

## RE-CONNECTING A LOST SMILE: THE JOURNEY OF TOOTH REPLANTATION

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**ABSTRACT**

Tooth avulsion is a severe traumatic injury in which a tooth is completely displaced from its socket. This results in the loss of blood supply to the pulp and exposes the periodontal ligament cells to external conditions. This case report highlights the rare but successful replantation of a primary tooth preserved in milk, emphasizing the potential for favorable long-term outcomes. It challenges traditional reluctance in clinical practice, offering valuable evidence for managing pediatric dental avulsions. This case report describes the successful management of an avulsed primary maxillary central incisor in a 4-year-old male patient, who suffered a traumatic dental injury to the anterior maxillary region from an accidental fall. The tooth had an extraoral time of 20 minutes and was preserved in milk. Clinical examination revealed an avulsed tooth 51 that was replanted and stabilized in place with splinting. Single visit Pulpotomy was completed five days post-replantation. Follow up was done at regular intervals of one, three, six months and 1 year showed a lack of clinical signs and symptoms and no resorption on radiographic interpretation. Prompt replantation and proper storage of an avulsed primary tooth can lead to successful outcomes, even with short extra-oral time. Early intervention and regular follow-up are key to preventing complications.

**KEYWORD:-** Tooth avulsion; Primary incisors; Dental trauma; Tooth replantation.**INTRODUCTION**

Facial trauma in children can lead to tooth fractures, displacement, and avulsion, negatively impacting their appearance, psychological well-being, and overall function. The highest occurrence of trauma to primary teeth is observed between the ages of 2 and 3 when motor coordination is still developing.<sup>[1]</sup> Studies indicate that avulsions contribute to approximately 7–13% of all primary tooth injuries, with maxillary incisors being the most affected due to their slight vestibular apical inclination and the direction of external forces toward the palatal surface.<sup>[2]</sup> Falls, accidents, violence, and sports are among the leading causes of such injuries to primary teeth.<sup>[1]</sup>

Tooth avulsion is more commonly seen in boys than in girls. The maxillary primary central incisor is the most frequently affected, followed by maxillary lateral incisors and mandibular central incisors.<sup>[3]</sup> In many cases, primary incisor avulsion is accompanied by luxation injuries to neighboring teeth, fractures of the

facial bone, and soft tissue lacerations involving the lips and gingiva.<sup>[1]</sup>

The preferred treatment for avulsion injuries is replantation. Several factors influence the success of replantation, including the patient's overall health, root apex maturity, type of storage medium, and the duration the tooth remains outside the socket. To preserve the viability and function of periodontal ligament (PDL) cells, dehydration of the root surface must be prevented. Among all considerations, the choice of storage medium and the amount of extraoral time are the most critical determinants of PDL cell survival.<sup>[4]</sup>

This case report outlines the comprehensive procedures followed to achieve a successful replantation of an avulsed primary maxillary central incisor.

**Informed consent:** Patient's father has been fully informed of the nature of the child's dental injury and the proposed treatment. He voluntarily gave his consent for the replantation of the child's avulsed primary tooth

(Tooth 51) and any follow-up treatments deemed necessary by the dental team.

### CASE REPORT

Four year old male patient child reported to the department with the chief complain of fall from bed. Intra-oral findings revealed that the child had an avulsed primary maxillary right central incisor (51) due to trauma and marginal gingival laceration was also seen (Figure I).



**Figure I: Pre-op. of the patient.**

The avulsed central incisor was brought to the department by the parents kept in a container with milk. The child was brought to the department within 20 minutes of trauma. The parents were explained about the replantation procedure and they agreed to it. The avulsed tooth was placed in normal saline till replantation. (Figure III)



**Figure II: Avulsed tooth 51.**



**Figure III: Avulsed tooth 51 in normal saline.**

The first objective of treatment was to manage the bleeding, which was done by debridement of the area and irrigation with normal saline. The socket was also irrigated with normal saline. The displaced teeth 51 were repositioned with gentle but firm digital pressure after administration of local anesthesia (Figure IV).



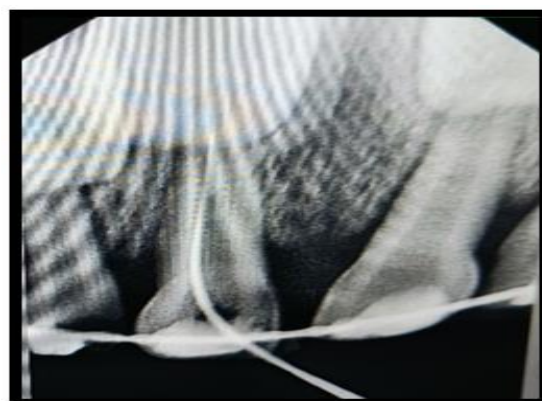
**Figure IV: Replantation of 51 with digital pressure.**

In the same visit, splinting was done with soft stainless steel wire and composite from 53 to 63 (Figure V).



**Figure V: Splinting from 53 to 63.**

The patient was advised soft diet for fourteen days and antibiotics and analgesics were prescribed for the five days. On the 2<sup>nd</sup> appointment (after 5 days of trauma) single visit Pulpectomy was planned. Access opening was done and working length of 51 was taken using 25K file (Figure VI).



**Figure VI: Working length IOPAR of 51.**

Biochemical preparation was done till 45K file with copious irrigation using sodium hypochlorite and normal saline and then canal was obturated with Metapex (Meta Metapex plus, Meta Biomed) (Figure VII). Post-endo. restoration was done with glass ionomer cement.



**Figure VII: Obturation of 51 with metapex.**

Splinting was removed on the follow-up visit of the patient after 14 days and GIC restoration was done i.r.t 52.



**Figure VIII: Follow-up radiographic image after 14 days.**

Follow-up after one month shows satisfactory healing with no mobility observed i.r.t 51.



**Figure IX: Intraoral photograph after one month follow-up.**



**Figure X: Intraoral photograph after three month follow-up.**



**Figure XI: Radiographic image after six months follow-up.**



**Figure XII: Radiographic image after one year follow-up.**

The patient was kept under follow up for the past one year and no signs of mobility or radiographic changes were seen.



**Chronological Timeline of events**

S. No.	Day/Time	Event
1.	Day 0 (Time of Trauma)	Child falls from bed; primary maxillary right central incisor (tooth 51) avulsed. Gingival laceration noted.
2.	Within 20 mins	Parents bring avulsed tooth (stored in milk) and the child to the department.
3.	Same day (Visit 1)	<ul style="list-style-type: none"> <li>- Bleeding controlled with debridement and irrigation.</li> <li>- Tooth 51 replanted after local anesthesia.</li> <li>- Tooth stored in normal saline before replantation.</li> <li>- Splinting done from tooth 53 to 63 using soft stainless steel wire and composite.</li> <li>- Advised soft diet for 14 days and prescribed antibiotics and analgesics for 5 days.</li> </ul>
4.	Day 5 (Visit 2)	<ul style="list-style-type: none"> <li>- Single-visit pulpectomy of 51 performed.</li> <li>- Access opening, working length taken, canal prepared and obturated with Metapex.</li> <li>- Post-endodontic restoration with glass ionomer cement (GIC).</li> </ul>
5.	Day 14 (Visit 3)	<ul style="list-style-type: none"> <li>- Splinting removed.</li> <li>- GIC restoration performed on tooth 52.</li> <li>- Radiograph taken to monitor healing.</li> </ul>
6.	1 month follow-up	<ul style="list-style-type: none"> <li>- No mobility observed.</li> <li>- Intraoral photo shows satisfactory healing.</li> </ul>
7.	3 months follow-up	<ul style="list-style-type: none"> <li>- Continued satisfactory healing confirmed through intraoral photograph.</li> </ul>
8.	6 months follow-up	<ul style="list-style-type: none"> <li>- Radiograph taken. No pathological findings reported.</li> </ul>
9.	1 year follow-up	<ul style="list-style-type: none"> <li>- Radiograph taken. No signs of mobility or radiographic changes observed. Patient under observation for 1 year.</li> </ul>

**DISCUSSION**

The maxillary central incisors, due to their prominent position in the dental arch, are highly susceptible to traumatic injuries in both primary and permanent dentition. Research indicates that dental trauma is more common in children between 0 and 3 years of age, as they are in the early stages of motor development and more prone to falls and collisions.<sup>[7]</sup> Avulsion is a severe form of dental trauma with significant aesthetic, functional, psychological, and financial consequences for both children and their caregivers.<sup>[5]</sup> Several factors contribute to a successful outcome, including the child's age, stage of dental development, minimal contamination of the avulsed tooth, prompt replantation, and regular monitoring of the dentition and surrounding soft tissues.<sup>[6]</sup>

When a tooth is avulsed, immediate replantation is the best approach to prevent dehydration of the PDL fibers. However, immediate replantation is often not feasible. In such cases, using an appropriate storage medium becomes essential to protect the remaining structures and minimize damage. The complications associated with replantation, such as inflammatory resorption, replacement resorption, and ankylosis, can largely be avoided with the use of an effective storage medium during the time before replantation. An ideal storage medium should preserve the viability of the PDL fibers on the root surface. Maintaining the health of these PDL cells supports mitosis and facilitates the regeneration of fibroblasts, which play a crucial role in ensuring the success of the replanted tooth.<sup>[10]</sup>

It is essential to note that the maximum recommended extraoral time for reimplanting an avulsed primary tooth is 30 minutes. During this period, the coagulum in the alveolus remains fluid, allowing for its removal through irrigation with sterile saline solution before reimplantation. Additionally, careful apical repositioning of the tooth should be performed in a controlled and gradual manner. This approach helps distribute pressure through the Haversian system of the alveolar bone, facilitating proper placement. Despite some pressure being applied during reimplantation, studies using cephalometric analysis indicate that a protective barrier, typically around 3 mm thick and composed of fibrous tissue, exists between the primary and permanent teeth. This barrier helps preserve the integrity of the developing permanent tooth.<sup>[9,11,12]</sup>

The splinting of teeth has been widely documented and should be semi-rigid to permit natural tooth movement. This flexibility supports the reattachment of the periodontal ligament, which is essential for maintaining periodontal health.<sup>[13]</sup>

Avulsion, a form of dental trauma, can lead to the premature loss of primary incisors, resulting in several short- and long-term consequences for the child.<sup>5</sup> While clinical reports on the replantation of primary teeth are limited, most authors such as Kinoshita et al., Kawashima et al., Padhy et al. and Zamon et al. suggest that replantation of the primary avulsed tooth is a recommended plan of treatment and is not always contraindicated. The decision to replant an avulsed

primary tooth should be based on specific clinical factors, including a short extraoral duration, appropriate storage in a moist environment, and a low risk of secondary infection following replantation.<sup>[8,14,15,16]</sup>

Limitation of this case report is that it is based on a single patient, which limits the generalizability of the findings. The success of replantation in primary teeth may vary depending on factors such as the child's age, the degree of injury, and the time elapsed before replantation, all of which may differ in other cases. Additionally, the long-term outcomes of replantation in primary teeth remain understudied in larger populations, and the potential for complications such as resorption or infection in different scenarios needs further investigation.

This clinical case demonstrates that primary tooth reimplantation can be safely carried out, provided that biological principles are adhered to, the practitioner is skilled in the conditioning technique, and the family remains actively involved throughout the procedure and follow-up care.

## CONCLUSION

This case report highlights the rare but successful replantation of a primary tooth preserved in milk, emphasizing the potential for favorable long-term outcomes. It challenges traditional reluctance in clinical practice, offering valuable evidence for managing pediatric dental avulsions. The avulsion of a primary tooth is a dental emergency that requires immediate assessment and treatment to reduce complications and support proper oral development. Prevention is key, by fostering safer environments and encouraging the use of protective gear during activities, we can greatly lower the risk of such injuries. Taking a proactive and well-informed approach to managing primary tooth avulsion helps ensure a foundation for lifelong healthy and confident smiles. Future research should involve larger studies to assess the success of replanting avulsed primary teeth with different storage methods and timing, as well as long-term outcomes on tooth and bone health.

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## Conflict of interest

There are no conflicts of interest.

## REFERENCES

1. Acharya S, Mohanty S, Panigrahi A, Singh B, Khatri A. Avulsion and replantation of primary teeth-A feasible option. *Dentist Case Rep*, 2017; 1(1): 1-3.
2. Martins-Júnior PA, Franco FA, De Barcelos RV, Marques LS, Ramos-Jorge ML. Replantation of avulsed primary teeth: a systematic review. *Int J Paediatr Dent*, 2014; 24(2): 77-83.
3. Ravn JJ. Sequelae of acute mechanical traumata in the deciduous dentition. *J Dent Child*, 1968; 35: 281-9.
4. Kadulkar N, Kataki R, Deka A, Thonai S. Replantation of an Avulsed Tooth: A Case Report. *Cureus*, 2023; 15(5): 1-6.
5. Ambarkova V, Tringo A, Fejzuli A, Krmzova T. Avulsion of primary teeth-a case report. *MicroMedicine*, 2021; 9, 9(2): 37-41.
6. Friedlander LT, Chandler NP, Drummond BK. Avulsion and replantation of a primary incisor tooth. *Dent Traumatol*, 2013; 29(6): 494-7.
7. Meyfarth S, Abreu MG, de Oliveira Fernandes T, Milani AJ, Antunes LS, Antunes LA. Dental trauma in primary dentition and the importance of its preservation until the eruption of permanent successor: a 6-year follow-up case report. *Int J Burn Trauma*, 2021; 11(5): 424-9.
8. Kinoshita S, Mitomi T, Taguchi Y, Noda T. Prognosis of replanted primary incisors after injuries. *Dent Traumatol: Case report*, 2000; 16(4): 175-83.
9. de Carvalho Rocha MJ, Cardoso M. Reimplantation of primary tooth-case report. *Dent Traumatol*, 2008; 24(4): e4-10.
10. Venugopal M. Recent Advances in Transport Medium for Avulsed Tooth: A Review. *Amrita J Med*, 2022; 1, 18(2): 37-44.
11. Smith RJ, Rapp R. A cephalometric study of the developmental relationship between primary and permanent maxillary central incisor teeth. *ASDC Journal of Dentistry for Children*, 1980; 1, 47(1): 36-41.
12. Cutright DE. The reaction of permanent tooth buds to injury. *Oral Surg Oral Med Oral Pathol*, 1971; 1, 32(5): 832-9.
13. Bassiouny MA, Giannini P, Deem L. Permanent incisors traumatized through predecessors: Sequelae and possible management. *J Clin Pediatr Dent*, 2003; 27: 223-8.
14. Kawashima Z, Pineda FR. Replanting avulsed primary teeth. *J Am Dent Assoc*, 1992; 123: 90-1, 94.
15. Padhy PP, Pawar M, Mehta V, Kurtkoti N, Meethawala V. Treatment outcomes of replantation of primary teeth with/without splinting and endodontic treatment modality following avulsion injury: A systematic review. *Journal of International Oral Health*, 2024; 1, 16(1): 33-41.
16. Zamon EL, Kenny DJ. Replantation of avulsed primary incisors: a risk benefit assessment. *J Can Dent Assoc*, 2001; 67(7): 386.