



## Intentional Replantation as Treatment of Extrusive Luxation: A Case Report

Aline Satie Takamiya<sup>a</sup> , Leonardo Raniel Figueiredo<sup>a</sup> , Caio Vinicius Lourenço Debortoli<sup>a</sup> , Paulo Koji Hara Sonoda<sup>b</sup> , Luy de Abreu Costa<sup>a</sup> , Cássio Messias Beija Flor Figueiredo<sup>a</sup> , Celso Koogi Sonoda<sup>c\*</sup>

<sup>a</sup> Dental School of Araçatuba, São Paulo State University (UNESP), Araçatuba, SP, Brazil; <sup>b</sup> Federal University of Triângulo Mineiro (UFMT), Medical School, Uberaba, MG, Brazil; <sup>c</sup> Department of Diagnosis and Surgery, Dental School of Araçatuba, São Paulo State University (UNESP), Araçatuba, SP, Brazil

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\*Corresponding author: Celso Koogi Sonoda, Departamento de Diagnóstico e Cirurgia, Disciplina de Clínica Integrada, Faculdade de Odontologia do Campus de Araçatuba, UNESP, Rua José Bonifácio 1193, CEP: 1601-50, Araçatuba, SP, Brazil.

E-mail: celso.k.sonoda@unesp.br

Accurate diagnosis, immediate care and proper treatment planning are important factors for the successful treatment of dental traumatic injuries. In extrusive luxation, postponement in treatment may lead to the need for new strategies for the resolution of unwanted consequences. The present case report describes an unusual condition of delayed treatment regarding extrusive luxation of two anterior teeth treated by intentional replantation. An 18-year-old female patient attended the Dental School for the treatment of a traumatic injury to the anterior teeth 5 days after a fall from a bicycle. Clinically, teeth #21 and #22 were extruded in incisal edges for 5 mm from their neighboring teeth, had edematous gingiva, showed grade II mobility and were painful to percussion. Radiographically, the roots were intact and the periodontal ligament space was thickened along its entire length. As immediate repositioning could not be performed, intentional replantation was recommended. After detaching the periodontal ligament, the teeth were extracted and the alveolus was curetted and irrigated with saline solution to remove the already-formed clot. After replantation, the teeth were restrained and the patient was medicated with antibiotics as well as analgesics. After 10 days, the splint was removed, the root canals were instrumented and then, filled with calcium hydroxide. After 30 days, they were completely obturated using gutta-percha. The 5-year follow-up showed root integrity, absence of mobility and normal periodontium. The outcomes of the current case report revealed that when intentional replantation was properly conducted, it could be considered an option for the treatment of extrusive luxation where the teeth were not to be immediately repositioned.

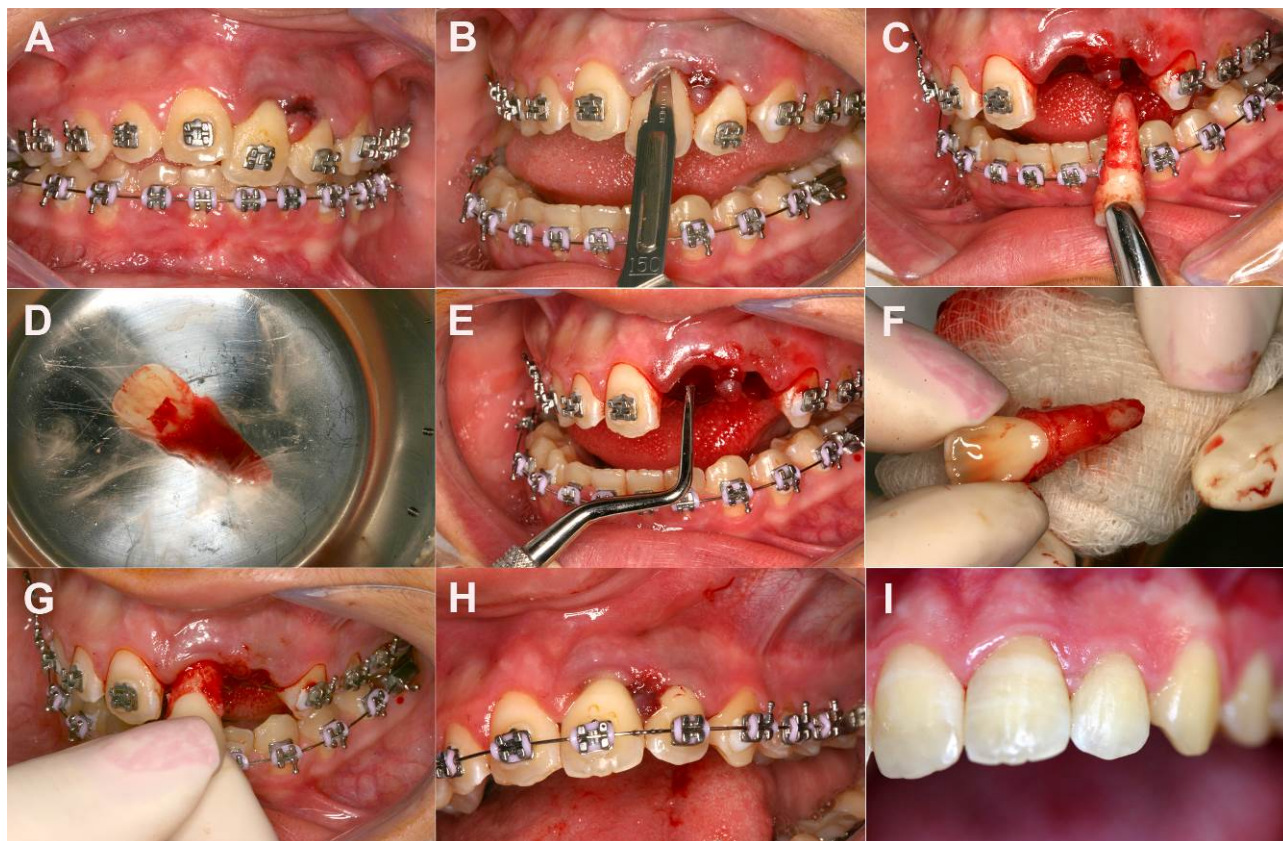
**Keywords:** Dental trauma; Extrusive luxation; Tooth replantation

### Introduction

In dental trauma, tooth dislocation deserves especial attention; because it is associated with damages to periodontal ligament and cementum, and may result in root resorption. The direction and intensity of the force of trauma can lead to different types of dislocations; e.g. concussion, subluxation, lateral dislocation, intrusion and avulsion [1]. Extrusive luxation is characterized by the partial displacement of the tooth out of the alveolus. Clinically, the tooth appears to be elongated and may be excessively mobile. Radiographically, the periodontal ligament space, especially in the apical region, is enlarged [2, 3]. Pulp necrosis and root resorption can occur, depending on the severity of trauma and stage of root

development [3]. The treatment for these cases is the immediate repositioning of the extracted tooth, followed by endodontic treatment if necessary [2, 3]. However, in some situations, the deferral in seeking treatment makes it difficult to treat the patient with the above-mentioned strategy. Intentional replantation is one of the treatment alternatives; which consists of a surgical procedure where the tooth is extracted, and replantation of the extracted tooth into its original alveolus [1]. It is deliberated as a technique that can be used in clinical situations where other conventional forms of treatment have not been effective [2]. The current case study aims to present a condition of extrusive luxation of two maxillary permanent incisors treated *via* intentional replantation with satisfactory results after 5 years of follow-up.





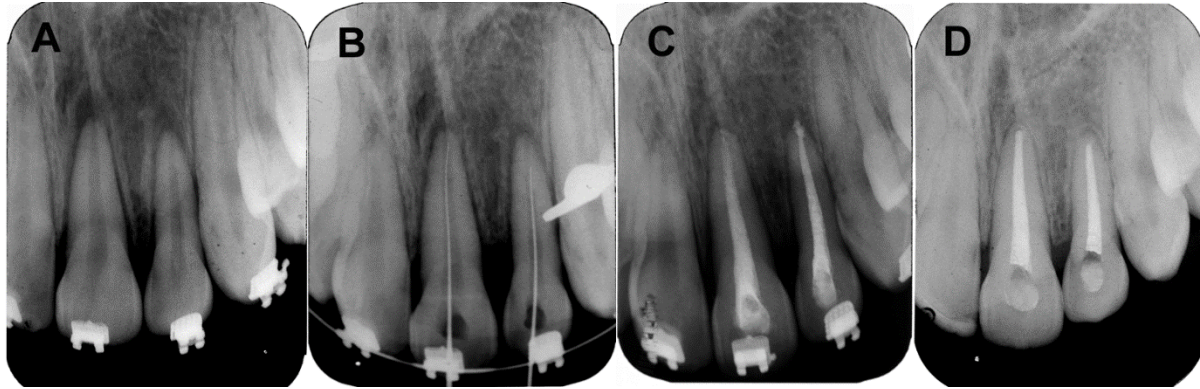
**Figure 1.** Sequence of the treatment performed: A) Initial clinical condition of teeth #21 and #22, extruded relation to their neighboring teeth; B) Detaching the periodontal ligament with scalpel blade #15 to perform exodontia; C) After extraction of tooth #21, tooth #22 was extracted using forceps, with care taken not to traumatize the root surface; D) The extracted teeth were preserved in saline solution; E) Blood clots in the alveolus were removed by careful curettage followed by cautious irrigation with sterile saline solution; F) Blood clots were removed from the root surfaces with gauze soaked in sterile saline solution; G) The teeth were replanted and repositioned into the alveolus with slight finger pressure; H) Splinting was performed using orthodontic wire fixed to the brackets with elastic ligature; I) Five-year clinical control, showing normal periodontium and acceptable aesthetics of the treated teeth

## Case Report

The Patient, an 18-year-old female teenager, attended the “Integrated Clinic of the Araçatuba Dental School–UNESP” for the treatment of a dental traumatic injury to the anterior region of her mouth; which resulted from a bicycle fall that had happened 5 days before the appointment. Clinical examination revealed that the crowns of teeth #21 and #22 were extruded for 5 mm from their neighboring teeth (Figure 1A). The involved teeth showed grade II mobility, were painful to the percussion, and had edematous marginal gingiva with laceration on the interdental papilla. The roots were radiographically unharmed and the periodontal ligament space was showed to be thickened along its length (Figure 2A). The teeth could not be repositioned by hand because they were resistant to the repositioning movement; therefore, intentional replantation followed by endodontic treatment was recommended. Informed consent was obtained from the patient for the development of this

manuscript. After careful sindesmotomy (detaching the periodontal ligament) with scalpel blade #15 (Figure 1B), tooth #21 was extracted while taking care not to damage the root surface and alveolus wall (Figure 1C). The extracted tooth was kept in sterile saline solution (Figure 1D) whilst curettage and cautious irrigation of the alveolus with saline were performed in order to only remove the already-formed clot (Figure 1E). The clot adhering to the apical third of the root was removed using gauze soaked in saline solution (Figure 1F). The same procedure was performed on tooth #22. After 10 min, the teeth were replanted in their original alveoli by finger pressure (Figure 1G); observing the alignment of their incisal edges with those of the adjacent teeth. In addition, thorough care was taken not to damage the root surface. The replanted teeth were splinted using 0.6 mm archwire (Dental Morelli, Sorocaba, SP, Brazil), fixed with an elastic ligature (Dental Morelli, Sorocaba, SP, Brazil) on the existing brackets (Figure 1H), and kept for 14 days. Moreover, occlusal adjustment prevented premature contact. Amoxicillin (500 mg)





**Figure 2.** Radiographic images; *A*) Preoperative periapical radiography of the tooth #21 and tooth #22 showing the integrity of root surface and increased periodontal ligament space; *B*) Periapical radiography of odontometry during root canal treatment; *C*) Periapical radiography with root canals instrumented and filled with calcium hydroxide paste; *D*) Periapical radiography of the 5-year control showing the integrity of root surface and periodontium

(Eurofarma Laboratórios, São Paulo, SP, Brazil) was administered every 8 h for 7 days, paracetamol (750 mg) (EMS S/A, Hortolândia, SP, Brazil) was directed every 8 h for 3 days, and mouth rinses (with 0.12% chlorhexidine digluconate) were performed daily.

After 10 days, the root canals were instrumented (Figure 2B) and filled with calcium hydroxide and filled with calcium hydroxide paste (Figure 2C). After 30 days, the canals were obturated with gutta-percha (Tanari Industrial, Manaus, AM, Brazil) and calcium hydroxide cement (Kerr, Orange, CA, USA). Then, the teeth were restored with resin-based dental composite restorative material (Filtek Z350 XT; 3M ESPE, Sumaré, SP, Brazil). The patient was followed up with clinical and radiographic examinations monthly for 12 months, and annually for 5 years. The clinical and radiographic follow-ups showed no root resorption, a sulcus depth of 2 mm, no marginal bone loss, normal mobility and no symptoms (Figures 1I and 2D).

## Discussion

Accurate diagnosis, prompt care, and proper treatment planning are important factors to consider so as to prevent or control the occurrence of root resorption and ankylosis in a traumatized tooth [3, 4]. Even in a case of extrusive luxation, where damage to periodontium is reduced, early treatment increases the chances of obtaining satisfactory results. In some cases, this type of trauma may not result in disorders, *e.g.* pain and aesthetic changes, and therefore, patients may tend to postpone the needed treatment [1, 3]. However, in the case presented, the 5-day delay in the initiation of treatment made it difficult to reposition the extruded teeth. The presence of blood clot in the periodontal ligament space favored the formation of a plunger that made repositioning difficult [1]. The treatment option was intentional replantation, which comprised dental extraction followed by the curettage of blood clot and teeth replantation.

Since there are possibilities of root resorption and ankylosis after the implementation of procedure, intentional replantation is a technique with specific indications [2]. Understanding the factors, that could contribute to these disorders, has allowed its application in a variety of clinical conditions that cannot be resolved with traditional approaches. Intentional replantation has been used for the removal of a fractured file after trepanning [5], access for paradodontic treatment under adverse conditions in endodontics [6, 7], recovery of periodontal biological space for prosthetic rehabilitation [8] and treatment of extrusive luxation [1]. Another treatment option would be orthodontic repositioning, which requires a longer period of treatment [9-11]. Intentional replantation allows for a faster result. The partial rupture of periodontal ligament fibers with the fractional displacement of tooth out of the alveolus [10] occurs in extrusive luxation; facilitating dental extraction while avoiding further trauma.

Intentional replantation is contraindicated for teeth with highly curved roots or any conditions which would make dental extraction difficult as well as patients with advanced periodontal disease, furcation involvement, extensive caries, longitudinal root fracture, severe cognitive impairment requiring sedation, uncooperative patients, and those who are immunosuppressed or suffer from severe heart disease [2, 3, 12]. This technique requires some precautions; *e.g.* avoiding a long extra oral period, preserving the tooth in an adequate conservation medium during the extra oral period, avoiding mechanical damage to the root surface during dental extraction and/or manipulation of the tooth, splinting teeth when necessary, prescribing broad-spectrum antibiotics, ensuring endodontic treatment when necessary, and taking care of hygiene and diet after surgery [2, 6, 12]. Root resorption, ankylosis, and marginal bone loss may occur after extrusive luxation [4, 10, 11, 13] and be aggravated if precautions for intentional replantation technique are not properly followed

[2, 10, 14]. Root resorption and ankylosis may be observed after 2 months. In most cases, these undesirable consequences are diagnosed within the first 2 years but are rarely observed in 5 to 10 years [15, 16]. In the case described, procedures, such as a 10-min extra oral period, maintaining the extracted tooth in saline solution, a traumatic dental extraction and postoperative care may have contributed to the favorable outcome. Moreover, systemic use of antibiotic [17] and subsequent endodontic treatment were performed to prevent the occurrence of infection-related resorption, which can occur in this type of trauma [13]. Calcium hydroxide dressing was used as intracanal medication because it has shown to be able to effectively control inflammatory resorption [4, 12], being the dressing of choice for cases of traumatic injuries [12]. The 5-year follow-up with root and periodontal integrity suggested the feasibility of the conducted treatment in the case presented.

According to Ditzel *et al.* [18], the prognosis in cases of dental trauma depends on the quality of the professional-patient relationship. The professional is responsible for correct diagnosis and treatment, and the patient should follow the protocols and follow-up appointments.

## Conclusions

It seems feasible to conclude that the intentional replantation, when properly conducted, could be used to treat extrusive luxation when tooth were not to be immediately repositioned.

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