained and severely discolored, their access cavities were open with food lodged inside and gutta percha was visible with 11. The loss of coronal portion of teeth affected patient's speech. A shy and an introvert social behavior were noted. Proposed treatment to restore both maxillary central incisors with intraradicular biological posts made by cutting the roots of previously extracted and properly sterilized canine followed by all ceramic crown adaptation of both maxillary central incisors was explained to the patient. The patient received instructions regarding the advantages and disadvantages of biological restoration as well as information on other treatment options. After agreeing upon the proposed treatment, a consent form was duly signed.

Post Space Preparation

First, surface stains and soft dentin layer were removed using a polishing bur attached to air rotor. Rubber dam was then applied (Fig. 1B) and coronal gutta-percha was removed using gates glidden drills (No. 2–4, Mani, Japan). The post space was then prepared using peeso reamers (No. 2–4, Mani, Japan). The coronal end of gutta-percha was flattened using a warm hand plugger, leaving 4 to 5 mm of the same at apical third. An intraoral periapical (IOPA) radiograph was taken to confirm the preparation (Fig. 1H).

Preparation and Adaptation of Biological Posts

Putty and light body impression was made for the post space prepared with 11 and 21 (Fig. 1C). Die stone cast model was made from it (Fig. 1D). An extracted, donated maxillary canine was selected for construction of posts. Using a diamond disk attached to straight handpiece with adequate amount of water spray the crown portion was sectioned at cementoenamel junction, and the remaining root was further sectioned mesiodistally along the long axis of the tooth. Both root halves were trimmed using a long taper diamond bur attached to air rotor to suitably adapt to stone model such that about 4 mm of its coronal portion was outside (Fig. 1E). The posts formed were finally checked for a snug fit on the cast.

Cementation of Posts and Core Build-up

The dentin posts formed were put in for autoclaving at 121°C temperature and 15 lbs pressure for 20 minutes. They were then conditioned with 37% phosphoric acid for 30 seconds (Fig. 1F), followed by the washing, drying, and application of the adhesive system (Adper single bond 2, 3M ESPE) with a microbrush in two coats, gently air dried and light cured for 15 seconds. Similarly the root canal walls were etched, bonding agent applied and light cured. The root canals were completely filled with self cure composite resin cement (3M RelyX Adhesive Resin Cement, 3M ESPE) using automixing tips and the posts were cemented into the canals under constant digital pressure until the end of the cement polymerization. Core build-up was done with light cured nanocomposite resin (Filtek Z350 XT, Universal Restorative, 3M ESPE) of shade B1 (Fig. 1J) and a radiograph was taken to confirm (Fig. 1I).

Crown Cutting for All Ceramic Crown and Cementation

Retraction cords were applied for gingival retraction with 11 and 21 so that a slightly subgingival shoulder finish line could be given all round for better adaptation and esthetics of all ceramic crowns (Fig. 1K). A putty-light body impression of upper and lower full arch was made. Shades were matched using VITA classical shade guide and the impressions were sent to laboratory processing of all-ceramic Zirconia crowns. Later they were cemented with self cure resin cement with light curing option (Multilink N, Ivoclar Vivadent) (Fig. 1L).

DISCUSSION

The choice of extracted teeth to be used as biological posts presents a viable alternative for restoring badly broken teeth. Also, it is an economic option in schools of dentistry where patients cannot afford much expensive treatment. The extracted tooth was obtained from the Department of Oral and Maxillofacial Surgery, People's College of Dental Sciences and Research Centre. Extracted teeth here are thoroughly scaled, curetted and stored in normal saline until use for educational and clinical purposes with prior patient consent.

In the present case, since the crown destruction extended to the cervical third, intraradicular reinforcement was necessary to provide retention and stability to the

crowns. Dentin posts made from roots of extracted canine were used. Their usage has been mentioned in the case report by Corrêa-Faria et al with the advantage that they allow for a juxtaposed adaptation to the root canals and do not cause stress to the dentin, since they contain the same biomechanical behavior as the restored teeth.[6] The posts were autoclaved at 121ºC temperature and 15 lbs pressure for 20 minutes to ensure complete sterilization before adaptation to root canals.[6] The adhesion provided among the biological post, the cementing agent, and the dental structure allows one to attain a sole biomechanical system (monoblock) with materials that are compatible among themselves.[6] The use of biological posts in teeth with compromising dental structure allows the occlusal forces that will place pressure on the tooth to be better distributed throughout the root.[10] A careful assessment of the patient's occlusion and the presence of premature contacts that can lead to the failure of the technique should be done.

The patient was instructed to pay special attention on dental hygiene and avoid excessive pressure on teeth which could result in fracture. The patient's restoration

Figs 1A to L: (A) Clinical appearance of the patient, (B) post space preparation under rubber dam, (C) Putty and light body impression of the prepared post space, (D) die stone cast, (E) sectioning of canine into two halves and trimming each half sufficiently to fit into the post space on the cast, (F) acid etching of posts, (G) preoperative radiograph, (H) radiograph after post space preparation, (I) Radiograph after post cementation and composite core build-up, (J) cementation of the posts followed by composite core build-up, (K) crown cutting and (L) all-ceramic Zirconia crowns cemented

Fig. 2: Patient reporting with confident smile and retentivity of biological posts after 6 months

was evaluated after 6 months for esthetics and retention. A confident, pleasing smile and excellent retentivity of the biological posts was noted (Fig. 2). The gingival health was visually and clinically inspected with an explorer. The assessment of patient's response to treatment indicated positive change in behavior, speech and self-esteem. The case is still being followed. The technique described in this case report is a cost-effective alternative making it possible to recycle precious biological tissue which otherwise would have been discarded as a biowaste.

CONCLUSION

The combination of biological posts and all-ceramic crowns offers excellent esthetic, functional and psychosocial results at a low cost. However, further studies are needed to assess adhesion, fracture resistance, and the long-term behavior of the posts so as to better understand the benefits of the technique and make it a more acceptable practice among dentists and patients.

REFERENCES

1. Krasteva K. Clinical application of a fiber-reinforced post system. J Endod 2001;27(2):132-133.
2. Zhi-Yue L, Yu-Xing Z. Effect of post-core design and ferrule on fracture resistance of endodontically treated maxillary central incisors. J Prosthet Dent 2003;89(4):368-373.
3. Habekost L, Camacho GB, Azevedo EC and Demarco FF. Fracture resistance of thermal cycled and endodontically treated premolars with adhesive restorations. J Prosthet Dent 2007;98(3):186-192.
4. Hussain SK, McDonald A, Moles DR. In vitro study investigating the mass of tooth structure removed following endodontic and restorative procedures. J Prosthet Dent 2007; 98(4):260-269.
5. Murchison DF, Burke FTJ, Worthington RB. Incisal edge reattachment: indications for use and clinical technique. British Dent J 1999;186(12):614-619.
6. Corrêa-Faria P, De Alcântara CEP, Caldas-Diniz MV, Botelho AM and Tavano KTA. Biological Restoration: Root Canal and Coronal Reconstruction. J Esthet Restor Dent 2010;22(3): 168-178.
7. Oz IA, Haytaç MC, Toroglu MS. Multidisciplinary approach to the rehabilitation of a crown-root fracture with original fragment for immediate esthetics: a case report with 4-year follow-up. Dent Traumatol 2006;22(1):48-52.
8. Osborne JW, Lambert LR. Reattachment of fractured incisal tooth segment. Gen Dent 1985;33(6):516-517.
9. Busato AL, Loguercio AD, Barbosa AN, Sanseverino MCS, Macedo RP, Baldissera RA. Biological restorations using tooth fragments. Am J Dent 1998;11(1):46-49.
10. Andreasen FM, Noren JG, Andreasen JO, Engelhardtsen S Lindh-Strömberg U. Long-term survival of fragment bonding in the treatment of fractured crowns: a multicenter clinical study. Quintessence Int 1995;26(10):669-681.