

Auto-Biologic Restoration - A Novel Method of Salvaging a Grossly Carious Mandibular Molar

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Abstract: Restoration of grossly decayed teeth is considered to be a challenging situation for any practitioner. In spite of the advances in material science none of the material completely simulate the physical and mechanical properties of natural tooth structure. These differences in properties can lead to failures at the tooth-restoration interface, can cause increased wear of opposing natural tooth or can lead to eventual fracture of the tooth. This case report describes a novel method of restoration of a grossly decayed mandibular first molar with a post-core and crown using the natural tooth structure derived from the mandibular third molar of the same patient while also ensuring an accurate fit.

Keywords: biological restorations, dentin post, extracted third molar, natural crown

I. Introduction

Grossly decayed permanent molars are common in clinical practice. Loss of these teeth at an early age may lead to neuro-muscular imbalance, decreased masticatory efficiency, phonetic/ aesthetic problems and development of parafunctional habits. A satisfactory restoration of these teeth can be achieved using several techniques and materials.[1-8] Although recent advances in restorative and adhesive materials have made the restoration of mutilated teeth a great success, no material till date is as effective as natural tooth structure when biological and mechanical properties are considered.[9]

The concept of biological restoration was given by Santos and Binachi in 1991. Here, sterile dental fragments were used for restoring large coronal defects.[10] Several reports have described the advantages of biologic restorations such as shorter and lower treatment costs without involvement of laboratory procedures, preservation of healthy tooth structure, less chances of galvanic corrosion, good adherence, favourable aesthetics, functional and masticatory effectiveness with lesser need of complex material resources.[11-15]

Ramires-Romito et al used teeth from the Human Tooth Bank of Sao Paulo University Dental School as natural post and crown to fit into the roots and rebuild the coronal portion of tooth.[16] However, using extracted teeth from the human tooth bank is often not accepted by patient. It is also difficult to find teeth with the same color.[17] This can be overcome by using extracted teeth of the same patient to restore the mutilated tooth.

This case report describes a novel method of using an extracted third molar (38) to restore a grossly decayed mandibular first molar (36) of the same patient while ensuring an accurate fit by using a custom made template.

II. Case Report

A 38 year old female reported to the Department of Conservative Dentistry and Endodontics at Sinhgad Dental College and Hospital with the chief complaint of pain in the lower left posterior region of her jaw since 1 month. On clinical examination tooth 36 was grossly carious, tender on percussion and showed a delayed response on electric pulp testing (Fig 1a). Patient also had a history of recurrent periodontal abscess with 38 which was associated with a 5 mm deep pocket on its distal aspect.

Based on clinical and radiographic findings, a diagnosis of symptomatic apical periodontitis secondary to chronic irreversible pulpitis was made (Fig 1b). Root canal treatment along with post-core and crown was planned with 36. Since there was no opposing third molar present, decision to extract the 38 was made. The patient was informed about the various materials and treatment options including prefabricated post-core and crown, auto biologic post-core and crown or extraction along with the advantages and disadvantages of each. Patient decided to go ahead with auto biologic post-core and gave consent for the same.

Mandibular nerve block with 2% lignocaine with 1:80,000 adrenaline (Biomed Pharma, Mumbai) was administered and single visit endodontic treatment with 36 was completed followed by extraction of 38 in the same visit (Fig 1e). The extracted tooth was stored in saline until the next appointment to prevent dehydration. After a healing period of 15 days, post-space preparation was done till #3 Peeso reamer (Mani, Japan) in the distal canal of 36 followed by a crown preparation with supragingival self cleansable margins (Figure 1c,d). Impression of the post-space and prepared crown was taken with addition silicone impression material (Zhermack SpA, Italy).

The stored 38 was decoronated with a diamond disc with water cooling (Fig 1f). The distal root of the 38 which was relatively straight was chosen to make the post. The root was trimmed from one side only preserving the dentin on all other sides and eliminating the root canal space while trimming with the flat surface of the diamond disc with water cooling (Fig 1g). The length and retention of the auto biologic post was checked in the tooth and confirmed with a radiograph (Fig 2a). The cementation of the post was done using dual cure resin cement (Panavia F, Kuraray, Japan) The core build up was not done and another impression was made with the biologic post in place (Fig 2b).

The casts obtained were mounted on an articulator. The crown of 38 was trimmed from within making it hollow till it had adequate marginal adaptation with the crown preparation margins of 36 on the cast and an all round thickness of at least 2.5 mm remaining. Minor marginal and proximal contact adaptations were done using composite resins (Fig 2c).

In this case the tooth was grossly destructed with only a mesial wall present after caries excavation and access opening. In order to ensure maximum thickness of the natural crown obtained from 38 and minimum thickness of the core material, the core was adapted to the interiors of the crown instead of the other way round by the procedure described below.

On the cast, inlay wax was added to simulate the core build-up. The crown was coated with a separating medium and placed on the soft inlay wax on the cast so that wax conforms to the crown. A custom matrix band template was made around the inlay wax core on the cast with clear acrylic. (Fig 2 d, e, f). This matrix band template was placed in the patients mouth around the 36 and the core build up was done with dual cure composite resin (ParaCore, ColteneWhaledent, USA) (Fig 2g, 3a,b).

After checking for adequacy of fit and occlusion with the crown in position, cord packing was done (Ultradent, USA) and the auto biologic crown was cemented using dual cure resin cement (Fig 3c, d). One year recall showed good marginal adaptation and sound natural crown surface. (Fig 3e, f, g).

III. Figures

Figure 1, 2 and 3. Composite figure of photographs and radiographs of the case.

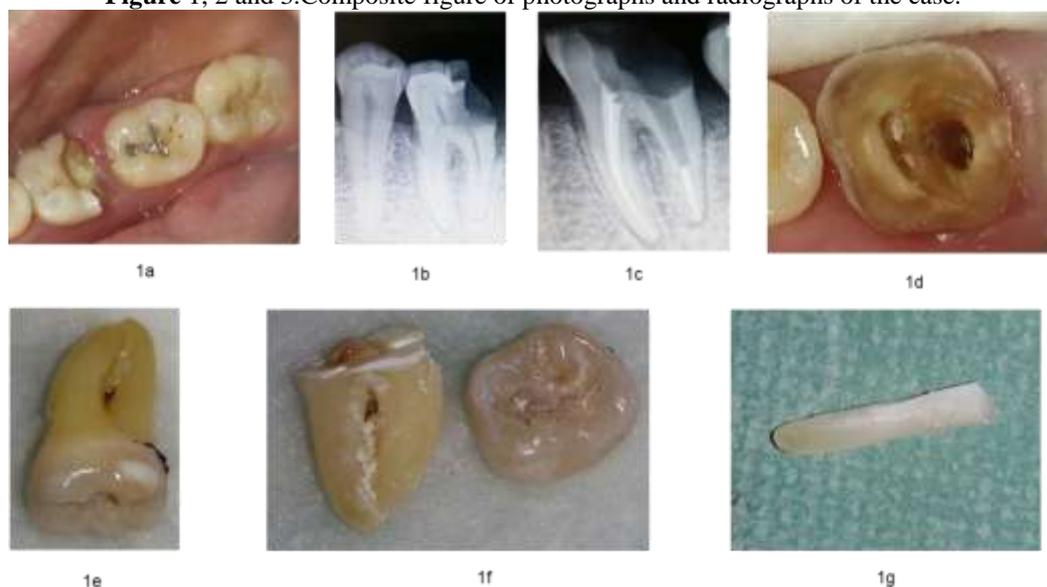


Fig 1

(1a). Pre-operative clinical photograph

(1b). Pre-operative radiograph

(1c). Post-space preparation

(1d). Clinical view of post space

- (1e). Extracted 38
- (1f). Decoronation of 38
- (1g). Preparation of post for 36 from the distal root of 38



Fig 2
(2a).Placement of post in the distal canal
(2b).Clinical view of post in the canal
(2c).Adaptation of crown on cast
(2d). Wax adaptation on cast according to crown for core
(2e). Preparation of clear acrylic matrix band around the wax
(2f). Clear acrylic matrix band
(2g). Clear acrylic matrix band placed around 36



Fig 3
(3a). Core build up with clear acrylic matrix band around

- (3b). Completed core build-up
- (3c). Crown cementation- buccal view
- (3d). Final cemented crown- occlusal view
- (3e). Post-operative radiograph
- (3f). 1 year follow-up – occlusal view
- (3g). 1 year follow-up - buccal view.

IV. Discussion

Significant evolution has taken place in the field of restorative dentistry since its beginning. The earlier concept of extracting a mutilated tooth has changed and today the tendency is to conserve any tooth. Biological post-core and crown made from natural extracted teeth appears to be very promising with regards to aesthetic and biomechanical properties.[9]

Retention and stability are the prime factors to be considered when the rehabilitation of mutilated teeth with conventional post and core is planned.[18] Root fracture is the most common form of failure associated with teeth restored with metal posts due to weakening of root dentin and their lack of resiliency in comparison to tooth structure. Fibre posts are more flexible but are susceptible to bond failures since its flexes more than dentin.

Biological restorations not only mimic the missing part of the oral structures, but are also biofunctional. In addition to being homogenous in nature, its similarity in elasticity to that of surrounding dentin would allow for a more uniform distribution of stress to the apical region. The cementing medium creates a type of single unit or a monoblock effect where the materials are compatible with each other.[19] Various in vitro and in vivo studies have concluded that teeth restored with dentin posts exhibited equal or better fracture resistance than those restored with fibre reinforced composite posts and clinical performance of biological post and core and intracanal reinforced composite were comparable.[20]

Post cementation was done using Panavia F cement which is a self-etching, dual-cure, fluoride-releasing cement which shows high bond strength to tooth structures. Even after releasing fluoride, the cement maintains its high mechanical strength due to the special surface coating technology of sodium fluoride. Also, it shows low leakage and virtually no post-operative sensitivity.[21]

A core is used to build a badly broken down tooth to restore the bulk of the coronal portion of the tooth to an ideal anatomic form before the full coverage crown is placed. As the core becomes an integral part of the structure of the tooth, it should provide strength to resist intraoral compressive and tensile forces. ParaCore is a fiber-reinforced, dual core and radiopaque core build up material. It exhibits a stackable, non-slumping consistency and is formulated to cut similar to dentin, allowing the bur to move smoothly between natural tooth structure and the material without creating troughs and grooves. It incorporates glass particles that impart high strength.[22]

In this case an attempt to minimize core material thickness and maximise the thickness of natural tooth structure was made by fitting the core to the crown instead of designing a crown that adapts to the core.

Various case reports have published using biological crown obtained from tooth bank for restoring grossly carious tooth. However teeth obtained from teeth banks have low patient acceptability and problems in shade matching.[18,19,23]

In present case, crown was obtained from an extracted third molar tooth of the same patient to re-establish the shape and function of a root-canal treated tooth. This procedure enables the clinician to achieve natural results in terms of anatomic shape, surface shine, smoothness and translucence of the enamel. It also enabled to improve chewing function and physiological wear of the tooth structure.

V. Conclusion

Biological restorations can be considered as a viable and cost-effective treatment option for restoring grossly carious tooth when compared to conventional treatment modality. Extracted teeth from the same patient provides a practical and convenient approach with greater patient acceptability, cost effective natural and esthetic restorations with the superior physical and mechanical properties of patients own natural teeth substance.

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