

## CLINICAL STUDY

# Evaluation of patients after different types of secondary cleft palate repair

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**ABSTRACT**

The aim of this retrospective study was to evaluate results of four different surgical approaches to palatoplasty and to demonstrate which type showed the lowest number of cases with the need for secondary surgeries. The results of 227 patients who underwent cleft palate surgical repair over a 13-year period (2000–2012) were included. The incidence rates of oronasal fistula, velopharyngeal insufficiency with the need of pharyngeal flap and pharyngoplasty were examined. The need for revision surgery was found in 48 patients (21.1 %). A significantly higher rate of cases with the need for secondary correction was found in patients with a complete cleft (44 %) as compared to patients with incomplete cleft palate (9.8 %). A higher percentage for additional surgery was noted after the Bardach procedure (50 %) as opposed to the lower revision rate after Veau-Wardill-Kilner (22.8 %) and Furlow (17.6 %). After the von Langenbeck procedure, the need for revision eventuated only in 5.5 % of cases. It is important to mention that there were no significant differences in the incidence of secondary surgery between the patients with cleft palate with or without the presence of Pierre Robin sequence. Neither there was observed a significant difference in the incidence of additional surgery between male and female patients. However, a higher need for pharyngeal flap was noted in the female group (*Tab. 8, Ref. 38*). Text in PDF [www.elis.sk](http://www.elis.sk)

**KEY WORDS:** complications after palatoplasty, cleft repair techniques, Pierre Robin sequence, pharyngeal flap.

**Introduction**

Cleft palate is a serious inborn condition, and surgical treatment represents the only curative procedure (1, 2, 3). The mean incidence is approximately 1.61/1000 newborns (3). Cleft palate surgery needs a very complicated approach with operations divided into several steps, which is then followed by long-term observation carried out by a team of several specialized members (plastic surgeon, speech therapeutics, orthodontist, phoniatrician and ENT specialist, pediatricist). The number of styles of operations and their differences (counting also modifications with more or less pronounced differences) are often a subject of controversy discussed in scientific papers (4, 5, 6, 7, 8). The main discussion is focused on late results, i.e. on the influence on palate and facial growth (9, 10, 11), dentition (9), speech competence (9, 12, 13, 14), and Eustachian tube function (15).

Less attention is focused on early postoperative complications after primary palatoplasty (bleeding, wound infection, etc.) showing the lowest rate of cases with the need for additional surgical repair (16, 17). Nevertheless, we can find many comparison studies dealing with late complications such as velopharyngeal insufficiency (VFI), orofacial fistula or decreased growth of maxilla (18, 19). In the past 5 years, there has been an increased number of articles dealing with other factors affecting long-term surgical results such as size of the nasopharynx and age of children undergoing palatoplasty (20, 21). The reviews are comparing usually two different procedures from the most frequent palatoplasty approaches (according to von Langenbeck, Veau-Wardill-Kilner and double opposite reverse Z-palatoplasty according to Furlow). Most of them showed superior results after Veau-Wardill-Kilner palatoplasty (in the occurrence of velopharyngeal insufficiency), but still better results after von Langenbeck and Furlow (in the occurrence of orofacial fistula and improved growth of the face) (22, 23). We, however, focused on the evaluation of four different techniques of cleft palate repair with the purpose to define a cleft palate repair surgical procedure resulting in the optimal outcome and lowest numbers of cases with secondary revision surgeries.

**Patients and methods**

The patients' charts from the Clinic for Plastic, Esthetic and Reconstructive Surgery (CPERS) of Medical Faculty, Comenius

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University data base were accessed. All patients with clefts of the secondary palate were included in the study. In total, 227 patients after cleft palate surgical repair during a 13-year period (2000–2012) were included. Patients with severe additional syndromes were excluded. Patients were treated by a team of experienced fully certified plastic surgeons with minimal experience of 5 years in

**Tab. 1. The characterization of patients.**

Total number of patients	227			
Gender	101 male		126 female	
Type of clefts	31 CCP	70 ICP	44 CCP	82 ICP
%	30.6	69.4	34.9	65.1

CCP – complete cleft of palate, ICP – incomplete cleft of palate

**Tab. 2. Groups of patients according to the type of surgical procedure.**

Total number of patients	227			
Type of palatoplasty	VWK	FW	BAR	LANG
Type of clefts	162	17	12	36
%	71.3	7.4	5.3	15.8

VWK – Veau-Wardill-Kilner, FW – Furlow, BAR – Bardach, LANG – von Langenbeck

**Tab. 3. Complications after different palatoplasty techniques. SRP – surgical revision of the primary palatoplasty.**

TYPE of operation	Number of operations	Number of SRP	% SRP	ONC	%	FL	%	FP	%
VWK	162	37	22.8**	17	10.4 <sup>A</sup>	17	10.4	3	1.8 <sup>A</sup>
FW	17	3	17.6 <sup>‡</sup>	3	17.6	–	–	–	–
BAR	12	6	50.0**§	2	16.6	1	8.3	3	25
LANG	36	2	5.5 <sup>#§</sup>	–	–	–	–	2	5.5

VWK – VEAU-WARDILL-KILNER, FW – FURLOW, BAR – BARDACH, LANG – von LANGENBECK, ONC – oronasal communication (fistula) treated by secondary correction, FL – pharyngeal flap performed for correction of the velopharyngeal insufficiency, FP – pharyngoplasty performed for speech improvement. Statistical significance: \* VWK » BAR,  $\chi^2 = 15.72$ ,  $p < 0.01$ ; § BAR » LANG  $\chi^2 = 48.04$ ,  $p < 0.001$ , #VWK » LANG,  $\chi^2 = 11.65$ ,  $p < 0.01$ , ‡ FW » BAR  $\chi^2 = 22.81$ ,  $p < 0.001$ , Δ ONC » FP  $\chi^2 = 4.03$ ,  $p < 0.05$

**Tab. 4. Surgical revision of the primary palatoplasty (SRP) performed in patients with complete cleft palate (from total number of 75 patients, the number of SRP was 33, i.e. 44 %).**

Type of operation	Number of operations	Number of SRP	% SRP	ONC	% ONC	FL	% FL	FP	% FP
VWK	59	27	45.7 <sup>#</sup>	13	22.0	12	20.3	2	3.3
FW	2	1	50.0 <sup>*</sup>	1	50	–	–	–	–
BAR	6	5	83.2 <sup>#*</sup>	2	33.3	1	16.6	2	33.3
LANG	8	0	0	–	–	–	–	–	–
Together	75	33	44	16	–	13	–	4	–

VWK – VEAU-WARDILL-KILNER, LANG – von LANGENBECK, FW – FURLOW, BAR – BARDACH, ONC – oronasal communication, FL – pharyngeal flap, FP – pharyngoplasty, #VWK » BAR,  $\chi^2 = 31.33$ ,  $p < 0.001$ , \* BAR » FW,  $\chi^2 = 24.44$ ,  $p < 0.001$

**Tab. 5. Surgical revision of the primary palatoplasty (SRP) performed in patients with incomplete cleft palate (of the total number of 152 patients, the number of SRP was 15, i.e. 9.8 %).**

Type of operation	Number of operations	Number of SRP	% SRP	ONC	%	FL	%	FP	%
VWK	103	10	9.7	4	3.8	5	4.85	1	1
FW	15	2	13.3	2	13.3	–	–	–	–
LANG	28	2	7.1 <sup>#</sup>	–	–	–	–	2	7.1
BAR	6	1	16.6 <sup>#</sup>	–	–	–	–	1	16.6
Total	152	15	9.8	6	–	5	–	4	–

VWK – VEAU-WARDILL-KILNER, LANG – von LANGENBECK, FW – FURLOW, BAR – BARDACH, ONC – oronasal communication, FL – pharyngeal flap, FP – pharyngoplasty, # LANG » BAR  $\chi^2 = 4.734$ ,  $p < 0.05$

surgery. The age of patients at the time of primary surgery ranged from 6–18 months. The follow-up was performed on a regular basis in out-patient clinics and evaluated by an interdisciplinary team of medical specialists, including plastic surgeon, pediatrician, speech-therapist, phoniatrician, stomatologist and feeding nurse. A period of six years was set as a minimal follow-up interval. All secondary procedures were indicated according to the results of examination during these controls.

The patients were divided into two groups, namely those with complete cleft palate (Veau II type) and those with incomplete cleft palate (24) (Veau I type) (Tab. 1). Gender of the patients was not considered as a determining factor. No photographs of the clefts were performed as the parents of children refused to give permission for photo documentation.

These patients were further grouped according to surgical procedure performed (Tab. 2). Four cleft palate repair techniques were used, namely the “push back” palate plastic according to Veau-Wardill-Kilner (25) (VWK), Furlow’s double opposing Z-platoplasty (26) (FW), cleft repair according to von Langenbeck (27) (LANG) and Bardach two-flap palatoplasty (28) (BAR).

The results of primary palatoplasty were evaluated according to the incidence of complications, including oronasal fistula of the palate, velopharyngeal insufficiency with the need of secondary surgical correction using a pharyngeal flap or pharyngoplasty, postoperative hemorrhage, infection, and wound dehiscence. Indication for revision surgery in case of complications was decided by the multidisciplinary team in order to correct more severe complications after primary palate closure presented with problems of pronunciation, speech production, food and liquid regurgitation. The presence of Pierre Robin sequence in our group of patients with cleft palate was diagnosed by clinical examination carried out by a clinical geneticist.

The differences between the groups with different repair techniques were statistically evaluated by using  $\chi^2$ -test and unpaired t-test.

## Results

The need for secondary surgery was found in 48 patients (21.1 %) from the total cohort of 227 patients (Tab. 3). A significantly higher number of cases with the need for secondary correction (or additional surgical revision of primary palatoplasty – SRP) was found in patients with complete cleft palate (44 %) (Tab. 4) as compared to patients with incomplete cleft palate (9.8 %) (Tab. 5). The comparison of the numbers of cases with the

need for additional surgery after the primary palatoplasty by different cleft palate repair techniques showed a higher percentage after the Bardach procedure (50 %) and lower rates after VWK (22.8 %) and FW (17.6 %) (Tab. 3). After the LANG repair surgical procedure, the need for revision occurred only in 5.5 % of cases (Tab. 3).

The specialized care can lead to a low occurrence of postoperative bleeding (in our group of 227 patients, we have documented only two cases, which represents 0.88 % rate) or wound dehiscence (no case) or infection (no case). All of these complications were statistically insignificant.

The appearance of the Pierre Robin sequence was observed in 30.3 % patients from the entire cohort of patients, but a significantly higher incidence was in the group of patients with complete cleft palate (Tab. 6). No significant differences were noticed in the incidence of secondary corrective surgery between patients with cleft palate and presence of Pierre Robin sequence as compared to patients with cleft palate but without Pierre Robin sequence (Tab. 7).

The evaluation of the total number and total percentage of cases with the need for additional corrective surgery did not show significant differences between male and female patients. However, a higher need for the repair of pharyngeal flap was noted in the female group (Tab. 8).

## Discussion

Most of the studies are focused only on the comparison between two approaches of cleft palate repair, compare standard

**Tab. 6. The appearance of Pierre Robin sequence (PRS) in the patients with clefts, complete cleft palate and incomplete cleft palate. The incidence of PRS is significantly higher in the group of patients with complete cleft palate.**

Group	Number	Number of PRS	Percentage %
Total number of patients	227	69	30.3 <sup>§</sup>
Patients with complete cleft palate	75	39	52.0* <sup>§</sup>
Patients with incomplete cleft palate	152	30	19.7*

§ – complete cleft overall count » count of patients with PRS  $\chi^2 = 24.70$ ,  $p < 0.01$

\* – count of PRS in the group of complete cleft » group of incomplete cleft palate in patients with PRS  $\chi^2 = 23.77$ ,  $p < 0.01$

**Tab. 7. Comparison of cases with the need for secondary operations (SRP) in the group of patients with and without Pierre Robin sequence (showing no significant differences).**

Group	Total number	with SRP	Percentage of SRP
Total number	227	48	21.1
Patients with PRS	69	16	23.1
Patients without PRS	158	32	20.2

**Tab. 8. Operation for the correction of primary palatoplasty.**

Gender	Number of operations	Number of SRP	% SRP	ONC	%	FL	%	FP	%
Females – F	126	31	24.6	14 <sup>A</sup>	45.1	13*	41.9	4	1.3
Males – M	101	17	16.8	8 <sup>A</sup>	47.0	5*	29.4	4	23.5

SRP – additional surgery, ONC – oronasal communication (fistula) treated with secondary correction, FL – pharyngeal flap performed for the correction of velopharyngeal insufficiency, FP – pharyngoplasty performed for speech improvement. Statistical significance: pharyngeal flaps \* M>F,  $\chi^2 = 7.111$ ,  $p < 0.01$ , oronasal communication  $\Delta$  M>F,  $\chi^2 = 3.272$

palatoplasty with a new modification, or compare the results of primary palatoplasty performed at two different specialized clinics (5, 6, 7, 29, 30). It was repeatedly observed that the primary cleft palate repair using Furlow's double opposing Z-palatoplasty showed better results in speech outcome and velopharyngeal closure than palatoplasty according to von Langenbeck (7, 29, 32). Also, the velopharyngeal closure was better after primary palatoplasty according to Furlow as compared to Bardach cleft palate repair (16). The comparison of three types of primary cleft palate repair demonstrated that Furlow's palatoplasty showed better results in reparation of velopharyngeal insufficiency than the repair according to Bardach, while the best results were noted after the repair of pharyngeal flap (31).

The aim of the present study is to compare four of the most frequent surgical approaches to the cleft palate repair performed at one center. The secondary corrective surgeries were indicated by a multidisciplinary team in order to improve the results after the primary cleft palate closure surgery.

It was reported that the rate of postoperative complications is very variable. Agrawal refers the probability of oronasal communication to be between 2–40 % (23). Our results show that the number of complications (21.1 %) is higher as compared with some previous observations (17, 32) but very close to those observed by others (33, 34).

A significantly higher number of surgery revision palatoplasty was performed in the group of patients with complete cleft palate in comparison with patients with incomplete cleft palate. This is caused by the worse clinical appearance in the complete cleft palate leading to an increase in the rate of complications. Nevertheless, Veau-Wardill-Kilner palatoplasty has the same rate of surgery revision palatoplasty interventions in both groups. The obtained data can serve for surgeons and other members of cleft centers to inform parents about the probability of complications and need for secondary corrections.

The evaluation of different surgical approaches for cleft palate repair showed an increased number of surgery revision palatoplasties in the group after Bardach palatoplasty (considering this type less advantageous). It was observed that von Langenbeck palatoplasty was the method with the least probability of possible complications. Therefore, further analysis and preference for this approach will continue at our department.

The presence of Pierre Robin sequence in our group of patients with cleft palate is close to the incidence observed by several authors (32, 35). Previously, it was found that there is a higher rate in the presence of velopharyngeal insufficiency and oronasal fistulae after primary palatoplasty in patients with Pierre Robin sequence and cleft palate as compared to the group without Pierre

Robin sequence (35, 36). However, in our observation there was no significant difference in the incidence of postoperative complications in patients with cleft palate with or without Pierre Robin sequence. This discrepancy can be partially explained by differences in the surgical approach to the primary palatoplasty. In our department, the

most frequent cleft palate repair was according to Veau-Wardill-Kilner, while the compared studies (35) used the Sommerlad technique for cleft palate repair.

A higher need for pharyngeal flap operation in the female patient group was noted and this is in agreement with previously described observations (37). However, no gender differences in the presence of velofacial insufficiency and speech development were noted after the primary cleft palatoplasty according to Furlow or von Langenbeck (38). The presented results showed that gender has no significant influence on the total number of postoperative complications after primary palatoplasty,

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