

REVIEWS

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Literature Review on Supernumerary Teeth

Przegląd piśmiennictwa dotyczący zębów nadliczbowych

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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

Abstract

This paper discusses dental anomalies in the form of supernumerary teeth, their division, diagnosis and treatment. Depending on the location in the dental arch, they can be distinguished as: supernumerary incisors including most commonly the mesiodens, supernumerary premolars, paramolars and retromolars. Supernumerary teeth are in both permanent and deciduous dentition, they may be with proper anatomy (supplementary teeth) or atypical and rudimentary (supernumerary teeth). The etiology and mechanisms of the formation of supernumerary teeth are not fully-known, but several theories are taken into account. They often run in families and can coexist with a cleft lip and palate as well as being one of the symptoms of cleidocranial dysplasia or Gardner's syndrome. The presence of supernumerary teeth can cause malocclusion and periodontal problems. It may result in problems with eruption of permanent teeth, crowding, root resorption or gingival inflammation. Hyperdontia diagnostics include imaging the position of the supernumerary teeth by performing X-rays after an intraoral examination. In more complex cases, 3D imaging in the form of computed tomography (CBCT) is very useful. A complete medical and family history is equally important. The treatment of supernumerary teeth may require removal of the supernumerary or its maintenance if it does not cause problems (**Dent. Med. Probl. 2014, 51, 4, 513–517**).

Key words: mesiodens, hyperdontia, supernumerary teeth, paramolars, retromolars.

Streszczenie

W pracy omówiono anomalie zębowe w postaci zębów nadliczbowych, ich podział, diagnostykę oraz leczenie. W zależności od umiejscowienia w łuku zębowym wyróżnia się: nadliczbowe siekacze, w tym najczęściej występujący meziodens, nadliczbowe zęby przedtrzonowe, zęby przytrzonowcowe (paramolary) oraz zatrzonowcowe (distomolary, retromolary). Zęby nadliczbowe występują w uzębieniu stałym i w mlecznym, mogą mieć budowę prawidłową (zęby dodatkowe) lub nieprawidłową, szczątkową (zęby nadliczbowe). Etiologia i mechanizm powstawania zębów nadliczbowych nie są do końca poznane, ale bierze się pod uwagę kilka teorii. Często występują rodzinnie, mogą współistnieć z rozszczepem wargi i podniebienia oraz być jednym z objawów m.in. dysplazji obojczykowo-czaszkowej czy zespołu Gardniera. Obecność zębów nadliczbowych może powodować nieprawidłowości zgryzowe oraz periodontologiczne, być przyczyną zaburzenia wyrzynania zębów stałych, stłoczeń, resorpcji korzeni czy zapalenia dziąseł. Diagnostyka hiperdoncji obejmuje obrazowanie położenia zębów dodatkowych za pomocą wykonania zdjęć rentgenowskich po badaniu zewnątrzustnym. W bardziej złożonych przypadkach jest przydatne obrazowanie 3D w postaci tomografii komputerowej (CBCT). Równie ważny jest dokładny wywiad medyczny i rodzinny. Leczenie zębów nadliczbowych może wymagać usunięcia zęba dodatkowego lub jego pozostawienie, jeśli nie powoduje zaburzeń (**Dent. Med. Probl. 2014, 51, 4, 513–517**).

Słowa kluczowe: hiperdoncja, zęby nadliczbowe, meziodens, zęby przytrzonowe, zęby zatrzonowe.

Tooth anomalies including hypodontia (lack of tooth buds), hyperdontia (additional teeth), transposition, change in shape and seizure of the teeth, etc. are observed quite often – they constitute ca. 18% of tooth defects [1].

The definition of supernumerary teeth is stated as teeth that occur in addition to the normal series of dentition. They may be observed in both permanent and deciduous dentition, anywhere in the oral cavity. They might be as a sin-

gle tooth or numerous teeth, various in shape, single or observed bilaterally. The incidence is more common in permanent dentition and ranges from 0.1 to 3.8%. Supernumeraries might have a different form and are observed in different parts of the maxilla and mandible [2–4].

The etiology is not fully known and the mechanisms are not clearly identified, but both environmental and genetic factors are involved. According to the heredity theory, mutated genes are responsible for the development of additional tooth buds. This theory is supported by the fact that supernumerary teeth are observed in many genetically based syndromes and the bilateral presence of the anomaly. It was believed that the genes responsible are inherited autosomally dominantly, but the higher prevalence in men suggests a chromosome X heredity pattern. (The prevalence of permanent supernumeraries is twice as frequent in males, while deciduous are present in the same prevalence in both sexes). The other theory suggests that supernumerary teeth are an atavistic feature and their presence suggests a return to more primitive dentition. Strong emphasis is given to embryologic aberrations of the dentitions, about which it is claimed that supernumerary teeth are a product of tooth germ dichotomy or hyperproliferation of the dental lamina. It is also suggested that they might be remnants of epithelial cells or a result of supernumerary dental germs. The progress zone theory suggests that the progress zone of dental lamina gives rise to the supernumerary tooth. According to the vascular theory, additional tooth buds in the anterior maxillary or mandibular region are caused by the sphenopalatine artery (*arteria sphenopalatina*), which should disappear during embryonic development [2, 5–7].

They are more common in families where they were previously observed in relatives. They occur more often in cleft lip and palate patients and are one of the symptoms in cleidocranial dysplasia or Gardner's syndrome [7]. They might be classified chronologically (predeciduous, similar to permanent teeth, postpermanent and complementary), topographically (mesiodens, supernumerary premolars or molars) and morphologically (supplemental, tuberculate, conical or an odontoma) [4, 6, 8].

The presence of a supernumerary tooth does not always go hand in hand with malocclusion, but in many cases they lead to a delay or failure of permanent tooth eruption, tooth displacement, crowding, root resorption with loss of vitality or dilacerations [9]. They may also result in periodontal problems, such as pericoronitis, gingival inflammation, periodontal abscess, odontomas and dental caries (caused by disturbances in plaque removal). These may also result in

orthodontic treatment failure, as they do not allow for space closure. The supernumeraries may remain impacted or appear inverted. In some situations, the supernumeraries are incidentally diagnosed when an X-ray is performed [8]. On the other hand, they may erupt normally or assume an abnormal path of eruption. They can also erupt in other places in the body, e.g. nasal cavity [2, 5, 6, 9]. Usually a pantomographic X-ray is a sufficient tool to diagnose the supernumerary tooth, but to detect its exact position, CBCT should be performed [6, 8, 9].

Supernumerary teeth may cause the impaction of the other teeth, and therefore are detected when a failure of eruption, ectopic eruption of the permanent tooth or persistence of the deciduous tooth is observed [2, 11]. Some cases require orthodontic treatment with traction of the impacted tooth, especially when the tooth is very rotated or the root development had finished [12].

The additional teeth can be divided into supernumerary (atypical, usually rudimentary) and supplementary (of the same shape and size as the other teeth in the arch).

The diagnosis should be stated after an anamnesis and X-ray. An interview that contains questions on the patient's medical history and presence of additional tooth buds in the family should be done. These also help to plan the treatment [5].

Supernumerary Incisor

A supernumerary incisor is the most common observation when supernumeraries are discussed. Among them, mesiodens that occurs between the maxillary central incisors is the most common observation [2]. Supernumerary incisors are most frequently observed in patients with different types of cleft, where double lateral incisors are observed in the maxilla, usually at the cleft side (Figs. 1a, 1b). They are observed 7 times more often in cleft patients than in healthy individuals. They are situated in both parts of the cleft (one on each side of the fissure) [5, 13–15]. It is interesting that in patients with clefts, hyperdontia refers mainly to the neighborhood of the cleft fissure while as in the rest of population, it dominates between the central incisors [after 16].

Mesiodens

In the general population, mesiodens is thought to be the most common supernumerary permanent tooth, and occurs twice as frequently in men [4]. It is observed in 0.15–7.8% of the

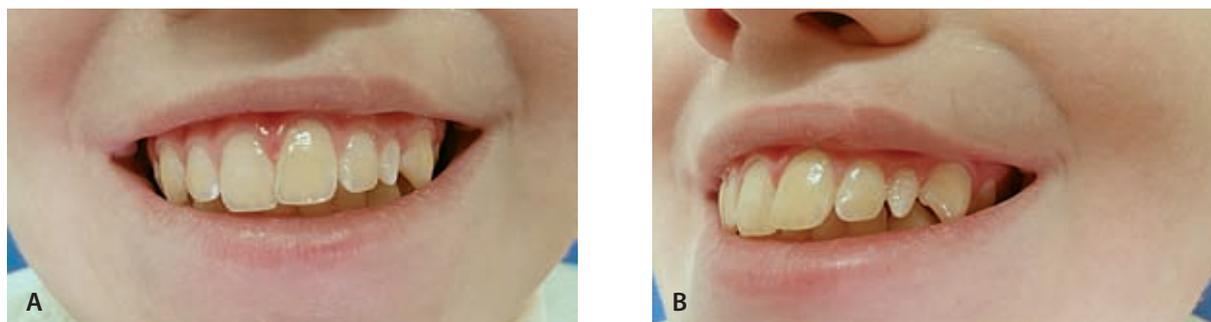


Fig. 1. Patient (11): supernumerary incisor in permanent dentition. In deciduous dentition also supernumerary tooth in the same position: A – view *en face*, B – profile view

Ryc. 1. Pacjent lat 11. Ząb sieczny nadliczbowy w uzębieniu stałym. W uzębieniu mlecznym w tym samym miejscu również był dodatkowy ząb sieczny: A – widok *en face*, B – widok z profilu

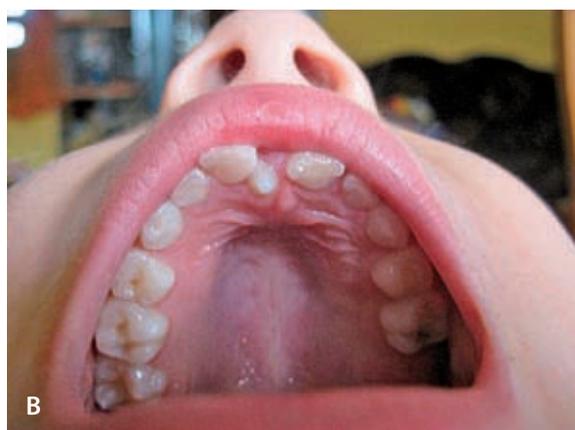


Fig. 2. Girl (5.5): mesiodens. The presence of tooth buds of permanent central incisors (11 and 21) and deciduous central incisors (51 and 61) lets us differentiate supernumerary teeth with solitary median maxillary central incisor syndrome: A – intraoral X-ray, B – intraoral image

Ryc. 2. Dziewczynka lat 5,5. Mezjodens. Obecność związków zębów stałych siekaczy przyśrodkowych (11, 21) oraz mlecznych siekaczy przyśrodkowych (51, 61) pozwala różnicować ząb nadliczbowy z zespołem pojedynczego siekacza środkowego szczęki: A – zdjęcie rentgenowskie przylegające, B – zdjęcie wewnątrzustne

population and 21.1–67% of all supernumeraries. It is more frequently observed in the Asian population. It is located between the maxillary central incisors [5, 17]. Only in ca. 20% of cases is it multiple. Mostly, it is singular and is situated in the medial line of the maxilla (Figs. 2a, 2b) [1, 5]. Only in a quarter of cases does mesiodens erupt into the oral cavity [17].

Mesiodens is more frequently observed in permanent dentition. Often, if it is present in deciduous dentition (Fig. 3.), it has its counterpart in the permanent dentition [5, 17].

Mesiodens often increases the perception of malocclusion, especially when distal occlusion is observed in the individual [5]. It usually causes anomalies in the incisor position. It may cause mesial/distal inclination, proclination, retroclination or rotations of them. The presence of midline diastema without frenulum overgrowth may suggest the presence of a midline supernumerary tooth [9].



Fig. 3. Girl (6): mesiodens with proper anatomy in deciduous dentition

Ryc. 3. Dziewczynka lat 6. Mezjodens o prawidłowej budowie w uzębieniu mlecznym

Supernumerary Premolars

Supernumerary premolars are not a common find. They are observed in 0.29% of the population and represent 8–9.1% of all supernumeraries [18]. They are observed 3 times more rarely in women [4, 19]. Unlike other supernumerary teeth, their shape and size resemble normal premolars and they are more frequently observed in the mandible [6]. Most of these teeth are diagnosed on the bases of radiographs, as they generally do not erupt into the oral cavity – this might be a reason of underestimation of the accurate number of these teeth. They are usually seen on the X-ray in 12–14-year-old patients, as they start developing then [4, 18, 19]. The calcification of the supernumerary premolars starts 1.5–2.5 years after their “regular” equivalents, and the evident image of them is seen 3–4 years after “regular” premolar development [20].

Paramolars

Paramolars are supernumerary teeth in the molar region. They are usually dysmorphic (rudimentary) and situated outside the molar row. They might develop in the mandible or maxilla, but more frequently are observed in the upper arch. In the vast majority of cases, they are situated between the second and first molars, barely observed between the first and second permanent molars [2, 21]. In general, they are found near the molars, either palatally or buccally, and in most cases only one side of the dental arch is affected. They might resemble either molars (smaller in dimensions) or premolars [7, 22].

Besides the complications characteristic for all supernumerary teeth, paramolars may lead to malocclusions due to diminution of the space in the dental arch and are a risk pattern of periodontitis and caries due to the limited possibilities in keeping appropriate oral hygiene of this region [7, 8, 22].

Retromolars

Retromolars, also known as distomolars, are situated either distally or distolingually to the third molars and are in most cases cone-shaped [2, 22, 25]. As the designation indicates, they are situated behind the third molar [7, 23]. As other supernumerary teeth, in most cases they are observed more often in the maxilla than in the mandible and, due to the lack of space in the dental arch, they resemble impacted [4, 24].

They are a very rare observation, usually discovered incidentally on an X-ray. Distomolars are

estimated to be in 0.57% of the population. Bilaterally, they are a characteristic of 0.07% of patients [4, 23, 24].

Treatment

The treatment of supernumerary teeth may require removal of the supernumerary or its maintenance with frequent follow-ups [25]. The latter is selected when the position of the supernumerary is discovered thanks to anamnesis and a series of X-rays. Nowadays, the most useful diagnostic tool is CBCT, which allows for 3D imaging [5, 6, 8, 9, 17]. The removal of supernumeraries is recommended when there is an associated pathology, supernumerary tooth delays eruption and its presence increases the risk of caries. The other recommendation for it is when there is an altered eruption or evident displacement of an adjacent tooth. It is also recommended when orthodontic treatment is planned to align the teeth and when esthetic and functional status are to be compromised [25, 26]. Extractions should be carried out carefully to prevent the damage of the teeth (ankylosis, maleruption) [2, 25]. The teeth are left without extraction when satisfactory eruption of the related teeth are observed or when there is no esthetic interference. This is usually observed in deciduous dentition – the teeth are fully erupted in 75% of the cases and therefore represent only an aesthetic problem [9]. The occlusion and eruption of permanent teeth is not disturbed [2, 5].

Unlike the deciduous teeth, the permanent ones are usually impacted and therefore the treatment depends on the position, size and occlusal disturbances caused by the supernumeraries. Only 15–34% of supernumeraries erupt in the permanent dentition. Some theories claim that the supernumeraries should be extracted, regardless if they cause any additional disturbances, as they are possible causes of idiopathic eruption of the neighboring teeth or malocclusions [26]. A valuable remark on extraction seems to be the timing of the procedure. In most cases, it is recommended to extract them after the roots of the neighboring teeth finish their development. This prevents tooth damage [5, 23].

In the cases where the supernumerary causes impaction of the other teeth, they should be removed as soon as the anomaly is noted. In most cases (75%), this is enough to allow the spontaneous eruption of the neighboring teeth. If the spontaneous eruption is blocked, some of the teeth may require orthodontic traction of the impacted teeth [5].

A very rare situation is when a regular tooth is unfavorably situated. In this case, the removal of a regular tooth is considered, even if the supernu-

merary tooth requires prosthetic treatment to simulate the regular tooth [5].

One should keep in mind that supernumerary teeth develop later than their "regular" equiv-

alents. That is why the patient, especially an orthodontic one, should be monitored radiologically at the treatment, as the teeth might develop during the orthodontic therapy [20].

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