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MEASUREMENTS OF MANDIBULAR LENGTH IN PATIENTS WITH TOTAL CLEFTS

POMIARY DŁUGOŚCI ŻUCHWY U PACJENTÓW Z ROZSZCZEPAMI CAŁKOWITYMI

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Abstract

Aim: *Patients with clefts suffer from maxillary underdevelopment. There is little data concerning the mandibular length. The aim of the study was to compare the measured lengths of mandibular body and ramus between the groups of patients with total clefts of lip, alveolar bone and palate and healthy individuals.*

Material and methods: *Mandibular ramus and body lengths were measured on the lateral X-ray cephalograms of 118 patients with total uni- and bilateral clefts of lip, alveolar bone and palate (45 women and 73 men) and 101 healthy individuals (69 women and 32 men). The average age of the examined group was 13.18 years in patients with clefts and 13.44 yrs in healthy individuals.*

Results: *In the group of boys with cleft the mandibular ramus length was significantly longer when compared to healthy individuals. The mandibular body lenght did not show any differences between the examined groups. In the group of girls, the observations were reversed – the mandibular body length was longer in the group of girls with CLP-R than with BCLP. The difference was also observed between the groups of girls with unilateral clefts, when compared to the healthy individuals. The mandibular body length in healthy girls had the smallest mean values.*

Conclusions: *The differences in bone lengths in patients with clefts when compared to healthy individuals, are observed not only in the maxilla, but also in the mandible.*

Key words: total cleft, cleft of the lip and palate, mandibular length

Streszczenie

Cel: *Pacjentów z wadą rozszczepową często cechuje niedorozwój szczęki. Mało jest badań dotyczących oceny pomiarów w obrębie żuchwy. Celem badania było zmierzenie i porównanie długości trzonu i gałęzi żuchwy w grupach pacjentów z rozszczepem całkowitym wargi, wyrostka zębodołowego i podniebienia i porównanie wartości z pacjentami zdrowymi.*

Materiał i metody: *Długości gałęzi i trzonu żuchwy mierzone były na zdjęciach cefalometrycznych w zwarciu u 118 pacjentów z całkowitym rozszczepem wargi, wyrostka zębodołowego i podniebienia jedno- lub obustronnym (45 dziewcząt i 73 chłopców) oraz 101 pacjentów bez towarzyszącej wady rozwojowej (69 kobiet i 32 mężczyzn). Średni wiek badanych wynosił 13,18 lat u pacjentów z rozszczepem i 13,44 lat w grupie kontrolnej.*

Wyniki: *W grupie chłopców z rozszczepami długość gałęzi żuchwy była statystycznie większa w porównaniu do dzieci zdrowych. Długość trzonu żuchwy nie wykazywała statystycznie istotnych zależności. W grupie dziewcząt obserwacje były odwrotne – zaobserwowano, że długość trzonu żuchwy w grupie pacjentek z rozszczepem prawostronnym była większa w porównaniu do pacjentek z obustronnym typem wady. Różnica obserwowana była także pomiędzy grupami pacjentek z rozszczepami jednostronnymi w porównaniu do dziewcząt zdrowych. Długość trzonu żuchwy miała najmniejszą średnią wartość w grupie dziewcząt zdrowych.*

Wnioski: *Różnice w mierzonych długościach kości u pacjentów z rozszczepami w porównaniu z pacjentami zdrowymi obserwowane są nie tylko w szczęce, ale też w żuchwie.*

Słowa kluczowe: rozszczep całkowity, rozszczep wargi i podniebienia, długość żuchwy

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INTRODUCTION

Cleft of the lip, alveolar bone and palate is the most common congenital deformity of facial region and refers to about 10% of all congenital deformities (1). The total frequency of total clefts is stated between 1:700 to 2.69:1000 live births and depends on the world region. It is frequently observed in Asian and Indian populations (1:500), rarer in Caucasians (1:700) and Africans (1:2500) (2-5). The most common type of cleft is unilateral cleft of the lip, alveolar bone and palate (CLP). It is twice more frequent than the bilateral one (BCLP). Among the unilateral clefts, the left-sided cleft (CLP-L) is more frequent than the right-sided one (CLP-R). It is also more frequently observed in boys than in girls (6, 7).

Patients with clefts are characteristic for multiple dental anomalies and severe malocclusions. It has been proved that most of these patients suffer from maxillary underdevelopment (8-10). The growth underdevelopment does not refer only to maxillary bone and nasal cartilages, but also to the whole midfacial region (11-13).

There is little data concerning the mandibular length. According to *Fudalej* et al. (14) the mandible is positioned more distally in patients with clefts than in the healthy individuals. *Zemann* et al. (15) claims, that the mandibular length in patients with unilateral clefts is larger than in the healthy individuals. It could be explained by the fact that the maxillary bone does not block the mandibular growth due to the reversed overjet. Similar observations had been reported by *Smahel* et al (12). He also stated that the length of mandibular ramus and body are smaller in 5-year-old patients with clefts and the difference in those measurements grow with age, which is usually related to the time of permanent incisors eruption. *Łopatyńska-Miklas* et al. (11), as well as Yucel-Eroglu (16) observed larger measurements in gonion angle and mandibular body lenght among the patients with total clefts when compared to the healthy individuals. The mandibular ramus lenght was smaller in the cleft group.

AIM OF THE STUDY

The aim of the study was to compare the measured lengths of mandibular body and ramus between the groups of patients with total clefts of lip, alveolar bone and palate and healthy individuals.

MATERIAL AND METHODS

The measurements of mandibular ramus and body were done on the lateral X-ray cephalograms by use of OrtoBajt computer programme in 118 patients with total uni- and bilateral clefts of lip, alveolar bone and palate (45 women and 73 men) and 101 healthy individuals (69 women and 32 men). The quantity structure was presented in table I. The average age of the examined was 13.18 years in patients with clefts and 13.44 in healthy individuals.

Statistical analysis was done by use of Statistica v.10.0 programme. The results were compared taking into account gender and type of cleft. For the analysis of relations between the parameters correlation analysis was used. The statistical significance was stated for $p<0.05$. In case of ascertainment of statistically significant differences, ANOVA (analysis of variance) was carried out.

Table I. The structure of the examined groups (group of patients with clefts and health individuals).
Tabela I. Struktura badanych grup (grupa pacjentów z rozszczepem i bez wady rozwojowej).

	Bilateral cleft -(BCLP) ***Rozszczep całkowity obustronny***	**Left-sided cleft-(CLP-L)** ***Rozszczep całkowity lewostronny***	**Right-sided cleft (CLP-R)** ***Rozszczep całkowity prawostronny***	**Healthy individuals (control group)** ***Pacjenci zdrowi-grupa kontrolna***
Women *Kobiety*	12	27	6	69
Men *Mężczyźni*	15	38	20	32
Total *Razem*	27	65	26	101

POST-HOC NIR tests and interaction charts were carried out only for statistically significant relations. All values were rounded to two decimal places.

RESULTS

Results of the measurements of mandibular body and ramus lengths were presented in tables II and III for boys and IV and V for girls. Figures 1 and 2 were done for statistically significant values.

Statistically significant values are bolded. The statistically significant values are presented on figure 1.

In a group of boys with cleft, the mandibular ramus length was significantly larger when compared to healthy individuals. The mandibular body lenght did not show any differences between the examined groups.

The statistically significant differences in mandibular body length among the girls were observed between the group of girls with CLP-R and BCLP. The mean value of mandibular body lenght was larger in the first group than in the second one. The difference was also observed between the groups of girls with unilateral clefts, when compared to the healthy individuals. The mandibular body length in healthy girls had the smallest mean values.

DISCUSSION

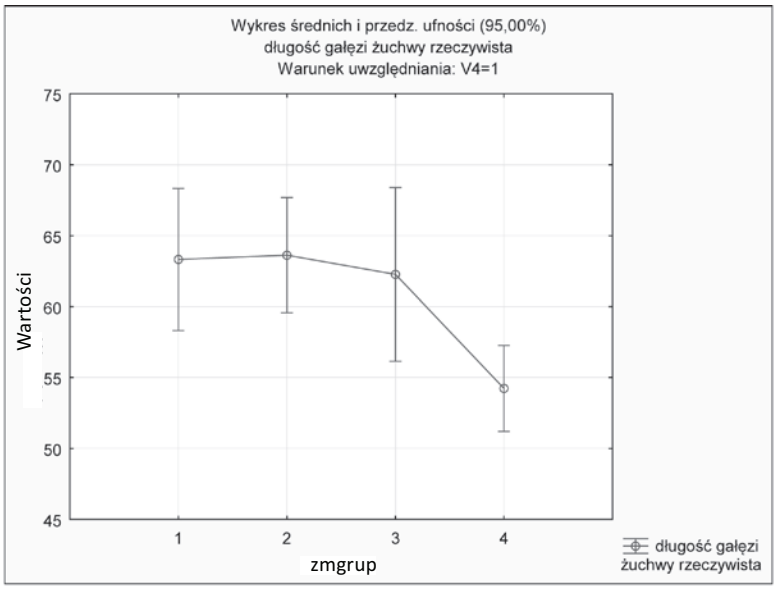
As other Polish authors (17, 18) inform, the mandible is more prominent in patients with clefts than in healthy individuals. In the examined group, the ramus length in boys with clefts was statistically longer than in healthy individuals, while the mandibular body did not reveal

Table II. Measurements of lenghts of mandibular body and ramus in the group of the examined boys.
Tabela II. Pomiary długości trzonu żuchwy w grupie badanych chłopców.

Type of cleft ***Rodzaj rozszczepu***	**Mandibular lenght** ***Długość żuchwy***	**N Total numer** ***Liczba całkowita***	**Mean value** ***Wartość średnia***	**Minimum**	**Maximum**	**Stdandard deviation** ***Odchylenie standardowe***
CLP-R	body *trzon*	20	79.78	64.20	110.10	11.39
	ramus *gałąź*	20	63.33	45.70	86.30	10.69
CLP-L	body *trzon*	38	76.43	58.60	117.80	13.36
	ramus *gałąź*	38	63.63	42.50	96.80	12.35
BCLP	body *trzon*	15	71.59	54.20	83.90	8.58
	ramus *gałąź*	15	62.27	42.00	87.90	11.06
Control (healthy individuals) *grupa kontrolna*	body *trzon*	32	73.82	61.20	94.50	8.63
	ramus *gałąź*	32	54.23	38.80	75.70	8.40

Table III. Variance analysis – group of boys.
Tabela III. Analiza wariancji – grupa chłopców.

	SS – Effect *SS – efekt*	df – Effect *df – efekt*	MS – Effect *MS – efekt*	SS – mistake *SS – błąd*	df – mistake *df – błąd*	MS – mistake *MS – błąd*	F	p
Mandibular body lenght *Długość trzonu żuchwy*	717.84	3.00	239.28	12405.06	101.00	122.82	1.95	0.13
Mandibular ramus lenght *Długość gałęzi żuchwy*	**1835.68**	**3.00**	**611.89**	**11720.43**	**101.00**	**116.04**	**5.27**	**0.00**



	{2} - M=63,626	{3} - M=62,273	{4} - M=54,231
1 {1}	0.92	0.78	**0.00**
2 {2}		0.68	**0.00**
3 {3}			**0.02**

Fig. 1. Comparison of mandibular ramus lenght in group of boys (group 1 – CLP-R, group 2 – CLP-L, group 3 – BCLP, a group 4 – control). Statistically significant values were bolded.

Ryc. 1. Porównanie długości gałęzi żuchwy w grupie chłopców (grupa 1 – CLP-R, grupa 2 – CLP-L, grupa 3 – BCLP, grupa 4 – kontrolna). Wartości istotne oznaczono tekstem pogrubionym.

Table IV. Measurements of lenghts of mandibular body and ramus in the group of the examined girls.

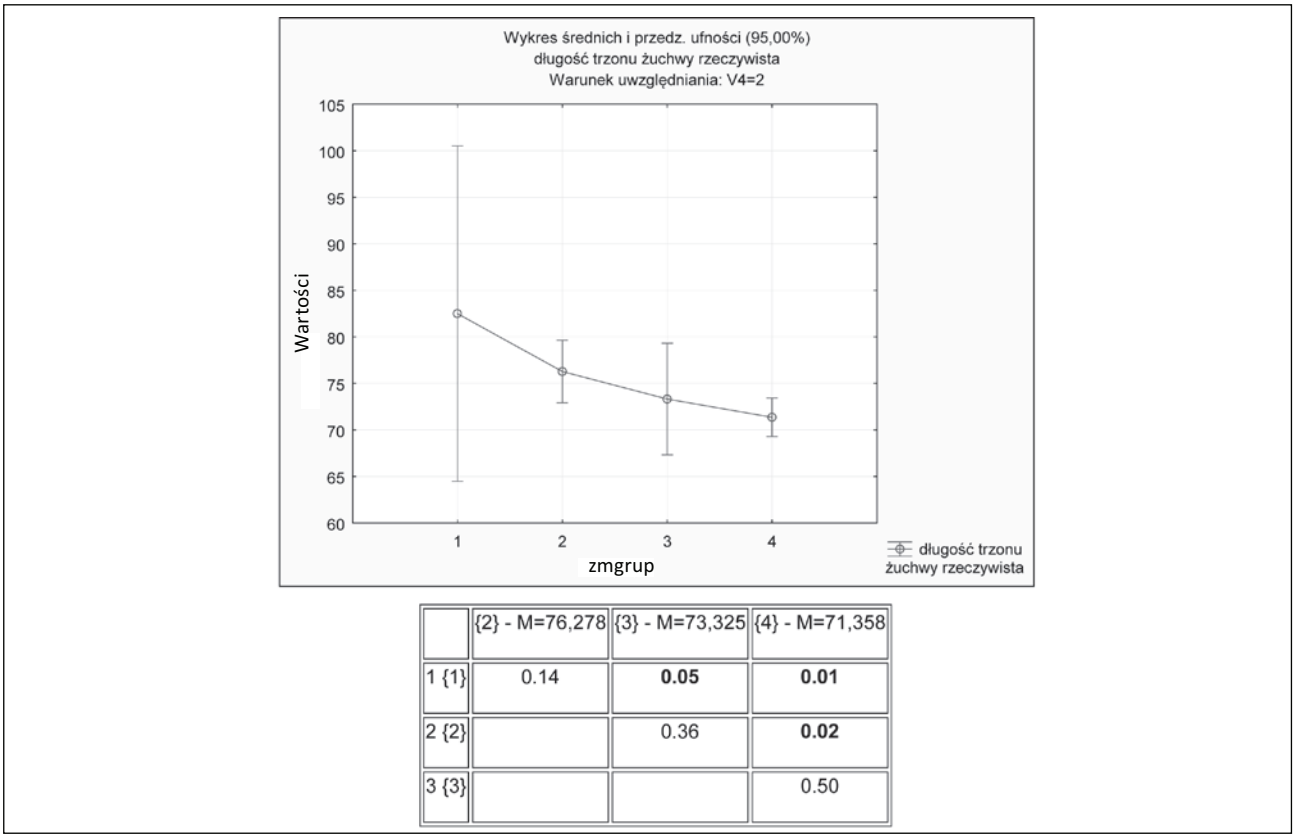
Tabela IV. Pomiary długości trzonu i gałęzi żuchwy w grupie badanych dziewcząt.

Type of cleft ***Rodzaj rozszczepu***	**Mandibular length** ***Długość żuchwy***	**N (Total number** ***Liczba całkowita)***	**Mean value** ***Wartość średnia***	**Minimum**	**Maximum**	**Standard deviation** ***Odchylenie standardowe***
CLP-R	body *trzon*	6	82.5000	62.4000	103.7000	17.16834
	ramus *gałąź*	6	68.1333	53.1000	81.6000	12.72017
CLP-L	body *trzon*	27	76.2778	61.6000	97.9000	8.50834
	ramus *gałąź*	26	82.2308	43.6000	562.0000	98.32068
BCLP	body *trzon*	12	73.3250	61.3000	90.6000	9.43033
	ramus *gałąź*	12	59.8250	44.8000	82.1000	11.66706
Control (healthy individuals) - *grupa kontrolna*	body *trzon*	69	71.36	45.60	102.00	8.61
	ramus *gałąź*	69	53.06	35.60	77.00	7.75

Table V. Variance analysis – group of girls.

Tabela V. Analiza wariancji grupa dziewcząt.

	SS – Effect *SS – efekt*	df – Effect *dt – efekt*	MS – Effect *MS – efekt*	SS – mistake *SS – błąd*	df – mistake *df – błąd*	MS – mistake *MS – błąd*	F	p
Mandibular body lenght *Długość trzonu żuchwy*	**1007.46**	**3.00**	**335.82**	**9369.78**	**110.00**	**85.18**	**3.94**	**0.01**
Mandibular ramus lenght *Długość gałęzi żuchwy*	16380.74	3.00	5460.25	248059.40	109.00	2275.77	2.40	0.07



	{2} - M=76,278	{3} - M=73,325	{4} - M=71,358
1 {1}	0.14	**0.05**	**0.01**
2 {2}		0.36	**0.02**
3 {3}			0.50

Fig. 2. Comparison of mandibular body lenght in group of girls (group 1 – CLP-R, group 2 – CLP-L, group 3 – BCLP, a group 4 – control). Statistically significant values were bolded.

Ryc. 2. Porównanie długości trzonu żuchwy w grupie chłopców (grupa 1 – CLP-R, grupa 2 – CLP-L, grupa 3 – BCLP, grupa 4 – kontrolna). Wartości istotne oznaczono tekstem pogrubionym.

such dependency. In group of girls, the situation was reversed – the mandibular ramus length did not show any statistically significant relations while the body length was larger in the group of girls with clefts when compared to the healthy individuals. Those results find their confirmation in other research (11, 16).

The multidisciplinary treatment of patients, development of surgical procedures and the orthodontic possibilities of growth modification (especially fast modification of position of upper incisors and possibilities of treatment with fixed appliances to mold maxilla) help us achieve acceptable relation of upper and lower jaw in patients with clefts (19). The maxillary underdevelopment as well as unlimited growth of mandible are no longer such a problem as they were decades before. Further research, especially longitudinal, should be done to confirm this statement.

CONCLUSION

The differences in bone structure in patients with clefts are observed in the mandible, as well as in the maxilla. The unlimited growth of mandible is caused probably by incorrect position of the upper incisors and lack of blocking of the growth by maxilla.

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