

Biological Restoration of a Grossly Decayed Deciduous Mandibular Molar

SHIVANI MATHUR, RAHUL CHOPRA, I.K. PANDIT, NIKHIL SRIVASTAVA, NEERAJ GUGNANI

ABSTRACT

This article reports a case of 7-year old child, in whom a severely damaged primary molar was biologically restored using a tooth obtained from another patient. After clinical evaluation, extracted tooth was adjusted to the prepared primary molar, it was autoclaved and bonded to the primary molar with dual cure

resin cement. Occlusal adjustment was performed and periodic clinical follow up was carried out at 6 month and 12 month interval. In this case report, the use of biological restorations as a possible alternative treatment for rehabilitation of severely destroyed primary teeth is discussed.

Key Words: Biological restoration, root canal therapy, paediatric dentistry

INTRODUCTION

Dental caries is one of the most prevalent disease of mankind. It has affected human race since times immemorial, especially during early childhood. According to 1999-2004 National Health and Nutrition Examination Survey 42% of children in the age group of 2 to 11 years have had dental caries in their primary teeth.

Primary molars with extensive carious lesions are routinely observed in clinical practice. Their loss at an early age may not only lead to establishment of neuro-muscular imbalance leading to decreased masticatory efficacy but also phonetic and esthetic problems, development of parafunctional, psychological problems. To restore them is thus a challenge for the clinician. Diverse treatment options are available today like stainless steel crowns, cheng crowns, dura crowns, strip crowns, glastech crowns, pedo jacket crowns etc. Out of the various treatment options available to rehabilitate it severely destroyed tooth crowns, conservatively and biologically, several authors have suggested the use of tooth structure as a restorative material [1-7].

Santos and Bianchi [8] in 1991 coined the term "biological restoration" while the first paper reporting the use of fragments of extracted teeth as dental restorative materials was published in 1964 by Chosak and Eidelman [9]. Ramirez-Romito et al used teeth from the human tooth bank of Sao Paulo University Dental School to be used as natural posts and crowns to fit into the roots and replace the crowns as well [10]. Thereafter, several other reports have demonstrated the advantages of this technique, such as favorable esthetics, resulting from enamel's natural surface smoothness, anatomic contouring and color match, functional and masticatory effectiveness, preservation of sound tooth structure, prevention of physiological wear, and no need of complex material resources [3,5,6,8]. The technique consists of bonding sterile dental fragments teeth with large coronal destruction. Adhesive materials retain the tooth fragment in the non-retentive cavity which is present as a result of extensive loss of tooth structure. Fragments obtained either from the patient or from a tooth bank may be used as a safe and reliable alternative to restore dental anatomy and function with excellent biomechanical properties [2, 8]. Not only is the technique

simple, but it also allows the preservation of sound tooth structure and provides excellent esthetics compared to composite resins and stainless steel crowns, especially regarding translucency. In addition the clinical chair time for fragment bonding procedures is relatively short, which is very interesting when treating paediatric patients.

This article describes a case in which a severely damaged primary molar due to extensive carious lesion was biologically restored using a tooth obtained from another patient.

CASE REPORT

A 7-year-old patient reported to the department of pedodontics and preventive dentistry D.A.V (C) Dental College and Hospital, Yamunanagar with extensive carious lesion in the primary mandibular left first and second molars. After clinical and radiographic examinations, local anesthesia was given and a rubber dam was placed for isolation of the operative field. Single sitting root canal therapy was performed thereafter in both the molars [Table/Fig-1]. A stainless steel crown was adapted on the mandibular first molar since there was substantial tooth structure left for it to be restored using SS crown.

For the mandibular second molar to be biologically restored, the steps, advantages as well as disadvantages of the technique were fully explained to the parents and a signed informed consent was obtained.

The core of the tooth structure was built with composite resin since the amount of remaining tooth structure was not sufficient for adhesion [Table/Fig-2]. Impressions of both the maxillary as well as the mandibular arches were then taken using alginate. Stone casts were obtained and the mesiodistal, cervico-occlusal and buccolingual dimensions of the tooth (mandibular left second molar) were measured using a compass, in order to select an extracted tooth, whose coronal dimensions best fitted the prepared tooth. Color matching was also taken into account.

A tooth was selected [Table/Fig-3] which was stored previously at 4 degree centigrade in Hank's balanced salt solution with donor

identification [11,12,13,14]. It was scaled, polished and freed of soft tissues and periodontal remnants. Also, the pulp was removed. The coronal fragment was adjusted with diamond burs at high-speed under air/water spray coolant until it fitted the cavity. Articulating paper was interposed between the fragment and the cavity in the stone cast as well as the fragment and the maxillary



[Table/Fig-1]: Pre-Operative view of the endodontically treated 74, 75



[Table/Fig-2]: 75 Prepared to receive the biological crown



[Table/Fig-3]: Tooth to be used as Biological crown



[Table/Fig-4]: Post-operative view of 75 restored with biological crown

cast to demarcate the areas that needed further adjustments. The prepared fragment was autoclaved at 121°C for 20 min.

In a second clinical appointment, the adaptation of the fragment to the tooth was checked. The fragment was bonded with a dual-cure resin-based cement (Calibra, Dentsply York, PA, USA), according to the manufacturer's instructions. The material was light cured on buccal and lingual surfaces for 40 s [Table/Fig-4].

The fragment-tooth interface was sealed with composite resin (Esthet-X, Dentsply, York, PA, USA), light-cured for 40 s. Occlusion was checked with articulating paper. The parents were instructed to get the follow-up done periodically; at 6 month and 12 month interval [Table/Fig-5]. Post-treatment course was uneventful.

DISCUSSION

The use of extracted teeth as biological restoration constitutes a viable restorative alternative for teeth with extensive coronal destruction. This technique is simple, provides excellent esthetics as well as preserves natural tooth colour compared to composite resins and stainless steel crowns, allows the preservation of sound tooth structure and has low cost [15]. The enamel of the biologically restored tooth has physiologic wear and offers superficial smoothness and cervical adaptation compatible with those of surrounding teeth [6,9]. Biological restorations not only mimic the missing part of the oral structures, but are also biofunctional [16].

The length of each appointment is reduced because natural teeth are prepared previously. Clinical chair time for fragment bonding procedures is relatively short, which is a merit especially while dealing with paediatric patients [2,3,5,6,16]. Resin composite restorations do not present these advantages and can allow staining and plaque formation on their surfaces.

However, biological restorations as any indirect restoration requires a laboratory phase that must be handled carefully. Collected samples should be scaled, polished and freed of soft tissues and periodontal remnants. Although a simple technique, it requires professional expertise to prepare and adapt the natural crowns in the cavity.

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



[Table/Fig-5]: 1-year follow up photograph of the biologically restored tooth

treatment [2]. 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 [2,17].

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 [2]. Since the Tooth fragment which was taken was large, it was concerned that optimal light-curing would not be achieved at the cavity gingival margin. Thus, dual-cure resin-based cement was used to enhance polymerization at this region in addition to filling any possible gaps existing at tooth/fragment interface with composite resin only [7].

CONCLUSION

Based on the positive results in the literature and on our own clinical experience, it may be concluded that the biological restoration technique using tooth fragments has a practical clinical applicability and is a viable, cost-effective restorative procedure for primary teeth with severely damaged crowns. In the present case, the use of biological restoration with natural crown resulted in clinical success as well as recovered the proper functional anatomy of the tooth.

REFERENCES

[1] Andreassen FM, Noren JG, Andreassen JO, Engelhardt S, Lindh-Stromberg U. Long-term survival of fragment bonding in the treatment of fractured crowns: a multicenter clinical study. *Quintessence Int* 1995;26:669-81.

- [2] Busato ALS, Loguercio AD, Barbosa NA, Sanseverino MCS, Macedo RP, Baldissera RA. Biological restorations using tooth fragments. *Am J Dent* 1998;11:46-48.
- [3] Ramires-Romito ACD, Wanderley MT, Oliveira MDM, Imperato JCP, Côrrea MSNP. Biologic restoration of primary anterior teeth. *Quintessence Int* 2000;31:405-11.
- [4] Olsburgh S, Jacoby T, Krejci I. Crown fractures in the permanent dentition: pulpal and restorative considerations. *Dent Traumatol* 2002;18:103-15.
- [5] Barcelos R, Neves AA, Primo L, Souza IPR. Biological restorations as an alternative treatment for primary posterior teeth. *J Clin Paediatr Dent* 2003;27:305-10.
- [6] Mandroli PS. Biologic restoration of primary anterior teeth: a case report. *J Indian Soc Pedod Prev Dent* 2003;21:95-97.
- [7] Terry DA. Adhesive reattachment of a tooth fragment: the biological restoration. *Pract Proced Aesthet Dent* 2003;15:403-09.
- [8] Santos J, Bianchi J. Restoration of severely damaged teeth with resin bonding systems: case reports. *Quintessence Int* 1991;22:611-15.
- [9] Chosack ABDS, Eidelman EDO. Rehabilitation of a fractured incisor using the patient's natural crown-case report. *J Dent Child* 1964;31:19-21.
- [10] Ramires Romito ACD., Wanderley MT, Oliveira MDM, Imparto JCP, Pires Correa MSN. Biologic restoration of primary anterior teeth. *Quint Int* 2000; 31: 405-11.
- [11] Ahmed FIK, Russel C. Sterilization of teeth for homogeneous transplantation. *British Journal of Oral Surgery* 1976;14:143-49.
- [12] Nassif AC, Tieri F, Da Ana PA, et al. Structuralisation of Human Tooth Bank. *Pesqui Odontol Bras* 2003;17(1);70-74.
- [13] Habiltz S, et al. Nanoindentation and storage of teeth. *J Biomech* 2002;35(7):995-98.
- [14] Grewal N, Reeshu S. Biological Restorations: An Alternative Esthetic Treatment for Restoration of Severely Mutilated Primary Anterior Teeth. *Jaypee's Int J of Clin Pediatr Dent*, September-December 2008;1(1);42-47.
- [15] Ehrmann EH. Restoration of a fractured incisor with exposed pulp using original tooth fragment: report of a case. *J Am Dent Assoc* 1989;118:183.
- [16] Kapur A, Chawla HS, Goyal A, Gaube K. An esthetic point of view in very young children. *J Clin Pediatr Dent* 2005;30:99-103.
- [17] Yang ZP, Chang CS. A 3-year follow-up of a homotransplanted tooth from a tooth bank. *J Endod* 1990;16:34-37.

AUTHOR(S):

1. Dr. Shivani Mathur
2. Dr. Rahul Chopra
3. Dr. I.K. Pandit
4. Dr. Nikhil Srivastava
5. Dr. Neeraj Gugnani

PARTICULARS OF CONTRIBUTORS:

1. Senior resident, Department of Pedodontics and Preventive Dentistry, Government Dental College, Rohtak, Haryana, India.
2. Senior resident, Department of Periodontics, Government Dental College, Rohtak, Haryana, India.
3. Professor and Head of the Department, Department of Pedodontics and Preventive dentistry D.A.V.(C) Dental College & Hospital, Yamunanagar, Haryana, India.
4. Professor, Department of Pedodontics and Preventive dentistry, D.A.V.(C) Dental College & Hospital, Yamunanagar, Haryana, India.

5. Professor, Department of Pedodontics and Preventive dentistry D.A.V.(C) Dental College & Hospital, Yamunanagar, Haryana, India.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Shivani Mathur, M.D.S
Senior resident,
Department of Pedodontics and Preventive Dentistry,
Government Dental College, Rohtak, Haryana, India.
Phone: 09354812365
E-mail: shivani_bds@rediffmail.com

FINANCIAL OR OTHER COMPETING INTERESTS:

None.

Date of Submission: **Sep 30, 2011**
Date of Peer Review: **Dec 22, 2011**
Date of Acceptance: **Jan 03, 2012**
Date of Publishing: **Feb 15, 2012**