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DENTAL ANOMALIES IN THE INCISOR-CANINE REGION IN PATIENTS WITH CLEFT LIP AND PALATE – LITERATURE REVIEW

ZABURZENIA ZĘBOWE W ODCINKU SIECZNO-KŁOWYM U PACJENTÓW Z ROZSZCZPEM WARGI I PODNIEBIENIA – PRZEGLĄD PIŚMIENICTWA

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Abstract

Tooth disorders in the anterior region of the maxilla are very common among patients with cleft lip, alveolar bone and palate. The authors concentrate on dental disorders, erupting problems and root development, specifying dental anomalies - especially regarding the lateral incisor, central incisor and canine. Disorders may relate to the shape of the tooth, its location, size, number and they can be considered separately or together. Anomalies can be affected by many factors, such as orthodontic or surgical treatment, the presence of supernumerary teeth, lack of bone, genetic factors and many others. Each group of cleft is different and the following anomalies can be identified: UCLP (unilateral cleft lip and palate), BCLP (bilateral cleft lip and palate), UCLA (unilateral cleft lip and alveolus) and BCLA (bilateral cleft lip and alveolus). This article is intended to summarise some of the most recent knowledge about tooth disorders in the anterior region of cleft lip and palate patients and present them in an orderly way.

Key words: dental disorders, cleft lip and/or palate

Streszczenie

Upacjentów z rozszczepem wargi, wyrostka zębodołowego i podniebienia zazwyczaj występują zaburzenia w uzębieniu w przednim odcinku szczęki. Autorzy omówili ten problem skupiając się na zaburzeniach zębowych, problemach z wyrzynaniem oraz rozwojem korzenia – zwłaszcza na nieprawidłowościach dotyczących siekaczy bocznych, siekaczy przyśrodkowych i kłów. Zmiany te mogą odnosić się do zaburzeń kształtu zęba, jego lokalizacji, rozmiaru, liczby, do których można ustosunkować się razem lub osobno. Omówione zaburzenia mogą być spowodowane przez wiele czynników, m.in. podjęcie u dziecka z rozszczepem leczenia ortodontycznego i chirurgicznego, obecność zębów nadliczbowych, brak kości w obrębie szczęki, uwarunkowania genetyczne. Autorzy podkreślają różnice, które istnieją między poszczególnymi grupami rozszczepów: jednostronnym rozszczepem wargi i podniebienia, obustronnym rozszczepem wargi i podniebienia, jednostronnym rozszczepem wargi i wyrostka zębodołowego oraz obustronnym rozszczepem wargi i wyrostka zębodołowego. Celem artykułu jest uporządkowanie aktualnej wiedzy dotyczącej nieprawidłowości zębowych u pacjentów z różnym typem rozszczepu wargi i podniebienia.

Słowa kluczowe: wady zębowe, rozszczep wargi i/lub podniebienia

Cleft lip and/or palate is the second most common congenital anomaly. It can be isolated (70% of cases) or be a part of multiple syndromes (1). Clefts have a strong genetic origin and multiple environmental causes that can “trigger” these genes. This anomaly is observed in 1/700 to 1/2500 population and are more often found in Asian patients. It is rarely observed in Africans (2, 3).

In this work the authors concentrate on dental anomalies, erupting problems and root development in patients with cleft lip, alveolar bone and palate. The most frequent anomaly is hypodontia – absence of up to 4 teeth and it is observed in 40% of cases. Other most common anomalies are: thick, curved maxillary central incisor (21%), presence of incisal fissures (17.5%), supernumerary teeth (7%), peg-shaped incisors (7%), transposition (5%) and malformed mandibular first molars (1.8%) (4). Genes *MSX1* and *PAX9* have been associated with tooth agenesis, but according to date there are about 100 genes having a role in this process. Besides this fact, genes *MSX1* and *PAX 9* have a proven association with cleft occurrence. It is also documented that children with cleft lip and/or palate are more likely to have a congenital lack of teeth outside the area of the cleft (5). Hypodontia in the cleft area is at the level of 48.8% and outside of it – 6.1%, which is statistically significant. There are smaller differences at the level of second maxillary and mandibular premolars (1.2% and 7.3%, retrospectively) (6).

Retarded eruption and root development delay on the cleft side have been observed and compared with the non cleft side (7). An important role in this delay may be played by a supernumerary tooth, lack of bone or the cleft itself. It is also very probable that surgical injury, especially an early one, can cause the absence of a tooth or disturb the time of its eruption (8). According to Fanning (9), orthodontic treatment can influence the eruption, but not the root formation of teeth. Using the Demirjian's method of establishing dental age, they have excluded the surgical trauma factor, and have not found a large difference in dental-chronological age among all groups. The delay is between 0.18-0.2 year to 0.3-0.7 year, depending on the source. A very similar result was observed by *Dubowik et al.* and *Amarla et al.* (10, 11).

LATERAL INCISORS

For logical reasons, the lateral incisor should be mostly susceptible to dental disorders. A close neighbourhood of cleft fissure, lack of bone or soft tissues and maxilla undergrowth are only a few of many causes that may determine this tooth's malformations.

Renato Menezes has concentrated on the general number of anomalies of the lateral incisor. He claims that 12.5% to 41.6% patients have at least one kind of dental anomaly on the non-cleft side. He stated as well that lateral incisors are the second most endangered by tooth malformations (12).

The most frequent anomaly is hypodontia of the lateral incisor. In the group of unilateral cleft lip and alveolus the proportion of missing lateral incisors was 29% on the cleft side to 0% on the non-cleft side. In UCLP

(unilateral cleft lip and palate) the ratio was 58.7% to 2.2%, retrospectively. The numbers were much higher in the BCLA (bilateral cleft lip and alveolus) and BCLP (bilateral cleft lip and palate) groups and they were on 80% and 64.3%, retrospectively (11). These results are similar to the study done by *Ribiero* in 2003 (7). Almost the same results were observed by *Lekkas* (18), who refers to *Tsai* and *King's* research. It is only said that the lateral incisor is mostly absent in the unilateral cleft lip, alveolus and palate patients. It has been stated, that the left lateral incisor in the left UCLP is more frequently absent than the right one. There were no such observations within the BCLP and right UCLP patients (13). Hypodontia is mostly observed in permanent dentition, mostly among girls (14, 15).

In other studies concerning bone grafts (12), it has been proven that hypodontia of the lateral incisor on the cleft side was present in over half of the cases (58.6%) and just twice rarer on the non-cleft side (27.2% – the number includes second premolars and lateral incisors). The interesting fact is that the second lower premolar was more often absent in patients with isolated cleft palate.

A surprisingly different results were presented by *Torora et al.* (6). In this research two groups were described: unilateral cleft lip and palate and bilateral cleft lip and palate. In contrast to other studies, the absence of the lateral incisor is more frequent in the first group (48.8%), than in the second (only 45%).

What is interesting, peg-shaped lateral incisors are also very common in the general population, with a prevalence of 0.32% to 25%. In UCLP 31.7% individuals have peg-shaped lateral incisors in the cleft area and 4.9% on the non-cleft side. About 60.0% of peg-shaped lateral incisors manifest in patients with BCLP (6). They have considered all the peg-shaped teeth with crown shape or dimension abnormality. Other researchers have very similar results. A distinctive high percent (92.25%) of peg shaped lateral incisors was reported by *Ribeiro et al.* (7).

Lekkas et al. (8) divided the group of 267 individuals into four groups: UCLA (unilateral cleft lip and alveolus), UCLP, BCLA, BCLP. He was comparing varied shape forms: from a normally shaped lateral incisor to a peg-shaped one. There were three possible combinations: one peg shaped, one peg shaped plus one normally shaped and two peg shaped lateral incisors. He was also paying attention to the location of the tooth. In the UCLA group 28.7% of those tested had one lateral peg shaped incisor dorsally related to the cleft, while the second was absent. Only one patient had both peg-shaped lateral incisors (0.6%) and they were also dorsally situated. In the group researched, 2.9% of all individuals had one normal and one pegged. In the UCLP, 37.1% had one dorsally located peg-shaped lateral with hypodontia on the other side, 1.6% had a combination of two shapes and only one patient had both malformed teeth. In the BCLA the values were 11.8% and 5.9%, retrospectively and none of the individuals had both lateral incisors which were deformed. In the last group (BCLP), 32.1% had only one lateral incisor and it was peg shaped, there was no case of normal/peg-shaped tooth and 3.6% had both malformed teeth. Only occasionally was a single,

peg-shaped lateral incisor found on the ventral part of cleft near the central incisor. What is more it was almost always in the left-sided cleft (UCLA).

It has been noted that in the UCLP group lateral incisors have a reduced size to the non-cleft individuals. The difference between unilateral cleft lip and/or palate to the control group is about 2.8%, and in the bilateral cleft twice more often (4.2%). There are also disproportions in tooth size on the cleft and non-cleft sides in UCLP cases. The differences are greater in the maxilla than in the mandible. These disorders are related to almost all teeth in the archway (13).

In UCLA the lateral incisor position can be situated ventrally or dorsally to the cleft with equal likelihood. In BCLA the dorsal localisation of the lateral incisor is twice as frequent as the ventral one. Comparing UCLP and BCLP, the number of dorsal localisation of the second incisor was four times higher (8).

CENTRAL INCISORS

The most common anomaly in the central incisors of patients with clefts are tooth rotations. In UCLP the rotation ratio is 42.7% in the cleft area and 20.7% non-cleft side. In BCLP we can observe this rotations at the level of 26.7% for the central incisors and 16.6% for the lateral ones (6). *Lai et al.* (16) claim that the central incisor's rotation is observed in 78.1% in UCLP patients and 95.9% in BCLP.

The second most common dental anomaly is a thick, curved maxillary central incisor (21%) (4). It has also been noted that the mesio-distal size of the central incisor is reduced when compared to the non-cleft individuals (15). The wedge-shaped or tapered cervico-incisally incisors were observed even in pregnancy. Also the presence of more than three typical mammals on the incisors edge were observed in cleft patients (17).

Central maxillary incisors are the least frequently missing teeth, but the data show that they may affect up to 12% of patients with a total cleft. Most of the data focus on the congenital absence of the central incisor, however it varies from 0.1% to 3.7%. This kind of hypodontia may be accompanied by a lack of the lateral incisor but the laterals are not always lacking (18-21).

CANINES

Because of the cleft fissure and accompanying disorders, a canine inclination is very frequent. For a UCLP patient it is 37.9% (one canine), 52.9% (both canines), 9.2% (three canines) and for a BCLP one it is 36.8%, 61.4% and 1.8% retrospectively. From this results it also seems that canine inclination might be a sign for future canine impaction (6).

Canines are the most palatally situated teeth in the cleft part of the arch, which causes a lateral partial crossbite (22).

A very common anomaly concerning canines is transposition (change in the order of tooth eruption). It affects 8.6% of patients. The change concerns mostly canine and first premolar on the cleft side (23).

In conclusion, dental anomalies are very frequent in cleft lip and/or palate patients. Most of them concern the anterior region of the maxilla, though they can be observed in any part of the dental arch.

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