Case Report

Tooth fragment reattachment after retrieval from the lower lip – a case report

Basuttil Naudi A, Fung DE. Tooth fragment reattachment after retrieval from the lower lip – a case report.

Abstract – The most common traumatic dental injury is the uncomplicated crown fracture of the maxillary central incisor. Various reports have been written about reattachment of the fragment, and literature reviews have cited this technique as the best way of treating these injuries if the fragment is available and properly stored. The case presented here is of a child who sustained an uncomplicated crown fracture with the lost portion of the tooth embedded in his lower lip. This was successfully reattached to the tooth using an acid-etch and enamel-bonding resin technique.

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Published data show that the most common traumatic dental injury to permanent teeth is the uncomplicated crown fracture (1-7). The tooth most commonly affected by trauma is the maxillary central incisor, with a quoted percentage of 75-80 of all traumatic injuries (1-5, 8). Uncomplicated crown fractures can be confined to enamel or involve both enamel and dentine (1). The mesial corners of the maxillary central incisors are the most commonly affected (2). A recent literature review has stated that traumatic dental injuries are becoming more common, mainly because of an increase in the participation of children in dangerous sports and activities (3). Children and teenagers are mostly affected, with boys considered as being at a higher risk than girls (1, 3, 8, 9). The most common causes of dental injuries include traffic accidents and sports activities (3).

Traditionally, uncomplicated crown fractures have been treated either by reshaping the sharp edges or, in cases of greater loss of dental tissue, by an acid-etched composite restoration (2, 7). However, if the tooth fragment is available, a preferred way of treating these injuries is by incisal edge reattachment (3–7). This case is of an uncomplicated crown fracture where the tooth fragment was retrieved from the lower lip of a child involved in a road traffic accident.

Case report

An 11-year-old boy was referred to the Child Dental Health Department at Glasgow Dental Hospital and School for treatment of traumatic oro-facial injuries sustained when a car knocked him down at a pedestrian crossing. He fell hitting his chin on the ground and bit his lip. There was no history of other injuries and no symptoms of head injury. He was attended by his general dental practitioner (GDP) within 1 h of the accident. After performing radiographic examination and prescribing antibiotics, his GDP referred him immediately to Glasgow Dental Hospital, where he was seen and treated by a paediatric dental consultant.

On examination, the patient was alert with no signs of neurological damage. Extra-orally, he had sustained soft tissue injuries to his face including chin abrasions and a laceration to his lower lip, which was swollen. There was no abnormal facial asymmetry. Intraorally, the upper right central incisor 11 and the upper right lateral incisor 12 were subluxed and an uncomplicated crown fracture of 11 was noted (Fig. 1). The incisal tip of 11 was seen to be embedded in a laceration on the right side of the lower lip (Fig. 2). Radiographic examination confirmed the presence of the tooth frag-

Basuttil Naudi & Fung



Fig. 1. Appearance of upper right central incisor at presentation.



Fig. 2. Tooth fragment embedded in a laceration in the lower lip.

ment in the lower lip. There were no signs of root fractures or other periapical pathology (Fig. 3).

The soft tissues were debrided with chlorhexidine solution (Adams Healthcare, Leeds, UK), under local anaesthesia. The tooth fragment was extracted from the lower lip, cleaned with a soft toothbrush and stored in saline until it was reattached to the upper right central incisor 11, using the acid-etch technique and Scotchbond Multi-PurposeTM (3M, St. Paul, MN, USA). A groove was placed into the dentine of the fragment removed from the lip with a size 009 diamond round bur. Following acid etching for 30 s, Scotchbond Multi-PurposeTM primer was applied and dried gently for 5 s. The adhesive was applied and light-cured for 10 s. The groove was then filled with Z100 composite resin (3M, St. Paul, MN, USA) matched to the tooth shade (A2). The tooth lip fragment was attached to 11, which had also been treated in a similar manner, and manoeuvred into place. The restoration was then light-cured for 60 s from both labial and palatal surfaces. Care was taken to ensure that some composite was applied over the junction of the fracture so that the fracture site was not visible once the composite was cured.

The lip was sutured with black silk, and oral hygiene instructions were given. Upper alginate



Fig. 3. Radiographic appearance of traumatized central incisor showing an uncomplicated crown fracture, no root fracture and a closed apex.



Fig. 4. Radiographic appearance of upper right central incisor after tooth fragment reattachment.





Fig. 5. Clinical appearance of upper right central incisor after tooth fragment reattachment.

impressions for construction of a soft mouth guard were taken 1 week later, when the sutures in the lower lip were removed. The patient was reviewed on a regular basis for over a year. He continued to have no symptoms; the teeth were neither tender to percussion nor mobile and were responsive to pulp testing. There was no periapical pathology visible on radiographic examination (Fig. 4). The appearance of the tooth was satisfactory (Fig. 5). He was then discharged and sent back to his GDP.

Discussion

The idea of tooth fragment reattachment is not new. The first case report from Chosack and Eidleman came as early as 1964, when the authors managed a complicated crown fracture case in which the crown was completely fractured, by recementing it to the tooth with a post after conventional root canal therapy (2, 3, 6). A large number of case reports demonstrating a variety of techniques for this procedure and some literature reviews have been published since then (2, 3, 6). Since 1978, the technique has been modified to avoid the use of pins and posts, replacing them with the use of acid-etch and enamel-bonding techniques (2).

Reattachment techniques have varied, in the literature, from simple reattachment depending solely on micromechanical bonding to various preparation techniques of the tooth and the fragment (3). Techniques used to enhance dental fragment retention after reattachment have included enamel bevels, internal enamel or dentine grooves, chamfers and over-conturing (3). There is a division of opinion in the literature as to whether these techniques actually improve the fragment resistance to refracture as compared to simple reattachment (3, 9). Few studies have attempted to evaluate the fracture strength of the reported techniques, and the results vary considerably among research centres (3). A study carried out in 1999 by Worthington et al. compared the fracture resistance of reattachment fragments using simple reattach-

ment, circumferential internal bevels and facial internal bevels together with lingual external bevels. The results showed that in all groups the fracture resistance was restored up to one half that of intact controls for crown fractures and one third for root fractures (9). This was in agreement with a study carried out in 1986 by Dean et al., who found that placement of a circumferential bevel does not increase retention (10). On the contrary, two independent studies carried out in 2001 by De Santis et al. and Reis et al. both concluded that simple reattachment of tooth fragments did not reach a high fracture resistance when compared to other techniques (3). An internal dentinal groove in the tooth fragment was used in this case, but no external bevel. Omitting the external bevel allowed more accurate placement of the fracture edges. The internal dentine groove allowed placement of composite resin to reinforce the reattachment.

Studies have been carried out to assess the strength of the adhesive systems in use. One such study, carried out in 2000, concluded that the fourth-generation adhesives that use ortho-phosphoric or maleic acid as etchant achieved a similar bond strength but fifth-generation adhesives are less effective (4). Andreasen et al. published a long-term multicentre study, in 1995, documenting the clinical survival of incisal edge reattachment (7). The data came from three centres, two of which used acid etch alone to reattach the fragment, while the third supplemented this with a dentine-bonding agent. It was found that the retention rate of the fragments treated with acid etching and enamel-bonding agent was superior to that achieved by acid etch alone (6, 7). Following these recommendations, the fragment reattachment in this case was achieved using acid etch and bonding agent.

An experimental study carried out in 1991 by Andreasen et al. on sheep incisors has shown that reinforcement of incisors restored by attachment of enamel-dentine fragments with a porcelain laminate veneer can achieve fracture strength equal to that of intact teeth. In this study, an example of a clinical case is given in which tooth fragments extracted from the lower lip of an adult patient, who had sustained traumatic injuries to her maxillary central incisors, were reattached to the teeth and then reinforced with laminate porcelain veneers (11). These results were observed again in a second study, published 1 year later, this time using cast ceramic (Dicor) laminate veneers on sheep teeth. Again, it was found that the use of veneers after tooth fragment reattachment restored fracture resistance to the original tooth strength, when the veneer preparation was limited to enamel. This study also showed that the greatest tooth strength was achieved when Dicor veneers were used alone to

Basuttil Naudi & Fung

treat crown fractures without prior treatment with either tooth fragment reattachment or composite build-up (12). In view of the patient's age, in this case, this type of treatment was not employed since the gingival margin of the tooth was still immature. Another reason for not using veneers in this case was that the aesthetics were deemed to be very satisfactory.

There are at least three published reports of tooth fragments embedded in the lip. One such report was published in 1978 of an adult patient in whose lower lip a fragment of a fractured central incisor was found, 3 years after the original trauma. The fragment was surgically removed from the lip and reattached to the tooth using the acid-etch resin technique (13). The other report came earlier, in 1963, before the first attempt at tooth fragment reattachment. In this case the fragment was noticed in the lip of a child 6 weeks after the injury, and it was easily removed using an intraoral incision. There is no mention of how the tooth was restored (14). The latest paper was published in 2005 and reports two cases of tooth fragments retrieved from the lip after detection on radiographic examination, but in these cases the fragments were not used for final tooth restoration (15). This case report describes the reattachment of a tooth fragment embedded in the lower lip some 3 h after the initial trauma.

Conclusion

A number of advantages have been cited in favour of tooth fragment reattachment. It is a conservative restoration which does not preclude the use of other types of restorations later on should it fail (9). The aesthetics that can be achieved by tooth fragment reattachment are far more superior to those achieved by any other type of restoration. This is mainly because the fragment is the same colour as the rest of the tooth and the incisal edge translucency is maintained, as are the original tooth contours (9). The occlusal contacts are preserved and the wear pattern is the same as for the other teeth (9). The provision of a prosthetic restoration for a young patient is delayed, and this is favourable because the earlier the restorative cycle is instituted, the greater the number of times this restoration will be replaced throughout the years (8, 9). This does not mean that there are no disadvantages associated with tooth fragment reattachment. If the tooth fragment has been allowed to dehydrate, the aesthetics achieved will be less than ideal (8, 9).

The technique becomes more complicated when multiple tooth fragments exist because these have to be first attached to each other and then to the tooth. This might disturb the adaptation of the fragment to the tooth (8). Another disadvantage is the predictable eventual separation of the repair because of failure of the bonded junction (9). The longevity of this type of restoration is not known, but a few clinical studies have shown that these restorations can last up to 7 years (7–9). Fragment loss is usually due to another traumatic injury to the treated tooth, non-physiologic use of the tooth or horizontal traction when biting into hard and chewy foods (7).

As has been shown in this report, tooth fragment reattachment can be satisfactorily used to treat uncomplicated crown fractures.

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