

Tooth loss and subluxation in the primary dentition: a twelve-year follow-up case report

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The case of a five-year-old child is reported, who suffered dento-alveolar injury including subluxation of the right upper lateral incisor and avulsion of the upper central incisors and left upper lateral incisor and laceration in the mucosa. The case was followed for 12 years until complete root formation and alignment of the anterior permanent teeth.

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INTRODUCTION

Dento-alveolar injuries the primary dentition are very common, especially in the first years of life. The correct diagnosis allows an adequate immediate treatment and favors the prognosis of the case.¹⁻³ Epidemiological investigations in different countries showed a high incidence of dental injuries related to accidents within and around the home. In most cases, only one or two teeth are affected which are usually the central maxillary incisors.^{1,2,4,5}

About 30% of the children suffer some kind of dental injury in the primary dentition.⁶ Most of the injuries are caused by falls and collisions or pushing of other children, while playing, followed by falling of stairs or the bicycle, and automobile accidents.^{1,2,5} Luxation injuries are more common than crown fractures in the primary dentition, probably because the alveolar bone tissue is more resilient in this period.^{2,5-8}

When primary teeth are lost prematurely, the permanent teeth may be delayed in eruption by one year.⁷ This occurs because a fibrotic scar tissue may develop in the pathway of the erupting permanent tooth.^{1,2} A removable space or fixed maintainer can be used to replace the missing anterior teeth.^{2,13} Rehabilitation of the anterior region even in the primary dentition is very important, because the absence to teeth until the eruption of permanent teeth may cause esthetic and functional complications as well as anxiety.⁹

There are some pulpal and periodontal complications following trauma to primary teeth that may occur, such as: pulpal hyperemia, pulpal hemorrhage, pulpal necrosis, pulp canal obliteration, inflammatory resorption, and replacement resorption.^{1,2} Necrosis is the most common complication¹. These teeth have a substantial risk of devitalization owing to the lack of collateral circulation. There is a thin band of neurovascular pulpal tissue entering at the root apex that can easily be severely damaged even by minor trauma.²

Follow-up of the dental development is very important in cases of trauma to the primary teeth, since it is well documented that it can easily be transmitted to its permanent successor. Developmental disturbances on the permanent successors can be expected in about 50% of all cases^{1,2} since, anatomically, the permanent anterior teeth develop in close proximity to the apices of the primary incisor.² Alterations on the permanent teeth may occur some months or even years after the trauma.^{2,14}

CASE REPORT

A white, five-year-old female patient came to the dental office four days after she had suffered dento-facial trauma due to a bicycle fall. The mother informed us that immediately after the trauma, the child received dental care and the laceration on the gingiva was sutured (Figure 1). No other procedure had been performed then.

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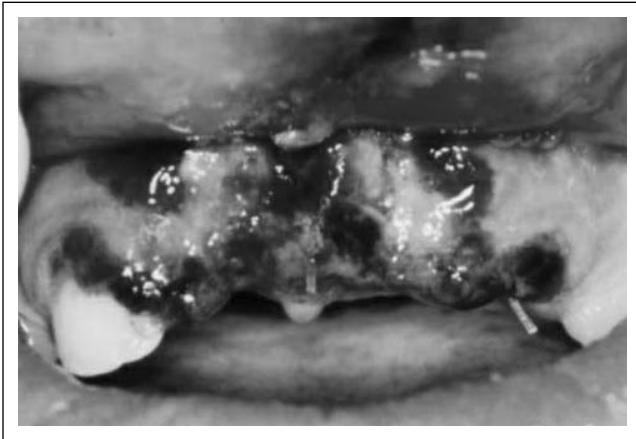


Figure 1. Intra-oral aspect of patient four days after trauma. The primary central incisors and the left primary lateral incisor were lost.



Figure 2. Initial radiograph showing the lost teeth.

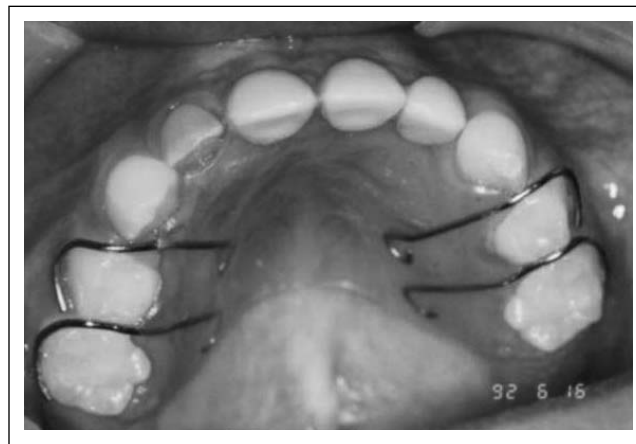


Figure 3. Space maintainer in place. Color alteration on the right primary lateral incisor can be observed.

After initial information was collected, we cleaned the affected area with a 0.12% chlorhexidine solution, followed by a clinical and radiographic examination. The child showed laceration on nose and lips, subluxation of right upper lateral incisor and avulsion of left upper lateral incisor and central incisors (Figure 2).

The mother was instructed to give a moderately soft diet to the child. Since the patient complained of pain in the traumatized region, Paracetamol was administered for 2 days. To prevent infection, Amoxicillin for one week was also prescribed. The patient's tetanus immunity was checked. The mother was warned on the possible sequela that may develop and on the need to clean the traumatized region in order to avoid secondary infection.

Three-months after the trauma, a removable esthetic appliance was placed to reestablish esthetics, mastication, and speech. The child demonstrated a

significant change in attitude after this maintainer was placed. Before the use of the space maintainer, the child was apparently shy and was always trying to hide the missing teeth. Immediately after placement of this appliance, the child had a smile on her face and did not place her hand over her mouth. Endodontic treatment was also performed on the right upper lateral incisor since after radiographic examination, pulpal degeneration was observed and clinically the tooth showed color change (Figure 3). The Vitapex® (New Dental Chemical Products Co. Ltd., Tokyo, Japan) filling material was employed. Two-weeks after endodontic treatment, the filling material that had extravagated was reabsorbed (Figure 4a). The child was recalled for follow-up sessions twice a year.

Twenty-seven months after the trauma, on radiographic examination it was seen that the upper right permanent central incisor had changed position. Clinically, a fibrotic



Figure 4a. Radiograph showing the endodontic treatment of the left primary lateral incisor. Some of the obturation paste flew out of the root canal.



Figure 4b. Radiograph 15 days after root canal treatment. The obturation paste that flew out was reabsorbed.

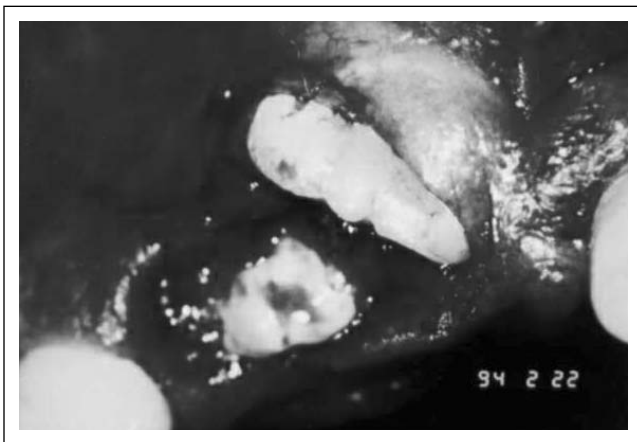


Figure 5. Surgery on the region of the right permanent central and lateral incisors.

tissue was detected on the area of both central incisors, indicating the need for surgery (Figure 5). Even though the upper right permanent central incisor changed position, it erupted easily after surgery. Five months after this procedure was performed, new radiograph was taken and a radiolucent image was seen on the cervical region of the root of the upper right permanent central incisor. At that moment, the diagnostic hypothesis was either root resorption or a discrete root dilaceration (Figure 6a). No additional treatment was performed and only follow-up of the region was the proposed treatment.

Clinical and radiographic follow-up was maintained until complete eruption of the upper laterals and



Figure 6a. Radiograph of right permanent central incisor showing alteration on the cervical region.

central incisors (Figures 6b and 6c). The anterior central permanent teeth showed only a discrete color change on the crown. The patient was then referred for orthodontic treatment. Twelve-years after the trauma, the follow-up of the radiolucent area that had appeared on the upper right permanent central incisor showed to be a defect on the root formation (Figure 7).

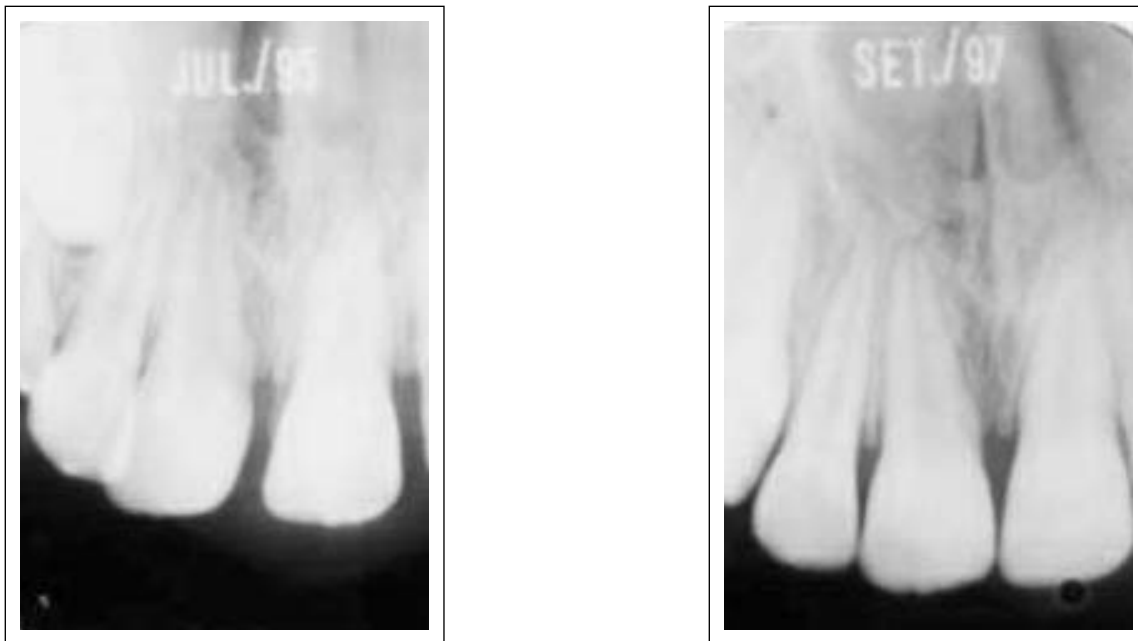


Figure 6b and 6c. Radiograph after 4- and 6-year follow-up, respectively.

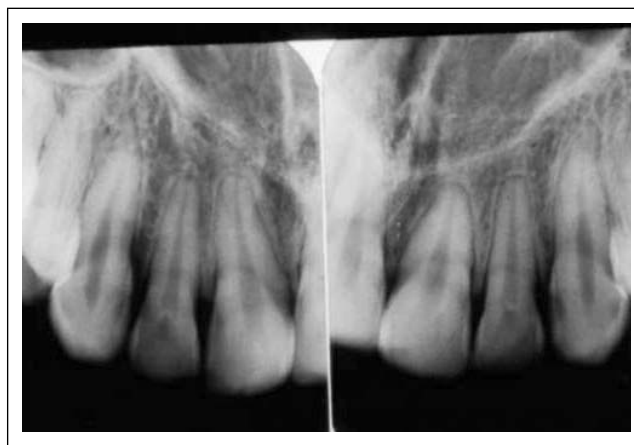


Figure 7. Radiographs of right permanent incisor after a 12-year follow-up.

DISCUSSION

The patient of this report, had fallen from her bicycle while she played near her house and lost three anterior teeth. At the time of the accident, the mother did not look for the missing teeth. Holan and Ram emphasize that following avulsion of a primary tooth, parents should be encouraged to find the exarticulated tooth to ensure that it has not been aspirated. In this case, even if the mother had found the avulsed tooth, the conditions were not ideal for replantation.¹⁰

A complete clinical examination should be performed in diagnosing traumatic injuries. This assessment should include extraoral, intraoral, and radiographic examinations. The initial radiographs of this case report revealed that there was no foreign body on soft tissues, teeth were avulsed, and there was no bone

or root fracture. This information was very important to determine the type of treatment. The radiographs taken throughout the 12-year follow-up period were also essential to observe the alteration on the pulp the upper right lateral incisor and the development of the permanent teeth until their complete eruption.^{7,11}

In subluxation, the injured teeth maintain the normal position in the dental arch. However, there is an increase of tooth mobility in the horizontal direction. Bleeding from the gingival sulcus is present, indicating injury to the periodontal tissues. Teeth may be sensitive to mastication and percussion. Teeth may also show crown discoloration due to pulpal hemorrhage or pulpal necrosis. Radiographically, no alteration is observed.^{1,6,7}

Treatment of subluxation include cleaning of the injured area and teeth with a 0.12% chlorhexidine

solution, semi-rigid splinting, checking tooth contact, and avoidance of thermo-mechanical stimuli, with a moderately soft diet for 14 days. These teeth should be monitored for at least one year.⁷

Complete avulsion of a tooth is the dental trauma that causes the greatest functional and emotional impact. The absence of the primary teeth until eruption of the permanent successors may cause functional and esthetic complications as well as increase anxiety of patients and parents. Only in some very restricted situations avulsed primary teeth are replanted.⁹ However, other authors do not recommend replantation of avulsed primary teeth due the poor prognosis and to the pathological outcomes observed in the succeeding permanent teeth such as alteration of eruption, ankylosis, and resorptions.^{1,11,12}

There are some pulpal and periodontal complications following trauma to primary teeth that may occur, such as: pulpal hyperemia, pulpal hemorrhage, pulpal necrosis, pulp canal obliteration, inflammatory resorption, and replacement resorption.^{1,2} Necrosis is the most common complication.¹ These teeth have a substantial risk of devitalization owing to the lack of collateral circulation. There is a thin band of neurovascular pulpal tissue entering at the root apex that can easily be severely damaged even by minor trauma.²

Follow-up of the dental development is very important in cases of trauma to the primary teeth, since it is well documented that it can easily be transmitted to the permanent successor. Developmental disturbances on the permanent successors can be expected in about 50% of all cases^{1,2} since, anatomically, the permanent anterior teeth develop in close proximity to the apices of the primary incisor.² The highest complications are found after intrusion and the lowest after subluxations. However, it should be emphasized that avulsion of primary incisors may also disturb further growth and development of the underlying permanent successors. The probable explanation is that the primary tooth is avulsed with a movement of the apex in the direction of the permanent tooth germ.¹ It is important to keep in mind that the intensity of the injury may cause disturbances in the developing tooth germ depending on the age at the time of injury.^{15,16}

It should be noted that harmful effects may also occur from the periapical inflammation of the primary tooth. The tooth germ is most vulnerable in early developmental stages.¹ Damages such as changes in morphology or mineralization (hypoplasia and hypocalcification) are the most common types of complications^{1,2} when injury occurred during the development of the permanent tooth crown.² Trauma may also interfere with root formation leading to bending of the root or partial arrest of its development^{1,2,14} and even alter the path of eruption, causing ectopic eruption.² These alterations on the permanent teeth may occur some months or even years after the trauma.^{2,14}

Since trauma to the primary dentition may affect in many different ways the permanent successors, the ideal follow-up of these cases should be until complete eruption of these teeth. No injury to the primary teeth should be considered insignificant.² Rational therapy depends upon a complete and correct diagnosis. An incomplete examination can lead to inaccurate diagnosis and less successful treatment.⁸

CONCLUSION

In this case, the twelve-year follow-up of the patient, from the time of the injury until complete eruption and occlusion of the permanent teeth showed that clinical and radiographic assessments are extremely important in determining the treatment and well being of the patient.

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