



# A multidisciplinary approach to the treatment of an intruded maxillary permanent incisor complicated by the presence of two mesiodentes

Ari Kupietzky, DMD MSc Ilan Rotstein, CD Dov Kischinovsky DMD

*Dr. Kupietzky is in private practice, Jerusalem, Israel; Dr. Rotstein is an associate professor and director of graduate endodontics, Hebrew University – Hadassah Faculty of Dental Medicine, Jerusalem, Israel; and Dr. Kischinovsky is a senior surgeon, Oral and Maxillofacial Surgery, The Jerusalem Medical Center, Shalom Mayer Center, Jerusalem, Israel. Correspond with Dr. Kupietzky at drkup@netvision.net.il*

## Abstract

*Treatment of a traumatically intruded maxillary incisor with an immature apex remains controversial. Treatment options include observation, surgical repositioning, or orthodontic forced eruption. Likewise, the ideal timing of surgical removal of a mesiodens is highly controversial: immediate versus delayed intervention. The complications associated with untreated supernumerary teeth include: overretention of primary teeth, delayed eruption of permanent incisors, rotations, impaction, diastema, pulp necrosis and root resorption. Less common sequelae include enlarged follicular sacs, cystic degeneration and nasal eruption. This paper describes another risk factor associated with delayed removal of a mesiodens previously not mentioned in the dental literature, namely potential complications arising from a traumatic injury, in particular intrusion, of the maxillary permanent incisors. (Pediatr Dent 22:499-503, 2000)*

**T**reatment of a traumatically intruded maxillary incisor with an immature apex remains controversial. Treatment options include observation, surgical repositioning, or orthodontic forced eruption. When pulp necrosis is diagnosed tooth reposition should be performed as fast as possible to allow intra-canal calcium hydroxide therapy (within 4 weeks) to prevent external inflammatory root resorption. It has been suggested that immediate surgical repositioning may cause further root surface damage and therefore spontaneous or orthodontic eruption is preferred.<sup>1</sup>

Likewise, the ideal timing of surgical removal of a mesiodens is highly controversial: immediate versus delayed intervention. Among the disadvantages and risks of immediate intervention are potential damage to adjacent teeth resulting in devitalization and /or root malformation, and the inability of a young child to psychologically tolerate the surgical procedure.<sup>2</sup> The complications associated with untreated supernumerary teeth include: overretention of primary teeth, delayed eruption of permanent incisors, rotation, impaction, diastema, root resorption, and pulp necrosis. Less common sequelae include enlarged follicular sacs, cystic degeneration and nasal eruption.<sup>3</sup> This report describes another risk factor associated with delayed removal of a mesiodens previously not mentioned in the dental literature, namely potential complications arising from a



Fig 1. An eight-year-old male presented to his pediatric dentist for an emergency visit. The child's chief complaint was a displaced central incisor resulting from a fall down the stairs of his school. The child was familiar with the dentist, as he had been coming regularly for biannual check ups since he was 4 years old. The patient was in excellent health with an unremarkable medical history. Extraorally, an abrasion and hematoma of the chin was observed. Although appearing for an emergency visit the child displayed excellent dental behavior as a result of his routine and consistent dental visits, emphasizing the importance of regular dental care.



Fig 2. Intraoral clinical examination revealed an intrusive luxation of his upper right central incisor. The tooth was intruded two thirds of its clinical crown length with the incisal third exposed. The left central incisor sustained only a concussion injury and appeared to be stable.

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Fig 3. Radiographic examination included a standard bisecting angle exposure (a, left) and an occlusal (b, right) exposure. The radiographs revealed an intruded right central incisor with an open apex overlapping a developing inverted mesiodens. A second mesiodens was observed between the immature left central and lateral incisors. Note the importance of varying radiographic angles in determining the extent of intrusion and the position of the mesiodentes. Antibiotic therapy and oral hygiene were prescribed and the child was rescheduled for follow - up one week later.

Table 1. Facts for the Clinician – Mesiodens<sup>2,3</sup>

<b>Prevalence:</b>	1-3%
<b>Etiology:</b>	unknown, most probably due to local independent hyperactivity of the dental lamina
<b>Terminology:</b>	<p><u>morphology:</u> rudimentary type: conical shaped supplemental type: normal size and shape;</p> <p><u>number:</u> usually single (mesiodens) &gt;&gt; less common bilateral -(mesiodentes) 13%;</p> <p><u>direction:</u> inversion of conical shaped mesiodens is not uncommon</p> <p><u>root formation:</u> complete root formation is common.</p>
<b>Location:</b>	midline – palatal>> labial
<b>Common complications:</b>	<p>-overretention of primary incisors;</p> <p>-delayed eruption, rotation, displacement or impaction of permanent incisors;</p> <p>-diastema ;</p> <p>-root resorption and/or loss of vitality.</p>
<b>Less common complications:</b>	<p>-cystic degeneration;</p> <p>-nasal eruption of inverted mesiodens.</p>
<b>Timing of treatment:</b>	<p>Early– to induce spontaneous eruption of permanent incisors and to prevent anterior space loss and extensive surgical/orthodontic treatment.</p> <p>Late – wait until adjacent root formation is complete and avoid possible iatrogenic damage to developing root, patient maturity and ease of surgery.</p>

traumatic injury, in particular intrusion, of the maxillary permanent incisors. The clinician is given an opportunity to review the basic fundamentals of these two topics as presented in this paper. The terminology, prevalence and treatment options of mesiodens and intrusion injuries are summarized for quick reference in Tables 1 and 2, respectively.

**Case description**

The case is described and illustrated in Figures 1-11.

**Discussion**

The successful outcome of the case described was dependent on a number of factors, such as immediate orthodontic repositioning, timely intracanal therapy, and complete interdisciplinary cooperation. However, the most important factors were the child’s consistent and periodic check ups and dental treatment. The importance of routine check ups and their influence on both the patient’s and parents’ dental attitude and behavior can not be overemphasized. Strict adherence to the AAPD radiographic guidelines ensures early diagnosis of common pathoses and the correct timing for their

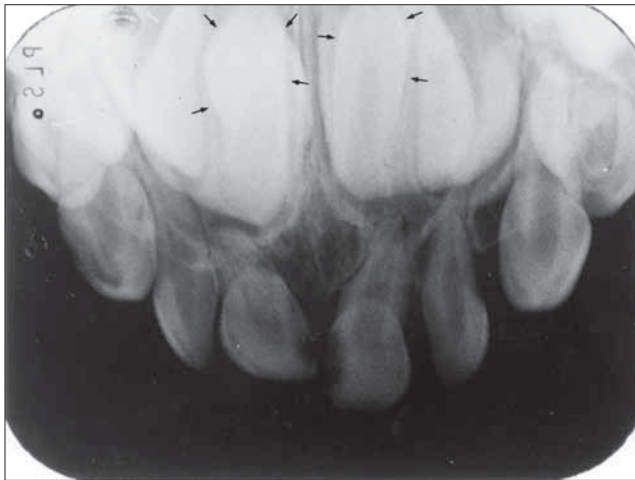


Fig 4. The presence of the two mesiodentes (arrows) was diagnosed at age four and reported to the parents at that time. Delayed surgical removal was recommended due to their position and the young age of the patient. Early diagnosis provided baseline reference and facilitated correct timing of mesiodens removal. The importance of routine screening with an occlusal radiograph as recommended by the AAPD guidelines is emphasized.



Fig 5. At one week follow-up all soft tissues appeared to be healing well. All incisors responded positively to cold pulp vitality tests. However, a decision was made to begin orthodontic extrusion to allow endodontic access in case of inflammatory resorption and/or pulpal necrosis. The incisors and canines were etched for 20 seconds with 35% phosphoric acid (Ultra-etch®, Ultradent® products, South Jordan, UT)

treatment. The parents and patient were aware of the need for future surgical removal of the mesiodens and were prepared for it. The patient's compliant dental behavior, which was achieved through years of routine dental treatment, facilitated the delivery of excellent specialized care without the use of sedatives or deep anesthesia.

The decision to delay surgical removal of the mesiodens was complicated by the occurrence of an intrusion injury. However, the successful clinical results support the school of thought advocating delayed removal. The attitude of the patient (maturity and receptiveness to oral surgery), as well as the closure of the permanent incisor root apex and potential migration of the mesiodens from it, reduce the possible complications of surgical iatrogenic injury to the development of the permanent



Fig 6. Ormco® Diamond® pre-angulated orthodontic brackets (Sybron Dental Specialties Inc., Orange, CA, USA) were used. A segmental appliance was fabricated on primary canines, permanent centrals and the right lateral. A .014 Ni Ti® nickel-titanium arch wire (Sybron Dental Specialties Inc., Orange, CA, USA) was placed and ligature ties were secured around the brackets. The patient was scheduled to return in four weeks. Six weeks later, extrusion was complete but vitality tests of the right central incisor were negative. Drill test confirmed that the pulp was necrotic and apexification with calcium hydroxide was initiated. Testing of the left incisor was positive.



Fig 7. Six months later, a permanent root canal filling with gutta-percha and AH26 Sealer® (De Trey, Konstanz, Germany) was completed by the endodontist. At this stage removal of the rapidly developing mesiodens which had migrated apically away from the apex of the right central incisor was recommended.

Table 2. Facts for the Clinician – Intrusion Injuries<sup>1,4</sup>

<b>Prevalence</b> – trauma to permanent teeth 20-30% boys >> girls, peak incidences at 9-10 year-olds.
<b>Definition</b> – displacement of tooth apically into alveolar bone <i>Even trivial degrees of intrusion can result in unexpectedly severe complications.</i>
<b>Diagnosis</b> – obvious, in developing mixed dentition use gentle percussion to elicit metallic sound, look for loss of PDL space at apical area in radiograph.
<b>Complications</b> – 1) loss of pulp vitality in <i>all</i> intruded mature teeth –at least 60% of immature teeth undergo future necrosis; 2) surface root resorption (self limiting); 3) external replacement root resorption (usually slow), ankylosis; 4) external inflammatory root resorption (very rapid –possibly within 4 – 5 weeks).
<b>Treatment</b> – 1) observe: only immature teeth have potential for spontaneous re-eruption, mature teeth do not; 2) reposition: surgical (splint for 7 – 10 days), or orthodontic forced eruption ( 3-4 weeks); <i>Reposition as fast as possible to allow endodontic access for calcium hydroxide therapy (within 4 weeks) before external inflammatory root resorption can become established.;</i> 3) endodontic therapy.

incisors and reduce the need for sedation during the surgical procedure.

The decision to start orthodontic eruption and not to await spontaneous eruption proved to be the correct one. Within 4 weeks the tooth lost vitality and needed immediate endodontic intervention to avoid inflammatory root resorption. Some clinicians may voice concern that early orthodontic treatment may have been a cause of pulp necrosis; however, the more likely contributory factor was the intrusive nature of the trauma. Although the tooth had a slightly open apex, the clinical impression was that it was not sufficient to allow spontaneous eruption. Perhaps observation should be reserved as a mode of treatment only in very immature teeth, within a year of their eruption. Spontaneous reeruption can only be expected to occur in cases with incomplete root formation. With increased stages of root development (closing apices), pulp necrosis is especially frequent. The most



Fig 8. Two weeks later, the patient presented with enamel crown fractures of both central incisors. He reported getting hit in the mouth during recess. Further detailed inquiry ruled out any foul play. The child's Class II malocclusion with increased overjet put him at high-risk for such injuries but the parents had previously refused a mouth guard.



Fig 9. Both maxillary lateral incisors and the left central incisor tested positively to pulp vitality tests and subsequently both maxillary central incisors were restored using a bonding agent (Single bond<sup>®</sup>, 3M Dental Products, St. Paul, MN) and resin composite (Z100<sup>®</sup>, 3M Dental Products, St. Paul, MN). The patient was referred to an oral surgeon for surgical removal of the two mesiodentes.

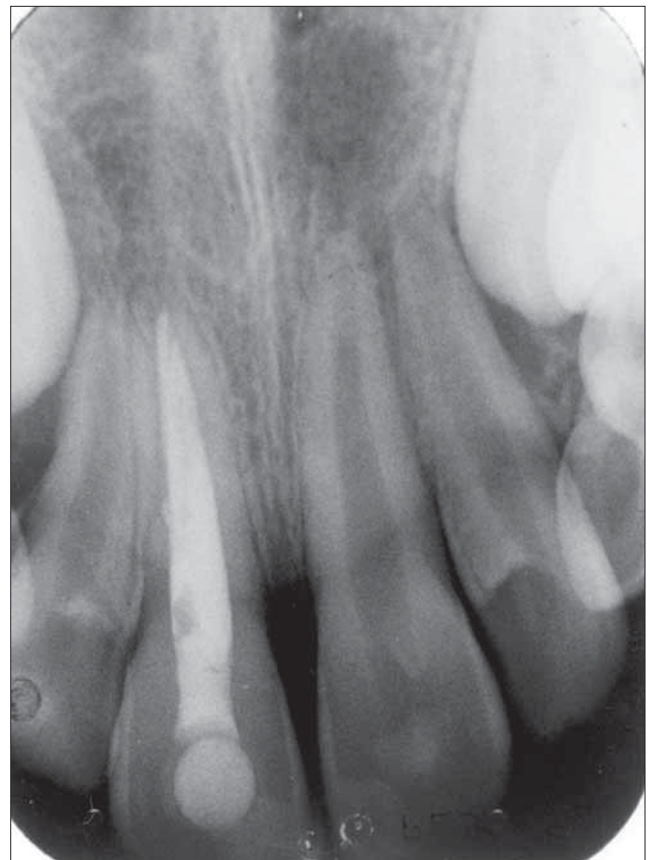


Fig 10. Three months following surgical removal of the mesiodentes the patient returned for a follow up appointment as instructed by the oral surgeon. The mesiodentes were removed using only local anesthesia. A full thickness mucoperiosteal flap was reflected and both mesiodentes were easily removed. The flap was then sutured back into place. The child tolerated the procedure well and was cooperative throughout. A radiograph showed newly formed bone in place of the mesiodentes. All incisor apices appeared to be normal. Vitality tests were positive.

significant prognostic factor appears to be the stage of root development at the time of injury.<sup>4</sup>

Finally, the team approach involving the pediatric dentist, endodontist, and oral surgeon also contributed to the successful outcome of the case described above. Intrusive injuries of incisors are fairly common yet have a very unpredictable prognosis. In this case, many odds were against success: the nature of the injury, the recurrent injury sustained during treatment, as well as the presence of two mesiodentes and their size and direction. The pediatric dentist contributed in correct patient management and decision making. Referral to the endodontist and oral surgeon guaranteed excellent patient care, which facilitated recovery and successful clinical outcome.

### References

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Fig 11. Facial portrait of the 9 year old patient demonstrating his severe overjet and trapped lower lip as being the etiology of the dental trauma. Note, the child's positive facial expression. As a result of his past dental experiences, his excellent dental behavior facilitated the numerous multidisciplinary treatments he underwent. All treatments were performed using only local anesthesia. The child had been under regular dental care from 4 years of age.

## ABSTRACT OF THE SCIENTIFIC LITERATURE



### THE SURFACE EFFECTS OF DENTIFRICES

The purpose of this in vivo study was to compare any changes in either the gingival tissue or surface morphology of the six maxillary anterior teeth following a four-week period of brushing with one of three toothpastes. 64 dental students were randomly assigned to one of four treatment groups. Each group was instructed to brush in the morning and evening using only the dentifrice assigned: Group 1-water only, Group 2- Colgate Baking Soda and Peroxide, Group 3- Macleans Whitening, Group 4- Colgate Sensation Whitening. Clinical examinations and polyvinyl silicone impressions were taken prior to and after the four-week period. The impressions were examined for differences by both light and scanning electron microscopy. Results showed no evidence of increased microabrasions of either gingival or tooth surfaces for any of the study groups. In addition, plaque levels were generally lower after four weeks except for some teeth in the water group. The authors concluded that all dentifrices were similar in their effectiveness for plaque removal, maintenance of gingival health and level of abrasiveness.

**Comments:** This article verifies the logical statement that the most important criteria for a dentifrice is that the patient use it routinely. MM

*Address correspondence to: Dr Ian Meyers, P.O. Box 161, Sherwood, Queensland 4075*

The surface effects of dentifrices. Meyers, I.A.; McQueen, M.J.; Harbrow, D.; and Seymour, G.J.: Aust Dent J 45: 118-124, June 2000.

15 references