Evaluation of benefits of nasal septal surgery on nasal symptoms and general health

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Abstract

Objective The purpose of the study was to analyze the patient's satisfaction following nasal septal surgery based on their subjective opinion and to study whether the SNOT-22 can be used as a reliable outcome measure for successful septal surgery.

Study design Between Oct 2005–July 2007, sixty consecutive adult patients who underwent nasal septal surgery and met the study criterion were enrolled. The patients were asked to fill in the SNOT-22 questionnaire both prior to and at regular follow up periods after the surgery.

Results The mean total preoperative SNOT score (of all 22 items) was 20.67 and the mean total postoperative SNOT-22 score was 10.48 ($t = 8.8135$, $p < 0.001$ highly significant). On further analysis, improvement was seen in subcategories of Nasal Symptoms ($t = 8.0825$, $p < 0.001$ highly significant), Non Nasal Symptoms ($t = 3.0913$, $p < 0.0025$ significant), General health symptoms ($t = 4.8602$, $p < 0.001$ highly significant) and Nasal Obstruction ($t = 7.7652$, $p < 0.001$ highly significant).

Conclusion The SNOT-22 score is a useful and reliable tool in nasal septal surgery in that it combines both nasal specific and quality of life related questions, which can be assessed individually and together both pre and post operatively.

Keywords Quality of life (QOL) · Sino nasal outcome test 22 (SNOT 22) · Nasal septal surgery

Introduction

The otorhinolaryngologists are daily confronted with the patients having symptoms because of a deviated nasal septum. An extremely deviated septum that completely obstructs a nasal passage undoubtedly needs surgery. However, with the less pronounced deformities and symptoms surgeons are often left to trust their own assessment of the degree of obstruction to make therapeutic decisions that ultimately involve surgery in majority of the cases. As patient's expectations from the surgery are often different from those of surgeons', it is very important that accurate pre-operative evaluation should be done.

Objective measures such as rhinometry, acoustic rhinomanometry and nasal spirometry to a large extent, fulfil the purpose [1, 2], but studies have shown that these measures tend to correlate poorly with symptomatology and are inconsistent when predicting outcomes [3]. As health care provision has become increasingly shaped by patients needs and preferences, the patients subjective pre-operative and post-operative evaluation should be considered to assess the impact of the septal surgery on nasal symptoms and general health.

There have been only a few studies that have been performed to assess the impact of nasal septal surgery (Septoplasty, SMR with or without Turbinectomy) on the patients' quality of life (QOL) and subjective relief of symptoms [4]. Not surprisingly, many patients still complain of persistence or non improvement in symptomatology or QOL even after the corrective surgery, as per the surgeon's assessment. Hence, there's a need for a patient based tool to evaluate or assess the outcome of nasal septal surgery

The Sino nasal outcome test (SNOT-22) score was originally developed as a rhinosinusitis-specific, 22-items health related questionnaire and combines both symptoms

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related to the nose and general health. The use of the SNOT-22 score as a measure of outcome after septal surgery is novel as previous studies have tended to use separate tool to evaluate the change in nasal and non-nasal symptoms. The present study has been undertaken for assessing the outcome of nasal septal surgery using the SNOT-22 score.

Aims and objectives

To analyse the patient's satisfaction following nasal septal surgery based on their subjective opinion. To study relief of nasal obstruction. To study the duration of relief in the overall nasal symptoms as a result of surgery. To study the overall change in Quality of life (QOL) following the corrective surgery. To study whether the Sino nasal outcome test score (SNOT-22) can be used as a reliable outcome measure for successful septal surgery.

Materials and methods

Between Oct 2005–July 2007, sixty consecutive adult patients (17 years and above of age) screened from ENT out patient department, Ram Lal Eye and ENT Hospital, Govt. Medical College, Amritsar who underwent nasal septal surgery that is, Septoplasty, SMR with or without Turbinatectomy for their symptoms were included in the study.

Inclusion criteria

- Age 17 years and above.
- Septal deviation consistent with the presenting symptoms.
- Symptoms lasting at least three months and persistent symptoms after a three months trial of medical management, including topical nasal steroids, topical or oral decongestants, or an oral antihistamine/decongestant combination.

Exclusion criteria

- Septal surgery performed for other reasons such as an access to nasal and sinus tumours, pituitary surgery and as part of treatment for sleep apnoea.
- Septoplasty performed with concurrent sinus surgery
- Rhinoplasty, prior septoplasty/rhinoplasty or turbinatectomy
- Acute nasal trauma
- Adenoid hypertrophy
- Uncontrolled asthma/nasal allergy

A detailed history of the patients was recorded and all the relevant points in the history were noted down. The nasal

symptoms like nasal obstruction, stuffiness, sneezing, post nasal discharge etc. along with symptoms pertaining to the ears like deafness, pain or discharge from ears and history of sore throat etc. were asked for. Proper family and personal history was elicited. A thorough general physical and systemic examination was done to exclude any concomitant disease.

A detailed examination of the nose, throat and ears was performed. Preliminary required investigations were done which included blood examination for hemoglobin, total leukocyte count, differential leucocyte count, bleeding time, clotting time and complete urine examination. X-ray examination of associated paranasal sinuses and nasopharynx for any soft tissue enlargement was also done as and when required. Prior to the surgery, the patient was asked to fill in the SNOT-22 questionnaire (Table 1). In this questionnaire, patients rated 22 different symptoms related to both nasal and general health on a score of 0 to 5 as below:

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

The various nasal symptoms included nasal obstruction, sneezing, runny nose, need to blow nose, cough, post nasal discharge etc. whereas (QOL) related symptoms included lack of good night's sleep, waking tired, fatigue, reduced productivity and concentration, frustration etc. The patients were also asked to tick the most important item or symptom affecting his or her health. The kind of anaesthesia given, the technique of the surgery to be performed, choice of nasal packing and any immediate postoperative treatment was chosen as per individual patient requirement. Prior informed consent was taken from every patient.

Follow up

A postoperative assessment for the same parameters was made at one month, two months and then four months from the day of the surgery. The data from the above study was systematically collected, compiled and statistically analysed. An improvement is defined as a reduction of ≥ 2 points on the Sino nasal outcome test (SNOT-22) score.

Results

The demographics and clinical presentation of patients are as in Table 2. The mean total preoperative SNOT score (of all 22 items) was 20.67 and the mean total postoperative SNOT-22 score was 10.48 ($t = 8.8135$, $p < 0.001$) which is highly significant (Table 3).

Table 1 Sino nasal outcome test score (SNOT-22)

Considering the severity and frequency of problem pl.rate each item on how bad it is by encircling the number corresponding to how you feel	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)	Most important item(s)
Need to blow nose							
Sneezing							
Runny nose							
Nasal obstruction/mouth breathing							
Loss of smell/taste							
Cough							
Post nasal discharge							
Thick nasal discharge							
Ear fullness							
Dizziness							
Ear pain							
Facial pain/ headache							
Difficulty falling asleep							
Wake up at night							
Lack of a good night sleep							
Wake up tired							
Fatigue							
Reduced productivity							
Reduced concentration							
Frustrated/rest less/ irritable							
Sad							
Embarrassed							

Please tick the most important item(s) affecting your health (maximum of 5 items)

Various subcategories

SNOT-22 score was further analysed in terms of questions relating to nasal symptoms, non- nasal symptoms, general health or quality of life related issues and Nasal Obstruction (Fig. 1) (Table 3).

Nasal symptoms

The average preoperative score for all the nasal symptoms was 10.43 (SD 4.42) compared with a postoperative average score of 4.73 (SD 3.21). Statistical analysis shows the $t = 8.0825$ and $p < 0.001$ which is highly significant. (Table 3)

If every patient is assessed individually and an improvement is taken as 47% reduction in symptom scores [6], then:

No. of patients presenting with nasal symptoms 59 (98%)

No. of patients improved after surgery 44 (74%)

No. of patients not improved after surgery 15 (26%)

Worsening seen after surgery 00 (00%)

Non nasal symptoms

The average preoperative score for all non-nasal symptoms was 2.47 (SD 2.16) compared with postoperative average score of 1.47 (SD 1.27); $t = 3.0913$ and $p < 0.0025$ which is significant (Table 3). If every patient is assessed individually and an improvement is taken as 47% reduction in symptom scores [6], then:

Table 2 Patient demographics

Mean age (years)	23 (range 17 – 52)
Sex (Male : Female)	3 : 1
Rural : Urban (%)	42 : 58
Preoperative symptoms(%)	
1. Nasal obstruction	80
2. Recurrent attacks of cold	65
3. Sneezing	55
4. Discharge/catarrh	13
5. Headache/Facial pain	5
6. Embarrassment ,QOL deterioration	2
Preoperative signs (%)	
1. DNS	
Left	48
Right	52
2. Nasal mucosa	
Congested	27
Pale	18
Normal	55
3. Turbinate hypertrophy	
Left	12
Right	12
4. Posterior rhinoscopy, Post nasal discharge	18
Surgery (%)	
Septoplasty	66
Submucosal resection (SMR)	34
No. of patients presenting with non-nasal symptoms	45 (75%)
No. of patients improved after surgery	22 (49%)
No. of patients not improved after surgery	23 (51%)
Worsening seen after surgery	00 (00%)

General health/quality of life related symptoms

The average preoperative score for all general health symptoms or quality of life (QOL) related symptoms was 7.75 (SD 4.18) compared with a post operative average score of 4.42 (SD 3.27). Highly significant improvement was seen in the postoperative score as compared to pre operative score ($t = 4.8602$ and $p < 0.001$). If every patient is assessed individually, and an improvement is taken as 47% reduction in symptom score (6), then:

No. of patients presenting with quality of life related symptoms	59 (98%)
No. of patients improved after surgery	28 (49%)
No. of patients not improved after surgery	31 (51%)
Worsening seen after surgery	00 (00%)

Nasal obstruction

The mean preoperative score for nasal obstruction was 3.42(SD 1.8), which equates to 'a severe problem and the total mean postoperative score was 1.3(SD 1.11) or approximately a 'mild problem'. Statistical improvement was highly significant ($t = 7.7652$ and $p < 0.001$). If every patient is assessed individually, and an improvement is taken as a reduction of ≥ 2 points or 47% reduction in symptom scores [6], then:

No. of patients presenting with nasal obstruction	48 (80%)
No. of patients improved after surgery	39 (81%)
No improvement seen	09 (19%)
Worsening after surgery	00 (00%)

Discussion

The nasal septum together with the nasal dorsum is responsible for the aesthetic form of the nose. The septum is a mid-line structure dividing the nasal cavity into two halves. In practice, however, a straight nasal septum is not a common finding in adults. It is estimated that as many as 75–80% of individuals exhibit some type of anatomic deformity of the septum. An extremely deviated septum that completely obstructs a nasal passage undoubtedly needs surgery. However, with less pronounced deformities or symptoms, which are the most frequent, surgeons, are often left to trust their subjective assessment of the degree of obstruction to make therapeutic decisions that ultimately involve surgery. Thus variation and error is inevitable. There have been only a few studies that have been performed to assess the impact of nasal septal surgery (septoplasty, SMR, caudal dislocation with or without turbinectomy) on the patient's quality of life (QOL) subjective relief of symptoms [4]. So, not surprisingly many patients still complain of persistence of symptoms or non-improvement in QOL even after the corrective surgery, as per the surgeon's self assessment. Hence there's a need for a patient based tool to assess the outcome of nasal septal surgery.

The Sino nasal outcome test (SNOT-22) score is a useful tool in assessing patient satisfaction and QOL improvement after septal surgery. It 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 [5]. The use of SNOT score as a measure of outcome after septal surgery is novel, as previous studies have tended to use separate tools to evaluate the change in nasal, non-nasal and general health related symptoms. This is a single questionnaire that can be quickly completed in an outpatient setting by the patient and can be used on a regular basis. Originally, the SNOT score was based on 16, which has been concluded to

Table 3 Statistical analysis of SNOT-22 score pre-operative to average post operative

	Pre-op.		Mean Post-op			t value	p value	
	Mean	SD	Mean	SD				
NS	10.43	4.42	4.73	3.21	NS	8.0825	< 0.001	HS
Non-NS	2.47	2.16	1.47	1.27	Non-NS	3.0913	0.0025	S
GHS	7.75	4.18	4.42	3.27	GHS	4.8602	< 0.001	HS
NO	3.42	1.8	1.3	1.11	NO	7.7652	< 0.001	HS
Total	20.67	6.72	10.48	5.92	Total	8.8135	< 0.001	HS

NS: Nasal symptoms, Non-NS: Non Nasal symptoms, GHS: General Health Symptoms, NO: Nasal Obstruction, HS: Highly significant, S: Significant

Fig. 1 Graph comparing average pre and postoperative (mean of 1, 2 and 4 months) sinonasal outcome test scores (SNOT-22) for nasal symptoms, non nasal symptoms, general health/quality of life related symptoms and nasal obstruction

be a reliable, valid and responsive instrument for measuring rhinosinusitis specific health related QOL. More recent modification of the SNOT-16 has given rise to the SNOT-20 and SNOT-22 scores.

In 2002, a 10-year retrospective study was undertaken to ascertain how accurately the surgeon's selection criteria for septoplasty, which largely relies on clinical judgement alone, is able to anticipate patients' long term satisfaction. It was concluded that the selection of patients on clinical grounds alone does carry a considerable risk of patient dissatisfaction with end results. It also stated that pre-operative rhinomanometry data failed to prove useful in predicting the long term surgical outcome [7].

The nasal obstruction symptom evaluation (NOSE) study was undertaken to assess disease specific QOL outcomes after septoplasty in adults with nasal obstruction. A validated outcomes instrument, the NOSE scale was used. Items on the NOSE scale included nasal congestion or stuffiness, nasal obstruction, trouble breathing through the nose, trouble sleeping and unable to get enough air. The symptoms were graded from not a problem to problem as bad as possible.

The primary outcome measure was disease specific QOL at 3 months after surgery, as measured on the validated NOSE scale. Secondary outcome included disease specific quality of life at 6 months post-procedure, medication use for nasal obstruction at 3 and 6 months, and patient satisfaction. On follow up questionnaires, patients also rated the change in the overall breathing through their nose. Physicians were blinded to the patient's NOSE scores, both before and after treatment. It was concluded that in patients with septal deformity, nasal septoplasty results in significant improvement in disease specific QOL, high patient satisfaction and decreased medication use [8].

In 2005, the patient benefit from nasal septal surgery for nasal symptoms, particularly nasal obstruction was evaluated using the Glasgow Benefit Inventory (GBI). GBI is a validated measure of patient benefit developed especially for Otolaryngological interventions. The GBI has previously been used to assess patient perception of benefit from rhinoplasty/septorhinoplasty. The Glasgow Benefit Inventory is an 18-item post-intervention questionnaire. It gives a total score and profile scores for General benefit,

Social support and Physical health categories. The GBI is constructed in a way that the majority of questions ($n = 12$) load on the subscale General benefit, and three questions each load for the subscales Social support and Physical benefit. Standardised GBI is calculated by calculating the mean of the three subscales weighted equally. It was concluded in this study that GBI is a valuable tool for the assessment of benefit from nasal septal surgery and may be applicable in clinical practice [9].

In our study, sixty consecutive patients who met the study criterion were enrolled. Males were found to be more affected than females in the ratio of 3:1. This could be because males are more likely to sustain trauma to the nose resulting in deviated nasal septum. 68% of cases belonged to the urban areas and 42% to rural areas. This could possibly be due to easy access of urbanites to our hospital.

The primary preoperative symptom in our study was nasal obstruction (80%) followed by recurrent attacks of cold (65%), sneezing (55%), catarrh (13%) and then headache (5%). Similar finding has been reported by Buckland et al. [6], showing nasal obstruction in 72% and catarrh and headache in 11% of cases.

In our study the operation performed was septoplasty in 66% and SMR in 34% of cases. In the study by Buckland et al. [6], septoplasty was done in 65% and SMR in 35% of cases. The figure of 81% improvement in nasal obstruction seen in our study compared favourably with the other studies such as Buckland et al. [6] – 75%, Denholm et al. [10] – 80%, Arunachalam et al. [4] – 74% and Samad et al. [11] – 70.5%. An improvement is defined as 47% reduction in symptom scores or for individual symptom, an improvement of 2 or more points in the SNOT scale.

Comparing nasal symptoms on a whole, 74% of patients have gained improvement after the surgery. Significant improvement in nasal symptoms has been noted in other studies as well [4]. In the group of non-nasal symptoms, headache/facial pain was the most common presenting complaint being present in 54% of cases, including 5% of subjects in whom it was the main presenting complaint. 49% of cases gained improvement in their non-nasal symptoms after the corrective surgery. Improvement in headache was 47% as compared to the study by Buckland et al. [6] in which the overall improvement in headache/facial pain was 33% as also in other published studies [12]. In a study by Arunachalam et al. [4] the improvement was about 72% in headache/facial pain.

Many studies seem to find that although nasal symptoms do improve, other symptoms, as assessed by general health questionnaires such as the Nottingham Health Profile (NHP) and General Health Questionnaire (GHQ), remain unchanged [4]. In contrast, our study found that 98% of our patients had high preoperative scores for general health questions or QOL related questions (albeit disease specific) and that these were similar to the nasal questions. There was an almost equal postoperative improvement in both groups.

This has been corroborated by findings of other studies as well [6]. 47% of our cases showed improvement in symptom scores relating to QOL.

Out of all the QOL related questions, the highest scoring was within the 13–16 group of the SNOT-22 score (Table 1), i.e. questions related to poor sleeping pattern. Similar findings were voiced by Buckland et al. [6] in their study. Measuring health related QOL is important as only this concept registers the disease-related impact on patient's overall daily life [13].

A question remains on duration of relief in the overall nasal symptoms after the corrective septal surgery. In our study the relief that was gained at one month after the surgery, was maintained throughout the follow up period of 4 months. One study showed that the benefits of septal surgery had dropped considerably after 9 years [14], and another study showed that the benefit is maintained [15]. Another prospective study was done for a follow up period of two and a half years which showed that the probability of having at least a 50% reduction in blockage decreased from 73% to 60% to 41% and then to 27% at 3 months, 6 months, 1 year and two and half years respectively [16]. Ideally, the follow up should be longer but high drop out rate and difficulty in follow up makes this harder to achieve.

So, to conclude, the SNOT-22 score is a useful and reliable tool in nasal septal surgery in that it combines both nasal specific and quality of life related questions, which can be assessed individually and together both pre and post operatively.

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