



Biological Restoration: A Simple Method for Reconstruction of Severely Damaged Primary Anterior Teeth

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ABSTRACT

Restoration of primary maxillary incisors, severely destroyed by trauma or caries is a commonly faced problem in a paediatric dental clinic. Most cases are observed in children with early childhood caries or trauma. In the past, the only option is to extract the affected teeth and replace them with prosthetic substitutes. The availability of natural crown and root would allow the use of biologic restorations to preserve the integrity of patient's natural dentition. This article describes a case in which biological restoration using tooth was placed in primary anterior tooth, with severely damaged crown due to trauma. The restored tooth demonstrated good retention and aesthetic results over a one year period. Hence, a biological restoration seems to be a successful and cost-effective alternative approach for treating such cases.

Key Words: Biologic restoration, Early childhood, Natural teeth

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INTRODUCTION

Anterior teeth fracture, as a result of traumatic injuries, frequently occurs in dentistry and presents a special challenge to paediatric dentist. Premature loss of primary incisors may affect the speech by interfering with the pronunciation of consonants and labial sounds, decreased masticatory efficiency, abnormal tongue habits and potential subsequent malocclusion.

The child may also suffer from psychological problems if aesthetics is hampered.¹ Because of reduced coronal tooth structure, direct adhesive restorative procedures do not always give satisfactory results. In the past, the most expedient treatment was to remove the involved teeth. This treatment was justified on the basis that the permanent teeth would eventually replace the extracted ones. However, the importance of

preserving the integrity of primary dentition until the appropriate exfoliation time is well recognized.

The consequences of premature loss of primary teeth are well known namely the loss of vertical dimension of occlusion, tongue thrusting and mouth breathing habits, which can be sources of future malocclusion. In cases of severe loss of tooth structure intra canal posts became mandatory.

The various root canal posts used in paediatric dentistry are orthodontic thread in the shape of alpha or gamma,² the metallic posts with macro retention,³ composites posts,⁴ biological restoration¹ and the fibreglass post.⁵ Recent development in restorative materials, placement techniques, and adhesive protocols facilitates these restorations. However these procedures turn out to be expensive, technique sensitive and also require expertise of the operator.

The expression “biological restoration” was coined by Santos and Bianchi,⁶ in 1991. A biological restoration⁷ meets up to the aesthetic and structural standards of natural teeth.

Proper reconstruction of extensively damaged teeth can be achieved through the fragment reattachment procedure known as “Biological Restoration.” They provide natural posts and crowns which can fit into the treated root stumps of the individual and replace the coronal portion aesthetically.

The first paper reporting the use of fragments of extracted teeth as dental restorative materials was published in 1964 by Chosak and Eidelman.⁸ Thereafter, several other reports have demonstrated the advantages of this technique, such as favourable aesthetics, resulting from enamel's natural surface smoothness, anatomic contouring and colour match, functional and masticatory effectiveness, preservation of sound tooth structure, prevention of physiological wear, and no need of complex material resources.^{9,10} This case report shows success of placing biological restoration in child with severely mutilated primary anterior tooth.

CASE REPORT

A 4yrs old female child presented along with parents to department of paediatric dentistry, three hours after sustaining a complicated crown fracture of her maxillary left central incisor during playing activity (Figure 1). Medical history was non contributory. General physical examination shows child appears to be panic. Extra –oral examination reveals no lacerations or bruises on face. Intra-oral examination reveals complete set of primary dentition with left maxillary central incisor crown split into two fragments intervening coronal pulp tissue.

Radiographic observation did not reveal sign of root fractures as the surrounding structures of root had sound integrity. The child's parents were informed about the various treatment options. Parents were impressed with biological restoration as it is cost effective, retaining portion of natural tooth. In addition, it was made clear to the parent's advantages as well as disadvantages of the technique and the post and the crown would be obtain from natural, extracted teeth that had been

previously sterilized by autoclaving in accordance with bio security standards. Consent was obtained using natural tooth restoration. Booster dose of Tetanus Toxin was given.



Figure 1. Initial view of fracture left maxillary central incisor

Phase 1

Child was premeditated due to anticipated negative taking her age into consideration. Under local anaesthesia, fractured mobile fragment of crown and intervening pulp tissue was removed (Figure 2).



Figure 2. Extirpated pulp with removal of fractured fragment

Endodontic preparation

Endodontic treatment of fractured teeth was carried using Ni-Ti files and reamers and after complete sterilization of canal, obturated with zinc oxide eugenol cement.

Phase 2

Preparation of biological post

The patient was asymptomatic on the second visit. The obturating material at coronal one

third of root (4mm) is removed, for preparation of core to take biological posts (Figure 3). A 1 mm thick layer of glass ionomer cement was condensed over the remaining zinc oxide eugenol filling to prevent interference in the polymerization of composite resin restoration.



Figure 3. Intra-oral photograph showing condensation of GIC over Zinc-oxide eugenol cement



Figure 4. Primary tooth selected for the procedure and shaped to function as post

Tooth selected from tooth bank was reshaped with a crown preparation kit and the roots shaped to function as posts. The apical third was removed and the remaining stump was filled with flowable composite material. Tooth prepared for use as biological restoration was then autoclaved for 15 min at 121°C before cementation. The tooth was then tried for fit and adjustments in the prepared root canal (Figure 4). The finally prepared

crown and root were cemented using dual cure resin modified GIC. Finishing and polishing was done to give natural appearance like adjacent tooth (Figure 5).

Follow-Up

After a period of follow ups for 3,6,9 months biological restoration is satisfactory without any discoloration, marginal breakdown, and loss of restoration.



Figure 5. Final aesthetic result

DISCUSSION

The principle goal of paediatric restorative dentistry is to restore the damaged teeth to its normal function as well as to retain its aesthetic. In the past, the only treatment option for pulpally involved primary teeth would have been to extract the teeth and replace them with prosthetic substitutes, until the permanent teeth erupted. However, the availability of natural crowns and roots would allow the use of biologic restorations to preserve the integrity of patient's natural dentition.

Fragment re-attachment using natural teeth is a technique known as biological restoration. Although the technique is simple, it requires professional expertise to prepare and adapt the natural crowns and intra-canal posts.¹¹ Biological restorations not only mimic the missing part of the oral structures, but are also bio-functional.¹²

The advantages of using biological restorations are the length of each appointment is reduced because natural teeth are prepared previously; the technique eliminates laboratory processing and is economical. The technique is simple, allows the preservation of sound tooth structure and provides excellent aesthetics

compared to composite resins and stainless steel crowns, especially regarding translucency.

Clinical chair time for fragment bonding procedures is relatively short, which is very advantageous when treating paediatric patients.^{13,14} Resin composite restorations do not present these advantages and can allow staining and plaque formation on their surfaces.

Disadvantages of the biological restoration technique include the difficulty in obtaining teeth with the required coronal dimensions and characteristics, problems inherent to indirect restorations and matching fragment colour with tooth remnant colour. Also, having fragments from other people's teeth in their mouth is not a pleasant idea for some patients and many of them refuse to receive this treatment. However, all these factors are not contraindications of the technique.

It is important that the parents are informed that the tooth fragments used for biological restoration are previously submitted to a rigorous sterilization process that completely eliminates any risk of contamination or disease transmission to the child receiving the fragment.

Presently, secure methods of sterilization and storage are available to ensure the safety of teeth or tooth fragments coming from tooth banks.^{15,16} Several materials have been used for bonding dental fragments to cavities, e.g., adhesive systems, composite resins, glass ionomer cements and dual-cure resin cements.

The association between "Biological Crowns and Posts" offers excellent aesthetic, functional, and psychosocial results, which justifies the use of this technique to achieve the morpho functional recovery of extensively damaged teeth. In the present case, the use of biologic restoration with the natural roots and crown resulted in clinical success as well as recovered function and aesthetics.

The biologic restoration is a promising alternative to prosthodontic restoration for primary teeth severely destroyed due to trauma or caries. Also, the technique eliminates high costs associated with other restorative techniques for deciduous anterior teeth, and provides highly functional and aesthetic outcomes.

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