

Case Report Article

A case report of triple dental injury: from the replantation to extraction in 27 years

Liliane Roskamp¹
Allan Abuabara²
Isabela Ribeiro Madalena²⁻⁴
Camila Paiva Perin¹
Erika Calvano Kuchler^{1, 5}
Daniel Hemming¹
Maria Carolina Botelho Pires de Campos¹
Giordano Oliveira Zandoná¹
Thaís Kauana Magalhães Sobral¹
Flares Baratto-Filho^{1, 2}

Corresponding author:

Liliane Roskamp
Universidade Tuiuti do Paraná
Rua Ladislau Kula, n. 365 – Santo Ignácio
CEP 89219-710 – Curitiba – PR – Brasil
E-mail: liliane.roskamp@utp.br

¹ School of Dentistry, Tuiuti University of Paraná – Curitiba – PR – Brazil.

² School of Dentistry, University of the Joinville Region – Joinville – SC – Brazil.

³ School of Dentistry, Presidente Tancredo de Almeida Neves University Center – São João del Rei – MG – Brazil.

⁴ Department of Restorative Dentistry, School of Dentistry, Federal University of Juiz de Fora – Juiz de Fora – MG – Brazil.

⁵ Department of Orthodontics, University of Regensburg – Regensburg – Germany.

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Abstract

Introduction: Preventive dentistry has undergone significant advancements in recent years, leading to a shift in the causes of tooth loss. In contrast, dental injury has emerged as the leading cause. **Objective:** This study presents a case involving multiple dental injuries at the permanent maxillary left central incisor (21) during a 27-year follow-up. **Case report:** An 18-year-old male patient suffered a dental injury that resulted in a root fracture and avulsion of 21. Tooth replantation was performed 90 minutes after the accident. After 30 days, the endodontic treatment was performed. Thirteen years later, the patient presented to the dental office with a complaint of pain after internal and external dental bleaching. Radiographic signs of root resorption were observed. Endodontic retreatment was then carried out. Twenty-three years from the first trauma, the same tooth

suffered a lateral luxation. Twenty-seven years after tooth replantation and four years after stabilization due to lateral luxation, 21 suffered a cervical horizontal root fracture. Thus, extraction was performed.

Conclusion: This case report's singularity is the long follow-up time associated with the sequence of events, including different types of dental injuries and bleaching. In addition, sharing treatment strategies can suggest insights for future studies and help other professionals with similar situations.

Introduction

Preventive dentistry has undergone significant advancements in recent years, leading to a shift in the causes of tooth loss. Once a substantial contributor, dental caries now accounts for a mere 7.0% of the losses, while periodontal disease is responsible for no more than 5%. In contrast, dental injury has emerged as the leading cause, responsible for over 62.0% of the cases [5, 11]. The prevalence of traumatic dental injuries can vary considerably, reaching from 4% to 58% [11, 26]. About one-third of the population will suffer at least one dental injury during their lifetime, with males being more susceptible than females. Falls and traffic accidents are the most common causes [12].

Dentoalveolar injuries, such as tooth avulsion, root, and alveolar fractures, are among the most severe dental conditions. The long-term prognosis of such injuries is a matter of debate, with various factors influencing it, including time elapsed until primary care, extra-alveolar time, root development, oral hygiene status, occlusion, and immunoinflammatory system. The development of root resorption may result in tooth loss. It is crucial to note that the sooner the dentist performs the best treatment, the more favorable the outcome can be [21].

This report aims to present a case involving multiple dental injuries and dental bleaching at the same tooth during a 27-year follow-up.

Case report

This report followed the Preferred Reporting Items for Case Reports in Endodontics (PRICE) guidelines [19]. The patient provided informed consent.

In June of 1992, an 18-year-old male patient came to the dental office ninety minutes after suffering a blow during a football match. The patient reported avulsion of the permanent maxillary left central incisor (21), which was dry stored for the first 30 minutes and in milk for the subsequent 60 minutes. Radiographic examination showed avulsion and root fracture of the apical third. The dental replantation was performed (figure 1A) and stabilized with a flexible splint for ten days. Systemic medication based on amoxicillin 500 mg and paracetamol 500 mg was prescribed, in addition to the recommendation of the tetanus vaccine.

After two weeks, percussion, palpation, and pulp sensibility tests were performed, with a normal response for all assessments. However, 30 days after replantation, 21 presented a negative reaction for the pulp sensibility test and a slight change in the color of the dental crown, leading to the decision of endodontic intervention. The working length was achieved at the limit of the root fracture, and its apical third was left untouched. The intracanal medication was calcium hydroxide powder mixed with a saline solution, which was changed every 90 days (figure 1B). After 14 months of follow-up and no symptomatic signs, a definitive root canal filling was performed (figure 1C). Clinical and radiographic follow-ups were performed every three months for the subsequent two years and then annually until five years after tooth replantation. The replanted coronal portion remained without signs of root resorption, and the apical portion showed no signs of apical lesion.

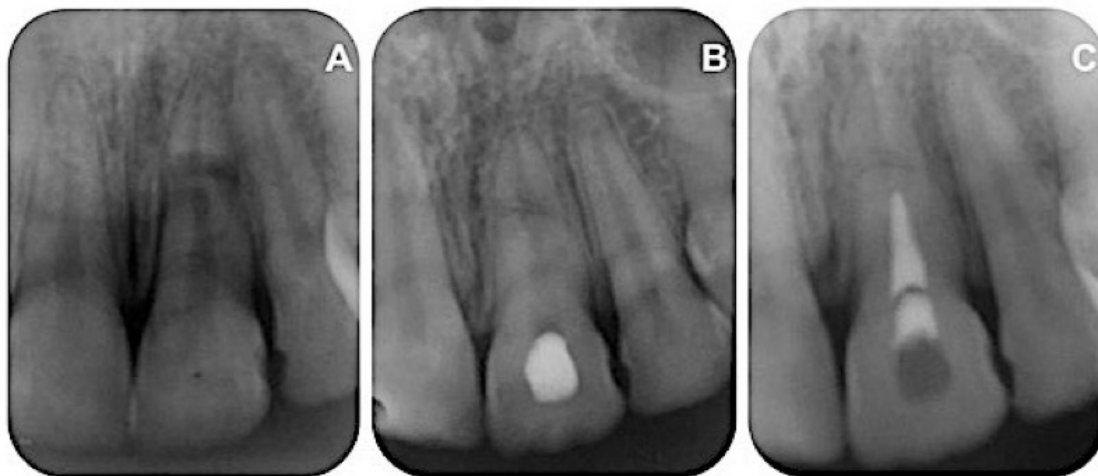


Figure 1 - Periapical radiographs of 21 (1992): A) immediately after dental replantation, the horizontal fracture in the apical third of the root is shown; B) three months of follow-up; C) fourteen months of follow-up

Thirteen years after this trauma, in 2005, the patient returned to the dental office referring pain on 21. He said the tooth received external and internal bleaching with carbamide peroxide 16%. Percussion and palpation tests confirmed that the tooth was symptomatic. The radiographic examination showed endodontic access without cervical protection, and the root presented signs of inflammatory external root resorption (figure 2). Thus, endodontic retreatment was initiated, including canal reshaping and irrigation with 1% sodium hypochlorite. Calcium hydroxide powder mixed with saline solution was used as intracanal medication. The intracanal medication was changed monthly for four months until the tooth became asymptomatic.



Figure 2 - Periapical radiograph of 21 after 13 years of the first trauma and dental replantation (2005). Observe the internal and external root resorption after dental bleaching

Twenty-three years after the first trauma, in 2015, the patient suffered a new tooth injury on 21 during a football match, resulting in lateral luxation. The patient immediately repositioned the tooth himself. He presented himself in the dental office, where the canal was reshaped and irrigated with 1% sodium hypochlorite. Calcium hydroxide powder mixed with saline solution as intracanal medication was used. A flexible splinting from right (13) to left (23) maxillary canines was placed for ten days. The intracanal medication was changed monthly for the next three months and then every three months. After one year, a calcified tissue barrier was observed, confirmed by a 0.5 mm reduction in working length, indicating the biological formation of an apical stop (figure 3). Intracanal medication was changed every six months for the following years.



Figure 3 - Periapical radiograph of 21 after 23 years of the first trauma and dental replantation, and on the day of the second trauma (lateral luxation) (2015)

In 2019, twenty-seven years after replantation of 21 and four years after stabilization due to lateral luxation, the patient suffered a new injury at the same tooth. In a sudden movement, his son hit his head on 21. After clinical and cone beam computed tomography examinations, a horizontal root fracture in the cervical third was observed (figure 4). Dental extraction was the treatment choice.

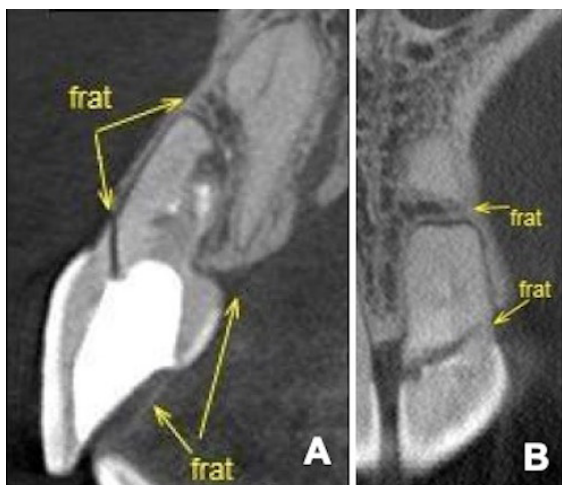


Figure 4 - Cone beam computed tomography: A) sagittal view showing root fracture; B) frontal view showing root fracture

Discussion

The prevalence and consequences of traumatic dental injuries make them a public health problem, and they are a challenge to clinical practice. The correct emergency management and follow-up are fundamental to ensure a favorable outcome [29]. The prognosis varies significantly on the characteristics of each case [17]. The objective of the present study was to report a clinical case with multiple injuries in the same tooth during 27 years of follow-up. Strategies taken to control injuries and root resorption are highlighted. It emphasizes the importance of emergency care and follow-up with clinical and radiographic exams of patients exposed to dental injuries.

Participation in sports activities is a source of dental traumatism [6]. The use of mouthguards, even though recommended use to prevent damage to the orofacial tissues, is an uncommon practice, especially among amateur athletes [22]. Of the three injuries suffered by the patient, two were during sports, both without using a mouthguard.

In situations of avulsion, tooth replantation is indicated even if extraoral conditions are unfavorable. This strategy aims to maintain the bone architecture during the healing of the supporting tissue to facilitate future rehabilitation strategies [1, 14, 18]. Even when the tooth undergoes a horizontal root fracture, repositioning the avulsed coronal fraction is indicated [1, 14, 18]. Root repositioning is expected to induce repair of the periapical and pulp tissues between the root fragments. A horizontal fracture in the apical or middle third of the root favors the prognosis [27].

A favorable response from the patient's immune system is crucial in repairing the periodontal ligament, apical region, and tooth surface damaged by trauma, especially in luxation, avulsion, and replantation [13, 24, 25]. It is essential to modulate the patient's immune response, cleaning and shaping the root canal in conjunction with antimicrobial therapy represented, in this case report, by the calcium hydroxide paste, to combat the infectious diseases and associated inflammation-mediated tissue damage. Thirty days after the replantation, the pulp necrosis of the coronal portion was evident. Calcium hydroxide, a gold standard of intracanal medication, is recommended until the decision is made to fill the root canal [7, 15]. Thus, the root canal was cleaned and shaped successfully, and a calcium hydroxide intracanal dressing was placed [15]. Next, the final filling with an endodontic sealer and gutta-percha points was performed, and a biological apical stop was achieved.

The total absence of symptoms in the replanted and endodontically treated tooth led the patient to disregard the importance of periodic clinical and radiographic follow-ups. Thus, the tooth only drew attention when the patient underwent external and internal dental bleaching. It is suggested that the absence of cervical shielding allowed the penetration of carbamide peroxide into the root canal and dentinal canaliculi, causing an inflammatory response, triggering pain, and developing root resorption [16]. Thus, the root canal retreatment was indicated.

Surprisingly, the patient suffered a new dental injury on the same tooth that was digitally reduced. A systematic review identified pulpal necrosis as the most common complication reported in mature teeth with lateral luxation, accounting for 44.2% of cases. Less commonly observed complications included surface resorption (14.0%), inflammatory resorption (8.5%), pulp canal obliteration (8.1%), and

replacement resorption (0.9%) [9]. The literature lacks studies regarding the effects of trauma on previously traumatized and endodontically treated teeth, as in this case, even though one can expect the consequences of the development of external root resorption. Thus, the root canal filling was removed, and a new calcium hydroxide temporary dressing was placed inside the root canal. It was considered that the presence of medication could be beneficial, preventing or avoiding external root resorption of the traumatized tooth. The tooth remained with an intracanal calcium hydroxide dressing until the third dental injury, resulting in the horizontal cervical fracture. The difficulty in restoring stability to the coronal third of the root and preventing infiltration make cervical root fracture one of the most challenging dental traumatic injuries [4]. There are reports of coronal one-third root fractures treated with prolonged immobilization and survival [28]. However, this case presented a cervical fracture, a short coronal segment root, with an unfavorable trauma history. It played a decisive role in the choice to extract the tooth.

During these 27 years, many authors worldwide have studied dental injuries. The International Association of Dental Traumatology (IADT) updates the guidelines, assisting professionals in decision-making [1,7, 8]. The last was published in 2020 [7, 10]. However, it is essential to point out that no easily reached guidelines for avulsion and replantation existed in 1998 when 21 was replanted. The dentist based her first aid on Andreasen's paper published in 1989 [2].

This case has some limitations. Observing the root surface in the periapical radiograph would be valuable before the dental bleaching. Unfortunately, the patient left his hometown during the dental treatment, and the periapical radiograph was lost. However, his dentist told us that he took it, and no signs of root resorption were evident. While calcium hydroxide has an important antimicrobial and biocompatible role, it has drawbacks, and its long-term use may be undesirable. Some authors emphasize that modifying dentin properties after 30 days may result in tooth fractures [3, 20, 23]. *In vitro* studies have shown that calcium hydroxide root filling weakens the dentin's microtensile fracture strength by 23-43.9% following root canal filling [23]. In this case, the dentist did not obturate the root canal and periodically changed the calcium hydroxide dressing. However, it is essential to

point out that the tooth remained healthy for four years with the medication inside the canal until it received the last trauma. The tooth could still be in the mouth if it had not happened.

Conclusion

The singularity of this case report is the long follow-up time associated with the sequence of events, which included different types of dental injuries, dental bleaching, and the management of root resorption. In addition, sharing treatment strategies can suggest insights for future studies and help other professionals with similar situations.

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