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Evaluation of Pediatric Voice Handicap Index and Pediatric Voice Related Quality of Life before and after adenotonsillectomy in pediatric population☆

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ABSTRACT

Objective: To study changes in Pediatric Voice Handicap Index (PVHI) and Pediatric Voice Related Quality of Life (PVRQOL) before and after adenotonsillectomy in short term follow up.
Methods: Quasi-experimental (before and after study). Eighty-six children aged 3–13 years (58 boys, 28 girls) with adenotonsillar problems (whether with obstructive or infectious surgical indications) who were admitted for adenotonsillectomy procedure. Parents of children were asked to complete PVHI and PVRQOL questionnaires prior to surgery and 1 month after it.
Results: Reliability of the PVRQOL and PVHI was established by evaluation of Cronbach α value. Cronbach α for PVHI was 0.92 and for PVRQOL it was 0.83. Preoperative values for the PVHI were: mean ± SD; 14.39 ± 14.65. Preoperative values for the PVRQOL were: mean ± SD; 92.60 ± 10.82. PVHI showed significant improvement after surgery: mean ± SD; 2.93 ± 6.98 ($P < 0.001$). Postoperative PVRQOL had a significant improvement: mean ± SD; 98.11 ± 5.82 ($P < 0.001$).
Conclusion: Adenotonsillectomy improved PVHI and PVRQOL scores in children with adenotonsillar problems, regardless of obstructive or infectious surgical indications.

1. Introduction

Tonsils are lymphoepithelial tissues located at the back of the oral cavity, and adenoid is situated in the roof and back of the nasopharynx. Tonsils and adenoid are very small at birth; they begin to grow up at 1–3 years of age along with increasing activity of the immune system, and reach their peak growth at 3–7 years of age [1,2]. Enlarged tonsils reduce the oropharyngeal airspace and push the tongue forwards, resulting in hyponasal or rarely hypernasal speech, oral breathing, muffled sound, noisy breathing, sweating, nocturia, daytime sleeplessness, morning headaches, dry mouth, halitosis, and difficulty swallowing [3,4]. Adenotonsillar hypertrophy also causes Sleep Disordered Breathing (SDB) and Obstructive Sleep Apnea (OSA) which can lead to failure to thrive, cor pulmonale, poor quality of life, compromise of cognitive skills and behavioral disturbance [5–19].

Adenotonsillectomy is one of the most frequent surgical operations done by an otolaryngologist [20]. Although tonsillectomy and adenoidectomy are classified as minor surgeries, recent studies report 1.4% major complications with them, including hemorrhage, dehydration, infection, injury to the Eustachian tube, nasopharyngeal stenosis, velopharyngeal insufficiency, complications of anesthesia [21–23], sore throat, post surgical nausea and vomiting, bleeding, pulmonary edema, airway obstruction, and rarely death [24].

Regarding to the resonating effect of the pharynx on voice and also parental concerns regarding their children voice after the adenotonsillectomy procedure, we decide to conduct this research. In the present study, we used PVRQOL questionnaire [25] and PVHI questionnaire [26] which are modified version of the adult questionnaires [27,28] to evaluate the quality of life in children with voice disorders caused by adenotonsillar problems with surgical indications.

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Table 1
PVHI preoperative and postoperative mean survey scores and change scores ($N = 86$).

	Preoperative score, mean (SD)	Postoperative score, mean (SD)	Change score, mean (95%CI)
Functional	3.98 (4.50)	0.8 (2.49)	3.18 (2.13–4.21)
Physical	6.34 (6.14)	1.2 (2.59)	5.14 (3.84–6.43)
Emotional	4.03 (5.31)	0.86 (2.62)	3.17 (1.97–4.37)
Total	14.39 (14.65)	2.93 (6.98)	11.46 (8.28–14.64)

2. Methods

In a quasi-experimental study (before–after trial), we recruited children aged 3–13 years who were referred for adenotonsillar surgery. The exclusion criteria were under 3 years of age and over 13, previous history of adenotonsillar surgery, children with neuromuscular diseases, craniofacial syndromes, any systemic disorder, growth retardation, psychiatric conditions, having two illiterate parents, and parents' inability to communicate in Persian. The children's parents completed the PVHI and PVRQOL questionnaires prior to surgery and after 1 month.

The PVHI, modified from its adult version, consists of 23 questions in three sections: functional, physical, and emotional. The functional section contains 7 questions, the physical section contains 9, and the emotional section holds 7 questions. The questions are scored as follows: 0 (Never), 1 (Almost Never), 2 (Sometimes), 3 (Almost Always), and 4 (Always). The maximum and minimum scores are 92 and 0, respectively. A higher score represents greater voice disorder.

The PVRQOL questionnaire consists of 10 questions, and is modified from its adult version. The questions are scored in the following manner: 1 (Not a problem), 2 (A small amount), 3 (A moderate amount), 4 (A lot), 5 (Problem is as bad as it can be) and 6 (Not applicable). The raw score will be transformed based on a 0–100 scale. Scores closer to 100 shows better quality of life.

Since these questionnaires had not been previously used in Iran, we used the forward–backward method to translate the questionnaires to Persian. For this purpose, the English version was first translated to Persian by two translators. The Persian versions were then translated back to English by two different translators, and finally a moderator prepared the final version using these English and Persian translations. We considered experts' comments for validity of the questionnaires in the final version. We applied the questionnaire to 30 patients to determine the sample size as well as the questionnaire's reliability. The selection was made using convenience sampling. According to this sampling method a sample size of 66 for PVHI and 85 for PVRQOL was required in this study at the 95% confidence level and 90% power. The calculated Cronbach's α for internal consistency of the questionnaires, which was equal to 0.92 for PVHI and 0.83 for PVRQOL. The parents were given comprehensive information about the study before participation, and they were given complete free choice to enter or withdraw from the study. This study was approved by the Otolaryngology Research Committee of Tehran University of Medical Sciences.

Afterwards, we got more 105 patients include the 30 patients who have mentioned above. Among those, 86 parents completed the study and 19 parents could not make it.

Once the questionnaires were completed, the findings were analyzed on SPSS Version 16 (SPSS Inc., Chicago, IL, USA). Results were reported as mean ± standard deviation (SD) for the quantitative variables and percentages for the categorical variables. The groups were compared using the dependent Student's t-test.

3. Results

Reliability of the PVRQOL and PVHI was established by evaluation of the Cronbach α value. Cronbach α for PVHI was 0.92 and for PVRQOL it was 0.83. The questionnaires were completed by parents of 86 children before and 1 month after surgery. 51 patients had surgical indication because of obstructive problems and 35 patients undergone surgery because of infectious problems. Adenotonsillectomy have been done for 86 patients. There were 58 boys (67.4%) and 28 girls (32.6%) with mean age of 7.93 ± 2.09 years (range 3–13 years). The preoperative mean ± SD for the PVHI was 14.39 ± 14.65 and postoperative mean ± SD 2.93 ± 6.98 ($P < 0.001$). The preoperative mean ± SD for the PVRQOL was 92.60 ± 10.82 and postoperative mean ± SD was 98.11 ± 5.82 ($P < 0.001$).

The findings of this study indicate a significant improvement in PVHI score and all its domains after surgery ($P < 0.001$). Range of scores for PVHI in our study was between 0 and 57. The mean and standard deviation of the total and domain scores and their change scores with 95% confidence interval (CI) before and 1 month after surgery for PVHI and PVRQOL are shown in Tables 1 and 2; Figs. 1 and 2. In PVHI questionnaire the domain with the greatest change in mean score was physical domain which improved by 5.14, then functional by 3.18 and emotional domain had the smallest mean change score by 3.17. PVRQOL scores improved significantly after surgery with mean change score 5.51 ($P < 0.001$). Range of scores for PVRQOL was between 54 and 100.

4. Discussion

Salami et al. [21] studied the impact of tonsillectomy with and without adenoidectomy on voice and speech. They recruited 40 children in groups A and B and compared them with 20 healthy children as the control group. Group A consisted of 20 children who had undergone tonsillectomy and adenoidectomy. Group B included 20 children who had undergone tonsillectomy without adenoidectomy. The groups were evaluated for acoustic analyses and Pediatric Voice Handicap Index before and 1 month after surgery. Both groups indicated improvements in acoustic analyses and PVHI 1 month following surgery. In the current study, we recruited children who underwent adenotonsillectomy, Similar to Salami et al., we assessed the children before and 1 month after surgery. We found PVHI score improved significantly ($P < 0.001$). We also addressed the score changes for different domains, and we found the greatest improvement to pertain to the physical domain, followed by the functional domain and finally the emotional

Table 2
PVRQOL Preoperative and postoperative mean survey scores and change scores ($N = 86$).

Preoperative score, mean (SD)	Postoperative score, mean (SD)	Change score, mean (95%CI)
92.60 (10.82)	98.11 (5.82)	5.51 (3.16–7.85)

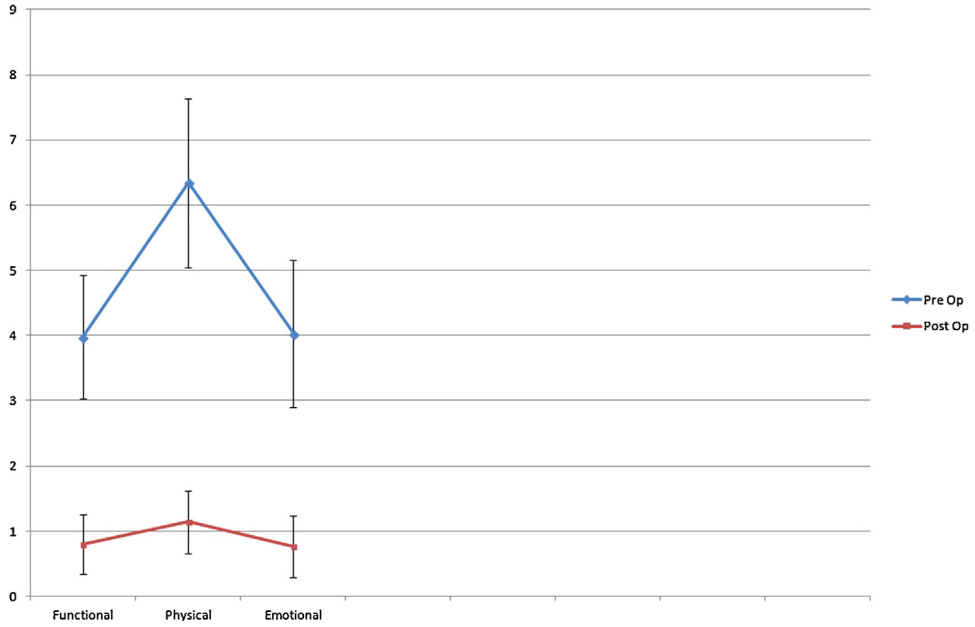

Fig. 1. Mean PVHI domain scores.

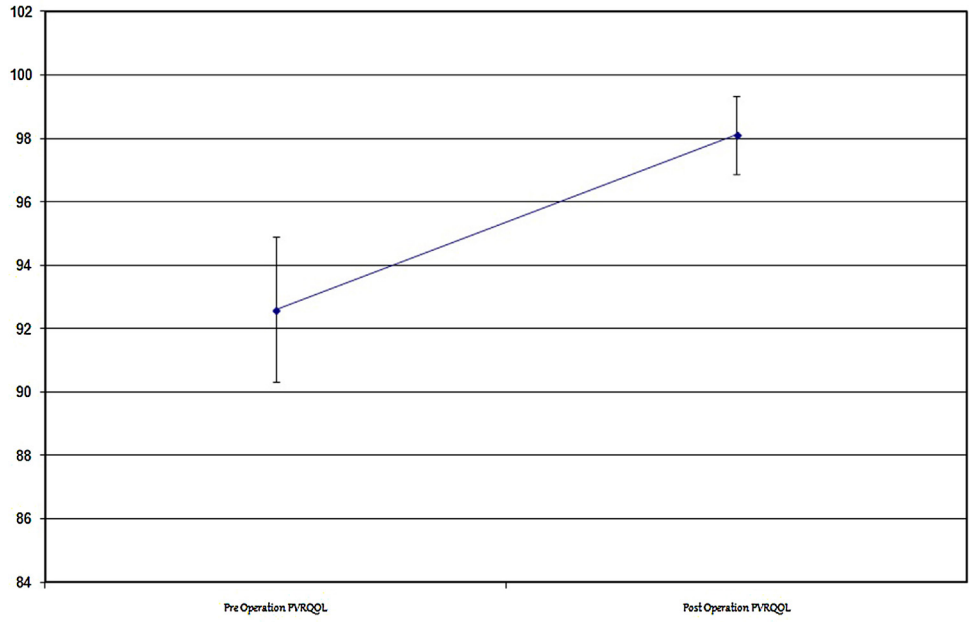

Fig. 2. Mean PVRQOL scores.

domain. It is noteworthy that all three domains improved significantly compared to before surgery ($P < 0.001$).

A study by Hartnick et al. [25] assessed PVRQOL (Pediatric Voice Related Quality of Life) and PVOS (Pediatric Voice Outcome Survery) in 104 children aged 2–18 years with a variety of otolaryngologic problems (dysphonia, adenotonsillar hypertrophy, otitis media, sinus complaints, etc.) without a history of surgery or with previous adenotonsillectomy, adenoidectomy, tympanostomy tube placement, etc. The results indicated that PVRQOL provides a more comprehensive assessment compared to PVOS, and it may be used in evaluating quality of life in children with different vocal disorders. In this study, we used PVRQOL questionnaire for patients referred for adenotonsillectomy (whether obstructive or infectious surgical indications). The children's parents completed the PVRQOL questionnaire before and 1 month after surgery, with the results indicating a significant improvement after surgery ($P < 0.001$).

Studies conducted by Salami, Reilly and Haapanen [21–23] mention velopharyngeal insufficiency (VPI) as a complication of tonsil surgery. In our study, we had one VPI case, the child did not have sub mucosal cleft palate and was referred for appropriate management.

In general, we presume improvement in all scores of PVHI and PVRQOL is mostly due to reversal of airway obstruction and pre-existing rhinolalia in our patients with obstructive symptoms, but the cause of improvement in patients with infectious causes needs more investigations.

5. Conclusion

The findings of the present study showed adenotonsillectomy improves children's voice and quality of life in patients with adenotonsillar problems (either with obstructive or infectious surgical indication), also we found significant improvement in both PVHI and PVRQOL scores after surgery.

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Authors' contribution

All authors contribute in the research process (e.g.: study design, interpretation, revising, data analysis and final approval).

Conflict of interest

There were no conflicts of interest and no financial relationships between authors.

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