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## Case Report

# Clinical outcome following the replantation of an avulsed mandibular incisor: A case report

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## Abstract

Tooth avulsion refers to the complete removal of the tooth from the alveolar socket involving damage to the periodontal ligament. This severe dental trauma requires prompt and complicated treatment. This case outlines the management of an avulsed mandibular lateral incisor that was replanted after being extraorally for seven hours and stored in milk during that period. A male patient aged 16 year presented with trauma to the anterior mandibular region caused by an incidental fall. Clinical evaluation exhibited the avulsion of tooth 32, which was treated following the International Association of Dental Traumatology (IADT) guidelines. The tooth was repositioned and further stabilized with a splint. After 1 week following replantation root canal treatment was started. At one-year review, the tooth remained symptom-free, showing no evidence of replacement resorption.

**Keywords:** Avulsion, Extra-Oral, Mandibular Incisor, Replantation, Splint

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## 1. Introduction

Avulsion is considered a rare occurrence in the permanent dentition, accounting for approximately 0.5% to 16% of all reported cases of dental trauma. Immediate replantation is the treatment of choice in case of avulsion.<sup>1</sup> Most of these incidents occur as a result of accidental falls.<sup>2</sup> As of December 1, 2022, there have been only 15 documented cases of avulsion involving permanent mandibular incisors.<sup>3</sup> Replantation is generally the first-line treatment; however, it might be contraindicated in patients having high caries risk, periodontal conditions, serious systemic conditions, or dental anxiety.<sup>4</sup> This case report contributes a rare instance of avulsion of mandibular lateral incisor to the existing literature.

## 2. Case Presentation

A male patient aged 16 presented with previous incident of trauma due to fall, resulting in injury to the mandibular anterior area. There were no relevant findings in the medical

history and clinical examination revealed no neurological deficits or extra oral injuries. Intraorally, the left mandibular lateral incisor was missing (**Figure 1A**). The clinical diagnosis was an Ellis Class V fracture involving tooth 32. The avulsed tooth had been stored in raw milk and was brought in the Department of Conservative Dentistry and Endodontics approximately seven hours post-trauma (**Figure 1B**). After obtaining informed consent it was decided to proceed with the replantation of the avulsed tooth.

Upon retrieval of tooth from storage medium, residual periodontal ligament (PDL) fibres were removed from the root surface by scaling and root planning. The root was conditioned with a 3% citric acid solution for three minutes, followed by treatment with a 2% sodium fluoride solution (Fluocal, Septodont) for about 20minutes. Local anaesthesia without vasoconstrictor was administered. The socket was gently flushed with normal saline, after which the tooth was repositioned into its socket using light digital pressure. The proper placement was confirmed radiographically using an

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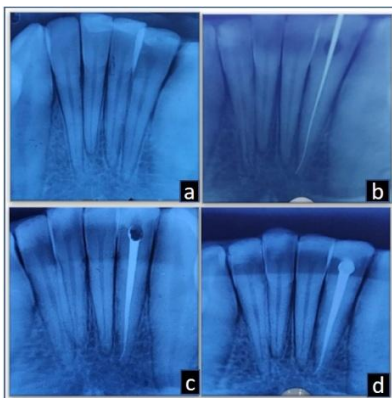
intraoral periapical radiograph (**Figure 1C**). Following confirmation, the replanted tooth was stabilized with a splint (Angelus Interlig) (**Figure 1D**).

Postoperative pharmacologic management included antibiotics: amoxicillin 500 mg with clavulanic acid 125 mg administered two times daily, and metronidazole 400 mg administered three times daily, both for five days. Oral analgesics were also prescribed. The patient was instructed to follow a soft diet for two weeks along with maintenance of oral hygiene. Seven days after the tooth was replanted, routine root canal treatment was commenced. The root canal was mechanically prepared using the ProTaper Gold rotary file system up to size F2 followed by placement of calcium hydroxide, and temporary sealing of the access cavity.

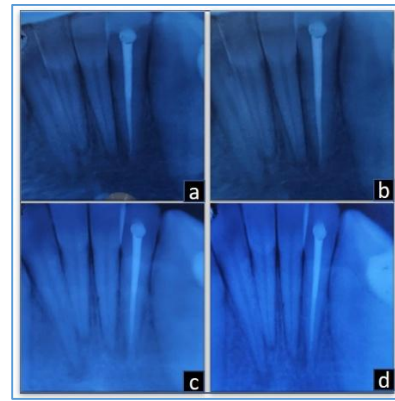
After 2 weeks the medicament was removed and the canal was obturated using gutta-percha and BIO-C sealer (Angelus) via the cold lateral compaction technique (**Figure 2A–D**). The access cavity was permanently restored with a light-cured composite resin (Ivoclar Tetric N Ceram). At the one-month follow-up, the tooth was asymptomatic with no signs of mobility or swelling. Radiographic evaluation showed no evidence of replacement resorption of tooth 32 (**Figure 3A**). These clinical and radiographic outcomes remained stable at three, six, and twelve-month follow-up intervals (**Figure 3B–D**).



**Figure 1:** (A) Pre-operative clinical image (B) Avulsed tooth stored in milk (C) Radiographic verification for correct positioning of the tooth in socket (D) Splinting of avulsed tooth



**Figure 2:** Root canal treatment of replanted tooth (A) Preoperative IOPA (B) Working length IOPA (C) Obturation (D) Post endo restoration



**Figure 3:** Follow up (A) 1 month, (B) 3 month, (C) 6 month, (D) 12 month

### 3. Discussion

Traumatic dental injuries affect individuals across all regions of the world. Trauma due to falls is recognized as a leading cause of dental avulsion in paediatric populations. The survival of periodontal ligament (PDL) cells is significantly compromised if the extra-oral dry time is more than one hour, frequently resulting in adverse effects like inflammatory/replacement root resorption.<sup>1,4</sup> A retrospective study conducted in paediatric patients has demonstrated that, when managed as per the guidelines established by the IADT, the replantation procedure exhibits a long-term survival rate of 79.3%.<sup>5</sup> Replantation of an avulsed tooth plays a crucial role in preserving the alveolar bone's volume and morphology, thereby facilitating a wider range of future rehabilitative interventions, including dental implant placement.<sup>6</sup>

The successful tooth replantation is influenced by multiple critical factors, including the patient's overall systemic health, the degree of root development, the nature of the storage medium utilized, and the duration of the extraoral period.<sup>7</sup> A range of storage media, including milk, Hank's Balanced Salt Solution (HBSS), Viaspan, Propolis, saliva, and saline, are recommended for the interim preservation of avulsed teeth before replantation.<sup>8</sup> Milk is regarded as one of the ideal transport medium due to its biologically compatible osmolarity and pH, as well as its easy availability at the site of injury. Milk, which is colder preserves the proliferative potential of periodontal ligament (PDL) precursor cells for nearly twice the duration compared to milk maintained at room temperature.<sup>9</sup>

In this case the surface of the root was treated with citric acid to induce demineralization and expose the collagen fibres within the root cementum, thereby facilitating a conducive interface for the reattachment of periodontal ligament collagen fibres. Application of citric acid for 30 minutes on the dehydrated root surface of avulsed teeth has shown more favourable outcomes compared to treatment with EDTA.<sup>10</sup>

The detrimental consequences of delayed replantation may be prevented through fluoride application to the root surface.<sup>11</sup> The IADT 2012 guidelines recommended immersing the replanted tooth in 2% sodium fluoride (NaF) solution for 20 minutes, particularly in cases of delayed replantation. This protocol was based on assumption that NaF could inhibit root resorption by converting hydroxyapatite in the dentin into fluorapatite, a more resorption-resistant form. However, due to insufficient scientific evidence supporting its efficacy, the IADT 2020 guidelines no longer endorse pre-treatment of avulsed teeth with NaF.<sup>4</sup>

Once the tooth is replanted, it should be immobilized with a splint. Splinting was done for two weeks to stabilise the tooth in its appropriate position. According to IADT guidelines root canal therapy must be initiated within two weeks after replantation.<sup>4</sup> Endodontic treatment is necessary in such cases due to the potential for necrotic pulp tissue and its byproducts to migrate through anatomical pathways and affect the periodontal ligament, thereby contributing to root resorption.<sup>11</sup> Calcium hydroxide served as an intracanal medicament owing to its broad antimicrobial properties, inhibition of bacterial enzymatic activity, stimulation of tissue enzymes such as alkaline phosphatase, and its role in promoting mineralization. These properties contribute to effective canal disinfection and decrease the chances of root resorption associated with replantation. Clinical and radiographic evaluation is important along with follow-up.<sup>4</sup>

#### 4. Conclusion

Tooth avulsion should be regarded as a dental emergency and needs to be treated as soon as possible. Replantation is considered the optimal therapeutic approach following an avulsion injury. Even after extended extra-oral time, replanting an avulsed tooth might have a positive result if all the recommended procedures and protocols are followed.

#### 5. Source of Funding

None.

#### 6. Conflict of Interest

None.

#### 7. References

- Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, DiAngelis AJ, et al. Guidelines for the Management of Traumatic Dental Injuries: 2. Avulsion of Permanent Teeth. *Pediatr Dent*. 2016;38(6):369–76.
- Alotaibi S, Haftel A, Wagner ND. Avulsed Tooth. 2023 Mar 6. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK539876/>.
- Kaur IP, Sharan J, Sinha P, Kumar A, Marya A. Avulsion of Permanent Mandibular Incisors: A Report of Two Cases with Pertinent Literature. *Case Rep Dent*. 2023; 2023:6204171.
- Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol*. 2020;36(4):331–42.
- Wang G, Wang C, Qin M. A retrospective study of survival of 196 replanted permanent teeth in children. *Dent Traumatol*. 2019;35(4-5):251–8.
- Kotsanos IN, Tzika E, Economides N, Kotsanos N. Intentional replantation and management of avulsion related ankylosis and external cervical resorption. A 10-year follow up case report. *Dent Traumatol*. 2023;39(4):392–8.
- Savas S, Kucukyilmaz E, Akcay M, Koseoglu S. Delayed replantation of avulsed teeth: two case reports. *Case Rep Dent*. 2015;2015:197202.
- Parthasarathy R, Srinivasan S, Vikram C, Thanikachalam Y, Ramachandran A. An Interdisciplinary Management of Avulsed Maxillary Incisors: A Case Report. *Cureus*. 2022;14(4):e23891.
- Lee JY, Vann WF Jr, Sigurdsson A. Management of avulsed permanent incisors: a decision analysis based on changing concepts. *Pediatr Dent*. 2001;23(4):357–60.
- Doiphode AR, Kalaskar RR. Assessment of the effects of citric acid and EDTA on cell viability of cultured human periodontal ligament cells attached to simulated avulsed permanent tooth using a spectrofluorometer-An in vitro study. *Dent Traumatol*. 2025;41(1):75–81.
- Panzarini SR, Gulinelli JL, Poi WR, Sonoda CK, Pedrini D, Brandini DA. Treatment of root surface in delayed tooth replantation: a review of literature. *Dent Traumatol*. 2008;24(3):277–82.

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