IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 9 Ser.7 (September. 2020), PP 32-37
www.iosrjournals.org

Crown Fragment Reattachment of Anterior Fractured Tooth - A Case Report

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Abstract
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 although less common, pose a challenge to the clinician as the main objective is successful pain management and immediate restoration of function, esthetics and phonetics. Since the development of the adhesive dentistry, the patient's own fragment can be used to restore the fractured tooth(1)
Crown reattachment is the most conservative treatment which can be used to restore fractured tooth, presumably with sufficient strength, while maintaining original contour, incisal translucency, and reducing chair time and cost(2)
The vitality of a healthy pulp can be preserved after traumatic exposure with predictable outcomes with the use of appropriate biomimetic materials (3)
This case reports a crown fracture case with pin-point pulp exposure that was treated using crown reattachment with direct pulp capping.
The reattached fragments were followed clinically and radiographicallyupto 12 months. The teeth remained vital, there were no color changes, and the restorations had an acceptable appearance.
Keywords: *Dental trauma, Reattachment, Adhesive Technique,Pulp capping, Biodentine.*

Date of Submission: 05-09-2020 Date of Acceptance: 20-09-2020

I. Introduction

Trauma to the facial area generally involves the teeth and their supporting structures; the most frequent causes are falls, traffic accidents, domestic violence, fights, and sports. Most dental injuries occur during the first two decades of life, especially between 2 and 3 years and between 8 and 12 years of age;(4)

Tooth trauma has been a common challenge for dental professionals because many different protocols for treatment are currently available (5)

Most commonly affected teeth are the maxillary incisors, forming 96% of all crown fractures.(1) It may be due to their vulnerable position in the mouth. (4).Crown fracture with pulp exposure represents 18 - 20% of traumatic injuries involving the teeth, the majority being in young permanent teeth.(2)

Tooth fracture may cause emotional trauma to the children and adolescents as a result of missing tooth structure. The principal objective of the treatment in such cases is the rehabilitation of both esthetics and function. (1).

Severaldiagnosticcriteriahavebeenusedtoclassifytraumaticdentalinjuries.EllisandDavery,proposed a classification based on a numerical system (I to VIII) and described the extent, using terms like "simple fracture" and "complicated fracture"; this classification considers X-ray examinationsandvitalitytests.(6)

The choice of treatment for a complicated fracture depends mainly on the patients' age. The extent of fracture and fracture pattern, defining the amount of tooth structure remaining, pulpal and periodontal involvement, and occlusion also influence the treatment plan.(3)

Treatment of the complicated crown fracture presents itself in 2 stages: (1) treatment of the injured pulp, and (2) performance of an esthetic restoration of the fractured tooth. (7)

However, in crown fractures accompanied by a pulp exposure, we should consider the following treatment option of the pulp: pulp capping, pulpotomy, and pulpectomy. We should try to plan the ideal procedure not only to get a good bonding of the fragment but also to minimize the pulpal irritation during the whole procedure. (2)

Reattachment technique has been published since 1964, when Chosak and Eidelman reported a case that involved reattaching the natural fragment of incisors. As adhesive dentistry developed, the incidence for choosing crown reattachment as the first choice of treatment for restoring fractured teeth is increasing. It is the most conservative treatment, thus it maintains the original contour and incisal translucency. In addition, less chair time is required, which reduces the cost of the treatment(2)

Use of acid-etch technique for reattachment was reported by Tennery. Several methods have been applied to enhance the adhesion between fractured and remaining fragment. These include circumferential beveling, placement of chamfer, placement of V- shaped notch, placement of internal groove, and superficial over-contouring.(1)

Biodentine is an interesting alternative to conventional calcium hydroxide- based materials for direct pulp capping.due to its improved material properties.It may contribute to the long- term maintenance of tooth vitality.(8)

II. Case Report

A 14-year-old girl visited the department because of crown fracture of the both central incisors after falling down fromschool two hour before arriving at the dental office. The patient found tooth fragments and brought them stored in saliva.

Her medical history was noncontributory. On extra- and intra-oral examination, there was no apparent trauma to the soft tissues.

On clinical examination, both the tooth displayed an Ellis Class 3 fracture (Figure 1). The fracture line extended mesio- distally with pulpal exposure of about 0.5 mm (Figure 2). The patient gave a history of sensitivity to cold after fracture, indicating that the pulp was vital. The tooth was nontender and showed no mobility. The exposed pulp did not show evidence of haemorrhage.

Radiographic examination revealed that those two teeth were fractured above alveolar level involving a pin-point exposure of the pulp (Figure 3).

Asthetoothfragmentwasbeingsufficientlyhydrated, pulp exposure size was minimal and exposure time was of short duration, wedevisedatreatmentplanthatincludedperformingdirect pulp capping and original tooth fragment reattachment, whichwasacceptedbythepatient'sparents.

On examination, the fragment revealed a clean fracture line with fragmentation of edges. On approximation of the fragment with the tooth margins fitted well and no space was present between the tooth and the fragment. The fragment was immediately replaced in saline solution (sodium chloride 0.9% w/v,) to avoid dehydration (Figure 4) .

In order to avoid the pulpal contamination, the area was carefully irrigated with chlorhexidine and normal saline.After rinsing and drying, a circumferential enamel bevel was prepared on tooth margin as well as fragment (Figure 5). The exposed pulp was covered with sterile cotton pellets and enamel was etched with 37% phosphoric acid gel for 30 seconds..The acid was eliminated by rinsing with copious water and drying with gentle air followed by capping with biodentine.(Figure 7). After setting of biodentine area was prepared for ,application of bonding agent and light curing (Figure 8).

Tooth fragmentwas also acid etched(Figure 6) and an additional internal dentinal groove was madeand bonding agent applied in the same manner above. After light curing, Aelite flow A2 shade (Bisco) was used to reattach the fragment to the remaining teeth. Flowable resin was light cured for 40 seconds each from the labial and palatal directions. The residual excess resin at the tooth surface and irregular margin surface was left untouched without finishing and polishing (Figure 8). Four days later, fracture line reinforcement and polishing was done. (Figure 9) and postop radiograph was taken (Figure 10)

At follow-up visits at 12 months, (Figure 11, Figure 12) the reattached tooth was functional and esthetically agreeable, suggestive of the successful treatment.

Figure 1-Preop photograph facial view

Figure 2- Preop photograph occlusal view

Figure 3- Preop IOPA

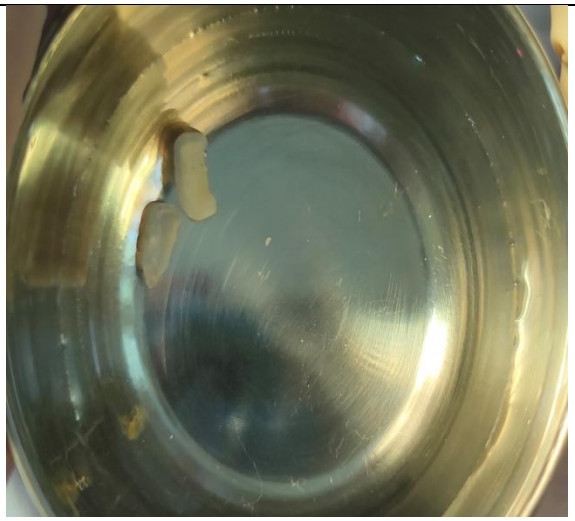

Figure 4- Crown fragments in saline

Figure 5-Bevelling on enamel

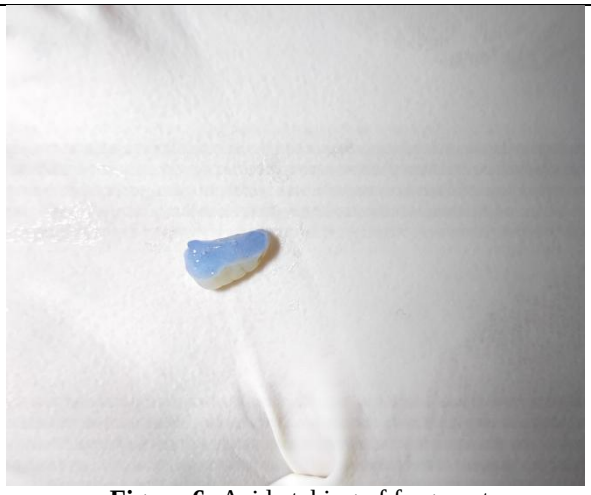

Figure 6- Acid etching of fragment

Figure 7- Biodetine pulp capping

Figure 8- Preparation for bonding

Figure 9- Postop photograph at 4th day

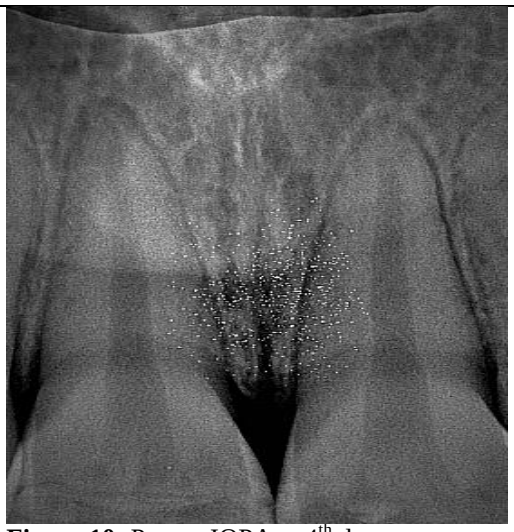

Figure 10- Postop IOPA at 4th day

Figure11- Post op Photograph at 12 months

Figure 12- Postop IOPA at 12 months

III. Discussion

Among the child and teenage population, the possibility of suffering orofacial trauma is high Of these traumas, dental crown fractures play a major role, comprising an estimated 70% of all orofacial trauma (4)

Many techniques can be applied to restore fractured crowns, varying from original tooth fragment reattachment to full-coverage crown restorations.(5)

In the present case, the fracture occurred in an child with a fully formed root. The availability of the fragment in a single mass, its close approximation to the tooth without any major discrepancy, minimal time lapse, and patients willingness indicated reattachment of the fragment with vital pulp therapy.

Numerous factors play an important role in determining how long the attached tooth fragment remains functional. Among these factors, the media used to store the tooth fragment after fracture, type of material used for adhesion, use of materials to protect the dentin-pulp complex, flow of composite resins or cements, and technique used for the reattachment procedure are the most prominent(5)

Fragments dehydratated for longer than 1 h have significantly reduced resistance to fracture. Also, prolonged dehydratation may cause esthetic problems. In the present case, the patient reached our clinic 2 h after the accident but, because they were maintained in a humid environment until reattachment, the fragments did not show dehydratation.(4)

Reattached teeth are resistant to shear stresses, similar to the intact teeth(1)

Some techniques of fragment reattachment include a bonding procedure without any type of wearing of the remaining tooth or tooth fragment surfaces. This technique is called simple reattachment(5)

A variety of reattachment techniques have been employed over the years. Simonsen's technique describe a 'bevel' type of preparation to provide a finishing line for restoration in order to preparate the edge of enamel prisms in the ideal 'end on' relationship for etching and bonding,. This technique is very similar to the 'chamber shoulder' technique proposed by Jordan (13). The fractured enamel margin is beveled at approximately 45 forming an area of enamel about 1–1.5 mm wide. (4)

Lise et al . have suggested the modification of both tooth and fragment prior to bonding which increases the fracture resistance up to 97%.(5)

Several studies have concluded that "over contour" and "internal dentinal groove" technique gives better results in comparison with other techniques.Circumferentialbeveling of enamel margins of the tooth as well as fragment increases the retention by an increase in surface area for bonding and masks the fracture line, which is covered with composite resin. Hence, circumferential beveling of the fractured fragment as well as for remaining tooth structure was done in our case.(1)

In this case,an internal groove was prepared in the tooth fragment surface. This groove had two objectives: (1) creating physical space for the composite material which reinforced the reattachment also protecting the dentin-pulpcomplex and (2) increasing the fracture strength of the reattached tooth fragment.(5)

Singhal and Pathak compared the fracture resistance of teeth reattached using different materials. Highest fracture resistance was observed with composite resin, whereas the least fracture resistance was seen with resin‐ modified glass ionomer cement.(1)

Reattachment is contraindicated in patients with unfavorableocclusal relations like deep bite or bruxism, which may lead to failure of treatment. At follow-up visits of the present case, the reattached tooth was functional and esthetically agreeable, suggestive of the successful treatment.(1)

In clinical terms, this means the tooth should be asymptomatic and that pulp bleeding after exposure should be easily and rapidly controllable.Hemostasis is a prime factor. Blood clots left at the material/pulp interface act as factors for treatment failure. Preventing microorganisms from entering the pulp is a key factor for successful direct capping This is best achieved with a rubber dam when treating on the dentin third close to the pulp.(8)

Pulp exposure caused by dental trauma has a better prognosis because of the absence of microorganism sassociated with caries.The objective is always to preserve pulp vitality. Pulp capping is recommended for small exposures (1mm) that have occurred not more than a 24 hours previously (6)

Unlike conventional crown reattachment technique of the fractured tooth without pulp exposure, this procedure has several different clinical steps. Especially, we should consider the etching, primer application, and polishing steps. (9)

First of all, we should consider the acid etching step. As in the current case, if the pulp is minimally exposed, acidic etchant should not be in direct contact with pulp. Pameijer and Stanley reported that if acidic etchant came in contact with the exposed pulp, hemostatic effectiveness and resin sealing was greatly reduced.Thus, in this case, acidic etchant was applied to the enamel surface only.Also the exposed pulp was covered with sterile cotton pellet in order to avoid direct contact with acid.. Burke and Watts reported that during an etching and washing cycle, Dycal lost 14.4% of its mass Therefore, etching procedure should be done before biomaterial application.(2)

Finally, timing of polishing should be considered. Conventionally, polishing and reinforcement of fracture line is done immediately after the fragment is rebonded in a single visit. However, Macedo and Ritter reported that delaying the overcontouring of fracture line is better to reduce the repeated pulpal damage in case of tooth treated by direct pulp capping because force and heat generated from preparation and polishing step may affect the pulpal status.Therefore, in this case, crown reattachment was done immediately but fracture line preparation, overcontouring and polishing steps were delayed 4 days after reattachment.(2)

Biodentine has been proven to be biocompatible. It has a capability of stimulating tertiary dentin formation. Hard tissue formation is seen after indirect and direct capping with Biodentine. In pulp capping, its benefits versus calcium hydroxide are: It is stronger mechanically, less soluble and produces tighter seals.(8)

Compared with other materials, Biodentine displays ease of handling and decreased setting time Biodentine consists of a powder in a capsule and liquid in a pipette. The powder mainly contains tricalcium and dicalcium silicate as well as calcium carbonate. Zirconium dioxide is the contrast medium. The liquid consists of calcium chloride in aqueous solution with an admixture of polycarboxylate. The powder is mixed with the liquid in a capsule in the triturator for 30 s. Once mixed, Biodentine sets in about 12 min(8)

The vitality of the tooth was checked at 4 weeks, 3 and 6 months interval upto 1 year. The tooth showed similar response as the adjacent tooth. The reattachment case must be followed for 2 years with clinical examination, vitality testing, periodontal probing, and radiographs.It is important to consider the limitations of the reattachment procedures of possible fragment debonding or refractures.(3)

However, long-term follow-up of cases is necessary to evaluate the longevity of reattached teeth, lack of which is a limitation in our case(1)

IV. Conclusion

In case of crown fracture with pin-point pulp exposure, we should cautiously minimize the irritation to the pulp and consider pre-treatment pulpal status, choice of pulp capping materials, choice of bonding system and treatment sequence during crown reattachment procedures

References

[1]. Raut AW, Mantri V, Shambharkar VI, Mishra M. Management of complicated crown fracture by reattachment using fiber post: Minimal intervention approach. J Nat Sc Biol Med 2018;9:93-6.

[2]. Bona Kim1, Yoon Lee2, Min-Ju Song1, Su-Jung Shin1, Jeong-Won Park,Considerations during crown reattachment procedure over the pulpal exposure: case report Restorative dentistry and endodontics.

[3]. Jambagi NM, Joshi SB. Reattachment of fractured fragment with pin-point pulp exposure in a mature tooth with partial pulpotomy using white mineral trioxide aggregate. J Interdiscip Dentistry 2015;5:79-82.

[4]. Francisco Ojeda-Gutierrez1, Brenda Martinez-Marquez1, Raul Rosales-Ibanez2, Amaury J. Pozos-Guillen3 Reattachment of anterior teeth fragments using a modified Simonsen's technique after dental trauma: report of a case CASE REPORT Dental Traumatology 2011; 27: 81–85; doi: 10.1111/j.1600-9657.2010.00964.x.

[5]. LuizMendes,1 LaisaLaxe,2 andLeandroPassos3 CaseReport Ten-Year Follow-Up of a Fragment Reattachment to an Anterior Tooth: A Conservative Approach Hindawi Case Reports in Dentistry Volume 2017, Article ID 2106245, 6 pages https://doi.org/10.1155/2017/2106245.

[6]. FranciscoOjeda-Gutierrez,1 BrendaMartinez-Marquez,1 SorayaArteaga-Larios,1 M.SocorroRuiz-Rodriguez,2 andAmauryPozos-Guillen2 CaseReport Management and Followup of Complicated Crown Fractures in Young Patients Treated with Partial Pulpotomy HindawiPublishingCorporation CaseReportsinDentistry Volume2013,ArticleID597563,5pages http://dx.doi.org/10.1155/2013/597563.

[7]. E. Amir, DMD B. Bar-Gil, DMD H. Sarnat, DMD, MS Restoration of fractured immature maxillary central incisors using the crown fragments The American Academy of Pediatric Dentistry Volume 8 Number 4.

[8]. Bhat SS, Hegde SK, Adhikari F, Bhat VS. Direct pulp capping in an immature incisor using a new bioactive material. Contemp Clin Dent 2014;5:393-6.

[9]. Vadini M, De Angelis F, D'Amario M, D'Arcangelo C. Direct pulp capping with an adhesive system in management of a complicated incisor fracture: a three-year follow-up case report. G Ital Endodonzia. 2011 Nov 1;25(3):162–7.

Shabna, et. al. "Crown Fragment Reattachment of Anterior Fractured Tooth - A Case Report–." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(9), 2020, pp. 32-37.