Reattachment of an Incompletely Fractured Anterior Tooth by a Conservative Approach

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ABSTRACT

Statement of problem: This paper discusses fragment reattachment in a 16-year-old female patient with an incomplete obliquely fractured maxillary left central incisor with exposed pulp.

Purpose: Trauma to the anterior teeth is relatively common among children and teenagers due to their active lifestyle. Reattachment of a fractured fragment to the remaining tooth can provide better and long-lasting esthetics and improved function. It is a faster and less complicated procedure with a positive psychological response.

Materials and methods: Access opening was done under local anesthesia in the left maxillary central incisor. Biomechanical preparation was done with conventional step-back technique followed by obturation with gutta-percha points and AH plus sealer. Beveling of remaining tooth structure and the fractured segment was done with a tapered bur. Vertical grooves were given with round bur for extra retention. Then, the tooth fragment was reattached with composite resin.

Results: Single-visit root canal therapy was performed under local anesthesia and the fractured fragment of the tooth was reattached with composite resin.

Conclusion: Under a conservative approach, fractured fragments can be reattached with dentin bonding adhesives to restore tooth with long-term follow-up.

Keywords: AH-plus sealer, External bevel, Oblique fracture, Reattachment, Vertical groove.

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CASE REPORT

Diagnosis

A 16-year-old female patient was referred to the Department of Conservative Dentistry and Endodontics of I.T.S. Dental College, Muradnagar, with the chief complaint of fractured left maxillary central incisor tooth because of trauma 2 days back (Fig. 1). The patient also reported acute pain through the line of fracture. Patient’s past medical history was noncontributory. The clinical and radiographic examinations showed an incomplete oblique fracture in the maxillary left central incisor involving the enamel–dentin junction and extending from buccal to palatal aspect subgingivally (Fig. 2). The tooth fragment was mobile but was palatally attached to the gingival tissue. There was no deformation around the tooth.
Treatment

After administration of local anesthesia, an ideal access opening was made in the tooth without removing the fractured segment. Root canal pulp was extirpated and canal preparation was performed using the standard step-back method. The prepared tooth was dried with paper points and filled with laterally condensed gutta-percha and AH plus canal sealer.

After the obturation the adaptation of the fragment was checked (Fig. 5). Then an external bevel was placed over the remaining tooth structure and the fractured tooth segment with a tapered bur (Fig. 3). For extra retention, a vertical groove was also made parallel to the long axis of the tooth, which was approximately 4 mm in length and 1 mm in width with a round bur.

The field was isolated and then 37% phosphoric acid gel was applied for 15 seconds to enamel and dentin on the fragment and on the tooth remnant, limited to 2 mm beyond the fractured tooth margin. An air–water spray was used to remove the acid, and the surface was dried with a mild air stream. Care was taken to keep the dentin slightly wet. Next, the adhesive system was applied to the conditioned areas in accordance with the manufacturer’s instructions. The adhesive was left unpolymerized, because a polymerized adhesive layer might interfere with a perfect adaptation. Afterward, small increments of resin composite were applied to the tooth fragment. While the fragment was kept in position under pressure, visible light polymerization was applied for 40 seconds to the facial surface of the tooth. After polymerization, a rough excess of resin were removed with a No. 12 scalpel blade followed by a sequence of flexible disks. A polishing slurry was employed to make the surface smoother and brighter (Figs 4 and 5).

The patient was informed of the possibility that the fragment might detach again and was instructed to avoid loading that tooth.

After 5 months assessment was done in terms of retention, color match, marginal discoloration, secondary caries, anatomic form, marginal adaptation and surface texture (Figs 6, 7). At the 9-month follow-up, the fragment appeared to be fully rehydrated. Radiographic evaluation revealed a successful fragment reattachment procedure.

DISCUSSION

A wide range of treatment options have been advocated for traumatic permanent teeth. These include
• Orthodontic extrusion 19
• Osteotomy/osteoplasty 20
• Intentional replantation 21
• Reattachment of fragments 4
• Extraction.

Reattachment of a tooth fragment should be preferable to restoring fractured teeth. There are several advantages in this treatment, such as obtaining esthetics in a single appointment, being a more conservative procedure, obtaining healthy periodontal attachment, and maintaining the original tooth contours and translucency as the patient’s own. 22, 23

The following reattachment strategies have been advocated for reattaching a detached tooth fragment to the remaining tooth:
• Placement of a circumferential bevel before reattaching the fragment 13, 24, 25
• Placement of an external chamfer at the fracture line after bonding 26
• Use of a V-shaped enamel notch 27
• Placement of an external groove 7, 25
• Leaving a superficial overcontour of restorative material over the fracture line 28–30

In the present case, the enamel beveling technique was used. This technique has claimed to improve fragment retention since enamel beveling alters the orientation of enamel prisms, which facilitates the achievement of a more effective acid etching pattern, 31 also it allows the
use of a greater volume of resin, which would increase the bond strength.  

The possibilities that the fragment will not regain its original color, will be reattached in an inadequate position, will loosen from the tooth remnant, or will show a visible union line are some of the limitations of this technique, which can be prevented through care before, during, and after reattachment.

Reis et al. investigated the fracture strength of various reattachment techniques. They found the use of a superficial overcontour over the fracture line, placement of an internal groove, and the resin composite restoration itself provide fracture strength as high as those observed in sound teeth. However, only 37% of the strength of an intact tooth was recovered when a dual-cure luting cement was utilized for a simple reattachment without any additional tooth preparation, and 60% when a buccal chamfer was placed over the fracture line.

The quality of fit between a detached tooth fragment and the remaining tooth structure is an important factor to be considered. When the segments fit together with no discernible disruption or defects, techniques that prevent resin composites from being exposed to the oral environment, such as placement of an internal groove, would be preferable. This is true with the exception of a simple reattachment due to the low fracture strength recovery associated with this technique. On the other hand, when enamel structure is lost during a traumatic event, it may be more convenient to use an overcontour technique, so esthetic can be achieved simultaneously with an increase in adhesion. In the present case, there was an adequate fit between the detached tooth fragment and the remaining tooth structure.
Another important consideration is fracture pattern. It has been reported that 80% of traumatized incisor fracture in an oblique fashion from the labial toward the lingual, with the fracture line proceeding in an apical direction. This is an unfavorable fracture pattern that exhibits low resistance to labially applied forces. Liew believed that tooth fragment reattachment should be a temporary procedure. The real merit of reattachment is the fact that all other restorative options, such as direct adhesive ones, veneers, and crowns can still be instituted in the event of reattachment failure.

CONCLUSION

When young patients with anterior tooth fracture are treated, treatment should be as conservative as possible. Reattaching fragments with dentin bonding adhesives can be used to restore fractured teeth, presumably with sufficient strength, but long-term follow-up is essential to predict the durability of the tooth–adhesive–fragment complex.

REFERENCES
