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Conservative Management Of Complicated Crown Root Fracture Due To Trauma To Multiple Anterior Permanent Teeth- A Case Report

Dr. Harakh Chand Baranwal[1], Dr. Aiyman Ayubi[2], Dr. Silviya Samad[2], Dr. Harshitaa Aggarwal[2]

[1](Professor, Department Of Conservative Dentistry And Endodontics, Faculty Of Dental Sciences, IMS, BHU)
[2](Junior Resident, Department Of Conservative Dentistry And Endodontics, Faculty Of Dental Sciences, IMS, BHU)

Abstract:
Adolescents and children frequently suffer trauma to the anterior dentition and the supporting tissues. In dental practice, it might be difficult to address severe crown fractures as well as traumatic dental injuries. Depending on the location, severity, and extent of the fracture, a variety of treatment options are available for severe crown fractures. This case report illustrates a scenario of the successful multidisciplinary management of complex crown fracture of maxillary *incisors requiring fragment reattachment, pulpotomy, surgical intrusion and semi-rigid splinting, followed by non-surgical root canal treatment and post and core and crown placement.*
The mobile fragment of the left lateral incisor was reattached after surgically raising the flap and performing partial pulpotomy, followed by splinting of the incisors and root canal treatment. Upon completion of treatment and removal of splinting, the teeth were seen to be nonmobile and asymptomatic. Thus, complicated crown fractures of multiple teeth can be successfully managed by appropriate diagnosis by CBCT and a multidisciplinary treatment approach.

Key Words: *complicated fracture, crown root fracture, reattachment*

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I. Introduction

Crown fractures have been defined as fractures of the crown including enamel and dentine. A complicated crown fracture, also known as a Class 3 fracture, occurs when the fracture also exposes the dental pulp. [1,2] The maxillary central incisor is the tooth that sustains problematic crown fractures the most frequently, accounting for 2% to 13% of all dental traumas. [2] Because of the difficulties in creating a dry operating field and the potential for soft tissue damage, treating severe crown-root fractures could be difficult. [3]

The following factors should be taken into consideration when selecting a treatment plan for a complicated crown fracture: [4,5]

- Time between the occurrence of the injury and the beginning of treatment.
- The angle at which the tooth fracture line occurs.
- Stage of root growth.
- Pulpal involvement.
- Any dislodged tooth fragments.
- Concomitant alveolar bone injury, etc.

This case report illustrates a unique scenario of the successful multidisciplinary management of complex crown root fracture of maxillary incisors requiring fragment reattachment, pulpotomy, surgical intrusion,and semi-rigid splinting, followed by non-surgical root canal treatment and post and core and crown placement.

II. Case Report

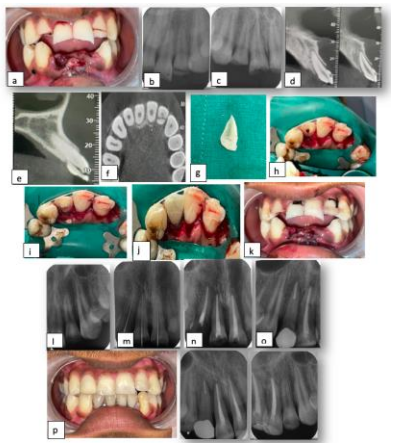
A 15-year-old boy visited the department complaining of broken and mobile teeth in the upper anterior region of the mouth due to trauma while riding his bicycle on the previous day. Upon clinical inspection, the gingiva was damaged and lacerated, and the mandibular incisors were absent (fig. a). The maxillary left lateral incisor (22) was fractured bucco-lingually, with a mobile fragment. The fracture line, which was seen to involve enamel, dentin, pulp, and cementum, extended subgingivally from the buccal to the palatal aspect. The obliquely fractured maxillary central incisors (11 and 21) showed extrusion with grade I mobility and pulp involvement. On both horizontal and vertical percussion, 11 and 21 were tender. The maxillary right lateral incisor (12) also

had a horizontal crown fracture with involvement of the pulp, presenting with grade I mobility and tenderness upon percussion. Radiographic investigation revealed pulpal involvement and a horizontal crown fracture in 22 (fig. b). 11 and 21 showed the presence of a horizontal crown fracture with pulpal involvement and increased PDL space apically. In 12, a horizontal crown fracture was also apparent (fig. c). CBCT findings confirmed the radiographic finding of extrusion as increased PDL space was seen apically wrt 11 and 21 (fig. d). An oblique fracture line was seen, extending from the buccal to the palatal side of 22 to the subgingival region. (fig. e, f).

Hence, it was decided to do an immediate pulpotomy on 22 and then reattach the mobile segment. To address extrusion, 11 and 21 were to be surgically repositioned. The decision was made to go ahead with splinting of maxillary anterior teeth, followed by non-surgical endodontic therapy in 11, 21, and 12 and fiber post & core build-up in 12.

Since the patient was a minor at the time, before treatment could start, the patient's guardian gave their informed consent. Following local anesthetic administration, a full-thickness palatal flap was raised, and the fractured piece of 22 was retrieved and placed in distilled water for storage (fig. g). Under copious irrigation, access was opened, and a sterile round diamond high-speed bur was used to remove the pulp chamber's coronal portion (fig. h). The bleeding was controlled by 3% sodium hypochlorite solution and the surface was irrigated with a sterile saline solution and dried with cotton pellets to avoid clot formation. Biodentine was prepared in accordance with the manufacturer's instructions, and 3-4 mm was applied on the remaining exposed pulp tissue (fig. i). Glass-ionomer cement was then used to seal the cavity. The tooth fragment and the remaining dental components were rinsed etching with a 37% phosphoric acid gel. Following the application of dentin bonding agent to both bonding surfaces, they were dried and the tooth fragment was reattached to its shattered location with a thin layer of composite resin. After positioning the fragment correctly on the broken tooth surface, the extra resin was scraped off, and the area was light-cured for 40 seconds, all the while applying pressure to keep the fragment in place (fig. j). Intrusion of 11 and 21 was done by digital repositioning followed by splinting of maxillary anterior teeth with fiber splint. This was followed by reapproximation of the palatal flap and suture placement (fig. k).

Access was opened in teeth 11,21 & 22, followed by working length determination and biomechanical preparation along with extensive irrigation with 3% NaOCl and normal saline. Endodontic irrigants were agitated and activated by ultrasonic endoactivator. Following appropriate irrigation and drying of the canal with paper points, calcium hydroxide was inserted as an intracanal medicament and sealed with temporary restorative material. The access was opened again during the subsequent appointment after 10 days. After removing the intracanal calcium hydroxide, the canal was properly irrigated with normal saline and 3% NaOCl. As a final irrigation, 17% EDTA was employed. The canal was dried with paper points and obturated with gutta percha cones coated in zinc oxide eugenol paste (fig. n). In the next appointment, post-space was prepared in 12, followed by fiber post and core build-up with composite (fig. o). Splinting was removed after 4th week. On clinical examination, 11, 21 & 22 showed reduced mobility and no tenderness was seen on percussion. 12 was prepared for crown placement followed by placement of zirconia crown. Follow-ups done at 1 month, 3 months and 6 months (fig. p).



(a)Pre-operative clinical photo, (b) and (c)Pre-operative IOPA, (d) and (e)CBCT showing saggital section, (f) CBCT showing axial section, (g)Removal of mobile fragment of 22, (h)Access opening and coronal pulp removed, (i)Sealed with Biodentine and GIC, (j)Reattachment of fragment, (k)Suturing done and splinting of maxillary anterior teeth, (l)IOPA showing coronal pulpotomy of 22, (m)working length IOPA of 12,11,21, (n)Obturation IOPA, (o) Post and core preparation, with crown placement in 12, (p)Follow up photograph and radiographs after 6 months

III. Discussion

Handling complicated crown-root fractures continues to be a challenging task. This is because it is difficult to provide isolation in a dry operational field using a rubber dam, which might jeopardize the restoration's hermetic seal. To regulate moisture throughout all treatment procedures related to treating such fractures, the goal must be to expose the fracture lines supragingivally. [6]

For tooth fractures involving the biologic width, several treatment approaches include a mucogingival flap, an osteotomy/osteoplasty, and orthodontic or surgical extrusion with reattachment of the fragment. [7]

The first course of treatment should be reattachment if the fractured segment is available.[8,9] A conservative, aesthetically pleasing, and reasonably priced restorative option is provided by adhesive reattachment of the actual fragment, as shown by case studies [10,11,12] Furthermore, it is an excellent replacement for resin-based composite restorations when it comes to restoring the functionality and appearance of teeth that have suffered oblique fractures. Reattaching an autogenous tooth fragment has the advantage of restoring biological width, which is determined by summing the epithelium and connective tissue attachment lengths.[13]

Other important factors to consider while treatment planning are the type and duration of splinting. Semi-rigid splinting allows for functional stimulation, and it seems to promote healing by preventing ankylosis and replacement resorption.[14] According to histological investigations, PDL repair begins after one week of splinting, but gingival reattachment appears to be complete at that point. After two weeks, two-thirds of the periodontal fibers have formed, allowing the tooth to be stabilized in the alveolus.[15] As such, semi-rigid retention is usually removed after two weeks.

Root support is required in patients who have undergone endodontic therapy and exhibited significant crown loss because there is insufficient tooth tissue left to sustain the restoration.[16] When a tooth sustains damage and a fracture affects two-thirds of the crown, the post system should be used.[17] Fibre posts not only satisfy the required aesthetic standards but also have an elastic modulus close to root dentin. Therefore, by reducing the build-up of stress, they lessen the chance of developing root fractures.[18]

IV. Conclusion

Crown-root fractures occurring in the anterior region must be assessed from different perspectives, such as the degree of surviving dental structure, the tissues associated, the position of the fracture, and the vitality of the tooth. In this particular case, interdisciplinary adhesive surgical techniques yielded positive outcomes in preserving the tooth's structural integrity. The prognosis, however, is reliant on patient compliance and upholding proper dental hygiene. A long-term follow-up is necessary.

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