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EMERGENCY MANAGEMENT OF AVULSION OF IMMATURE PERMANENT MAXILLARY INCISORS IN A 7-YEAR-OLD CHILD: A CASE REPORT AND PROTOCOL-BASED CLINICAL DISCUSSION

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Abstract

Dental avulsion is one of the most severe traumatic injuries affecting the permanent dentition, particularly in children, where it may compromise esthetics, function, alveolar development, and psychosocial well-being. This case report presents the emergency management of a 7-year-old boy with traumatic avulsion of two maxillary anterior teeth following a bicycle accident. The patient presented approximately 2 h after injury, and the avulsed teeth had been stored in saliva until arrival. Clinical examination revealed recent post-avulsion sockets, localized gingival laceration, and fresh bleeding, without signs of associated craniofacial emergency. Immediate management consisted of careful handling of the teeth by the crown, conservative socket management, prompt replantation, and stabilization using flowable composite. Systemic antibiotic therapy, oral hygiene instructions, and follow-up monitoring were prescribed. Radiographic control performed 2 days later showed preserved alveolar integrity and no evidence of associated bone fracture, while the patient reported no significant pain. This case highlights the importance of rapid, biologically oriented emergency intervention in pediatric dental avulsion. It emphasizes that even in delayed presentations, prompt replantation and careful follow-up may preserve tooth position, alveolar continuity, and future therapeutic options.

Keywords: dental avulsion, tooth replantation, pediatric dental trauma, permanent incisors, emergency management, case report.

Introduction

Dental avulsion is one of the most severe traumatic injuries affecting the permanent dentition because it causes complete displacement of the tooth from its socket and abruptly disrupts the pulp neurovascular supply and periodontal ligament attachment [1-5]. Although avulsion is less frequent than crown fractures or luxation injuries, it carries a disproportionate biological, functional, esthetic, and psychosocial burden, particularly when it involves the maxillary anterior region in a growing child [1,2,6-10]. Prognosis is strongly time-dependent

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and is determined mainly by the extra-oral dry time, storage conditions before replantation, stage of root development, and the quality of emergency management [1-4]. Experimental evidence has shown that prolonged dry storage markedly increases periodontal damage and the risk of inflammatory root resorption and ankylosis, whereas immediate replantation or short-term storage in a physiologic medium offers more favorable healing conditions [4,9-12].

In children, avulsion of immature permanent incisors represents a distinct clinical scenario. Open apices provide a biologically plausible substrate for spontaneous revascularization and continued healing, which differentiates these teeth from mature permanent teeth and directly influences endodontic decision-making [1,5,6]. At the same time, delayed or inappropriate management may compromise not only tooth survival but also alveolar bone preservation, anterior esthetics, phonetics, incisal guidance, and the child's oral health-related quality of life [6,11,12]. This issue is especially relevant in the mixed dentition period, when careful distinction between avulsed permanent and primary teeth is mandatory, since replantation is recommended for permanent teeth under defined conditions but is generally contraindicated for primary teeth [1,10].

Current International Association of Dental Traumatology (IADT) guidelines provide the contemporary evidence-based framework for the emergency management of avulsed permanent teeth, including immediate replantation when feasible, gentle socket decontamination, flexible splinting, systemic adjunctive measures, and structured long-term follow-up [1-3]. However, real-world pediatric cases remain clinically valuable because they illustrate how protocol-based decisions are implemented under urgent circumstances and how early management may influence later pulpal and periodontal outcomes [5-9,13-18]. Therefore, this case report aims to present the emergency management of avulsion of immature permanent maxillary incisors in a 7-year-old child and to discuss the clinical approach in relation to current protocol-based recommendations [1-3].

Case Presentation

A 7-year-old boy was brought to emergency dental care after a traumatic injury to his forehead sustained in a bicycle accident. According to the accompanying parent, the patient presented about 2 hours after the traumatic event, because the injury occurred on a Saturday, in an area where immediate dental assistance was not available. The child was in the mixed stage of teething and had acute pain, active oral bleeding, and marked emotional stress. The parent reported that the avulsed teeth were recovered at the scene of the accident and kept in the child's saliva during transport to the dental office. No loss of consciousness, vomiting, dizziness, or other signs suggestive of associated craniofacial or neurological injury have been reported. Extraoral examination revealed mild upper lip swelling and soft tissue contusion, without evident facial asymmetry, major extraoral laceration, or clinical signs of mandibular dysfunction or facial bone instability (Figure 1).

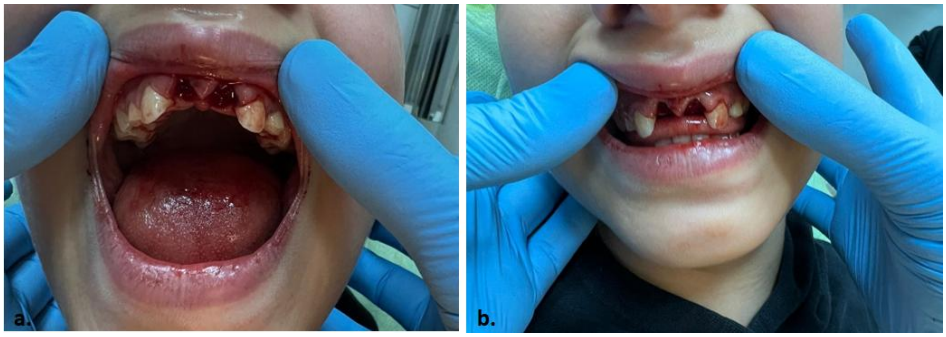

Figure 1. Initial clinical presentation after traumatic dental avulsion. (a) Frontal intraoral view showing recent post-avulsion sockets in the anterior maxilla, associated gingival laceration, and fresh bleeding. (b) Frontal clinical view confirming traumatic loss of the affected maxillary anterior teeth and the extent of the associated soft tissue injury.

Intraoral examination revealed recent post-traumatic edentulous sockets in the anterior maxilla corresponding to the avulsed teeth 1.1 and 2.2, associated with localized gingival laceration, fresh bleeding, and disruption of the marginal soft tissues. The alveolar sockets appeared clinically intact, with preserved architecture and no visible evidence of socket wall collapse or associated alveolar fracture. A fresh coagulum was present, but no visible foreign body contamination was identified. Examination of the adjacent teeth did not reveal associated crown fractures or clinically significant displacement. The surrounding oral mucosa showed localized traumatic injury limited mainly to the anterior maxillary soft tissues.

Because this was an emergency presentation and immediate management was prioritized, treatment was initiated based on the clinical findings and parental consent. The avulsed teeth were handled exclusively by the crown, gently inspected, and repositioned into their respective sockets under careful digital guidance. The sockets were managed conservatively to preserve the residual periodontal ligament and minimize additional trauma to the alveolar tissues (Figure 2).

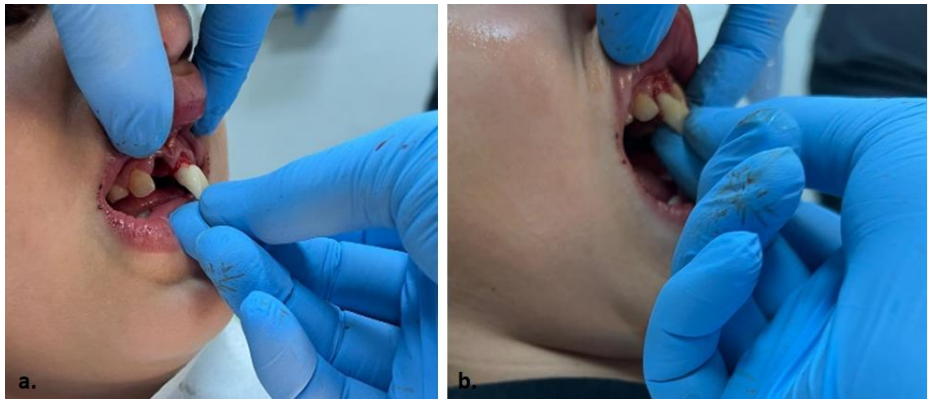

Figure 2. Emergency replanting procedure of avulsed teeth. (a) Guided repositioning of the first avulsed tooth in the socket under delicate digital control (2.1). (b) Replanting of the second avulsed tooth with careful anatomical alignment and non-traumatic manual pressure (1.1).

Figure 3. Immediate post-replantation hemostasis and stabilization. (a) Local hemostasis after repositioning of the avulsed teeth. (b) Photopolymerization of the flowable composite is used to stabilize the replanted anterior teeth immediately.

Immediate replantation was performed with gentle digital pressure until satisfactory clinical adaptation was obtained. Local hemostasis was achieved, and the soft tissue margins were repositioned to the greatest extent possible. The replanted teeth were then stabilized using a composite-based splint with flowable composite (Figure 3).

Postoperative management included systemic antibiotic therapy, oral hygiene instructions, a soft-diet recommendation, and local plaque-control measures. Tetanus prophylaxis was not considered necessary in this case, based on the clinical circumstances and history obtained from the parent. A radiographic control examination performed 2 days later showed a satisfactory postoperative appearance, with preserved alveolar integrity and no radiographic evidence of associated bone fracture. At that time, the patient reported no significant pain. Immediate postoperative examination showed satisfactory repositioning of the replanted teeth and restoration of anterior maxillary continuity (Figure 4).

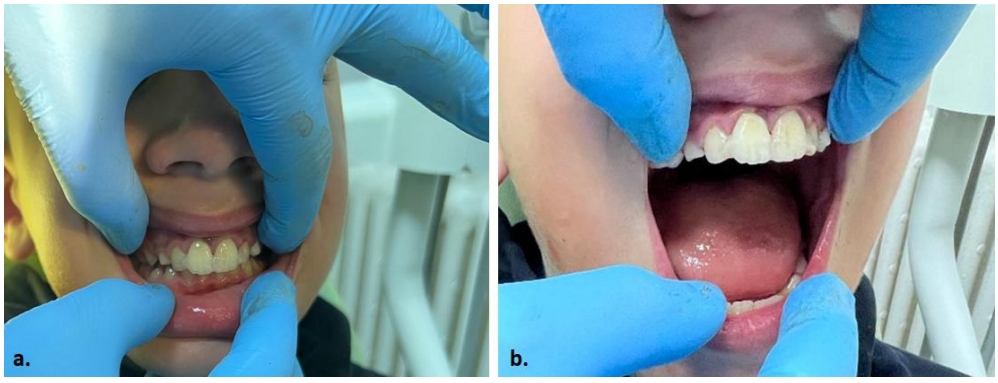

Figure 4. Immediate postoperative clinical outcome after emergency replantation. (a) Frontal view showing restoration of the anterior esthetic appearance after treatment. (b) Intraoral view demonstrating satisfactory repositioning of the replanted teeth and re-establishment of anterior maxillary continuity.

The patient was scheduled for periodic follow-up to monitor splint tolerance, pulpal and periodontal healing, root development, and possible complications, including inflammatory root resorption, replacement resorption, ankylosis, or pulpal necrosis.

Emergency Management

Emergency management was initiated immediately after general clinical assessment and exclusion of signs suggestive of associated neurologic or craniofacial emergency [1,15]. In accordance with current IADT recommendations for avulsed permanent teeth, the avulsed teeth were handled exclusively by the crown, the socket area was managed gently and conservatively, and immediate replantation was performed as soon as clinically feasible [1-3]. Clinical position was verified after replantation, and postoperative radiographic control was performed subsequently [1]. The replanted teeth were stabilized using a flexible splinting approach, followed by systemic antibiotic therapy, oral hygiene instructions, local chlorhexidine-assisted plaque control, and scheduled follow-up [1,2]. Tetanus status was reviewed, and no additional prophylactic intervention was considered necessary in this case [1]. When immediate replantation cannot be performed, the tooth should be stored in a physiologic medium, such as milk, HBSS, saliva, or saline, to reduce additional damage to periodontal ligament cells and improve healing potential [1,4].

Discussion

Dental avulsion is one of the most severe traumatic injuries of the permanent dentition because it simultaneously affects the periodontal ligament, pulpal vascular supply, and alveolar socket relationship [1-3]. In children, the impact is amplified by esthetic, functional, psychological, and developmental consequences, especially when the anterior maxilla is involved [1,10,11]. In our case, the clinical relevance lies in the emergency management of anterior dental avulsion in a 7-year-old child under delayed but still biologically meaningful conditions.

According to current IADT guidelines, the main prognostic determinants after avulsion are extra-alveolar time, storage medium, root development stage, and the quality of emergency management [1-3]. In our case, the patient presented approximately 2 h after trauma, and the avulsed teeth had been stored in saliva. Although saliva is not the ideal storage medium, it is preferable to dry storage and may reduce additional damage to the periodontal ligament when immediate replantation is not possible [1,4]. This is clinically relevant because prolonged dry storage is strongly associated with inflammatory root resorption and replacement resorption [4,7,8].

The patient's young age is another favorable biologic factor. In immature permanent teeth, healing potential may be greater because incomplete root formation may support pulpal revascularization and other favorable post-traumatic responses. However, this remains dependent on multiple local and temporal factors [1,5,6]. Therefore, in our case, short-term

success should not be interpreted only as immediate tooth retention, but as the beginning of a process that requires long-term clinical and radiographic surveillance.

The management performed by our team was based on immediate replantation, atraumatic handling of the teeth, conservative socket management, and immediate stabilization, in line with the essential biologic principles of avulsion treatment [1-3]. Although radiographic examination was not performed at the emergency visit, subsequent radiographic control showed preserved alveolar integrity and no evidence of associated bone fracture. This sequence reflects a pragmatic emergency approach, in which immediate replantation was prioritized, with radiographic confirmation obtained shortly afterward.

Our case also highlights that early favorable evolution does not exclude later complications. In avulsion injuries, inflammatory root resorption, ankylosis, replacement resorption, and pulpal necrosis may develop after an initially satisfactory clinical result [1,7-9]. For this reason, long-term follow-up remains mandatory.

Overall, our case supports the principle that prompt replantation, appropriate temporary storage, conservative handling, immediate stabilization, and structured follow-up remain the key elements of successful emergency management in pediatric dental avulsion [1-3,11].

Conclusions

Prompt emergency replantation of avulsed permanent anterior teeth in children remains the key determinant of favorable short- and long-term outcomes. Even when treatment is delayed or performed under less-than-ideal circumstances, atraumatic handling of the tooth, conservative socket management, immediate stabilization, and careful follow-up are essential to preserve tooth position, support pulpal and periodontal healing, maintain alveolar continuity, and preserve future therapeutic options during growth.

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