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Management of Avulsed Primary Teeth and Replantation: A Literature Review

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Abstract

Avulsion of a primary tooth is a traumatic injury commonly seen in children and can be a distressing experience. Paediatric dentists frequently encounter cases of avulsed primary teeth in their clinical practice. While avulsion injuries occur more often in permanent teeth, they can also affect primary teeth. The decision to replant an avulsed primary tooth has been a subject of debate and controversy for many years.

The most important consideration in managing such injuries is evaluating the risk–benefit ratio, particularly with regard to the underlying permanent tooth. Priority must be given to protecting the development and normal eruption of the succedaneous (permanent) tooth. This consideration is essential when determining whether procedures such as replantation should be attempted.

Several factors require careful evaluation before proceeding with treatment, including the extent of root resorption in the primary tooth, the developmental stage of the underlying permanent tooth and the appropriate method of splinting if replantation is performed. Different studies have expressed varying opinions about replantation of avulsed primary teeth depending on the type of tooth involved. In addition, there is uncertainty regarding whether replantation may affect the eruption pathway or difficulty of eruption of the permanent successor.

Currently, there is limited scientific evidence regarding the overall benefits and risks associated with replanting avulsed primary teeth. This article presents a review of the replantation of avulsed primary teeth.

Keywords: Primary tooth, Avulsion, Replantation

Introduction

Traumatic dental injuries affecting the primary dentition are a significant public health issue, with an estimated global prevalence of 22.7%, particularly among children aged 2–6 years.[1] Due to the relatively elastic nature of the alveolar bone and supporting tissues in young children, luxation injuries are common and often require thorough clinical assessment and careful management. Primary teeth are essential for proper mastication, speech development, guidance of permanent tooth eruption and

child's psychological well-being. Consequently, trauma to these teeth can have both immediate and long-term functional and emotional implications.[2]

Among traumatic dental injuries, avulsion is one of the most severe, characterized by the complete displacement of the tooth from its socket. In contrast to permanent teeth where immediate replantation is generally recommended replantation of avulsed primary teeth is not advised. Professional guidelines, including those issued by the International Association of Dental Traumatology (IADT), clearly recommend against replanting primary teeth.[3-5] This recommendation is based on the need to reduce serious risks such as aspiration during the procedure, additional psychological distress to the child and most importantly potential injury to the developing permanent tooth germ.[3-6]

Despite these recommendations, pediatric dentists are often confronted with parental requests to replant avulsed primary teeth due to concerns about aesthetics, speech, occlusal stability, chewing efficiency and the psychological impact of a missing anterior tooth. Some studies have described successful outcomes following replantation however, other studies have documented significant complications. These include pulp necrosis, fistula formation, crown discoloration and external root resorption in the replanted primary tooth.[7]

Damage may occur at the time of the initial trauma, during the replantation procedure itself or later as a result of persistent infection or inflammation associated with the replanted tooth. Reported sequelae in permanent teeth include crown and root malformations such as dilacerations, impaction and deviations in eruption path.

Alternative approaches, such as leaving the space unrestored or using space maintainers, may result in aesthetic and phonetic challenges and are sometimes poorly tolerated by young children. However, the current body of evidence is limited, as most published reports are isolated case studies with varying methodologies and outcomes.[8]

Moreover, it remains uncertain whether adverse outcomes are attributable solely to the replantation procedure or to the combined effects of the initial avulsion trauma and subsequent intervention. Therefore, comprehensive evaluation of the existing literature is necessary to better understanding the risks and benefits of replanting avulsed primary teeth.

Discussion

In the absence of solid scientific evidence regarding the treatment of avulsed primary teeth, recommendations in textbooks, review articles and clinical guidelines have largely reflected authors personal opinions. Traditionally, these sources have discouraged replantation of avulsed primary tooth, often on the basis of theoretical risks rather than documented outcomes. A careful analysis of the literature reveals that many objections are grounded in assumptions, anecdotal observations or isolated case reports, rather than controlled studies or long-term evidence.

One of the commonly cited arguments against replantation is the claim that young children have minimal esthetic concerns. In a study by Moss, has been suggested that preschool children are generally unaware of the loss of a primary incisor and are not psychologically affected by it, particularly since their peers are also in the process of losing teeth. However, no published evidence substantiates the assertion that premature loss of primary incisors has no impact on a child's self-esteem or body image.[9]

On the contrary, parents often express a strong desire to restore their child's appearance. Evidence that even preschool children may be sensitive to aspects of their

appearance further challenges the notion that esthetic considerations are irrelevant in this age group.

Hill and kenny et al[10-11] commented that financial costs, time commitment and concerns regarding child cooperation have also been cited as reasons to avoid replantation. While treatment expenses and repeated dental visits are valid considerations, they are not unique to replantation. Wilson in his study stated that Prosthetic replacement of missing primary incisors, instead of replantation requires extensive child cooperation and multiple appointments.[12]

According to Andreasen and Andreasen biological complications, particularly pulp necrosis and external inflammatory root resorption, represent more substantive concerns. Pulp necrosis is inevitable in an avulsed primary tooth due to severance of its blood supply. However, this condition is also expected in avulsed permanent teeth and established treatment protocols emphasize early endodontic therapy to prevent inflammatory root resorption.[13-14]

Harrison concluded that high failure rate reported in cases where replanted primary teeth when did not receive endodontic treatment underscores the importance of appropriate follow-up care rather than serving as an argument against replantation itself.[15]

The most frequently invoked argument against replantation is the potential risk to the developing permanent successor. It has been proposed that replantation may damage the permanent tooth bud, either mechanically during reinsertion or indirectly through inflammation associated with pulp necrosis.

Yet, there is no direct evidence demonstrating that replantation increases the risk of damage beyond that already associated with traumatic injuries to primary teeth. In fact, repositioning of luxated primary incisors an accepted treatment also involves manipulation of the root in close proximity to the permanent successor. Moreover, developmental disturbances of permanent incisors have been reported following avulsion of primary teeth even without replantation. While isolated case reports have described severe sequelae after replantation, these cases often lacked adequate endodontic treatment, splinting and follow-up.

The absence of controlled human or animal studies leaves the true level of risk uncertain. Proposed modifications, such as apical root resection prior to replantation, have been suggested to reduce potential harm to the permanent tooth germ.[16-18]

According to Kokich et al Ankylosis has also been cited as a complication of replantation. Theoretically, damage to the periodontal ligament may permit direct fusion between cementum and bone. However, a review of reported cases of replanted primary teeth reveals little documented evidence of ankylosis. Interestingly, ankylosis has been intentionally induced in specific orthodontic applications involving primary teeth, suggesting that the condition is not inevitable following replantation. Furthermore, ankylosis following trauma in the primary dentition is most commonly associated with intrusive injuries rather than avulsion. Although the possibility of ankylosis cannot be excluded, its actual incidence after replantation remains unclear.[19]

The risk of aspiration of a mobile replanted tooth is a legitimate concern. Killian criticized Kawashima for tooth rendered unstable by trauma to the supporting tissues should be splinted to adjacent teeth. Appropriate splinting not only reduces mobility and discomfort but also minimizes the danger of accidental aspiration. Thus, adherence to established principles of splinting is essential in cases where replantation is attempted.[20-21]

Arguments in favor of replantation, as presented by Moss and Maccaro, include prevention of esthetic impairment,

space loss, speech difficulties, masticatory problems, delayed eruption and malposition of permanent successors. However, many of these proposed benefits are weakly supported by empirical evidence Developmental disturbances of permanent incisors have been documented even in cases where early loss of primary predecessors did not occur.

Moreover, there is no conclusive proof that replantation reliably prevents the problems it is purported to address. Regular recall examinations and radiographic monitoring are required following replantation, exposing the child to repeated imaging; yet similar follow-up is recommended for other severe traumatic injuries to primary teeth, such as intrusion or complicated crown fractures.[22]

The prevailing negative attitude toward replantation of primary teeth appears to be influenced more by tradition, medico-legal concerns and financial considerations than by strong scientific evidence. The absence of standardized guidelines and long-term outcome studies has lead clinicians to rely on intuition rather than structured clinical protocols. Nevertheless, the well-established treatment principles for avulsed permanent teeth can be adapted to the primary dentition, with appropriate modifications to account for patient age, cooperation, parental compliance, physiologic root resorption and proximity to the developing permanent successor.[23]

According to Filippi replantation should be avoided in situations such as incomplete crown development of the permanent successor, significant systemic disease, anticipated noncompliance, multiple avulsions without suitable abutment teeth for splinting, severe alveolar fractures, advanced physiologic root resorption, extensive caries or preexisting periodontal infection.

When replantation is undertaken, it should ideally occur within 15 minutes to preserve periodontal ligament vitality. In practice, this is feasible only if the tooth is replanted immediately at the site of injury. If immediate replantation does not occur, both pulp and periodontal ligament can be assumed necrotic and appropriate endodontic and supportive measures must follow. [24-25]

Conclusion

In conclusion, the widespread recommendation against replantation of avulsed primary incisors appears to rest largely on opinion rather than robust evidence. While replantation without risk which requires careful technique, case selection, integrity of the alveolar bone, total extra-alveolar time, the contamination level of the location from where the tooth fell, storage media in which the tooth is kept while out of the alveolus, the presence of adjacent teeth to splint, and nutritious or nonnutritious habits in the child's routine that may affect the stability of the replanted tooth. Also, the avulsed primary tooth requires a subsequent endodontic treatment to avoid apical consequences of pulp necrosis. and scheduled follow-up.

Until well-designed long-term studies, decisions regarding replantation should be individualized, balancing potential risks and benefits, parental preferences and the best interests of the child.

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