

Management and Follow-up of Orthodontic Forced Extrusion: A Case Report.

Manejo y seguimiento de la extrusión forzada de ortodoncia: Un informe de caso.

English version

Revista Odontología Vital

<https://revistas.ulatina.ac.cr/index.php/odontologiavital>

<https://doi.org/10.59334/ROV.vi138.548>

ISSN: 2215-5740

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Abstract

The case of an adult patient with a complicated crown fracture of the right upper canine due to trauma is reported, diagnosing a class VII Ellis coronal fracture. There are several treatment alternatives that range from the extraction, placement of a bone graft and placement of an implant, to a forced root extrusion with bone removal to allow the biological space and subsequently be restored.

In the present case, a multidisciplinary orthodontic forced extrusion treatment is performed, which allows to increase the amount of clinical remnant, preserving the periodontal support and maintaining the biologic thickness, thus achieving to maintain the root remnant with good length so that prosthetic rehabilitation is facilitated.

The clinical and radiographic follow-up was 12 months. The multidisciplinary treatment

involved: Root canal treatment, forced extrusion with orthodontics, fibrotomy with root planing and fixed prosthesis.

Key words:

Trauma, Coronary fracture, Endodontics, Forced extrusion, Prosthetic Restoration.

Introduction

Some of the main reasons why patients go to the dentist are: Aesthetic and chewing problems, so patients prioritize this type of treatment (Uribe et al., 2010). Dental trauma represents a real therapeutic

Ojeda-Gutiérrez, F, Martínez-Zumarán, A, Manzur-Sandoval, N, González-Correa, R, Ojeda- Juárez, JF, Garrocho-Rangel, JA, Zavala Alonso, NV. & Ojeda-Gutiérrez, F. Management and Follow-up of Orthodontic Forced Extrusion: A Case Report. *Odontología Vital*, 1(38), 69-76. Versión traducida al inglés. Original en español. <https://doi.org/10.59334/ROV.vi138.548>

dilemma for the professional of stomatology (Koyuturk & Malkoc, 2005).

Most dental injuries occur within the first two decades of life, although they can occur at any age, the most susceptible teeth being the central and lateral incisors (AAPD, 2008-Forsberg & Tedestam, 1993). Fractures of the permanent teeth constitute the most frequent type of dental trauma, with a percentage of 26 to 76%.

These injuries involve the loss of dental tissues hard (Andreasen & Ravn, 1972-Andreasen, 1993), although they can involve enamel, or enamel and dentin, without affecting the pulp (Arapostathis et al., 2006), good prognosis (De Blanco, 1996); however, when it affects the pulp (Cavalleri & Zerman, 1995-Ojeda et al., 2011), especially in cases of complex injuries of root and complicated crown the prognosis is generally less favourable long-term (Keinan et al., 2013).

Lesions involving enamel, dentin and pulp represent from 4 to 16% of all traumatic dental injuries (Cavalleri & Zerman, 1995- Stockwell, 1988), with the central incisors accounting for 80% and lateral incisors for 16% being the most frequently affected teeth due to their protruded and vulnerable anterior position in the mouth (Andreasen, 1970).

Different criteria have been established to classify the different types of dental fractures. The most recognized and used are those of Black, OMS and Ellis. (Spinas & Altana, 2002- Ellis & Davey, 1970).

According to these criteria, the treatment to be followed is established, which will depend on the degree of

condition caused by the trauma, from control and observation appointments, direct or indirect pulp coating, partial pulpotomy, pulpotomy, pulpectomy, to tooth extraction.

When the fracture involves the entire crown, particularly in the anterior sector, a multidisciplinary dental treatment involving several pulpal, periodontal and restorative procedures is indicated. In the present case, several procedures were carried out that involved the treatment of ducts and orthodontic forced extrusion with fibrotomy, with the aim of achieving a sufficient dental structure and an adequate biological space for prosthetic rehabilitation.

In 1977, Ingber developed the concept of extrusion force, which is defined as a vertical movement that is done with forces orthodontic controlled and continuous low-intensity, improving the ratio crown-root and eliminating defects intraosseous and bags, to allow the rehabilitation of the crown fractured (Ingber, 1989). Pontoriero (1987) proposes to perform the fibrotomy (resection of the periodontal fibers) together with the forced extrusion, which allowed to reduce the eruption time, resulting in an elongation of the crown without the need for bone resection (Pontoriero et al., 1987).

The objective of this report is to describe the management and follow-up of a case of orthodontic forced extrusion and the multidisciplinary treatment of the coronal fracture of an upper canine in an elderly adult patient.

Case Report

Apparently healthy 78-year-old patient comes to the clinic of the Specialty of Orthodontics and Dentomaxillofacial Orthopedics, referred by a specialist in Endodontics, due to corono-radicular fracture of right upper canine, fixed bridge abutment of three units (Figure 1). The patient reports having received a blow to the mouth about three weeks ago.

On physical examination, he presents good general conditions, with no apparent wounds or edema in the oral region.

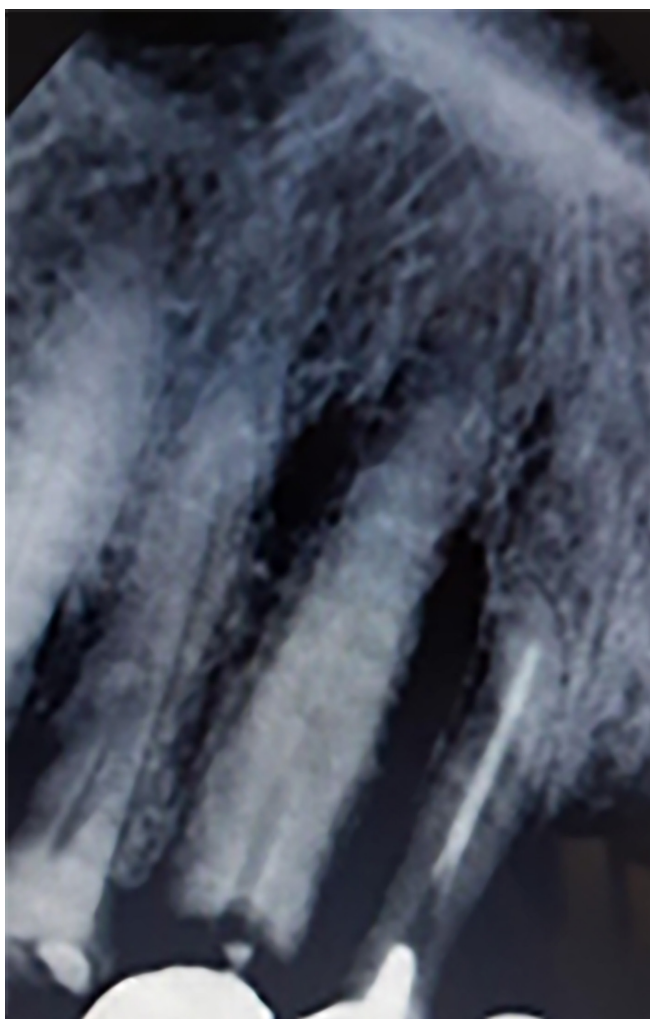


Figure 1. Corono-root fracture of right upper canine, fixed bridge abutment.

On intraoral examination, he presents with a cervical fracture of the crown of the right upper canine (Ellis class VII). Periapical radiographs and clinical percussion, palpation and mobility tests are performed (Figure 2).

When evaluating the case, it is determined to carry out dental treatment with a multidisciplinary approach, which involves endodontics, orthodontics (forced extrusion), periodontics with fibrotomy and prosthetic rehabilitation.



Figure 2. Diagnostic tests and radiographs for the choice of multidisciplinary dental treatment.

As a first step, endodontic treatment was performed on the dental piece and placement of a supporting intracaval attachment (emptied endoposteum) (Figure 3), in order to improve orthodontic traction.

This attachment consisted of a cast post with perforations (Figure 4).

After an exhaustive orthodontic diagnosis, we proceed to place fixed appliances in the upper arch with MBT technique (slot 0.022), from the right molar to the left canine of indirect and passive cementing (with the slots of the brackets aligned).

Immediately after, a 0.019 x 0.025 rectangular arch made of stainless steel with an extrusion bend was placed at the level of the right upper canine. In the same fold, a helix-type loop was adapted that functioned as a support to place the passive ligature (the cebanda) (Figure 5).



Figure 3.1 Performance of endodontic treatment and placement of endoposte (emptied post).



Figure 4. Drilling and cementation of the endoposte. (post casting)



Figure 5. Helix doublers and placement of orthodontic appliances.

The activations of the apparatus were carried out every week with metal ligation (0.010), expecting an extrusive movement of 0.5 to 1 mm per week with a force between 15 and 20 grams per activation in addition to the realization of the circumferential supracrestal fibrotomy to help the extrusion and avoid its recurrence.

The treatment time to achieve the planned extrusion was 4 weeks, at the rate of one millimeter per week, in addition to 8 weeks of stabilization, for a total period of three months before placing the fixed prosthesis.

The circumferential supracrestal fibrotomy and root planing were performed before, during and after each orthodontic activation, in order to be able to decrease the stabilization time.

During the control appointments, at three, six, nine and twelve months, the stability of the extruded tooth was evaluated, through palpation of the mucosa, in addition to percussion tests and X-ray taking, mainly verifying the absence of clinical and radiographic signs and symptoms (Figure 6).



Figure 6. Prosthetic rehabilitation one year after the start of orthodontic treatment.

Discussion

The difficulty of treatment in the dental organs with transverse or intraalveolar fracture, which involves enamel, dentin, pulp and cement, represents a challenge for the dentist, who must take the necessary measures to maintain their vitality and their subsequent restoration in an aesthetic, pedagogical and functional way.

The accurate diagnosis of each individual case is carried out through the evaluation of the mobility of the coronary segment, the demonstration x-ray of the fracture line, and, on special occasions, through computed tomography, cone beam, which allows more accurate assessment of the extent and direction of the fracture line (May et al., 2013).

Different treatment modalities have been adopted for this type of injury, ranging from control and observation appointments to osteotomy, gingivectomy, orthodontic extrusion (Bondemark et al., 1997- Sönmez et al., 2008- Saito et al., 2009) or surgical, extraction or intentional reimplantation (Grossman, 1966).

An alternative treatment is forced extrusion by orthodontic means (Kumar et al., 2019), which is a conservative and predictable method to achieve a supragingival margin that allows the survival of the restoration in a longer term.

In the present case, along with the forced extrusion, the supracrestal circumferential fibrotomy was performed, described by Campbell (Campbell et al., 1975). This procedure consists of the resection of the periradicular fibers to the bottom of the gingival sulcus and root planing to minimize possible recurrence (Carvalho et al., 2006) and improve the stability of the affected tooth (Bach et al., 2004).

These actions allow the alveolar bone and the gingival extension to move together with the root (Edwards, 1988- Brain, 1969). It is recommended that the orthodontic extrusion speed be one millimeter of root movement (Bach et al., 2004- Durham et al., 2004- Jorgensen & Nowzari, 2001) per month and subsequently a stabilization period of eight weeks (Carvalho et al., 2006).

In 2000, Jorgensen (Jorgensen & Nowzari, 2001) recommended fibrotomy before, during and after forced orthodontic eruption, to decrease the necessary stabilization time.

The advantages of the procedure are the absence of bone loss or periodontal support, which usually occurs when an extraction is performed; the recurrence of the extruded teeth is avoided and the aesthetic appearance left by the extrusion is improved (Yoshinuma et al., 2009- Gonçalves et al., 2015). Its disadvantages are the use of orthodontic devices with

consequent aesthetic problems and the impediment to proper oral hygiene.

The treatment time is 2 to 3 months, plus the stabilization period; according to Bach (Bach et al., 2004), it is contraindicated in ankylosed teeth, in the presence of vertical fracture, teeth with short roots, insufficient space in the arch and exposures of the furca.

Keinan (Keinan et al., 2013) and Simon (Simon et al., 1978) propose in some cases, where the exposed dental structure allows it, the placement of a supporting intra-ductal attachment, but this technique is not always possible. In the present case, a hollowed post was cemented with perforations, which helped to pull the tooth in a progressive and controlled way, with an extrusion speed of one millimeter per week (Ingber, 1989- Carvalho et al., 2006), for 4 weeks, in addition to a retention period of eight weeks.

This procedure differed from that proposed by Durman, who suggests one month of stabilization for every millimeter of orthodontic extrusion.

In independent reports, Keinan (Keinan et al., 2013) and Farmakis (Farmakis, 2018) concluded that the prognosis of treatment is much more favorable in young patients. However, in this case, adequate extrusion was achieved in an elderly patient, along with the immediate placement of the prosthesis, so it represents a comprehensive and multidisciplinary treatment that offers good functional and aesthetic

results. During the follow-up period, every three months until one year was completed, no pain was reported in the area, no signs or symptoms of apical or periapical pathology, nor radiographic periodontal defects were presented as expected in an elderly patient. Finally, the restorations placed were functionally and aesthetically acceptable.

Conclusion

Through an interdisciplinary approach (endodontics, periodontics, orthodontics and prosthetics) the dentist can offer quality joint treatments, such as those described in the case reported here.

Here all the advantages offered by forced orthodontic extrusion were taken advantage of, even in an elderly adult patient, achieving a traction of four millimeters. This objective was achieved thanks to the use of light and controlled extrusive forces on the affected dental organ. With the described treatment modality, a crown lengthening can be achieved without the need to perform a bone resection, which allows a correct prosthetic rehabilitation, returning the function and aesthetics to the injured tooth and providing an integral benefit to the patient.

We consider as a limitation of this report that the observation time of the case was not long enough. The authors declare that there is no conflict of interest with respect to the case presented.



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