



Management of a Fractured Maxillary Incisor by Fragment Reattachment: A Case Report

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Abstract

Anterior teeth trauma is relatively common among children and teenagers. Maxillary central incisors are the most affected teeth. Crown fractures are most common form of traumatic dental injuries which restoration represent a real challenge to the clinician. The improvement in adhesive dentistry has allowed dentists to use the patient's own fragment to restore the fractured tooth, if the fragment is available. Natural fragment tooth Reattachment is an ultraconservative and an aesthetic advanced technique which provides pleasing results with immediate restoration of function and phonetics. This paper describes a case of a complicated crown fracture treated using tooth fragment reattachment technique.

Keywords: Anterior crown fracture; Pulp exposure; Biodentine; Adhesive; Fragment reattachment

Introduction

Traumatic injuries to teeth and their supporting tissues usually occur in young people and damage may vary from enamel fracture to avulsion [1,2]. Uncomplicated crown fracture, defined as fracture of the enamel only or the enamel and dentin without pulp exposure is the most common traumatic dental injury to permanent teeth especially maxillary upper incisors. This is attributable to their anterior position and protrusion caused by eruptive pattern [3]. Complicated crown fractures involve enamel dentin and pulp and occur in 0.9% to 13% of all dental injuries. The size pulp exposure is variable and makes the treatment challenging. The appropriate treatment for the

pulp and its required restoration is determined with the extent of the injury.

Anterior teeth trauma is a tragic experience for the young patient who requires immediate attention, not only because of damage to the dentition but also because of emotional effect of the trauma to the child and his parents. Various treatment modalities are available depending upon the clinical, physiological and radiographic status of the involved tooth. The treatment modality depends mainly upon the location and extent of the fracture. Recent development in restorative materials and adhesive protocols facilitate the restoration of fractured maxillary incisors. Tooth Fragment

reattachment is considered to be an aesthetic treatment and a conservative approach for the restoration of anterior teeth crown fracture caused by dental trauma [1,3,4].

Case Presentation

A 7 years old female patient reported to the Department of Dental Medicine, Hospital of Charles Nicolle Tunis with the chief complaint of broken upper incisors following trauma caused by a stumble in her home while playing ,

an hour prior. The father brought the broken fragments stored in milk. No medical history or anterior trauma was reported at the time of anamnesis. Clinical examination revealed an ELLIS class III fracture of the 11 with a small point of pulp exposure. The exposed pulp was red in color with no hemorrhage. An enamel fracture of the mesial horn of the 21 was noticed. Figures 1a, 1b. The whole fractured fragment of the 11 was available .No mobility or bleeding was noticed on both teeth Figure 1c.



Figures 1: A ,B: Pre-operative views showing a complicated crown fracture of the 11, a fracture of the mesial horn of the 21. C: Natural fractured fragment.

Periapical radiographs of upper anterior teeth revealed an immature root apex with an oblique fracture of 11 involving enamel, dentin and pulp. No root fracture or apical pathology was evident in the radiographic examination Figure 2.



Figure 2: Periapical radiograph of the patient at the initial visit.

Pulp preservation in this case of traumatized immature fractured incisor tooth 11 is of prime importance in order to achieve a natural apical closure. Then, fragment

reattachment procedure seemed to be the treatment of choice tooth restoration since the parent had brought the fractured fragment, intact and well conserved at the best delay. Restoration of the mesial horn of the 21 with composite resin was indicated as the fracture was limited to enamel. The fractured fragment was tried intraorally to check for proper positioning and fit with the fractured coronal structure then stored in a saline solution.

The upper right incisor was anesthetized by local infiltration and was isolated using rubber dam (Opal Dam TM, Ultra dent). The tooth was disinfected with chlorhexidine 0.2 %. The pulp exposure was widened and about 1 mm of the coronal pulpal tissue was excised using a round diamond bur on a high-speed hand piece under an assisted irrigation with a saline solution Figure 3. The bleeding was controlled by a gentle application of small cotton pellets moistened with saline for 5 minutes .After hemostasis, the entire cavity was disinfected with 2.5% sodium hypochlorite. Biodentine® was prepared according to the manufacturer's instructions (Septodont, France) and was gently placed over the exposed pulp with no pressure on the vital pulpal tissue. The little cavity was filled with Biodentine® up to the level of the fracture. Figure 4. The bioactive material was set in for the 12 minutes then both fragment and the tooth were prepared to reattachment.

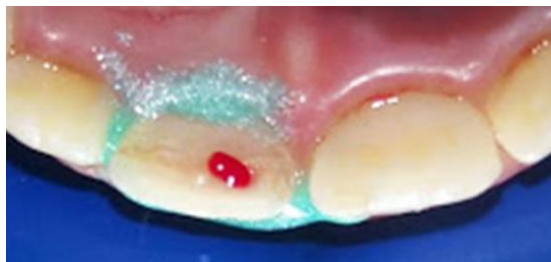


Figure 3: Occlusal view after 1 mm pulp excision.



Figure 4: Occlusal view after placement of the Biodentine.

The detached fragment was tried again, and small groove of 1 mm was made on the fractured surface of the tooth, opposite to the placement of the biodentine, using a small round diamond bur. Then, the fragment was checked again for its adaptation to the tooth fractured surface. Both tooth and fragments fractured surfaces were etched with 37% phosphoric acid (META Biomed) then bonded (ESPE Scotch bond TM universal adhesive, 3M) and finally light cured for 20 s (Figure 5 and 6).

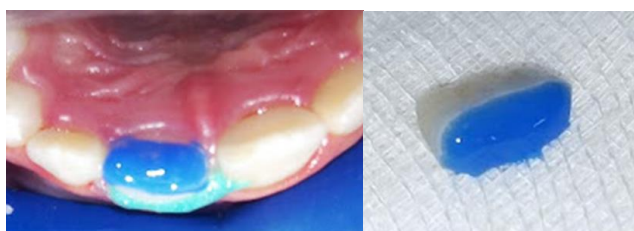


Figure 5 and 6: Phosphoric acid-etching of the fractured tooth and natural fragment.

A fine layer of flowable composite resin (Nexcomp Flow, Meta Biomed, shade A1) was applied carefully on both surfaces. The fragment was adapted to the tooth and fixed. The complex tooth fragment were light cured for 40 s then finished and polished. The mesial horn of the 21 was restored with composite resin (Vitra APS, FGM, shade enamel EA1). A final periapical radiography control was applied (Figure 7).



Figure 7: Immediate clinical view after fragment reattachment.

The patient was recalled 7 day later for follow-up. On clinical examination, both teeth were asymptomatic. Follow up for 1, 3, 6 and 16 months was maintained. Clinical examination showed asymptomatic teeth with normal response to sensitivity tests. There was no fracture or discoloration of the reattached fragment (Figure 8).



Figure 8: Clinical Examination showed.

Periapical radiographs revealed a continued root formation of the 11 (Figure 9). No evidence of resumption or widening of the periodontal ligament was noticed.



Figure 9: Periapica I radiograph 16 months post trauma.

Discussion

Anterior crown fractures are a common form of traumatic dental injuries that mainly affect the maxillary incisors, especially in children and adolescents. Complicated crown fractures with a pulp exposure makes the treatment challenging. A trauma involving the pulp, if left untreated, always results in pulp necrosis [1]. Management of complicated crown fractures and the outcome of treatment depend on the following factors [2,3]:

- Age of patient
- Time of referral after trauma.
- Level of tooth fracture line.
- Size of pulp exposure
- Root development stage.
- Availability of the detached fragments, its state and the storage medium.
- Concomitant surrounding tissue injury.
- Restorative treatment plan

Traumatized teeth with immature apices present a serious challenge. Preservation of the pulp in a traumatized immature fractured incisor tooth is an emergency in order to achieve a natural apical closure. The choice of a bioactive material for pulp protection is a main influencing factor. Moreover, the initial state of the pulp and its eventual microbial contamination at the site of injury should be analyzed carefully [5,6]. Biodentine® is new bioactive cement with dentin-like mechanical properties that can be used as a dentist substitute on crowns and roots [7]. It has a positive effect on vital pulp cells and stimulates tertiary dentin formation. In direct contact with vital pulp tissue, it also promotes the formation of reparative dentin and contributes to the long-term maintenance of tooth vitality. Biodentine has several advantages which include good sealing ability, adequate compressive strength, and short setting time, which provide a significant clinical advantage over other comparable materials [7,8].

After pain managing, crown restoration is a real emergency in case of anterior teeth fracture. The main objective is re-establishing the esthetics, function and phonetics. Since the development of the adhesive dentistry, fragment reattachment should be the first choice of treatment. In the present case, as the fragment was intact and well stored, reattachment was possible [9-12]. The use of fractured fragment clearly eliminated problems of dealing with different restorative material, difficulties of shades selection and the reproduction of the macro and micro geometry of the involved teeth. This technique is a good restorative alternative and long-

lasting esthetics, because the original morphology, color, and surface texture are preserved [13-15]. It's an ultraconservative procedure if found fragment is intact and well adapted. It could be achieved in one single appointment which offers miraculous solutions to affected patients and their parents.

Conclusion

Anterior crown fractures are the most frequent type of permanent dental injury. If the detached fragment is available, the natural tooth structures can be reattached using adhesive techniques. The reattachment of the fractured tooth segment appears to an ultra-conservative, simple and esthetically acceptable method of restoring the form and function of the teeth.

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