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# Mesiodens as a risk factor in treatment of trauma cases CASE REPORT

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Correspondence to: Prof. Dr. Alev Alaçam, Gazi Üniversitesi, Diş Hekimliği Fakültesi, Pedodonti Anabilim Dalı, Emek 82.sok, 06510 Ankara, Turkey Tel.: +312 2034082 Fax: +312 2034062 e-mail: alacam@gazi.edu.tr Accepted 28 June, 2008 **Abstract** – The presence of mesiodens often results in complications including retention of primary teeth and delayed eruption of permanent teeth, closure of eruption path, rotations, retention, root resorption, pulp necrosis, and diastema as well as nasal eruption and formation of dentigerous and primordial cysts. Less common complications involving the permanent incisors include dilaceration of the developing roots and loss of tooth vitality. Therefore, early diagnosis of mesiodens has particular importance in terms of preventing such complications. However, with respect to surgical removal of mesiodens, ideal timing of intervention – immediate or delayed intervention – remains to be a highly controversial issue. While predisposing factors of dental trauma such as open bite, increasing overjet with protrusion of upper incisors, and insufficient lip closure have been well documented in the literature, there is limited evidence indicating mesiodens as a risk factor in trauma. In this report of two cases, it is aimed to emphasize mesiodens as a risk factor in the treatment of dental trauma besides its effect on prognosis.

The term mesiodens is used to refer to a supernumerary tooth in the central region of the premaxilla between the two central incisors (1). Although its etiology is not known exactly, today the theory suggesting that the anomaly is resulting from the hyperactivity of dental lamina has been generally adopted. According to this theory, remnants of the dental lamina or palatal offshoots of active dental lamina are induced to develop into an extra tooth bud, which results in a supernumerary tooth (2). Constituting 47–67% of supernumerary teeth cases, the incidence of mesiodens in general population is reported to be 0.15–1.9%. In 15% of such cases, the eruption of mesiodens is observed between 3 and 7 years of age (3, 4).

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Traumatic dental injury is not a result of disease but a consequence of several factors that will accumulate throughout life if not properly treated (6). While predisposing factors of dental trauma such as open bite, increasing overjet with protrusion of upper incisors, and insufficient lip closure have been well documented in the literature, the only case report pointing out mesiodens as a risk factor was reported by Kupietzky et al. (5). Yet, delayed intervention in mesiodens cases may have an important influence on prognosis because of the type of trauma and the location of mesiodens. In this report of two cases, it is aimed to emphasize mesiodens as a risk factor in the treatment of dental trauma besides its effect on prognosis.

## **Case report**

### Case I

A 9-year-old boy was referred to Gazi University Faculty of Dentistry Department of Pediatric Dentistry with a history of bicycle accident resulted in dislocation of upper left anterior central tooth, in 1 h following the incident. He was in good physical condition with a noncontributory medical history. Intra-oral clinical examination revealed absence of upper left central incisor that was avulsed. There was no apparent trauma to the soft tissues. Further clinical examinations revealed that the alveolar process and socket were free from any fracture. Tooth was stored in milk by the parents. The clinical observation of the avulsed tooth indicated that threefourth of root development was completed. As no fractures were detected at the alveolar process and socket in the clinical examination and immediate reimplantation was necessitated, a radiograph was not taken



*Fig. 1.* Intra-oral view of the semi-rigid splint following immediate reimplantation.

prior to reimplantation. The avulsed tooth was relocated with slight pressure. Then, semi-rigid splint application between upper primary molars for 2 weeks was carried out (Fig. 1). A mesiodens in inverted position adjacent to immature upper left central incisor was observed following immediate reimplantation in control radiographs (Fig. 2). A delayed intervention to mesiodens is planned in order to wait until adjacent root formation is complete. Patient was advised to have a soft diet for



*Fig. 2.* Radiographic view after semi-rigid splint. Note mesiodens in inverted position adjacent to immature upper left central incisor.



*Fig. 3.* One month after the initiation of apexification treatment. Note the resorption of  $Ca(OH)_2$  dressing in the root canal.

2 weeks and use chlorhexidine mouthwash two times a day for a week as well as prescribing oral hygiene and antibiotic therapy. As loss of vitality was detected at the end of first week, apexification with Ca(OH)<sub>2</sub> was initiated prior to removal of splint (Figs 3 and 4). With the completion of root development after 6 months, root canal filling was completed with gutta-percha and AH26 sealer (Fig. 5). One week after root-canal filling, mesiodens was extracted surgically (Fig. 6). Twelve months following the surgical intervention, composite resin restoration was renewed as slight discoloration was observed (Fig. 7). However, external root resorption was noted at radiographic examination (Fig. 8). The patient was recalled for follow up after 6 months (Fig. 9). Radiographic evaluation revealed the progress of external root resorption (Fig. 10).

#### Case II

An 8-year-old boy was referred to Gazi University Faculty of Dentistry Department of Pediatric Dentistry with a history of dental trauma because of an accident at home. He was in good health with an unremarkable medical history. No apparent trauma to the soft tissue was observed at extra-oral examination. During intraoral examination, a semi-erupted upper right central incisor and an erupted mesiodens were observed. According to patient history, upper left central incisor did not erupt yet, nevertheless, it was observed at infra-



*Fig. 4.* Three months after the initiation of apexification. Root development was observed in progress.



Fig. 6. Radiographic view after removal of mesiodens.



Fig. 5. Radiograph taken immediately after root canal filling.



Fig. 7. Intra-oral view after 18 months.

gingival eruption period during clinical evaluation. There were no coronal fractures at erupted teeth (Fig. 11). Radiographic evaluation revealed that trauma to erupted mesiodens caused uncomplicated crown fracture of upper left central incisor, which did not erupt yet and was in slight rotation (Fig. 12). Surgical extraction of mesiodens was planned with immediate intervention besides couterization for opening the eruption pathway of upper left central incisor (Fig. 13). After the extraction of mesiodens, cracks were observed on the root surface of the mesiodens adjacent to upper left central incisor supporting the radiographic findings (Fig. 14). Following these procedures, fracture area of upper left central incisor was sealed with glass ionomer cement (Fig. 15). At the end of 2 weeks, tooth was restored with



*Fig. 8.* Radiographic view of upper left central incisor. Note the external root resorption.



*Fig. 10.* Radiographic view after 24 months. Note the progress of external root resorption.



Fig. 9. Intra-oral view after 24 months.

composite resin and patient was rescheduled for follow up. The restoration was renewed because of esthetic reasons at 9-month follow up (Figs 16 and 17). Patient was followed up to 18 months. At 18-month recall appointment, gingivectomy to upper right central incisor and frenulectomy were carried out for esthetic requirements (Fig. 18). Radiographic examination revealed the healthy progress of root development of upper left central incisor (Fig. 19).



*Fig. 11.* Intra-oral view at the initial visit. Note that there was no clinically observed coronal fracture at erupted teeth.

#### Discussion

Open bite, increasing overjet with protrusion of upper incisors and insufficient lip closures have been described as important predisposing factors related to trauma. This report demonstrated that mesiodens may also be a risk factor in both the occurrence and the treatment of dental trauma. As the presence of mesiodens causes complications such as retention of primary teeth and delayed eruption of permanent teeth, closure of eruption path, rotations, retention, root resorption, pulp necrosis, and diastema, it may also complicate trauma cases.



*Fig. 12.* Radiographic examination revealed the uncomplicated coronal fracture of unerupted upper left central incisor.



*Fig. 13.* Intra-oral view after extraction of mesiodens and coterization for opening the eruption pathway.

Therefore, treatment planning has an important role in prognosis and mesiodens should be evaluated as an anomaly that requires careful follow up and intervention. This report also underlined that delay in diagnosis and treatment of mesiodens cases may affect the prognosis because of trauma type and the location of mesiodens as well as the importance of timing of surgical intervention. There appears to be two approaches for the extraction of mesiodens: early extraction (before the radicular formation of permanent incisors) and late extraction (when permanent incisors have completed their formation) (4).



*Fig. 14.* The view of mesiodens after extraction. Note the cracks on the distal side facing unerupted upper left central incisor.



Fig. 15. Restoration of fracture area with glass ionomer cement.



*Fig. 16.* Discoloration of composite resin restoration was observed after 9 months.

As the teeth with open apices have the potential for revascularization and root development, initial treatment was directed toward the re-establishment of blood supply in Case I. As the loss of vitality was apparent at the end



Fig. 17. Restoration was renewed immediately.



Fig. 18. Intra-oral view after gingivectomy and frenilectomy.

of the first week of semi-rigid splint therapy, it was decided to initiate the apexification therapy. After observing apical closure at radiographic evaluation, root canal filling was completed. Probably the patient was unaware of the unerupted mesiodens before traumatic injury. As no fractures were detected at the alveolar process and socket in the clinical examination and immediate reimplantation was necessitated, a radiograph was not taken prior to reimplantation. Normally, trauma procedures require taking a radiograph in such cases. However, observing the mesiodens radiographically would not change the immediate intervention procedure. In emergency treatment of the avulsed tooth, there was no chance to make any surgical intervention to mesiodens, so it was delayed till apexification. Twelve months following the surgical removal of the mesiodens, external root resorption was observed. Root resorption is a common consequence in avulsion cases with a reported prevalence of 57-80% (7). Studies have shown that total extra-alveolar time has less effect on the outcome provided the tooth has been stored in a wet medium (8, 9). Donaldson and Kinirons (10) found that dry time is the most crucial clinical factor associated with the development of postreimplantation root resorption. Therefore, minimizing the extra-oral dry time is the



*Fig. 19.* Radiographic examination revealed the healthy root development of upper left central incisor.

most important factor in preventing unfavorable (inflammatory resorption or replacement resorption) healing (10, 11). As milk storage as seen in our case is suggested to be one of the suitable media (7) and the total extraoral time was not more than 1 h, the conditions in which the avulsed tooth was reimplanted were thought to be appropriate for favorable (cemental) healing. As root resorption is shown to be a complication associated with mesiodens (2), the possible factors responsible for the outcome in Case I may be the delayed intervention to mesiodens or the surgical treatment itself. It is advocated that in cases where the supernumerary tooth does not cause any symptoms or when there is an elevated risk of damaging the development of the permanent tooth, it is advisable to avoid therapeutic approach and instead adhere to periodic clinical and radiological examinations (4). During surgical procedure, mesiodens was observed in close proximity with the root of previously avulsed tooth. Therefore, it has negative effect on periradicular healing process and causes external root resorption.

Early extraction of mesiodens is believed to favor the eruption of permanent incisors, prevent the loss of anterior space in the dental arch and avert further complications of cystic, pulpal (4), or traumatic nature as we observed in Case II. Unlike Case I, immediate intervention was performed in Case II. At the end of 15 months, upper left incisor continued its vitality and was about to complete its eruption. Radiographic evaluation revealed that trauma to mesiodens reflected the force to unerupted left central incisor causing an uncomplicated crown fracture and this finding was further confirmed by observing cracks on the root surface of the mesiodens facing unerupted left central incisor after extraction as seen at Fig. 14. The anatomic factors consistently reported to increase the risk of occurrence of anterior teeth injuries are substantial maxillary incisor overjet and inadequate lip coverage of the anterior teeth (12, 13) as well as increased protrusion, class II malocclusion and lip incompetence (14). The findings in Case II suggesting mesiodens as a predisposing factor in dental trauma were in accordance with Kupietzky et al. (5). If the mesiodens was observed and extracted previously, the fracture of unerupted upper left central incisor might not occur.

Because traumatic dental injuries can be prevented, there needs to be a better understanding about the risk factors associated with trauma in order to allow the application of adequate preventive actions (6). In mesiodens cases, complications associated with immediate surgical intervention including 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 should not be overlooked. On the other hand, the fact that delayed intervention may cause over retention of primary teeth, delayed eruption of permanent incisors, impaction, and diastema should always be kept in mind. Accurate diagnosis and treatment planning as well as multidisciplinary approach and regular follow up are important issues for the achievement of therapy.

#### References

 Giancotti A, Grazzini F, De Dominics F, Romanini G, Arcuri C. Multidisciplinary evaluation and clinical management of mesiodens. J Clin Pediatr Dent 2002;26:233–7.

- 2. Russel KA, Folwarczna MA. Mesiodens diagnosis and management of a common supernumerary tooth. J Can Dent Assoc 2003;69:362–6.
- 3. Hattap FN, Yassin OM, Rawashdeh MA. Supernumerary teeth: report of three cases and review of the literature. J Dent Child 1994;61:382–93.
- Montenegro PF, Castellón EV, Aytés LB, Escoda CG. Retrospective study of 145 supernumerary teeth. Med Oral Patol Oral Cir Bucal 2006;11:339–44.
- Kupietzky A, Rotstein I, Kischinovsky D. A multidisciplinary approach to the treatment of an intruded maxillary permanent incisor complicated by the presence of to mesiodentes. Ped Dent 2000;22:499–503.
- Soriano EP, Caldas AF Jr, Carvalho MVD, Amorim Filho HA. Prevalence and risk factors related to traumatic dental injuries in Brazilian schoolchildren. Dent Traumatol 2007;23:232–40.
- Finucane D, Kinirons MJ. External inflammatory and replacement resorption of luxated, and avulsed replanted permanent incisors: a review and case presentation. Dent Traumatol 2003;19:170–4.
- Kinirons MJ, Gregg TA, Welbury RR, Cole BOI. Variations in the presenting and treatment features in reimplanted permanent incisors in children and their effect on the prevalence of root resorption. Br Dent J 2000;189:263–6.
- Mackie IC, Worthington HV. An investigation of replantation of traumatically avulsed permanent incisor teeth. Br Dent J 1992;172:17–20.
- Donaldson M, Kinirons MJ. Factors affecting the time of onset of resorption in avulsed and replanted incisor teeth in children. Dent Traumatol 2001;17:205–9.
- 11. Trope M. Clinical management of the avulsed tooth: present strategies and future directions. Dent Traumatol 2002;18:1–11.
- 12. Baldava P, Anup N. Risk factors for traumatic dental injuries in an adolescent male population in India. J Contemp Dent Pract 2007;8:35–42.
- Sandalli N, Cildir S, Guler N. Clinical investigation of traumatic injuries in Yeditepe University, Turkey during the last 3 years. Dent Traumatol 2005;21:188–94.
- Kania MJ, Keeling SD, McGorray SP, Wheeler TT, King GJ. Risk factors associated with incisor injury in elementary school children. Angle Orthod 1996;66:423–32.

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