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Fractured Fragment Reattachment: "Preserving the Natural Tooth": A Case Report

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Abstract: ***Coronal fractures of the anterior teeth are common sequelae of dental trauma. In case of complicated fractures, where the fractured segment is available and there is close approximation of the segment to the remaining tooth, root canal treatment followed by reattachment of the fractured segment with fibre post reinforcement is a feasible option. The procedure is simple and economic and needs less chair-side time as compared to many conventional methods. In addition, the procedure provides good and long-lasting aesthetics, because the original morphology, colour, and surface texture are maintained. This clinical case reports the treatment of coronal tooth fracture case that was successfully managed using tooth fragment reattachment using glass-fibre-reinforced composite post.***

Keywords: Coronal fractures, fractured segment, glass-fibre-reinforced composite post

1. Introduction

Complex crown fractures involving the enamel, dentin, and pulp constitute a major share of all dental injuries and are most common in maxillary anterior teeth [1, 2]. It is estimated that a quarter of the population suffers a minimum of one dental traumatic injury related to coronal fractures of the anterior teeth before the age of 18 years, the most common of which are due to falls, high-impact sports, and road traffic accidents [3, 4].

Most traumatic tooth injuries involve damage to the enamel and dentin without pulpexposure. Crown-root fractures represent only 0.3% to 5% of these injuries and require a complex and multidisciplinary treatment [4, 5]. Selecting the correct treatment to be followed is based on the age of the patient; the extent of the fracture the presence or absence of endodontic involvement; the presence/absence of the tooth fragment and its condition of use; the occlusion and aesthetics; and patient expectations [5, 6].

A fractured anterior tooth requires immediate clinical attention and, if untreated, can cause damage to dentition and even have a psychological impact on the patient.

The main objective of this technique is to provide highly conservative approach that combines aesthetics & functions[15].

2. Case Report

- 27-year-old male patient reported to the Department of Conservative Dentistry and Endodontics of GDC&H, Aurangabad with the chief complaint of pain & mobility in upper front region of jaw (fig 1).Patient gives H/O trauma 1 day before coming to the clinic.
- Clinical examination revealed the complicated crown fracture of maxillary left central incisor.
- Fracture line was running horizontally from the gingival third of the crown on the labial aspect to subgingival level palatally (fig.1, 2 & 3).
- Fractured fragment was having grade III mobility in labio-palatal direction. Tooth was tender on percussion.
- The radiograph indicated complete root formation and a closed apex with no periapical radiolucency.
- There was also Ellis class 2 fracture of #11 along with chipping of enamel of # 22.

Figure 1

Figure 2

Figure 3

Preoperative intraoral radiograph showed fracture of crown at cervical level. CBCT of same tooth confirmed the crown fracture coronal to CEJ (fig. 2 & 3).

After taking written consent, it was planned to perform single visit root canal treatment (RCT) on #21 followed by reattachment with fiber post reinforcement. #11 & #22 were planned for direct composite resin restoration.

Local anesthesia was administered (1.0 cc of lidocaine 2% with 1: 80,000 epinephrine) (fig. 4, & 5) and the fractured segment in relation to 21 was atraumatically removed (fig. 6,7 & 8).

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

It was then cleaned with 2% chlorhexidine solution (germicidal) and stored in 25% dextrose (as hypertonic solution increases bond strength of reattached fragment)[13].

Fractured fragment was stored in 25% dextrose to prevent drying & desiccation (fig. 9, 10).

Figure 9

Figure 10

Labial & palatal views after removal of fractured fragment (fig.11&12).

Figure 11

Figure 12

After removal of fractured fragment atraumatically root canal procedure was initiated, working length was determined using intraoral radiograph [Fig 13, 14, & 15].

After thorough cleaning & shaping root canal is obturated using lateral condensation method (Fig.16).

Figure 13

Figure 14

Figure 15

Figure 16

After completing RCT on 21 post space was prepared using Peeso reamers (Fig. 17&18).

Figure 17

Figure 18

Aesthetic post of diameter 1.1 mm (MailyardFiber Post) was selected. Assessment of post is done radiographically after adjusting the post length. (Figure 19 & 20).


Figure 19


Figure 20

The prepared post space was etched for 15 seconds using 37% phosphoric acid (DENTSPLY, Spectrum) (Fig.21). It was then rinsed thoroughly with water and excess water was removed with a cotton pellet. Next the bonding agent (DENTSPLY, Spectrum) was applied on the etched surface as well as the post. The adhesive was air thinned and light-cured for 10 seconds (Fig. 22 & 23).


Figure 21


Figure 22


Figure 23

The post was then luted with resin cement (LUXACORE Z dual cure resin) (Fig. 24 & 25).


Figure 24


Figure 25

After anaesthetising, palatal full thickness mucoperiosteal flap was raised as palatal margin was subgingival.A slot was prepared into the fractured segment to receive the part of post (Figure 26& 27).

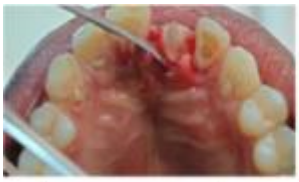
Figure 26


Figure 25

Etchant (DENTSPLY, Spectrum) was applied to the fragment and the remaining tooth structure using micro applicator tip (Fig. 28 & 29) It was then rinsed thoroughly with water and excess water was removed with a cotton pellet. Next the bonding agent (DENTSPLY, Spectrum) was applied (Fig. 30 & 31). The adhesive was air thinned and light-cured for 10 seconds.


Figure 28

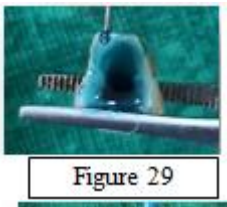
Figure 29


Figure 30


Figure 31

and the fragment was cemented using dual-cure composite resin cement (LUXACORE Z dual cure resin) (Fig. 32).


Figure 32

The flap was stabilized by giving 2 black braided silk sutures. A good periapical radiograph was taken to ensure the proper cementation of post as well as fragment (Figure33). The occlusion was checked and postoperative instructions were given to the patient. The patient was recalled after 1 week for removal of sutures& then after, kept under follow up.


Figure 33

Composite restoration was done to improve esthetics & to mask fracture line (Fig. 32, 33 & 34).


Figure 34


Figure 35


Figure 36

Then Composite restoration of for 11 and subsequently 22 was performed. The patient was kept on periodic review after every month and it was observed that both endodontic and restorative treatments remained clinically acceptable through each visit.

Preoperative | Postoperative aftrer 6 months

3. Discussion

Conventional techniques employed in the restoration of fractured teeth include partial and full coverage crowns, laminate veneers, and composite resins all of which are time-consuming, high priced, and not conservative [2].First described by Chosack and Eidelman in 1964, restoration of fractured teeth using the dental fragment offers a fineway to reinstate the natural shape, contour, surface texture, occlusal alignment, and colour of the fragment [7].

The advancement in adhesive material creates new perspective in the reconstruction of fractured teeth; it is now possible to achieve superb results with the reattachment of fractured tooth fragment provided that the biological factors, materials and techniques are logically assessed and managed.

Reattachment should be the first choice of treatment when the fracture fragment is available. The advantage of this alternative treatment includes regaining colour and size of the original tooth, being worn away in similar proportion to adjacent tooth and giving positive psychological response to the patient and is also economical [8].

The success of the reattachment depends on different factors: hydration of the fractured segment while outside oral cavity is one of them. This is necessary to maintain the vitality and natural aesthetic appearance of the tooth and also ensures adequate bondstrength [2].

When there is a substantial associated periodontal injury and/or invasion of the biological width, the restorative management of the coronal fracture should also consider the rehabilitation of those affected tissues [9].

Cavalleri and Zerman reported that the long-term prognosis for reattached crown fragments appears to be better than for composite resin restorations [10].

When the tooth is completely unrestorable, extraction is the only option available, leading to the loss of bone in the area compromising future treatment with implants [11].

Positive and Negative aspectsof reattachment are shown below [12].

Positive aspectsof reattachment
- Wear similar to adjacent/opposed teeth.
- Colour match to the remaining crown structure.
- Preservation of incisal translucency.
- Maintenance of natural tooth contours.
- More durable restoration than a Class IV resin restoration alone.
- Preservation of ‘identical’ occlusal contacts.
- Colour stability of the enamel.
- Positive emotional and social response from patients.
- Economical.

Negative aspects of reattachment
- Less than ideal aesthetics if the tooth fragment is allowed to dehydrate.
- Colour changes of the bonded fragment.
- Necessity for continuous follow up.
- Unknown longevity.
- ‘Predicted’ eventual separation of the repair due to progressive breakdown of the bonded junction.

In the present case, we used an adhesive, a dual-curing luting composite system, a glass-fibre-reinforced composite root canal post and the original crown fragment. This technique provides reinforcement to the restored segments and increases durability and survival.

4. Conclusion

When the fractured fragment is available tooth fragment reattachment procedure offers an ultraconservative, safe, fast and aesthetic result [14].
- A number of treatment options have been proposed for coronal tooth fractures depending upon the circumstances like immediate reattachment, surgical exposure, crown and root recontouring and fragment reattachment; using splints and without radicular anchorage, each with their own advantages and disadvantages.
- The reattachment of a fractured crown fragment may be the most conservative and desirable treatment of choice for anterior teeth, providing an instant return to the natural appearance upon reattachment of the original tooth fragment.

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