Quality of life in patients with nasal obstruction after septoplasty: a single institution prospective observational study

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Research

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Abstract

Background

Nasal obstruction is a common symptom in otorhinolaryngological practice. It can impact significantly on the individual's quality of life. The primary goal of the study was to evaluate quality of life after septoplasty in adults with nasal obstruction. A secondary goal was to assess the effectiveness of septoplasty.

Methods

This was a single institution prospective observational study. Patients had experienced septal deviation and symptomatic nasal obstruction with no benefit from medical treatment. There were 51 patients who completed the Nasal Obstruction Symptom Evaluation (NOSE-POL) scale as well as a Visual Analogue Scale (VAS) before undergoing septoplasty, 3 months later, and finally 7 months after surgery. Patients evaluated changes in their nasal obstruction and changes in their quality of life using the Clinical Global Impression Scale (CGI-S).

Results

There was significant improvement in nasal obstruction after septoplasty. Before septoplasty the mean score on NOSE was 60.3 ± 20.4; 3 months after surgery it was 32.9 ± 16.8; and 7 months after surgery it was 39.6 ± 33.2. VAS results also proved a significant enhancement in nasal obstruction after septoplasty. Patients reported an improvement in nasal obstruction as well as a positive change in quality of life, confirming the effectiveness of septoplasty.

Conclusions

In patients with deformed septum, septoplasty contributes to high satisfaction of the patient and a compelling improvement in disease-specific quality of life. The NOSE-POL questionnaire is a useful tool for measuring the outcomes of this procedure.

Background

Nasal congestion, also called a stuffy nose, is a common complaint in otolaryngologist's practice. This problem affects 9.5–15% of general population(1). In the adult population, it is often a symptom of another health problem, as the main causes for nasal blockage are chronic diseases, such as chronic rhinosinusitis and allergic rhinitis. In Europe, chronic rhinosinusitis has a prevalence of 10.9% (2) and allergic rhinitis a prevalence of 17–29% (3). Beforementioned diseases cause mucosal congestion which results in nasal obstruction with decreased nasal airflow. The third main cause for nasal blockage is

nasal septal deviation, where abnormalities of the bony and cartilaginous structures of the nose can lead to difficulties in breathing caused by reduced nasal airflow. Deviation of the nasal septum has a prevalence of 19–65% depending on the criterion for defining a deviated septum.(4)

Not all patients with a deviated septum need surgery to relieve symptoms. In the ear nose and throat (ENT) specialty nasal septoplasty is the third most common surgery performed(5). Several studies have evaluated the outcome of septoplasty but most of them are retrospective(6), conducted on a small group of patients(6), include different surgical techniques,(5), (7), (8) or are associated with other surgical treatments(9),(10),(11), (12), what may interfere with their interpretation There is a poor correlation between objective measurements and subjective nasal potency symptoms(13): several studies where objective measures were used showed no correlation with patient satisfaction after septoplasty(14),(15). Other studies did not use validated instruments to assess surgical outcomes(5),(16).

Over the last decades, disease-specific instruments that measure nasal obstruction and health-related quality of life have been developed and validated to assess the outcomes of of the nose surgery. These tools are reliable, reproducible, valid, and sensitive to change(9)(17), (18). 15 We carried the translation and cultural adaptation in Polish of the NOSE questionnaire and confirmed that the Polish version has the same psychometric properties as the original tool(19).

The primary goal of this study is to compare severity of symptoms and the quality of life related to nasal obstruction before septoplasty, 3 months later, and finally 7 months after surgery. A secondary goal was the assessment of the septoplasty effectiveness in patients with nasal obstruction.

Materials And Methods

Measures

Participants were asked to complete the Nasal Obstruction Symptom Evaluation (NOSE-POL), the Visual Analogue Scale (VAS), and the Clinical Global Impression Scale (CGI-S).

The Nasal Obstruction Symptom Evaluation (NOSE) scale is a questionnaire specific to nasal obstruction. It was developed by Stewart et al. in 2004(17) and since then has been translated into many languages, adapted, and validated[12–17]. We chose this questionnaire because it is brief, easy for the patient to complete, and specific to nasal obstruction. Furthermore, it can be also applied after septoplasty(20), functional rhinoplasty,[9] or turbinoplasty(10). Patients from our study group completed the NOSE three times: once prior to surgery (2 weeks before) and then 3 months and 7 months post-op.

A visual analogue scale (VAS) was also used. Participants were asked to mark on a horizontal line how difficult it was to breathe through the nose. There was a line 100 mm long and three verbal descriptors (or word anchors): ‘none’ (on the left); ‘medium’ (in the centre); and ‘severe’ (on the right). The mark made by

the participants was converted into a number from 0 to 10. The higher number, the more troublesome was breathing through the nose.

The Clinical Global Impression Scale (CGI-S) is a brief tool used to assess change in a subject's condition(21). In our study the patients were asked to evaluate the change in their nasal obstruction and the change in their quality of life 7 months after septoplasty in comparison with the state before the surgery. The evaluation was done by means of a 7-point scale with the following degrees: 1, very much worse; 2, much worse; 3, minimally worse; 4, no change; 5, minimally improved; 6, much improved; and 7, very much improved. Separately, the patients assessed the change in their nasal obstruction and the change in their quality of life, selecting one answer for each.

Subjects

This was a single institution prospective observational study. The study protocol, informed consent form, and patient information brochure were approved by the Institutional Ethics Committee (approval number IFPS KB/19/2016) and accorded with the World Medical Association Declaration of Helsinki. Each patient gave informed written consent for participating in the study.

Initially the study group consisted of 51 patients. Inclusion criteria were: at least 18 years old; septal deviation consistent with presenting symptom of chronic nasal obstruction; symptoms lasting at least 3 months; and persistent symptoms after a 4-week trial of medical management (including topical nasal steroids, topical or oral decongestants, or an oral antihistamine/decongestant combination). Exclusion criteria were: sinonasal malignancy; radiation therapy to the head or neck; previous surgery (septoplasty, sinus surgery, rhinoplasty, or turbinoplasty); history or clinical evidence of chronic sinusitis (using the criteria from the European Position Paper on Rhinosinusitis and Nasal Polyps 2012)(22); adenoid hypertrophy; sleep apnea syndrome; septal perforation; craniofacial syndrome; acute nasal trauma or fracture in the past 3 months; nasal valve collapse; sarcoidosis; Wegener's granulomatosis; uncontrolled asthma; pregnancy; or illiteracy.

Patients completed the NOSE-POL 2 weeks before the septoplasty and 3 months later after surgery when all patients were back at the outpatient clinic (reporting symptoms at this follow-up should minimize reporting errors). Seven months after the surgery all the patients were sent questionnaires by post. Follow-up rate was 53% – only 27 subjects sent back completed questionnaires. There were 6 women and 21 men aged from 20 to 62 years old (M = 34.67; SD = 11.95).

Statistical analysis

Repeated measures analysis of variance (rANOVA) was conducted to compare baseline and 3-month and 7-month follow-up NOSE-POL scores. Bonferrroni correction was applied for multiple comparisons.

Additionally, pre-treatment to post-treatment change in the NOSE-POL and VAS scores was assessed in two other ways. Firstly, with the mean difference between baseline and postoperative results (i.e. the follow-up postoperative score was subtracted from the pre-operative score: a positive result indicated improvement (reduction of nasal obstruction symptoms); a negative result indicated deterioration (enhancement of nasal obstruction symptoms). Secondly, the pre-treatment to post-treatment change in the NOSE-POL and VAS scores was assessed as the standardized mean difference and taken as a measure of Cohen's effect size(23): 0.2 was considered a small effect, 0.5, a moderate effect, and 0.8 a large effect.

Correlations between change in the NOSE-POL and change in VAS, and changes in nasal obstruction and quality of life were calculated using rho-Spearman correlation. The hypothesis was that the correlations would be positive and at least moderate. The strength of correlation was evaluated according to criteria provided by the British Medical Journal guidelines(24): more than 0.8, a very strong correlation; 0.6–0.79, strong; 0.4–0.59, moderate; 0.2–0.39, weak; and below 0.2, very weak.

A *p*-value less than 0.05 was considered statistically significant. Statistical analysis was conducted using IBM SPSS Statistics v. 24 software.

Results

Pre-treatment and post-treatment results

Baseline NOSE-POL scores (2 weeks before septoplasty) and the results obtained after septoplasty (3 and 7 months post) are shown in Table 1.

Table 1
Scores of the NOSE-POL 2 weeks before septoplasty and 3 months and 7 months after septoplasty.

	Min	Max	Me	M	SD
Baseline	15	95	65	60.37	20.38
3 months post	0	60	35	32.96	16.77
7 months post	0	100	30	39.63	33.22
Min - minimum; Max - maximum; Me - median; M - mean; SD - standard deviation					

The results of repeated measures ANOVA showed that the NOSE-POL scores were significantly different: $F = 12.62$; $p < 0.001$; $e^2 = 0.33$. Post-hoc tests revealed that there was a significant improvement in nasal obstruction 3 months ($p < 0.001$) and 7 months ($p < 0.05$) after septoplasty compared to baseline. A comparison between the 3-month and 7-month scores was not statistically significant ($p > 0.05$), indicating stability of nasal obstruction symptoms. The mean change in the NOSE-POL scores 3 months after septoplasty was 27.41; SD = 16.01 (95% CI, 21.1–33.7) and 7 months after septoplasty it was 20.74;

SD = 37.56 (95% CI, 5.9–35.6). The effect size 3 months after the surgery was 1.71 and after 7 months it was 0.55.

The VAS score before septoplasty was M = 6.33 (SD = 2.28). A statistically significant improvement in nasal obstruction symptoms was revealed 3 months after septoplasty (M = 2.39; SD = 1.31; $p < 0.001$) as well as 7 months after surgery (M = 3.84; SD = 3.38; $p < 0.01$).

The mean change in VAS score 3 months after septoplasty was 3.94; SD = 2.12 (95% CI, 3.1–4.8) and 7 months after septoplasty it was 2.50; SD = 3.54 (95% CI, 5.9–35.6). The effect size 3 months after surgery was 1.86 and 7 months after the surgery it was 0.71.

Change in the NOSE-POL and change in other measures

The data in Table 2 show how the patients assessed the perceived change in their nasal obstruction and change in their quality of life 7 months after septoplasty.

Table 2
Subjectively perceived change in nasal obstruction and quality of life 7 months after septoplasty

	Subjective change in nasal obstruction	Subjective change in quality of life
Very much worse	0	1 (4%)
Much worse	3 (12%)	1 (4%)
Minimally worse	0	1 (4%)
No change	4 (16%)	5 (20%)
Minimally improved	3 (12%)	4 (16%)
Much improved	12 (48%)	10 (40%)
Very much improved	3 (12%)	3 (12%)

Twenty-five patients answered the questions concerning change in nasal obstruction and quality of life. And 72% of them reported improvement in their nasal obstruction 7 months after septoplasty. No change in nasal obstruction was reported by 16% of the patients and deterioration was reported by 12%.

Some 68% of the patients declared that their quality of life had improved 7 months after the septoplasty, 20% reported no change, and 12% declared that their quality of life had decreased in comparison with the pre-treatment period.

For each of the above-mentioned category of patients, the mean change in the NOSE-POLE scores was calculated and is presented in Fig. 1.

It can be seen that the mean change in NOSE-POL scores exhibit an orderly progression from very much or much worse through no change to much or very much improved. The highest change in the NOSE-POL

(average 75 points) was in those patients who were the most satisfied with their nasal obstruction according to the CGI-S. Similarly, the patients who reported very much improvement in their quality of life demonstrated a considerable reduction of complaints in the NOSE-POL. Also, the patients who answered in the CGI-S that their nasal obstruction had got worse had a negative change in the NOSE-POL, indicating deterioration of nasal obstruction symptoms. Thus, the change in the NOSE-POL is consistent with the changes assessed subjectively by other measures, and this is confirmed by the following correlations.

The correlations between change in the NOSE-POL scores and changes assessed with other measures were statistically significant. They were: rho = 0.86; $p < 0.001$ (change in VAS scores), rho = 0.77; $p < 0.001$ (change in nasal obstruction, rho = 0.61; $p < 0.05$ (change in quality of life). All correlations were positive, meaning that the higher the change in NOSE-POL score, the higher the change in scores of other measures.

Discussion

Patient-reported outcome measures are widely used among surgical specialties to estimate the impact of interventions on patients' health-related quality of life. There is a wide variety of elective operative procedures in otolaryngology, all of which aim to improve quality of life. As septal deviation has a prevalence up to 65%, we as doctors should use questionnaires to choose those patients with the greatest likelihood of improvement after septoplasty.

This research showed a statistically and clinically significant enhancement in quality of life and nasal obstruction scores after septal surgery. NOSE baseline scores for our patient population (67.5 ± 19.5) was similar to the study by Stewart et al.(9) (60.37 ± 20.38). NOSE scores after surgery(9) were also similar (26.6 ± 23.8 vs. 39.63 ± 33.22). We have demonstrated that NOSE scores are dependable on the results from other measures and so this self-report questionnaire can be used to assess the effectiveness of septoplasty..

There are controversies in the literature regarding potentially positive results of septoplasty with turbinoplasty vs. septoplasty alone. Both Stewart(9) and Uppal(11) found no statistically significant difference between either group. Nielsen et al.(25) compared three groups of patients: septoplasty, radiofrequency therapy of the inferior turbinate (RFIT), and both procedures. They concluded that patients who underwent RFIT with septoplasty complained less about postoperative nasal congestion than patients who went through RFIT only. We haven’t performed RFIT on our patients, just septoplasty.

In a systematic review of patient-reported nasal obstruction scores of the PubMed database,(20) normal and anomalous values of NOSE and VAS scores were settled for clinical use. This approach could be helpful in categorizing the severity of nasal obstruction, guiding treatment, educating patients, and measuring surgical outcomes.

Bugten et al.(26) revealed that nasal blockage may augment symptoms such as snoring, oral breathing, and nasal discharge, which may therefore weaken the general health of the patient. Surgery leads to a highly significant symptom improvement.

Furthermore, nasal septoplasty is often performed to some patients who have coexisting diseases such as chronic rhinosinusitis, obstructive sleep apnea, asthma, or allergy. These are all conditions which may be affected by nasal blockage. Patients who suffer for allergy might not achieve as good postoperative outcomes as non-allergic patients after surgery. This group should benefit from additional preoperative diagnostic procedures, such as computed tomography of nose and sinuses, to improve preoperative planning. Nevertheless, it is strongly recommended that allergic patients are also receive medical treatment postoperatively to optimize the results after surgery(26).

It was shown in the study by Thorstensen(27) that asthmatic patients have more symptoms of nasal blockage than non-asthmatic patients, and that they need an open nose to optimize airflow to the lower airways. A blocked nose, with consequent lack of humid, warm, and clean inspired air may harm the lungs and lead to worsening of asthma, so treatment of nasal blockage in asthmatics is particularly important(28).

Many patients with CRS do have a deviated nasal septum, but we excluded this group of patients from our study. The reason was so we could focus solely on nasal obstruction and its impact on quality of life.

This study has limitations. We have not randomized the patients to other treatment options for comparison. The major strength of this study is that it is prospective and from one otolaryngology hospital with more than 100 beds. All patients selected for surgery were asked to participate. From the findings of this study, we encourage other specialists to use the NOSE questionnaire: it can successfully guide treatment and can act as a clinically meaningful measure of surgical outcome.

Conclusions

Nasal septal surgery leads to a highly significant improvement in disease-specific quality of life. Our patients reported a positive change in nasal obstruction and quality of life after septoplasty.

Declarations

Ethics approval and consent to participate:

This study was conducted in accordance with ethical standards of the Institutional Review Board and conformed with the Helsinki Declaration. The study was accepted by the Bioethics Comittee of Institute of Physiology and Pathology of Hearing, Warsaw, Poland, reference number: IFPS/KB/19/2016

Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests

Funding details

None to declare.

Author's contributions:

All authors contributed to the study conception and design. J.D-B.and PH.S supervised the project. Material preparation, data collection and analysis were performed by J.D-B., S.G., PH.S. and H.S. The first draft of the manuscript was written by J.D-B., PH.S and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Figures

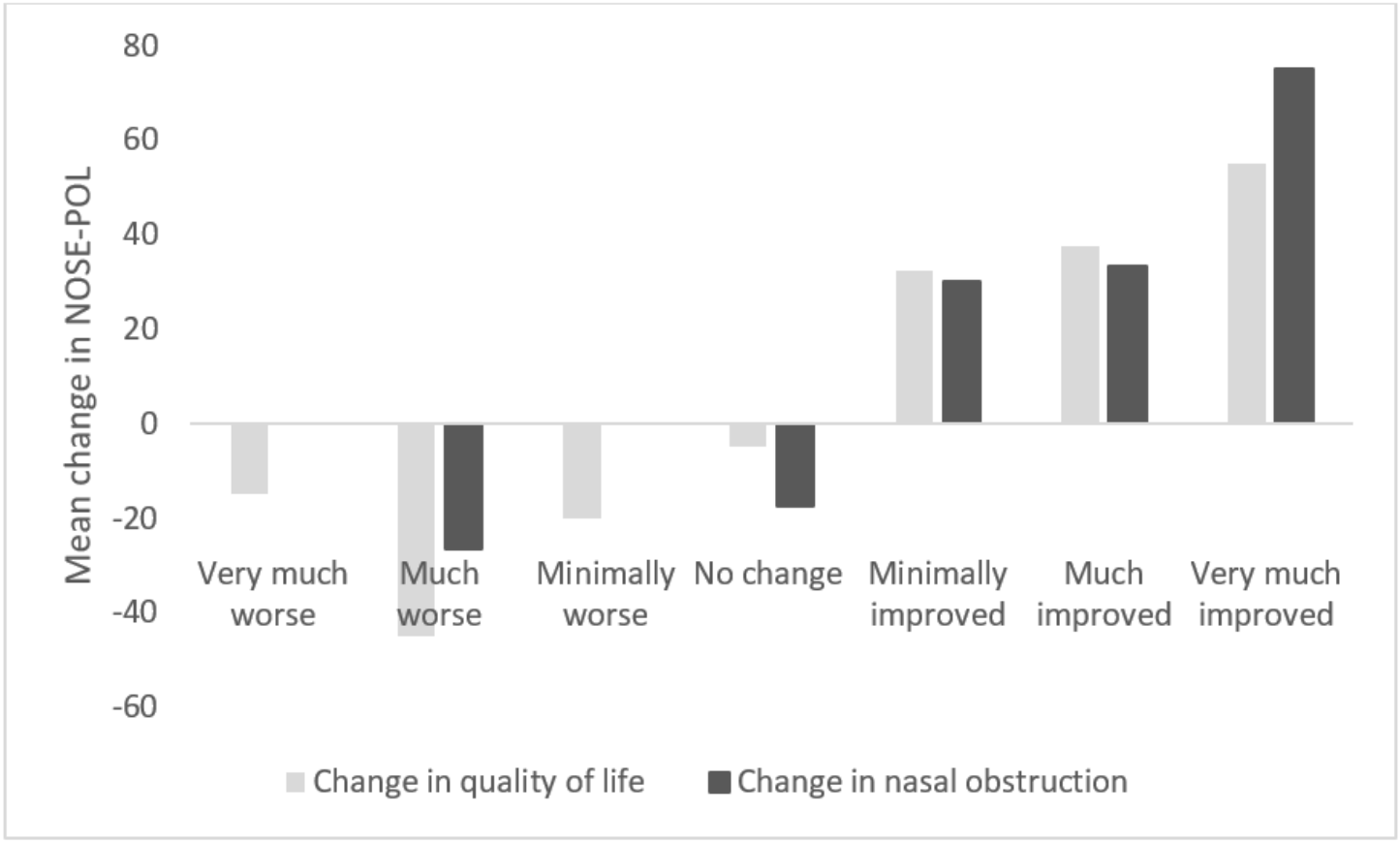

Figure 1

Mean change in the NOSE-POL score due to change in nasal obstruction and due to change in quality of life 7 months after septoplasty.