

# Transurgical re-attachment of coronal fragment in anterior-fractured tooth

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## ABSTRACT

Esthetic and functional rehabilitation is the primary goal of the treatment of crown-root-fractured tooth. A 14-year-old male patient that fractured her maxillary left canine with biologic width violation is presented. Transurgical exposures of the fracture remnant were performed to possibility the rubber dam isolation followed by crown re-attachment using bonding system and a resin composite. Clinical and radiographic examination 5 months after trauma showed good esthetics, pulp normality, and periodontal health.

## Key words

Tooth fracture, dental trauma, fragment re-attachment, periodontal surgery

## INTRODUCTION

Fractures in anterior teeth are very frequent, particularly in children and younger individuals.<sup>[1,2]</sup> The level of fracture is an important factor in the determination of treatment, especially when the dentogingival complex is compromised.<sup>[3,4]</sup> When the fracture invades the biologic width, flap surgery becomes necessary to allow adequate isolation of the surgical field.<sup>[5-7]</sup>

Depending on the extent of the fracture, tooth fragment re-attachment might be unfeasible.<sup>[5-6]</sup> Actually, an alternative approach, which is becoming more attractive due to the technology of new dentin bonding agents, is fragment bonding.<sup>[7-13]</sup>

The transurgical repositioning of fractured crown fragment using the bonding fragment technique offers several advantages including the re-establishment of function, esthetics, shape, shine, and surface texture, in addition to the original contour and alignment of teeth.

This paper reports a case of a permanent canine with crown fracture treated by adhesive fragment re-attachment during a transurgical procedure.

## CASE REPORT

A 14-year-old male patient was referred to the dental clinic of our institution, reporting a dental trauma of the maxillary left canine. Dental history revealed that he had a trauma as the result of impact with a brick thrown at him. The patient reported no treatment until that moment and the crown fragment it was perfectly intact and stored in water.

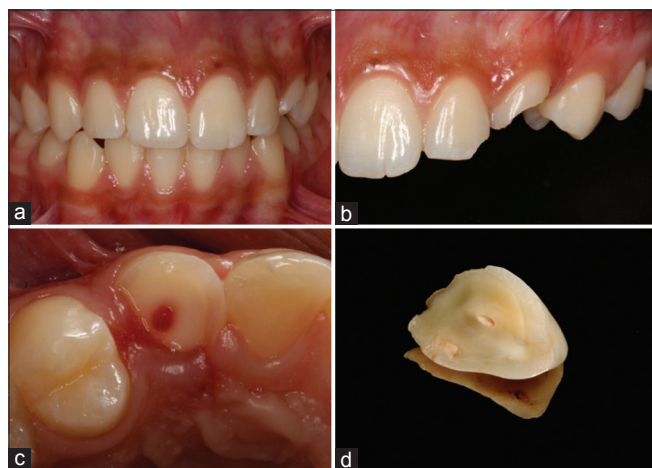
The clinical examination showed that the injury had caused a non-complicated transverse fracture at the subgingival level of the tooth maxillary left canine, with slight pulp exposure [Figure 1a-c]. Clinical examination evidenced a beveled fracture involving the enamel/dentin aspect. The coronal fracture pattern had involved almost the whole crown, and extending subgingivally on the palatal aspect of the tooth. The crown fragment analysis showed a perfect margin adaptation of the fragment to the tooth remnant [Figure 1d]. The radiographic examination did not clearly reveal the depth of the fracture [Figure 2].

The position and pattern of the fracture, the occlusion (maxilo-mandibular relationship), and a tooth remnant with an intact substrate suggested that a re-attachment of the fragment to its original position by using adhesives procedures associate to periodontal

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surgery would be a reliable option for the case. Pulpal exposure showed by intraoral examination has confirmed the need of the direct pulpal protection. The patient was systemically healthy, presented an overall plaque index and gingival index of below 20%, and the operative area was free from visible plaque.

The patient and their parents were informed about the procedures. The periodontal procedure was initiated with a mucoperiosteal flap to determine the extension of the fracture [Figure 3a and b]. After the palatal full-thickness flap performed, it was possible to observe the fracture line extension and to visualize the possibility of the rubber dam isolation. Due to an invasion of the biologic width around 1 mm, a slight ostectomy/osteoplasty was performed on the disto-palatal aspect. Following periodontal instrumentation, the operative field was isolated with an extra heavy rubber dental dam aided by a 212 retainer (Hygenic, Coltène/Whaledent GmbH, Langenau, Germany) [Figure 3c].

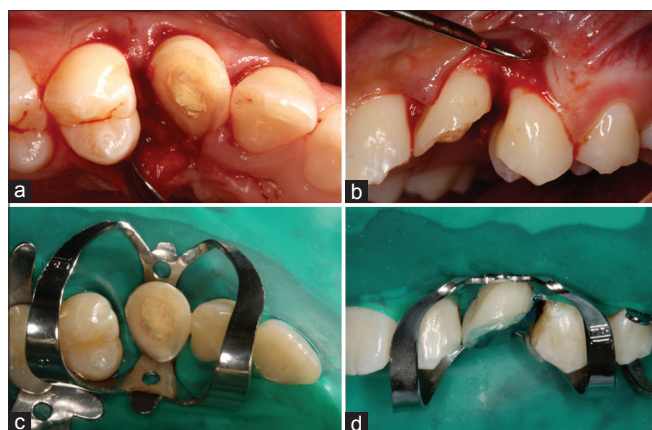


**Figure 1:** (a) Initial clinical aspect of the traumatized left canine. (b) Details of the fractured tooth. (c) Transverse fracture extending subgingivally. (d) Aspect of the crown fragment

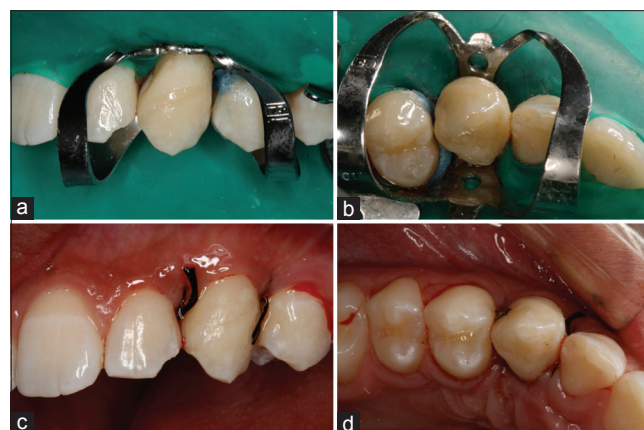
The direct pulp protection was performed with calcium hydroxide (Dycal, Dentsply, Petrópolis, RJ, Brazil), and the re-attachment procedures were initiated after rubber dam isolation. Briefly, the crown fragment and the tooth remnant were acid-etched for 30 s with a 35% phosphoric acid gel, rinsed for 30 seconds and dried with air spray [Figure 3d]. Then, a conventional two-bottle adhesive system (Scotchbond Multi Purpose Plus, 3M ESPE, St. Paul, MN, USA) was applied on enamel, and after juxtaposition of fragment with the tooth, they were light-cured for 40 s buccally and 40 s lingually by using a halogen light-curing equipment. To enhance fragment retention and to fill possible gaps between the fragment and the remaining tooth structure, a slight composite resin (IPS Empress, Ivoclar Vivadent, Schaan, Liechtenstein) was applied around the fracture line [Figure 4a and b]. Excess of the adhesive/resin was removed, and final polishing was performed with a high-luster polishing paste (Opal L, Renfert GmbH, Hilzingen, Germany) using goat-hair brushes and cotton



**Figure 2:** Initial radiographic appearance of the fractured tooth



**Figure 3:** (a) Full-thickness flap exposing the fracture line extension, (b) Buccal view showing the extension of the fracture. (c) Transsurgical isolation of the operative field. (d) The dental surface and the coronal fragment was acid-etched (35% phosphoric acid)



**Figure 4:** (a) Juxtaposition of fragment with the tooth and initial photopolymerization. (b) Occlusal view of the fragment reattached. (c) Flap suturing after transsurgical reattachment. (d) Clinical aspect of the coronal fragment adaptation

buffs (Renfert GmbH, Hilzingen, Germany) at external enamel surface. Following stabilization of the coronal fragment, the flaps were sutured [Figure 4c and d].

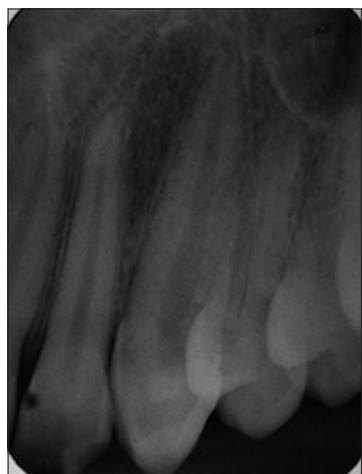
The patient was instructed about the care of excessive mastication and occlusion forced in that region and initiated the post-surgical procedures. Immediate results after 7 days revealed a stable re-attachment of the fragment [Figure 5a and b]. Five months after the transurgical re-attachment procedure, good esthetic appearance and principally function with no painful symptomatology were observed, and a frontal smile view shows an imperceptible re-attachment [Figures 5c and d]. Radiographic examination revealed the periodontal health and a normal aspect of the apex and osseous structures [Figure 6].

## DISCUSSION

Esthetic and functional rehabilitation is the primary



**Figure 5:** (a) Frontal and (b) lateral view after 7-days of re-attachment procedures. (c) Clinical view after 5-months follow-up. (d) Final clinical aspect of the traumatized maxillary canine



**Figure 6:** Radiographic follow-up 5-months of transurgical crown reattachment

goal of the treatment of crown-fractured tooth. Re-attachment of the fragment to its original position is considered an excellent approach for the management of a coronoradicular fracture.<sup>[7-13]</sup> The application of dental adhesives or composite resins capable of re-attaching a fragment to the remaining tooth structure appears to offer a number of advantages compared to the conventional methods for restoring fractured teeth.<sup>[9,11-13]</sup>

Clinical situations presenting high difficulty and complexity, such as dental fractures involving the invasion of the periodontal biologic width, has been well described by Baratieri *et al.*<sup>[5]</sup> and Filho *et al.*,<sup>[6]</sup> which they emphasized that despite the transurgical restorative procedure is not an ideal treatment from a periodontal perspective, in an extreme situation, it could be considered like an encouraging option, with satisfactory esthetic results.

Another great benefit of the adhesive fragment re-attachment technique is to reduce the necessity of restorative procedures used to fill the tooth with composite resin. In the case of unsuccessful treatment, the composite resins restorations as a second alternative and can be placed in a region where the structure has been preserved.<sup>[3,4]</sup> In the present case, the location and aspect of the fracture (a single fragment) and the presence of a balanced occlusion may have favored the clinical success. Limitations of the bonding fragments technique can be attributed to detachment of the remaining dental fragment; the fragment does not recover its original color or also bonding of the remaining the fragment at incorrect position.

The radiographic follow-up is essential for viewing alterations not perceptible clinically, as an extension of the crown fractures and its proximity with the pulp tissue; root and alveolar fractures; stage of rhizogenesis and the alterations of the periodontal structures. We should take into mind that several variables can affect the longevity of this type of treatment including the overall prognosis of the injured tooth, the extent of the crown fracture, and the atypical or vicious occlusion of patient with crown re-attached. The present treatment planning enabled clinical success with transurgical direct adhesive fragment re-attachment; however, further clinical descriptions are necessary in order to evaluate the outcomes of re-attachment over the long-term.

## CONCLUSION

The present case report shows that the transurgical re-attachment of the fractured crown fragment using the bonding technique offers several advantages including the re-establishment of function and esthetics.

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