



Tratamento da Avulsão Dentária: Um Relato de Caso

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Danielle Bezerra de Oliveira Nascimento¹, Débora Vieira Vaz², Clarissa Lopes Drumond³,
José Klidenberg de Oliveira Júnior⁴, Marcos Alexandre Casimiro de Oliveira⁵,
Kauana da Silva Andrade⁶, Renally de Freitas Lima⁷, Raulison Vieira de Sousa⁸

ABSTRACT

Dental trauma (DT) refers to injuries caused by impacts to the teeth and/or the hard and soft tissues within or outside the oral cavity. Among the various types of DT, avulsion, characterized by the complete displacement of the tooth from its socket. The success of treatment depends on timely management and proper professional care during and after reimplantation in preserving the tooth in the oral cavity. This study describes a case report of an avulsion of the upper left central incisor (21) that underwent reimplantation. The patient, a 10-year-old boy, had a history of bicycle fall, presenting with extraoral injuries to the cheek and chin, lip abrasions, and avulsion of tooth 21. The tooth was stored in milk and reimplanted 30 minutes after the accident. Clinical and radiographic examinations showed no bone fractures but revealed mobility of teeth 11 and 12 and avulsion of tooth 21. Treatment included cleaning, repositioning of the avulsed tooth, stabilization with a semi-flexible splint, and administration of antibiotics and analgesics. Endodontic therapy with mechanical instrumentation was successfully initiated after 20 days. This case highlights the importance of proper tooth storage and timing of reimplantation, leading to the restoration of patient's aesthetics, chewing function, and self-esteem.

Keywords: Tooth Injuries; Tooth Avulsion; Tooth Reimplantation.

RESUMO

Os traumatismos dentários (TDs) podem ser descritos como lesões geradas a partir de impactos projetados sobre os dentes e/ou tecidos duros e moles no interior e/ou exterior da cavidade oral. Entre os diferentes tipos de TDs, a avulsão, se caracteriza pelo deslocamento total do dente para fora do alvéolo. O sucesso do tratamento depende do tempo de procura por atendimento e a conduta profissional, durante e após o reimplante são cruciais para a manutenção do dente na cavidade oral. Este estudo descreve um relato de caso de uma avulsão dentária que afetou o incisivo central superior esquerdo (21), o qual foi submetido ao reimplante. Paciente do sexo masculino, 10 anos, histórico de queda de bicicleta, apresentava lesões extrabuciais na região da bochecha e do queixo, escoriações labiais e avulsão do dente 21. O dente foi armazenado em leite, sendo reimplantado aproximadamente 30 minutos após o acidente. O exame clínico e radiográfico não revelou fraturas ósseas, mas indicou mobilidade nos dentes 11 e 12, além da avulsão do dente 21. O tratamento incluiu a limpeza e reposicionamento do dente avulsionado, estabilização com contenção semi-flexível, e administração de antibióticos e analgésicos. Após 20 dias, iniciou-se a terapia endodôntica com sucesso. O caso evidenciou a importância do armazenamento adequado do dente e do tempo de reimplante, resultando na recuperação da estética, função mastigatória e autoestima do paciente.

Palavras-Chaves:

Palavras-chave: Traumatismos Dentários; Avulsão Dentária; Reimplante Dentário.

1 Centro Universitário Santa Maria – UNIFSM, Cajazeiras, Brazil.

2 Universidade Federal dos Vales do Jequitinhonha e Mucuri – UFVJM, Diamantina, Brazil.

3 Centro Universitário Santa Maria – UNIFSM, Cajazeiras, Brazil.

4 Centro Universitário Santa Maria – UNIFSM, Cajazeiras, Brazil.

5 Centro Universitário Santa Maria – UNIFSM, Cajazeiras, Brazil.

6 Centro Universitário de João Pessoa – UNIPE, João Pessoa, Brazil.

7 Centro Universitário Facisa – UNIFACISA, Campina Grande, Brazil.

8 Centro Universitário Santa Maria – UNIFSM, Cajazeiras, Brazil.

Autor de correspondência

Danielle Bezerra de Oliveira Nascimento

Email: danielle-oliveira14@hotmail.com

INTRODUÇÃO

Dental trauma (DT) can be described as injuries resulting from impacts to the teeth and/or hard and soft tissues inside and/or outside the oral cavity. Typically, these injuries occur suddenly, unexpectedly, and accidentally, requiring emergency care for patients with this clinical condition.¹

DTs are classified as injuries to the tooth structure and supporting tissue. Thus, uncomplicated crown fractures result in the loss of some of the tooth structure, including enamel and dentin, without affecting the pulp. Symptoms may include normal mobility, positive pulp sensitivity tests, absence of pain to touch and pressure, and significant tooth sensitivity.²

In addition, DTs can affect the pulp and alveolar process and include crown-root fractures, root fractures, and fractures of the alveolar processes of the maxilla or mandible. Other possible injuries include periodontal tissue damage such as concussion, subluxation, lateral dislocation, intrusive dislocation, extrusive dislocation, and avulsion. In addition, injuries to the gingiva or oral mucosa, such as bruises, abrasions, and cuts, can also occur.³

DTs are also considered a public health problem and are particularly common among children and adolescents,⁴ potentially leading to physical,⁵ social, and economic consequences.⁶ They also bring aesthetic-functional and psychological problems that can affect both the patient and his family members.⁷

The most common causes are falls, sports accidents, traffic accidents and physical violence.^{8,9} Furthermore, other factors, such as inadequate labial coverage of the upper anterior teeth and lack of a mouth guard during sports activities, may be predisposing factors.⁷

Among DTs, tooth avulsion is characterized by complete displacement of the tooth from the alveolus. The prevalence is between 0.5% and 16% of all dental injuries. Several studies have shown that this injury is one of the most serious and the prognosis depends on the measures taken at the scene of the accident and immediately after the demolition.¹⁰

Reimplantation is the treatment of choice in most cases, but cannot always be performed immediately. Proper emergency management and treatment plan are crucial for a good prognosis,¹⁰ although there is still significant disagreement among researchers and authors about the best approach to treat avulsion trauma.¹¹

However, tooth reimplantation after avulsion is widely recognized as the most beneficial treatment approach, aimed at preserving the structure of the affected tooth and ensuring the aesthetics of the smile. Therefore, the aim of this study was to describe the treatment of tooth avulsions on the left upper central incisor after tooth reimplantation.

Case report

Research Ethics Committee of the Centro Universitário Santa Maria and was approved under CAAE number 79245124.2.0000.5180 (Appendix A). It was based on the ethical principles of National Health Council (CNS) Resolution 466/12. The Informed Consent Form

(ICF) (Appendix A) and the Free and Informed Consent Form (FIAF) (Appendix B).

A 10-year-old male patient presented for treatment in the city of, northwest state, and had suffered a bicycle fall in the past. The patient had extraoral cheek and chin injuries, lip abrasions, and avulsion of tooth 21 (Figure 1).

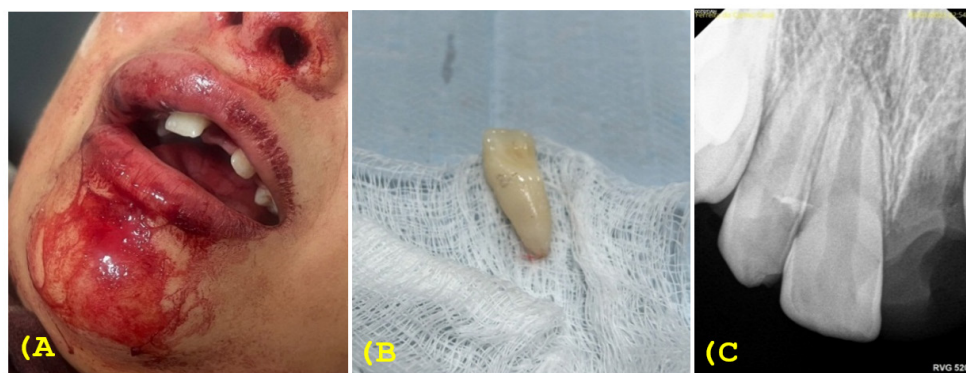


FIGURE 1: (A) Preoperative appearance. (B) Avulsed tooth 21 removed from saline solution at the time of reimplantation (C) Initial radiographic appearance.

The tooth was first transported by the patient's grandmother in a disposable plastic container filled with milk to the Hospital of Municipal Hospital of São Vicente de Paulo, where the patient received first aid about 30 minutes after the incident. It was then stored in a saline container until it was repositioned in the socket (Figure 1).

The anamnesis revealed that the patient had no systemic impairment. To check for bone plate fractures, palpation of the anterior maxilla was performed, which revealed no changes. The initial radiographic examination revealed the integrity of the alveolar bone and elements adjacent to the avulsion trauma and confirmed the absence of any fractures (Figure 1). However,

physical examination revealed mobility of teeth 11 (upper right central incisor) and 12 (upper right lateral incisor).

The protocol established by the International Association of Dental Traumatology (IADT) was used for the procedure.³ (Levin et al., 2020). Extraoral antisepsis, hemostasis, bilateral anterior infiltration anesthesia, and cleaning of the alveoli with 0.9% saline were performed. The tooth was then repositioned and stabilized with a semi-flexible splint made of a 0.4 mm diameter steel wire for approximately 20 days, thereby securing the replanted tooth to the adjacent healthy and immobile teeth. An anterior periapical radiograph was then taken (Figure 2).

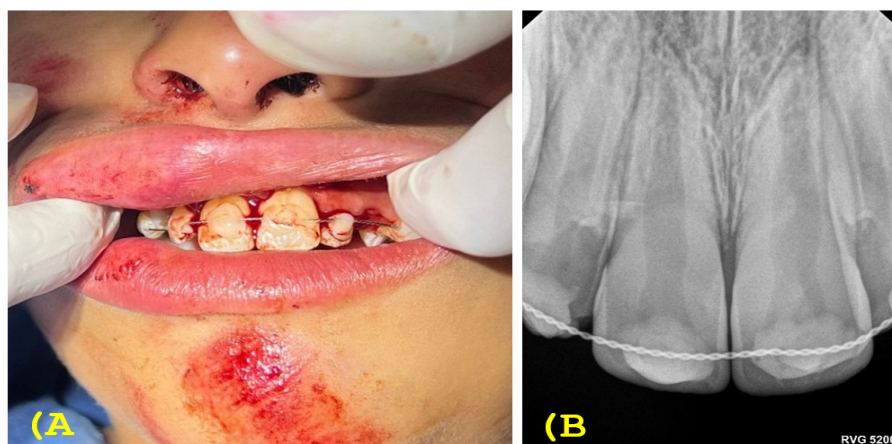


FIGURE 2: (A) Reimplanted tooth and installation of a flexible retainer. (B) Postoperative radiographic appearance.

Prescribed postoperative medications included amoxicillin 500 mg every 8 hours for 14 days, nimesulide 100 mg every 6 hours for 5 days, and dipyron 500 mg/mL every 6 hours for 3 days. In addition, the patient's tetanus vaccination status was checked. Both the patient and his guardians were instructed in the care of the replanted tooth to ensure a better prognosis and prevent new injuries. These instructions included avoiding contact sports, adopting a soft diet acceptable to the patient for up to two weeks, brushing teeth with a soft toothbrush after each meal, and using chlorhexidine (0.12%) for rinsing.

Endodontic treatment of the reimplanted tooth began 20 days after trauma⁽²¹⁾. Absolute isolation was performed under infiltration anesthesia, followed by coronary opening and irrigation of the canals with 2.5% sodium hypochlorite solution. The odontometry of tooth 21 and the biomechanical preparation

of the canals were performed using machine tools in a single session of the canal. The lateral condensation technique was used to close the canals and bioceramic cement (Bio-C Sealer Angelus®) was chosen to cement the gutta-percha pegs. A provisional restoration was then carried out with glass ionomer cement (Riva Light Cure – SDI®). The next day, the restoration was completed with composite resin (Filtek Z350 XT – 3M®). The same day after the examination, the semi-flexible splint was removed (Figure 3). In addition, radiographic examination revealed that tooth 11, which was mobile after trauma, had a periapical lesion (Figure 3), requiring endodontic treatment. However, since the patient lived in another city, this treatment was carried out by a different professional. The patient returned for a follow-up examination 12 months after reimplantation (Figure 4).

On clinical examination, tooth 11, which had undergone endodontic treatment by another professional, appeared dark due to the endodontic cement remaining in the pulp chamber (Figure 4). The chamber was cleaned and then bleached internally (Figure 4).

For clinical control, a radiological follow-up examination was carried out 18 months after reimplantation (Figure 4), which has not shown any changes to date.



FIGURE 4: (A) Radiographic appearance of tooth 21 (12 months after reimplantation). (B) Clinical appearance of tooth 21 (12 months after reimplantation). (C) Appearance at the end of the internal whitening of tooth 11. (D) Radiographic appearance of tooth 21 (18 months after reimplantation).

DISCUSSION

The upper central incisors are typically the most affected by dental trauma.^{12,13,14} This is because the anterior superior area is more exposed during trauma, not taking into account the presence of malocclusions (anterior open bite, increased overjet) and lack of lip seal in this area, which can increase the prevalence and recurrence of trauma.¹⁵

Regarding avulsion, 36% of avulsion traumas involved the upper left central incisor, followed by 33% in the upper right central incisor.¹³ Tooth avulsions often affect children because they often lack motor coordination to minimize injuries in collisions and falls. Furthermore, the

periodontal ligament in children is not yet fully developed and provides minimal resistance to extrusive forces.¹⁶

In addition, young people's participation in activities with direct physical contact (e.g. football and fighting) is also associated with this incidence. One study found that the age of trauma patients ranged from 6 to 51 years, with the most common group between 6 and 17 years.¹³ In the present case, the patient belonged to the age group mentioned in the study and suffered avulsion trauma to the permanent upper left central incisor (tooth 21).

Replantation, the treatment method of choice for permanent dentition, involves repositioning the avulsed tooth in its socket,

preserving the structure of the alveolar bone, preserving the tooth and achieving rehabilitation.^{3,17,18} Immediate replantation within 30 minutes after avulsion has a 90% success rate. However, beyond this period, the likelihood of clinical success becomes uncertain.¹⁹ After two hours, the success rate drops to around 5%.¹⁷

A major reason for delayed replanting is the lack of public information on how to proceed in such situations,²⁰ highlighting the need for better information dissemination. In this clinical case, replantation occurred 30 minutes after avulsion, according to the time frames described in the literature,^{3,19,21} contributing to its success and favorable prognosis.

Various storage media are used in cases of avulsion, but the ideal medium should have low bacterial content, physiological osmolarity, neutral pH, and essential nutrients.¹³ Hanks' balanced salt solution is considered an ideal storage medium and is the reference in avulsion cases because it maintains the vitality of the periodontal ligament for up to 24 hours, and this solution contains essential metabolites necessary for cell maintenance, but is difficult to access, is commonly used in research laboratories, and is not available for general use.²² Another solution for storing torn teeth is ViaSpan[®], which is used for washing, storing and transporting transplanted organs. Although it maintains the vitality of periodontal ligament cells for up to 12 hours and is considered an almost ideal medium, its high cost makes it less practical for daily use.²⁴

Alternative media such as saline, water, human saliva, and milk are commonly used by the public because of their easy accessibility. Saline has adequate osmolarity and pH, but it lacks essential ions for cell survival. Therefore, some authors recommend storage for up to 4 hours.²¹ Although tap water and human saliva prevent dehydration, they are not recommended due to bacterial contamination, hypotension, and insufficient pH and osmolarity leading to cell lysis.^{23,24} Milk is considered one of the most suitable media for tooth preservation with its isotonic properties, near-neutral pH and osmolarity, minimal or no bacterial content, and easy accessibility and low cost.²⁵

However, despite its many properties, milk does not provide conditions for maintaining the integrity of cell morphology or carrying out differentiation or cell mitosis, but simply prevents cell death. When the tooth is stored in milk, its cells remain viable for the first 3 hours (enough time to seek professional help), but after 12 hours, the cell viability is reduced to only 50%.²⁶ In this case report, milk was used as the initial storage medium, followed by saline. The combination of appropriate treatment time and storage medium influenced clinical and radiological success without absorption, as shown in the literature.^{21,25}

If an avulsion occurs, resorption may occur in the most superficial layer of the root. To support the repair process of periodontal ligament cells and the deposition of a new cementum layer for replantation, splinting techniques may

be required.^{27,28} Among the splinting methods, semi-rigid or flexible splinting is performed for a period of 7 to 14 days using photopolymerizable composite resin and monofilament nylon thread. Orthodontic wire or 0.4 mm steel wire allows stabilization and reorganization of periodontal ligament fibers through physiological movement of the tooth, thus preventing ankylosis,²⁹ a clinical condition in which the cementum or root dentin fuses with the alveolar bone with loss of the periodontal ligament.

In this case reported, the patient had a semi-flexible splint for 20 days, enough time for teeth 11 and 21 to stabilize without mobility. Although the duration of the splinting exceeded the literature recommendations, clinical and radiographic success was achieved in the absence of ankylosis and resorption.

The periodontal ligament of avulsed teeth is contaminated by bacteria from the storage medium or the trauma environment.^{3,30} Therefore, systemic antibiotics are used after replantation to prevent infections and reduce inflammatory root resorption.³¹ First-line antibiotics include amoxicillin and penicillin due to their effectiveness against oral microbiota and the low frequency of side effects. In this case report, amoxicillin was prescribed postoperatively and the combination of systemic antibiotics with appropriate replantation management did not show radiographic root resorption.

Case maintenance should occur at least five years after treatment to assess the evolution

of the case and ensure that there are no clinical or radiological signs such as resorption or apical lesions.³² Currently, this case report shows clinical success, but regular follow-up is required for a full long-term evaluation. The limitations of this study are that it is a case report that describes a single clinical case step by step, which limits the scope of observation. In contrast, a case series would allow observation and comparison of different clinical case outcomes, thus providing a more comprehensive view of the topic.

In addition, to confirm clinical success in this case, preservation is necessary since endodontic treatment of replanted teeth requires continuous monitoring to verify the absence of ankylosis and resorption. However, this study can serve as a basis for future in-depth research on this topic and contribute to enriching the literature.

Therefore, this study highlights not only the importance of technical and clinical knowledge, but also the need for a comprehensive approach that incorporates public education and preventative measures to ensure the best possible outcome in the treatment of tooth avulsions. These initiatives can significantly improve patients' quality of life and promote more effective and comprehensive oral health in the community.

CONCLUSION

The success of dental reimplantation treatment after avulsion trauma is crucial to restore patient aesthetics, chewing function, and self-esteem. The procedures performed on the patient in this particular case showed success after treatments that included ideal positioning conditions (milk and saline) and a time interval between trauma and reimplantation (30 minutes) as well as a suitable splint. These practices adhere to current literature protocols demonstrating clinical success.

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Observação: os/(as) autores/(as) declaram não existir conflitos de interesses de qualquer natureza.