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# THE PRESENCE OF THE MAXILLARY LATERAL INCISOR IN THE CLEFT GAP IN PATIENTS WITH UNILATERAL CLEFT LIP AND PALATE. PRELIMINARY REPORT

## WYSTĘPOWANIE SIEKACZA BOCZNEGO SZCZĘKI W PRZYPADKACH JEDNOSTRONNEGO ROZSZCZEPU WARGI I PODNIEBIENIA. DONIESIENIA WSTĘPNE

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### Abstract

**Objective:** Evaluation of the presence of the maxillary lateral incisor in the cleft in patients with complete unilateral cleft lip and palate treated with the use of various surgical protocols.

**Material and methods:** A retrospective analysis was conducted as regards diagnostic models, panoramic radiographs and tooth images of the cleft of 75 patients with complete unilateral cleft lip and palate treated with the use of various surgical protocols (group I: patients who underwent one-stage surgery with early alveolar bone grafting; group II: one-stage operation with secondary alveolar bone grafting; group III: two-stage operation with secondary bone graft or no graft).

**Results:** The analysis of the relation between the applied surgical protocol and the absence of the maxillary lateral incisor indicated the lack of the lateral incisor in the cleft in 4 patients from group I (16%), 8 patients from group II (32%) and 13 patients from group III (52%). The difference between groups I and III was statistically significant ( $p=0.007$ ). The analysis also revealed that as regards the lack of the incisor on the side of the cleft (in all three groups), the hypodontia of the maxillary lateral incisor on the left side was twice as rare as on the right side, in 14 patients (25%) on the left side and in 11 patients (58%) on the right side respectively ( $p=0.009$ ).

The analysis of the relation between the absence of the lateral incisor and the side of the cleft in particular groups of patients indicated that the relation was statistically significant only in group III.

**Conclusions:** The studies reveal that the type of surgical procedure may affect the presence or lack of the lateral incisor in the maxilla on the cleft side. However, it is necessary to conduct studies on larger material.

**Key words:** cleft lip and palate, dental anomalies, permanent lateral incisors, agenesis

### Streszczenie

**Cel pracy:** Ocena częstości występowania siekacza bocznej szczęki w szczeliny rozszczepu u pacjentów z jednostronnym całkowitym rozszczepem wargi i podniebienia leczonych przy zastosowaniu różnych protokołów chirurgicznych.

**Materiał i metody:** Przeprowadzono retrospektywną analizę modeli diagnostycznych, pantomogramów i zdjęć zębowych szczeliny rozszczepu 75 pacjentów z jednostronnym całkowitym rozszczepem wargi i podniebienia leczonych przy zastosowaniu różnych protokołów chirurgicznych (grupa I – operowani jednoetapowo z wczesnym przeszczepem kości do wyrostka zębodołowego, grupa II – operowani jednoetapowo z wtórnym przeszczepem kości do wyrostka i grupa III – operowani metodą dwuetapową z wtórnym przeszczepem kości lub bez przeszczepu).

**Wyniki:** Badając związek między zastosowanym protokołem chirurgicznym a brakiem siekacza bocznej szczęki stwierdzono, że brak siekacza bocznej szczęki w szczeliny rozszczepu występował w grupie I – u 4 badanych pacjentów (16%) grupie II – u 8 badanych pacjentów (32%), w grupie III – u 13 badanych pacjentów (52%). Między grupami I i III różnica w częstości występowania braku siekacza bocznej

była istotna statystycznie ( $p=0,007$ ). Ocena braku siekacza bocznego po stronie rozszczepu u wszystkich pacjentów (łącznie w trzech grupach) wykazała, że brak siekacza bocznego szczęki występował po stronie lewej ponad dwukrotnie rzadziej niż po stronie prawej, odpowiednio u 14 (25%) po stronie lewej i u 11 (58%) po stronie prawej badanych pacjentów ( $p=0,009$ ).

Analizując zależność między brakiem siekacza bocznego a stroną występowania rozszczepu w obrębie poszczególnych grup pacjentów, jedynie w grupie III potwierdzono tę zależność jako istotną statystycznie.

**Wnioski:** Z badań wynika, że rodzaj postępowania chirurgicznego może mieć wpływ na wystąpienie lub brak siekacza bocznego w szczęcie po stronie rozszczepu. Koniecznym jest jednak przeprowadzenie badań na większym materiale.

**Słowa kluczowe:** rozszczep wargi i podniebienia, anomalie zębowe, stałe siekacze boczne, wrodzony brak zawiązka

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## INTRODUCTION

The aesthetic aspect of the teeth alignment and the symmetry of the superior and inferior dental arch is increasingly important in planning the treatment of patients with dental and skeletal craniofacial defects. One of the vital problems related to the above is the absence of the maxillary lateral incisor which occurs mainly in the event of agenesis and in unilateral primary and/or secondary cleft palate – UCLP (the bud has been damaged during the first cleft operation or the tooth lost as a result of no bone support). The cleft lip and/or palate, considered the most common congenital craniofacial defect (1, 2, 3, 4), is characterised by the absence of the maxillary lateral incisor on the cleft side (5). In patients who do not suffer from a cleft defect, agenesis concerns most often the mandibular premolar and then the maxillary lateral incisor. It occurs 1.37 times more often in women than in men (6, 7, 8, 9).

## MATERIAL AND METHODS

The study material was the medical documentation of 75 patients with complete unilateral cleft lip and palate, treated in the Orthodontic Clinic of the Mother and Child Institute in Warsaw. Patients were divided into three groups, depending on the surgical protocol. Each group comprised 25 persons (tab. I).

– Group I: patients who underwent orthodontic treatment after one-stage closure of cleft lip and palate at the age of 1 year; the alveolar bone grafting was performed between the age of 1 year 7 months (1.6) and 4 years 8 months (4.7);

– Group II: patients who underwent orthodontic treatment after one-stage closure of cleft lip and palate at the age of 1 year; the alveolar bone grafting was performed between the age of 6 years 6 months (6.5) and 10 years;

– Group III: patients who underwent orthodontic treatment after two-stage closure of cleft lip and palate (the lip at the age of 1 year, the palate before the age of

2 years); the alveolar bone grafting was performed in some of the patients between the age of 6 years 1 month (6.1) and 11 years 8 months (11.8).

The study material comprised: diagnostic models, panoramic radiographs and dental images of the cleft. Based on the above, the cleft side and the presence or absence of the maxillary lateral incisor was analysed.

The data were submitted to the statistical analysis in the SAS 12.1 system. The relationship between the qualitative variables (the surgical protocol and the cleft side in terms of the incidence of the permanent maxillary lateral incisor) was analysed by means of the chi-squared test or Fisher's exact test if the values expected in the cells of the contingency table were not high enough (i.e. above 5). The statistically significant level was set at  $p<0.05$ . In the case of multiple comparisons, the significance level was adjusted with the Bonferroni correction.

## RESULTS

The statistical analysis comprised three groups of patients undergoing orthodontic treatment. Examining the effect of the applied surgical treatment on the maxillary lateral incisor, its absence in the cleft was identified in 4 patients in group I (16%), 8 patients in group II (32%) and 13 patients in group III (52%) (tab. II). The comparison of the relation between the applied surgical method and the absence of the maxillary lateral incisor in particular groups indicated statistically insignificant differences between group I (absence of the incisor in 16% of the patients) and group II (absence of the incisor in 32% of the patients), and between groups II and III (no maxillary lateral incisor in 32% and 52% of the patients respectively). However, the comparison of group I (one-stage operation with early bone grafting) and group III (two-stage operation with delayed alveolar bone graft or without the graft) revealed significant differences, i.e. the absence of the lateral incisor in the cleft was identified in 4 patients (16%) and 13 patients (52%) respectively ( $p=0.007$ ).

The relation between the absence of the lateral incisor and the cleft side was also examined. In all of the analysed groups, the distribution of the side of the cleft was similar – the left side dominated (tab. II). The analysis of all

the patients showed that on the left side, the absence of the maxillary lateral incisor was twice as rare as on the right side, i.e. in 14 patients (25%) and 11 patients (58%) respectively ( $p=0.009$ ) (tab. III).

Table I. Characteristics of the patients analysed in relation to the used surgical protocol and the age at which the diagnostic models were made and X-ray images taken for diagnostic purposes.

Tabela I. Charakterystyka badanych pacjentów w zależności od zastosowanego protokołu chirurgicznego oraz wieku, w którym wykonano modele diagnostyczne i zdjęcia rtg do badań

Group (size) Nazwa grupy (liczebność)	Surgical protocol Protokół chirurgiczny	Age at which the diagnostic models were made and X-ray images taken Wiek modeli diagnostycznych i wykonania zdjęć RTG			Age at which the bone graft was performed Wiek przeszczepu kostnego		
		average $\pm$ sd średnia $\pm$ sd	min.	max.	average $\pm$ sd średnia $\pm$ sd	min.	max.
Group I (N=25) Grupa I (N=25)	One-stage operation, early alveolar bone grafting Operacja jednoetapowa, wczesny przeszczep kości do wyrostka zębodołowego	10.0 $\pm$ 0,5	8.9	11.1	2.7 $\pm$ 0.9	1.6	4.7
Group II (N=25) Grupa II (N=25)	One-stage operation, late alveolar bone grafting Operacja jednoetapowa, późny przeszczep kości do wyrostka zębodołowego	10.1 $\pm$ 0.5	9.1	11.1	8.3 $\pm$ 1.1	6.5	10.0
Group III (N=25) Grupa III (N=25)	Two-stage operation, late alveolar bone grafting or no grafting Operacja dwuetapowa, późny przeszczep kości do wyrostka zębodołowego lub bez przeszczepu	10.0 $\pm$ 0.6	9.0	11.5	9.2 $\pm$ 1.6	6.1	11.8

Table II. Incidence of the lateral incisor and cleft on the left and right side in three groups of children who underwent orthodontic treatment and were operated on with the use of various surgical protocols (one-stage operation with early alveolar bone grafting, one-stage operation with late alveolar bone grafting and two-stage operation with late alveolar bone grafting or no bone grafting)

Tabela II. Częstość występowania siekacza boczego oraz częstość występowania rozszczepu po lewej i prawej stronie w trzech grupach dzieci leczonych ortodontycznie operowanych różnymi protokołami chirurgicznymi (operowani I-etapowo z wczesnym p.k.d.w., operowani I-etapowo z późnym p.k.d.w., operowani II-etapowo z późnym p.k.d.w. lub bez przeszczepu)

Group Grupa	Lateral incisor Siekacz boczny		Cleft side Strona rozszczepu	
	Absence N (%) Brak N (%)	Presence N (%) Jest N (%)	L N (%)	R N (%)
I	4 (16)	21(84)	21 (84)	4(16)
II	8 (32)	17 (68)	18 (72)	7 (28)
III	13 (52)	12 (48)	17 (68)	8 (32)

(\*) Due to multiple comparisons,  $p<0.016$  was adopted as statistically significant, acc. to the Bonferroni correction.

(\*) Significance p for the chi-squared test in the assessment of the incidence of the lateral incisor between groups I and II - NS

(\*) Significance p for the chi-squared test in the assessment of the incidence of the lateral incisor between groups I and III – 0.007

(\*) Significance p for the chi-squared test in the assessment of the incidence of the lateral incisor between groups II and III – NS

(\*) Significance p for the chi-squared test in the assessment of the incidence of the cleft on the left and right side between all the groups – NS

Table III. Relation of the presence of the lateral incisor to the cleft side in the entire analysed group

Tabela III. Zależność występowania siekacza bocznego od strony rozszczepu w całej badanej grupie.

Side Strona	Lateral incisor Siekacz boczny		Significance p for the chi-squared test Istotność p dla testu Chi_kwadrat
	Absence N (%) Brak N (%)	Presence N (%) Jest N (%)	
L (N=56) L (N=56)	14 (25)	42 (75)	0.009
R (N=19) P (N=19)	11 (58)	8 (42)	

Table IV. Relation between the presence of the lateral incisor and the cleft side in three groups of children who underwent orthodontic treatment and were operated on with the use of various surgical protocols (one-stage operation with early alveolar bone grafting, one-stage operation with late alveolar bone grafting and two-stage operation with late alveolar bone grafting or no bone grafting)

Tabela IV. Zależność występowania siekacza bocznego od strony rozszczepu w trzech grupach dzieci leczonych ortodontycznie operowanych różnymi protokołami chirurgicznymi (operowani I-etapowo z wczesnym p.k.d.w., operowani I-etapowo z późnym p.k.d.w., operowani II-etapowo z późnym p.k.d.w. lub bez przeszczepu)

Group Grupa	Side Strona	Lateral incisor Siekacz boczny		Significance p for the Fisher's exact test Istotność p dla dokładnego testu Fishera
		Absence N (%) Brak N (%)	Presence N (%) Jest N (%)	
I	L (N=21)	2 (10)	42 (90)	NS
	R (N=4) P (N=4)	2 (50)	2 (50)	
II	L (N=18)	6 (33)	12 (67)	NS
	R (N=7) P (N=7)	2 (29)	5 (71)	
III	L (N=17)	6 (35)	11 (65)	0.030
	R (N=8) P (N=8)	7 (88)	1 (12)	

To analyse the relation between the lateral incisor absence and the cleft side in particular groups, the Fisher's exact test was applied due to the small size of the groups. A significant dependence was identified only in group III (on the right side, the incisor was twice as often absent in the cleft) (tab. IV).

In group I, the cases of a missing tooth in the cleft were five times as often, yet, due to the low number of patients with the right-side cleft, the difference is not statistically significant (tab. IV).

## DISCUSSION

In the Brazilian population analysed by Ribeiro, the absence of the maxillary lateral incisor on the cleft side in

patients with complete unilateral primary and secondary cleft palate occurs in 49.8% of the studied cases (10). Similar results were obtained in the Belgian population, where hypodontia of the lateral incisor on the cleft side was identified in 50% of the patients examined and the absence of the 2nd mandibular premolar and/or maxillary lateral incisor outside the cleft area in 27.2%. 80% of cases studied by Dewinter et al. had the alveolar bone grafting performed in order to restore the continuity of the dental arch (11). The above authors do not specify the type of surgical protocol used to treat their patients. The outcomes obtained by Ribeiro et al. and Dewinter et al. are similar to the results we received in group III, i.e. the absence of the lateral incisor was identified in 52% of the patients. The results obtained in the case of patients with complete unilateral cleft lip and palate, treated

in the IMiD Orthodontic Clinic by means of the one-stage operation, were twice as good (12). The presence of the maxillary lateral incisor on the cleft side was identified in 68% patients who underwent orthodontic treatment and earlier one-stage operation with alveolar bone grafting at the average age of 8 years and 3 months, and in 84% cases of patients operated on earlier with one-stage procedure with alveolar bone grafting at the average age of 2 years and 5 months. M.O. Akcam et al. defines the level of agenesis of the maxillary lateral incisor on the cleft side at 70.8% to 97.1%. They analysed together patients with complete unilateral cleft lip and palate, bilateral cleft lip and palate and isolated cleft palate (13) and found that in patients with UCLP on the right side, the agenesis of the maxillary lateral incisor occurs in 70.8%, while in the case of UCLP on the left side it is twice as rare, i.e. 29.3%. Similar results were obtained in own studies: the absence of the lateral incisor in patients with UCLP on the right side was identified in 57.89%, whereas in the case of the left side it was 25%. Walker et al. states that the reduction of the size and abnormal morphology of lateral incisors can be observed in patients with UCLP, which was also confirmed by own studies (14).

## CONCLUSIONS

Own studies indicate that the surgical method may have an effect on the presence or absence of the maxillary lateral incisor on the cleft side in patients with complete cleft lip and palate. However, it is necessary to conduct studies on larger material.

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### Conflicts of interest/Konflikt interesu

The Author declares no conflict of interest.

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