

Replantation of a Iatrogenically Avulsed Mandibular Premolar Undergoing Orthodontic Therapy: A 5 Year Follow-Up

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The succedaneous permanent teeth develop in close proximity to primary teeth. They can get accidentally luxated or avulsed during the extraction of primary teeth. The purpose of this paper was to describe a case of a 14-year-old boy with an “iatrogenic avulsion” of an immature mandibular second premolar during the extraction of a primary mandibular second molar. The case was managed successfully with replantation technique within 30 minutes of extra oral period and followed up for 5 years. The replanted tooth remained clinically asymptomatic, showed continued root development and eruption and remained vital. This paper had also discussed about the modifications in extraction technique to avoid the iatrogenic avulsion of permanent tooth bud during extraction of primary teeth.

Keywords: Accidental extraction, Management, Replantation, Root development, Eruption

INTRODUCTION

The extraction of the non-restorable or over-retained primary tooth is a common procedure carried out in pediatric dentistry. The roots of primary molars harbor the developing premolars which remain in their close proximity till eruption¹. Additionally, the immature teeth, prior to attaining root maturation do not have adequate support of periodontium¹. Hence, the deep position of an elevator, the apical grip of extraction forceps or excessive force during extraction can result in accidental extraction of developing succedaneous tooth bud i.e., “iatrogenic avulsion”. This is similar to the complete disjunction as seen in the traumatic dental injuries more prevalent in the maxillary anterior region². The International Association of Dental Traumatology (IADT) guidelines advocate an immediate replantation of avulsed permanent teeth³.

Kemp (1997) described a case of accidental removal of premolar while carrying out the extraction of a primary mandibular second molar in a 9-year-old girl⁴. It was immediately replanted in the alveolar socket. In the subsequent follow-ups, normal eruption and obliteration of the root canal was reported. This case report describes the five years follow up of a similar case in a pediatric patient managed by immediate replantation.

Case presentation

A 14-year-old healthy male child planned for fixed orthodontic mechanotherapy underwent extraction of primary mandibular left second molar [FDI notation-75] in a general practice which led to iatrogenic avulsion of mandibular left second premolar [FDI notation-35]. The treating dentist wrapped the tooth in gauze and brought it to the orthodontist who transferred it to the normal saline storage medium and referred the patient to the pediatric dentistry

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unit for management. Extraoral dry time was about 15 minutes with an additional time of 15 min in normal saline during transportation. The tooth was in Nolla's stage 8 at the time of presentation and the extraction socket was filled with blood clots without any fracture of buccal and lingual alveolar walls [Figure 1a-b]. An intraoral periapical radiograph confirmed the patency of the empty extraction socket [Figure 1c]. The past dental history revealed that the patient had to undergo fixed orthodontic therapy and as a part of the same had undergone extraction of all his first premolars [FDI notation 14,24,34,44].



Figure 1. a. Avulsed mandibular left second premolar (35) with incomplete root development b. Clinically missing premolar c. Alveolar socket after avulsion.

Written informed consent was obtained from the patient's father. The extraction socket was gently cleaned with normal saline and curetted to remove blood clots and debris. The tooth was replanted into socket followed by stabilization with figure-eight suturing using chromic gut suture (Size 4-0, Hu-Friedy, USA). The patient was instructed to maintain oral hygiene, advised twice daily mouth-wash (Chlorhexidine 0.2%) and a soft diet. The patient was asked to report after 10 days for follow-up during which he was asymptomatic. A lingual holding arch was placed to prevent space loss. At subsequent follow-ups, comprehensive orthodontic therapy was started while the replanted tooth remains clinically asymptomatic. The tooth was vital with continued root development with no signs of ankylosis as verified by periapical radiographs and electric pulp testing [Figure 2a-e]. The patient is currently in the finishing stage of fixed orthodontic therapy and is clinically asymptomatic without any pathological radiographic finding even 5 years after replantation [Figure 3].



Figure 2. Clinical images showing continued eruption of mandibular left second premolar (35) (a-c). Radiographic images showing completed root development and normal periodontal ligament space (d-f).



Figure 3. Clinical picture and radiograph of the replanted tooth after 5 years follow-up.

DISCUSSION

The procedures of auto-transplantation and replantation are based upon maintaining the viability and function of the periodontal ligament and Hertwig's epithelial root sheath of the transplanted/replanted tooth⁵⁻⁷. This largely depends upon the extraoral dry time elapsed since the tooth is out of alveolus and the storage time during transportation as well as the storage media used⁸⁻¹⁰. This can further determine the prognosis of the replanted tooth. The survival of extracted premolar (FDI notation 35) in the present case report after an extraoral dry time of 15 minutes and additional storage time of 15 minutes in normal saline highlights the importance of setting in which the avulsion has been taken place⁹. In the present case, an extraction of primary mandibular left second molar [FDI notation 75] was performed under the sterile condition and the total extraoral time (dry time and saline storage) was not more than 30 minutes which might be the reason why the viability of periodontal ligament was maintained. Although immediate replantation would have been possible, the attending general dentist was neither confident to attempt it, nor the tooth was stored accordingly³. This also emphasizes the importance of including such scenarios as a part of the training of all the dentists and dental personnel who are directly involved in the patient care. Since the tooth was in Nolla's stage 8, its repositioning could preserve the continuing root growth potential as well as the integrity of the periodontium⁶.

The findings of the present case in many ways are similar to the case described by Kemp (1997)⁴. The replantation of teeth was immediate in their case while there was a delay of about 30 minutes in our case. The roots of primary molars encircle the crown of the succedaneous tooth which undergoes resorption with time.¹ There are patients in which the roots of primary molars are divergent due to which they do not undergo root resorption with the eruption of succedaneous premolar. This results in encircling of developing premolar by primary molar roots as shown in the pre-operative orthopantomogram of the present case (Figure 4) and therefore further increasing susceptibility of iatrogenic avulsion. Thus, in such cases caution must be exercised during the extraction of the primary molars. The crown sectioning of the primary molar prior to the extraction is recommended to prevent the inadvertent displacement of the underlying premolar¹¹. In the mandibular primary

molars sectioning of the crown can be performed in buccolingual direction to divide their crown into a mesial and distal half and thereby extracting each half separately (Figure 5). Similarly, crown sectioning of the maxillary molars can be performed in a meso-distal direction to divide the crown into buccal and palatal halves. The successful management of the present case even after a delay emphasizes the tolerance and regenerative potential of periodontal tissues and HERS of an immature permanent tooth. The outcomes of the present case also highlight the importance of reducing the chances of contamination and adequate storage medium^{2,10,12}.

There are other indications too requiring immediate replantation due to iatrogenic avulsion. These includes the accidental extraction of a wrong site tooth or extraction of an adjacent tooth while luxating the tooth to be extracted. The risk factors for wrong tooth extraction include providing incorrect information by the patient, operator fatigue, multiple operators, multiple procedures, unusual time pressures, emergency extractions, unusual patient anatomy, and overall poor communication among and between the treating staff and the patient.¹³ Most of the cases of wrong tooth extractions are preventable. This complication can be minimized by the development of an educational program, a pre-operative checklist, an unambiguous referral form, and the incorporation of a universal protocol for the prevention of wrong procedures, wrong site as well as wrong person surgery into daily clinical practice¹². However, in spite of all the precautions, such complications do occur. The International Association of Dental Traumatology guidelines for the management of traumatic dental injuries (Avulsion of permanent teeth) is



Figure 4. Preoperative Orthopantomogram showing primary mandibular left and right second molars encircling the crowns of their succedaneous premolars.



Figure 5. Illustration showing the sectioning of crown of the primary mandibular second molar followed by extraction in segments.

recommended for the management of such cases¹⁴. The consultation should be sought from the treating orthodontist if the extraction was part of orthodontic therapy or patient had to undergo orthodontic therapy in the future. The other scenario in which adjacent tooth accidentally get avulsed while extraction should be managed with replantation whenever possible. The successful management of the present case even after a delay emphasizes the tolerance and regenerative potential of periodontal tissues and HERS of immature permanent teeth even after significant trauma and signifies the importance of reducing the contamination and adequate storage^{2,10,15}.

CONCLUSION

Iatrogenic avulsion although rare but can be a potential complication associated with the extraction of primary teeth especially the molars.

The preoperative radiograph for anatomic evaluation followed by caution and modification in extraction technique can help to avoid damage to a developing succedaneous tooth.

Immediate replantation can help to prevent ankylosis and results in continued root development and eruption in an avulsed immature unerupted tooth.

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