

Andrzej Brudnicki<sup>1</sup>, Włodzimierz Piwowar<sup>1</sup>, Dorota Cudziło<sup>2</sup>, Ewa Sawicka<sup>1</sup>

## COMPLETE UNILATERAL CLEFT LIP AND PALATE OPERATED ON BY MEANS OF THE ONE-STAGE METHOD – OWN EXPERIENCE

### CAŁKOWITY JEDNOSTRONNY ROZSZCZEP WARGI I PODNIEBIENIA OPEROWANY METODĄ JEDNOETAPOWĄ – DOŚWIADCZENIE WŁASNE

<sup>1</sup>Clinical Department of Child and Adolescent Surgery

<sup>2</sup>Orthodontic Clinic for Children

Institute of Mother and Child, Warsaw, Poland

#### Abstract

*The study presents the surgical protocol of unilateral cleft lip and palate (UCLP) treatment based on the one-stage method. It is exemplified by the treatment course of a patient suffering from UCLP. The method was worked out and implemented at the Institute of Mother and Child in Warsaw. Its main advantage is the early establishment of the anatomical structures of the naso-oral cave and the facial part of the skull, before the development of speech. The complete closure of each part of the cleft – the soft and hard palate and the lip before the end of the first year of life, enables the quick implementation of the next stages of treatment, such as alveolar osteoplasty, which facilitates both orthodontic treatment and speech therapy.*

**Key words:** unilateral cleft lip and palate, one-stage operation

#### Streszczenie

*Na podstawie prześledzenia przebiegu procesu leczenia dziecka z jednostronnym rozszczepem wargi i podniebienia, omówiono opracowany i wdrożony w Instytucie Matki i Dziecka protokół postępowania chirurgicznego metodą jednoetapową wskazując na jego zalety. Najważniejszą korzyścią tej metody jest odtworzenie prawidłowych warunków anatomicznych w obrębie jamy nosowo-gardłowej i twarzowej części czaszki przed rozpoczęciem nauki mowy. Całkowite zamknięcie szczeliny rozszczepu w pierwszym roku życia daje także możliwość szybszego wykonania kolejnych niezbędnych etapów korekty wady (osteoplastyka wyrostka zębodołowego), co ułatwia leczenie ortodontyczne i rehabilitację logopedyczną.*

**Słowa kluczowe:** jednostronny rozszczep wargi i podniebienia, operacja jednoetapowa

DEV. PERIOD MED., 2014, XVIII, 1, 38-43

## INTRODUCTION

The one-stage method operation of the unilateral cleft lip and palate (UCLP) was implemented and improved by Dudkiewicz at the Institute of Mother and Child (IMiD) in the 1980s (1, 2). The main idea of that method was the closure of the cleft fissure in the area of the soft and

hard palate (with the double pedicled von Langenbeck flaps) and lip (using the modified Tennison-Randall technique) during one surgical session. The aim of the operation performed in the second part of the first year of life is to establish the optimal conditions for speech development. Its advantage is the potentially positive psychological influence on the patient, as well as his/her

family. Moreover, such an operation makes it possible to perform secondary bone grafting at an early stage of life, which leads to the complete integrity of all the anatomical structures of that area. Finally, the method simplifies the surgical protocol, which results in reducing the overall treatment expenditure on a cleft case.

## THE AIM OF THE STUDY

To present the standard cleft treatment protocol which is in place at the Institute of Mother and Child illustrating it with an example of the therapy course of a child suffering from UCLP.

## MATERIAL AND METHODS

At the moment around 550 cleft operations are performed at the Institute of Mother and Child including 300 primary cleft operations each year. The one-stage operation is the method of choice in the cases of UCLP.

A female patient, J.T., whose case will serve as an example of the operation technique, was referred to IMiD by her pediatrician for specialist care. The patient with the body weight of 3200 grams gained 10 points on the Apgar scale at birth and was diagnosed with non-syndromic complete right side UCLP. There was no coexisting developmental malformation nor any defect in the family history. The first consultation in the Surgical Outpatient Clinic of IMiD took place during the first month of her life. The patient was referred for the one-stage operation in accordance with the surgical protocol in place at IMiD (tab. I). Additionally, the patient was monitored by the Orthodontic Unit of IMiD. Pre-surgical orthopedic treatment was not applied. The development of the patient during the subsequent months was uneventful. She was admitted to the Department of Surgery for Children and Adolescents of the IMiD at the 7th month of age. Her body weight on admittance was 7650g. Lab tests performed as preparation for general anesthesia were within normal range. The patient was operated on the next day after admittance following the surgical procedure described hereby as follows (fig. 1).

As a rule the cleft fissure closure starts in the area of the soft palate. Then it is continued at the hard palate to be finally finished by operating on the lip (cheiloplasty). That order of procedure gives a better approach to the site located deep in the naso-oral cavity at the beginning of the operation when the cleft fissure has not yet been operated on and is wide open. Another reason is to avoid tearing off the structures that had already been sutured (e.g. the lip) when operating on the structures located deeper in the mouth (e.g. soft palate). After performing incisions along the cleft fissure in the area of the soft and hard palate – on the border between the oral and nasal mucosa – and making two additional lateral incisions at the base of the alveolar process on the palatal surface, the palatal periosteal membrane is dissected, which makes it possible to see and carefully elongate the palatal neurovascular bundles and to easily approach the pterygoid hamuli of the sphenoid bone in order to break them. The elevation of the double pedicled muco-periosteal palatal

flaps enables their dissection and cutting them off from the posterior border of palatal horizontal laminae, as a result of which the soft palate is pulled back towards the throat. The procedure results in the elongation of the soft palate and obtaining a more anatomically correct direction of the palatal muscles (a shape resembling an open ring). The edges of the mucosal membrane of the nasal cavity are sutured on the cleft side (the first layer of the cleft fissure closure in the hard palate area), and so are the layers of the soft palate, the edges of the mucosal membrane of the hard palate (the second layer of the cleft fissure closure in the hard palate area) and finally the additional lateral incisions on the palatal surface. The closure is performed without leaving any open wounds on the palatal surface. The next step is alveoloplasty performed with the use of the muco-periosteal flaps deriving from the vestibule of the mouth. Finally cheiloplasty is performed by means of the modified Tennison-Randall technique (triangle flaps).

The overall time of the operation on this patient was 3 hours and 35 minutes. The postsurgical follow-up was uneventful. The patient was discharged on the third day after the operation. The healing was successful (fig. 1), so the skin stitches were removed from the upper lip on the 7th day, as planned. The child has been under constant monitoring of both the Orthodontic and the Speech Therapy Units of IMiD.

According to the surgical protocol at IMiD (tab. I), the patient was admitted to the Department of Surgery for Children and Adolescents again in her 3rd year of life. Her body weight on admittance was 13.5 kilos. The time of the operation (alveoloplasty), which included bone grafting and the closure of the residual naso-oral fistula localized in the alveolar region, was 50 minutes. The donor site for bone tissue was the left hip of the patient. The postsurgical follow-up was uneventful. The patient was discharged on the following day.

Computer tomography performed 9 months after the alveoloplasty revealed the continuity of the alveolar process. However, there was the insufficient volume of the grafted bone (fig. 2). The decision to implement additional bone grafting was made. That is why the patient was admitted to our department again in her 4th year of life.

At the moment the child is 5 years old (fig. 3) and is treated by removable appliances at the Orthodontic Unit of IMiD. The previously observed cross bite in the region of teeth 53 and 52 was preliminarily corrected. The improvement of occlusion was obtained due to both orthodontic treatment and the good cooperation of the patient (fig. 4).

The speech ability examination revealed a nasal pathway of breathing without fistulas and without nasality – so there was no necessity of any additional secondary corrective procedures.

## DISCUSSION

The idea of the one-stage operation (repair of the cleft in the region of the soft and hard palate, as well as the lip in the same surgical session) was first published by the Brazilian surgeon Farina in 1958 (3). Despite

Table I. The surgical protocol of the treatment of unilateral cleft lip and palate (UCLP) existing at IMiD.

Tabela I. Protokół chirurgicznego leczenia jednostronnego rozszczepu wargi i podniebienia obowiązujący w IMiD.

	<b>Surgical procedure Procedura chirurgiczna</b>	<b>Age of patient Wiek pacjenta</b>
Cheiloplasty <i>Plastyka rozszczepu wargi</i>	One-stage operation (Dudkiewicz method) <i>Operacja jednoetapowa (metodą Dudkiewicz)</i>	7-12 months old 7-12 mż.
Palatoplasty of soft palate <i>Plastyka rozszczepu podniebienia miękkiego</i>		
Palatoplasty of hard palate <i>Plastyka rozszczepu podniebienia twardego</i>		
Alveoloplasty <i>Plastyka rozszczepu wyrostka zębodołowego szczęki</i>	Bone grafting (hip of a patient as a donor site) <i>Przeszczep kości z talerza biodrowego</i>	2-3 years old (after the end of the first growth acceleration) 2-3 rż. (po zakończeniu pierwszego skoku wzrostowego)
Secondary surgical repairs (if required) <i>Wtórne zabiegi korekcyjne (w razie potrzeby)</i>	Dermabrasion scars of the upper lip Closure of naso-oral fistulas <i>Open rhinoplasty Orthognathic surgery</i>	16-18 years old (after the end of intensive growth of facial part of skull) 16-18 rż. (po zakończeniu wzrostu twarzowej części czaszki)

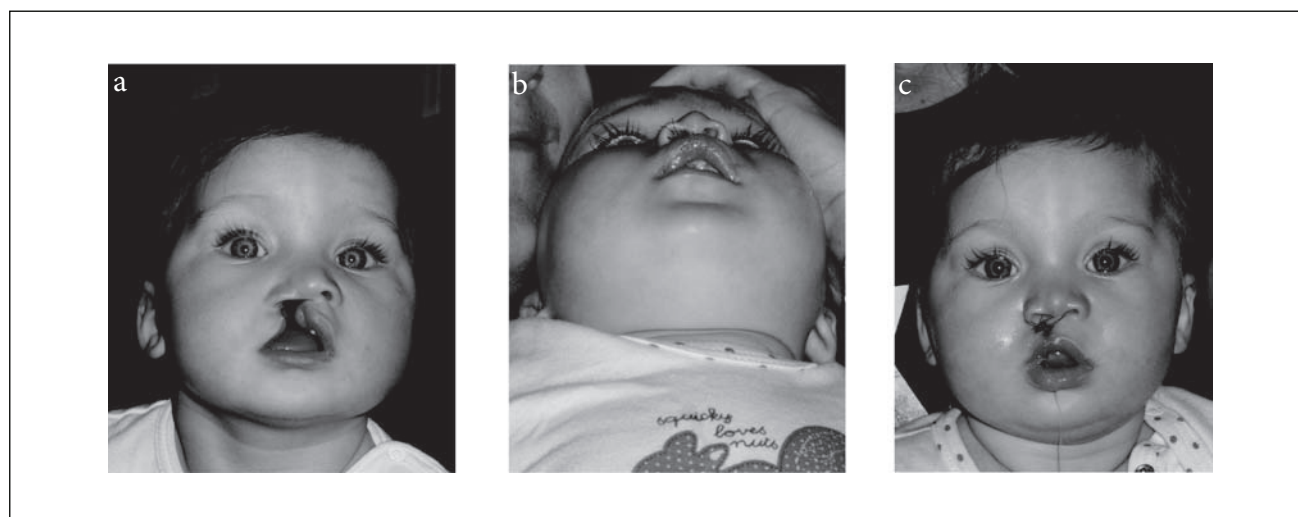


Fig. 1. Patient J.T. suffering from complete right side UCLP at her 7th month of life; a – before surgery; b, c – at the follow-up 7 days after one-stage operation.

Ryc. 1. Pacjentka J.T. z prawostronnym całkowitym rozszczepem wargi i podniebienia w 7. miesiącu życia; a – tuż przed wykonaniem operacji jednoetapowej; b, c – podczas kontroli 7 dni po operacji jednoetapowej.

its long history, there is a relatively limited number of publications on that subject (4, 5, 6). Sometimes the surgical strategy consists of cleft repair procedures divided into stages performed in the first year of life (5, 7, 8). The aim of early surgical cleft intervention, no matter what surgical technique is used, is to restore the integrity of all the structures involved, before the beginning of speech development (9, 10, 11).

Many cleft centres all over the world still make use of the surgical protocol of palatoplasty in which the soft palate is repaired first, while the hard palate is repaired in about

the 9th year of age. That way of treatment is perceived as at least controversial, because of its negative influence on speech development. The most popular point for delayed hard palate closure is its positive influence on maxillary development (12, 13, 14). However, other authors prove one-stage palatoplasty (the closure of both the soft and hard palate in one surgical session) to be effective for optimal speech development without compromising the development of the facial skeleton (15). The one-stage operation of UCLP (palatoplasty together with lip repair in one surgical session) substantially decreases

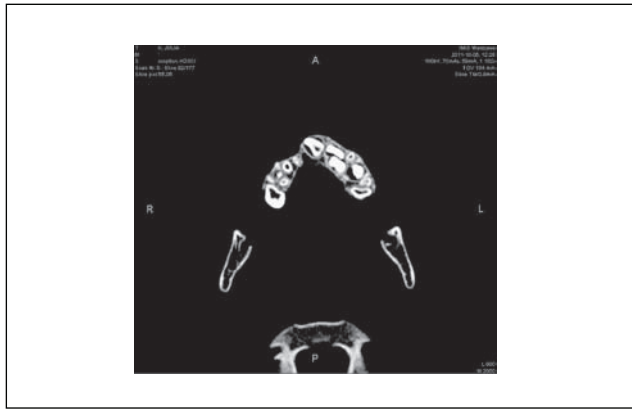


Fig. 2. CT of the patient J.T. at 3 years of age – horizontal scan at the level of the alveolar process, the state after the first bone grafting.

Ryc. 2. Tomografia komputerowa pacjentki J.T. w wieku 3 lat, stan po osteoplastyce wyrostka zębodołowego za pomocą przeszczepu kości autogennej po stronie prawej – przekrój poprzeczny na wysokości wyrostka zębodołowego szczęki.

the overall number of surgical procedures leading to the simplicity of the treatment protocol. Inter-center comparison studies indicate that the number of procedures in the surgical protocol does not coincide with favorable results (16), which supports the idea of simplifying the surgical methods.

The next stage of treatment of the case presented was alveoloplasty that was performed by means of early secondary bone grafting at the age of three. The surgical technique of this procedure does not differ from the late secondary grafting usually scheduled at the age of 8-12 years. It is important to distinguish this procedure from the early primary bone grafting of the 1960s and 70s that was finally abandoned mainly because of the subsequent inhibition of the maxillary development. This was probably due to the traumatic course of this surgical technique. Done before the complete palate closure, primary bone grafting required more extended preparation of tissues in the neighborhood of growing bone structures like the incisival bone and vomer.



Fig. 3. The patient J.T. at her 5th year of life, the facial symmetry and profile were satisfactory.

Ryc. 3. Pacjentka J.T. w wieku 5 lat, zadowalająca symetria i profil twarzy.

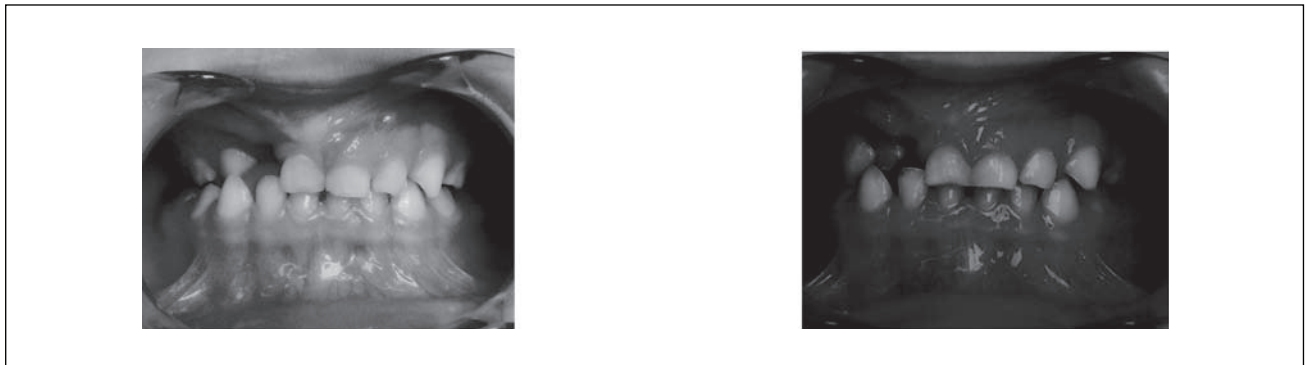


Fig. 4. The patient's J.T. occlusion: a – before orthodontic treatment; b – occlusion after the orthodontic treatment by removable appliances.

Ryc. 4. Warunki zgryzowe pacjentki J.T.: a – przed leczeniem ortodontycznym; b – warunki zgryzowe po leczeniu ortodontycznym z użyciem aparatów zdejmowanych.

Three months later, orthodontic treatment with the sequence of removable appliances was started in order to correct occlusion.

It has to be emphasized that during the early stages of orthodontic treatment it is very important for later development of the maxilla and other structures of the facial skeleton to obtain a symmetry of the alveolar process as quickly as possible (17).

It was revealed that the first procedure of bone grafting was not fully satisfactory, however there was plenty of time to repeat the procedure in due time.

The need to repeat late bone grafting means postponing the orthodontic treatment that in this period of life becomes intensive. Moreover, the term of repeated procedure can easily overlap with the end of upper canine eruption, which can negatively affect the result of the procedure.

Many authors noticed less favorable results of bone grafting when performed after canine eruption (18, 19, 20).

The studies of the quantitative evaluation of bone grafting revealed a relationship between the age of the patient during the procedure and the volume of bone integrated into the alveolar cleft fissure obtained – with better results among children younger than 12 years old at the time of the procedure (21), or among children aged of 6-9 years (22) than older children. Similarly, studies based on qualitative evaluation by methods of radiodensitometry of the patient aged 10-19 years old at the time of bone grafting showed that mineralization of the integrated bone tissue is less intensive among the older patients in the group (23).

In the past poor results would make it necessary to repeat the procedure in less favorable circumstances so as to obtain better results. The more intensive tendency for bone resorption after tertiary bone grafting was confirmed by Dempf et al. (24).

The outcome of the treatment of UCLP patients using the one-stage method operation at IMiD have already been published several times in papers where different matters we considered.

The following topics have been published and analyzed:

- facial aesthetics (25, 26),
- cephalometric analysis of the development of the facial skeleton (27, 28),
- assessment with the Goslon Yardstick (29),
- dental arch relationship (30, 31),
- speech development (32).

Other topics still have to be discussed, for instance: hearing evaluation, the number of secondary corrective repairs such as rhinoplasty, pharyngoplasty, orthognathic surgeries, the psychological burden and suffering of the child and the financial aspect of cleft therapy.

## CONCLUSIONS

The one-stage operation of the unilateral cleft lip and palate is a modern way of cleft management simplifying the surgical protocol of treatment.

The most important advantage of this method is obtaining the normal anatomical structures in the area

of the naso-oral cavity and the throat, as well as the facial part of the skull before the early stages of speech development. The complete closure of the cleft fissure during the first year of life provides an opportunity to perform the next inevitable stages of cleft treatment, such as alveoloplasty at an earlier age, which makes it easier to conduct both the orthodontic treatment and speech therapy.

## REFERENCES

1. *Dudkiewicz Z.*: Wielokierunkowa ocena zastosowanej własnej jednoetapowej metody w leczeniu chirurgicznym jednostronnych całkowitych rozszczepów podniebienia pierwotnego i wtórnego. Praca habilitacyjna z kliniki Chirurgii Dzieci i Młodzieży. Warszawa 1987.
2. *Dudkiewicz Z.*: Ocena jednoetapowego chirurgicznego leczenia jednostronnych rozszczepów podniebienia pierwotnego i wtórnego. *Probl. Chir. Dziec.*, 1991, 18, 8-19.
3. *Farina, R.*: Total unilateral harelip: correction of severe deformity of the palate and lips in a single operation; Le Mesurier's cheiloplasty & Veau-Ernst's gnatho-urano-staphyloplasty. *Ann. Chir. Plast.*, 1958, 3, 199-205.
4. *Corbo M., Dujardin T., de Maertelaer V., Malevez C., Gléneur R.*: Dentocraniofacial morphology of 21 patients with unilateral cleft lip and palate: a cephalometric study. *Cleft Palate Craniofac. J.*, 2005, 42, 618-624.
5. *De Mey A., Franck D., Cuylits N., Swennen G., Malevez C., Lejour M.*: Early one-stage repair of complete unilateral cleft lip and palate. *J. Craniofac. Surg.*, 2009, 20, 1723-1728.
6. *Savaci N., Hoşnüter M., Tosun Z., Demir A.*: Maxillofacial morphology in children with complete unilateral cleft lip and palate treated by one-stage simultaneous repair. *Plast. Reconstr. Surg.*, 2005, 115, 1509-1517.
7. *Swennen G., Berten J.L., Schliephake H., Treutlein C., Dempf R., Malevez C., De Mey A.*: Midfacial morphology in children with unilateral cleft lip and palate treated by different surgical protocols. *Int. J. Oral Maxillofac. Surg.* 2002, 31, 13-22.
8. *Zanzi M., Cherpillod J., Hohlfeld J.*: Phonetic and otological results after early palate closure in 18 consecutive children presenting with cleft lip and palate. *Int. J. Pediatr. Otorhinolaryngol.*, 2002, 66, 131-137.
9. *Dorf D.S., Curtin J.W.*: Early cleft repair and speech outcome. *Plast. Reconstr. Surg.*, 1982, 70, 74-81.
10. *Baylon-Campillo H., Montoya P., Pietrea P.*: Résultats phonétiques de 33 enfants présentant un bec de lièvre avec division palatine opérés à 3 mois et à 6 mois. *Glossa*, 1987, 5, 20-29.
11. *Psaume J., Malek R., Mousset M.R., Trichet C., Martinez H.*: Technique et résultats du traitement total précoce des fentes labio-palatines. *Folia Phoniati.*, 1986, 38, 176-220.
12. *Noverraz A.E., Kuijpers-Jagtman A.M., Mars M., van't Hof M.A.*: Timing of hard palate closure and dental arch relationship in unilateral cleft lip and palate patients: a mixed-longitudinal study. *Cleft Palate Craniofac. J.*, 1993, 30, 391-396.
13. *Gaggl A., Feichtinger M., Schultes G., Santler G., Pilchmaier M., Mossböck R., Kärcher H.*: Cephalometric and occlusal outcome in adults with unilateral cleft lip, palate, and alveolus after two different surgical techniques. *Cleft Palate Craniofac. J.*, 2003, 40, 249-255.

14. Stein S., Dunsche A., Gellrich N.C., Härle F., Jonas I.: One- or two-stage palate closure in patients with unilateral cleft lip and palate: comparing cephalometric and occlusal outcomes. *Cleft Palate Craniofac. J.*, 2007, 44, 13-22.
15. Pradel W., Senf D., Mai R., Ludicke G., Eckelt U., Lauer G.J.: One-stage palate repair improves speech outcome and early maxillary growth in patients with cleft lip and palate. *Physiol. Pharmacol.*, 2009, 60, 37-41.
16. Shaw W.C., Brattström V., Mølsted K., Prahl-Andersen B., Roberts C.T., Semb G.: The Eurocleft study. Part 5: discussion and conclusions. *Cleft Palate Craniofac. J.*, 2005, 42, 93-98.
17. Jaunet E., Le Guern A., Le Tacon P., Thery-Dumeix C., Deshayes M.J.: Uncovering and treating asymmetry before 6 years in our daily clinical practice: Option or obligation? *Orthodontics or orthopedics?* *Int. Orthod.*, 2013, 11, 35-59.
18. Jia Y.L., Fu M.K., Ma L.: Long-term outcome of secondary alveolar bone grafting in patients with various types of cleft. *Br. J. Oral Maxillofac. Surg.*, 2006, 44, 308-312.
19. Newlands L.C.: Secondary alveolar bone grafting in cleft lip and palate patients. *Br. J. Oral Maxillofac. Surg.*, 2000, 38, 488-491.
20. Rawashdeh M.A., Al Nimri K.S.: Outcome of secondary alveolar bone grafting before and after eruption of the canine in Jordanian patients with cleft lip and palate. *J. Craniofac. Surg.*: 2007, 18, 1331-1337.
21. Marzec K., Świrski A., Komorowska A.: Radiologiczna ocena przeszczepów kości do wyrostka zębodołowego u pacjentów z różnymi typami rozszczepów. *Forum Ortod.*, 2008, 6, 158-165.
22. Opitz C., Meier B., Stoll C., Subklew D.: Radiographic evaluation of the transplant bone height in patients with clefts of the lip/alveolus/palate after secondary bone grafting. *J. Orofac. Orthop.*, 1999, 60, 383-391.
23. Mikołajczak T., Wilk G., Gawrych E.: Badanie mineralizacji przeszczepu kostnego u pacjentów z rozszczepami wyrostka zębodołowego za pomocą radiografii cyfrowej. *Ann. Acad. Med. Stetin.*, 2007, 53, 66-73.
24. Dempf R., Teltzrow T., Kramer F.J., Hausamen J.E.: Alveolar bone grafting in patients with complete clefts: a comparative study between secondary and tertiary bone grafting. *Cleft Palate Craniofac. J.*, 2002, 39, 18-25.
25. Fudalej P., Katsaros C., Bongaarts C., Dudkiewicz Z., Kuijpers-Jagtman A.M.: Nasolabial esthetics in children with complete unilateral cleft lip and palate after 1- versus 3-stage treatment protocols. *J. Oral Maxillofac. Surg.*, 2009, 67, 1661-1666.
26. Urbanova W., Brudnicki A., Strydom H., Bronkhorst E.M., Katsaros C., Fudalej P.S.: Nasolabial aesthetics correlates poorly with skeletal symmetry in unilateral cleft lip and palate. *J. Plast. Reconstr. Aesthet. Surg.*, 2013, 66, 1-7.
27. Fudalej P., Król Z., Dudkiewicz Z.: Cefalometryczna ocena symetrii twarzoczaszki osób z jednostronnym całkowitym rozszczepem wargi i podniebienia leczonych metodą jednoczasową. *Med. Wieku Rozw.*, 2007, 3, 255-259.
28. Fudalej P., Obłój B., Dudkiewicz Z.: Budowa twarzoczaszki 10-latków z jednostronnym całkowitym rozszczepem wargi i podniebienia leczonych metodą jednoczasową. *Med. Wieku Rozw.*, 2007, 1, 45-50.
29. Fudalej P., Hortis-Dzierzbicka M., Obłój B., Miller-Drabikowska D., Dudkiewicz Z., Romanowska A.: Treatment outcome after one-stage repair in children with complete unilateral cleft lip and palate assessed with the Goslon Yardstick. *Cleft Palate Craniofac. J.* 2009, 46, 374-380.
30. Fudalej P., Obłój B., Dudkiewicz Z.: Odległa analiza szerokości i długości górnego łuku zębowego u osób z jednostronnym rozszczepem wargi i podniebienia. *Med Wieku Rozw.*, 2005, 4:781-789.
31. Fudalej P., Hortis-Dzierzbicka M., Dudkiewicz Z., Semb G.: Dental arch relationship in children with complete unilateral cleft lip and palate following Warsaw (one-stage repair) and Oslo protocols. *Cleft Palate Craniofac. J.*, 2009, 46, 648-653.
32. Hortis-Dzierzbicka M., Radkowska E., Fudalej P.: Speech outcomes in 10-year-old children with complete unilateral cleft lip and palate after one-stage lip and palate repair in the first year of life. *J. Plast. Reconstr. Aesthet. Surg.*, 2012, 65, 175-181.

---

#### Author's contributions/Wkład Autorów

According to the order of the Authorship/Według kolejności

#### Conflicts of interest/Konflikt interesu

The Authors declare no conflict of interest.

Autorzy pracy nie zgłaszają konfliktu interesów.

**Received/Nadesłano:** 27.11.2013 r.

**Accepted/Zaakceptowano:** 28.01.2014 r.

**Published online/Dostępne online**

---

Address for correspondence:

Andrzej Brudnicki  
Klinika Chirurgii Dzieci i Młodzieży  
Instytut Matki i Dziecka  
ul. Kasprzaka 17a, 01-211 Warszawa  
tel.: (22) 32-77-110  
e-mail: abrudnicki@poczta.fm