

SALVAGING FRACTURED MAXILLARY INCISORS BY REATTACHMENT: CASE REPORTS

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ABSTRACT

Background: Dental trauma most commonly results in anterior crown fractures. Salvaging such fractured teeth is often a clinical challenge. The development of adhesive dentistry has allowed dentists to reattach the broken segment of the fractured tooth. The reattachment technique offers many advantages such as achieving esthetics, less time consuming etc. **Aim:** To evaluate different techniques of reattachment, as a treatment modality for fractured maxillary incisors. **Case description:** The first case report presents a 21 years old male patient with fractured maxillary right central incisor. The treatment carried out included root canal treatment, electrocautery to expose the palatal margin of the root and reattachment of the fractured segment, using resin luting cement. The second case report presents a 24 years old male patient with fractured maxillary right central incisor. Similar treatment as in the first case was followed, with the addition of a fiber-post placement in the root canal before the reattachment of the fragment. At recall visit after 12 months, a stable reattachment was observed in both the cases with good esthetics and periodontal health. **Discussion:** Treatment of fractured anterior teeth is challenging. Continuous research in adhesive materials has led to the development of innovative techniques like reattachment of fractured segments that offer advantages over routine restorative procedures like composite build-ups, onlays and crowns. The techniques described for the two cases here allow successful reattachment of the broken segments to the fractured teeth, achieving desirable esthetic results. **Conclusion:** Reattachment resulted in a successful outcome, giving good esthetics and function at a comparatively low cost to the patient. **Clinical significance:** Reattachment of a tooth fragment is a viable technique that restores function and esthetics, with a very conservative approach.

Received on: 11th-Dec-2012

Revised on: 04th-May-2013

Accepted on: 23rd- May-2013

Published on: 10th-Aug-2013

KEY WORDS

Dental trauma; Crown fractures; Fiber-post; Resin luting cement; Fragment reattachment

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[I] INTRODUCTION

The treatment of complicated crown-root fractures in many cases is compromised by fracture lines that are well below the gingival margin or crestal bone. After root canal obturation, proper isolation for a dry operative field is critical to the successful restoration of traumatized teeth. In this respect, a wide range of treatment options have been advocated for fractured permanent teeth including; orthodontic extrusion [1]; osteotomy/osteoplasty [2]; intentional replantation [3]; re-attachment of fragments [4] and the last option being, extraction if nothing else is possible. Re-attachment of a tooth fragment should be preferable to restoring fractured teeth. Besides being a more conservative procedure, there are several advantages to this, such as obtaining esthetics in a single appointment, obtaining a healthy periodontal attachment and maintaining the original tooth contour and translucence [5,6,7]. The present case reports describe the re-attachment of the original fractured tooth fragments with resin luting cement. In one of the cases a glass fiber post, was also used.

[II] CASE DESCRIPTION

2.1. Case 1

A 21 year old male patient was referred to the department of Endodontics, with the complaint of a fractured maxillary right central incisor due to a fall on the sportsfield. He complained of pain during mouth closure and bleeding from the gums at the fracture site. Patient's medical history was non-contributory. Extra-oral examination showed no significant abnormality. Intra-oral examination revealed crown fracture of 11, classified as an unfavorable (plane of the fracture angle extended cervically in a labial to lingual direction with no lingual support to the applied forces) [8]; complicated crown fracture (oblique fracture with fracture line extending subgingivally on the palatal aspect, but without involving the biological width). The fractured coronal segment was highly mobile. Neither laceration nor alveolar bone fracture was evident. Patient had mild pain during examination.

Radiographic examination (I.O.P.A.) revealed complete root formation and no extrusion of the root was seen [Figure-1A]. After taking the patient's consent, it was decided to reattach the broken fragment.

Treatment- step by step procedure

After administration of anesthesia the mobile fractured segment was separated from the gingival tissue attachment [Figure 1B and 1C]. The pulp chamber of the fractured segment was cleaned and the segment was stored in saline. To expose the fractured margin of the root, the free gingival margin was selectively trimmed on the palatal side by electro cauterization [Figure- 1D]. Endodontic treatment of the tooth was performed. Canal was obturated with gutta-percha and AH plus sealer [Figure- 1E].

Acid-etching of the fractured segment and the remaining tooth structure was done. The fractured segment was reattached using the selected shade of composite resin [Figure- 1F]. After reattaching the fragment, a superficial preparation was made on the labial surface extending about 2.5 mm coronally and apically from the fracture line. This was then veneered with a thin composite layer. This technique is useful when the fracture line is still evident after reattachment [8]. After final finishing and polishing the occlusion was evaluated. The patient was informed about the limitations of the technique and was asked to maintain regular follow-up visits.

On recall visit after a month, clinical examination revealed complete healing of the palatal gingival surgical wound and upon recall after 12 months a stable reattachment was observed, with good esthetics and periodontal health [Figure-1G].



Fig: 1. A) Pre-operative radiograph, B) Pre-operative Photograph after removal of fractured segment, C) Fractured segment



Fig: 1. D) Electrocautery done, E) Post-obturation radiograph, F) Reattachment, G) 1 year follow-up photograph

2.2. Case 2

A 24 year old male patient was referred to the department of Endodontics, with the complaint of a fractured maxillary right central incisor due to trauma, while working on a farm. He complained of pain during mouth closure and bleeding from the gums at the fracture site. Patient's medical history was non-

contributory. Extra-oral examination showed laceration of the lower lip. Intra-oral examination revealed crown fracture of 11, classified as a favorable (plane of the fracture angle extended cervically in a lingual to labial direction with maximum lingual support to applied forces) [8]; complicated oblique crown fracture. The fractured coronal segment was mobile [Figure- 2A, 2B]. Patient had mild pain during examination.

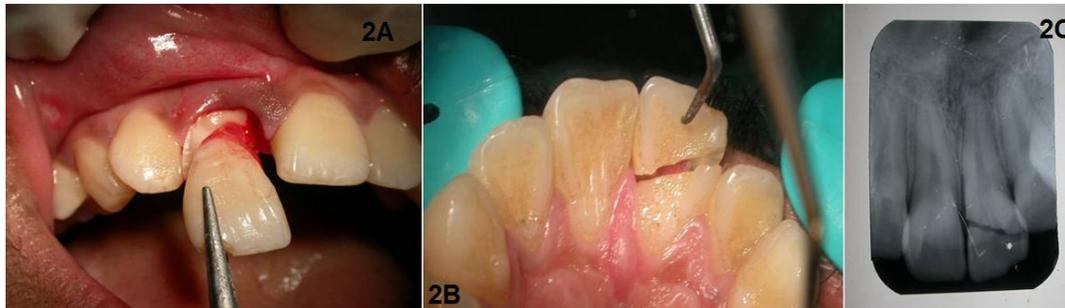


Fig: 2. A) Preoperative labial view, B) Preoperative palatal view, C) Preoperative radiograph

Radiographic examination (I.O.P.A.) revealed complete root formation and coronal fracture but no extrusion of the root was seen [Figure- 2C] Reattachment as an option was discussed with the patient and his consent was obtained.

Treatment- step by step procedure

After anesthesia, the fractured coronal segment was removed [Figure 2D] The pulp chamber of the fractured segment was cleaned and the segment was stored in saline. Root canal treatment for the radicular portion was performed. Canal was obturated with gutta-percha and AH plus sealer [Figure 2E]. To expose the fractured labial margin of the root, the free gingiva was selectively trimmed by electro cauterization.

Post-space was prepared upto 14mm length and a light transmitting post (DT post) was cemented with Panavia F (Kuraray Dental) dual cure resin cement [Figure 2F]. The pulp

chamber of the fractured crown segment was prepared to accommodate the head of the post. Acid-etching of the fractured segment, fiber-post and the remaining tooth structure was done. Reattachment was done with Panavia F (Kuraray Dental) as per the manufacturer's instructions [Figures- 2G and 2H]. The excess resin was removed gently with a polishing stone. When reattachment was completed, the occlusion was checked to avoid any premature or heavy occlusal contact at the junction of reattachment. In this case, a glass fiber post was used to retain the coronal segment and reduce the stress on the luting material. The post interlocks the two separate fragments and minimizes the stress on the remaining tooth structure [9].

At the 1 month recall examination, the fragment was absolutely firm and upon recall after 12 months a stable reattachment was observed, with good esthetics and periodontal health [Figure- 2I].

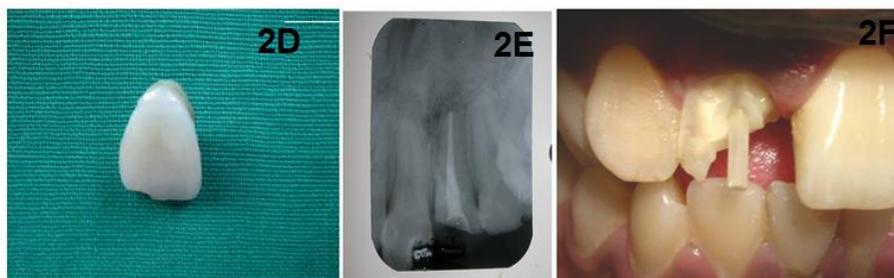


Fig: 2. D) Fractured segment, E) Post obturation radiograph, F) DT post cementation



Fig: 2. E) Fragment reattached, F) Postoperative photograph, G) 1 year follow-up photograph

[III] DISCUSSION

The present case reports describe that the reattachment of tooth fragments is an alternative to composite resin build-up, for restoring esthetics and function of fractured teeth.

Anterior crown fractures are a common form of injury that mainly affects children and adolescents. Abundant literature is available on dental trauma, crown fractures and the treatment modalities for such cases. In the pre-adhesive era fractured teeth needed to be restored with either pin-retained inlays or cast restorations that sacrificed healthy tooth structure. Achieving aesthetic requirements were also a challenge for the clinician. The development of adhesive dentistry has allowed dentists to use the broken fragment to restore the fractured tooth [8].

Till date, a lot of different approaches were proposed for the treatment of fractured teeth depending on the location of the fracture [9]. One of the options for managing coronal tooth fractures is the reattachment of the dental fragment [4]. This treatment may offer several advantages over conventional acid-etch composite restoration. Improved esthetics is obtained since the enamel's original shape, color, brightness and surface texture are maintained. In addition, the incisal edge will wear at a similar rate to adjacent teeth, whereas a composite restoration will likely wear more rapidly. Furthermore, this technique can be less time-consuming and provide more predictable long-term appearance [7]. Different reattachment techniques involved are Enamel Beveling; V-shaped Internal Enamel Groove; Internal Dentin Groove; External Chamfer; Over-contour; Simple reattachment etc [8].

Esthetic, biologic and restorative problems may occur as a result of the fracture extending subgingivally and impinging on the biologic width. The treatment options depend on the relationship of the fracture to the alveolar crest, degree of pulpal involvement, amount of eruption, apex formation and esthetic requirement of the patient. Treatment alternatives include crown lengthening to restore the biologic width, flap surgery and ostectomy/osteoplasty to restore biologic width, rapid orthodontic extrusion possibly in conjunction with fiberotomy followed by crown reattachment [9].

[IV] CONCLUSION

Reattachment of a tooth fragment is a viable technique that restores function and esthetics with a very conservative approach. Adhesive techniques, sometimes in conjunction with intra-canal retention, like a post, can be used to reattach fractured segments and an esthetic result can be obtained, with minimal procedure and cost to the patient.

[V] CLINICAL SIGNIFICANCE

Re-attachment of fractured anterior teeth offers an alternative to composite build-ups and more invasive and time consuming treatment options like orthodontic/surgical extrusion followed by crowns. The reattachment technique is less time consuming; not very expensive and fulfills the patient's expectations as far as esthetics is concerned.

FINANCIAL DISCLOSURE

These procedures were carried out, in our institution, free of cost to the patient and we are not supported by any financial assistance.

ACKNOWLEDGEMENTS

We acknowledge the patients' cooperation and appreciate their punctuality in keeping regular follow-up visits. We thank the Principal of our institution for permitting us to render the treatment free of cost to the patients.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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