Survey of mesiodens and its characteristics in 2500 children of Davangere city, India

**ABSTRACT**

**Aim** The aim of the present study is to report the prevalence of mesiodens and its characteristics and also to present 25 cases with 27 mesiodentes in 2500 children in Davangere city, India.

**Materials and methods** A survey of 2500 children examined in the Department of Paediatric Dentistry was conducted. Their ages ranged from 3 to 12 years. A total of 27 mesiodentes were diagnosed in 25 patients (1%). The patients' records and radiographs were evaluated and the following variables were studied: age and sex distribution, number, shape, position, eruption status, associated dentition and arch, associated complications and anomalies.

**Results** In this study were enrolled 16 males and 9 females: 96.2% of the mesiodentes were seen in the maxillary arch while only one in the mandibular arch; 92.5% were observed in the permanent dentition. Most mesiodentes (92.5%) were conical in shape, and about 96.2% were placed vertical in position with only one mesiodens impacted and inverted. Of the 27 mesiodentes, 23 were unilateral; 59.2% caused a midline diastema, 14.8% occlusal interference, 7.4% root resorption, and 3.7% had caused delayed eruption of permanent incisors. Rare anomalies like facial talon cusp were found in two cases with 27 mesiodentes among 2500 children. Mesiodens may occur as an isolated finding or in association with other developmental anomalies.

**Conclusion** Mesiodens may occur as an isolated finding or in association with other odontogenic anomalies.

**Keywords**: Anomaly; Mesiodens; Molariform; Prevalence; Supernumerary tooth.

Introduction

Mesiodens is the most frequently found supernumerary tooth. This term is used to refer to an erupted or unerupted supernumerary tooth in the central region of the premaxilla between the two central incisors in particular, on the palatal side [Gallas and Garcia, 2000]. Mesiodens can occur in the mandible also [Boer, 1968; Zengin, 2007]. The plural word for mesiodens is mesiodentes. Mesiodens may be found both in the primary dentition (prevalence from 0.3% to 0.8%) and in the permanent dentition (prevalence from 0.15% to 3%). It has a male predominance compared to females in the ratio of approximately 2:1 [Gallas and Garcia, 2000; Kupietzky, 2000]. It usually occurs unilaterally but it may also be bilateral.

Based on morphology, it can be classified into four forms: conical (most common type), tuberculate, supplemental (resembling adjacent natural tooth) and molariform [Giancotti et al., 2002]. Mesiodens may occur as a single isolated dental anomaly or in association with other developmental anomalies [Sannomiya et al., 2007; Serrano, 1991; Mehta and Manjooran, 1989; Nakayama et al., 1984; Deplagne, 1984; Srivatsan and Aravindha Babu, 2007] or syndromes such as cleft lip and palate [Bohn, 1963], Gardner syndrome, cleidocranial dysplasia, Fabry-Anderson’s syndrome and chondroectodermal dysplasia [Regattieri and Parker, 1973]. Various factors have been put forward regarding its pathogenesis. The mostly widely accepted theories for the occurrence of mesiodens are: anomalous splitting of the dental bud in the very early stages of development, excessive proliferation of the degenerating dental lamina, anomalous proliferation of the external epithelial layer of the enamel [Sedano and Gorlin, 1969].

The occurrence of mesiodens has been reported among western countries [Ersin et al., 2004; Gunduz et al., 2008; Alberti et al., 2006; Buenviaje and Rapp, 1984; Jarvinen and Lehtinen, 1981; Kaler, 1998]. But there is only one report on prevalence of this anomaly in Indian population [Roychoudhury et al., 2000]. There are no other studies showing the characteristics of mesiodens in India. Thus the aim of the present survey is to report prevalence of mesiodens and also to describe its characteristics in 25 cases with 27 mesiodentes among 2500 children.

**Materials and methods**

A survey of primary, mixed and permanent dentition in 2500 children, who visited the Department of Pedodontics and Preventive Dentistry, College of Dental Sciences, Davangere, India was conducted for period of 6 months for diagnosing mesiodens. The age group of subjects ranged between 3 to 12 years. The presence of erupted or unerupted supernumerary tooth or tooth bud between the two central incisors or as unilateral or bilateral teeth at the midline of the maxilla or mandible, or tooth present in place of incisors were diagnosed as mesiodens. Twenty-seven mesiodentes were detected in 25 patients (1%) who underwent a complete radiographic examination and the following variables were studied: age and sex distribution, number, shape, position, eruption status, associated dentition and arch, associated complications and anomalies.
Results

Age and gender distribution and number of mesiodens
A total of 27 mesiodentes (1%) were diagnosed in 25 patients, 16 males (64%) and 9 females (36%). The age ranged from 3 to 12 years old. Approximately 92% of the patients had only 1 mesiodens, while in 8% of cases 2 mesiodentes were present (Table 1).

Shape
In the present study, among 27 cases, 1 mesiodens (3.7%) was of molariform shape, 1 mesiodens (3.7%) was supplemental and 25 were (92.5%) conical in shape (Table 1).

Position
The majority of the mesiodentes (96.2%) were placed in normal vertical position, with the crown facing inferiorly and root superiorly, and only 1 mesiodens (3.7%) was inverted (Fig. 1) (Table 1).

Eruption status
Most of the mesiodentes (96.2%) were fully erupted in the oral cavity, while only 1 mesiodens (3.7%) was impacted (Fig. 1) (Table 1).

Associated dentition and arch
Only 2 mesiodentes (7.4%) were detected in the primary dentition, while most of the mesiodentes (92.5%) appeared in the permanent dentition. In the mandible, only one (3.7%) mesiodens was observed (Fig. 2), while most of the mesiodentes (96.2%) were found in the maxillary dentition (Table 1).

Associated complications and anomalies
Three patients had associated dental anomalies. Facial talon cusp on mesiodens (Fig. 3) was observed in two patients (7.4%), and one patient (3.7%) had root anomaly like root dilaceration of the mesiodens (Fig. 4). One mesiodens (3.7%) was associated with crowding, two mesiodentes (7.4%) with root resorption of the adjacent tooth, one mesiodens (3.7%) had caused delayed eruption of the permanent incisor, while four mesiodentes (14.8%) had caused occlusal interference, and the majority of mesiodentes (59.2%) caused a midline diastema (Table 1).

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Number</th>
<th>Shape</th>
<th>Position</th>
<th>Status</th>
<th>Dentition &amp; Arch</th>
<th>Complications/Anomalies</th>
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<td>Root Dilaceraton</td>
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<td>Midline diastema</td>
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<td>Midline diastema</td>
</tr>
</tbody>
</table>

FIG. 1 - Impacted and inverted mesiodens (arrow). Crown is facing superiorly and root inferiorly.

TABLE 1 - Characteristics of the mesiodentes in the 25 patients
Discussion

Mesiodens is a developmental disturbance occurring during odontogenesis. The exact aetiology of the mesiodens is unknown, several hypotheses have been suggested for its formation [Sedano and Gorlin, 1969; Primosch, 1981]. The reported prevalence of mesiodens varies considerably between ethnic groups, ranging from 0.15% to 2.2% in Turkish children [Gunduz et al., 2008] to 0.64% to 1.06% in Italian children [Alberti et al., 2006]. There are also other reports showing prevalence in different populations like Finnish (0.4%) [Buenviaje and Rapp, 1984], Norwegians (1.43%) [Järvinen and Lehtinen, 1981] and Hispanic population (2.2%) [Kaler, 1998]. In our study the prevalence of mesiodens has been estimated to be 1% of the population.

Males are more frequently affected than females in the ratio of approximately 2:1. In the present survey, the male to female ratio was 1.7:1. Bruning et al. [1957] have suggested the possibility of sex-linked inheritance in which the predominance of males over females, linked to Y chromosome, would explain the greater prevalence of the disorder in male patients. In our study also, 16 out of 25 cases were observed in males compared to females.

In the dental literature, the mesiodens anomaly showed a striking predilection for the maxilla over the mandible [Ersin et al., 2004]. The present survey showed 26 mesiodentes (92.5%) in the maxilla, with only one rare type of mandibular mesiodens. All reported cases of mesiodens affected more frequently the permanent dentition compared to primary dentition [Ersin et al., 2004; Gunduz et al., 2008; Alberti et al., 2006]. However, in the present study, 2 (7.4%) of the 27 mesiodentes were found in the primary dentition.

Mesiodens may occur single, multiple, unilateral or bilateral, erupted or unerupted and in one or both jaws. The most common position of the mesiodens is at the midline level. But they can also be seen in place of incisors, or may emerge in the palate, or be impacted in the palatal vault. Conical mesiodens is the most common type and is generally peg-shaped, smaller than the neighbouring incisor and located palatally between the maxillary central incisors. They have a completely formed root and can erupt into the oral cavity. However, they may also be inverted, in which case they are less likely to erupt into the oral cavity [Kupietzky et al., 2000; Giancotti et al., 2002]. Supplemental mesiodens resemble natural teeth in both size and shape, whereas rudimentary mesiodens exhibit abnormal shape and smaller size. Tuberculate mesiodentes are barrel-shaped with several cusps or tubercles and have incomplete or abnormal root formation. They rarely erupt into the oral cavity. A much rarer type of mesiodens is the molariform mesiodens, which has a premolar-like crown and a completely formed root. In the present survey, 92.5% mesiodentes were conical, one supplemental, and one mesiodens was of molariform shape. Ninety-two percent of the mesiodentes were unilateral. Most of the mesiodentes (96.2%) were placed vertically and fully erupted with only one mesiodens (3.7%), inverted and impacted in the palate. Because of the erupting forces of the central incisor, this mesiodens might have shifted toward the palatal region.

Mesiodens may be associated with other dental anomalies, suggesting a genetic association. The most commonly associated anomalies include dens invaginatus [Sannomiya et al., 2007; Serrano, 1991], talon cusp [Mehta and Manjooran, 1989], fissural cysts [Deplagne, 1984], fusion [Nakayama et al., 1984], and multiple impacted supernumerary teeth [Srivatsan and Aravinda Babu, 2007]. In this survey, two rare cases of mesiodens associated with dental anomalies were diagnosed. One of them was a facial talon cusp on mesiodens (Fig. 3) and the other was a mesiodens with root anomaly (Fig. 4). Occurrence of facial talon cusp on mesiodens (Fig. 3) and the other was a mesiodens with root anomaly (Fig. 4). Occurrence of facial talon cusp in a mesiodens is an extremely rare occurrence, with only 4 cases reported so far [Hattab et al., 1996; Salama et al., 1990; Nadkarni et al., 2002; Topaloglu et al., 2008]. The occurrence of both talon cusp and mesiodens could probably be explained by Rantanen’s [1971] theory of hyperactivity of the anterior part of the dental lamina resulting in a both mesiodens and talon cusp.

Most of the time the root of the mesiodens is generally fully formed and is often short and globular. In this study, the root
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of one of the mesiodens had severe dilaceration, which is a rare finding (Fig. 4). This finding is not reported in any of the previous prevalence studies on mesiodens [Ersin et al., 2004; Gunduz et al., 2008; Alberti et al., 2006; Buenvaje and Rapp, 1984; Jarvinen and Lehtinen, 1981; Kaler, 1998; Roychoudhury et al., 2000].

There are many case reports of patients showing complications with mesiodens [Gallas and Garcia, 2000; Kupietzky et al., 2000; Giancotti et al., 2002; Sedano and Gorlin, 1969; Primosch, 1981]. The complications most frequently encountered with the occurrence of mesiodens are the midline diastema, lack of eruption of permanent teeth, deviation of the eruption path, rotations, retentions, root resorption of adjacent teeth, formation of primordial or follicular cyst with bone destruction, pain and swelling at the site. In this study, the most common complications found were midline diastema (52.5%), followed by occlusal interference (14.8%), root resorption of the adjacent tooth (7.4%), delayed eruption of the permanent incisor (3.7%), and crowding (1%).

It has been stated that only 25% of maxillary mesiodens erupt [Gallas and Garcia, 2000; Kupietzky et al., 2000]. Mesiodens whether impacted or erupted, may remain in position for many years without clinical manifestations. In this study also, one impacted mesiodens was found without causing clinical manifestations. Thus mesiodens which is impacted and inverted emphasises the importance of a radiographic protocol. Furthermore delayed, ectopic or asymmetric pattern of eruption of the permanent central incisors should alert the clinician about the possibility of a mesiodens.

A comprehensive literature review revealed most of the publications as case reports [Gallas and Garcia, 2000; Kupietzky et al., 2000; Giancotti et al., 2002; Sannomiya et al., 2007; Serrano, 1991; Mehta and Manjooran, 1989; Nakayama et al., 1984; Deplagne, 1984; Srivatsan and Aravindha Babu, 2007; Bohn, 1963; Regattieri and Parker, 1973; Sedano and Gorlin, 1969; Primosch, 1981]. Studies of the prevalence of mesiodens involving certain ethnic or racial populations, including Caucasians [Hurlen and Humerfelt, 1985], Finnish [Jarvinen and Lehtinen, 1981], Norwegians and Hispanics [Kaler, 1998] and in Turkish children [Ersin et al., 2004; Gunduz et al., 2008] have been published to date. But there is a paucity of literature citing the prevalence of mesiodens in India. Only one retrospective study [Roychoudhury et al., 2000] of mesiodens shows male predominance of 1.5:1 and 36% of erupted and 64% of impacted mesiodens. Apart from this study, no other prevalence study has been done in India. The present study aims to assess the prevalence of mesiodens and their characteristics in Indian children.

Conclusion

The present survey on mesiodens is unique in the following aspects:

- It is the first study undertaken to investigate not only the prevalence but also the characteristics of mesiodens in a group of children of India.
- It shows the prevalence of mesiodens in large group of children (2500).

- Reports three unusual findings, such as occurrence of facial talon cusp on mesiodens and mesiodens with root anomaly (severe dilaceration), which are extremely rare findings, and also a case of mandibular mesiodens.

References