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Nasal & Pharyngeal Endoscopic Research of the Palato-Pharyngeal Ring Function

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This research analyses the application of nasal & pharyngeal endoscopic study in the assessment of palato-pharyngeal ring function in children with congenital cheilognathopalatoschisis, as well as palato-pharyngeal failures. The effectiveness of surgical removal of hard and soft palate defect and of the velopharyngeal insufficiency depends on the maximum restoration degree for the correct orientation of palato-pharyngeal ring muscle structures.
Key words: *children, cheilognathopalatoschisis, velopharyngeal failure, velopharyngeal ring, rhinolalia.*

Nasal & pharyngeal endoscopic study is an important method of assessing velopharyngeal function [1, 2]. Defective closure of palato-pharyngeal ring structures, which include lateral and posterior pharyngeal walls and soft palate, results in palato-pharyngeal failure development [3]. The latter becomes evident through rhinolalia, promiscuous speech, nasal emission, the weakening of oral sounds' articulation and of articulation compensatory mechanisms [4, 5]. Removal of the palato-pharyngeal failure is a phased process, including both surgical treatment and conduction of systematic speech therapy sessions with the child. This study aims to analyze the movement of the soft palate and pharyngeal walls, velopharyngeal closure in children before and after surgery: palatoplasty and eliminate velopharyngeal failure in accordance with methods of L.E. Frolova and A.A. Mamedov.

Patients and Methods

The study included children aged from 3 to 6 years, 6 years and older having a congenital cheilognathopalatoschisis and velopharyngeal insufficiency, who were surged on the MONICA basis of M.F. Vladimirskiy and Scientific Centre of Children's Health of RAMS from 2008 to 2011. Endoscopic examination of PPR (palate-pharyngeal ring) function was carried out for 31 patients in the first (primary) group, and for 7 patients in the second (control) group. The first group patients were operated according to the method of A. Mamedov - with palato-pharyngeal ring constriction; while in the control group patients underwent palatoplasty and removal of palato-pharyngeal failure according to the method of L. Frolova - without lengthening the soft palate and without palato-pharyngeal ring restriction. Olympus (ENF Type P4) Fibreoptic and Karl Storz Hopkins rigid optics were used to investigate the function of the palato-pharyngeal ring. Video recording was performed using an endoscopic Karl Storz telecamera. Nasopharyngoscopy method is based on direct visual study of the palato-pharyngeal ring anatomy and structures functions. There was carried out the following video-assessed nasoendoscopy of velopharyngeal function in accordance to international guidelines.

Statistical analysis of results was performed using the program STATISTIKA 6,0 (StatSoft Inc., USA). The Pearson criterion χ^2 was used for comparison of discrete variables presented in frequency forms. The results were assessed as statistically significant at $p < 0.05$.

Results

In the surveyed group (Fig. 1) poor mobility of the soft palate (SP) was observed in 74.19% of the patients, satisfactory - at 25.81% before surgery; and in the control group (Fig. 2) - 85.71 and 14.29 %, respectively. After surgery no poor mobility of the NC was noted in any patient of the surveyed group, whereas in the control group - in 42.86% of patients. Satisfactory mobility of SP after surgery was observed in 32.26% patients of the main group and in14.29% of the control group, good mobility - in 67.74% and 42.86%, respectively ($p < 0.05$).

Poor mobility of the left lateral pharyngeal wall in the preoperative period was noted among 77.42% of the patients in the surveyed group and among 71.43% in the control group in the postoperative period - at 6.45% and 42.86%, respectively. Satisfactory mobility in the preoperative period was observed in 22.58% of the main group and in 28.57% of control group in the postoperative period - at 64.52% and 42.86% of patients, respectively. In the preoperative period, good mobility of the left lateral pharyngeal wall was not observed among any patients of both groups, whereas after the operation it was observed among 29.03% and 28.57% of the surveyed and control groups, respectively ($p < 0.05$).

Before surgery, poor mobility of the right lateral pharyngeal wall (RLPW) was observed in 61.29% and 85.71% of the patients; and after the surgery - at 3.23% and 28.57% of the surveyed and control groups, respectively. Satisfactory RLPW mobility was observed among 38.71% and 14.29% of patients in the preoperative period, and among 48.39% and 28.57% in the postoperative period of the surveyed and control groups, respectively. Good mobility of RLPW was observed among any patients in the preoperative period, whereas after surgery it was observed in 48.39% patients of the surveyed group and among 42.86% of the control group ($p < 0.05$).

Poor mobility of both pharynx side walls of the in the preoperative period was observed among 45.16% and 85.71% of the patients; and in the postoperative period among 6.45% and 28.57% of the patients in the surveyed and control group, respectively; satisfactory mobility was observed among 54.84% and 14.29% among patients in surveyed group and among 32.26% and 42.86% of the patients in control group in pre-and postoperative periods, respectively.

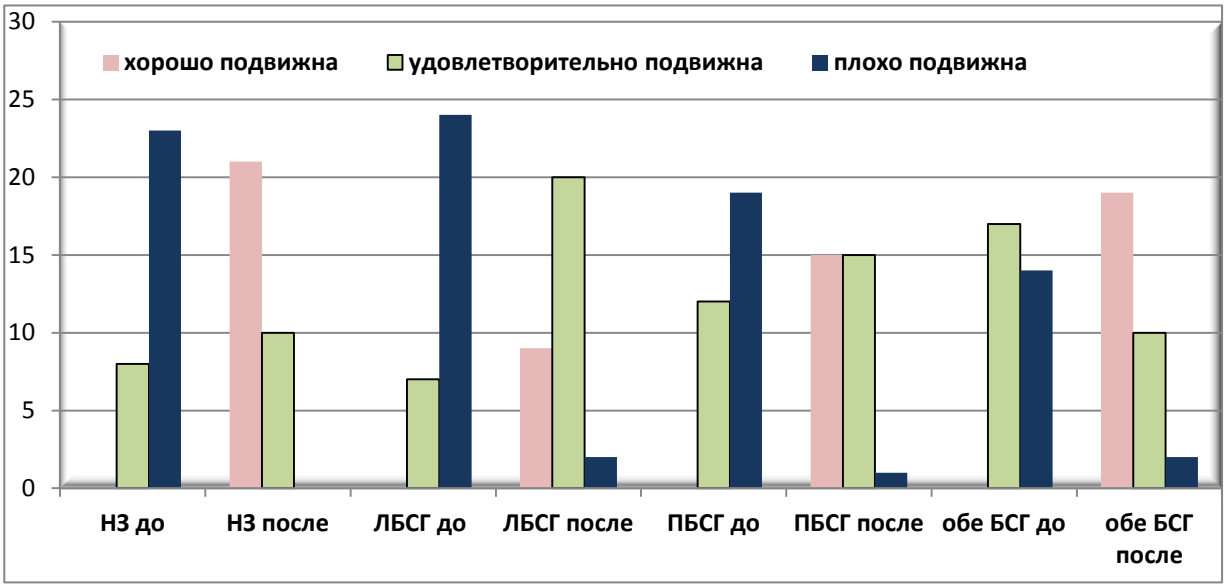
Good mobility of both pharynx side walls was not observed in the preoperative period, while it was observed after the surgery among 61.29% of the surveyed group, and among 28.57% of the control group ($p < 0.05$).

Thus, in the postoperative period there was a significant improvement in mobility patterns of palato-pharyngeal ring (soft palate, RLPW, the left lateral pharyngeal wall) in the surveyed group compared to control group.

Conclusion

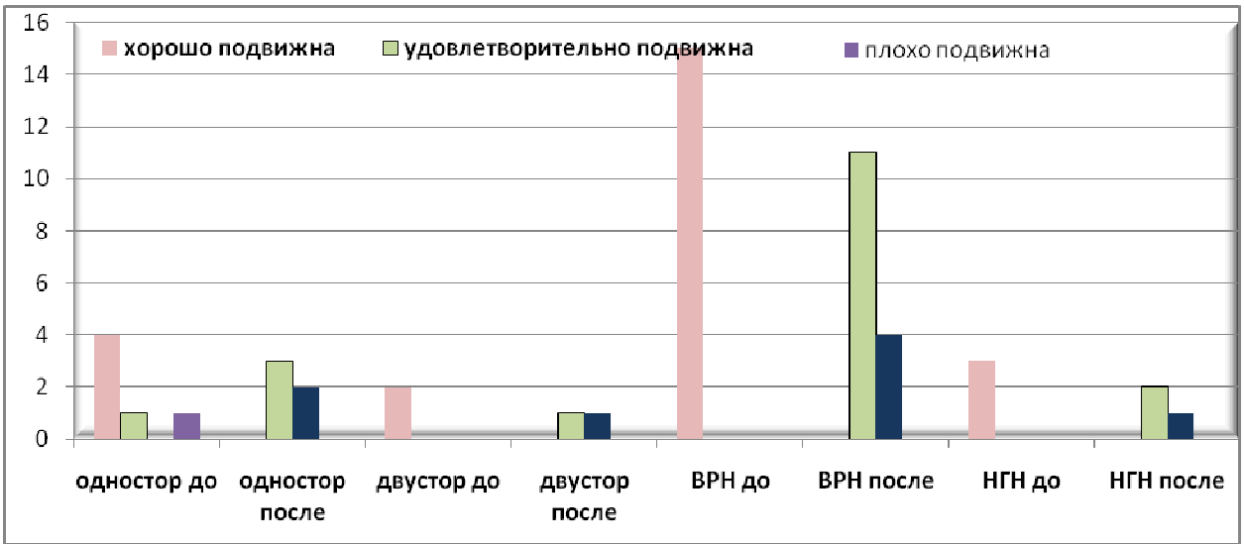
Using nasal&fharyngeal endoscopy made it possible to develop the tactics of surgical treatment and rehabilitation of children having congenital cleft palate and velopharyngeal failure. This tactics aimed to restore the least mobile structures of the palato-pharyngeal ring along with the restoration of normal anatomy of the soft palate muscular system and its lengthening, thus helping to fully restore physiological function of palato-pharyngeal ring.

Fig. 1. Assessment of mobility patterns disorders of palato-pharyngeal ring in the surveyed group before and after surgery



Note. **Хорошо подвижна** – mobile, **удовлетворительно подвижна** – satisfactory mobile, **плохо подвижна** – poorly mobile; **НЗ до** – NC - velum before, **НЗ после** – NC after, **ЛБСГ до** – LSPW (left side pharyngeal wall) before, **ЛБСГ пос**ле – LSPW after, **ПБСГ до** – RLPW (right lateral pharyngeal wall) before, **ПБСГ после** – RLPW after, **обе БСГ до** – LPW (the lateral pharyngeal wall) before, **обе БСГ после** – LPW after.

Fig. 2. Assessment of mobility patterns disorders of palato-pharyngeal ring in the control group



Note. **Хорошо подвижна** – mobile, **удовлетворительно подвижна** – satisfactory mobile, **плохо подвижна** – poorly mobile; **одностор до –** one-sided before**, одностор после –** one-sided after**, двустор до –** two-sided before**, двустор после–** two-sided after**, ВРН до –** velopharyngeal failure before**, ВРН после –** velopharyngeal failure after.

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