Hyperdontia: Exploring the Developmental Abnormality

Naji Ziad Arandi

1 Arab American University, Occupied Palestinian Territories Jenin, Palestine

A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article

Address for correspondence: Naji Arandi, Arab American University, Occupied Palestinian Territories
E-mail: arandi@gmail.com

Received: 10.10.2020; accepted: 11.11.2020; first published: 02.12.2020

INTRODUCTION

Developmental dental anomalies are marked deviations from the normal presentation of the primary or permanent dentition. These anomalies include changes in the number, morphology, structure, and size of teeth. Anomalies resulting in a variation in the number of teeth include hyperdontia, a dental anomaly in which supernumerary teeth are formed in excess of the normal number. The incidence of hyperdontia is quite rare and falls in the range of 0.04/2.7% [1–9] with a well reported male predilection [1, 4, 9–12]. Supernumerary teeth may erupt normally, remain impacted, appear inverted, or assume an ectopic position or an abnormal path of eruption. Supernumerary teeth may cause a variety of complications, such as crowding, delayed eruption, rotations, diastemas, cystic lesions, and resorption of adjacent teeth. Therefore, early diagnosis, proper evaluation, and appropriate treatment planning are essential [2].

Traditionally, supernumerary teeth were occasionally found and diagnosed using panoramic radiographs. However, these radiographic images fail to assess the accurate locations of a supernumerary tooth and its spatial relationships with neighboring structures and adjacent teeth, which are necessary for treatment planning. Nowadays, CBCT (Cone Beam Computer Tomography) is advocated to determine, analyze and plan the treatment of supernumeraries based on the accurate 3D information with regards to the type, shape, and position of the supernumerary tooth, as well as local aberrations and root resorption of adjacent permanent teeth [13]. This article reviews the current literature on hyperdontia in the permanent dentition.

MATERIALS AND METHOD

A thorough literature search was carried out using Scopus, PubMed, and Google Scholar databases. Results were reviewed, prioritized, and findings compiled. The keywords of the search strategy were: prevalence, case reports, supernumerary, supplemental, distomolars, forth molars, paramolars, parapremolars, mesiodens, and supernumerary lateral incisors. Only articles in English published in peer-reviewed journals were included.

Brief description of the state of knowledge. The prevalence of supernumerary teeth varies between and within different populations. They may cause various aesthetic, occlusal, and functional complications and often require an interdisciplinary intervention. Familiarity with such anomalies is essential for the dental practitioner. Recognition and correct identification of the anomaly is important when communicating with other dental team members, especially in the case of a referral to or from another dental office. Moreover, understanding the anomaly is an important factor in determining the course of treatment, if any.

Conclusion. It is hoped that this review will provide dental practitioners with an update on the classification, characteristics, and prevalence figures for each type of supernumerary tooth.

Key words
distomolar, dental abnormality, paramolar, parapremolars, supplemental lateral incisor, non-syndromic, mesiodens, hyperdontia, supernumerary teeth

Supernumerary teeth in the anterior region. Although supernumerary teeth may be found in any location in the maxillary or mandibular dental arch, they have a well-documented predilection for the anterior premaxilla. Supernumeraries in the premaxilla most frequently cause local disturbances, such as midline diastema, delay or prevention in the eruption of the associated permanent incisors, displacement and rotations of the adjacent teeth, crowding and malalignment of the incisors, possible root resorption or dilacerations, development of dentigerous cyst, and migration into the nasal cavity or maxillary sinus [19].

A mesiodens is the supernumerary tooth that occurs in the region between the maxillary central incisors (Fig. 1). They may occur singly or paired, erupted, or impacted. They are more commonly seen in the permanent dentition than in the primary. Mesiodentes are consistently reported as the most commonly observed supernumerary teeth (Tab. 1). Its incidence is reported to range between 0.13–1.6% [20–27] with a 1.5–2.8:1 predilection for occurrence in males [20–24, 27, 28]. Bilateral mesiodentes occur in 4–25.8% of all cases [20, 21, 23, 24, 27, 29]. Mesiodentes are usually found unerupted [13, 21, 23, 24, 27], with a cone-shaped crown and a short root [20, 21, 23, 28, 30]. According to their shape (morphology) and size, there are two types of mesiodentes, the first type is eumorphic, resembling the central incisors with normal shape and size. The second includes dysmorphic mesiodentes with variable sizes and shapes, and can be further subdivided (according to their morphology) into conical, tuberculate or molariform, of which the conical form is the most prevalent [13, 21, 23, 24, 27].

Table 1. Descending arrangement supernumeraries as reported by various studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>n</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burhan et al. [9]</td>
<td>Syria</td>
<td>46</td>
<td>39.1%</td>
<td>Mesiodens</td>
<td>28.3%</td>
<td>Premolar</td>
<td>26.1%</td>
<td>Lateral</td>
</tr>
<tr>
<td>Arandi et al. [1]</td>
<td>Palestine</td>
<td>23</td>
<td>26.1%</td>
<td>Mesiodens</td>
<td>21.7%</td>
<td>Premolar</td>
<td>21.7%</td>
<td>Distomolar</td>
</tr>
<tr>
<td>Esenliket al. [38]</td>
<td>Turkey</td>
<td>84</td>
<td>51.2%</td>
<td>Mesiodens</td>
<td>20.3%</td>
<td>Premolar</td>
<td>17.9%</td>
<td>Lateral</td>
</tr>
<tr>
<td>Mossaz et al. [13]</td>
<td>Switzeland</td>
<td>101</td>
<td>48.52%</td>
<td>Mesiodens</td>
<td>23.76%</td>
<td>Premolar</td>
<td>18.81%</td>
<td>Lateral</td>
</tr>
<tr>
<td>Bereket et al. [43]</td>
<td>Turkey</td>
<td>1100</td>
<td>30.45%</td>
<td>Mesiodens</td>
<td>22.36%</td>
<td>Distomolar</td>
<td>20.18%</td>
<td>Premolars</td>
</tr>
<tr>
<td>Khandelwal et al. [33]</td>
<td>India</td>
<td>82</td>
<td>39.02%</td>
<td>Premolars</td>
<td>21.95%</td>
<td>Mesiodens</td>
<td>20.72%</td>
<td>Premolar</td>
</tr>
<tr>
<td>Celikoglu et al. [11]</td>
<td>Turkey</td>
<td>42</td>
<td>31.3%</td>
<td>Mesiodens</td>
<td>25%</td>
<td>Premolar</td>
<td>22.9%</td>
<td>Lateral</td>
</tr>
<tr>
<td>Öztas et al. [26]</td>
<td>Turkey</td>
<td>116</td>
<td>43.1%</td>
<td>Premolar</td>
<td>31%</td>
<td>Distomolar</td>
<td>19.8%</td>
<td>Mesiodens</td>
</tr>
<tr>
<td>Fernandez-Montenegro et al. [30]</td>
<td>Spain</td>
<td>145</td>
<td>45.9%</td>
<td>Mesiodens</td>
<td>24.1%</td>
<td>Premolar</td>
<td>18%</td>
<td>Distomolar</td>
</tr>
<tr>
<td>Amini [37]</td>
<td>Iran</td>
<td>24</td>
<td>58.3%</td>
<td>Mesiodens</td>
<td>25%</td>
<td>Lateral</td>
<td>16.7%</td>
<td>Paramolar</td>
</tr>
<tr>
<td>Gupta and Praveen Kumar [39]</td>
<td>India</td>
<td>94</td>
<td>93.6%</td>
<td>Mesiodens</td>
<td>6.4%</td>
<td>Lateral</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dobles and Meza [10]</td>
<td>Mexico</td>
<td>40</td>
<td>35%</td>
<td>Mesiodens</td>
<td>17.5%</td>
<td>Premolars</td>
<td>17.5%</td>
<td>Distomolar</td>
</tr>
<tr>
<td>Harris and Clark [52]</td>
<td>USA</td>
<td>64</td>
<td>44%</td>
<td>Distomolar</td>
<td>33%</td>
<td>Premolar</td>
<td>15.2%</td>
<td>Mesiodens</td>
</tr>
<tr>
<td>Mahabob et al. [53]</td>
<td>India</td>
<td>27</td>
<td>44.44%</td>
<td>Mesiodens</td>
<td>29.62%</td>
<td>Premolars</td>
<td>25.92%</td>
<td>Distomolar</td>
</tr>
<tr>
<td>Leco-Berrocal et al. [47]</td>
<td>Spain</td>
<td>24</td>
<td>42.8%</td>
<td>Distomolar</td>
<td>28.6%</td>
<td>Mesiodens</td>
<td>23.8%</td>
<td>Premolar</td>
</tr>
<tr>
<td>Jiang et al. [44]</td>
<td>China</td>
<td>1149</td>
<td>61.18%</td>
<td>Mesiodens</td>
<td>16.7%</td>
<td>Lateral</td>
<td>8.8%</td>
<td>Distomolar</td>
</tr>
<tr>
<td>Cortés-Breton-Brinkmann and Maria [57]</td>
<td>Spain</td>
<td>726</td>
<td>37.7%</td>
<td>Distomolar</td>
<td>20.1%</td>
<td>Premolars</td>
<td>19.8%</td>
<td>Mesiodens</td>
</tr>
<tr>
<td>Singh [12]</td>
<td>Nepal</td>
<td>55</td>
<td>63.63%</td>
<td>Mesiodens</td>
<td>25.45%</td>
<td>Lateral</td>
<td>10.9%</td>
<td>Premolar</td>
</tr>
</tbody>
</table>

Figure 1. A facial image displaying a buccally located conical mesiodens
22, 27, 31, 32]. Most mesiodentes have been reported to occur palatal to the central incisors [23, 28, 30, 32]. Mossaz et al. reported that out of the 49 mesiodentes they studied, two (4.1%) had a labial/buccal ‘bucco-oral’ position of the crown [13]. Studies report that the most common position is the vertical position [13, 20, 21, 24, 27, 33]. Nevertheless, an inverted position is also common [23, 28, 34]. Asaumi et al. reported that of the 256 mesiodentes they studied, 172 (67%) were inverted, 69 (27%) in a normal direction, and 15 (6%) in a horizontal direction against the axis of the tooth [28] (Fig. 2). Hyun et al. observed that 56.58% of the 1,200 mesiodentes they investigated were inverted, 27.33% were vertical, and 16.08% were horizontal [32]. The familial occurrence of mesiodens is well documented. In some cases, more than one sibling has been affected [23, 35]. The anomaly has also been seen in more than one generation and sometimes skips a generation.

Less frequently, supernumerary teeth may be positioned between the central and lateral incisors or between lateral incisors and canines. Supernumerary lateral incisors occur more frequently in the maxilla than in the mandible [13, 36], and the majority occur unilaterally [1, 26, 33, 37, 38], erupted [1, 25, 33, 38], and of the supplemental type [1, 10, 33, 38, 39]. Supernumerary lateral incisors are more frequently observed in males [1, 25, 33], although some studies have reported them occurring more frequently in females [10] and sometimes equally [36, 37]. Supernumerary lateral incisors are smaller than the adjacent normal lateral incisors, whereas the normal lateral incisors adjacent to supernumerary ones are smaller than the contralateral incisors [36]. Supplemental lateral incisors are rare, and almost all the cases of supernumerary lateral incisors reported in the literature were erupted. However, Hekmatfar et al. reported the case of a bilaterally impacted supplemental supernumerary lateral incisor in a 9-year-old male [40]. Andrei et al. reported the case of an impacted unilateral supernumerary lateral incisor in a 5-year-old female [41]. The prevalence of supernumerary lateral incisors has been described to occur within the range of 0.05–1.59% [1, 10, 25, 26, 33, 37, 38, 42].

Although there are numerous studies in the literature investigating the characteristics of various types of supernumerary teeth, only a few focus on supernumerary canines. They are detected more often in the maxilla than in the mandible [13, 43–46] (Fig. 3) and may occur mainly in the form of small conical-shaped teeth [44]. However, a study reported them to have almost an equal percentage of supplemental and conical shapes [26]. Cortés-Bretón-Brinkmann et al. [46] reported that of the 26 supernumeraries in their study, 14 (53.85%) had supplemental morphology and 12 (46.15%) heteromorphic morphology.

Supernumerary canines are extremely rare. Among 21,615 Spanish patients, 22 with 26 supernumerary canines were diagnosed presenting a prevalence of 0.10% [46]. In a study conducted among 5,200 Turkish patients, only one was diagnosed with a supernumerary canine [26]. Among 1,038 Mexican individuals, supernumerary canines were found only in three [10]. In an investigation involving 60,104 Chinese adults, 6.44% (n=74) of the 1,149 supernumeraries detected were supernumerary canines [44]. The corresponding figure in a Brazilian study of 460 supernumerary teeth amounted to 3.8% (n=17) [45]. Fernández Montenegro et al. [30] found four supernumerary canines among 145 supernumerary teeth (2.75%), but Leco Berrocal et al. [47] obtained a higher percentage in their sample (4.17%), although the study only included 24 supernumerary teeth. Many other studies did not discover any supernumerary canines in their study populations (Tab. 1).

**Supernumerary premolars.** Supernumerary premolars are ‘extra’ teeth morphologically belonging to the premolar group [17, 18], and are usually reported in patients older than 12 years of age [30]; cases of late-developing supernumerary premolars have also been reported [48]. Supernumerary premolars can be unilateral, bilateral, single, or multiple [17]. Supernumeraries in the premolar region are usually of the supplemental type [8, 13, 30, 49]. However, Küchler et al. reported that 80% of all the supernumerary premolars detected in their study were tuberculated in shape [50]. The prevalence of supernumerary premolars varies between 0.09% – 0.76% [17, 18, 51, 52], and are reported to be more common in males than in females [17]. Supernumerary premolars occur more frequently in the mandible than in the maxilla [18, 51] (Fig. 4). Studies report that 57–90% of all detected supernumerary premolars from various studies were mandibular [8, 1, 38, 45, 51–54] and are the most common supernumerary teeth in the mandible [45, 47, 53]. Still, the prevalence of supernumerary teeth occurring in the mandibular premolar region is quite low [55]. The orientation of a supernumerary premolar might be vertical, mesio-inclined, disto-inclined, and inverted. Arikan et al. reported that of the 16 supernumerary premolars detected in their study population (n = 755), 10 (62.5%) were vertically oriented [8]. Bilateral cases are more common than the unilateral [51, 55] (Fig. 5). Mandibular bilateral cases are more common than maxillary [51, 55] (Fig. 4). Kaya et al. reported...
that 75% (n = 20) of the unilateral cases of supernumerary premolars were on the right side [51].

Supernumerary molars. Supernumerary molars are either para- or distomolars. Paramolars are located distally to the first molar, but outside the dental arcade, either buccally or lingually, while distomolars are found distally to the third molar and generally in line with the dental arch. Distomolars are more common than paramolars [9, 11, 13, 26, 30, 43, 56, 57]. In contrast, Jiang et al. reported that paramolars (68.8%) were more common than distomolars [44]. Similarly, Khandelwal et al. observed paramolars (17/26; 65.38%) more common than distomolars [33]. Distomolars (also referred to as fourth molars) are reported with a prevalence of 0.03 – 2.1% [56, 58–66]. Distomolars primarily occur singly; bilateral occurrence is rare [26]. Distomolars have a female predilection [37, 56, 64]. The prevalence of paramolar teeth was slightly higher on the left side than on the right side [26, 43, 56]. Jiang et al. observed that 41.8% of the paramolars (n=55) they detected were tuberculate and 36.4% were of the supplemental type [44]. Bereket et al. reported that the majority (96/145) of paramolars detected in their study were of the tuberculate form [43]. Two other studies reported that the majority of the paramolars they detected were conical, followed by tuberculated and then supplemental forms [33, 56]. Khandelwal et al. reported that 10 out of 17 paramolars were conical [33], while Ostaz et al. [26] and Fernández-Montenegro et al. [30] reported that the majority of paramolars they observed were of the rudimentary form.

Wide variations in the prevalence figures of supernumerary teeth have been reported in the literature. In addition to racial variations, the age difference in the patients studied and the different diagnostic and data collection methods used by the investigators may explain this wide range of prevalence. Table 1 shows the reported differences in the percentages of different types of supernumeraries (based on their location) in various studies.

CONCLUSIONS

The characteristics, and prevalence figures of each type of supernumerary tooth varies within and between different ethnicities and study populations. However, supernumerary teeth may cause aesthetic, functional, and occlusal problems; therefore, early diagnosis, proper treatment planning and interdisciplinary intervention are important to minimize consequences to the developing dentition. Clinicians should be aware of such signs as delayed eruption, alterations
in the eruptive pattern, shift in the midline, or dental crowding.

REFERENCES


