

AESTHETIC REHABILITATION OF A COMPLEX CROWN-ROOT FRACTURE BY FRAGMENT REATTACHMENT WITH A FIBER-REINFORCED POST: A CASE REPORT.

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Abstract: Complex crown-root fractures are characterized by the involvement of both crown and root with pulp exposure. They pose aesthetic, functional, and psychological problems for the patient. Furthermore, they can pose technical difficulties for the practitioner. The purpose of this case report is to describe the management of a complex crown-root fracture of the right upper central incisor with subgingival limit by reattaching the tooth fragment with fiber-reinforced post. We considered a coronal elongation (gingivectomy and osteoplasty) to recreate the biological space and to expose the limit of the fracture line to guarantee the quality of the bond.

Keywords: complex crown-root fracture, fiber post, reattachment, dental traum

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Conflicts of interest:

The authors declare no conflicts of interest.

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RÉHABILITATION ESTHÉTIQUE D'UNE FRACTURE CORONO-RADICULAIRE COMPLEXE PAR RÉATTACHEMENT DU FRAGMENT AVEC UN TENON FIBRÉ: CAS CLINIQUE.

Résumé: Les fractures corono-radicales complexes sont caractérisées par l'implication de la couronne et de la racine avec exposition pulpaire. Elles posent des problèmes esthétiques, fonctionnels et psychologiques au patient. De plus, elles peuvent poser des difficultés techniques au praticien. Le but de ce rapport de cas est de décrire la prise en charge d'une fracture corono-radicaire complexe de l'incisive centrale supérieure droite avec limite sous-gingivale en réattachant le fragment dentaire avec un tenon fibré. Une élévation coronaire a été réalisée pour recréer l'espace biologique et rendre la limite supra-gingivale pour garantir une qualité de collage meilleure.

Mots clés: fracture corono-radicaire complexe, tenon fibré, réattachement, trauma dentaire.

Introduction

Complex crown-root fractures of permanent incisors account for approximately 11% to 15% of all traumatic events involving the incisors, with the vast majority (96%) of maxillary central incisors [1]. This may be attributable to their position in the dental arch and can be aggravated by exaggerated overjet and maxillary protrusion [2]. It occurs following falls, traffic accidents, fights and sports [3].

Crown-root fracture with pulpal exposure is a complex clinical form of dental trauma. If the fracture line is supragingival, the procedure for reattachment will be the technique of choice. However, when the fracture site is subgingival or intraosseous, surgical or orthodontic extrusion will be necessary before the restoration of the coronal defect using a post retained crown.

This case report presents a conservative approach for the treatment of crown root fracture using glass-fiber-reinforced composite post and original tooth fragment.

Case report

A 16-year-old healthy female patient consulted after a road traffic accident one day prior. She was complaining of severe pain in the broken central upper right incisor, aggravated by cold stimuli.

Clinical findings

On the clinical examination, we noted:

- No signs of bone fractures or mobility were detected on palpation.
- Teeth 11, 12 and 21 were tender on percussion.
- Complicated crown-root fracture of the tooth 11, with a partially attached fragment to the palatal gingiva.
- Pulpal exposure after removal of the fragment (explaining the acute pain to cold stimulus).
- The fracture line was localized in



Figure 1. (a) Initial clinical view showing the fracture line and the attached fragment, (b) preoperative intraoral radiograph.

the cervical third of the crown, just below the gingival margin on the palatal surface.

Radiographic findings

The intraoral periapical radiograph revealed:

- The absence of periapical pathology and root fracture.
- The absence of an associated alveolar fracture.
- The buccal cervical limit of fracture line was visible, but the radicular palatal limit was invisible in this 2D radiograph.

Based on the radiographic and clinical findings, the diagnosis of a complex crown-root fracture of the tooth 11 was evoked (Figure 1).

Therapeutic approach

The treatment plan aimed to offer a prompt relief of the severe pain for the patient and to achieve the aesthetic rehabilitation by reattaching the coronal fragment of teeth 11, using a fiber-reinforced post.

During the first session, the mobile fractured coronal fragment of tooth 11 was removed using local anesthesia (articaine 4% with epinephrine 1: 100 000, MediS). The fragment was cleaned using sterile moist gauze and then placed in a sa-

line solution. The tooth 11 was then isolated using rubber dam, and an access cavity was opened. The extirpation of the pulp and the canal shaping were achieved using a rotary shaping system (PlexV® Orodeka, China). Canal cleaning was done using 3.25% sodium hypochlorite (NaOCl) irrigation. The canal filling was done by lateral condensation with gutta percha and resin-based sealer (Adseal®, Meta Biomed, Korea). The subgingival limit at the palatal level led us to consider coronal elongation to recreate the biological space, expose the fracture line's limit, and ensure bond quality. So, a gingivectomy and osteoplasty were performed (Figure 2). The patient was recalled after 7 days.

During the second session, the post space was created using Peeso Reamer No. 1 (Dentsply®), and any remains of filling material were removed with saline. Once the fit and length of the N°1 fiber post (Dentsply®) had been checked, bonding procedures were initiated. The dentin was etched with 37% phosphoric acid gel (Meta Biomed®) for 15 seconds, then thoroughly rinsed and dried before applying the bonding agent (All-Bond universal®) on the dentin surface. Light curing last-

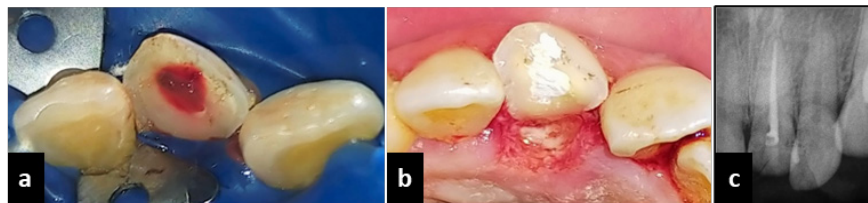


Figure 2. (a) Removal of the fractured fragment and isolation of the tooth with rubber dam, (b) coronal elongation: gingivectomy and osteoplasty, (c) postoperative radiograph. tooth with rubber dam, (b) coronal elongation: gingivectomy and osteoplasty, (c) postoperative radiograph. fracture line and the attached fragment, (b) preoperative intraoral radiograph.

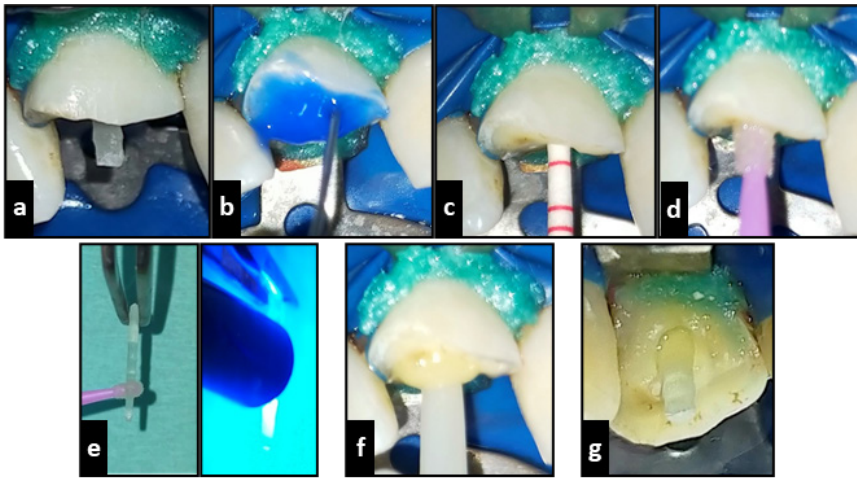


Figure 3. (a) Fitting the post in the canal, (b) etching of the dental tissue, (c) drying of the post space, (d) bonding application in the canal, (e) bonding application and light curing on the post, (f) dual cure resin cement, (g) introduction of the fiber post into the canal.

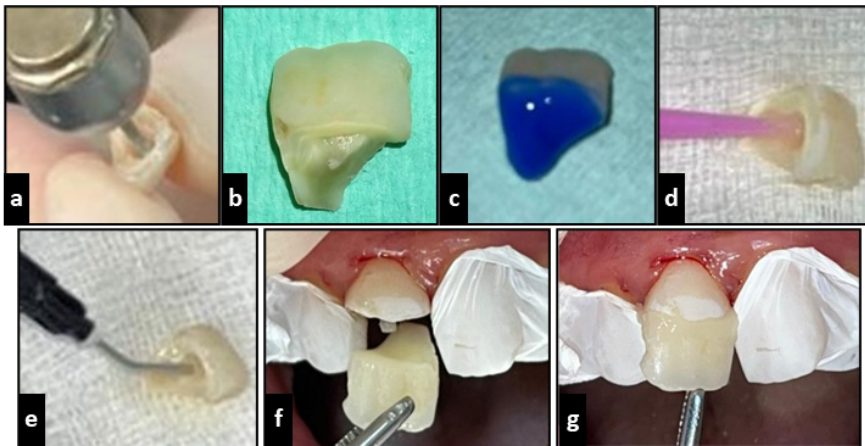


Figure 4. (a) Preparation of retention groove, (b) fractured fragment ready to be sealed (c) etching of the tooth fragment, (d) application of the bonding agent, (e) resin cement application, (f) positioning the fragment on tooth, (g) tooth fragment affixed onto the tooth.



Figure 5. (a) Final clinical view, (b) postoperative intraoral radiograph.

ed for 20 seconds. The post was cemented into the canal with dual cure resin cement (OliFlow Care, Olident®) and light cured for 40 seconds (Figure 3). The two adjacent teeth (12 and 21) were protected with Teflon, to prevent etching and bonding products from diffus-

ing onto their surfaces. A retention groove was fashioned within the removed crown fragment, which was then brought into proximity with the tooth to verify accurate fit and positioning. After achieving proper alignment, the underside of the removed fragment was etched and

coated with a bonding agent. The fragment was then affixed onto the tooth using the same dual cure resin cement and light cured for 40 seconds (Figure 4). Excess cement was removed by a diamond bur (yellow ring), followed by polishing of the tooth surface by finishing cups (Denco®, china) (Figure 5). The occlusion was examined meticulously. Standard postoperative instructions were provided to the patient to avoid additional trauma to the teeth.

Discussion

Complex crown-root fractures are characterized by the involvement of both crown and root with pulp exposure [3]. They pose aesthetic, functional, and psychological problems for the patient. Furthermore, they can pose technical difficulties for the practitioner.

Such injuries in permanent teeth present some challenges that involve both endodontic and restorative issues. The choice of pulp therapy hinges on factors such as the stage of root development, the extent of the exposure, and the duration between the accident and the immediate treatment [4]. In mature teeth with complete root formation, removal of the pulp is usually indicated. Moreover, in terms of restoration, selecting an aesthetically pleasing treatment for fractured anterior teeth remains a significant challenge for dentists. The literature outlines various techniques for managing this type of fracture, spanning from coronal stratification with composite resin to prosthetic restoration using partial or full-coverage crowns [5]. The choice depends on factors such as whether the dental fragment is preserved or not, the extent of coronal loss, the boundaries of the fracture line, the patient's socio-economic resources, and the practitioner's experience [6]. The current case report describes the technique of coronal fragment reattachment with fiber-reinforced post and illustrates that it serves as an alternative method to composite resin build-up, of-

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fering a solution for managing both aesthetic and functional issues in cases of crown-root fracture.

The positive aspects of this case included the presence of an intact dental fragment and the environment in which the fragment was preserved, which was saliva, ideal for maintaining hydration. However, the challenges encountered in this case included the aesthetic concern for the young patient, the substantial size of the fragment, posing a risk of fragment loss due to insufficient retention and the subgingival location of the fracture, contravening bonding principles and impeding proper hygiene maneuvers. These challenges were respectively managed by preserving the tooth's color and morphology in the restoration by using the original tooth fragment [7], enhancing retention of the dental fragment by using fiber-reinforced post, and performing coronal elongation, combining gingivecto-

my and osteoplasty, employed to release the fracture line and achieve successful bonding [8, 9].

Crown-root fracture with pulpal exposure is a complex clinical form of dental trauma. If the fracture line is supragingival, the fragment reattachment will be the technique of choice. However, when the fracture line is subgingival or intraosseous, surgical or orthodontic extrusion will be necessary before the restoration of the coronal defect using a post retained crown. In the present case, considering that the biological space invasion was minimal, the fracture line was exposed through gingivectomy and osteoplasty. Having a supragingival fracture line can also be reached by an orthodontic extrusion, but the main disadvantages are treatment time, with an average of 4 to 6 weeks, and the aesthetic problems due to all orthodontic devices [10].

The significant advancements in adhesive dentistry have transformed the reattachment procedure from a temporary restoration to a more durable and lasting solution [11]. The post minimizes constraints on coronal dental tissues and offers high retention, ensuring long-term stability of the restoration [7].

Conclusion

Fragment reattachment is a cost-effective and efficient technique. While it can be viewed as a permanent solution in some cases, it frequently provides the option for temporization, especially in young patients who may need a definitive prosthesis later.

Patient information about the limits of this procedure may promote clinical outcomes and avoid reattachment failures which usually occur because of new trauma or parafunctional habits.

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