

Supernumerary teeth – place of occurrence, epidemiology, correlation between occurrence of STs and selected predisposing factors and detection of STs

Zęby nadliczbowe – miejsca występowania, epidemiologia, korelacja pomiędzy występowaniem zębów nadliczbowych a wybranymi czynnikami predysponującymi oraz wykrywanie zębów nadliczbowych

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ABSTRACT

Most ST's are detected in anterior region of the maxilla. Mesiodens is the most common type of ST. Their presence can give a lot of clinical problems. Multiple hyperdontia mainly occurs with complex syndromes like cleidocranial dysostosis. The etiology of STs is still not completely understood. They are classified according to their form and location. This study aims to present the epidemiological characteristics of STs in Great Poland based on retrospective study group comprised of the medical records of 88 patients who were treated in the Clinic and Department of Oral Surgery and Periodontology, Poznan University of Medical Sciences from January 2013 to December 2018.

Keywords: Hyperdontia, supernumerary teeth, mesiodens.

STRESZCZENIE

Zęby dodatkowe zazwyczaj występują w przednim odcinku szczęki, są klasyfikowane ze względu na lokalizację lub budowę. Najczęstszym ich rodzajem ze względu na lokalizację jest mesiodens. Występowanie zębów dodatkowych może wiązać się z przeróżnymi problemami klinicznymi, takimi jak opóźnione, ektopowe, zatrzymane wyrzynanie, stłoczenia, powstawanie torbieli zębopochodnych. Mnoga hiperdoncja przeważnie występuje w zespołach genetycznych, np. dysplazji obojczykowo-czaszkowej. Etiologia zębów nadliczbowych nie jest do końca poznana.

Słowa kluczowe: hiperdoncja, zęby nadliczbowe, mesiodens.

Introduction

Supernumerary Teeth/Tooth (STs/ST) may be detected by the general dental practitioner as a chance finding in a radiographic examination spontaneously, as the cause of an impacted tooth or may be found intraorally following eruption [1–3]. ST is defined as “any tooth or odontogenic structure that is formed from tooth germ in excess of usual number for any given region of the dental arch” [2–4]. STs may appear as a single tooth or multiple teeth, unilaterally or bilaterally, erupted or impacted and in mandible or maxilla or both the jaws [3–7]. While STs may occur in both primary and permanent dentition and they are more common in permanent dentition [1, 3, 4, 6, 8]. The reported

frequency in permanent dentition varies from 0.1% to 3.8% in the general population [2, 3, 4, 6]. They can be found in non-syndromic patients or they can be associated with a syndrome like: cleidocranial dysostosis, Gardner syndrome, Fabry Anderson's syndrome, chondroectodermal dysplasia, incontinentia pigmenti and tricho rhino-phalangeal syndrome [2, 4, 6, 7, 9, 15, 17, 18]. They are more common in patients with cleft lip and palate in comparison to the general population [1, 6, 9]. The etiology of STs is still not completely understood. There are several theories suggested for their occurrence: phylogenic theory, the dichotomy theory, theory of concrescence, hyperactive dental lamina and due to genetic and environmental

factors [1–7, 9, 17]. Supernumeraries are classified according to their morphology or location. Morphology variations include conical types, tuberculate types, supplemental teeth and odontomes [7]. According to their locations, STs may also be categorized into four types: mesiodens, paramolar, distomolar and parapremolar [1, 10–12]. STs may result in many severe complications at different ages and very often require long-lasting, multidisciplinary dental treatment and medical support. In our opinion, gaining knowledge about the epidemiological features of STs is very useful for their effective diagnosing, detection and treatment. This study may help the practitioners to correctly diagnose STs and predict their occurrence and offer optimal treatment to their patients.

Aim of the study

This study aims to present the epidemiological characteristics of STs in Great Poland according to their number, location, type of dentition and the correlation between occurrence of STs and selected predisposing factors.

Material and methods

The retrospective study group comprised of the medical records of 88 patients who were treated in the Clinic and Department of Oral Surgery and Periodontology, Poznan University of Medical Sciences from January 2013 to December 2018, including 37 women (42%) and 51 men (58%) aged 4–64 years old. The database search revealed 108 supernumerary teeth in 88 patients. In all cases STs were diagnosed using x-ray. The comprehensive dental and medical history were taken from all patients in the Emergency Department, Poznan University of Medical Sciences. Data collection from the patient records included: sex, age and the following characteristics of supernumerary teeth: dentition (primary/mixed/permanent), location, number of STs, reason for reporting and accompanying diseases. For the comprehensive presentation of STs location in both jaws we have divided into 4 regions: S/ Z1, S/Z2, S/Z3, S/Z4 where S presents maxilla, and Z presents mandible. Region 1 contained area around incisors, region 2 contained area around canine and premolars, region 3 contained area around molars and region 4 contained a peri-wisdom area. Mesiodens were counted separately. The incidences of the data obtained were analyzed.

Descriptive statistics were used to evaluate the data using Statistica 12 by StatSoft and StatXact by Cytel. P value < 0.05 was considered as statistically significant. Before any procedure was carried out,

written informed consent was obtained from every subject. The study was carried out in accordance with the ethical standards set by the World Association Declaration of Helsinki.

Results

STs are mostly detected in mixed dentition (60%) in comparison to primary (5%) and secondary (35%). STs occur more often in maxilla (82%) than in mandible (15%). 3% of patients have STs both in maxilla and mandible. 75% of patients have only one ST. The precise distribution of STs in the assessed regions in both jaws is demonstrated in **Table 1**.

Table 1. Distribution of STs in the selected areas of the maxilla and the mandible

Location	Frequency (n)	Percentage (%)
S1	25	23.15
S2	8	7.41
S3	0	0
S4	13	12.04
Z1	3	2.78
Z2	9	8.33
Z3	3	2.78
Z4	1	0.93

S1 – area of upper incisors, S2 – area of upper canines and premolars, S3 – area of upper molars, S4 – upper peri-wisdom area, Z1 – area of lower incisors, Z2 – area of lower canines and premolars, Z3 – area of lower molars, Z4 – lower peri-wisdom area

The mesiodens is the most frequent supernumerary tooth representing 42,59% of the total STs, following by the supernumerary teeth located in upper jaw S1 (23,15%) and lower jaw Z2 (8,33%). No supernumerary teeth are located in zone 3. This study found correlation between occurrence of STs and gender ($p = 0,2025$) and showed that 40,47% of patients were women. There was no correlation between STs and any determined factors. Orthodontist were the most frequent doctor who detect ST during clinical examination **Table 2**.

Table 2. Distribution of dental and medical specialists who detect STs

Type of specialists	Frequency (n)	Percentage (%)
orthodontist	34	38.64
general dentist	18	20.45
pedodontist	15	17.04
surgeon	6	6.81
pediatrician	15	2.27
internist	1	1.14
no referral	12	13.64

In 89.77% of all assessed cases STs are the separated abnormalities without the accompanying defects. The most frequent accompanying defects are presented in **Table 3**.

Table 3. Accompanying defects and diseases

Defects/diseases	Frequency (n)	Percentage (%)
Non-accompanying diseases	79	89.77
Cleft palate	4	4.54
Cleidocranial dysplasia	3	3.41
Bone structure disorders	1	1.13
Allergy	1	1.13

Discussion

STs are considered as a rare structure that can be found in the maxilla and mandible. Studies report various ST incidence rates, depending on the type of dentition. For primary dentition this prevalence varies between 0,1% to 1,8% [1, 2, 3, 5, 9, 13]. Prevalence of STs in permanent dentition is higher and fluctuates from 0,1% to 3,8% [1–6, 8, 11, 12, 14]. There are some differences of STs occurrence for each ethnical group. Previously mentioned presented occurrence of STs is for Caucasian group, which is lower compared to Asian (2,4% – 3,4%), or Afro-American (6%–7%) [9, 13]. These differences are reported probably due to the different populations investigated (China, Japan, South Africa) and whether the reported prevalence of STs is just a reflection of the variation in the diagnostic tools, assessment process, and sampling methods [10]. Our study shows that the occurrence of STs predominate in mixed dentition. Differences between occurrence of STs in primary and secondary dentition may be caused by oversight of the parents, because STs are often of normal shape, erupt normally, and appear to the proper alignment⁴. Studies report that STs occur mostly as single ones (50,9%–92,5%), as double they perform in 12% to 25,15% of cases [2, 9, 13]. The most rare cases include patients with multiple supernumerary teeth and its less than 1% [2, 5, 9] and only Chou present the prevalence 7,19% [2]. Multiple STs are usually linked with complex syndromes like cleidocranial dysplasia [13]. The study we performed shows that 72,72% of patients have single supernumerary tooth, 20,45% have 2 STs, and 4,55% have more than 3. It is in accordance with other studies. Studies show the maxilla as the most common region of supernumeraries occurrence [2, 3, 13]. Fadi Ata-Ali et al. affirm that the prevalence of STs varies between 67% to 95% [5]. The most common region of maxilla where STs occurred is anterior region and the prevalence varies between 51,5% to 89,6% [2, 3, 5, 6, 8, 9, 13]. Chou et al. report 131 STs identified in anterior region of maxilla and 61 of them were mesiodens.

24,60% of all STs in this study were mesiodens [11, 14]. Second most common place of occurrence of STs is mandible premolar region: 29,44% to 44,8% [9, 13]. In our study, the most common region of STs prevalence is region S1 that corresponds to anterior region of maxilla and contains incisors. In region S1 we found 23,15% of supernumerary teeth. We counted mesiodens separately and their prevalence is 42,59%. Sum of STs in region S1 and mesiodens counts 67,74%. The second highest rate was found in region Z2 (8,33%) and it corresponds to premolar region of mandible. The findings observed in this study are consistent with previous research in the field of STs. The predominance of anterior region of maxilla is similar to the predominance of inflammatory cysts in this region. In our opinion the bony structure of the maxillae in the anterior compartment and long eruption of the upper canine predispose to the STs formation. A number of researchers have reported that proportion male to female with supernumeraries is 2:1 [1, 2, 3, 5, 6, 7, 9, 13], although some authors report this proportion to range from 1.7:1 to 3.1:1 [5]. A study of supernumerary teeth in Asian school children found a greater male to female distribution of 5.5:1 for Japanese, and 6.5:1 for Hong Kong children [3, 7, 13]. Our study presents that proportion between males and females with supernumeraries is 1.37:1. This proportion is more balanced than other studies show, but prevalence is still for males. In our study we want to find which specialist is the most common detector of STs. 38,64% of patients were detected by orthodontists. We assume this specialist is the most common detector because each orthodontic treatment starts with panoramic x-ray. We can draw a hypothesis that if each patient was as a matter of course examined by panoramic x-ray in early stage of we could prevent most of complications caused by STs. There are many various complications that may occur as the result of the presence of ST: crowding, delayed eruption, spacing, impaction of permanent incisors, abnormal root formation, cystic formation, alteration in the path of eruption or incisors or adjacent tooth root resorption [1–5,7,9]. Orthodontists are the first who determines the possible complications of STs [1–5, 9, 12, 14].

Conclusion

Mesiodens is the most common type of ST. The possible presence of STs in anterior compartment of the maxillae should be excluded in all cases of dental abnormalities, especially in mixed dentition. Taking panoramic x-ray is the best diagnostic and

screening test to detect STs. Multiple hyperdontia is very often associated with complex syndromes like cleido-cranial dysplasia. Dentists should take panoramic x-rays as an additional diagnostic test to detect the presence of additional tooth in early childhood to avoid complications caused by ST [19].

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