

Reattachment of fractured crown fragment in maxillary incisor- A holistic intervention approach and review

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Abstract

Coronal fractures of maxillary anterior teeth are the most common form of traumatic dental injuries. Although, complicated crown fractures are less common they still pose a great challenge to the clinician. The ultimate objective while treating such type of cases is to re-establish normal tooth position together with normal function and better aesthetics. Among the various treatment modalities available, reattachment of the patient’s own fractured tooth fragment is a conservative method that can provide immediate esthetics, phonetics, functional and biologic restoration. Although lesser used, reattachment of broken tooth fragment can provide a very cost effective alternative which is psychologically more acceptable to the patient. This clinical case reports the management of crown fracture of a maxillary right central

incisor of a middle aged adult by reattachment of the tooth fragment using a glass-fibre-reinforced composite post. To improve the adhesion between the fractured and remaining tooth fragment, circumferential outer bevelling, crown lengthening of the remaining intact tooth part were also performed.

Keywords: Fiber post, Reattachment, Tooth fracture, Esthetic.

Introduction

Trauma to tooth is an emergency that needs instant care, prompt decision making and sound treatment. Maxillary incisors account for the majority cases of crown fractures due to their anterior and protrusive orientation in the dental arch.[1,2] Accidents, striking with foreign bodies, contact sports injuries, falls are the major factors that can cause fracture of teeth.[3,4] Crown

fractures can either be complicated or uncomplicated.[5-7] While the complicated fractures being more extensive may necessitate reinforcement with endodontic posts, the latter can be easily managed by conservative procedures such as enamel recontouring , composite restorations ,porcelain veneers or simply by reattachment of broken fragment.[8,9] If the fractured fragment is not missing and its margins are well-preserved with minimal disruption of the biological width then its reattachment using adhesive technique supplemented by a post could be the preferred method of treatment. This technique amalgamates the concepts of minimal intervention and biological restoration which aims to achieve maximum preservation of the natural structure of the tooth as well as aesthetics. [9-11]This case report illustrates the treatment of a complicated crown fracture of maxillary right central incisor by reattaching the fractured tooth fragment using glass fibre post.

Case Report

A 45-year-old male patient reported to the Department of Public Health Dentistry S.C.B Dental College and Hospital, Cuttack, Odisha, India with a chief complaint of mobile and broken upper front tooth caused by a physical trauma one day ago. He presented with a non-contributory medical history. Soft tissues including lips were apparently normal without any traumatic sign on examination. Intra-oral examination revealed a complicated oblique Ellis Class III fracture of maxillary right central incisor which extends labio-palatally in an inciso-apical direction (Fig.1). Moreover this oblique fracture line was also seen descending from the distal side towards the mesial side (Fig.3). The fractured fragment of 11 was incompletely separated and mobile (Fig.1). No inflammation or edema on palatal gingiva and interdental papilla was noticed. Periodontal evaluation of the patient

revealed the absence of periodontitis. Pulp exposure was clinically obvious and was further confirmed by a preoperative periapical radiograph. However there was no apparent evidence of periapical pathosis.

The adhesive reattachment of the fractured fragment was planned for 11 with the remaining tooth structure. The limit on labial surface was located about 3 mm from the free gingival margin as measured with a Williams's periodontal probe. A translucent glass fiber post was then decided to be placed in 11 which was meant to serve two purposes. First was to improve the tooth resistance and secondly to expand the bonding areas for the adhesive reattachment. After discussing the advantages and disadvantages of other treatment options the patient opted for the tooth fragment reattachment treatment plan. Upon local anesthesia administration the fractured fragment was removed without damaging the investing tissue. The subgingival extent of fracture line was confirmed on fragment removal. On examination the fractured fragment had all intact surfaces and edges and was well-adapted to the remaining tooth structure. Storage of fragment was done in an isotonic saline solution so as to avoid dehydration and discoloration till reattachment (Fig 2). The tooth fragment and pulp chamber was debrided and cleaned. As the patient reported the day after trauma, preservation of the tooth vitality was not possible. The endodontic treatment was performed in single visit with respect to 11 and crown lengthening procedure by gingivectomy using internal bevel incision was accomplished assisted by electro cautery to expose the fracture line (Fig 4a, 4b). An enamel bevel was made all around the remaining tooth structure and the fragment margins to establish good adaptation. The post space was prepared with the help of peeso reamer in radicular portion of the tooth as well as in the fractured

fragment with a flat end tapered fissure bur (Fig. 5). A translucent glass fiber post of diameter 1.1 mm reforpost glass fiber angelus londrina brazil was tried in the canal and cut at the desired length to fit into the coronal fractured fragment and the fragment was aligned to confirm its fit with the apical part of the tooth (Fig 6). Next the prepared post space was acid etched for 15 seconds using 37% phosphoric acid. It was then rinsed thoroughly with water and excess water was removed with a cotton pellet and paper point. Subsequently an adhesive was applied on the etched surface as well as the post. The adhesive was air thinned and light cured for 10 seconds. The post was then luted with dual-cure resin cement multilink ivoclar vivadent with 2 mm of its coronal portion extending into the chamber. Any excess cement oozing out of the canal was removed so as not to compromise the fit of the coronal fragment (Fig 7). Tooth fragment was reattached using resin cement and repositioned and cured from palatal and labial surface for 40 seconds each (Fig 8). The bevelled part was restored with composite restorative material. Suturing the palatal gingiva was not required as it was atraumatically separated during fragment removal. The patient was instructed to rinse with 0.12% chlorhexidine gluconate solution twice daily for 7 days. Six months later clinical and radiographic examination revealed a stable reattachment of the crown fragment. The palatal gingiva showed adequate approximation with the reattached tooth without formation of any pocket. Six months evaluation was done to ensure the success of the treatment (Fig. 9,10,11)

Discussion

Fracture of the anterior teeth causes discomfort to the patient in the form of pain, fear and emotional concern about his or her appearance.[12] Various treatment modalities for crown-root fractures include composite

restoration, post-and-core supported prosthesis, and various other alternatives such as gingival reattachment, surgical exposure of the subgingival fracture, orthodontic extrusion, surgical extrusion, each being preceded by fragment removal.[13] With the emergence of new dentin bonding agents and adhesive materials, fractured tooth fragments can reliably be reattached to the remaining intact part of the tooth.[14] Reattachment should be the first line of treatment if the fractured fragment is available in a sound condition. Various case reports have reported the successful reattachment in these kind of fractures.[15,17] In view of the success of the treatment, longevity of the reattached teeth is the major concern. Majority of the failures can result due to trauma or non-physiologic use of the reattached tooth. Most important factor to determine the longevity is the fracture strength of the reattached tooth fragment.[18] Effect of the reattachment technique on the fracture resistance has been studied by Reis *et al*,[19-20] who concluded that simply reattaching the fragment without its preparation reinstated 37.1% of the intact tooth's fracture resistance, whereas buccal chamfer, superficial overcontouring, and internal groove placement restored 60.6%, 97.2%, and 90.5% of fracture resistance, respectively. Various studies have reported that "over contour" and "internal dentinal groove" technique provide better results as compared to other techniques.[21] In this case, internal groove was made to enhance the fracture resistance of restored tooth. Circumferential enamel bevelling of the tooth along with the fractured fragment increases the retention due to an increase in surface area for bonding, and masks the fracture line with composite resin. The success of such types of treatment modality depends upon numerous factors like time elapsed after trauma, extent of the fracture, position of fracture line, size of the fractured part, involvement of the pulp, stage of root formation,

periodontal condition, invasion of biological width and post type as well as the material used for reattachment.[22] Advantages and disadvantages of the fragment reattachment technique are shown below.[23]

Advantages of reattachment technique

- ▶ Conservative approach.
- ▶ Superior simulation of adjacent/opposed teeth.
- ▶ Esthetic advantage as colour matches to the remaining crown portion.
- ▶ Preservation of incisal translucency.
- ▶ Maintenance of original tooth form and contour.
- ▶ More durable restoration than a Class IV resin restoration alone.
- ▶ Preservation of original occlusal contacts.
- ▶ Colour stability of the enamel to some extent if dehydration of fragment can be avoided.
- ▶ Positive psychologic, emotional and social response from patients.

Disadvantages of reattachment technique

- ▶ Aesthetics may be compromised if the tooth fragment undergoes dehydration.
- ▶ Colour change of the bonded fragment with time.
- ▶ Need for continuous monitoring.
- ▶ Longevity is questionable.
- ▶ 'Predicted' eventual separation of the repair due to progressive breakdown of the bonded junction.

Fiber-reinforced posts are advantageous over metal posts as they are passive, tooth colored, more flexible and have modulus of elasticity close to dentin and require minimum preparation.

[24] It combines elastic and adhesive characteristics, as a result tooth and post move and flex as a single unit, favouring even stress distribution.[25] Reattachment is

absolutely contraindicated in cases with unfavorable occlusal relations like deep bite or bruxism.

In context of the present case, the long-term follow-up to evaluate the longevity of reattached tooth was not done, lack of which is a limitation of our case.

Conclusion

Treatment of a crown fragment with the help of fiber-reinforced post and original tooth fragment reattachment is a conservative, less time consuming and a cost effective approach which can restore optimum aesthetics and function for anterior teeth. The major requirements to be met for its success are intact edges of the fractured fragment, easy access to the fracture line, an adequate isolation and bleeding control during the procedure.

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Legend Figure



Fig.1: Clinical view of the fracture of maxillary right central incisor. Note the attached tooth fragment.



Fig.2: Intact fracture fragment of 11.



Fig.3: Preoperative radiograph. Note the oblique fracture line descending from the distal towards the mesial side of 11



Fig.4a and 4b: Labial and palatal aspect respectively after gingivectomy for crown lengthening.



Fig.5: Postspace preparation wrt 11.



Fig.6: Radiograph showing glass-fibre - post placed after postspace preparation in 11.



Fig.9: Palatal attachment after six month



Fig.7: Cementation of glass fibre post.



Fig.10: labial aspect after six month



Fig.8: Postoperative view after the fragment has been reattached.



Fig.11 Radiograph after six months