

Supernumerary teeth: literature review

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Summary

A review of the literature on supernumerary teeth in general and supernumerary molars in particular was carried out on prevalence, aetiology, complications and the treatment of supernumerary teeth. Additional teeth are relatively common and are usually of simple conical shape (supernumerary teeth) but may resemble teeth of the normal size and shape. The aim of this review is to provide reference material for dental practitioners in Zimbabwe.

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Introduction

Pliny first observed a supernumerary tooth in the first century.¹ Additional teeth, or hyperdontia, can be defined as an excessive number of teeth when compared to the normal dental formula i.e. 20 deciduous and 32 permanent teeth.² Additional teeth are relatively common and are usually conical in shape.³ The majority of publications dealing with supernumerary teeth are of case reports.^{1,4,5}

Supernumerary/supplemental teeth, whether erupted or impacted may cause numerous problems depending on their number and position. Clinical manifestations of supernumerary teeth include delayed eruption, non-eruption, malposition, separation of the permanent teeth, ectopic eruptions of other teeth, and the development of dentigerous cysts.⁶

The extra teeth may also be accompanied by a deficit of other teeth.^{7,8} Supernumeraries may be classified according to the time of appearance: primary, permanent, and post permanent; topographically, according to their positions in the dental arch: mesiodens, paramolars or distomolars; and according to the variations in the form: conical types, tubercular types, supplemental teeth and odontomes. Supernumerary teeth have been found in all tooth bearing areas of the dental arches. Most supernumerary teeth show only rudimentary development and are of small size, but occasionally teeth of normal size and structure are found (supplemental teeth).³ The supplemental tooth resembles a normal tooth in size and shape while the accessory tooth has a form different from any tooth normally found in the

dentition.⁹ Supernumeraries may occur singly or in multiples, unilaterally or bilaterally and in one or both jaws.¹

Literature on supernumerary teeth is not readily available locally, and as such this paper reviews the literature on supernumerary teeth regarding clinical appearance, prevalence, location, aetiology, diagnosis and treatment for easy reference by dental practitioners in Zimbabwe.

Prevalence.

Supernumerary teeth in the primary dentition were less common with a reported incidence of only 0.3 to 1.7% of the population and account for nearly a fifth of that seen in the permanent dentition.^{10,11} The presence of supernumerary teeth in primary and permanent dentition of the same child had been reported in 30% of the cases.¹⁰ This low occurrence in deciduous supernumeraries could be due to non-detection by parents as most children undergo their first dental examination after the eruption of the anterior permanent teeth.

The prevalence of supernumerary teeth in Caucasian populations ranged from 0.3 to 3.8%.^{12,13} The prevalence in Japanese¹⁴ and Honk Kong Chinese¹⁵ population is between 2.7 and 3.4%. However, Shaw¹⁶ recorded a much higher prevalence of supernumerary teeth (4.8%) in a series of 248 South African Negro patients. Stafne¹⁷ reported that 80% of the supernumeraries were unerupted, and was more common in the maxilla than in the mandible (8.2:1). He also reported bilateral occurrence in 12.25%. Yusof¹⁸ in contrast to Stafne¹⁷ reported that the mandible was the most frequent site of occurrence (60.9%).

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Methodology of detection and the population studied could account for the variations in the range of prevalence cited in the literature.

In a series of 8 328 skulls drawn from many racial groups, Klatsky¹⁹ observed a prevalence of 0.5% supernumeraries. De Villiers²⁰ observed supernumerary teeth in only 0.7% of the 650 skulls studied. Prasada Rao²¹ reported two cases of supernumerary molar teeth in 153 skulls. These low incidences reported may be due to many broken and edentulous maxillary and mandibular specimens.

The highest prevalence was of a single supernumerary tooth which accounted for 76 to 86% of all cases. Double supernumeraries occurred in 12 to 23% and multiple supernumeraries with three or more teeth were reported in less than 1% of cases.^{22,23}

Location.

Supernumerary teeth have been observed in various locations in the jaws. Single or double supernumerary teeth were most commonly found in the pre maxilla, followed by the mandibular premolar region.¹³ Multiple supernumeraries were most commonly observed in the mandibular premolar region and were often associated with syndromes like Gardiner's syndrome²⁴ and cleidocranial dysostosis.²⁵ Though the supernumeraries can occur bilaterally, in majority of the cases they are unilateral.²⁶

About 95% of all supernumeraries occur in the maxilla, especially in the premaxilla,¹³ 75% of the anterior supernumerary teeth were unerupted, with the remainder either partially or fully erupted.¹⁷ Mesiodens between the maxillary central incisors account for 45 to 67% of all supernumerary teeth.¹² The mesiodens occurrence in general population of Hispanics ranged between two to 2.65%,²⁷ while in Eskimo population it was reported as 0.77%.²⁸

The incidence is considerably higher in the central incisor region of the maxilla (mesiodens, 46%), followed by maxillary molars (23%), maxillary paramolars (12%), mandibular premolars (7%), maxillary lateral incisors (4%), mandibular molars (2%), mandibular central incisors (2%), maxillary premolars (2%) and cuspids (<1%).¹⁷ In contrast to the above order, Luten¹² reported the order as upper lateral incisors (50%), mesiodens (36%), upper central incisors (11%), bicuspid (3%). Yusof's study¹⁸ revealed that premolar region had the highest frequency (62.1%) when both the jaws were combined, followed by 27.6% in the molar area and 10.3% in the anterior area.

Supernumerary premolars account for eight to 10% of all supernumeraries²⁹ and have been reported to occur in 0.29% of the general population.²³ They are more likely to occur in the mandible²⁶ than in the maxilla. Multiple supernumerary teeth in the premolar region are less frequently observed compared with single supernumeraries. Davis¹⁵ reported a single case in a group of 1 093, 12 year old Southern Chinese children.

Supernumeraries of the molar region were either paramolars or fourth molars (distomolars). Stafne¹⁷ reported

supernumerary molar teeth in 39.8% of the cases, and 2% of these were mandibular fourth molars. In 37.8% maxillary supernumerary molars, 26.2% were fourth molars and 11.6% were paramolars.¹⁷ In a Japanese study, Tochihiro³⁰ observed the presence of supernumerary molar teeth in 14.6%, with 0.9% in the mandible. The above two studies suggest that the incidence of supernumerary molars is higher in Caucasian population than in Japanese.

Fourth molars or distomolars located behind the third molars are the second most commonly observed supernumerary teeth and may be impacted.¹⁷ Fourth molars occur mostly in maxilla (93%), generally accounting for 28.2% of all supernumerary teeth.¹⁷ Grimanis *et al*¹ also reported that fourth molars were more frequently seen in the maxilla (79.7%) and often impacted (88.7%) with bilateral presence in 25% of the cases. The mandibular fourth molars are much less common, the incidence being only 2%.¹⁷ Grover and Lorton³¹ stated that the incidence of mandibular fourth molars among the cases of unerupted teeth were 0.12%. Maxillary fourth molars are often smaller than the normal series but the mandibular fourth molars are equal size to normal molars.¹⁵

Paramolars occurred most frequently in the maxilla.^{12,29} These may be fully erupted or partially erupted.¹⁷ Paramolars may be normal in shape but smaller in size, usually located between second and third molars on the buccal or lingual surface of the jaw, while in rare cases they may be found between the first and second molars.¹⁷ They may also be fused to one of the normal molars³² (paramolar tubercle), mostly with the maxillary second molar. In mandibular molars, a supernumerary root, or paramolar root³² may also exist. Stafne¹⁷ reported 11.6% maxillary paramolars and no mandibular paramolars, while Tomocin *et al*³³ reported a case with supernumerary paramolars in each quadrant of the upper and lower jaw in a 15 year old Caucasian male.

Supernumerary teeth were also observed in unusual places like the soft palate,²⁹ the nasal cavity,²⁹ the sphenomaxillary fissure,³⁴ the maxillary tuberosity³⁵ and the maxillary sinus³⁶ and between the orbit and brain.^{37,38}

Appearance.

According to the shape, the supernumerary teeth may be classified as rudimentary or supplemental, the later referring to teeth of normal size and shape. Rudimentary forms include conical, tubercular and molariform types.²⁸ Molariform supernumeraries are observed rarely²⁸ and may occur either alone or in pairs in the central incisor area. In a study by Koch *et al*³⁹ conical shaped supernumeraries were observed in 56% of the cases, tubercular type in 12%, incisor shaped supernumeraries in 11% and the rest were of other configurations. The fourth molars are often compressed mesiodistally, may have a rudimentary conical shape, and may often be displaced palatally. Morphologically, they are blunt, multicuspid and rather smaller than the third molars.¹⁷

Sex Difference.

Sexual dimorphism in supernumeraries was observed by most of the authors.^{12,13,40} Mitchell¹³ reported no difference

in sex distribution in deciduous supernumeraries. In supernumerary teeth of the permanent dentition, there was male preponderance (2:1). In the Caucasian population, Luten¹² reported a male to female ratio of 1.3:1. In Japanese¹⁴ and Hong Kong Chinese¹⁵ populations male frequencies as high as 5.5 and 6.5 respectively was reported. However, in another Japanese study⁴¹ on supernumerary molars the male to female ratio of 3:1 was reported. Grimanis *et al*¹ reported little sexual difference in the frequency of supernumerary molars while Harel-Raviv *et al*² reported a slightly higher frequency of supernumerary molars in males.

Aetiology.

Several possible theories have been put forward to explain the cause of supernumerary teeth. Atavism is the phylogenetic reversion⁴² to extinct primates in which it was theorized that the supernumerary molars are formed due to an atavistic reappearance of extra molars of the primitive dentition.

Supernumerary teeth may result from aberrations during embryonic formation, which would include a split in the tooth bud⁴³ (dichotomy theory), and local hypertrophy of the dental lamina⁴⁴ resulting in the formation of additional tooth germs.

The progress zone theory suggests that supernumerary teeth form from the progress zone of the dental lamina at the end of every tooth series or class. This theory has been complemented by studies based on models.⁴⁵

According to the theories based on heredity, supernumerary teeth may be developed due to mutant genes. Supernumerary teeth are often associated with the syndromes which have a well established genetic mode of transmission which include maxillofacial anomalies such as cleft lip or cleft palate,⁴⁶ cleidocranial dysplasia,⁴⁷ and Gardiner's syndrome.²⁴ The greater frequency of supernumerary teeth in men suggest a possibility of sex-linked heredity. The aetiology of supernumerary teeth may be partly genetic as supernumerary teeth are more commonly found in relatives of affected individuals than the general population. However, the inheritance pattern does not follow the Mendelian pattern.

According to the unified etiologic theory⁴⁸ based on experimental studies, a combination of genetic and environmental factors (multifactorial model) has been suggested as the cause of supernumerary teeth.

Diagnosis.

It is essential to identify the irregularities present in the human dentition, both clinically and radiographically before a definitive diagnosis and treatment plan can be formulated. Clinical examination alone may be inadequate, as some supernumerary teeth may be unerupted.²³ Timocin *et al*³³ suggested that a complete X-ray screening of the oral cavity (a panoramic radiograph) must be the initial step in diagnosis. He also suggested that clinicians must be alerted of delayed eruption, impaction and ectopic eruption, as these are associated with presence of supernumerary teeth, particularly in the areas with predilection for occurrence.

Some of the supernumerary teeth may be impacted and asymptomatic and thus complete radiographic surveys are required for their diagnosis: orthopantomograms, panoramic radiographs, periapical, occlusal, and the lateral oblique radiographs.²⁸ However, Grimanis *et al*¹ were of the opinion that the dental radiographs alone are not adequate for supernumeraries diagnosis and their interpretation must be in conjunction with the clinical findings.

Complications.

It has been reported that only seven to 20% of supernumerary teeth are without clinical complications.^{31,43} Problems caused by the anterior supernumeraries are more serious than those caused by the posterior supernumeraries.²⁴ Problems associated with anterior supernumerary teeth occurred in 28 to 60% of the cases;¹⁷ these included delayed eruption or non-eruption of permanent teeth and displacement of the adjacent teeth with crowding, as well as enhancing various types of malocclusions. Conical shaped supernumeraries may cause malocclusions. Tubercular and molariform supernumeraries may cause delayed eruption of adjacent teeth.⁴⁹ Supernumeraries may occasionally cause dentigerous cysts, fistulas, ameloblastomas, root resorption or rotation of adjacent teeth.²⁸ Increased incidence of dental carries in adjacent teeth has also been reported due to retention and formation of plaque.²⁴ Sometimes the presence of fourth molars may interfere with the eruption of the third molars leading to their ectopic eruptions, which may even cause malocclusion.¹⁷ Sporadically they may even cause fusion of teeth in that particular area.⁵⁰

Treatment.

Supernumerary teeth are removed if any of the complications listed above are identified. Hogstrum and Anderson⁴⁰ suggested two alternatives. In the immediate approach, removal of the supernumerary tooth is done soon after the initial diagnosis, while in the delayed approach the supernumerary tooth is removed after the completion of root formation of the adjacent tooth. The potential disadvantages associated with the deferred surgical plan include the loss of eruptive force of the adjacent teeth, loss of space and crowding in the affected arch and possible midline shifts.⁴⁰ Early removal of supernumerary teeth is recommended when they cause delayed eruption of adjacent permanent teeth. Early removal is also recommended to prevent disturbing the eruption of permanent teeth.²⁹ Removal of the supernumerary teeth may result in spontaneous correction of the existing malalignment. Early surgical intervention in anterior supernumeraries takes advantage of the spontaneous eruptive potential of the permanent incisors, which may prevent diastema formation and the extensive surgical/orthodontic treatment at later period.⁵¹ Spontaneous eruption following the supernumerary removal occurred in 54 to 75% of the cases and it is suggested that most teeth experiencing delayed eruption will spontaneously erupt within 18 months, provided the delayed tooth is not excessively displaced.⁵²

The options concerning the delayed eruption due to the presence of supernumerary teeth include removal of the supernumerary teeth only, removal of supernumerary and orthodontic treatment with or without surgical exposure of the unerupted tooth at the time of supernumerary tooth removal. The surgeon must also be alerted to all possible complications like damage to the inferior alveolar artery and nerve during the removal of the tooth, excessive haemorrhage, infection, jaw fracture, paralysis or anaesthesia due to nerve involvement, perforation into the pterygomaxillary space and the maxillary sinus or orbit.

The treatment for fourth molars is usually based on the position of the supernumerary and the likelihood of disruption of the dental arch. The treatment of choice for fourth molars that have erupted but are non-functional is extraction.⁵³ If maxillary fourth molars are positioned high in the posterior wall of the maxilla, they can be left for extraction at a later period.¹ Impacted fourth molars that are not apparently associated with pathology or in patients who are unwilling to undergo surgical removal should be monitored at least once a year or until they are extracted. Great care must be taken during the surgical removal of maxillary fourth molars positioned very close to the floor of the orbit.¹ In that situation, it is preferable to remove the third molars with the hope that the fourth molars will eventually move to a favourable position.⁵

If supernumerary teeth are extracted, the patient should be maintained under long term review, because the additional supplemental premolars have been reported to develop up to five years after initial extractions.⁵³ If supernumerary teeth are left *in situ* because they are asymptomatic, the patient must also be kept under long term review, which will allow early diagnosis of any later complications. The removal of supernumerary teeth in primary dentition may be postponed to allow enlargement of dental arches, which eases eruption of permanent dentition.¹

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