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RELIABILITY OF SINO-NASAL OUTCOME TEST IN MEASURING THE OUTCOME OF SEPTOPLASTY

Objective:

To assess the subjective benefits to the patients undergoing septoplasty using Sino-Nasal outcome test (SNOT-10) scoring system.

Materials and methods:

It is a prospective, longitudinal and comparative study done at Department of Otorhinolaryngology and head & neck surgery, Tribhuvan University Teaching Hospital, Kathmandu, Nepal. Ninety patients who underwent septoplasty between November 2007 to March 2009 were kept in study group, and 45 patients without any intervention were the control. Sino-nasal outcome test (SNOT-10), was measured and graded from 0 to 3, depending upon the severity, 'Z' test for mean was used as a statistical tool.

Results:

Total 135 (90 cases and 45 control) patients with deviated nasal septum were included. The total mean SNOT score improvement was from 7.73 (S.D.-3.2) to 2.23 (S.D.-1.69) i.e. 71.13% one month after surgeries. The mean SNOT score improvement was from 6.57 (S.D.-2.36) to 5.88 (S.D.-2.6) i.e. 10.48% after one month in the control groups. There was a statistically significant improvement ($p < 0.001$) in post operative SNOT-10 score in patients who underwent septoplasty. However, improvement in control group was not found to be statistically significant ($p > 0.05$) using the same score. Comparison of post-operative SNOT scores between cases and controls was statistically significant. Comparison of difference of SNOT score pre and post operatively between cases and controls using 'Z' test for mean ($P < 0.001$) was also statistically significant.

Conclusion:

SNOT- 10 scoring system is a reliable subjective evaluating tool to observe the outcome of septoplasty and there was a significant symptomatic improvement seen after septoplasty in symptomatic DNS patients.

Key words: septoplasty, SNOT, DNS, objective tests

INTRODUCTION:

Septoplasty is one of the most common surgeries done by the otorhinolaryngologists. There are various indications for the septoplasty, but most important among them is nasal obstruction. To observe the relief of the different symptoms, various types of objective assessment tools are available. Most important among them are Nasal peak flow meter, Rhinometry, Rhinomanometry and Acoustic Rhinomanometry. The use of these objective tools has always been debated to see the symptomatic improvement. The measurements of these objective tools are not comparable with the subjective feeling of the patients. That is why most of the surgeons have to rely on the subjective symptoms for the indication, as well as outcome measurement of the septoplasty. In lieu of observing the subjective improvement, various subjective assessment tools have been developed. SNOT (Sino-nasal outcome test) is a tool of one of its kind, in which both nasal and health related symptomatic improvements are assessed. This tool was initially used to assess the benefits in the treatment of the rhinosinusitis. Later on, it was also used for measuring the outcome of the functional endoscopic sinus surgery. Buckland¹ in 2003 used this scoring system for the first time to assess the improvement after septoplasty. Various modifications have been made eventually, according to the convenience of different authors for their specific needs. Based on the experience and applicability in our setup, 10 symptoms SNOT scoring system (SNOT-10) has been developed, which is more thoughtful and practical in evaluating the outcome of septoplasty in our context. In this modified SNOT-10 scoring system, the health related symptoms have been excluded. To further simplify this scoring system, four grades (zero to three) depending on the severity of the symptoms, were used instead of six grades used by Buckland et al.¹ This study is first of its kind in Nepal to evaluate the outcome of septoplasty using a subjective scoring tool. This study will help to generate a valid scoring system for septoplasty outcome as well as for indication of surgery.

MATERIAL AND METHODS:

This is a prospective, longitudinal and comparative study of cases undergoing septoplasty, performed in Department of Otorhinolaryngology and Head & Neck Surgery, Tribhuvan University, Teaching Hospital, Kathmandu, Nepal from 15th November 2007 to March 2009. Outcome measure was done using Sino-nasal outcome test (SNOT-10) comprising ten nose related symptoms from grade 0 to 3, depending upon the severity, after measuring its validity and reliability. Regarding validity and reliability of SNOT scoring system,

a pilot study was conducted using test – retest and internal validity measures. The SNOT scoring system is found to be reliable and valid. The performa was translated to Nepali language. Only age equal to or more than 13 years with symptomatic deviated nasal septum of both genders were selected for inclusion criteria. Septal surgery combined with any other procedure was excluded. Patients visiting OPD with symptomatic deviated nasal septum were selected. Then, patients were divided into two groups. Study group underwent septoplasty. For control groups, those patients who were not willing for surgery or those with long time of waiting list for surgery were selected. Preoperative assessment using SNOT-10 score was done a day before the surgery. Patients were rated on 10 different symptoms related to nose on a score of 0 (no problem) to 3 (problem as bad as it can be) as shown in Table- 1.

All the patients were called after one month of surgery and re-evaluation was done using the same SNOT score. Preoperative score was not informed before completing the postoperative scores. Patients,

Table 1. SNOT-10 scoring system of our study

Symptoms	Nil (0)	Mild (1)	Moderate (2)	Severe (3)
Nasal obstruction				
Runny nose				
Sneezing				
Facial pain / headache				
Cough				
Need to blow nose				
Post nasal discharge				
Thick nasal discharge				
Epistaxis				
Loss of smell and taste				

who couldn't follow-up, were contacted on telephone. For statistical significance, controls were also selected. They were evaluated using same SNOT-10 score. These controls were prescribed sodium chloride nasal drops for 10 days. Controls were also followed up after one month and evaluated on the same SNOT-10 score. If they could not follow up, they were contacted on telephone. Statistical analysis was done using SPSS 11.0 software. At first, frequency and percentages were calculated for individual symptoms of SNOT-10 scoring system. Then 'Z' test was used to compare the preoperative and postoperative symptoms scores.

RESULTS:

Out of 150 cases done in the study period, 90 cases were selected for the study. Rest of the cases were excluded due to concomitant turbinate surgery or rhinoplasty. 10 cases either didn't follow up or could not be contacted on telephone. Most of the cases were male i.e. 77 out of 90, in the study group and 37 out of 45 in control group. (Table- 2).

Table 2. Demographic details of patients

	Cases	Control
Total patients-	90	45
Male	77	37
Female	13	8
Age range	13 - 52	15 - 65
Mean age	25.6	29.6
M/C Symptom	Nasal obstruction	Same
2nd M/C symptom	Need to blow nose	Same
Least common	Cough	PND
F/U on telephone	33	24
Left DNS	60	19
Right DNS	27	24
GA/LA	17/73	-

The mean age of the patients was 25.6 years in the study group age ranging from 13 to 52. It was 29.6 years in the control group age ranging from 15 to 65 years. The most common symptom was nasal obstruction in both the groups. Out of 90 cases, 33 were contacted on telephone for follow up. Most of the surgeries were done under local anaesthesia (73). Most of the cases were left sided DNS i.e. 60 out of 90 but surprisingly it was predominantly right sided DNS in the control group (Table-2). The most common symptom was nasal

Table 3. Sino-nasal outcome test (SNOT-10) scoring (Study group)

Symptom	Pre-op	Mean	Post-op.	Mean	% improvement
Nasal obstruction	148	1.64	34	0.37	77
Runny nose	60	0.66	27	0.30	55
Sneezing	75	0.83	41	0.45	45.44
Facial pain/ Headache	94	1.04	22	0.24	76.60
Cough	33	0.36	7	0.07	78.80
Need to blow nose	119	1.32	26	0.28	78.16
Post-nasal discharge	27	0.30	7	0.07	74.08
Thick nasal discharge	62	0.68	21	0.23	66.13
Epistaxis	31	0.34	6	0.066	80.65
Loss of smell or taste	47	0.52	10	0.11	78.73
Total score	69	67.73	201	2.23	71.13

obstruction in both study group and controls, followed by need to blow nose, facial pain and headache, sneezing, thick nasal discharge, runny nose, loss of smell, cough, epistaxis and post nasal drip, in the study group as mentioned in detail in Table-2.

Table 4. Sino-nasal outcome test (SNOT-10) scoring (control group)

Symptom	Pre-op score	Mean (Pre-op)	Post-op. score	Mean (Pre-op)	% Improvement
1 Nasal obstruction	77	1.17	64	1.42	16.89
2 Runny nose	25	0.55	27	0.60	-8
3 Sneezing	26	0.57	27	0.60	-3
4 Facial pain/ Headache	35	0.77	36	0.73	5.72
5 Cough	8	0.17	7	0.15	12.5
6 Need to blow nose	54	1.2	50	1.11	7.44
7 Post-nasal discharge	10	0.22	11	0.24	-10
8 Thick nasal discharge	24	0.53	18	0.40	25
9 Epistaxis	11	0.24	4	0.05	63.64
10 Loss of smell or taste	26	0.57	24	0.53	7.70
Total	296	6.57	265	5.88	10.48

The maximum improvement in the study group was seen in epistaxis and minimum in sneezing. Total relieve in nasal obstruction was seen in 77%, mentioned in detail in Table-3. Sino-nasal outcome test (SNOT-10) scoring (Study group). Table-3 shows the final SNOT-10 score of the study group having overall scores of each individual symptoms,

Fig: 1. Mean of total SNOT Scores

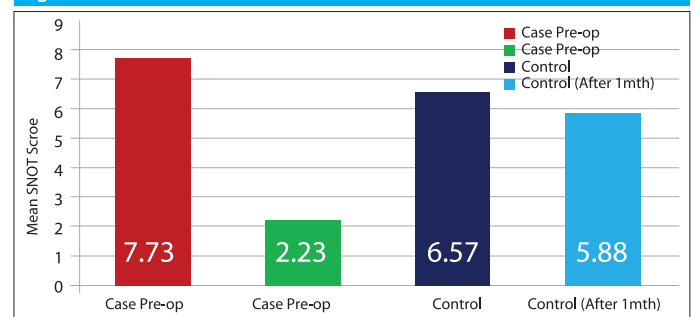
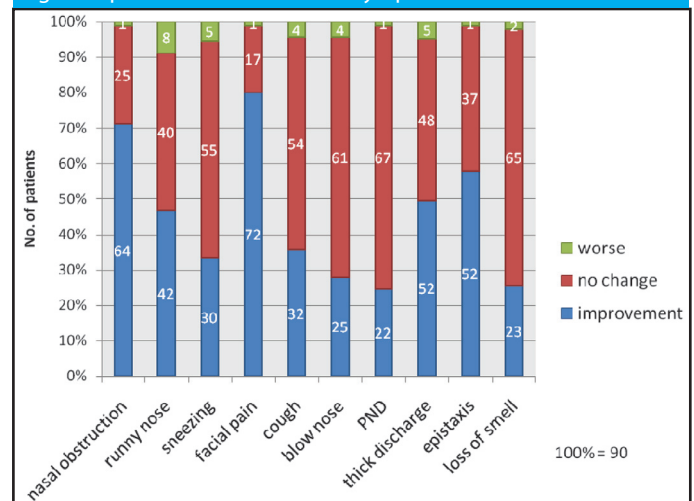


Fig: 2. Improvement in individual symptoms in cases



pre and post-operatively, their mean and overall improvement. Table 4 shows symptoms like runny nose, sneezing and PND has deteriorated after the one month of evaluation in the control group. Surprisingly, epistaxis has dramatic improvement of 63.64% as compared to overall improvement of 10.48%. From Fig: 1 and 2 we can know that how many patients have improvement of at least one grade, no change or worsening of an individual symptom of the SNOT-10 score in the study group. Table: 5 shows comparison of pre and post septoplasty SNOT scores in cases (n=90)

Table: 5. Comparison of pre and post septoplasty SNOT scores in cases (n=90)

	Mean score	S.D.	'Z' value	'p' value	Inference
Pre-op	7.67	3.2	13.92	P < 0.001	Significant
Post-op	2.3	81.69			

Table - 6 Comparison of symptom score pre and post one month in controls (n=45)

	Mean score	S.D.	'Z' value	'p' value	Inference
1st evaluation	6.5	2.36	1.34	P > 0.05	Not significant
After one month	5.8	2.6			

On applying the 'Z' test of mean in comparison of pre and post septoplasty total SNOT scores in cases, 'Z' value was 13.92. The 'p' value was less than 0.001 which is significant statistically (Table 5). It means, post operative improvement after septoplasty was drastic. At the same time, the same comparison after one month of first evaluation in control was not significant statistically because the 'p' value calculated to be more than 0.05 (Table 6).

DISCUSSION:

Studies on outcome after septoplasty are not new. Many authors have reported on this topic and the results have been consistent as patients have good results after septoplasty. However, many studies were retrospective.^{2,3} Some of those were also chart reviews, retrieving physician rated outcomes. Patient based outcomes were not assessed much in the past. Siegel et al⁴ used a validated sinusitis instrument after septoplasty and found improved scores but at the same time, he also used a global Quality of life instrument and found no changes after septoplasty. Although there are several useful validated instruments for use in rhinosinusitis, all are for patients with rhinitis and/or sinusitis. Their content is focused on rhinorrhea, facial pressure, cough, etc. but lacks many features of deviated nasal septum.^{5,6} The SNOT score was originally designed for rhinosinusitis. 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 to observe the outcome of the septoplasty surgery. SNOT-10 (Table 1) has been prepared after several modifications in the past and present scoring system. The validity and reliability of SNOT has been done in pilot studies by test-retest and internal validity measures. The overall improvement of SNOT score after septoplasty was 71.13% which is comparable with many of the studies. Mean overall NOSE scale improvement was 65.88% done by Stewart et al.⁷ Total NOSE score benefit of 70% after septoplasty was observed by Rhee et al.⁸ Probability of 50% reduction of nasal obstruction was 73% after 3 months according to Ho et al.⁹

The figure of 77 % improvement in nasal obstruction compares favourably with other studies such as 80% by Denholm et al¹⁰, 74% by Arunachalam et al¹¹, 70.5% by Samad et al¹², 82% by Newman et al¹³ and 75% by Buckland et al.¹ The improvement in facial pain and catarrh is better than other studies. Outcome result for symptoms other than nasal obstruction varies considerably from other studies. According to Arunachalam et al¹¹, improvement in facial pain was 72%, and catarrh was 64% of patients. Buckland et al,¹ says improvement of facial pain is 33% and Catarrh was 10% only. Significant improvement in nasal obstruction, catarrh & facial pain on linear

analogue score after 2 months of surgery, was observed by Sanderson et al.¹⁴ Significant improvement of total nasal score in obstruction, sore throat & smell, but not much in headache was seen by Kantadinis et al.¹⁵ In our study, improvement in other symptoms like, runny nose was 55%, sneezing 45%, facial pain 76%, cough 78%, epistaxis 80% and loss of smell 78%. These symptomatic improvements were comparable with other studies, but better than many of them. Our study concludes that septal surgery should be carried out for symptoms other than nasal obstruction also, in patients with deviated nasal septum.

Surgical treatment designed to eliminate mucosal contact pressure zones between the turbinate and septum can be effective in treating facial pain and headache. In our study, the total improvement was 76.6%. Sanderson and Rivron¹⁴ reported successful reduction of facial pain symptoms in a series of 60 patients undergoing septal surgery, although only 26 scored greater than 50 on a visual analogue scale from 0 to 100 pre-operatively. 90% had some degree of reduction in the symptom of facial pain. These patients had no plain X-ray evidence of sinus infection; however the authors did not report detailed rhinoscopic findings, and did not mention the incidence of mucosal contact pressure zones. Novak,¹⁶ operated on 299 patients with migraine, cluster and idiopathic headaches, using a standard technique of septal correction, middle turbinectomy and ethmoido-sphenoidectomy. He states that 78.8% of patients were cured completely and 11.3% improved.

A question remains on long-term follow-up. One study showed that the benefits of septal surgery had dropped considerably from 73% to 27% after 9 years¹⁷ whereas another study showed that benefit is maintained up to ten years.¹⁸ Ideally, the follow-up should be longer but high drop-out rate and difficulty in follow-up makes this harder to achieve. So in our study, the patients were followed up after one month only.

CONCLUSION:

There is significant symptomatic improvement seen after septoplasty, when the pre-operative and post-operative scores were compared using SNOT-10 score. The improvement in the study group, i.e. cases who underwent septoplasty, is statistically highly significant. However, the symptomatic improvement in the control group, is not found to be significant. The comparison of results of the study group and control was found to be highly statistically significant. The improvements of the symptoms are not only seen for nasal obstruction, but also for sneezing and watery discharge, which are regarded as the symptoms of the rhinitis. So there is controversial subjective improvement seen in many rhinitic symptoms after septoplasty as well. High patient satisfaction has been seen in the patients undergoing septoplasty. SNOT-10 is a reliable tool to evaluate the improvement in symptoms after Septoplasty.

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