Investigation of prevalence and characteristics of mesiodens in a non-syndromic 11256 dental outpatients

H. ÇOLAK1, R. UZGUR2, E. TAN3, M.M. HAMIDI1, M. TURKAL2, T. ÇOLAŞ3

1Department of Restorative Dentistry, 2Department of Prosthodontics, 3Department of Orthodontic, Faculty of Dentistry, Kirikkale University, Kirikkale, Turkey

Abstract. – AIM: To investigate the prevalence of mesiodens in a sample of Turkish dental patients and their distribution among genders.

PATIENTS AND METHODS: A retrospective study was performed using panoramic radiography of 11256 patients, who ranged in age from 15 to 55 years old. All data (age, sex and syndrome) were obtained from the patient files and analyzed for mesiodens. Statistical evaluation of the presence of mesiodens related to gender was performed by the Pearson chi-squared test.

RESULTS: Mesiodens was detected in 15 subjects (0.13%). The prevalence of mesiodens for females and males was 0.20% and 0.057%, respectively (p = 0.037). The most commonly observed mesiodens was maxillary canine-like type (60%). Most of the mesiodens (67%) were found in the vertical position, followed by horizontal position (33%). The age and sex distribution, number of mesiodens per patient, shape, direction, size, and effect on permanent maxillary incisors are also presented in this study. The most common complication caused by mesiodens was midline of the permanent incisors.

CONCLUSIONS: Mesiodens is an uncommon developmental anomaly in Turkish dental patients. Early diagnosis allows the most appropriate treatment, often reducing the extent of surgery, orthodontic treatment and possible complications.

Key Words: Mesiodens, Turkish population, prevalence.

Introduction

Developmental dental anomalies are an important category of dental morphologic variations. Abnormalities in tooth size, shape, and structure result from disturbances during the morphodifferentiation stage of development, while ectopic eruption, rotation and impaction of teeth result from developmental disturbances in the eruption pattern of the permanent dentition. These anomalies result from disturbances during initiation, morphodifferentiation of tooth germs, apposition of hard dental tissues and during eruption of teeth.

A supernumerary tooth is one of dental anomalies. By definition, supernumerary teeth are extra teeth in comparison to normal dentition. It is more common in the central region of the upper or lower jaw; however, its occurrence in the mandible is rare. The most common type of supernumerary tooth as indicated by Alberti et al is mesiodens.

Their reported prevalence ranges between 0.3-0.8% in the primary dentition and 0.1-3.8% in the permanent dentition (Table I). Males are affected approximately twice as often as females. Methodology for detection and variation in the populations studied may account for the range of prevalence reported.

In many instances, mesiodens is associated with disturbances in tooth eruption, midline diastema or axial rotation or inclination of erupted permanent incisors, or complications such as resorption of adjacent teeth and development of dentigerous cysts.

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.

Morphologically, mesiodens may have heterogeneous forms. Three common types; namely, conical or peg shaped, tuberculate and supplemental (tooth like) have been reported, of which the conical form is the most common type.

Asymptomatic unerupted mesiodens may be discovered during a radiological examination of the premaxillary area. Mesiodens may give rise
Table I. Survey of available studies on the prevalence of mesiodens in performed in different populations.

<table>
<thead>
<tr>
<th>Population</th>
<th>Authors</th>
<th>Year</th>
<th>Individuals</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finnish</td>
<td>Jarvinen and Lehtinen</td>
<td>1981</td>
<td>1141</td>
<td>0.4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>Kaler</td>
<td>1988</td>
<td>Not available</td>
<td>2.2</td>
</tr>
<tr>
<td>Norwegians</td>
<td>Hurlen and Humerfelt</td>
<td>1985</td>
<td>63,029</td>
<td>1.43</td>
</tr>
<tr>
<td>Chinese</td>
<td>Huang et al</td>
<td>1992</td>
<td>543</td>
<td>7.8</td>
</tr>
<tr>
<td>Japanese</td>
<td>Miyoshi et al</td>
<td>2000</td>
<td>8122</td>
<td>0.05</td>
</tr>
<tr>
<td>Saudi</td>
<td>Osuji and Hardie</td>
<td>2002</td>
<td>1878</td>
<td>0.85</td>
</tr>
<tr>
<td>Mexican</td>
<td>Salcido-Garcia et al</td>
<td>2004</td>
<td>2241</td>
<td>2.1</td>
</tr>
<tr>
<td>Turkish</td>
<td>Gunduz et al</td>
<td>2008</td>
<td>23,000</td>
<td>0.3</td>
</tr>
<tr>
<td>Indian</td>
<td>Nagaveni et al</td>
<td>2010</td>
<td>2,500</td>
<td>2.50</td>
</tr>
<tr>
<td>Thai</td>
<td>Kositbowornchai et al</td>
<td>2010</td>
<td>570</td>
<td>1.05</td>
</tr>
<tr>
<td>Iranian</td>
<td>Ghabanchi et al</td>
<td>2010</td>
<td>414</td>
<td>0.97</td>
</tr>
<tr>
<td>Turkish</td>
<td>Kazanci et al</td>
<td>2011</td>
<td>3,351</td>
<td>0.3</td>
</tr>
<tr>
<td>Indian</td>
<td>Khandelwal et al</td>
<td>2011</td>
<td>3,896</td>
<td>3.18</td>
</tr>
<tr>
<td>Indian</td>
<td>Nayak and Nayak</td>
<td>2011</td>
<td>500</td>
<td>0.6</td>
</tr>
</tbody>
</table>

to a variety of complications such as impaction, delayed eruption and ectopic eruption of adjacent teeth, crowding, diastema, axial rotation, radicular resorption of adjacent teeth, and dentigerous cysts. In addition to clinical examinations, radiographic observations play an important role in the differential diagnoses of these anomalies.

The purposes of this study were to describe the prevalence of mesiodens in a sample of Turkish dental patients using panoramic radiographs.

**Patients and Methods**

Panoramic radiographs from 11,256 patients (5,976 women and 5,280 men, age range from 15 to 55 years) attending Kırıkkale University Dental Faculty Hospital during the period from July 2009 to January 2012 were reviewed for the presence of mesiodens.

Selection criteria of the samples included patients who were not diagnosed with any syndrome or illness that involved odontogenesis and dental eruption.

The presence of an unerupted supernumerary tooth, or tooth bud between the two central incisors, or of unilateral or bilateral teeth in the midline of the maxilla, was noted as mesiodens on radiographs.

The number of mesiodentes per patient, location (palatal, labial, overlap), position (left, right, midline), eruption status (erupted, impacted), shape (conical, tuberculate, supplemental, other), crown direction (normal, inverted, horizontal), and complications (delayed eruption of adjacent tooth, diastema, displacement, rotation, cystic formation or cystic change, root resorption of adjacent primary or permanent tooth, nasal eruption) were investigated.

The examiners were calibrated by reading 100 radiographs separately, containing 10 different cases of mesiodens before the investigation starts. The examiners re-read together a sample of 10 panoramic radiographs containing mesiodens after 2 weeks after the first examination and a 100% agreement was obtained.

**Statistical Analysis**

Statistical evaluation was performed with the Windows XP-Excel Statistical Package and SPSS 15.01 for Windows (SPSS Inc., Chicago, IL, USA). The statistical analysis was descriptive. The frequencies of anomalies which are detected are calculated with respect to sexes, number, shape, position, complications caused by mesiodens and treatment. The Pearson chi-squared test was used to determine potential differences in the distribution of dental anomalies when stratified by sex. A p value of < 0.05 was considered statistically significant.

**Results**

**Gender Distribution**

Table I presents the distribution and prevalence of mesiodens according to the gender of patients. Females had more mesiodens (12 teeth) than females (3 teeth). The prevalence of mesiodens for females and males was 0.20% and 0.057%, respectively (Table II). The difference was statistically significant using chi square test (p = 0.037).
Table II. The frequency of mesiodens according to gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mesiodens</th>
<th>Prevalence</th>
<th>$\chi^2$</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>5976</td>
<td>12</td>
<td>0.20</td>
<td>4.367</td>
<td>$p = 0.037$</td>
</tr>
<tr>
<td>Male</td>
<td>5280</td>
<td>3</td>
<td>0.057</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Number of Mesiodens**

Patient with mesiodens were found in 15 subjects (12 females, 3 males) out of 11256 subjects examined, thus the person prevalence was 0.13%.

**Shape of Mesiodens**

The most commonly seen type of mesiodens was canine-like (60%) followed by conical (40%). Incisor-like mesiodens were not observed in any cases (Table III).

**Position of Mesiodens**

Of the 15 mesiodentes, 9 (53.3%) were fully impacted, 4 (33.3%) was partially erupted and 2 (13.3%) were fully erupted. Most of them were found in a vertical position (67%), followed by a horizontal position (33%). Inverted position is not detected (Table IV).

**Complications Caused by Mesiodens**

Midline diastema (27%) was observed as most common complication caused by mesiodens followed by axial rotation or inclination of permanent incisors (13%) (Table V). In 9 cases (60%) complications were not detected.

**Discussion**

The number of teeth in humans has tended to decrease through evolution. However, alterations in tooth development commonly result in an increase in the number of teeth. A frequently found supernumerary tooth present in the midline of the maxilla is called a mesiodens.

Most publications concerning mesiodens are case reports and only a few have reported the prevalence of this anomaly. Review of the literature reveals a wide discrepancy in the prevalence of dens invaginatus in different populations. According to the present results, the occurrence of mesiodens in a Turkish population was 0.13% of all patients. This finding is in agreement with previous reports on Turkish population and Caucasians (Table I) but was considerably lower compared with data reported for another races. A detailed comparison of the results obtained in the present study with previous reports can be found in Table I.

An interesting finding in this work was that the females presented a higher prevalence of mesiodens than females and these differences were statistically significant ($p = 0.037$). This finding is conflicting with reports conducted in both Turkish and other nations. These studies reported that mesiodens occurred more frequently in females than males.

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

<table>
<thead>
<tr>
<th>Position</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical</td>
<td>10</td>
<td>67</td>
</tr>
<tr>
<td>Inverted</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Horizontal</td>
<td>5</td>
<td>33</td>
</tr>
</tbody>
</table>

Table V. Complications caused by mesiodens.

<table>
<thead>
<tr>
<th>Complication</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midline diastema</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>Axial rotation or inclination of permanent incisors</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Resorption of adjacent teeth</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cystic change</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>None (asymptomatic)</td>
<td>9</td>
<td>60</td>
</tr>
</tbody>
</table>
show that canine-like (60%) are the most frequent type of mesiodens (40%), followed by conical. These findings coincide with the published reports8,17,20,28,29.

A positive diagnosis of a mesiodens is the presence of an extra tooth between the central incisors. The differential diagnosis includes a solitary median maxillary central incisor, present in the minor form of holoprosencephaly or a conical shaped tooth encountered in ectodermal dysplasia as hypomelanosis of Ito. In Nance-Horan syndrome careful examination must be done to recognize normal tooth with abnormal crown shape and supplementary tooth30.

It is essential not only to enumerate but also to identify the supernumerary teeth (ST) present clinically and radiographically before a definitive diagnosis and treatment plan can be formulated6. Occasionally, supernumerary teeth are asymptomatic and may be detected as a chance finding during radiographic examination. Detailed history, clinical examination, thorough investigation, early diagnosis and appropriate treatment of supernumerary teeth are mandatory31. A panoramic radiograph serves as a screening aid and provides additional information about the associated supernumerary or congenitally missing teeth that are frequently seen with mesiodens, but this type of imaging often yields limited evidence of the mesiodens itself because of lack of clarity in the midline region20. For a precise view in the incisor region, an anterior occlusal or a periapical radiograph is also helpful. With the parallax technique (horizontal tube shift technique), the buccolingual position of the un-erupted mesiodens can be evaluated32. In addition, cone-beam computed tomography has recently been used to evaluate supernumerary teeth33. This technique yields detailed three dimensional images of local structures and may prove useful in pre-treatment evaluation of supernumerary teeth and surrounding structures.

There is no precise indication concerning the ideal time for surgical removal of impacted mesiodens. The treatment of supernumerary teeth differs from case to case. According to Canoglu et al34, mesiodens can be best removed when the permanent central incisors begin to erupt, but this may not be always possible. On the contrary, Primosch26 discourages early extraction of mesiodens due to the risk of iatrogenic damage to the developing adjacent permanent teeth.

**Figure 1.** Panoramic radiographs showing mesiodens in different directions. A-B, Vertical. C, Horizontal.
References


Prevalence of mesiodens in Turkish population


