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Bane to Boon A Rehabilitation of Fractured Incisor Tooth with Multidisciplinary Approach: A Case Report

Medical Science

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ABSTRACT

Fracture of tooth below the gingival attachment or crest of the alveolar bone presents many restorative challenges. Such fractured teeth often consider hopeless and extracted. A fractured anterior tooth often requires correct diagnosis and thorough treatment planning. Periodontal crown lengthening of such tooth which involves removal of supporting alveolar bone and gingival tissue can compromise aesthetic; and should be reserved for posterior area. Multidisciplinary treatment approach using orthodontic forced eruption has been suggested as a viable alternative to extraction and periodontal crown lengthening for aesthetic and functional rehabilitation of subgingivally fractured anterior tooth. The purpose of this article is to present case report of fractured anterior tooth and its interdisciplinary management taking in consideration the biologic, functional, aesthetic and economic aspects.

KEYWORDS:

subgingivally fractured tooth, crown-root fracture, orthodontic extrusion, crown lengthening

INTRODUCTION

Aesthetic rehabilitation of complicated crown-root fracture poses many challenges to the clinician. Crown-root fracture comprise 0.3-5% of tooth injuries affecting the permanent dentition and are usually caused by direct trauma to the anterior teeth[1]. The literature reports various treatment modalities for this crown root fractures, ranging from fragment removal and restoration, crown lengthening, orthodontic extrusion, surgical extrusion and extraction followed by surgical implant or fixed partial denture[2,3]. Extraction must not be the first choice of treatment because it leads to loss of bone in this prime aesthetic zone. Moreover surgical crown lengthening causes negative change in the length of the clinical crowns, producing poor aesthetics, wide embrasures and is also less conservative[4]. The use of orthodontic extrusion for such teeth raises the fracture line above the epithelial attachment, leaving 3-4 mm distance from the alveolar crest to the coronal extension of the remaining tooth and allows for a ferrule effect[5]. In complicated cases; interdisciplinary management may be required.

In this case report, a multidisciplinary approach for restoration of a subgingivally fractured maxillary permanent central incisor is presented.

Case report:

A 32 yr old male patient reported to the department of Prosthodontics, Govt. Dental College and Hospital, Mumbai with the chief complaint of poor aesthetics due to fractured anterior tooth. Past medical history was insignificant and past dental history revealed that patient had undergone endodontic treatment for 21. Intraoral examination revealed an oblique crown root fracture of 21 with the fracture line extending subgingivally at distopalatal aspect (Fig-1). Further radiographic examination confirmed clinical finding (Fig-2).

Fig-1 Preoperative view of fractured left maxillary central incisor

Fig-2 Radiographic view of fractured tooth.

After discussing all the treatment options with the patient a definitive treatment plan was designed, its risks and benefits were explained and a written, informed consent was obtained.

The following treatment was carried out for this patient. Orthodontic extrusion of left central incisor was implemented to facilitate placement of the coronal restoration and to set up ferrule effect. Orthodontic brackets were bonded to 11, 12 and 21, whereby the bracket was placed more gingivally on a tooth to be extruded (Fig-3).

Fig-3 orthodontic extrusion

Extrusive force of approximately 25 gm was applied along the long axis of the tooth provided by an orthodontic wire. After a period of 12 weeks approximately 3 mm of extrusion had been achieved. After extrusion was completed tooth was stabilized for the period of 8 weeks. Afterwards periodontal surgery was performed to correct the discrepancy of the gingival zenith due to coronal migration of the connective tissue. Following the orthodontic extrusion, glass fibre post was selected to restore the fractured tooth. The gutta-percha was partially removed leaving 4 mm of apical filling to maintain good seal. Post space was prepared with peaso reamer and gates glidden drill. A

glass fibre post (GC Fibre post) was cemented within the root canal using dual cure resin cement (Panavia F2.0, Kuraray Medical Inc.) (Fig-4).

Fig-4 glass fiber post was placed

Core buidup was done with restorative composite (Filtek Z350, 3M EPSE). Tooth preparation was done for all ceramic restoration. Circumferential shoulder margin was prepared and ferrule was set up to increase the fracture resistance of the remaining tooth structure and retention of prosthesis (Fig-5).

Fig-5 resin core built and tooth prepared with circumferential shoulder margin configuration

The final impression was made using elastomeric impression material with two step putty wash technique (Examix NDS, GC) (Fig-6).

Fig- 6: final impression

Provisional restoration was given for period of one month to stabilize the soft tissue. All-ceramic crown (IPS EmpressII, Ivoclar Vivadent) was prepared. The marginal fit and occlusion were evaluated intraorally, then glazed crown cemented intraorally with dual cure resin cement (Panavia F2.0, Kuraray Medical Inc.) (Fig-7).

Fig-7: Final prosthesis after cementation

Post insertion instruction was given to the patient to maintain good oral hygiene with the use of dental floss and interdental brush. After a week patient was evaluated for oral hygiene status. Follow up clinical and radiographic examination done after six month, no signs of root resorption and relapse occurred during this period.

DISCUSSION:

Management of traumatic Crown- root fractures and their consequences can be challenging and therefore treatment option providing aesthetic, functional and economical solution should be considered.

Depending upon the clinical situation there are several methods available in the literature for treatment of such fractured tooth. Endodontic post placement is indicated when there is not less than one mm of healthy tooth structure present supragingially. If the tooth is fractured subgingivally and if the length of the apical root is sufficient enough to support a restoration, the first step in treatment is to expose sound supragingival tooth structure to allow restoration. Procedure like crown lengthening, surgical extrusion and orthodontic extrusions are possible treatment options. Crown lengthening procedure involves additional recontouring of bone and gingival tissues which causes further reduction of bone support, difference in the gingival zenith and widened embrasure5,6. Thus, it may cause severe aesthetic problem in the anterior region. Surgical extrusion is less time consuming and simpler but main drawback is possible risk of root resorption7. Due to disadvantages of above mentioned method we chose orthodontic extrusion to expose fracture line before restoration in the case mentioned here.

Orthodontic root extrusion first reported by Heithersay and Ingber is a well documented clinical procedure which alters the relationship between a non restorable tooth and attachment apparatus 4,8. Forced eruption facilitates the establishment of biologic width. When light extrusive forces are applied on teeth both bone and gingival tissue migrate coronally. The applied tension on the periodontal ligament results in elongation of periodontal fiber and induction of osteoblast to deposit new bone along the wall of alveolus9. In case of rapid extrusion, the periodontal fiber stretch and readjust, but the bone does not have time to remodel because of rapid movement. Thus, there is no coronal shift of the marginal bone; facilitating prosthetic rehabilitation without bone reshaping10. According to Simon, movement of the gingival and the alveolar bone is related to how rapidly the root is extruded, how far it is moved and how much force is applied11. Some authors recommended that the force for slow extrusion of the root should not exceed 30 gm, while rapid extrusion are accomplished with forces higher than 50 gm[11,12].

However, coronal displacement of the gingival tissue can be stimulated under extrusive force. Some author suggested supracrestal fiberotomy during active tooth movement to prevent this phenomenon[13]. Berglundh et al demonstrated that repeated fiberotomy led to recession of gingival margin and loss of connective tissue attachment[14]. Instead surgical recontouring of altered gingival margin should be done prior to tooth restoration because it is considered simple, minimally invasive and reliable[15].

When the tooth is sufficiently erupted it should be stabilized to prevent possible relapse. In general, 3-6 weeks of stabilization should be sufficient after extrusion[16].

When deciding on orthodontic extrusion and prosthetic rehabilitation, some confounding factor must be taken in account, such as crown root ratio, root abnormalities, fracture type and location, interocclusal space and risk of exposure of furcation of multirooted tooth9. The major limitation of this approach is it increases duration of treatment and need to use an orthodontic appliance which is not always convenient for patient. Additional few weeks are necessary for maturation of gingival tissue after periodontal surgery, during which period provisional crown can be placed. Finally use of glass fiber post and all ceramic crowns provides good esthetic results, and increases retention.

The necessity for interdisciplinary approach to treatments of routine dental problems has been recognized for a long time. In the present case it is clear that without such cooperative action the prognosis would not have been good.

CONCLUSION

Multidisciplinary approach which involves endodontics, orthodontics, periodontics, and prosthodontics has been recognized as a key factor for successful functional and esthetic rehabilitation of a crown-root fracture.

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