MANAGEMENT OF A COMPLICATED CROWN FRACTURE OF THE PERMANENT CENTRAL INCISOR BY FRAGMENT REATTACHMENT. A CASE REPORT

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Abstract
Coronal fractures of the anterior teeth are a common form of dental trauma, affecting mainly children and adolescents. [1,2] Average incidence of injuries to anterior teeth reported in literature ranges from 4 to 46%, with 11 to 30% in primary dentition and 6 to 29% in permanent dentition. Traumatic dental injuries are associated with biological, socio-economic conditions, psychological and behavioral factors. Complicated crown fractures involve enamel, dentin and pulp. Various treatment modalities are available, depending upon the clinical, physiological and radiographic status of the teeth.

The current case report describes the procedure of reattachment of tooth fragment of permanent maxillary central incisor in a 29 year-old patient with extensive fracture, involving subsequent pulp trauma.

Key words: central incisor, reattachment, fiber post, resin cement

1. INTRODUCTION

Coronal fractures of the anterior teeth are a common form of dental trauma, affecting mainly children and adolescents. [1,2] Average incidence of injuries to anterior teeth reported in literature ranges from 4 to 46%, with 11 to 30% in primary dentition and 6 to 29% in permanent dentition. [3]

The main causes of dental injuries are falls and collisions, sporting activities, violence, and traffic accidents, [4,5] most frequently involved being the maxillary central incisors, followed by maxillary lateral incisors and mandibular incisors. [4,6] Traumatic dental injuries, associated with biological, socio-economic conditions, psychological and behavioural factors, [7] represent a grievous experience for young individuals, not only because of the physical disfigurement but also because of their psychological impact.

A complicated crown fracture involves enamel, dentin and pulp. [4] The incidence of complicated crown fractures ranges from 0.9 to 13% of all dental injuries, the most commonly involved tooth being the maxillary central incisor. [4]

Various treatment modalities are available, depending upon clinical, physiological and radiographic status of the teeth. In complex cases, endodontic, periodontal, orthodontic and restorative procedures may be required. [8]

Progressive improvements in the field of adhesive dentistry allow clinicians to mechanically or chemically reattach a broken tooth fragment to the remaining tooth structure. [9]

Chosack and Eidelman (1964) proposed the restoration of fractured crowns by reattachment using dental fragments, a conservative and rapid restoration technique offering several advantages, [10-13] such as:

- it provides total aesthetical recovery, assuring the contour, color, translucency and surface texture of the natural tooth
- it also provides color stability over time and a wear rate similar to that of natural teeth
- it reduces the severe psychological impact experienced by patients, caused by trauma of the oral structures
- the clinical procedure is safe and simple, the time spent in the dental chair is shorter, which might reduce treatment costs.
The current case report describes the reattachment of a tooth fragment of permanent maxillary central incisor in a 29 year-old patient with extensive fracture involving pulp trauma.

2. CASE REPORT

A 29 year-old male patient reported to the Department of Conservative Dentistry, Goa Dental College and Hospital, with the chief complaint of pain and broken front tooth in the upper front region of jaw, caused by a car accident trauma 4 hours prior to the visit.

Soon the after accident, the fractured tooth fragment was stored in milk. Medical history was non-contributory. Intra-oral clinical examination revealed Ellis Class III fracture with 11, involving enamel, dentin and pulp. (Figs. 1.2 and 1.3) The fracture line was supragingival, at the junction of the middle and cervical thirds of the crown. The tooth exhibited no mobility. The soft tissue was only slightly injured, while the alveolar bone remained unaffected. Radiographically, no associated root fracture and no root resorption were evidenced. (Fig. 1.3)

Based on clinical examination and dental history, a diagnosis of complicated crown fracture was established, the recommended treatment plan including:
- root canal opening and sectional obturation of 11
- fibre post cementation with dual core resin cement
- reattachment of the fractured segment using dual cure resin cement.

The whole procedure was explained to the patient, along with all benefits and risks, and his written consent was taken.

Adaptation of the fragment was checked. The fractured fragment was stored in normal saline. (Fig. 1.5)
Under profound anesthesia, tooth isolation was done using a rubberdam with 210 retainer. (Fig. 2.1) Root canal opening was done with a round carbide burr, and pulp extirpation was done using H file (Fig. 2.2); working length was determined using Apex Locator (Root ZX, J Morita). Cleaning and shaping was done using ProTaper files till F3; after proper apical gauging till no. 50 size, sectional obturation was done using Gutta Percha and AH Plus sealer (Dentsply Caulk, Milford, DE). (Fig. 2.3), followed by post-space preparation using peeso reamer (size 2 and 3) and checking of the prefabricated light transmitting glass fiber post (glassix) in the canal as to its proper length and adaptation, both clinically (Fig. 3.1) and radiographically. (Fig. 3.2)

Meanwhile, a vertical groove was made in the fractured segment using a taper fissure burr to accommodate the coronal portion of fiber post (Fig.3.3), and again checked for proper clinical adaptation.

A 37% phosphoric acid etchant was applied on fiber post, then washed after 30 sec. After proper drying, an adhesive (PRIME & BOND NT, DENTSPLY) was applied and light-cured. The fractured fragment and the root canal wall were also etched with phosphoric acid for 30 sec and, after proper drying of the canal, an adhesive was
applied using a small brush, followed by light curing.

The thus prepared fiber post and fractured segment were again checked for proper adaptation. The post was then luted inside the canal with dual cure resin cement (Calibra, Calibra® Esthetic Resin Cement, Dentsply International, Inc.) mixed according to manufacturer’s instructions; after confirmation of a proper adaptation, light curing was done. The excess cement was removed with an explorer and the tooth was polished with rubber cup. Intraoral occlusion was checked and post operative instructions were given to the patient. Currently, the patient is asymptomatic, satisfactory results being recorded after an 1 year follow-up.

3. DISCUSSION

Tooth fracture by a traumatic incident in a young patient involves a positive emotional and social response from his part, for the preservation of natural tooth structure. [14] Fragment’s reattachment provides optimal aesthetics and is very economical. The tooth color, contour and texture remain the same, being more recommended than a composite resin restoration. [15,17]

Various treatment options have been mentioned in the literature for fractured crown, such as: [18,19]
1. fragment removal followed by restoration
2. fragment reattachment
3. gingivectomy and osteotomy (crown lengthening) (Trushkowsky 1988);
4. orthodontic extrusion with/without gingivoplasty
5. forced surgical extrusion
6. vital root submergence
7. extraction followed by surgical implants or fixed partial denture

A proper treatment option for fractured tooth should first consider the location of the fracture line. If the fracture line is in the middle or incisal third of the crown and the patient is unable to retrieve the fractured segment, a resin composite restoration is preferred for both aesthetics and functioning. [20]

The materials employed for bonding the fragment include dentin-bonding agents, dual or self-cured luting cements or light-cured luting cements, and viscous light-cure hybrid or micro-filled resin composites. [21-23]

Several operative procedures have been suggested in literature, starting from no additional tooth preparation to various preparation options, such as: circumferential bevel, internal groove, external chamfer and superficial over-contour of composite on the fracture. [23] Worthington et al. (1999) showed that placement of any kind of preparation did not improve fracture strength, [24] while Reis et al. (2002) stated that the buccal chamfer technique provides a better fracture resistance than simple reattachment, both remaining nevertheless inferior to a resin composite restoration of the original tooth. [22]

Chosack and Eildeman (1964) published the first case report on the reattachment of a fractured incisor fragment in which complicated tooth fracture was managed by endodontic treatment, followed by a cast post and core. [12] In the here presented case, Glass Fibre Post was used along with dual cure resin cement. Tooth-colored fiber posts have several advantages. They are more aesthetic, bound to tooth tissue, their modulus of elasticity is similar to that of dentin and less chances of fracture may occur. [25] Using glass fiber post with composite core and applying the recent advances in adhesive techniques and materials, one can create a Monobloc, a multilayered structure with no inherent weak inter-layer interfaces. [26] Additionally, post-placement serves to retain the coronal portion via a friction bond, preventing dislodgement of the non-axial forces. [27]
4. CONCLUSIONS

Reattachment of fractured tooth fragments appears as a valid alternative for conservative treatment in special situations involving the anterior teeth. The reattachment procedure can be improved with different adhesive techniques and restorative materials.

References

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