A Multidisciplinary and Multipronged Approach for the Management of Subgingivally Fractured Incisors – A Case Report

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Abstract: This case report describes the management of a subgingivally complicated crown root fracture of upper anterior teeth using different treatment approaches. A 26 year old patient was referred to the Department of Conservative Dentistry for the management of his traumatized maxillary incisors. Tooth 11 had a subgingival crown root fracture; the mobile coronal fragment was extracted atraumatically. Gingivectomy was performed with electrosurgery to expose remaining subgingival fragment. This was followed by single visit endodontic therapy, placement of prefabricated fibre post and core buildup with composite resin. Since 21 had Ellis class I fracture and vitality tests were normal, it was decided to be treated with direct composite restoration. In 22 the small mobile palatal fragment was removed followed by single visit endodontic therapy and subsequent composite core build up. Results – evaluation of 9 months follow up after treatment revealed good esthetics, good periodontal health & normal function.

Keywords: Traumatic injury, Ellis fracture, Gingivectomy, Osteotomy, prefabricated fibre posts

1. Introduction

Dento alveolar trauma of the maxillary anterior often leads to aesthetic, functional and phonetic problems.^{1, 2, 3}Treatment options for such fractures include fragment reattachment, restoration after gingivectomy/osteotomy, forced orthodontic or surgical extrusion, vital tooth submergence, resin crowns, ceramic crowns and composite restoration reinforced with/without pins. Traumatic injuries of anterior teeth usually occur within the gingival margin and very often manifest with complex presentations.^{4, 5, 6} When the fracture extends further subgingivally, flap surgery, combined with osteoplasty /osteotomy procedures is required.^{7, 8, 9}This case report describes the management of a subgingivally complicated crown root fracture of teeth 11, 21 and 22 using different treatment approaches.

Case History: A 26 year old male patient reported to our Department of Conservative Dentistry and Endodontics, Albadar dental college & hospital, Gulbarga, Karnataka with a chief complaint of pain in upper anterior region. Patient gives history of road traffic accident seven days before, followed by mild loss of consciousness and lacerated wounds over outer canthus of eye, lower lip, forehead and chin. He was rushed to a general hospital and immediately treated for his lacerated wounds. Prophylactic medications including tetanus toxoid injections were given for systemic infection and relive pain. The patient's medical and family histories were non-contributory. Physical examination revealed healed lip lacerations and some remnant sutures were noticed in the forehead and chin region. No other extra oral injuries were noted. Intra oral examination revealed subgingival crown root fracture in relation to 11, coronal fracture involving enamel & dentin in relation to 21, suggesting Ellis class II #. Further probing revealed a complex fracture in relation to 22 with the fracture line extending from mesial part of the crown to the distal part of the root. On palpation, there was no Dento-Alveolar fracture and mobile fragments were noticed in relation to 11 & 22 (Figure 1a & b). Intra oral periapical (IOPA) radiograph revealed subgingival crown root fracture in relation to 11. In tooth numbered 22, the fracture line was seen to extend subgingivally as shown in (Figure 2).At the same time, the fracture line extending from the mesial part of the crown to the distal part of the root at the crest of the inter dental alveolar bone was noted. It was also accompanied by widening of PDL space. There was no evidence of root fracture with either 11, 21 or 22.



Figure 1a & b: pre operative



Figure 2: Diagnostic radiograph

2. Treatment Plan

On the basis of clinical and radiographic examination, the following treatment options were presented to the patient. First option is extraction of the teeth followed by implant or fixed partial denture. Second option is removal of the broken fragments, gingivectomy osteotomy procedures, followed by post, core and crown. After discussing the advantages, disadvantages, prognosis, and cost of both the treatment options, patient gave consent for the second option. Tooth numbered 21 was restored with composite resin. In tooth numbered 22, the small mobile palatal fragment was removed atraumatically followed by endodontic therapy during the same visit. The mobile coronal fragment in relation to 11 was extracted atraumatically. This was followed by access opening in relation to 11 & 22. After biomechanical preparation and thorough debridement of the canal, an intracanal dressing of calcium hydroxide was given and access cavity was sealed adequately. On second visit, gingivectomy

procedure combined with clinical Crown lengthening was performed with electrosurgical method and osteotomy procedure was done in relation to 11 (Figure 3a). This served the purpose of achieving clean margins for restoration. This was followed by biomechanical preparation and obturation using sectional condensation technique. Next post space was prepared after maintaining an apical seal of 5mm of gutta-percha (Figure 3b). A suitable sized fiber post (glassix fibre post) was selected and checked in the canal. Both the post space as well as post were etched, and bonding agent(3m) was applied followed by light curing for 10 seconds. Glassix fibre post were luted in the post space using multilink automix resin cement and light cure for 20 seconds followed by composite core build up done in relation to 11(Figure 3c). Small mobile palatal fragments were removed followed by endodontic therapy and composite core build up done in relation to 22. (Figure 3d) & (Figure 4).



Next visit, Final prosthesis of All ceramic crown was cemented in relation to 11 & 22, left lateral incisor was restored with direct composite restoration (Figure 5a & b).

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Figure 5a & b: Final prosthesis –ALL ceramic crown – 11 & 22

Patient was followed up for the next 9 months. He was asymptomatic and revealed good aesthetics, good periodontal health & normal function (Figure 6a & b).



Figure 6a & b: post operative

3. Discussion

Management of a complicated crown root fracture presents a challenge due to difficulty in achieving isolation which might further compromise the hermetic seal of final restoration. Various treatment modalities have been proposed for crown root fractures: If the fracture line is supragingival, the procedure for reattachment will be straight forward. Second option is to convert subgingival fracture to supragingival fracture with the help of gingivectomy and osteotomy procedures. Third option is removal of the coronal fragment and surgical extrusion of the tooth, to surgically move the fracture to a supragingival position. Fourth modality of treatment is removal of the coronal fragment and subsequent orthodontic extrusion of the tooth. In spite of prolonged treatment procedures, these procedures result in favourable gingival and periodontal health without compromising the integrity of alveolar bone or periodontal support. Above all they also result is excellent esthetics.^{10, 11}In this case, fragment reattachment (11) was ruled out due to trauma since fragments were broken into small pieces & hence it does not meet the criteria for reattachment procedures. Orthodonticextrusion (11) was also ruled out because of the time constraint on the part of patient. In this present case report, after taking informed consent from the patient, the mobile coronal fragments was extracted atraumatically followed by gingivectomy and osteotomy procedure was performed in order to get clean margins for restoration. This was followed by endodontic therapy, placement of prefabricated fibre post, composite core build and followed by all ceramic crown restoration. The lack of adequate tooth structure necessitates it to be supported with an anchorage system.Tooth-colored fiber posts have several advantages. Their main proposed advantage is monobloc effect, good aesthetics and flexibility as compared to metal posts and have approximately the same modulus of elasticity as dentin.¹²When such posts were bonded in place with resin cement, researchers thought, forces would be distributed more evenly in the root, resulting in fewer root fractures. In addition, the fiber-reinforced posts can be used with minimal preparation because resin cement uses the undercuts and surface irregularities to increase the surface area for bonding. Thus, it reduces the possibility of tooth fracture during function or traumatic injury. In addition, they are relatively easy to remove in case of

retreatment.¹³In theory, a post that flexes together with the tooth during function should result in better stress distribution and fewer fractures.^{14, 15}Moreover resin increase retention^{16, 17}, as they tend to leak less than other cementsand provide at least good strengthening of the root.^{18, 19}Junge and colleagues²⁰ reported that posts cemented with resin cements were more resistant to cyclic loading than were those cemented with zinc phosphate or resin-modified glass-ionomer cement. In Maxillary left central incisor (21), patient had Ellis class II fracture for which the vitality tests were normal and so it was decided to be treated with direct composite restoration. And in Maxillary left lateral incisor (22), the small mobile palatal fragment was removed atraumatically followed by single visit endodontic therapy, composite core build and all ceramic restoration. With the advent of newer materials available today, in conjunction with an appropriate technique, the clinician should emphasize a more conservative approach, when treating patients with subgingival crown root fractures.

4. Conclusion

The goal of conservative dentistry is to conserve as much tooth structure as possible. Moreover fracture of an anterior tooth is a traumatic incident for a patient hence preservation of the remaining natural and healthy tooth structure will have a positive psychological impact on the patient,. This clinical case report describes an interdisciplinary approach for the rehabilitation of fractured teeth by endodontic treatment, periodontal surgery, glassix fibre post insertion, composite core build up and fabrication of All ceramic crown was done, where patient was satisfied both esthetically and functionally. Coordinated endodontic & periodontal treatment with careful consideration of patients expectations & request are critical for successful outcome & patient satisfaction.

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