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Validity of the Egyptian version of Sino-Nasal Outcome Test-22 and its predictive value in evaluation of patients undergoing septoplasty surgery

M. H. Abdelazim*  and M. E. Alsobky

Abstract

Background: The purpose of this study is to evaluate the patients undergoing septoplasty surgery via the Egyptian version of Sino-Nasal Outcome Test-22 (SNOT-22). Sixty patients were selected from 77 deviated nasal septum patients who had undergone septoplasty surgery represent the group 1, and another 60 healthy subjects were selected to be the control group 2. All patients as well as the control group were exposed to SNOT-22 questionnaire preoperatively and 3 months postoperatively.

Results: SNOT-22 questionnaire was found to be improved from a mean \pm SD of 29.0 ± 10.7 preoperatively to 13.2 ± 3.22 postoperatively; the control group has a mean of 13.8 ± 2.64 .

Conclusion: The Egyptian version of SNOT-22 is an effective tool in evaluating the operation results in patients with deviated nasal septum after septoplasty surgery.

Keywords: Septoplasty, Sinonasal, Deviated septum

Background

Septal deviation is one of the most common causes of nasal obstruction and is a prevalent problem among the general population [1]. As such, septoplasty is among the most frequently performed procedures in otolaryngology and facial plastic surgery [2].

Outcomes of surgical procedures were evaluated using different objective measures as well as subjective quality of life questionnaires. The 22-item Sino-Nasal Outcome Test (SNOT-22) is a widely applied patient-reported outcome instrument used to assess the severity of symptoms associated with chronic rhinosinusitis [3]. It is a validated questionnaire of disease-specific, quality-of-life (QoL)-related measures of sinonasal function [4].

There are indications that the SNOT-22 questionnaire can also be used to register the degree of improvement after septoplasty surgery [5].

The purpose of this study is to evaluate the patients undergoing septoplasty surgery via the SNOT-22 and to predict the validity of the Egyptian version in predicting such operations.

Methods

This prospective cohort study was performed on 77 patients undergoing septoplasty from January 2016 to December 2018. Both sexes were included in the study; of the 77 patients, only 60 patients answered the SNOT-22 questions both pre- and postoperatively and completed the study. Another 60 healthy volunteers were randomly selected from outpatient clinic to participate as a control group.

The study is approved by the Committee for Medical Research Ethics in Al-Azhar University, Egypt. A written

* Correspondence: mohammedabdelaazem35@yahoo.com
Otorhinolaryngology Department Al-Azhar Faculty of Medicine, New Damietta, New Damietta 34518, Egypt

informed consent was given by the patients for their clinical records to be used in this study.

There were no restrictions or directions for the surgeon regarding the surgical procedure and use of post-operative nasal pack or nasal splints.

Inclusion criteria were deviated nasal septum with nasal breathing problems not responding to medical treatment. Exclusion criteria were the following:

- Septoplasty in combination with sinus and other surgeries
- Rhinoplasty operation
- Age less than 18 years and more than 55 years
- Patients who did not complete the study and follow-up.
- Patients who did not perform our medical consent.

The diagnosis was based on endoscopic examination of the nose combined with patients' symptoms.

Materials

Preoperatively, a SNOT-22 questionnaire was completed at the outpatient clinic.

Postoperatively, another SNOT-22 questionnaire was completed at the follow-up visit to the outpatient clinic 3 months after surgery.

Technique

Translation and cultural adaptation of the SNOT-22 was used in the following steps:

Step 1: All the items of the English version of the SNOT-22 (Table 1) were forward-translated by two translators separately into the Egyptian dialect. The translators avoided word-for-word translations and used simple terms that could be easily understood by the subjects. The final draft was created and finally reviewed by an ENT specialist for medical viewpoint.

Step 2: The draft obtained was back-translated into English by two translators different from those who translated the first forward translation.

Step 3: The English draft obtained was reviewed and compared with the original version. It was confirmed that similar expressions had been used.

Scoring of SNOT-22 Egyptian version was done for each participate preoperatively and 3 months postoperatively.

The scoring of SNOT-22 points was interpreted as 0 = no problem, 1 = very mild problem, 2 = mild or slight problem, 3 = moderate problem, 4 = severe problem, 5 = problem as bad as it can be) [6].

Table 1 English form of SNOT-22

N	Item	No problem (0)	Very mild problem (1)	Mild/slight problem (2)	Moderate problem (3)	Severe problem (4)	Problem as bad as it can be (5)
1	Need to blow nose						
2	Sneezing						
3	Runny nose						
4	Nasal obstruction/mouth breathing						
5	Loss of smell/taste						
6	Cough						
7	Postnasal discharge						
8	Thick nasal discharge						
9	Ear fullness						
10	Dizziness						
11	Ear pain						
12	Facial pain/headache						
13	Difficulty falling asleep						
14	Wake up at night						
15	Lack of a good night sleep						
16	Wake up tired						
17	Fatigue						
18	Reduced productivity						
19	Reduced concentration						
20	Frustrated/rest less/irritable						
21	Sad						
22	Embarrassed						

Table 2 Demographic data of our patients

	Group 1 (n = 60)		Group 2 (n = 60)		Total (n = 120)		Test of significance	
	No.	%	No.	%	No.	%		
Gender:							χ^2	p value
Males	35	58.33	33	55.0	68	56.67	0.0656	0.1871
Females	25	41.67	27	45.0	52	43.33	0.0713	0.1956
Total	60	100	60	100	137	100		
p value	> 0.05		> 0.05		> 0.05			
Age (years)							t test	p value
- Range	18–55		19–52		18–55		0.03443	0.3078
- Mean \pm SD	36.6 \pm 7.21		38.2 \pm 6.94		37.5 \pm 7.03			

Assessment

Reliability

Reliability is defined as the extent to which the SNOT-22 produces the same results on repeated trials. It is the stability of scores over time assessed through a test-retest reproducibility by measuring correlations between the SNOT-22 at time 1 and at time 2 (1 week after) for the same patients with septal deviation. Internal consistency or homogeneity concerns the extent to which items on the test are measuring the same thing.

Validity

Validity is defined as the extent to which the SNOT-22 measures what it purports to measure. Content validity was assessed in the development of the original form and maintained by the process of forward and backward translation. Criterion validity compares test score performance to a gold standard, which in the case of the QOL scales does not exist.

Construct validity is the degree to which the SNOT-22 measures the theoretical construct that it is intended to measure and includes convergent and discriminant or divergent validity. Convergent validity was assessed by comparing the two scores: SNOT-22 and RSDI. A convergent validity was assessed because we desired to see how closely the SNOT-22 was related to another questionnaire (RSDI) of the same construct. Discriminant validity, which is the ability to discriminate between known groups, was determined by comparing two groups: patients with septal deviation and healthy volunteers.

Responsiveness or sensibility

The scores before (at time 1) and 3 months after septoplasty were compared to detect if they were significant clinical change after surgical intervention.

Analyses of the data were performed using Windows, version 23. Data are expressed as the mean values (with standard deviations [SDs]), and all statistical tests are 2-tailed. Non-parametric tests were applied to the data. Chi-square tests (χ^2), paired *t* test, and Student's *t* test were used to identify differences between groups (according to ANOVA test of variance).

Then, probability was tested to determine the validity of the test as follows: values of $p > 0.05$ were considered insignificant, while $p < 0.05$ were considered to indicate statistical significance.

The interpretation of correlation coefficient (*r*) was plotted and calculated according to Hopkins et al. [7] excellent correlation (> 0.91), good correlation (0.71–0.90), moderate correlation (0.51–0.70), acceptable correlation (0.31–0.50), and low correlation (< 0.30).

Results

The study included 77 patients undergoing septoplasty, of which only 60 patients completed the study and represented group 1, and 60 healthy volunteers were selected to be the control group 2. The average age of the patients was 30.5 years (range, 18–55 years) which represented in Table 2).

Demographic characteristics of the studied patients of our groups are demonstrated in Table 2. The total SNOT-22 score of the studied groups is represented in Table 3.

Table 3 Sino-Nasal Outcome Test-22 score of the studied groups

SNOT-22 points	Group 1 Septoplastic surgery group		Group 2 Controls
	Preoperative	3 months postoperative	
Range	18–38	9–24	9–18
Mean \pm SD	29.0 \pm 10.7	13.2 \pm 3.22	13.8 \pm 2.64
t test	0.6345		0.7327 ^a
p value	0.0024		0.0001 ^a
Improvement change	15.8 \pm 7.48 (54.4%)		

^aComparison between preoperative patients and controls

Table 4 Statistical analysis of SNOT-22 score pre- and postoperative

	Preoperative (n = 60)		Postoperative (n = 60)		Test of significance	
	Mean	±SD	Mean	±SD	t test	p
Nasal obstruction score	3.5	1.1	1.2	0.82	5.121	0.015
Nasal symptoms score	16.2	2.3	6.3	1.6	7.544	0.001
Non-nasal symptoms score	3.7	1.5	1.7	1.3	4.514	0.018
General health score (QoL)	9.1	3.2	5.2	1.6	2.921	0.035
Total SNOT# score	29.0		13.2		4.872	0.019

QoL quality of life

Analysis of the SNOT-22 score pre- and postoperative is represented in Table 4.

The distribution of cases according to their nasal obstruction symptom and the operation results on such symptom is represented in Tables 5 and 6.

The distribution of cases according to their nasal symptoms improvement is showed in Table 7.

The distribution of cases according to their non-nasal symptoms and the operation results for such symptoms is demonstrated in Tables 8 and 9.

The improvement in general health and quality of life is represented in Table 10.

Discussion

The SNOT score was originally developed as a rhinosinusitis-specific, health-related questionnaire and combines both symptoms related to the nose and general health. It has been validated in this respect. The use of the SNOT score Egyptian version as a measure of outcome after septal surgery is novel. This is a single questionnaire that can quickly be completed in an out-patient setting by the patient and can be used on a regular basis. In what is effectively a quality-of-life operation, the figures generated are useful when assessing outcome [8].

Seventy-seven patients underwent surgery in this study, but only 60 of them came for the postoperative control, and all patients were at the out patient's clinic when they reported their symptoms which should minimize errors in their reporting.

This study assumes that nasal septoplasty leads to a better nasal QoL and a significant improvement for all symptoms.

To our knowledge, this is the first study that uses Sino-Nasal Outcome Test-22 in a special Egyptian version to evaluate patients' symptoms and QoL after nasal septoplasty surgery.

Table 5 Distribution of cases according their nasal obstruction

Item	Number	%
Patient with nasal obstruction	60.0	100.0

We see that more men than women undergo nasal septum surgery. The reason for this is not clear, but Bugten et al. [9] think that men tend to be involved in activities that are associated with a higher risk for nasal traumas. Nevertheless, both men and women respond to nasal septum surgery and reach the same QoL and symptom level postoperatively.

The patients report a mean preoperative SNOT-22 of 29.0 ± 10.7 . Comparing the preoperative results from the SNOT-22 questionnaire with results after 3 months postoperatively, we see that the patients with septal deviations report SNOT-22 QoL at a mean \pm SD of 13.2 ± 3.22 .

Same results reported previously by other questionnaire comparing other septoplasty QoL studies [10–12].

Nasal septal surgery leads to a highly significant improvement in mean SNOT-22 score 15.8 ± 7.48 (54.4%). For all subsets in the questionnaire, we find a highly significant improvement. When comparing the postoperative results with healthy controls ($p < 0.001$), we find that the patients reach nearly the same level as the controls in the subset of the questionnaire where the symptom burden is comparable in the groups.

Our SNOT-22 results are well in accordance with the expected results of Septoplasty, which decreased from 29.0 to 13.2 with a mean QoL change of 15.8 points (54.4%). However, Hyzctonen et al. [10] found a mean difference of SNOT-22 score, 21.5 points.

Regarding nasal symptoms, the patients had a high level of significance than the healthy controls ($p < 0.05$ to < 0.001). For symptoms such as nasal obstruction, change in sense of smell, nasal secretions, need to blow the nose, we found a greater reduction in symptoms in the patient group postoperatively.

Table 6 The operation results of patient with nasal obstruction

Results of operation	Number N = 60	%
Improved	50	83.3
Not improved	4	16.67
Worsening	0	0.00
Total	60	100

Table 7 The operation results of patient with nasal symptoms

Results of operation	Number N = 60	%
Improved	48	80
Not improved	12	20
Worsening	0	0.00
Total	60	100

In the previous studies of septoplasty, chronic rhinosinusitis, and nasal polyposis, the decrease in symptom score was 17.0, 12.6, and 17.7, respectively [5, 13].

Hytonen et al. [10] reported after 6 months of septoplasty surgery, as measured by the SNOT-22, the need to blow the nose, sneezing, runny nose, nasal obstruction, loss of smell or taste, postnasal discharge, facial pain/pressure, difficulty in falling asleep, and waking up at night improved significantly.

SNOT-22 in this study showed that septoplasty resulted in significant improvement in nasal obstruction 83.3%. A previous report found up to 75% improvement in nasal obstruction by Buckland et al. [5] compares favorably with other studies ranged from 70 to 80% [14, 15].

An overall improvement in the mean SNOT-22 score of 47% could be defined as an improvement [5]. A high patient satisfaction and decreased medication use. Severe preoperative nasal obstruction indicated a higher predicted improvement [12].

This study confirms the hypothesis that septoplasty for the treatment of adults with nasal septum deviation results in improvements in the disease-specific QoL measures using SNOT-22 questionnaire 3 months after the surgery.

Previous studies showed the same results with other NOSE tests questionnaire. Bezerra et al. [16] found a statistically significant improvement in their NOSE questionnaire scores 3 months after surgery (median (md) = 75, interquartile interval (IIQ) = 26 vs. md = 10, IIQ = 20) ($p < 0.001$) and a strong statistically significant correlation between the improvement in postoperative score and the preoperative score in the NOSE questionnaire ($r = -0.789$, $p < 0.001$). The effect's magnitude was significant and three times higher than the standard deviation, indicating an important treatment effect. They did not find differences between the genders in their sample of patients; despite the fact that quality of life studies published about other diseases showed a worsening in the quality of life among females [17].

Table 8 Distribution of cases according to their non-nasal symptoms

Item	Number N = 60	%
Patient with non-nasal symptoms	48	80.0

Table 9 The operation results of patient with non-nasal symptoms

Results of operation	Number N = 48	%
Improved	26	54.16
Not improved	22	45.84
Worsening	0	0.00

This study had some limitations as we did not compare the SNOT-22 with other QoL tests regarding nasal septum surgery such as SNOT-20 [8], generic 15D questionnaires [10], Nottingham Health Profile (NHP), General Health Questionnaire (GHQ) [15], etc.

Also, we did not compare different age groups as some studies [10] reported a poor test with old age group.

The short follow-up period (3 months) may affect the SNOT-22 questionnaire, as this is the least period in the studied literatures which ranged from 6 to 12 months.

We did not classify nasal symptoms according to their severity as other study reported that the more nasal symptoms the patients had pre- or postoperatively, the poorer the QoL [10].

Also we did not compare patients who receive treatment and not receiving treatment as Hytonen et al. [10] suggested treatment combination with septoplasty in septal deviation patients. There are also signs that nasal mucosal edema causes blockage and other nasal symptoms and medical treatment has not eased the symptoms. It can be recommended because it is well tolerated [14].

Conclusion

In this study, we have shown that nasal septoplasty leads to a better sino-nasal QoL and a highly significant symptom improvement.

The Egyptian version of SNOT-22 is an effective tool in evaluating nasal septum patients QoL after septoplasty surgery.

The results of this study also encourage the use of a systematic questionnaire, e.g., the SNOT-22, for patients with nasal symptoms in daily clinical practice to estimate the severity of symptoms and successful surgery.

Table 10 The operation results of patient with general health score (quality of life) symptoms

Results of operation	Number N = 60	%
Improved	37	61.67
Not improved	23	38.33
Worsening	0	0.00
Total	60	100

Abbreviations

SNOT-22: The 22-item Sino-Nasal Outcome Test; QoL: Quality-of-life; Md: Median; IiQ: Interquartile interval

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Authors' contributions

Abdelazim MH and Alsobky ME contributed to the study design, carried out the collection and assembly of data, drafted the manuscript, did the feature extraction statistical work, and reviewed the manuscript. Abdelazim MH and Alsobky ME read and approved the final manuscript.

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Availability of data and materials

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

Ethics approval and consent to participate

The study is approved by the Committee for Medical Research Ethics in Al-Azhar University, Egypt. A written informed consent was given by the patients for their clinical records to be used in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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