

Preserving the natural smile by immediate reattachment of a fractured tooth

Drs. Ramesh Bharti, Deeksha Arya, Anil Chandra, Aseem Prakash Tikku, Rakesh Yadav, and Promila Verma present two case reports detailing the reattachment of a fractured tooth fragment for the restoration of function and esthetics

Traumatic injury in the form of anterior crown fracture has been estimated to occur in one-quarter of the population under the age of 18 (Murchison, Burke, Worthington, 1999; Petti, Tarsitani, 1996). Ninety-six percent of these traumatic injuries involve maxillary incisors (80% central incisors and 16% lateral incisors) [Andreasen, Ravn, 1972]. These injuries pose a substantial challenge to the dental team because the patient often wants resolution of trauma during an emergency visit.

Restoration difficulties depend on:

- The type of fracture (according to Dean's classification) [Trushkowsky, 1998; Dean, Avery, Swartz, 1986]
- The extent of fracture (supragingival, subgingival, or may involve root)
- The type of occlusion
- The involvement of soft tissue (Leroy, et al., 2000; Qulis, Berdouses, 1996).

Dr. Ramesh Bharti, MDS, is assistant professor at the Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, CSM Medical University (formerly King George's Medical College), Lucknow, India.

Dr. Deeksha Arya, MDS, is assistant professor at the Department of Prosthodontics and Dental Material Sciences, Faculty of Dental Sciences, CSM Medical University (formerly King George's Medical College), Lucknow, India.

Dr. Anil Chandra, MDS, is professor at the Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, CSM Medical University (formerly King George's Medical College), Lucknow, India.

Dr. Aseem Prakash Tikku, MDS, FICD, is professor of the Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, CSM Medical University (formerly King George's Medical College), Lucknow, India.

Dr. Rakesh Yadav, MDS, is Assistant Professor at the Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, CSM Medical University (formerly King George's Medical College), Lucknow, India.

Dr. Promila Verma, MDS, is associate professor at the Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, CSM Medical University (formerly King George's Medical College), Lucknow, India.

Educational aims and objectives

This clinical article aims to describe the immediate reattachment of a fractured tooth fragment for the restoration of function and esthetics at the emergency visit.

Expected outcomes

- Correctly answering the questions on page 31, worth 2 hours of CE, will demonstrate that the reader can:
- Recognize successful pain management with immediate restoration of function, esthetics, and phonetics as the prime objective in treating these cases.



Oblique fractures (type B, according to Dean's classification) are more difficult to treat than horizontal fractures. The conventional treatment of fractured anterior teeth includes post and core and composite restoration followed by prosthetic restoration. However, reattaching the fractured segment has several advantages over other treatment. The patient's own incisal enamel appears more natural than any other restoration (Busato, et al., 1998), so preserving it will maintain the contour, color, texture, and translucency of the original tooth.

Case report one

A 21-year-old female consulted at the postgraduate clinic of the Department of Conservative Dentistry and Endodontics of CSM Medical University, Lucknow (King George's Medical College). She arrived at the clinic 13 hours after an outdoor activity accident that had fractured her maxillary right lateral incisor. The patient history revealed no systemic disease, and there was no hemorrhaging or swelling in the related area. The clinical and radiographic maxillofacial examination revealed that there was no fracture of the maxilla, mandible, or any other facial bones.

Intraorally, the right maxillary lateral incisor tooth showed an oblique crown fracture. The fractured line was located 2 mm supragingivally on the buccal aspect and at the level of the alveolar crest on the palatal aspect (Figures 1 and 2). The fragment was extremely mobile, and only periodontal fibers on the palatal aspect retained it.



Figure 1: Case report one – fractured maxillary lateral incisor



Figure 2: Case report one – radiograph showing fracture line in maxillary lateral incisor

After removal of the coronal fragment, it was kept in physiological saline solution to prevent dehydration of the segment (Figure 3). Root canal therapy was performed with rubber dam. After cleaning and shaping, the root canal was filled with AH Plus® sealer (Dentsply) and gutta percha using a warm vertical compaction technique. Throughout the procedure, homeostasis was achieved by locally placing adrenaline-



Figure 3: Case report one – clinical view after the removal of the fractured fragment



Figure 4: Case report one – post positioning to accommodate the fracture fragment

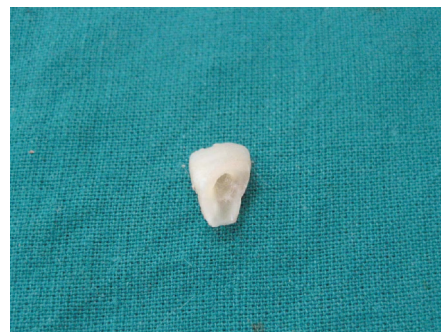


Figure 5: Case report one – fractured crown after removal and preparation



Figure 6: Case report one – labial view after sealing



Figure 7: Case report one – radiograph after sealing the fractured fragment

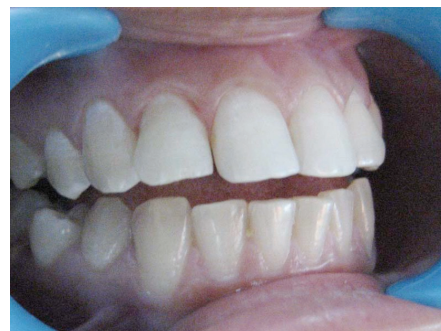


Figure 8: Case report one – photograph after 1 month of the treatment



Figure 9: Case report two – clinical view of fractured mandibular left central incisor

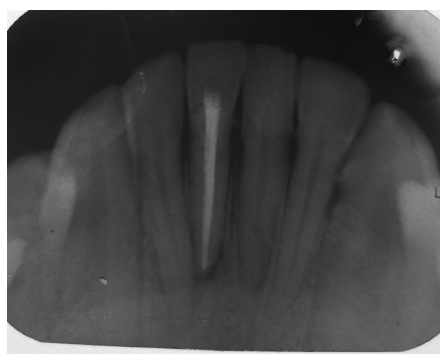


Figure 10: Case report two – radiograph showing fracture line, and tooth was root canal treated

embedded cotton pellets.

A ParaPost® XP™ (Coltène Whaledent) was inserted into the first third section of the root canal for retention (Figure 4). A hole was drilled in the middle part of crown fragment (Figure 5). RelyX™ U100 self-adhesive resin cement (3M™ ESPE™) was then applied to the adherent surfaces. The crown fragment was reattached to the root surface, light-cured for 40 seconds, and allowed to self-cure. The remnants of the resin were removed from the interdental space and the tooth surfaces. Finishing and polishing of the restoration was carried out, and the occlusion was checked to make sure that there was no contact (Figures 6 and 7).

One month later, the clinical and radiographical examination revealed a stable reattachment of the crown fragment with no color change (Figure 8). At this

time, periodontal probing revealed a depth of 2 mm on the mesial side, 2 mm on the buccal side, 2.5 mm on the distal side, and 1 mm on the palatal side.

The patient was then scheduled 6-month recall visits, and the periodontal measurements were repeated at each visit. After 1 year, the clinical and radiographic findings presented no color change, no mobility, no periapical pathosis, and the tooth had a healthy periodontium with no pocket formation or gingival recession.

Case report two

A 28-year-old female patient reported to the Department of Conservative Dentistry and Endodontics of CSM Medical University, Lucknow (King George's Medical College) following trauma to the mandibular left central incisor. The day before her visit, she was eating corn, resulting in a fracture of

the mandibular left central incisor.

The fragment was mobile, but still in place (Figure 9). Clinical examination revealed an oblique fracture. The fracture line was present on the coronal portion, extending from lingual to labial aspect subgingivally. The margin on the labial surface was located 2 mm below the free gingival margin and could be probed easily with a periodontal probe. Clinical and radiographic examination revealed that the tooth was endodontically treated (Figure 10).

The patient was very apprehensive about her fractured tooth. However, after the condition was explained to her, she felt reassured. Of the various treatment options explained, she preferred to retain the fractured fragment.

The fractured fragment of the mandibular left central incisor was removed and stored in physiological saline, to be used at a later stage. Isolation was achieved using cheek retractors, cotton rolls, and saliva ejector. A gelatin sponge (AbGel®, Sri Gopal Krishna Labs, India) was packed on the labial surface of the subgingival area to control any bleeding.

To prepare the post space, ParaPost XP (Coltène Whaledent) was tried in the canal and cut to the desired length. The fractured fragment was removed from the physiological saline and tried on the cut end of the fiber post. A groove was made on the



Figure 11: Case report two – clinical view after completion of treatment

fractured fragment until it fitted comfortably on the post. Care was taken not to remove excess dentin, as it would have altered the final esthetic appearance of the tooth. Once the desired fit was confirmed, it was again stored in physiological saline.

The post was cemented with the help of RelyX U100 self-adhesive resin cement (3M ESPE). Any excess cement was removed so as to not compromise the fit of the coronal fragment. The gelatin sponge was then removed, and the exposed root surface and fractured fragment were acid-etched simultaneously. The groove in the fractured fragment was filled with resin cement, and the exposed post was also luted with the same resin. The fragment was repositioned.

Because the fracture line was visible on the lingual surface, a groove was made along the fracture line. It was then restored with nanocomposite (Filtek™ Z 350 universal restorative, 3M ESPE). Finishing and polishing were performed using Sof-Lex™ polishing system (Sof-Lex extra thin contouring and polishing discs, 3M ESPE), and a radiograph was taken (Figures 11 and 12).

After 8 weeks, none of the fragments were mobile, and the periodontal status in relation to both central and lateral incisors was satisfactory (no periodontal pockets, normally contoured palatal gingiva). Radiographic examination revealed satisfactory healing of both central and

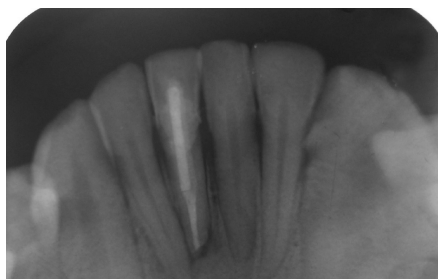


Figure 12: Case report two – radiograph after sealing the crown fragment

lateral incisors, and no discoloration was evident on clinical examination.

Discussion

With the advances in dental bonding technology, it is now possible to achieve excellent results with reattachment of fractured tooth fragments. The use of natural tooth substance clearly eliminates the problems of differential wear of restorative material, unmatched shades, and difficulty of contour and texture reproduction associated with other techniques.

The treatment plan can be made after evaluation of the periodontal, endodontic, coronal, and occlusal status (Chu, Yim, Wei, 2000). Other factors that might influence the choice of technique include the need for endodontic therapy, extension of fracture line, and the fracture pattern.

Resin cements applied in this technique have added advantages over other cements because of decreased chance of microleakage (Andreasen, 2001). Resin luting cements have good bond strength to the tooth, are predictable, and easy to use. Resin-based root canal sealers are used to obturate such teeth, which are planned to seal posts with resin cement, as the eugenol-based root canal sealers inhibit the setting of resin cements (Demarco, et al., 2004).

An additional chamfer was also prepared on the labial surface along

the fracture line, which was filled with microhybrid composite, in case report one, after reattachment to increase the fracture resistance (Reis, et al., 2002).

If the fracture line is supragingival, the procedure for reattachment will be straightforward. However, when the fracture line is subgingival or intraosseous, orthodontic extrusion with a post-retained crown may be necessary.

Alternatively, surgical techniques, such as electrosurgery, elevation of tissue flap, clinical crown lengthening surgery with removal of alveolar bone, and removal of gingival overgrowth for access to the fractured site, are viable methods for bonding fractured components. It has been suggested that whenever the fracture site invades the biological width, surgery should be performed with minimum osteotomy and osteoplasty (Baratieri, et al., 1993). However, in cases with minimal biological width invasion, the operator is able to restore the biological width by providing adequate plaque control, and satisfactory esthetics and function, without conventional flap surgery but requiring long-term follow-up.

The success rate of reattached fragments has been seen to be 90%, depending upon the periodontal and pulpal condition (Yilmaz, et al., 2008). The prognosis of the reattached teeth would also depend on the health, contour, and surface finishing of the subgingival restoration.

Conclusion

Reattachment of fractured tooth segment is a conservative, effective, and immediate treatment approach for the maintenance of esthetics and function as compared to ceramic crown fabrication. However, long-term follow-up is very important for such cases. Periodontal status should be checked during follow-up appointments. **EP**

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