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Original research

The prevelance of mesiodens in a group of non-syndromic Turkish children: a radiographic study

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Purpose
The aim of the present study is to determine the prevelance and clinical status of mesiodens in a group of non-syndromic Turkish children, with an analysis of the associated clinical-eruptive complications.

Materials and Methods
This study sample consists of 58142 pediatric patients'. Standard equipment and films were used in the suspected patients. The examination of all radiographs was performed under standard conditions by two pediatric dentists with over 10 years experience. Age, gender, number of mesiodens, morphology and clinical status were recorded in forms.

Results
A total of 83 mesiodentes were diagnosed in 59 children with ages ranging from 6-14 years. The prevelance of mesiodens was estimated as 0.1%. Males were more frequently affected than females in the ratio of 2.3:1. Of the 83 mesiodentes, 48.2% were conical, 31.3% were tuberculate and 20.5% were incisor like, 22.9% were inverted, and 68.7% were fully impacted. The number of mesiodens was one in 36 cases (61.0%), two in 22 cases (37.3%) and three in one case (1.7%). The mean age at the time of diagnosis of the mesiodens was 9.5 years. The main complication associated with the mesiodens was displacement or rotation of the permanent teeth (73.3%).

Conclusion
This study presents 0.1% prevelance of mesiodens in a group of Turkish children sample. The majority of the mesiodentes were unilateral located in the premaxillary region, were conical shaped, and remained unerupted. The mean age at the time of diagnosis of the mesiodens in this study was 9.5 years, with this period being later than the eruption time of the maxillary central incisor.

Keywords: *Mesiodens; pediatric population; radiographic study; prevelance; complication*

Introduction

The most common type of supernumerary tooth which can appear in the maxillary midline area is defined as mesiodens (1). The reported prevalence in the permanent dentition ranges between 0.1-3.8% whereas, in the primary dentition the range is between 0.03-1.9% (2-5). Supernumerary teeth are estimated to occur in the maxilla more frequently than in the mandible (6). The mesiodens is the most frequent type of supernumerary tooth and accounts 80% of all (7-9). Mesiodens may occur either as single or multiple (8).

Mesiodentes can cause a variety of problems, including; retention of the primary tooth, delay or prevent of eruption of central incisors and can lead to ectopic eruption, tooth displacement, central incisor rotation , abnormal root development, dilacerations in the developing roots,

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root resorption and loss of tooth vitality, crowding, spacing of the anterior teeth, dentigerous cyst formation, follicular cysts, eruption of the mesiodentes into the nasal cavity as well as other alterations requiring surgical or orthodontic intervention (10-12).

The etiology of mesiodens remains unclear; however, various theories have been suggested regarding the presence of supernumerary teeth. Supernumerary teeth have also been attributed to atavism. The first theory of atavism - referring to having more teeth - is widely rejected. For splitting of the dental follicle (the theory of dichotomy), some factors such as trauma or evolutionary mutations, can cause accidental follicle division into two or more fragments. The hyperactivity of the dental lamina and the combination of genetic and environmental factors may be considered as the most acceptable etiologic factors in the development of mesiodens (13-15). Familial occurrence of mesiodens is reported to involve more than one sibling, or one generation (16, 17).

Mesiodens may also occur in association with syndromes like; cleidocranial dysostosis, Gardner's syndrome, especially cleft lip and palate, Down's syndrome (18, 19).

However, the appearance of a mesiodens can occur in non-syndromic individuals. Positive family history is one of the predisposing factors and this condition might be found as an isolated finding (20).

The objective of the present study was to examine the prevelance and clinical status of mesiodens, with an analysis of the associated clinical-eruptive complications. The null hypothesis of the study is the appearance of a mesiodens don't occur in non-syndromic individuals and there is no associated mesiodens complications.

Materials and Methods

The study was based on the evaluation of 58142 pediatric patients who attended the Istanbul University Faculty of Dentistry, Department of Pedodontics between September 2013 and December 2015. Ethical committee approval was obtained from the ethical committee of Istanbul University Faculty of Dentistry (Ref.Number 158; 2016/44). All patients and/or parents signed a letter of consent giving permission to use data for research purposes after related radiographs were taken.

Inclusion criteria

Only patients who accepted the use of their data for research purposes and visited the faculty for: treatment of caries, gingival conditions, tooth fracture, malocclusion or routine dental check-ups during the specified period and had no history of any previous extraction or tooth loss due to trauma, were included in the study.

Exclusion criteria

Patients without adequate documentation or patients who had any associated developmental anomalies, missing teeth adjacent to the mesiodens and with poor quality radiographs were excluded.

Radiographic examination

Standard equipment (Kodak 8000; Tropphy, etx) and films (Kodak) were used. Radiographic examination of the premaxilla was based on intraoral periapical (anterior region, +40°) and panoramic radiographs (kVp 65-68; mA range varies between 2-3,2 for infants; 5-6.5 for adolescents) for all children. Some of the cases were supplemented with occlusal radiographs (Kodak film ultra-speed). The examination of all radiographs was performed under standard conditions (on standard light boxes) by two pediatric dentists with over 10 years experience. All discrepancies were solved by consensus and agreement.

Diagnosis and recording of the mesiodentes

The presence of a supernumerary tooth or tooth bud between two central incisors, or of unilateral or bilateral teeth in the midline of the maxilla was noted as mesiodentes on radiographs. Age, gender, number of mesiodentes, morphology (conical, tuberculate, supplemental, other), clinical status (erupted, impacted) were recorded in forms.

Statistical analysis

The variables were analyzed using Statistical Package for the Social Sciences 12 (IBM Corp.; 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY, USA). The Pearson chi-square test was used to analyse sex differences. A p value of < 0.05 was considered statistically significant.

Results

Results showed that among the total 58142 children screened (male-28733; female- 29409), 0.1% had mesiodentes. A total of 83 mesiodentes were diagnosed in 59 (18 girls, 41 boys) children from 58142 samples from a pediatric Turkish population with ages ranging from 6 to 14 years. No statistical significance was found between genders.

Age, gender, number of mesiodentes, morphology (conical, tuberculate, supplemental, other), clinical status (erupted, impacted) of the cases are presented in Table 1.

Forty one (49.4%) mesiodentes presence were detected in age group of 6-9 years, and 42 (50.6%) in age group of 10-14 years. Of the 59 children, 36 children (61.0%) had one mesiodens (Figure 1), 22 children (37.3%) had two mesiodentes (Figure 2) and 1 child (1.7%) had three mesiodentes.

Among the 83 mesiodentes, the conical shape was the most common type accounting for 48.2%, followed by tuberculate in 31.3% followed by incisor-like in 20.5% (Figure 3).

Of the 83 mesiodentes, 68.7% were fully impacted and 31.3% were either partially or completely erupted. Among 83 mesiodentes, 77.1% were located in the vertical direction, followed by invertion with 22.9%. The main complication associated with the mesiodentes was displacement or rotation of permanent teeth seen in 44 patients (73.3%) followed by the delayed eruption of permanent central incisors (24 patients, 40.0%), delayed or abnormal root development of permanent central incisors (7 patients, 11.6%). Six patients were asymptomatic.

Table 1. *The percentage distribution of mesiodentes according to the age, gender, number, morphology, clinical status*

Age of subjects	Ratio of boys to girls	Number of mesiodens	Morphology	Clinical status
		One (61 %)	Conical (48.2%)	Impacted (68.7%)
6-14 years	2.3:1	Two (37.3%)	Tuberculate (31.3%)	Erupted (31.3%)
		Three (1.7 %)	Incisor like (20.5%)	(partialy/completely)

Figure 1. *Panoramic radiograph of the case with one mesiodens.*

Figure 2. *Panoramic radiograph of the case with two mesiodentes.*

Figure 3. *Photograph of the case with an incisor-like mesiodens.*

Discussion

In this study, the complete records of 58142 pediatric patients who presented mixed or permanent dentition were assessed. A total of 83 mesiodentes were diagnosed in 59 children (average of 1.4 mesiodentes per child), corresponding to 0.1% prevalence in the overall sample. This prevalence was less than that described in studies by Hurlen and Humerfelt (21) (1.4%) and Salcido-García *et al.* (22) (1.6%), Patil *et al.* (3) (1.4%) and was very close to the mean frequency observed in the prevalence values presented in Çolak *et al.* (2) (0.13%). The null hypothesis of the study was not supported.

Supernumerary teeth affect both dentitions equally, but mesiodens are the most frequently observed dental anomaly in permanent dentition (20) and it was more common among males. In the present study, there was a male to female ratio of 2.3:1, in the 59 patients with mesiodens. This ratio was 2.8:1 in the 200 patients (3 -84 years old) in Asaumi *et al.* (1) study. Kim and Lee (7) examined 40 children, whose ages ranged from 4 to 26 years, also found that males were affected approximately four times as frequently as females.

The mean age at the time of diagnosis of the mesiodens in this study was 9.5 years, but of 59 cases, 32 (54.2%) were discovered at 9-11 years. This period is later than the eruption time of the maxillary central incisors. When the delay of eruption and malposition of the maxillary central incisors or supernumerary teeth, congenitally missing teeth were seen, the radiographic examination was performed as a screening aid. Usually, mesiodens are discovered when adjacent teeth are displaced or have delayed eruption. Furthermore, during a routine radiographic check-up, an unerupted mesiodens without significant effect on the adjacent teeth may be examined (15, 23). Most mesiodientes are discovered with radiographic evaluation in the eruption period.

Although, mesiodentes may be single or multiple, multiple supernumerary teeth are rare in individuals with no other associated diseases or syndromes (24). A single mesiodens was found in 61% of the sample, while the remaining 37.3% presented two and 1.7% had three mesiodentes in this study. These findings were similar to the findings of Asaumi *et al.* (1), Gunduz *et al.* (25), Kim and Lee (7), and Huang *et al.* (26), who recorded one mesiodens in most of the reported cases.

Among 83 mesiodentes, 57 (68.7%) were impacted and 26 (31.3%) had erupted in the oral cavity. With regard to the direction of the crown, a mesiodens is most often in an upright position, but it can be found in an inverted or even in a horizontal position (4, 25-27). In the present study of the 83 mesiodentes, 64 (77.1%) were in a normal direction and 19 (22.9%) in an inverted direction against the axis of the tooth. Roychoudhury *et al.* (28) have reported seeing inverted impacted mesiodens in 62.5% of impacted mesiodentes, yet such a relationship was not observed in our study.

A mesiodens is often unique (1, 4, 7, 25, 26) and different in shape and size (16), but may vary in morphology, from a small rudimentary conical shape (4, 7, 22, 25, 28), to a complex form with several tubercles. In the current study, the crown shape was mainly conical (48.2% of cases) and this was in accordance with Giacontti *et al.* (29), Seddon *et al.* (30) and Kim and Lee (7).

The main complications associated with mesiodentes in this study were: displacement or rotation of permanent incisors (74.6%), delayed eruption of permanent incisors (42.4%),

delayed or abnormal root development of associated permanent teeth (11.8%). Similar findings have been previously reported (7, 25, 27). Von Arx (31) reported the retention and malposition of the adjacent permanent incisors in 34.5% of 113 mesiodentes.

The treatment of mesiodentes should be planned, after consideration of all clinical and radiological findings. Management always depends on the type of supernumerary teeth, its position in relation to other teeth, and its effects on adjacent teeth. Extraction is not always the preferred treatment. Surgical removal should be avoided if unerupted supernumerary teeth remain asymptomatic and are sometimes best left and kept under observation (24). Late or delayed removal of supernumerary teeth is recommended in order to prevent damage to tooth buds and/or adjacent teeth, decrease the surgical burden for a child, and to avoid repetitive surgery. However, periodic follow-up is necessary (32). Most recommendations for early and late removal of supernumerary teeth are anecdotal rather than evidence based (33).

This report shows the need for early and correct diagnosis of mesiodentes, which requires an individualized treatment plan. Unilateral persistence of a deciduous incisor, failure of eruption or ectopic eruption of a permanent incisor, a wide diastema, or rotation of erupted permanent incisors should alert the clinician to the possible presence of supernumerary teeth (31) and indicate appropriate radiographic investigation. Whatever the management approach, early diagnosis is critical. An appropriate treatment plan should emphasize prevention and include regular clinical and radiographic monitoring and, if possible on eruption.

Conclusion

This study showed a 0.1% prevelance of mesiodens in a group of Turkish children sample. The majority of the mesiodentes were unilateral located in the premaxillary region, were conical shaped, and remained unerupted. In this study the main complication associated with the mesiodens was displacement or rotation of permanent teeth (73.3%). The mean age at the time of diagnosis of the mesiodens in this study was 9.5 years, and this period is later than the eruption time of the maxillary central incisor. On appropriate diagnosis early intervention is required in the form of surgical or orthodontic treatment and combination in order to minimize unwanted side effects to the developing dentition in children.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of İstanbul University Faculty of Dentistry (Ref.Number 158; 2016/44).

Informed Consent: Written and verbal informed consent was obtained from patients/patients' parents who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: GAr and GAk designed the study. GAr and GAk generated the data. APE gathered the data. ODO analyzed the data. GAr wrote the majority of the original draft. APE participated in writing the paper. All authors approved thefinal version of the paper.

Conflict of Interest: The authors have no conflicts of interest to declare.

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Türkçe öz: *Sendromu olmayan bir grup Türk çocuğunda mezyodens prevelansı: bir radyografik çalışma. Amaç: Bu çalışmanın amacı, sendromu olmayan bir grup Türk çocuğunda mezyodens sıklığını ve klinik durumunu ilgili klinik sürme komplikasyonlarıyla ilişkilendirerek incelemektir. Gereç ve Yöntem: Bu çalışma, 58142 çocuk hastanın panaromik radyografilerinin değerlendirilmesiyle gerçekleştirilmiştir. Çalışmada, standart gereç ve filmler kullanılmıştır. Tüm radyografiler, standart koşullar altında, 10 yıl üstü deneyime sahip iki pedodontist tarafından değerlendirilmiştir. Yaş, cinsiyet, mezyodens sayısı, morfoloji ve klinik durum formlara kayıt edilmiştir. Bulgular: Yaşları 6-14 arasında değişen 59 hastada 83 mezyodens tespit edilmiştir. Mezyodens prevelansı %0,1 olarak saptanmıştır. Kadınlar, erkeklerden 2.3:1 oranında daha fazla etkilenmiştir. Seksen üç mezyodensin; %48,2'sinin konik, %31,3'ünün tüberküllü, %20,5'inin kesici diş görünümünde, %22,9'unun enverte ve %68,7'sinin ise tamamen gömük olduğu belirlenmiştir. Otuz altı olguda bir (%61,0), 22 olguda iki (%37,3) ve bir olguda 3 (%1,7) mezyodens varlığı izlenmiştir. Mezyodens tanısının yapıldığı ortalama yaş 9,5 yıl olarak belirlenmiştir. Mezyodens ile ilişkili en önemli komplikasyonun, kalıcı dişlerin yer değiştirmesi veya rotasyonu (%73,3) olduğu saptanmıştır. Sonuç: Bu çalışma, bir grup Türk çocuğunda mezyodens prevelansını %0,1 olarak vermektedir. Mezyodenslerin çoğunluğunun premaxiller bölgede tek taraflı, konik şekilli ve sürmemiş olduğu belirlenmiştir. Bu çalışmada, mezyodens tanısının konduğu yaş ortalaması 9,5 yaş olup, bu periyot üst birinci kesici dişin sürme zamanından sonradır. Anahtar kelimeler: Mezyodens; çocuk popülasyonu; radyografik çalışma; prevelans; komplikasyon*

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