Avulsion of posterior primary teeth and space maintaining appliance: case report

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A four-year-old child was presented to the Pediatric Dentistry Clinic of the Federal University, 21 days after an incident in which canine first and second primary molar teeth were avulsed, due to a trauma to the face. This was confirmed on radiological examination. The clinical examinations showed that tissues were normal. A removable space-maintaining dental-mucosa supported appliance was made in acrylic resin to replace the three missing teeth. After a period of eight months, the tissues were preserved, the device is helping the child to eat, to speak, and preserving the appearance of the patient. Radiograph examinations have shown that the first molar tooth and canine, first pre molar and second pre molar teeth are erupting normally. Trauma in primary dentition can cause psychological, morphological and functional problems. In the presented case the treatment was planned to recuperate the function and to avoid problems from the premature loss of primary teeth.
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INTRODUCTION

A perfect primary dentition has important roles, not only in speech, mastication, esthetics, in the prevention of injurious oral habits, but also as a guide for the eruption of permanent teeth.[1] Each of these aspects can undergo changes whenever there is an early loss of primary teeth.[2] These losses may occur due to ectopic eruption, congenital disorders, extensive caries lesions and their sequelae. Dental trauma is very common in primary dentition and is also one of the causes of teeth early losses.[3] When compared to trauma in permanent dentition, the numbers show that the incidence of trauma in primary dentition is the same or even greater. Specialized literature, however, shows that there are little research dealing with the control of post-trauma in primary dentition.[3]

Some authors[4,5] believe that around 45% of the children suffer some kind of trauma in primary dentition. Among luxations, avulsions occur more frequently than fractures.[5,6] The numbers show that the incidence of avulsions occur in 7 to 13% of trauma cases, even when light forces act upon them. The frequency of avulsions can be explained due to the alveolar bone resilience, to the great number of teeth when compared to bone amount in primary and mixed dentitions and also to the short roots of primary teeth.[7] Falling down against hard objects is the main cause of avulsions.[6,8,9] These incidents occur principally when children are between 1 and 2 years old[10] and again when boys are five.[11] Authors[7,12] agree that the primary teeth that are more affected by traumas are the incisors, reaching the percentage of 95.3 of cases.[3] Among the incisors, the upper teeth are more easily and frequently affected as they are more externally located, and for that reason they come in contact with forces before any other teeth.[12] Despite the low incidence, trauma in other teeth are also reported in the literature.[13] The upper canine, upper first and second molar first and second molar teeth avulsions in primary dentition are very uncommon.

When there is the avulsion of a primary tooth, the clinician can simply decide either to: leave the tooth

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Figure 1. Frontal view.

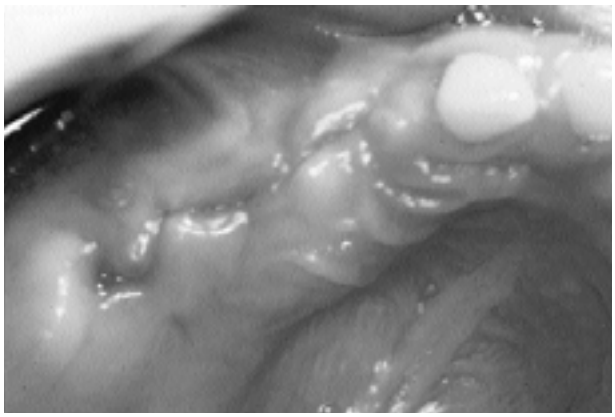

Figure 2. Right occlusal view.

space empty, replant the avulsed tooth or make a space-maintaining appliance.

Replanting primary teeth is still a controversial matter and a great number of researchers avoid using such a procedure, as it can cause a lesion to the permanent tooth germ, while the coagulum is pushed during the reimplant surgery.

Even when the early loss happens to a posterior tooth, causing problems to the occlusion stableness and the eruption guide of the first permanent molar is lost, this appliance can be recommended.

The main goal of this report is to describe the treatment to an uncommon case of avulsion that happened to a four-year-old male child, who fell down and lost three primary teeth - upper, right canine, first and second molar teeth.

CLINIC CASE DESCRIPTION

D.P, a four-year-old male patient fell 3 meters and hit the right side of the face on a stone. His face was wounded. He had upper maxillary mucosa lacerations, bone fractures and three teeth were avulsed: maxillary right canine, first and second molar teeth. His parents did not report consciousness loss.

He was properly assisted at the hospital and was taken by his parents to the Pediatric Dentistry Clinic of the Federal University of Santa Catarina. After periapical, occlusal and panoramic radiographic examinations, it was concluded that radicular structures were not present. His parents were told to return to the clinic after buccal tissues were completely healed.

When the patient returned to the Pediatric Dentistry Clinic of the Federal University of Santa Catarina (UFSC), bone tissues and the mucosa were completely recovered. Other panoramic and periapical radiographic examinations were done and a total bone recovery of the affected region was observed. During the clinical examination, it could seen that the patient had a good oral hygiene, and the occlusal instability. A space-maintaining appliance was planned to provide esthetical, morphological and functional recovery of the region corresponding to the maxillary right canine, first and second molar teeth.

After analysis, it was decided that a removable functional space-maintaining appliance was the best treatment choice to replace the three missing teeth by teeth.

After impressions were taken again, the models were properly mounted on a simple articulator and sent to a technician, who made the space-maintaining appliance. The teeth shade was carefully selected

The appliance was made with an Adams type retention clasp on the maxillary left second molar tooth and two round clasps on the maxillary left first molar and canine teeth.

The technician was told to make the appliance in blue acrylic resin including a turtle shaped sticker so that the 4-year-old patient would feel motivated to use it constantly.

The appliance was placed and adjusted so that the patient could recover occlusal stability, which had been lost with the avulsion of the dental elements. His parents were informed about the usage of the appliance and about hygiene methods to keep the appliance in good conditions. The patient has been wearing the appliance for eight months and periodical maintenance is made.

DISCUSSION

Due to bone characteristics of children, the greatest number of injuries in primary teeth are luxations, including avulsions.[11,13,14] These traumas almost always happen when children fall.[9]

Dental avulsions usually occur singularly, but they can also be multiple[15] as in the reported case, in which three teeth were avulsed.

The premature loss of a primary tooth reduces the space to the succeeding tooth, which can result in or aggravate the lack of space in the dental arch, rotation of the permanent tooth or even impacted permanent teeth.[3]

Besides the accumulated inclination effects, there is the possibility of some other changes when the early loss happens to the two primary molar teeth. The loss of the

Figure 3. Right side view.

Figure 4. Frontal view with space maintaining appliance.

Figure 5. Occlusal view with space maintaining appliance.

Figure 6. Right side view with space maintaining appliance.

posterior dental support can keep the jaw in a position that provides a type of occlusal function with accommodative posterior cross bite. This positional cross bite has effects that include the temporomandibular joint (TMJ), the musculature, the development of face bones, the final position of the permanent teeth,[1] and the abnormal development of oral musculature.[16]

In order to avoid lesions with the premature loss of primary teeth caused by avulsion, dental replants have been used as an option. There are some studies that praise the use of replants when primary teeth are avulsed. This practice is not still very well accepted by many authors who believe that the replantation of the avulsed tooth may create lesions in the succeeding permanent tooth.[7]

Most of the time the replant is not possible. That is the reason why different techniques have to be used so that the primary tooth is replaced and the role performed by it is, if not totally, but partly recovered.

It is known that a great number of absent teeth in the primary dentition brings the risk of a malocclusion in the permanent dentition.[17]

The space-maintaining appliance (removable or fixed) acts as an apparatus to preserve the space of the missing tooth, providing better chances to a normal development of the permanent dentition. The efficacy of this type of appliance can not still be proved, since studies comparing two groups of children with early loss of primary teeth have not been developed yet. Such a study should compare two groups and prove that the group that did not use the appliance had a greater loss of space than the group who used it.[18]

The early loss of the primary canine tooth is not common, either because of a trauma or because of caries. That is why there is still a doubt if the loss of space will actually occur if the tooth is not replaced.[19]

In relation to primary molar teeth, the space reduction possibility becomes more evident, especially when several teeth are lost, including the second primary molar tooth. The early loss of the first primary molar tooth can block the eruption of the permanent canine tooth. If the loss happens to the second molar tooth, the eruption of the second pre-molar tooth can be impacted. Considering the last possibility, the eruption guide of the first permanent molar tooth can be changed, causing a mesial shifting.

When the second primary molar tooth is lost before the eruption of the first permanent molar, the use of

Figure 7. Left side view with space maintaining appliance.

Figure 8. Right side periapical radiograph.

Figure 9. Left side periapical radiograph.

space-maintaining removable appliances with free edges in acrylic are recommended. In this case there is no appropriate support to maintain the occlusal forces.[1,19] The reported case, where there were the avulsions of three teeth is an example of what was mentioned above. Among the disadvantages of removable appliances we can mention the restraint and the cooperation of the patient. In the reported case the loss was unilateral and the restraint was not damaged as the clasps were supported by the teeth on the opposite side of the avulsion. The cooperation by the patient was satisfactory, despite the age of the child, since the sticker and the colored acrylic resin motivated him.

This type of appliance with free edges in acrylic must be high enough to keep the occlusal vertical dimension, avoiding the lower teeth over eruption, providing the recovery of the mastication function of the patient and the occlusal stability.

The old-fashioned appliances that are distal extended and held by the first permanent molar tooth are not indicated because they are not hygienic or flexible.[1]

No matter what the recommended treatment is, radiographic monitoring of the permanent succeeding teeth should be done regularly in order to follow eruption, since a delay may occur due to the bone deposition and/or a route change in the eruption. The eruption delay is diagnosed through the comparison of the trauma region radiographic examinations with the examinations done on the opposite side of the mouth. Following this procedure the clinician will possibly have an early diagnosis, giving him/her the opportunity to make the necessary corrections as soon as possible.

CONCLUSION

An uncommon case of multiple avulsions of the upper canine, first and second molar primary teeth was reported in this article. The treatment of the case used a space-maintaining appliance to regain esthetical, morphological and functional skills of the stomatognathic system until the eruption of the permanent succeeding teeth.

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