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ORIGINAL ARTICLE

Periodontal status in growing patients with unilateral cleft lip and palate

Badanie periodontologiczne u pacjentów w wieku rozwojowym z jednostronnym rozszczepem wargi i podniebienia

Beata Wyrębek[1], Renata Górska[1], Dorota Cudziło[2], Paweł Plakwicz[1]

[1] Zakład Chorób Błony Śluzowej i Przyzębia, Warszawski Uniwersytet Medyczny, Polska
Department of Periodontology and Oral Diseases, Medical University of Warsaw, Poland
Head: prof. *R. Górska*

[2] Zakład Ortopedii Szczękowej i Ortodoncji,Instytut Matki i Dziecka w Warszawie, Polska
Department of Maxillofacial Orthopaedics and Orthodontics, Institute of Mother and Child, Warsaw, Poland
Head: dr n. med. *D. Cudziło*

Abstract

Aim of the study. *To evaluate differences in periodontal parameters and oral hygiene between cleft and control sides in growing patients with unilateral cleft.* ***Materials and Methods:*** *15 patients, aged 10 to 18 years, with unilateral cleft lip and palate. Evaluation of probing pocket depth (PPD), clinical attachment level (CAL), gingival recession (REC), vestibule depth (VD), keratinized gingiva (KG), presence of plaque (PCR) and bleeding on probing (BoP) for eight maxillary anterior teeth were performed. Types of fraena and mucosa deformities were also evaluated.* ***Results.*** *Significant differences for PD (but not for CAL) were found only at some surfaces of lateral incisors and canines. Keratinized gingiva was significantly narrower at lateral incisors, canines and first premolars on the cleft side (mean values were: 2.8 mm and 5.4 mm for lateral incisors, 2.7 mm and 3.9 mm for canines, 3.1 mm and 4.7 mm for first premolars, respectively for the affected and the control side). Significantly shallower vestibule at central and lateral incisors was found at some group of teeth (mean values were: 7.0 and 9.2 mm for central incisors, 8.6 and 11.6 mm for lateral incisors, respectively for the affected and control side). Due to tissue malformations it was difficult to assess the upper labial fraena. High scores were recorded for PCR and BoP both on the cleft and the control side.* ***Conclusions.*** *Malformations of soft tissues caused*

Streszczenie

Cel pracy. *Ocena różnic w parametrach przyzębia i higieny jamy ustnej pomiędzy stroną z rozszczepem a stroną kontrolną u dorastających pacjentów z jednostronnym rozszczepem.* ***Materiały i metody.*** *15 pacjentów, w wieku od 10 do 18 lat, z jednostronnym rozszczepem wargi i podniebienia. Przeprowadzono badanie głębokości kieszeni (PPD), poziomu przyczepu łącznotkankowego (CAL), recesji dziąsłowych (REC), głębokości przedsionka jamy ustnej (VD), szerokości strefy dziąsła skeratynizowanego (KG), obliczono wskaźniki płytki nazębnej (PCR) oraz krwawienia (BoP) dla ośmiu zębów przednich szczęki. Ocenie poddano także typ wędzidełka wargi górnej i obecność deformacji błony śluzowej.* ***Wyniki.*** *Znaczące różnice dla PD (ale nie dla CAL) stwierdzono tylko na niektórych powierzchniach siekaczy bocznych i kłów. Dziąsło zrogowaciałe było istotnie statystycznie węższe przy bocznych siekaczach, kłach i pierwszych zębach przedtrzonowych po stronie rozszczepu (średnie wartości wynosiły: 2,8 mm i 5,4 mm dla siekaczy bocznych, 2,7 mm i 3,9 mm dla kłów, 3,1 mm i 4,7 mm dla pierwszych zębów przedtrzonowych odpowiednio dla badanej i kontrolnej strony). Istotnie statystycznie płytszy przedsionek jamy ustnej odnotowano przy centralnych i bocznych siekaczach (wartości średnie: 7,0 mm i 9,2 mm dla centralnych siekaczy, 8,6 i 11,6 mm dla siekaczy bocznych, odpowiednio dla badanej i kontrolnej strony). Ze*

KEYWORDS:
cleft lip and palate, mucogingival defects, periodontal status

HASŁA INDEKSOWE:
rozszczep wargi i podniebienia, defekty śluzówkowo-dziąsłowe, status periodontologiczny

by cleft and previous surgical procedures negatively affected periodontal parameters on the cleft side. It is requisite to introduce periodontal assessment into comprehensive approach in children with clefts to control development of periodontal disease.

względu na malformacje tkanek trudno było ocenić typ wędzidełka wargi górnej. Wysokie wyniki odnotowano dla PCR i BoP zarówno po stronie rozszczepu, jak i po stronie kontrolnej. ***Wnioski.*** *Wady rozwojowe tkanek miękkich wywołane rozszczepem i przeprowadzonymi zabiegami chirurgicznymi negatywnie wpłynęły na badane parametry przyzębia po stronie z rozszczepem. Istotne jest włączenie badania periodontologicznego do kompleksowej opieki dzieci z rozszczepem w celu kontrolowania możliwego rozwoju chorób przyzębia.*

Introduction

Clefts lip and/or palate develop in the early phase of embryogenesis.[1] They are the most prevalent congenital craniofacial birth defects.[2] Patients with cleft lip and cleft palate are treated by a multidisciplinary team; however, their periodontal status is rarely evaluated.[3] Surgical procedures including bone grafting re-establish maxillary arch continuity, enhance nasal symmetry and improve speech,[2] however patients with cleft are more susceptible to develop carious lesions and periodontal disease than the non-cleft population.[4-6] Moreover, long-lasting orthodontic treatment may negatively influence periodontal tissues by hampering proper plaque control.[3,4,7,8] Patients with clefts present mucogingival alterations such as lack of keratinized gingiva, gingival recession, malformations of the gingiva, soft tissue folds, shallow vestibule and postoperative scars.[9-14] Additionally, crowding or malposition of teeth may further favour insufficient oral hygiene.[3,5,14] The aim of this study was to assess periodontal condition and oral hygiene in patients with unilateral cleft lip and palate.

Materials and Methods

The study group consisted of 15 Caucasian individuals (2 females and 13 males) with unilateral cleft lip and palate. The age of the patients ranged from 10 to 18 years (mean age: 14.7). Patients were treated in the Department of Maxillofacial Orthopaedics and Orthodontics of the Institute of Mother and Child in Warsaw, Poland. They had no periodontal evaluation or treatment before. The measurements were performed on eight (all present) permanent anterior teeth in the maxilla (central incisors, lateral incisors, canines and first premolars) on the cleft and the control side (109 teeth were assessed in total). On the control side, lateral incisor in one patient and canine in another were missing. On the cleft side lateral incisors in five patients, canines in three patients, and first premolar in one patient were missing. All patients underwent reconstructive surgery of the hard and soft palate, cleft lip, alveolar process. Records were taken between April and July 2015. Exclusion criteria were as follows: presence of systemic syndromes and congenital anomalies, deciduous or mixed dentition, medication that could influence bone or soft tissue metabolism, and smoking.

The following parameters were recorded with a periodontal probe (Hu-Friedy, PCP UNC 15, calibrated to 1 millimetre):

Probing pocket depth (PPD), clinical attachment level (CAL), gingival recession (REC) at six surfaces of each tooth: distolabial, labial, mesiolabial, mesiopalatal, palatal, distopalatal.

Keratinized gingiva (KG) was measured at the labial surface of a tooth as the distance from the gingival margin to the mucogingival junction.

Vestibulum oris depth (VOD) was measured at centrolabial aspect of a tooth as the distance from marginal gingiva to the highest point of the vestibule formed by mucosa covering alveolar process of the maxilla and the inner part of the lip in relaxed muscle position.

Plaque Control Record (PCR) according to the Plaque Index[15] was recorded at four surfaces

(labial, palatal, mesial and distal) and bleeding on probing (BoP)[16] was assessed at six surfaces: distolabial, labial, mesiolabial, mesiopalatal, palatal, distopalatal. Type of fraena of the upper lip according to the Placek classification[17] and the presence of additional folds and deformations of mucosa were also assessed. Wilcoxon signed ranks test and McNemara test were used with significant difference at $p < 0.05$.

Results

A mean probing depth smaller or equal to 3 mm was the most prevalent. Among all evaluated surfaces (654 in total), at thirteen surfaces mean probing depth was 4 mm and 5 mm at another eight surfaces. Significantly deeper pockets were noted on the distolabial surface of the lateral incisors and on the palatodistal and palatomesial surfaces of canines on the cleft side when compared to the control side (Tab. 1).

By contrast, comparing cleft sides with control sides there were no statistically significant differences in CAL. One patient had 4 mm of CAL loss on the distolabial surface of the central incisor and another had 3 mm of CAL loss at the central incisor on the distopalatal surface (both of them on the cleft side). Few patients had 1 mm or 2 mm CAL loss at the single surfaces of some teeth. 14 teeth with CAL loss were on the cleft region and one on the control side.

Gingival recession was observed at one central incisor (3 mm and 1 mm at distolabial and distopalatal surface, respectively).

There were no statistically important differences for dental plaque between the cleft and control sides, however PCR scores were higher for the cleft side. Only on the distolabial surface of the central incisor on the cleft side bleeding was statistically higher than on the control side (Tab. 2)

Keratinized gingiva was narrower near teeth on the cleft side. Significant differences were as follows: 2.7 mm for lateral incisors, 1.1 mm for canines and 1.6 mm for first premolars (Tab. 3, Fig. 1). Similarly, depth of the vestibule was statistically lower on the cleft side. The differences were 2.2 mm for central incisors and 3.9 mm for lateral incisors (Tab. 4, Fig. 1).

Table 1. Mean scores for probing pocket depth (in millimetres) for each measurement site

Tooth	Surface	Cleft	Control
Central incisor	ML	2.1	2.2
	L	1.4	1.4
	DL	2	2
	DP	1.8	2.1
	P	1.5	1.7
	MP	1.9	2
Lateral incisor	ML	2.1	2.6
	L	1.5	1.7
	DL	1.9	2.7
	DP	1.5	2.1
	P	1.4	1.9
	MP	1.6	2.9
Canines	ML	2.0	2.0
	L	1.3	2.0
	DL	2.4	2.5
	DP	1.8	2.2
	P	1.4	1.8
	MP	1.6	2.4
First premolars	ML	2.5	2.4
	L	1.7	1.7
	DL	2.4	2.6
	DP	2.3	2.6
	P	1.5	1.6
	MP	2	1.9

ML – mesiolabial, L – labial, DL – distolabial, MP – mesiopalatal, P – palatal, DP – distopalatal, for each group of teeth.

In eight out of fifteen patients due to soft tissue malformations it was impossible to define the type of labial fraena in the maxilla. Another six patients had mucosal type of fraena attachment and one patient had gingival type.

Table 2. Mean scores for PCR and BoP (in%) for each group of teeth

	Central incisors		Lateral incisors		Canines		First premolars	
	PCR	BoP	PCR	BoP	PCR	BoP	PCR	BoP
Cleft	55.0	31.1	67.5	50.0	50.0	37.5	39.3	19.0
Control	43.3	22.2	35.7	17.9	48.2	17.9	33.3	10.0

Table 3. Mean scores for keratinized gingiva (in millimetres) on the labial surfaces of teeth groups

	Central incisors	Lateral incisors	Canines	First premolars
Cleft	3.7	2.8	2.7	3.1
Control	4.3	5.4	3.9	4.7

Table 4. Mean scores for vestibule depth (in millimetres) on the labial surfaces of teeth groups

	Central incisors	Lateral incisors	Canines	First premolars
Cleft	7.0	8.6	8.7	10.1
Control	9.2	11.6	10.4	9.0

Discussion

Studies assessing oral hygiene status and the degree of gingival inflammation in children and adolescence with cleft are limited.[4,13,14,18-20] It should, however, be taken into consideration that growing and adult patients with cleft have more periodontal inflammatory risk factors than the non-cleft population.[6,7,21]

In our study severe periodontal pockets were not present, which is in accordance with previously published studies.[4,12,14] Loss of attachment was not a common finding but young age of the presented group should be considered. According to some authors, age seems to be an important factor influencing clinical parameters (including probing depth and attachment level.[8,22] Despite some statistical differences in our study, the cleft side does not present clinically significant deeper pockets or attachment loss when compared with the control side. No teeth in the evaluated sample presented severe loss of attachment. These findings are similar to a study conducted by *Quirynen*.[4] The author reported that teeth in the cleft region had deeper pockets and more clinical attachment loss on the approximal surfaces than on the control side but the differences were insignificant (≤0.5 mm). Furthermore, according to studies analysing radiographs, marginal bone level was significantly more apical in the cleft region, whereas the attachment levels were similar in the cleft and control sides.[5,23,24] It was suggested that the absence of attachment loss on the cleft side could result from the presence of a long connective tissue attachment in this area. Nevertheless, reduced bone level might favour attachment loss in the future especially in the case of inadequate plaque control.[5,25] Moreover, the mean probing depth was shallower in subjects

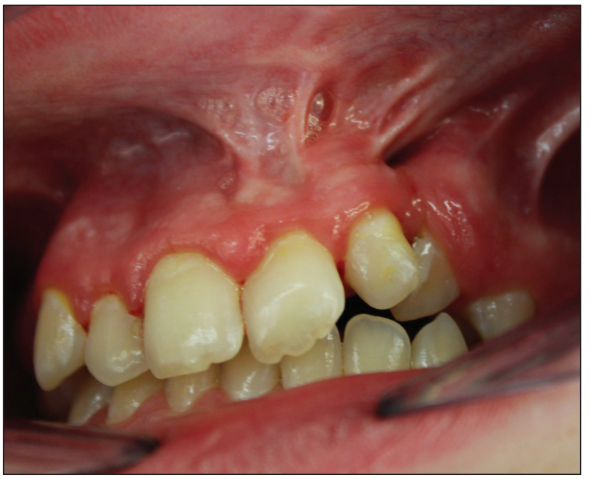

Fig. 1. *Shallow vestibule and narrow keratinized gingiva are present near teeth on the cleft side.*

Fig. 2. *Dental plaque accumulation and gingival inflammation are observed near mucosa folds and soft tissue malformations.*

with clefts who have not received any orthodontic treatment.[5]

In the presented study, the prevalence of gingival recession was very low. Class I recessions according to Miller's classification[26] were the most frequent, which is in agreement with other studies.[10,27] *Almeida* et al.[10] assessed the presence of gingival recessions in correlation with possible etiological factors, such as tooth position in the dental arch, presence of fraena, mucosa scars, absence of keratinized gingiva, and traumatic teeth brushing. Results showed that these factors were associated with the presence of gingival recession but teeth most affected were not those adjacent to the cleft.[10] Individuals with cleft lip and palate present the same prevalence and severity of gingival recession when compared with control population, so the cleft did not seem to be a risk factor for gingival recession.[27]

Our findings showed that vestibule was statistically shallower near teeth on the cleft side. Shallow vestibule leaves less space for a toothbrush. This, combined with mucosa folds and malformed tissue, may favour dental plaque accumulation. Moreover, in our study also keratinized gingiva was narrower on the cleft side when compared with the control side, which is in accordance with other studies.[4]

In the presented group, high scores were recorded for dental plaque and bleeding both on the cleft and control side. Scores were, however, a bit higher on the sides with cleft when compared with control sides of the same individual. Our findings confirm the results of other studies.[7,21,28] The cleft deformity, orthodontic appliances, stiffness of the upper lip, scars formation, absence of keratinized mucosa, crowding and malformation of the teeth might constitute factors that hamper proper oral hygiene.[4,21] Surprisingly, teeth close to the cleft area presented similar plaque and bleeding indices as control teeth. Moreover, *Perdikogianni* et al.[21] analysed subgingival microbiota in children and adolescent with clefts and compared results with healthy patients. The analysis did not reveal significant differences in the types of bacteria between two groups. However, teeth at the cleft sites had a higher number of periodontopathogenic bacteria. In *Quirynen's*[4] study no pathogens typical for periodontitis were detected; however, cleft region favoured growth of commensal species.

Our study revealed malformations in the gingiva and soft tissue on the cleft side (Fig. 2). Soft tissue scars and additional mucosa folds, caused both by cleft and surgery during alveolar bone grafting, were detected. According to *Quiryren*,[4] soft tissue folds may serve as a habitat for pathogens, and consequently increase the risk of periodontal

disease. The presence of scars in the cleft area may favour attachment loss and gingival recession.[10]

The above-listed results indicate that preventive dental programme starting in the early childhood should be mandatory to decrease the risk of periodontal disease in the future.[3,21] Regular dental assessment is essential to maintain periodontal health of patients with cleft.[25]

Conclusion

Patients with clefts present malformations of soft tissues that may potentially have a negative effect on the periodontal status in the cleft area. For this reason, they require periodic and long-term multidisciplinary assessment to establish and execute periodontal preventive treatment plan with respect to their needs.

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Address: 00-246 Warszawa, ul. Miodowa 18
Tel.: +4822 5022099, 692 013 589
e-mail: beatawyrebek@gmail.com

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