CASE REPORT

Fracture tooth fragment reattachment

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diya2001_rastogi@yahoo.co.in**SUMMARY**

Coronal fractures of the anterior teeth are a common form of dental trauma and its sequelae may impair the establishment and accomplishment of an adequate treatment plan. Among the various treatment options, reattachment of a crown fragment is a conservative treatment that should be considered for crown fractures of anterior teeth. This clinical case reports the management of two coronal tooth fracture cases that were successfully treated using tooth fragment reattachment using glass-fibre-reinforced composite post.

BACKGROUND

Coronal fractures of the anterior teeth are a common form of dental trauma that affect the primary and permanent teeth. It has a severe impact on the social and psychological well-being of a patient.¹

Divakar and Nayak (2007) reported that crown fractures have been documented to account for up to 92% of all traumatic injuries to the permanent dentition. Coronal fractures of permanent incisors represent 18–22% of all trauma to dental hard tissues, 28–44% being simple (enamel and dentin) and 11–15% complex (enamel, dentin and pulp).²

The majority of dental injuries involves the anterior teeth, especially the maxillary incisors (because of its position in the arch), whereas the mandibular central incisors and the maxillary lateral incisors are less frequently involved.³

Various epidemiological studies have shown that approximately one in six adolescents and one in four adults suffer a traumatic dental injury in their lifetime and that most dental injuries involve just one tooth. Following maxillary incisors, traumatic injuries occur most frequently in upper and lower lateral incisors and the upper canines.^{4–7}

Factors which influence the management of coronal tooth fractures are:^{8–10}

- Extent of fracture (biological width, endodontic involvement, alveolar bone fracture).
- Pattern of fracture and restorability of fractured tooth (associated root fracture).
- Secondary trauma injuries (soft tissue status).
- Presence/absence of fractured tooth fragment and its condition for use (fit between fragment and the remaining tooth structure).
- Occlusion, aesthetics, finances and prognosis.

Clinical assessment**Periodontal assessment**

Gentle probing around the periodontal tissues of the fractured tooth under local anaesthesia will help determine the level of the tooth fracture as well as the presence of vertical root fracture.¹¹ If

Figure 1 Preoperative view of the fractured tooth 12 (class III fracture).

the fracture line is supragingival, the procedure for reattachment will be straightforward. However, when the fracture site is subgingival or intraosseous, surgical or orthodontic extrusion of the apical portion for restoration with a postretained crown, instead of reattachment, may be necessary.

Endodontic assessment

In addition to clinical examination for pulpal exposure, the vitality of the pulp and status of apex maturation should be analysed by vitality tests and periapical radiographs.

Coronal assessment

If multiple fragments are present, it may be necessary to assemble the pieces with resin composite prior to trial in the mouth.

Occlusal assessment

Check whether the occlusion is traumatic or atraumatic. In case of traumatic occlusion, disoccluding the teeth is advised.

The objective of this case report is to present a conservative approach for the treatment of coronal

Figure 2 Tooth fragment. Note that the fracture line is running obliquely from labial to palatal aspect.

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Figure 3 Preoperative radiograph.

tooth fractures using glass-fibre-reinforced composite post and original tooth fragment to give a functional, aesthetically pleasing result.

CASE PRESENTATION

Case 1

A 28-year-old male patient presented with severe pain and a broken front tooth (figure 1) after an accident 2 days before.

The patient also presented the fragment of the detached tooth that had broken due to trauma.

Clinical examination revealed a class III fracture in 12 with the fracture line running obliquely from the gingival third of the tooth on the labial aspect to subgingivalpalatally (figure 2). Intraoral examination also revealed soft tissue laceration in the mandibular buccal vestibule, but no alveolar bone fracture. A radiograph indicated complete root formation and a closed apex with no periapical radiolucency and did not show any other fracture or injury on the adjacent teeth (figure 3).

A treatment plan was compiled that comprised immediate endodontic treatment of tooth 12 and reattachment of the fractured crown fragment.

Figure 4 Preoperative view of tooth 11 (class III fracture), Note that the fractured fragment is still held.

Figure 5 Postspace preparation performed.

Case 2

A 22-year-old female patient presented with a broken front tooth after an accident in the morning of the same day.

Clinical examination revealed a class III fracture in 11 with the fracture line running oblique from the gingival third of the tooth on the labial aspect to subgingivalpalatally (figure 4).

Intraoral examination revealed the fractured fragment still held by the palatal periodontal tissues.

A radiograph indicated complete root formation and a closed apex with no periapical radiolucency and did not show any other fracture or injury on the adjacent tooth.

Case 3

A 17-year-old male patient presented with a broken front tooth after falling from a bicycle.

Figure 6 A dual cure luting system and a glass-fibre-reinforced composite post-placed after postspace preparation.

Figure 7 Postoperative radiograph. Note the fibre-post in place and tooth fragment reattached.

Clinical examination revealed a class III fracture in 11 with fragment held by the palatal periodontal tissues, class III fractures were also found in 21 and 12.

Radiographs showed no significant findings.

TREATMENT

Case 1

Following cleaning and shaping, the root canals were obturated with gutta-percha and resin-based sealer using the lateral compaction technique. The gutta-percha was then partially removed, leaving the apical 5 mm of the filling to maintain a good seal and a glass-fibre-reinforced composite root canal post was placed in the canal (figure 5).

A dual-cure luting system (*SmartCem2*, *Dentsply Maillefer*) and a glass-fibre-reinforced composite root canal post (*Easypost*, *Dentsply Maillefer*) were sequentially placed according to the manufacturer's instructions (figure 6).

A trough was created in the centre of the original crown fragment, and both the intact coronal portion of the tooth and the

Figure 8 Postoperative image.

Figure 9 Tooth fragment stabilised to prevent dehydration.

original crown fragment were etched with 37% phosphoric acid gel for 20 s, rinsed for 20 s and dried.

Flowable composite resin (*EsthetX Flow*, *Dentsply Caulk*) was applied at the intact coronal portion of the tooth and the original crown fragment. Following this, the original fragment was accurately placed and photo polymerised for 40 s (figures 7 and 8).

Case 2

The tooth was stabilised in the mouth to prevent it from getting dehydrated (figure 9) which was later detached after obturation (figure 10). Treatment plan comprised the same procedure as in Case 1 (figures 11–16).

Case 3

Treatment plan comprised the same procedure as in above cases (figures 17–22).

DISCUSSION

The development of adhesive material creates new perspective in the reconstruction of fractured teeth; it is now possible to achieve excellent results with the reattachment of dislocated 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.

Figure 10 Fractured tooth fragment removed after obturation.

Figure 11 A dual cure luting system and a glass-fibre-reinforced composite postplaced after postspace preparation.

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.^{12–14}

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.²

Cavalleri and Zerman¹⁵ reported that the long-term prognosis for reattached crown fragments appears to be better than for composite resin restorations.

A number of treatment options have been proposed for coronal tooth fractures depending upon the circumstances like immediate reattachment;¹⁶ surgical exposure, crown and root recontouring and fragment reattachment;¹⁷ using splints;¹⁸ and without radicular anchorage,³ each with their own advantages and disadvantages.

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.¹⁹

Pros and cons of reattachment are shown below.²⁰

Pros of reattachment

- ▶ Conservatism.
- ▶ Wear similar to adjacent/opposed teeth.
- ▶ Colour match to the remaining crown portion.
- ▶ Preservation of incisal translucency/good aesthetics.
- ▶ Maintenance of original tooth contours.

Figure 12 Tooth fragment with oblique fracture line from labial to subgingival palatally.

Figure 13 Preoperative radiograph.

Figure 14 Postspace preparation done.

Figure 15 Postoperative radiograph. Note the fibrepost in place and tooth fragment reattached.

- ▶ 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.

Cons of reattachment

- ▶ Less than ideal aesthetics if the tooth fragment is allowed to dehydrate.
- ▶ Colour changes of the bonded fragment.
- ▶ Necessity for continuous monitoring.
- ▶ 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

Figure 17 Preoperative view of the fractured teeth 12, 11 and 21 with tooth fragment of 11 attached.

post and the original crown fragment. This technique provides reinforcement to the restored segments and increases durability and survival.²¹

Figure 18 After root canal treatment of all the three teeth, core buildup was performed in 12 and 21 after placement of glass-fibre reinforced composite post.

Figure 16 Postoperative view after the fragment has been reattached.

Figure 19 A dual cure luting system and a glass-fibre-reinforced composite post placed after postspace preparation in 11.

Figure 20 Postoperative image with reattached tooth fragment in 11 and metal ceramic crowns in 12 and 21.

Figure 22 Postoperative radiograph.

Figure 21 Preoperative radiograph.

Learning points

- The technique has been described that offers substantial benefits for the clinician and the patient.
- The use of the patient's own tooth fragment is aesthetically more pleasing.
- Despite these clinical advantages, the applicability of the technique is of limited importance to the fragments which are not too large as such the tooth fracture is below the alveolar bone height.
- When the fracture is below the alveolar bone height then other techniques like orthodontic extrusion, surgical crown lengthening or tooth repositioning should be considered.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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