

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

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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 or 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 denti-

tion¹. 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 al² is mesiodens.

Their reported prevalence ranges between 0.3-0.8% in the primary dentition and 0.1-3.8% in the permanent dentition³⁻⁵ (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 reported⁶.

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^{7,8}.

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^{9,10}.

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^{7,11-13}.

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.

Population	Authors	Year	Individuals	Prevalence (%)
Finnish	Jarvinen and Lehtinen ³⁵	1981	1141	0.4
Hispanic	Kaler ³⁶	1988	Not available	2.2
Norwegians	Hurlen and Humerfelt ³⁷	1985	63.029	1.43
Chinese	Huang et al ³⁸	1992	543	7.8
Japanese	Miyoshi et al ³⁹	2000	8122	0.05
Saudi	Osuji and Hardie ⁴⁰	2002	1878	0.85
Mexican	Salcido-Garcia et al ⁴¹	2004	2241	2.1
Turkish	Gunduz et al ²⁸	2008	23000	0.3
Indian	Nagaveni et al ⁴²	2010	2500	2500
Thai	Kositbowornchai et al ⁴³	2010	570	1.05
Iranian	Ghabanchi et al ⁴⁴	2010	414	0.97
Turkish	Kazancı et al ¹⁷	2011	3.351	0.3
Indian	Khandelwal et al ¹⁹	2011	3.896	3.18
Indian	Nayak and Nayak ⁴⁵	2011	500	0.6

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 cyst^{12,14}. In addition to clinical examinations, radiographic observations play an important role in the differential diagnoses of these anomalies¹⁵.

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 11256 patients (5976 women and 5280 man, 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 week 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.

Gender	N	Mesiodens	Prevalence	χ^2	p value
Female	5976	12	0.20	4.367	$p = 0.037$
Male	5280	3	0.057		

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 evolution¹⁶. 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^{3,14}.

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 males and these differences were statistically significant ($p = 0.037$). This finding is conflicting with reports conducted in both Turkish and other nations^{14,17-19}. 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 IV. The position of mesiodens.

Position	n	%
Vertical	10	67
Inverted	0	0
Horizontal	5	33

Table V. Complications caused by mesiodens.

Complication	n	%
Midline diastema	4	27
Axial rotation or inclination of permanent incisors	2	13
Resorption of adjacent teeth	0	0
Cystic change	0	0
None (asymptomatic)	9	60

Table III. The shape of mesiodens.

Shape	n	%
Conical	6	40
Canine-like	9	60
Incisor-like	0	0

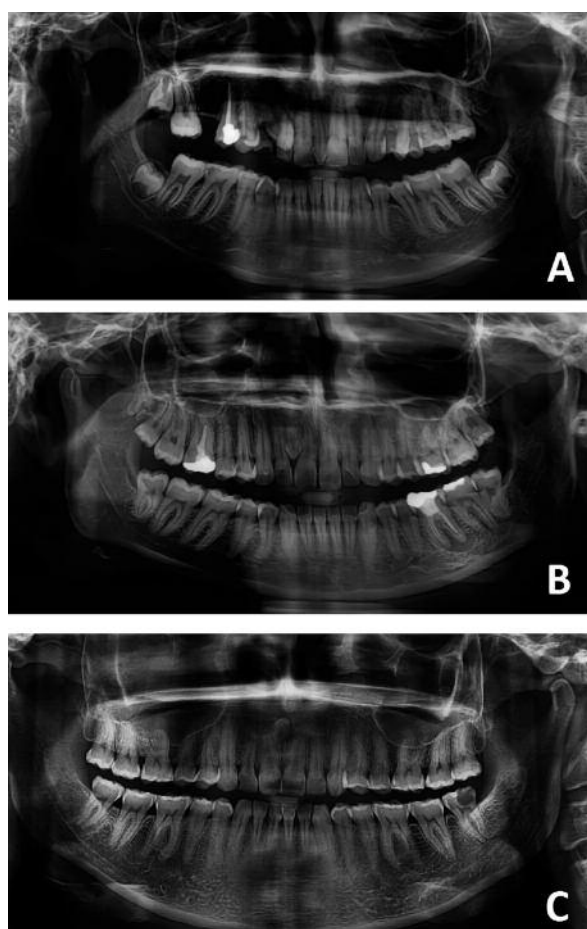


Figure 1. Panoramic radiographs showing mesiodens in different directions. **A-B**, Vertical. **C**, Horizontal.

primordial cysts^{9,20}. Less common complications involving the permanent incisors include dilaceration of the developing roots, root resorption and loss of tooth vitality. Complications involving the mesiodens itself include eruption of the mesiodens into the nasal cavity; development of a dentigerous cyst has been reported in 4% to 9% of cases²⁰⁻²⁵. In present study, the main complications were maxillary midline diastema (27%), inclination or rotation of erupted permanent incisors (13%). There were no root anomaly, cyst formation and intraoral infection in any cases in contrast to other studies where cyst formation was found 37% and 30% of their cases, respectively^{26,27}.

Mesiodens are classified according to their morphology. The shape of mesiodens may vary from a simple conical to a larger, more complicated crown shape with a number of tubercles^{8,18,20,27}. The results of this study clearly

show that canine-like (60%) are the most frequent type of mesiodens (40%), followed by conical. These findings coincide with the published reports^{8,17,20,28,29}.

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 mesiodentes, 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.

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