Case study

Replacement of the crown in a fractured tooth using the coronal tooth structure: A CLINICAL CASE REPORT

ABSTRACT

The anterior teeth are relatively prone to trauma. According to research, 37% of trauma cases involve the upper central incisors. Anterior tooth trauma resulting in a fracture fragment demands rapid care because of the psychological effects it has on the patient as well as the destruction it does to the dentition. This paper highlights one of the anterior tooth fracture which is managed immediately with re attaching the mobile tooth structure with successful result.

Keywords: fracture tooth, anterior tooth fracture, crown attachment, fragment re attachment

1. INTRODUCTION

The anterior teeth are relatively prone to trauma. According to research, 37% of trauma cases involve the upper central incisors[1]. Anterior tooth trauma resulting in a fracture fragment demands rapid care because of the psychological effects it has on the patient as well as the destruction it does to the dentition. [1] Depending on the degree and extent of the fracture, the treatment includes simple to extensive restorative intervention[2,3].Tennery was the first to document the application of the acid-etch procedure as part of repair a broken fragment[4]. Starkey and Simonsen have since documented such related cases[5,6].Reattaching the original tooth fragment aids in preserving the restoration's translucency, morphology, wear resistance, and tooth colour. The patient's emotional and social response to the preservation of the original tooth structure is also positive[7].The progress and improvement of adhesive techniques and restorative materials have made it possible to reattach a broken fragment[8]. The therapy of a broken maxillary right central incisor treated endodontically, followed by reattachment of the same fragment, is described in the relevant case report.

2. CASE REPORT

A 32-year-old male patient was referred to the D A P M R V Dental College and Hospital's Department of Conservative Dentistry and Endodontics with a broken upper front tooth as his main complaint. A comprehensive history from the patient revealed that the right central incisor (11) of the maxilla was cracked three days prior due to biting force applied to the upper tooth region. The maxillary right central incisor was found to have a mesiodistal fracture at the cervical third labially and middle third palatally without the fragment being displaced after an intraoral examination. Due to the incoherence of the fracture and the anchoring effect of the soft tissue palatally, the fragment was movable (fig.1). A radiograph of the intraoral periapical area (IOPA) revealed no associated root fracture. The periapical tissues and the alveolar bone both showed signs of inflammation. Regarding the maxillary right central incisor, an Ellis Class III complex crown fracture (including the pulp chamber) diagnosis was made. Due to the complexity of the fracture, a single-visit endodontic procedure was chosen after obtaining patient's consent on the same. Reattachment of the same fragment was intended because the broken pieces were still intact and still had some palatally attached supporting tissue. Access was made labially through the broken area after local anaesthetic was administered. The mobile fragment was then disengaged/extracted and kept in saline for future operation. The chamber was irrigated with 5.25% sodium hypochlorite (NaOCl) and normal saline after the coronal pulp tissue was removed. Initial root canal negotiations were carried out. With a no. 10 K-file, the root canal was initially negotiated, and a working length radiograph was taken. The root canal was cleansed using 17% ethylenediaminetetraacetic acid (EDTA) and 5.25% sodium hypochlorite. The root canal was then shaped using K files up to a size of 60K, followed by the step-back technique up to a size of 110K, and then hand protaper files and K files. The root canal was sealed with zinc oxide eugenol sealer and 2% gutta percha points after being dried with absorbent paper points. After obtaining a post-obturation IOPA radiograph,(fig.2) it was determined that the root canal filling was adequate.

Fig.1: pre operative view of 11
Labially and palatally

Fig.2: radiograph of a)pre operative; b) working length determination; c) obturation

2.1 Gingival tissue preparation techniques

It was done to contour the tissue well over buccal surface, measuring 1.5 mm from the mesial to the distal surface.

The steps were taken to prepare the tooth's post space for a root canal, after obturation, the patient was brought back 24 hours later. This was followed by the preparation of the post space, during which the leftover gutta percha measured approximately 4.7mm. The appropriate post size was chosen to be a size 2 fibre post, and IOPAR was obtained for final confirmation. Once the fit was established, the post was bonded using single cure resin cement.

2.1.1 Technique for reattachment

The fragmented tooth surface was etched with 37% orthophosphoric acid for 15 seconds before being thoroughly washed with water and allowed to air dry (fig.3). The relocated fragment, etched surface, and tooth surface were all treated with a dentin bonding agent (Adper Single Bond, 3M ESPE). Prior to light curing, it was confirmed that the fragment had adapted to the tooth surface. On the labial and palatal sides, visible light curing was performed for 20 seconds each. Using a round bur, a 1-mm deep chamfer was created on the buccal surface medially and distally along the fracture line. The chamfer surface was treated with surface etching and bonding before a coating of microhybrid composite (Filtek Z250TM 3M ESPE) was applied.

In order to splint the piece to the tooth surface, ribbond was applied palatally. With Sof-LexTM discs from 3M ESPE, the repaired surface was completed and polished. A final assessment of occlusion and aesthetics was performed.

The patient received postoperative instructions on how to avoid loading the anterior teeth, and one month later recall visits were scheduled. The postoperative time was documented and went well, had satisfactory results(fig. 4).

Fig.3: tooth mobile fragment labially and palatally

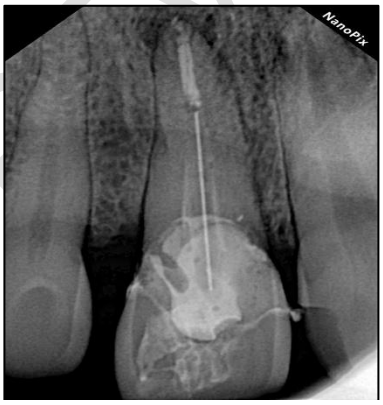

Fig.4:a) re attached tooth fragment clinically view
b) re attached tooth fragment radiograph (post operative)

3. DISCUSSION

Trauma to anterior teeth is a relatively common occurrence, but it has been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure.[7] Reattachment of fragments involving enamel and dentin has been found to be satisfactory after 1 year.[7] Incisal fractures of anterior teeth have been successfully treated by reattachment.[9] Complicated fractures involving pulp have been treated by reattachment with post and core.[10] The following reattachment strategies have been advocated for reattaching a tooth fragment[11]:

1. Placement of a circumferential bevel
2. Placement of an external chamfer at the fracture line after bonding
3. Use of a V-shaped enamel notch
4. Placement of an internal groove
5. Superficial over contour of restorative material over the fracture line and pulp chamber, in case of complicated fracture

In the present case, the enamel chamfer technique was used, as it provided a better strength recovery than simple reattachment. Reis et al. have reported 60% recovery of fracture strength with chamfer technique 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. [11] Reattachment of fragment may offer the following advantages:

1. Most rapid and conservative management
2. Better esthetics as shade match and translucency will be perfect.
3. Incisal edge will wear at a rate similar to that of the adjacent teeth
4. A positive emotional and social response from the patient

There are also perceived disadvantages:

1. Color changes of the bonded fragment
2. Less esthetic result if the tooth fragment is dehydrated
3. Unknown longevity
4. Need of continuous monitoring

The remarkable advancement in adhesive systems and resin composites has made reattachment of tooth fragments a procedure that is no longer a provisional restoration but rather a restorative treatment offering a favorable prognosis. However, this technique can be used only when intact tooth fragment is available and close repositioning between fragments is possible.[12] Reattachment of the fractured fragment after endodontic treatment was possible in the present case as the fragment was intact.

4.CONCLUSION

Immediate esthetic management of traumatic injury demands proper planning which should be based on sound knowledge of the techniques available and their indications, along with risk benefit ratio. Tooth fragment reattachment procedure offers an ultraconservative, safe, fast, and esthetically pleasing result when the fractured fragment is available. Reattachment of the dental fragment as a restorative procedure has become possible with the improvement of adhesive techniques and restorative materials.

CONSENT

All authors declare that ‘written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

As per the international standard or university standard written ethical approval has been collected and preserved by the authors.

REFERENCES

1. Andreasen et al JO, Andreasen FM. Textbook and color atlas of traumatic injuries to the teeth. Copenhagen: Munksgaard; 1993.

2. Baratieri et al LN, Monteiro S. Tooth fracture reattachment: Case reports. Quintessence Int 1990 ;21:261-70.

3. Chu FC, Yim TM, Wei SH. Clinical considerations for reattachment of tooth fragments. Quintessence Int 2000;31:385-91.

4. Tennery NT. The fractured tooth reunited using the acid bonding technique. Tex Dent J 1988;96:16-7.

5. Starkey PE. Reattachment of a fractured fragment to a tooth. J Indiana Dent Assoc 1979; 58:37-8. 6. Simonsen RJ. Restoration of a fractured central incisor using original teeth. J Am Dent Assoc 1982;105:646-64.

7. Hegde RJ Tooth fragment reattachment - an esthetic alternative: Report of a case. J Indian Soc Pedod Prev Dent 2003; 21:117-9
8. Baratieri LN, Monteiro S. Tooth fragment reattachment: Fundamentals of the technique and the case report. Quintessence Int 2003;34:99-107.
9. Oz IA, Haytaç MC, Toroglu MS. Multidisciplinary approach to the rehabilitation of a crown-root fracture with original fragment for immediate esthetics: a case report with 4-year follow-up. Dent Traumatol. 2006 ;22:48-52.
10. Lehl G, Luthra R. Reattachment of fractured fragments of maxillary central incisors report of a case. J Indian Soc Pedo Prev Dent 2004;22:54-5.
11. Reis A, Francci C, Loguercio AD, Carrilho MR, Rodrigues Filho LE. Re-attachment of anterior fractured teeth: Fracture strength using different techniques. Oper Dent 2001;26:287-94.
12. Simonsen RJ. Traumatic fracture restorations: An alternative use of the acid etch technique. Quintessence Int Dent Dig 1979; 10:15-22