A survey on supernumerary molars

G. A. Grimanis* / A. T. Kyriakides** / N. D. Spyropoulos***

The contemporary literature concerning the etiology, frequency, and classification of supernumerary teeth, specifically molars, is reviewed in this article. Also, methods for their early detection, as well as the prognosis and treatment of supernumerary molars, are discussed. Eight cases at the University of Athens and 105 others obtained from the literature were subjected to statistical analysis to examine sexual dimorphism and the position, impactions, and bilateral presence of supernumerary molars. Supernumerary molars occurred more frequently in the maxilla (79.7%), often were impacted (88.7%), and were found bilaterally 23.9% of the time. No great difference was found between the sexes in the frequency of supernumerary molars.


Introduction

The first report of supernumerary teeth is attributed to Pliny (AD 23 to 79), who wrote that “Timarcus, son of Nicoles of Paphus, had two rows of molar teeth.”

Supernumerary teeth are not uncommon and can occur almost anywhere in the mouth. They appear singly or in multiples; in the mandible, the maxilla, or both; and unilaterally or bilaterally. Cases of simultaneous presence of supernumerary teeth with partial anodontia have also been reported.

In studies on the frequency of supernumerary teeth, the results have ranged from 0.3% to 3.8%, for various populations.

Supernumerary teeth appear more frequently in the permanent than in the primary dentition and in males more frequently than in females. They are more common in the maxilla than in the mandible: Researchers have observed ratios of 8 to 1, 8.2 to 1, 9 to 1, and 4 to 1. The incidence is considerably higher in the incisor region of the maxilla (mesiodens), followed by maxillary fourth molars, and mandibular molars, premolars, canines, and lateral incisors.

Supernumerary teeth can also be found in unusual places, such as the maxillary sinus, the sphenomaxillary fissure, the soft palate, the nasal cavity, the maxillary tuberosity, and in dentigerous cysts.

In this paper, a survey of the literature concerning supernumerary teeth, particularly molars, is presented, including their classification, etiology, diagnosis, consequences, and treatment. A descriptive statistical analysis of sexual dimorphism and the position, impaction, and bilateral presence of supernumerary molars has also been conducted from cases presented in the literature as well as our own cases.

Classification

Supernumerary teeth can be classified in the following ways: chronologically, as predeciduous, similar to the permanent teeth, postpermanent, or complementary; morphologically, as similar to the regular teeth or completely different; or topographically, as mesiodens, supernumerary premolars, or supernumerary teeth in the molar region.

Supernumerary teeth in the molar region are paramolars or fourth molars (distomolars). Paramolars...
are rudimentary teeth situated lingually or buccally to the molar row. As a rule, they are situated between
the second and third molars, while in rare cases they
can be found more anteriorly, between the first and
second molars. They usually are fused to one of the
normal molars (paramolar tubercle), most frequently
with the maxillary second molar. In mandibular mo-
lars, a supernumerary root, or paramolar root, may
also exist.²³

Fourth molars, or distomolars, are situated behind
the third molar and are compressed mesiodistally.
They are not completely developed, have a rudimentary
conical shape, and may often be displaced palatally.
They are more often smaller in the maxilla than in the
mandible, in which they are equal to the normal mol-
ar. They appear more frequently in males than in females.²⁴ Mandibular fourth molars are often im-
pacted. It is rare for patients to have impacted fourth
molars in all quadrants.²⁵-²⁷ A case in which three
supernumerary maxillary molars were found bilater-
ally has also been reported. The third, fourth, fifth,
and sixth maxillary molars were all impacted.²⁸

Etiology

The etiology of supernumerary teeth has not yet been
completely clarified and various theories have been
suggested to explain this phenomenon.

Atavism or reversion

Atavism is the return to or the reappearance of an an-
cestral condition or type. Thus, it has been theorized
that a supernumerary molar may be an atavistic reap-
ppearance of the extra molars of the primitive denti-
tion.⁵

Heredity

According to theories based on heredity, supernumer-
ary teeth result from mutant genes. This is supported
by the observation of a greater frequency of super-
numerary teeth in patients with maxillofacial
anomalies such as cleidocranial dysostosis,²⁹ cleft lip
or cleft palate,³⁰ Fabry's disease (angiokeratoma cor-
poris diffusum,³¹ and Gardner's syndrome."³²

The possibility of an autosomal dominant inheritance
with lack of penetration has also been proposed.³³ The
presence of supernumerary teeth bilaterally suggests
that they may be controlled by a mutant gene.²⁴ More-
over, the greater frequency of supernumerary teeth in
men than in women indicates the possibility of a sex-
linked heredity.³⁵

Abnormalites during embryologic formation

Theories that supernumerary teeth result from aberra-
tions during embryologic formation include the follow-
ing:

1. Theory of epithelial remnants²⁸
2. Theory of supernumerary dental germs
3. Theory of duplication by dichotomy of tooth germs
4. Theory of additional proliferation of the dental
   lamina³⁰
5. Theory of the Prague school³⁷
6. The Godo theory³⁸
7. Theory of histochemical disruption³⁹

Progress zone

The progress zone theory, complemented by a model,
suggests that supernumerary teeth result from the
progress zone of the dental lamina in the end of every
tooth series or class.³⁰ This theory would account
for the development of supernumerary molars.

Unified etiologic explanation

A unified etiology for anomalies of tooth number and
size has been supported.⁴¹ It is based on a multifac-
torial model that has a continuous scale with thresholds
related to tooth number and size. The anomaly's posi-
tion on this scale is determined by a combination of
 genetic and environmental factors. This model, which
covers the spectrum of anomalies of tooth number and
size and is based on experimental results, successfully
explains the presence of supernumerary teeth and
other anomalies.

Diagnosis

Supernumerary teeth can erupt or be impacted. If
impacted, they can be revealed only by roentgeno-
grams.¹⁷ Radiographic means of diagnosis include or-	hropantomograms, panoramic radiographs of the
status-X type, and periapical, occlusal, and lateral ob-
lique radiographs.¹⁷ A complete radiographic survey of
the entire oral cavity is necessary to reveal the exis-
tence of all impacted supernumerary teeth, because
the ratio of impacted to erupted supernumerary teeth
ranges from 3 to 1 to 5 to 1.⁵,¹²,⁴³ An adequate number
of radiographs should be taken to allow full assess-
ment of the situation before unerupted or partially
erupted teeth are approached surgically. This is par-
ticularly important in the maxillary third molar area,
because small supernumerary teeth can easily be dis-
Table 1  Cases of supernumerary molars reported in the literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>No. of supernumerary molars</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>49. Barnett, 1972</td>
<td>1</td>
</tr>
<tr>
<td>50. Bowden, 1971</td>
<td>1</td>
</tr>
<tr>
<td>51. Chate, 1978</td>
<td></td>
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<tr>
<td>52. Eller and Stein, 1978</td>
<td></td>
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<tr>
<td>28. Fisher, 1982</td>
<td></td>
</tr>
<tr>
<td>15. Fleury et al, 1984a</td>
<td>20</td>
</tr>
<tr>
<td>36. Fleury et al, 1984b</td>
<td>19</td>
</tr>
<tr>
<td>53. Foley and del Rio, 1970</td>
<td></td>
</tr>
<tr>
<td>54. Harvey, 1978</td>
<td></td>
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<tr>
<td>55. Hasey, 1976</td>
<td></td>
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<tr>
<td>56. Henefer, 1968</td>
<td></td>
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<tr>
<td>57. Hufmann and Thatcher, 1974</td>
<td></td>
</tr>
<tr>
<td>67. Kamberos and Kolokoudias, 1990</td>
<td>16</td>
</tr>
<tr>
<td>58. Lowry and McCallum, 1965</td>
<td></td>
</tr>
<tr>
<td>59. Means and Tabeling, 1984</td>
<td></td>
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<tr>
<td>34. Messer, 1972</td>
<td></td>
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<tr>
<td>25. Mittelman and Poliak, 1963</td>
<td></td>
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<tr>
<td>60. Ogborn, 1971</td>
<td></td>
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<tr>
<td>27. Raley and Reichert, 1975</td>
<td></td>
</tr>
<tr>
<td>31. Regattieri and Parker, 1973</td>
<td></td>
</tr>
<tr>
<td>61. Sammartino and Toblan, 1979</td>
<td></td>
</tr>
<tr>
<td>26. Schofield, 1973</td>
<td></td>
</tr>
<tr>
<td>62. Smith, 1969</td>
<td></td>
</tr>
<tr>
<td>63. Spengos, 1972</td>
<td></td>
</tr>
<tr>
<td>46. Spyropoulos, 1970</td>
<td></td>
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<tr>
<td>24. Sugimura et al, 1975</td>
<td></td>
</tr>
<tr>
<td>64. Turner, 1978</td>
<td></td>
</tr>
<tr>
<td>65. Vagenas et al, 1983</td>
<td></td>
</tr>
<tr>
<td>66. Weiss, 1951</td>
<td></td>
</tr>
<tr>
<td>Present study, 1989</td>
<td>6</td>
</tr>
</tbody>
</table>

The entries indicate the number of cases of supernumerary molars given in the corresponding reference.

placed during surgical manipulation, if their presence and position has not been fully estimated.

Radiographs alone, however, are not adequate for diagnosis; their interpretation must be conducted in conjunction with clinical findings. For example, superimposition of the coronoid process over the maxillary tuberosity or movement of the patient's head during exposure of the radiograph may lead to misinterpretation of the radiograph.

A detailed history of the patient's health should be taken, because past extractions may create confusion in the presence or absence of supernumerary teeth.

Consequences

Supernumerary teeth usually cause dental abnormalities. Problems caused by anterior supernumerary teeth are more serious than those caused by posterior supernumeraries.

The most common consequences of supernumerary
teeth are (1) delayed eruption or noneruption of permanent teeth, or (2) malposition of the supernumerary teeth or displacement of the adjacent teeth with crowding, enhancing various types of malocclusion. Most of these abnormalities can be treated orthodontically.46

Supernumerary teeth may also cause cystic lesions, subacute pericoronitis, gingival inflammation, periodontal abscesses,32 ameloblastomas, odontomas, and fistulas. Furthermore, they may cause absorption of the roots of the permanent teeth or absorption of their own root when they erupt before the permanent teeth.34

Increased incidence of dental caries in the adjacent teeth has also been reported. This is due to the creation of plaque-retaining regions inaccessible to oral hygiene.32

Treatment

Early diagnosis, proper evaluation, and appropriate treatment of supernumerary teeth are essential.12 Treatment can take two forms: (1) removal of the supernumerary tooth and (2) in selected cases, maintenance of the tooth in the arch and frequent observation.

Early removal of supernumerary teeth is recommended when they are causing problems. This eliminates the possible trauma and cost of future complications. Also, abnormalities are at least partially recovered without treatment.

Extractions should be performed carefully by experienced oral surgeons to prevent damage to the dental follicle or reduction of the enamel epithelium at the roots of adjacent permanent teeth, which may cause ankylosis or maleruption of these teeth. The surgeon must also be alert to all probable complications: damage to the inferior alveolar artery and nerve during manipulation of the tooth; excessive hemorrhage or infection; jaw fracture; paralysis or anesthesia because of nerve involvement; or perforation of the pterygomaxillary space, maxillary sinus, or orbit. Great care must be taken during surgical removal of maxillary fourth molars, which are positioned closely to the floor of the orbit. In that situation, it is preferable to remove the third molars only and postpone removal of the fourth, in the hope that the fourth molars will eventually move into a more favorable position.25

Some patients are unwilling, however, to undergo a surgical procedure, especially if it is not an emergency situation. In selected cases, regular monitoring is recommended, particularly if the tooth could be useful for orthodontic purposes. Also, the removal of supernumerary teeth in the primary dentition may be postponed to cause enlargement of the dental arch. This eases eruption of permanent teeth, unless malocclusion is caused.57

Incidence of supernumerary molars

The incidence of supernumerary molars has been estimated in a few studies. Stafne3 found that 199 (39.8%) of 500 supernumerary teeth were molars. Ten (2.0%) were mandibular fourth molars, and 189 (37.8%) were maxillary supernumerary molars: one hundred thirty-one (26.2%) fourth molars and 58 (11.6%) paramolars.

In a Japanese population, in which 520 supernumerary teeth were found, 76 (14.6%) were located in the molar region and only five (0.9%) were found in the mandible.7-10,48 Comparison of these studies suggests that the incidence of supernumerary teeth is higher in whites than in Japanese, but further investigation is necessary.24 The incidence is higher in males (nearly 3 to 1), according to data from the Japanese population.24

In two other studies, supernumerary molars were found in 0.45%5 and 0.7%36 of the population. Table 1 lists the supernumerary molars reported in the literature.

Case reports

Among the patients attending the Oral Diagnosis Clinic of the University of Athens during the last 10 years, eight with supernumerary molars have been found. Three of these patients are presented in Figs 1 to 3. In Table 2, characteristics of the eight cases are described.

Descriptive statistical analysis

Analysis concerning sexual dimorphism and the position, impaction, and bilateral presence of supernumerary molars was conducted on 105 cases described in the literature and on our eight cases. The results of this analysis are summarized in Table 3.

Results

There was no significant difference in the incidence of supernumerary molars in males and females. This is not in agreement with similar data for a Japanese
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Fig 1 Case 1. A 20-year-old man with (arrow) an impacted supernumerary molar in the right side of the mandible.

Fig 2 Case 3. Cast of the maxilla from a 23-year-old patient with a paramolar between the left second and third molar.

Fig 3 Case 8. Radiograph demonstrating (arrow) a fourth molar germ on the right side of the maxilla of a 17-year-old boy.

Table 2 Characteristics of supernumerary molars in the present study

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age (yr)</th>
<th>Position (region)</th>
<th>Situation</th>
<th>Remarks</th>
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<tr>
<td>1</td>
<td>M</td>
<td>20</td>
<td>32</td>
<td>Impacted germ</td>
<td>Fig 1</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>26</td>
<td>32</td>
<td>Impacted germ</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>23</td>
<td>Between 15 and 16</td>
<td>Erupted</td>
<td>Paramolar Fig 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(buccally)</td>
<td></td>
<td>Three other supernumerary molars in the mandible</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>14</td>
<td>1 and 18</td>
<td>Impacted germ</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>21</td>
<td>1</td>
<td>Impacted germ</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>18</td>
<td>1 and 18</td>
<td>Impacted germ</td>
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<tr>
<td>7</td>
<td>M</td>
<td>33</td>
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<td>Impacted germ</td>
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</tr>
<tr>
<td>8</td>
<td>M</td>
<td>17</td>
<td>1</td>
<td>Impacted germ</td>
<td>Fig 3</td>
</tr>
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</table>
population\(^7\) or with corresponding data for supernumerary teeth in general.

Supernumerary molars occurred more frequently in the maxilla than in the mandible, which is in accordance with the findings of previous studies.

Because the majority of supernumerary molars are impacted, radiographic diagnosis is of great importance. The high rate of impaction can be explained by the later formation of these teeth in comparison to normal teeth.

Supernumerary molars existed bilaterally in almost one fourth of the cases. Dentists should keep this in mind and examine the dental cavity thoroughly, both clinically and radiographically, when a supernumerary molar is found.

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### References

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