



## Conservative treatment of severely luxated maxillary primary central incisors: case report

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### Abstract

*The treatment and follow-up evaluation of two orally luxated maxillary primary central incisors in a three-year-old girl is described. The injured teeth were displaced into a cross-bite with their mandibular opposing teeth. They were repositioned shortly after the injury and splinted with composite resin for two weeks. Oral hygiene instructions and antibiotic therapy were prescribed. Two weeks after the injury a necrotic pulp was removed and the root canals filled with a resorbable paste. Thirty months after the injury, the teeth and the surrounding tissues were clinically and radiographically asymptomatic and physiologic root resorption could be noted. The permanent successors erupted soon after natural exfoliation of the injured primary teeth. Only mild hypocalcified defects were observed on the permanent incisors. (Pediatr Dent 21: 459-462, 1999)*

Oral luxation affects mainly the maxillary central incisors. Horizontal force directed to the labial aspect of the crown displaces it palatally pushing the root apex labially and away from the developing permanent tooth bud. When the child has normal relations between the dental arches (i.e. the incisal edge of the mandibular incisors are in contact with the palatal aspect of the maxillary incisors) oral displacement of the crown will create occlusal interference. No such disturbance may occur when an open bite or an increased overjet exists prior to the injury.



Fig 1. Clinical view showing both maxillary primary central incisors in cross bite with the mandibular incisors short after the injury.

Oral luxation causes rupture of the gingival fibers and the periodontal ligament (PDL) on the palatal aspect of the root as well as compression of the PDL on the labial aspect. Detachment of gingival fibers allows invasion of oral microorganisms along the root surface and infection of the PDL. In addition, the delicate labial bone plate often fractures concomitant with hemorrhage and swelling of the upper lip. Severance of the neurovascular supply to the pulp is a common effect of oral luxation leading to pulp necrosis.

The purpose of this article is to present a conservative treatment of a severe case of oral luxation of both maxillary primary incisors and follow-up evaluation until their natural exfoliation and eruption of their permanent successors.

### Case report

A three-year and eight month old girl presented to the emergency dental clinic of the Department of Pediatric Dentistry at the Hadassah School of Dental Medicine in Jerusalem. Her medical history was uneventful with no known allergies. The mother reported that two hours before her admission to the emergency clinic her daughter slipped at home and hit her teeth against the edge of her bed. She did not lose consciousness nor did she vomit following the injury. Extra-oral examination revealed no disturbances in the temporo-mandibular joint. Swelling of the upper lip and small cuts above the chin were observed. Intra-oral examination revealed hematoma of the upper and lower lips, soft tissue lacerations, and palatal displacement of both maxillary primary central incisors into cross bite relations with the opposing mandibular teeth. Despite this, the child could close her molars into normal occlusion (Fig 1). Dental caries was diagnosed on the mesial aspect of the luxated teeth. There were blood clots at the gingival sulcus surrounding the injured teeth. Increased mobility was not present and both direct light reflection and transillumination detected no coronal discoloration. Sensitivity to percussion could not be confirmed due to lack of cooperation, but metallic sounds were produced during this test. A periapical radiograph of the premaxilla presented shortened images of both central incisors with a wide periapical radiolucent area indicating that the apices of the primary teeth were pushed labially, away from the developing permanent successors (Fig 2).

The child seemed apprehensive when the treatment options were explained to her mother. Tell-Show-Do was sufficient to

Received March 3, 1999 Revision Accepted July 27, 1999

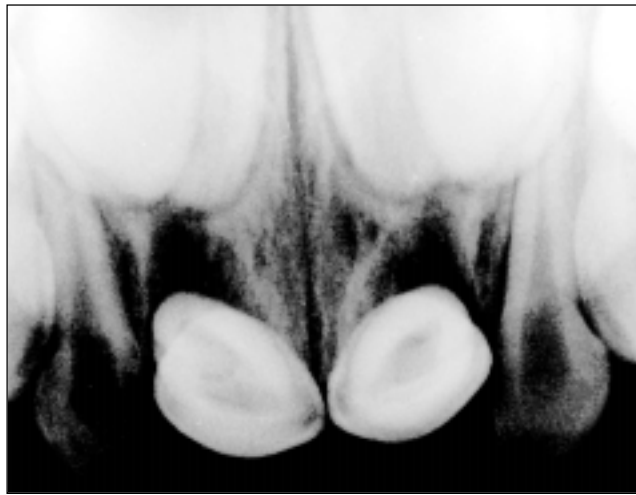


Fig 2. Radiograph of the premaxilla exposed shortly after the injury. Note the shortened image of the maxillary primary central incisors compared to adjacent lateral incisors. The periapical radiolucent areas indicate that the apex was pushed labially and away from the developing permanent teeth.



Fig 3. Radiograph of the premaxilla exposed immediately after the root canal treatment in both maxillary primary central incisors.

achieve the child's full cooperation during performance of the dental treatment. The involved teeth and surrounding tissues were anesthetized by local infiltration of 1 ml of 2% lidocaine with adrenaline 1:100,000. The teeth were repositioned using thumb and finger as described by Andreasen and Andreasen.<sup>1</sup> The maxillary central incisors were then splinted to the adjacent laterals with composite resin using the acid-etch technique.

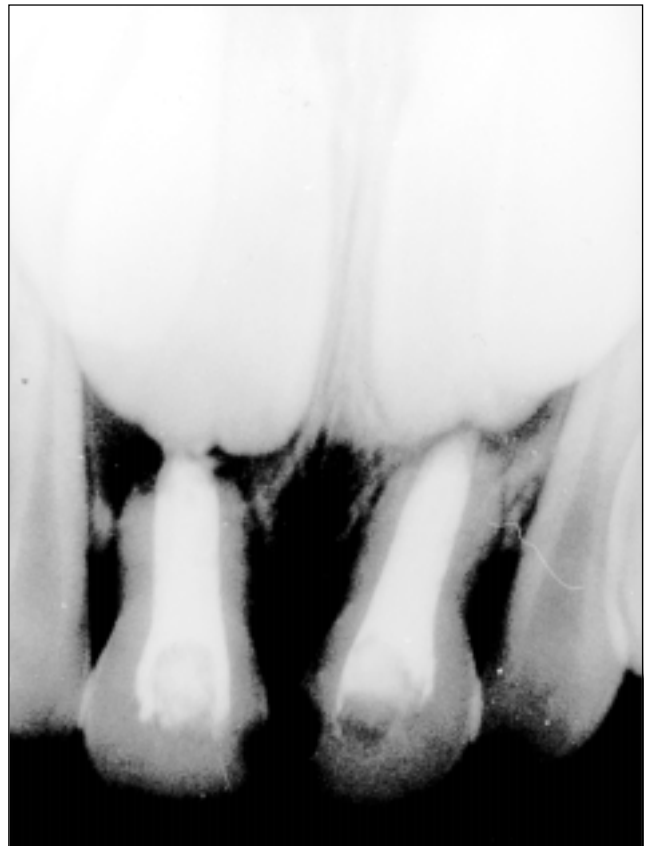


Fig 4. Radiograph of the premaxilla exposed two years and seven months after the injury. Note the continuous PDL with slight resorption of the roots and filling material and some expansion of the dental follicle of the permanent teeth.

Instructions for strict oral hygiene were given and amoxicillin (375 mg/day for five days) was prescribed.

Two weeks later, the teeth seemed to be sensitive to percussion, slightly mobile, and their color changed into a yellow-brown hue. At this point, the splint was removed and pulpectomy performed in both primary incisors. The following technique was used for the endodontic treatment: the teeth were isolated with a rubber dam; and access to the pulp chamber was obtained through a palatal approach using a #330 tungsten bur on a high-speed hand piece with water spray coolant. The pulp was found to be necrotic. Anesthetic solution was injected into the root canal to avoid possible pain in case of inadvertent over instrumentation or if the pulp was still vital close to the apex. The pulp was removed, root canals cleaned, washed with hydrogen peroxide and saline, and dried with paper points. A resorbable paste (Kri-1-Pharmachemie AG., CH-8053, Zurich, Switzerland) was used to fill the root canals. Caries was removed and the teeth restored with a composite resin using the acid-etch technique. A postoperative radiograph (Fig 3) showed that the root was filled to the apex with no overfill. The parents were instructed to encourage the child to use the injured teeth.

On all recall examinations, both teeth presented physiologic mobility, with no sensitivity to percussion (the tone produced on percussion was also normal). Surrounding soft tissues were intact and the patient did not report any pain or discomfort. The crowns had a yellowish hue resulting from the high con-



Fig 5. Radiograph of the premaxilla exposed three years and eight months after the injury and shortly before natural exfoliation.

tent of iodoform in the root filling material, but the mother rejected suggestions to improve the esthetic appearance of the teeth. Radiographs exposed two years and seven months after the injury showed continuous PDL with slight resorption of the root apex and the filling material and some expansion of the dental sac of the permanent tooth (Fig 4).

No pathosis was observed in several recall examinations until the child was seven years and four months old. At this age both maxillary primary central incisors were mobile and displaced. A periapical radiograph (Fig 5) showed physiologic root resorption of both teeth with small-unresorbed remnants of the endodontic filling material. The primary incisors exfoliated naturally a few months later and the permanent successors erupted with no hypoplastic lesions but with mild hypocalcified defects in the enamel close to the incisal edge (Fig 6).

## Discussion

This article presents one of the most complicated types of injury to the primary dentition. It also describes the treatment provided and follow-up evaluation until natural exfoliation of the primary teeth and eruption of their permanent successors. Such injury involves the supporting tissues (i.e. periodontal ligament, gingival fibers, and bone) and the vitality of the pulp. Orally luxated incisors cannot return spontaneously to their normal alignment when interference exists between the maxillary and mandibular teeth. This condition requires intervention. If the dentist sees the patient soon after the injury, repositioning of the teeth can be performed as described in the present case. Delayed repositioning may be difficult probably due to a blood clot organized in the socket.<sup>2</sup> Slow repositioning using orthodontic appliance is an option if the child's cooperation is anticipated.<sup>1</sup>

The child's age at the time of injury should be a factor affecting the operator's decision on the suitable approach. The younger the child, the greater the risk for damages to the permanent tooth, and the more severe the defect may be.<sup>1</sup> The child in the present case was three years and eight months old when injured. Enamel hypoplasia in the permanent incisor is less expected at this age because the crown of the permanent tooth is usually fully formed. It has been shown, however, that injuries to primary teeth may affect permanent teeth and cause hypo-calcification even at a later age.<sup>3</sup> Holan et al.<sup>4</sup> suggested that such defects could be the result of periapical infection, over-instrumentation during endodontic treatment, or pulpal infection. As the pulp in this case was not infected, this can be ruled out as a possible cause for the defect. Rifkin,<sup>5</sup> who followed endodontic treatment with Kri paste, observed similar defects. His sample, unlike the teeth in this case, comprised of abscessed teeth.

In cases of subluxation or mild luxation injuries of primary incisors one might expect the pulp to remain vital. However, in the present case, the apices of the injured teeth were displaced to such an extent that the pulp was not anticipated to maintain its vitality.<sup>6</sup>

The dental pulp and the supporting tissues are both affected by luxation injuries. Blood vessels entering the root canal through the apical foramen may be stretched to some extent without being damaged. However, the probability that the pulp remains vital following severe displacement of the apex is very low. It is necessary, therefore, to consider endodontic treatment for such teeth.

Damage to the supporting tissues has several aspects. Rupture of the PDL and fracture of the labial bone plate result in increased mobility, discomfort, and even pain during mastication. Splint of the injured teeth to adjacent healthy teeth prevents possible exarticulation, prevents pain, and allows their exposure to physiologic forces that regularly exist in the oral environment. These forces were found to help in reconstituting the injured PDL.<sup>7</sup> Rupture of the gingival fibers surrounding the injured teeth allows invasion of oral microorganisms through the gingival sulcus and along the root, infecting the PDL and interfering with the healing of the supporting tissues. Strict oral hygiene and antibiotic therapy should alleviate this problem. Rupture of the PDL on one side of the

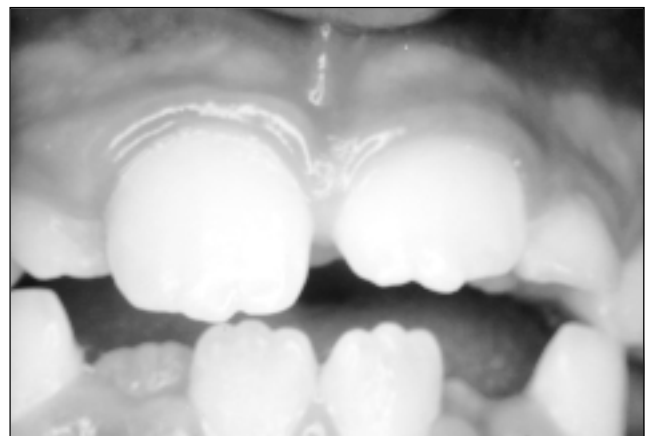


Fig 6. A clinical radiograph of the maxillary permanent central incisors. Note the mild white opacities in the enamel close to the incisal edge in both teeth.

root and compression on the other side may lead to necrosis and expose the root dentine to osteoclastic activity. This process, usually self-limiting, is observed on radiographs as surface root resorption especially if not exposed to additional irritants such as infection of oral microorganisms or toxins originating from a necrotic pulp.

In this case, the child's cooperation was achieved using the Tell-Show-Do behavior management technique. It seems reasonable, however, that a young child seen by a dentist following dental trauma is apprehensive and does not cooperate. In this case, the use of pharmacological behavior management techniques is a legitimate option.<sup>8</sup>

While follow-up examinations are sufficient for mildly injured primary incisors, the more severe cases cannot be left untreated. However, the general attitude is that when intervention is required, the treatment performed should be extraction with no attempt to preserve the injured primary incisor.<sup>9</sup> This has been justified by the possible damage to the developing permanent teeth, the difficulty to perform a complicated procedure in a small child, and the fact that sooner or later the primary tooth will be replaced by its permanent successor.<sup>10</sup> This approach ignores parental demands and expectations for esthetics not only in permanent teeth of the child but also in their preschool child's teeth. The present case provides a conservative alternative to extraction for severely injured primary incisors. The main complications in this case were pulp necrosis, infection of the supporting tissues, pain during mastication, increased mobility, and external root resorption. Endodontic treatment, splinting, good oral hygiene, and antibacterial therapy may preserve the injured teeth until natural exfoliation.

## References

1. Andreasen JO. And Andreasen FM.: Textbook and color atlas of Traumatic Injuries to the Teeth. 3rd Edition. Munksgaard, Copenhagen 1994.
2. Andreasen JO. Andreasen FM: Essentials of Traumatic Injuries to the Teeth, 1<sup>st</sup> Ed. Copenhagen: Munksgaard, 1990. pp141-154.
3. Brin, I.; Ben-Bassat, Y.; Zilberman, Y.; Fuks, A : Effect of trauma to the primary incisors on the alignment of their permanent successors in Israelis. Community Dent Oral Epidemiol. 16:104-108, 1988.
4. Holan G, Topf J, Fuks AB.: Effect of root canal infection and treatment traumatized primary incisors on their permanent successors, Endod Dent Traumatol, 8:12-15, 1992.
5. Rifkin, A.: The root canal treatment of abscessed primary teeth-a three to four year follow-up. J Dent Child. 49:428-431, 1982.
6. Soporowski NJ.; Allert EN.; Needleman HL.: Luxation injuries of primary anterior teeth - prognosis and related correlates. Pediatric Dentistry. 16:96-101, 1994.
7. Carranza FA Jr, Saglie FR: The periodontal ligament. In Glicman's Clinical Periodontology. 7th ed. W.B. Saunders Company, Philadelphia 1990. pp 47-48.
8. Ram D, Holan G.: Partial pulpotomy in traumatized primary incisor with pulp exposure: A case report. Pediatric Dentistry. 16:46-48, 1994.
9. Borum MK, Andreasen JO.: Sequelae of trauma to primary maxillary incisors. 1. Complications in the primary dentition. Endod Dent Traumatol 14:31-44, 1998.
10. Gatewood JC. Thornton JB.: Successful replantation and splinting of a maxillary segment fracture in the primary dentition. Pediatr Dent 17:124-126, 1995.

## ABSTRACT OF THE SCIENTIFIC LITERATURE



### THE USE OF PANORAMIC RADIOGRAPHS TO LOCALIZE DISPLACED MAXILLARY CANINES

The purpose of this investigation was to see if a system could be developed to localize impacted maxillary canines from a single panoramic radiograph. The authors analyzed 115 panoramic radiographs from 115 different subjects with impacted maxillary canines. Comparing the ratio of widths of adjacent erupted lateral incisor (homolateral) to the radiographic width of the impacted canine and the ratio of the contra-lateral canine/lateral ratio combined with the radiographic heights of the crowns of the impacted canines and adjacent lateral a canine incisor index was developed.

The authors achieved an accuracy of 87% locating an impacted canine in either the mid-alveolus/palatal position or facial position. They were unable to distinguish with adequate accuracy the difference between the mid-alveolus position and the palatal position, however.

The authors concluded that this method of determining impacted canine position is useful in determining whether the teeth are placed facially or are mid-alveolus to palatally placed.

**Comments:** While useful as a screening tool, this method does not approach the accuracy of the standard two "shift-shot" periapical radiographic study. **MGP**

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**The use of panoramic radiographs to localize displaced maxillary canines. Chaushu, S; Chaushu G; Becker A; OOO 1999; 4:511-516.**

21 references