

CASE REPORT

Esthetic and Functional Rehabilitation of Fractured Central Incisors using Biological Post

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ABSTRACT

Conventional root canal treatment aims to remove the microorganisms and pulp tissue from the canal system and repair the tooth by filling the canal system and restoring the lost coronal tissue. Anterior tooth fracture, as a result of traumatic injuries, frequently occurs in dentistry. Proper reconstruction of extensively damaged teeth can be achieved with the use of natural teeth used as post. In some cases, surgical retreatment of previously failed surgery is indicated because this is the most appropriate way of ensuring the effective removal of any remaining microorganisms. This case report refers to the esthetics and functional rehabilitation of extensively damaged maxillary incisors through the preparation and adhesive cementation of 'Biological Posts' in a young patient. Biological posts obtained through natural, extracted teeth from another individual—represents a low-cost option and alternative technique for the morphofunctional recovery of extensively damaged anterior teeth.

Keywords: Biological post, Endodontic surgery, Retreatment, Traumatic injuries.

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INTRODUCTION

When teeth have irreversible pulp disease, the best course of action is root canal treatment. Conventional root canal treatment aims to remove the microorganisms and pulp tissue from the canal system and repair the tooth by filling the canal system and restoring the lost coronal tissue. In this way, the surface integrity of the tooth is restored and the barrier to microbial ingress re-established. Unfortunately, the technical difficulties inherent in root canal treatment

occasionally results in microorganisms remaining within the canal system and, thus, continuation of the disease process. In most cases, conventional retreatment of failed cases is indicated,¹ because this is the most appropriate way of ensuring the effective removal of any remaining microorganisms. On occasion, however, surgical endodontics in the form of root-end resection and root-end filling are preferred. The success rate of surgery has been reported to range from 25 to 99%,² with the result that, in failed cases, the clinician has to decide whether to attempt a second surgical procedure, a resurgery, or whether to attempt an alternative and more predictable strategy for removing microorganisms, e.g. extraction. Data on the outcome of resurgery are sparse. There is a large collection of literature that explores outcomes of surgical intervention. However, there is scant literature relating to a second surgery or resurgery of a persistent lesion that fails to heal after the initial surgery has been attempted.

Anterior tooth fracture, as a result of traumatic injuries, frequently reported in dental clinics, with prevalence of 8.1 in 1,000 children examined.³ This fact is commonly related to sports, leisure activities, and caries lesions, thus causing functional, esthetic and psychosocial problems⁴ in addition to reducing the patient's quality of life.⁵ A satisfactory smile can be achieved by using several techniques and esthetic materials, such as resin and porcelain. Over the past decades, dentistry has achieved great scientific and technological advances regarding restorative and adhesive materials. Nevertheless, to date, no restorative material has been more effective than the properties of the natural dental structures themselves.⁶ Several authors have suggested the use of natural teeth fragments as an efficient method for restoring fractured anterior teeth.^{6,7} When the patient presents the fragment in good condition, this procedure presents optimal results in the restoration of fractured teeth (autogenous bonding).^{6,8,9} However, when the patient does not present the fragment, or its use is not recommended, donated extracted teeth (homogeneous bonding) can be used. 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.⁹ The combination of dental fragments, adhesives, and restorative

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materials that are commercially available today provides a good functional and esthetic result, connecting these properties within an alternative treatment in the restoration of extensively damaged fractured teeth.^{10,11}

A proper coronary reconstruction that produces satisfactory esthetic and functional conditions for endodontically treated and extensively damaged teeth is still a challenge for restorative dentistry, considering that, to achieve these conditions, the making of an intracanal retention, aimed at a better retention and stability of the dental fragments, becomes imperative. This retention can be performed by using posts made from several materials such as fiber glass, carbon fiber, metal and ceramic. However, no commercially available premanufactured post meets all ideal biological and mechanical. The use of natural, extracted teeth (homogeneous bonding) for restorations does, however, present limitations, such as the difficulty of finding teeth with a similar color or the patient may refuse to accept a tooth fragment obtained from another patient, which prevents the execution of the restoration.⁶

CASE REPORT

A 34-year-old male patient reported to the out-patient department of conservative dentistry and endodontics, AMU, Aligarh, with the chief complaint of pain and pus discharge in relation to upper front tooth. Clinical examination revealed fractured upper left central incisor upto cervical third and protruded, discolored upper left lateral incisor (Fig. 1). History of the patient revealed trauma approximately 10 years back for which he consulted a local practitioner and underwent a periapical surgery. Radiograph of the patient revealed inappropriate endodontic treatment in upper left central and lateral incisor and a large persistent well-circumscribed periapical radiolucency in relation to left lateral incisor (Fig. 2). A decision was taken for a periapical

surgery, taking into consideration the circumscribed nature of the pathology and to restore maxillary central incisor using intraradicular biological posts made from the roots cutting of extracted and properly sterilized canine followed by subsequent crown adaptation. 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, periapical surgery was done, pathology was completely curetted (Fig. 3) and canals were obturated and verified radiographically (Fig. 4). Patient was recalled further for the esthetic correction of central incisor using biological post.

Properly autoclaved extracted canines were used for making of posts. Using a diamond disk, the crown portion was separated from a portion of the root, and the root was sectioned mesiodistally along the long axis of the tooth and each part was cut to make biological post which was properly sterilized and stored in normal saline (Figs 5A to C). After verification of length and adaptation of the post radiographically, it was conditioned with 37% phosphoric acid for 30 seconds, followed by the washing, drying, and application of the adhesive system (ADPER SINGLE BOND 2, 3M ESPE, CA, USA) and was polymerized. The self-cured resin cement (C and B Cement, Bisco) was applied to the inner portion of the canals with the help of a lentulo spiral and lightly applied to the surface of the posts, which were then inserted into the canals under constant digital pressure until the end of the cement polymerization. After cementation of post crown, reduction was done and tooth was restored with porcelain fused to metal crown (Fig. 6).

On 3-month follow-up examination, patient was completely asymptomatic and radiograph revealed very good healing of periapical tissues (Fig. 7).

Nine months follow-up radiograph (Fig. 8) revealed excellent healing of periapical tissues.



Fig. 1: Fractured maxillary left central incisor upto cervical third, protruded, and discolored upper left lateral incisor

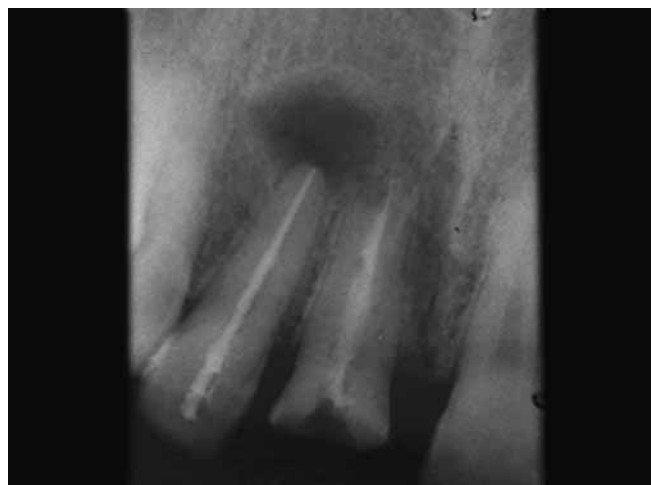


Fig. 2: Preoperative radiograph showing poor endodontic treatment done in upper left maxillary central and lateral incisors



Fig. 3: Raised flap and completely curetted pathology

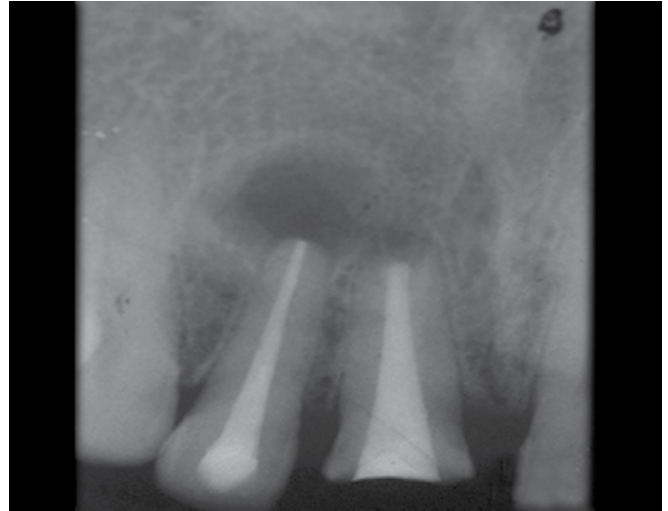


Fig. 4: Immediate postsurgical radiograph



A



B



C

Figs 5A to C: Preparation of biological post (A) tooth cleaned of pulpal remnants, (B) sterilized, and (C) stored in normal saline

DISCUSSION

The use of biological posts made from extracted natural teeth represents a feasible option for the strengthening of the root canal, thus presenting the potential advantages which are as follows:

1. Does not promote dentin stress,
2. Preserves the internal dentin walls of the root canal
3. Presents total biocompatibility and adapts to conduct configuration, favoring greater tooth strength and greater retention of these posts as compared to premanufactured posts.
4. Presents resilience comparable to the original tooth, and
5. Offers excellent adhesion to the tooth structure and composite resin and at a low cost.¹²



Fig. 6: Maxillary left central and lateral incisors restored with porcelain fused to metal crowns



Fig. 7: Three months follow-up radiograph showing healing of periapical tissues



Fig. 8: Nine months follow-up radiograph showing excellent healing of periapical tissues

This case-report presents the restorations of central incisor using biological posts made from natural, extracted teeth. It is important to note that, before the manipulation of any of these extracted dental elements, the teeth were properly cleaned, stored, and sterilized by autoclaving at 121°C for 15 minutes, ensuring all biosecurity standards.¹³ In the present case study, since the coronary destruction extended to the cervical third, intraradicular reinforcement was deemed necessary to provide retention and stability to the crowns. 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. The use of posts in teeth with great compromise of the dental structure allows the occlusal forces that will place pressure on the tooth to be better distributed throughout the root.¹⁴

CONCLUSION

‘Biological restorations’ take on special importance in restorative dentistry, especially since they are less expensive, which makes this practice a feasible option within dentistry

that attend mostly to people of a lower economic level. However, further studies are called for to assess adhesion, fracture resistance, and the long-term behavior of these posts so as to better understand the benefits of the technique and make it a more acceptable practice among dentists and patients.

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