

Fractured Maxillary Central Incisor Restoration with Fragment Reattachment: A 2 Year Follow-up Case Report

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ABSTRACT

Injury to anterior teeth is a relatively common event. Dentists are confronted with managing dental trauma and restoring fractured teeth on a regular basis. Hence the technique that speed and simplify treatment, restore esthetics and improve long term success rate are therefore of potential value and should be considered. If an intact tooth fragment is present after trauma, the incisal edge reattachment procedure presents a conservative, simple and esthetic alternative. Clinical trials have reported that reattachment using modern dentine bonding agents and resin system may achieve a functional and esthetic success. This article presents with a case report of restoration of fractured maxillary central incisor using fragment reattachment in a 12 year old child. The reattachment was carried out using resin cement followed by additional chamfer on buccal surface which was restored with resin composite. The reattached fragment was found to be intact at a 2 year follow-up visit.

Key words: Crown fracture, Trauma, Tooth fragment, Re-attachment, Resin composite restoration

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Injury to anterior teeth is a relatively common event. Studies on incidence of dental trauma especially children have suggested that one-third of the patients in this age group suffer from some type of dental trauma.(1) Dentists are confronted with managing dental trauma and restoring fractured teeth on a regular basis. Hence the technique that speed and simplify treatment, restore esthetics and improve long term success rate are therefore of potential value and should be considered.(2)

The educational attempts of dental professional regarding trauma have resulted in patients presenting with intact avulsed teeth, as well as fractured coronal tooth fragments. If an intact tooth fragment is present after trauma, the incisal edge reattachment procedure presents a conservative, simple and esthetic alternative.(3)

The first published case of reattaching a fractured incisor fragment was reported in 1964 by Chsuck A et al.(3) After this many articles have been published regarding a variety of preparations design fractures and materials for reattachment. Reattachment technique have been described in demanding clinical situations, as in a case report by Simonsen where incisor fragment was reattached and tooth subsequently subjected to orthodontic treatment without difficulty.(4) Anderson et al reported 25% retention of fragments for 7 years and noted that this technique is especially useful for young patients needing apexogenesis or in mixed dentition age where delaying prosthetic restoration of tooth is required until eruption and tooth position have stabilized.(5, 6)

Hence the published advantages from reattachment of fractured tooth fragment are:(1-6)

- Conservation of tooth material
- Wear similar to adjacent and opposing tooth
- Colour matching
- Preservation of incisal translucency
- Good esthetics
- Maintenance of original tooth contours
- Economical.
- Preservation of occlusal contacts
- Colour stability of enamel
- Delay in prosthetic restoration for young patient (eruption, margin placement etc.).
- Positive emotional and social responses from patients.

Case Report

A 12 year old female patient reported following trauma to maxillary central incisors. Trauma had occurred due to fall while playing 4 hours prior (Fig. 1). The child patient brought one broken crown fragment of right central incisor along with her as the fragment of left central incisor could not be traced (Fig. 2). Patient's medical history was non contributory. Examination revealed that the teeth had horizontal fracture involving enamel and dentin. Fractured portion of the teeth were intact with a thin layer of dentine covering the pulp tissue. Both the teeth tested positive to the electric pulp tester. No mobility of the injured teeth was recorded and surrounding tissues were healthy. A periapical radiograph showed that the root formation was complete with no extrusion. The teeth fragment was immediately maintained in normal saline during whole period prior to restoration. Following a detailed examination, the adaptation of the fragment was checked. The adaptation of fragment of right central incisor was found to be satisfactory. It was decided to reattach the fragment for right central incisor and restoration of left central incisor with composite resin was planned as there was no fragment available with that tooth.

Restoration of Maxillary Right Central Incisor

After administration of local anesthesia, a rubber dam was



Fig. 1: Pre operative

placed to isolate the fractured tooth. Acid etching of both the remaining tooth surface and the fragment was carried out for 15 seconds using 37% phosphoric acid (Scotchbond™ Etchant Phosphoric Acid from 3M ESPE) then rinsed thoroughly with water and air dried. Next an adhesive (Scotchbond, 3M ESPE, St. Paul, MN, USA) was applied on the etched surfaces and were not light cured. Then the resin cement (Panavia F 2.0 Kurary medical inc.Okayama) was manipulated according to the manufacturer's instruction and applied to the fragment and tooth surface. The fragment was then attached to the tooth and the adaptation was confirmed before light curing for 20 seconds each on labial and palatal side using a halogen light curing unit (PolyLUX II™, KaVo Dental GmbH, Biberach, Germany).

After the fragments was attached a 1 mm depth chamfer was placed in the fracture line on the buccal surface with a diamond round bur (ref#1016, KG Sorensen, Sao Paulo, Brazil)). After the surface etching and bonding a layer of microhybrid composite (Filtek Z250™ 3M ESPE, St. Paul, MN, USA) was applied to the chamfer surface and light cured for 40 seconds. Later the restored surface was finished and polished (Sof-Lex™ disks 3M ESPE, St. Paul, MN, USA). The repaired area was barely visible, and the esthetic result was excellent (Fig. 3). Occlusion was checked and post operative instructions to the patient were given to deter from loading the anterior teeth.

Restoration of maxillary left central incisor

The left central incisor was restored with composite resin restoration (Filtek Z250™ micro hybrid composite, 3M ESPE, St. Paul, MN, USA).

Patient could not follow-up for routine recall appointments as she had moved to a different city for higher education. However after repeated recall reminders patient returned after almost 2 years and it was found that the fragment was intact with no



Fig. 2: Intact fractured fragment



Fig 3: Immediate Post operative



Fig 4: At 2 year recall visit

clinical and radiographic features of pulpal reactions. The vitality was carried using electric pulp testing and was found to be vital. It was observed that there was slight discoloration at the fracture interface; however it was not so severe to compromise the esthetics (Fig. 4).

Discussion

Fracture of an anterior tooth is a most traumatic incident for a young patient. It has been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure.(1,7) Whenever the fractured fragment is available intact, the reattachment of the fragment has to be the most desired treatment. In recent years due to remarkable advancement of adhesive systems and resin composites has made reattachment procedure no longer a provisional restoration.

The following re-attachment strategies have been advocated for re-attaching a tooth fragment:(1,8)

- Placement of a circumferential bevel
- Placement of an external chamfer at the fracture line after bonding
- Use of a V-shaped enamel notch
- Placement of an internal groove
- Leaving a superficial over contour of restorative.

In the present case the enamel Chamfer technique was used, because Reis et al found the chamfer technique provided a better strength recovery than simple re-attachment and both were inferior to a resin composite restoration that can be used to restore the original tooth fracture.(8, 9)

Reis et al has suggested 60% recovery of fracture strength with chamfer technique can be obtained with minimal loss of natural fit of the fragment compared to other methods which increased the strength recovery at the cost of exposing more resin surface to oral environment.(8) Kanca J reported a

reattachment procedure with the fragment being intact at 5 year follow-up visit; however their case had a pulpal exposure at the time of trauma which was sealed with a dentine adhesive.(10) The pulpal response in such cases is usually as result of marginal leakages rather than the procedure itself. In the present case endodontic therapy was not required because the pulp chamber was not exposed.

In fragment reattachment procedures strong consideration must be given to the fabrication of a soft acrylic mouth guard to be worn in athletic competition or at night (if nocturnal para functional habit present) as these conditions may predispose the reattached fragment to an early failure.

Conclusion

Reattaching a tooth fragment with newer adhesive materials may be successfully used to restore fractured teeth with adequate strength, but long term follow up is necessary in order to predict the durability of the tooth-adhesive-fragment complex and the vitality of the tooth.

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