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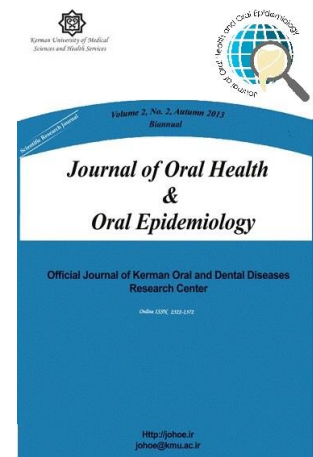
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Non-Syndromic Supernumerary Fourth Molar: A report of two cases and review of literature

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Abstract

Background: Supernumerary teeth are excess teeth found in a normal dentition, with a prevalence of 0.1–3.8% in the permanent dentition and 0.3–0.6% in the primary dentition. This case series presents two non-syndromic supernumerary fourth molar cases in two male and female patients.

Case Report: This study describes two rare supernumerary fourth molar cases. Both cases were asymptomatic and impacted in the maxillary arch. A routine panoramic radiograph revealed the presence of them for the first time. The medical and familial records of the patients were non-contributory, with no abnormalities in the extraoral examination.

Conclusion: Well-developed, impacted supernumerary teeth are rare occurrences in individuals with no concurrent diseases or syndromes. Dental practitioners should know the different types of supernumerary teeth and manage them according to their type and possible complications.

Keywords: Supernumerary tooth, Impacted tooth, Permanent dentition.

Introduction

Supernumerary teeth, also called hyperdontia, are dental anomalies characterized by any tooth or tooth substance more than the normal set of primary or permanent teeth, consisting of 20 and 32 teeth, respectively.¹

Despite the availability of different theories for these teeth, the exact etiologic factor is unknown.² The most popular etiologic factors include the phylogenetic theory, which attributes the condition to anthropoids with dentitions consisting of more numerous teeth, an autonomic recessive inheritance pattern or an X-linked chromosome, a bizarre reaction to local injuries or traumas, the environment, division of a tooth bud, and a hyperactive dental lamina.³

The incidence of supernumerary teeth is 0.1–3.8% and 0.3–0.6% in the permanent and primary dentition, respectively. Nonetheless, the prevalence depends on the technique used to detect this condition.⁴ The condition might affect one tooth or several teeth and might be unilateral or bilateral; it can also affect erupted, unerupted, or impacted teeth. The condition has been reported in the upper or lower jaw or both jaws simultaneously, affecting both deciduous and permanent teeth.^{1,5}

Supernumerary teeth are more prevalent in males than females, with a 2:1 proportion. However, this male predilection is not valid in primary dentition.¹

The presence of several supernumerary teeth might be attributed to a developmental anomaly such as cleft lip and palate, cleidocranial dysostosis, Gardner's syndrome, Anderson–Fabry disease, Ellis–Van Creveld syndrome (chondroectodermal dysplasia), Ehlers–Danlos syndrome, incontinentia pigmenti, and trichorhinophalangeal syndrome. Additionally, the condition might be detected in the absence of any systemic pathoses.⁴

These teeth are classified based on their morphology and area. The morphology of supernumerary teeth is usually regular or conical in the primary dentition, with high variability in the permanent dentition, as follows:

Conical: This is the most common variant in the permanent dentition. However, this finding differs from a report by Cassetta et al, based on which the most frequent supernumerary teeth were tuberculate.²

Tuberculate: This variant is often found as a barrel-shaped tooth, usually paired.

Supplemental: The supplemental variant refers to two identical teeth, most commonly at the end of a normal dentition.

Odontoma: Although it is not universally accepted, according to most authors, odontoma is a hamartomatous malformation.⁶

Furthermore, supernumerary teeth can be categorized into three types based on their location:

A mesiodens, a conical supernumerary tooth, forms between maxillary central incisors; a paramolar, a small rudimentary supernumerary molar, is found on the buccal or palatal aspect of a maxillary molar tooth. Alternatively, it is most commonly found in the interproximal area on the buccal aspect of the maxillary second and third molars. A distomolar tooth is a fourth permanent molar, usually detected on the distal or distolingual aspect of a third molar tooth.¹

Supernumerary teeth might be discovered during a usual clinical or radiographic assessment, and the most diagnostic radiographs for distomolars are periapical and panoramic radiographs and computed tomography scans to determine the abnormal morphology if needed.⁷ Occasionally, they do not affect the adjacent tooth or teeth. However, the clinical approach toward supernumerary teeth relies on their position, the likelihood of eruption into the dental arch, and the presence of preexistent pathological disorders.^{2,7} They might cause various problems, including delayed eruption, non-eruption, crowding, or displacement (such as permanent tooth rotation) and the development of odontogenic cysts or resorption of adjacent teeth, which is less frequent.

We searched supernumerary teeth on databases from 1991 to 2022, and due to the complications and paucity of studies investigating the treatment approaches for supernumerary teeth, especially the fourth molars, this study aimed to provide a literature review on the complications of supernumerary teeth as well as treatment options. The report also deals with two cases of an uncommon occurrence of a distomolar tooth in an otherwise healthy subject's maxilla.

Methods

For data collection, English literature was searched in PubMed, Google Scholar, and ScienceDirect by entering the keywords "supernumerary tooth, impacted tooth, permanent dentition, surgical and orthodontic management of supernumerary teeth" to survey the theme in recently published data up to the year 2022. The inclusion criteria were the prevalence and complications of supernumerary teeth in case studies and review articles. Of the 254 founded articles, only 31 were properly associated with the subject; thus, the published articles from 1991 to 2022 were evaluated. The exclusion criteria were articles that did not discuss widely the complications of supernumerary teeth or those that were not relevant to the treatment modalities. In this regard, the English abstracts and full texts of all the articles on supernumerary teeth complications and clinical management were evaluated. The study selected about 31 references most cited in the literature.

Case Presentation

Case 1

A 37-year-old male patient was referred to a private clinic with a chief complaint of pain in tooth #47, non-contributory medical and familial history, and no signs of systemic diseases or syndromes. There was no history of genetic or dental disorders or anomalies in his family history. No enlarged or palpable lymph nodes were detected in the head and region's extraoral examinations. The oral cavity examination revealed normal soft tissues. A carious lesion was found in tooth #26, and a distoproximal carious lesion was detected in tooth #47 (Figure 1). The upper fourth molar was semi-erupted on the right side (Figure 1).

A panoramic radiograph revealed a well-developed upper fourth molar on the right side. The maxillary distomolar tooth was positioned vertically, distal to the third molar. The crown and root were significantly developed, and the morphology was normal but smaller than the regular molars without any displacement of the permanent teeth. There was no underlying resorption, pathology, or unerupted supernumerary teeth on the panoramic radiograph (Figure 2).

Both maxillary second premolars, the maxillary right first premolar, and both mandibular first molars had been extracted. The tooth #26 had only its roots. The oral hygiene was fair, and periodontal tissues had natural color and consistency. The maxillary and mandibular arches were symmetrical. The crown sizes of all the teeth were normal. The midline was off, and both overjet and overbite were less than 1 mm. The molar relationship was class I on both sides. The patient denied any history of symptoms or pain in the right maxilla. Family history, medical history, general examinations, and extraoral examinations revealed no problems; a diagnosis of a non-syndromic supernumerary tooth was established. The patient was informed of radiographic findings and the difficulties of maintaining oral hygiene. He was also adequately counseled, but he was reluctant to undergo surgery. Therefore, we decided to wait until the planning of treatment. After referring the patient to the oral and maxillofacial surgery department, the recommendation was long-term follow-up until any complications occurred, and surgical extraction of the fourth molar was considered elective. However, after instituting oral hygiene measures, the follow-up was uneventful.

Case 2

Another patient was referred to the dental clinic for a routine dental check-up. She was a 39-year-old female with no family history of syndromic problems. No history of specific medical conditions or systemic diseases was observed. The patient's familial history did not show any genetic dentoalveolar anomalies. Extraoral examination did not reveal any abnormalities, such as swelling or enlargement of the lymph nodes. Intraoral examination showed normal soft tissues as well as healthy periodontium. The panoramic radiograph showed no carious lesions concerning five root canal therapies on teeth #15, #16, #26, #27, and #36. Tooth #7 was restored with dental amalgam. A fourth molar was located at the maxillary left region (Figure 3). It was impacted at a horizontal position distal to the maxillary left third molar. The morphology was fairly normal, and the crown and root were developed well but smaller than normal molar teeth. The distomolar had not displaced the adjacent tooth, and no specific pathology was observed, such as cyst formation or root resorption. The patient was aware of the presence of the fourth molar, and according to her statement, it was first diagnosed by her orthodontist. The patient stated no history of pain or swelling caused by the fourth molar on the maxillary left region. Maxillary and mandibular arches were symmetrical, and the midline was on, along with an overjet of 2 mm and an overbite of 1 mm (Figure 4). The molar relationship was CI I. Since the patient had no familial or genetic history of syndromic problems or any specific systemic condition, a diagnosis of "non-syndromic supernumerary teeth" was made. For this patient, the same recommendation was provided by the oral and maxillofacial surgeon, and it was noted that the prescription of Cone beam computed tomography (CBCT) was not justified since the patient had no clinical and radiographical complications.

Discussion

Prevalence

Stafne et al, Luten et al, and Kokten et al reported prevalence rates of 1%, 2%, and 1.9% for supernumerary molars, respectively.^{8,9,10} Rajab and Hamdan reported a 2.2:1 male-to-female ratio for the incidence of supernumerary teeth.⁶ A 2:9 female-to-male ratio for supernumerary teeth was reported by Yusuf et al, while Liu reported a ratio of 1:3.^{11,12} Sharma reported 300 cases of supernumerary teeth, demonstrating a predominance in males at 83%, consistent with this case.¹³ A higher prevalence in males might indicate an autosomal recessive gene heredity pattern.² However, no significant difference in gender distribution was found by Grimanis et al,¹⁴ Fleury et al,¹⁵ and Menardía-Pejuan et al.¹⁶

Hajmohammadi et al suggested that the most prevalent supernumerary teeth are fourth molars (0.46%), and most of them are located in the maxilla and are unilateral.¹⁷

Bamgbose et al and Kaya et al reported 0.32% and 0.26% prevalence rates for distomolars, with a much higher propensity for the maxilla and a significant difference between men and women.^{7,18} According to Harris and Clark, fourth molars are much more frequent in black American patients than whites, and they are the most prevalent supernumerary teeth in black Americans.¹⁹

However, Anibor et al found that the prevalence of supernumerary fourth molars is around 12.7% in the Nigerian population, which is higher than the studies mentioned above.²⁰

Supernumerary molars are more frequent in the maxilla. Grimanis et al reported a 79% incidence for supernumerary molars in the maxilla.¹⁴ Menardia et al reported incidence rates of 86.8%, whereas Stafne et

al reported a rate of 88.9%.^{8,16} According to Kokten et al, the incidence of supernumerary molars was 75% among all the supernumerary teeth in the maxilla.¹⁰ Also, 76%–86% of cases exhibit only one supernumerary tooth, with <1% of the cases exhibiting several supernumerary teeth.²¹ In the present case, the supernumerary tooth was found in the maxilla. However, another study on 393 supernumerary teeth revealed almost no differences in frequency between the upper and lower jaws,²² although some important data give similar interpretations as demonstrated in Table 1.

Table 1. Review of case reports regarding supernumerary teeth

Study	Year and country	location and number of supernumerary teeth
Nayak et al ¹	2012, India	One paramolar, posterior site
Cassetta et al ²	2014, Italy	45 ST in 25186 patients, posterior site
Díaz et al ³	2009, Colombia	17 ST maxilla and mandible
Ramakrishna Rajashekarappa ⁴	and 2013, India	2 premolars, mandible
Kara et al ⁵	2012, Turkey	351 ST in 288 patients, distomolar and premolar
Rajab et al ⁶	2002, Amman	117 ST in 152 patients, anterior and posterior sites
Bamgbose et al ⁷	2019, Nigeria	87 ST fourth molars in 26721 patients
Kokten et al ¹⁰	2003, Turkey	2 ST fourth molars in maxilla
Menardía-Pejuan et al ¹⁶	2000, Spain	53 ST in 36 patients, maxilla and mandible
Hajmohammadi et al ¹⁷	2021, Iran	53 ST in 5000 patients, maxilla and mandible
Anibor et al ²⁰	2015, Nigeria	127 ST in 1004 patients, anterior and posterior
Gawande et al ²¹	2015, India	15 ST, maxilla and mandible
Fernández Montenegro et al ²³	2006, Spain	147 ST in 102 patients, maxilla and mandible
Di Donna et al ²⁴	2022, Switzerland	1 impacted maxillary ST fourth molar
Navarro and Capote ²⁵	2018, Cuba	1 impacted mandibular ST fourth molar

Hara et al ²⁶	2019, Japan	1 impacted mandibular ST fourth molar
Gupta et al ²⁷	2012, India	2 impacted mandibular ST premolar
Pereira et al ²⁸	2019, Brazil	1 impacted maxillary ST fourth molar
Shahzad and Roth ²⁹	2012, Japan	90 ST fourth molar in 409 patients
Christopher et al ³⁰	2014, Saudi Arabia	3 ST fourth molars
De Oliveira Gomes et al ³¹	2008, Brazil	460 ST in 305 patients, maxilla and mandible

ST: Supernumerary teeth.

Etiology

The exact etiology of this abnormality is still unknown. Numerous theories have been suggested for it, among which the 'phylogenetic theory,' the 'dichotomy theory,' a hyperactive dental lamina, and a combination of genetic and environmental factors are of significant importance.^{1,19} Several studies have reported that they originate from dental lamina hyperactivity, where the epithelial cells forming the supernumerary teeth lie dormant for a long time.^{3,6,20} Other studies have reported that the chief etiologic agent is a genetic predisposition attributed to a dominant autosomal gene.^{3,27} Some other researchers believe it is associated with different syndromes or try to explain it using phylogenetic theory, environmental factors, or tooth germ division.^{3,27} However, although the literature indicates a familial predisposition to hyperdontia, it was confirmed in this study that there was no such relationship in any of the patient's close relatives.

Complications

The majority of supernumerary teeth are impacted and are commonly detected accidentally in routine radiographs with no associated problems. The complications include prevention of eruption or delayed eruption of the affected permanent teeth, displacement or rotation of the neighboring teeth, retention or ectopic eruption of the neighboring teeth, dilaceration, spacing of molars, crowding and malocclusion, the buccal mucosa laceration due to traumatic bite in the presence of buccally positioned paramolars, problems during orthodontic treatment, delays or abnormalities in root maturation of adjacent permanent teeth, follicular cyst development due to the follicular sac degeneration of the supernumerary tooth, neoplasms, trigeminal neuralgia due to the pressure applied on the nerve by the paramolar tooth, pulpal necrosis, root resorption of the neighboring tooth as a result of pressures exerted by the paramolar tooth, dental caries resulting from plaque accumulation in inaccessible areas, gingivitis, and localized periodontitis.¹

According to Seddon et al,³² the prevalence of delayed eruption of the permanent teeth in the presence of supernumerary teeth was 26%–52%, with a prevalence of 28–63% for the displacement and rotation of neighboring teeth. Another study reported that 88.5% of supernumerary teeth exhibited problems, with tooth displacement (55.7%) as the most frequent problem, followed by delayed eruption (50.8%), diastemas (21%),

rotation of teeth [18.7%], retention of primary teeth (7.9%), and resorption of the root [0.3%] in descending order.²²

Kalra et al³³ reported that 15.3% of distomolar and 63% of paramolar teeth affected the molar teeth. Fernández Montenegro et al²³ reported that 14.7% of distomolar teeth affected the molar teeth, consistent with the results reported by Kalra et al.³³ Menardía-Pejuan et al reported that 40% of molars were affected by supernumerary molars.¹⁶ However, in the present case, it had no effect on the adjacent teeth, as shown on a panoramic radiograph taken to view tooth #47.

According to the literature review, there are only three cases of distomolars associated with dentigerous cysts, two of which presented with severe pain and swelling, and another one was asymptomatic. All the three cases were mandibular distomolars, and two of the patients were female.²⁴⁻²⁶

Classification

Supernumerary teeth are classified based on one of the following methods:

Morphology: As supplemental, in which the supernumerary tooth looks like a normal tooth or is rudimentary, in which the supernumerary tooth might be conical, tuberculate, molariform, or referred to as odontoma.

Topography: Mesiodens, paramolar, distomolar or parapremolar.

Chronology: Pre-deciduous, similar to permanent teeth, post-permanent, or complementary.³⁴

Orientation: Transverse, vertical, and inverted.³⁵

Normally positioned supernumerary teeth usually erupt. However, compared to 73% of primary supernumerary teeth, only 13–34% of all permanent supernumerary teeth erupt normally.¹ Overall, 64.6% and 90.9% of paramolars and distomolars are impacted, respectively.⁵ In the present case, the maxillary distomolar was positioned vertically, with normal morphology, but was smaller than the third molar. Crown and root were significantly developed.

Treatment

Supernumerary teeth are generally asymptomatic, and most cases are detected accidentally during routine dental visits. Their clinical management depends on their location, effect on adjacent teeth, and main anatomical structures.¹ Ordinarily, asymptomatic cases are left undisturbed and only followed. Surgical extraction might be undertaken on the basis of pathological sequelae. Moreover, panoramic radiographs are used for routine examinations for the presence of multiple supernumerary teeth.³⁶ These teeth might be accompanied by other dental problems, including hypodontia, taurodontism, gemination, and microdontia.²⁷

The treatment plans and the time for surgical extraction of supernumerary molars are a source of controversy for clinicians.²⁷ This choice of treatment is selected when the distomolar causes cystic injuries, odontogenic tumors, and severe pericoronitis. Also, in cases where the impaction leads to misalignment of adjacent permanent molars, it is better to remove the distomolar surgically.²⁸ It is crucial to evaluate these patients using clinical and radiologic criteria for possible association with syndromes for timely case management. In addition, it is an important responsibility for clinicians to inform the patient of the possible complications if treatment is denied.⁴ In this case, the patient was

reluctant to have the tooth removed. Therefore, he was informed of the presence of a supernumerary tooth in the radiographic examination, and follow-ups were scheduled.

Conclusion

A practitioner should know the different types of supernumerary teeth and understand the relevant signs. Investigations are necessary in these situations, and each case should be appropriately managed to cope with any possible problems.

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Authors' Contribution

Conceptualization: Fatemeh Jahanimoghadam.

Data curation: Fatemeh Jahanimoghadam, Fatemeh Mohammadi.

Formal analysis: Fatemeh Mohammadi, Reyhaneh Aftabi.

Investigation: Fatemeh Mohammadi, Reyhaneh Aftabi.

Methodology: Fatemeh Jahanimoghadam.

Project administration: Fatemeh Jahanimoghadam.

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Validation: Fatemeh Mohammadi, Reyhaneh Aftabi.

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Patient Consent

Informed consent was obtained from the patients for publication of this report.

Competing Interests

The authors of this manuscript certify that they have no financial or other competing interests concerning this article.

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Figures



Fig. 1: Semi-erupted fourth molar of the patient 1.

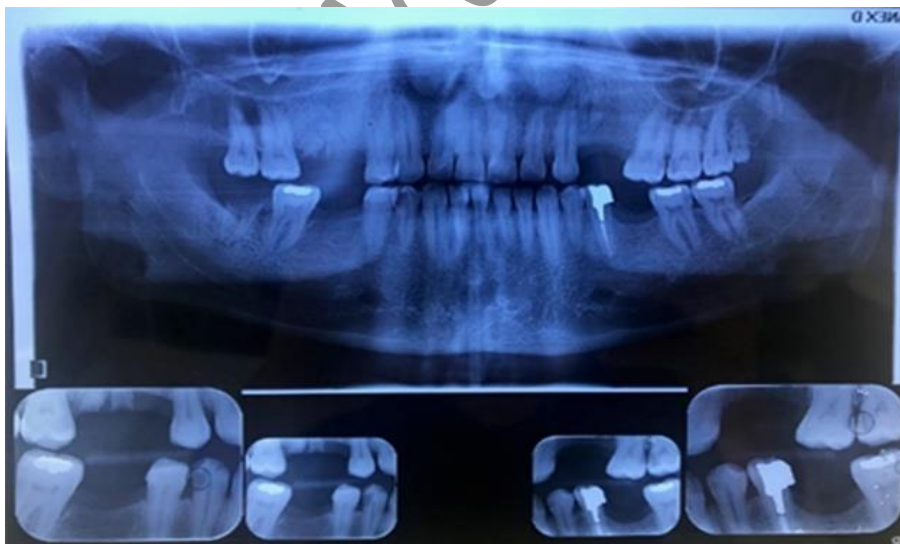
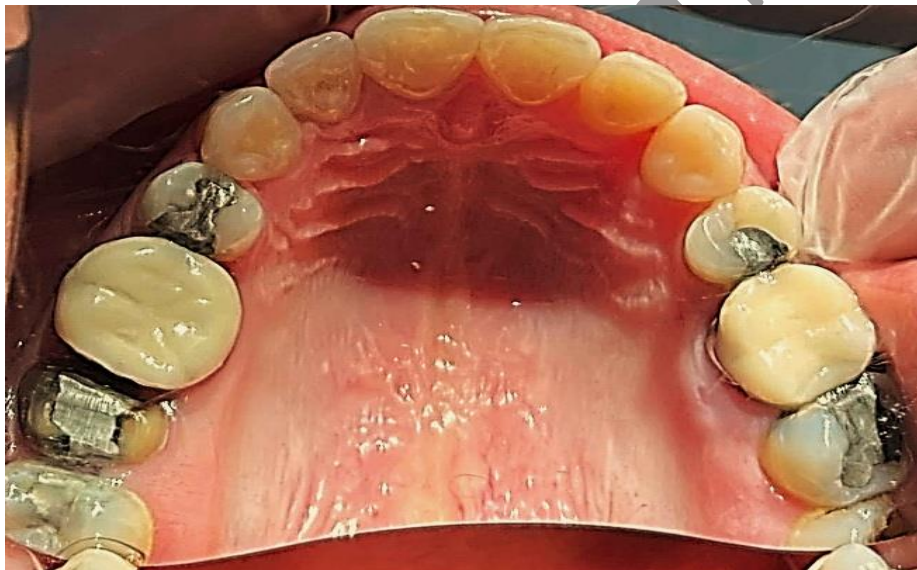


Fig. 2: Radiographic appearance of the fourth molar (patient 1).



Fig. 3: Radiographic appearance of the fourth molar (patient 2)



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