Abstract

The constant evolution of Restorative Odontology is creating a benchmark. The case reports represent the functional recuperation of a tooth, through the use of a dental fragment obtained from an extracted tooth, a technique known as ‘Biological Restoration’. The highly satisfactory results obtained permitted to conclude that this technique can be considered as an alternative to all others and can be carried out successfully, quickly, and inexpensively.

Keywords: biological restoration, extracted tooth, crown fragment, cementation.

INTRODUCTION

In clinical practice, permanent molars with extensive carious lesions are routinely observed. Their loss at an early age may not only lead to neuro-muscular imbalance, causing decreased masticatory efficacy, but also phonetic and aesthetic problems, development of parafunctional, psychological problems. Their restoration is therefore a challenge for the clinician. Diverse treatment options are available today after root canal and post and core treatment. Out of the various treatment options available to conservatively and biologically rehabilitate the severely destroyed tooth crowns, several authors have suggested the use of tooth structures as a restorative material. [1-8]

The expression “biological restoration” was coined by Santos and Bianchi in 1991. [9] The technique consists of bonding sterile dental fragments to teeth with large coronal destruction. Cavity preparation should be non-retentive, the fragment being retained with adhesive materials. [3, 10]

The combination of dental fragments, adhesives and restorative materials commercially available today provides good functional and aesthetic results. Combination of these properties can offer an alternative treatment option for the restoration of extensively damaged or fractured teeth. [11-13]

Two cases of restoration with biological crown, treated in the Department of Conservative Dentistry and Endodontics, Guru Nanak Institute of Dental Science and Research, Kolkata, will be discussed in the following.

CASE REPORT 1

The patient was an 18 year-old male presenting crown structure loss of 37, due to caries (Fig. 1). Clinical and radiographic examinations revealed the loss of tooth structure and pulp exposure. Radiographic examination also revealed a mesioangular impacted 38 (Fig. 2). The treatment proposed to restore 37 included root canal with its post and core treatment, as well as subsequent crown adaptation of 37 taken from 38.

As the patient was 18 year-old, Ricketts analysis was done and 38 remained impacted there (Fig. 3).

The patient received instructions regarding the advantages and disadvantages of biological restoration, as well as information on other treatment options. In addition, it was made clear to the patient that the crown would be obtained from his own impacted natural tooth, extracted surgically.

All carious tissues were removed, followed by Endodontic treatment and screw post (PARA POST, COLTENE) and core build up with light
cure composite resin (SOLITAIRE 2, HERAEUS, GERMANY LOT 010306) (Figs. 4-5). Crown reduction was done and impressions were taken using addition silicone (Express XT Putty Soft, 3M ESPE, Germany, LOT ZP0010688, Aquasil LV; Densply, USA, LOT 201408) and a cast was realized (Fig. 6). There followed the surgical removal of 38, which was extracted and kept in normal saline, the patient being called after 1 week for suture removal and crown adaptation (Fig. 7).

Fig. 1: Grossly carious 37

Fig. 2: I.O.P.A radiograph showing grossly carious 37 with an impacted 38

Fig. 3: Ricketts analysis was done to calculate that whether the impacted 3rd molar will erupt or not in the future.

Fig. 4: Root canal treatment was done and screw post was given

Fig. 5: Completed root canal treatment with post and core build up

Fig. 6: Crown reduction was done with temporization

Fig. 7: Surgical extraction of 38 was done taking care not to harm the crown of 38

The crown part of 38 was separated from the root with a straight diamond abrasive (SF- 41, ISO 109/010;21) and made hollow to adapt again and again on the cast over the reduced 37, then checked with bite paper to reduce the points of interference to fit it over the reduced 37 (Figs. 8,9). The cast was articulated on a hinge...
articulator and occlusal adjustments were made with a flame-shaped diamond abrasive (CE0297, DFS-DIAMOND; LOT 27/10) and light cure composite resin (TETRIC N – CERAM, IVOCLAR VIVADENT, LOT P81525), and preserved in normal saline.

In the final clinical session, the correct adaptation of the biological crown over 37 on patient’s mouth was checked and minor occlusal adjustments were made intraorally. The crown was luted using MULTILINK SPEED (IVOCLAR VIVADENT, Liechtenstein, LOT R64472) self-curing resin, and the marginal discrepancies were corrected using light cure composite resin (TETRIC N– CERAM, IVOCLAR VIVADENT, LOT P81525). (Fig. 10) The patient was called after one month, six months and one year. After 1 year follow-up, the clinical and radiographic findings showed that the adaptation of crown, the aesthetics and the tooth function had been preserved. (Fig. 11)

CASE REPORT 2

A 23 year-old female reported with a chief complain of broken tooth. Clinical examination showed crown structure loss of 46 and 47 due to caries. (Fig. 12) Clinical and radiographic examinations revealed that the loss of tooth structure was caused by caries with an exposure of pulp chamber. Radiographic examination also revealed a linguoverted impacted 38. (Fig. 13) The treatment proposed to restore 47 included root canal treatment of 47 with subsequent crown
adaptation on 47 taken from 48, while the restoration of 46 included root canal treatment with porcelain fused to the metal crown.

Endodontic treatment and post endodontic restoration were done as in the first case. Crown reduction was done and impression was taken in same manner. (Fig. 14) Patient was given appointment for the surgical removal of 48. (Fig. 15)

The crown part was prepared in the same manner as in case 1(Figs. 16, 17).

In the final clinical session, after minor corrections, both crowns were luted using Self Curing Resin. (Fig. 18) After 1 year follow-up, the clinical and radiographic findings showed a clinically-sound tooth structure. (Fig. 19)
DISCUSSION

The above clinical cases described an alternative restoration procedure in which a crown obtained from an extracted human tooth is used to re-establish the shape and function of a root canal-treated tooth. This technique allows natural results in terms of anatomic shape, surface shine, smoothness and translucence of the enamel; it also enables improvement of the chewing function and physiological wear of the tooth structure. [15,16]

However, biological restoration may have limitations related to the selection of extracted teeth with similar color and shape to the tooth to be restored. This is especially true with posterior teeth, which can exhibit more extensive decay and greater anatomic complexity, particularly when having undergone root canal treatment. [15] It is therefore fundamental to establish human tooth banks. [14] The difficulty of encountering an extracted tooth similar to the one to be restored did not constitute a limitation in the present case, as the crown used for restoration was acquired from the extracted third molar of the patient himself.

Another limitation of biological restoration is the possibility of fracturing the selected extracted tooth during its sectioning for the obtainment of the crown, as well as the difference in color after bonding. In order to minimize such risks, the teeth used in biological restorations should be kept hydrated throughout all procedures.

The results of the presented cases – both in the immediate post-operative period – demonstrate that the fragment bonding technique (biological restoration) using an either endogenous (obtained from a tooth extracted from the patient himself/herself) or heterogeneous fragment (obtained from a donated extracted tooth) is a viable treatment option.

CONCLUSIONS

Based on the positive results provided in literature and on our own, even if limited, clinical experience of using the whole crown part of posterior tooth to restore gross carious tooth with biological crown, it may be concluded that biological restoration has a practical clinical applicability and is a viable, cost-effective restorative procedure for teeth with severely damaged crowns. Undoubtedly, further research will yield better prognosis.

References


