Original Article

Outcome predictors post functional endoscopic sinus surgery: A prospective observational study

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Abstract

Objective: Functional endoscopic sinus surgery (FESS) is a common procedure used to treat recalcitrant chronic rhinosinusitis. We aimed to determine factors associated with favourable outcomes post sinus surgery. **Methods:** Forty patients diagnosed with medically refractive chronic rhinosinusitis were evaluated with preoperative CT scans of Paranasal sinuses, diagnostic nasal endoscopies and patient reported symptom scores using the SNOT-20 system. All patients underwent FESS and symptom outcomes were evaluated at 6 months postoperatively using the SNOT-20 scale. **Results:** Females comprised 21 out of the forty patients. 16 patients had chronic rhinosinusitis with polyposis. 11 patients had history of associated atopy. 91.6% of non atopic patients showed improvement in postoperative SNOT scores compared to 75% of atopic individuals. **Conclusion:** FESS improves quality of life postoperatively by decreasing SNOT scores. Atopy plays a major role in determining outcomes. Patients with limited sinonasal disease do better postoperatively as opposed to patients with pansinusitis and sinusitis associated with polyposis.

Keywords: FESS, Chronic Rhinosinusitis, Atopy, SNOT-20.

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INTRODUCTION

Chronic sinusitis is a common health condition for which people frequently visit general physicians or ENT specialists. The treatment modalities vary from maximal medical management to Endoscopic sinus surgeries. The response to treatment whatever the chosen modality of treatment is not uniform, with outcomes differing among patients. Numerous studies have been undertaken to predict outcomes among surgically treated subsect of patients. Studies have been done to characterize chronic rhinosinusitis based on symptom scores, computed tomography scores, diagnostic nasal endoscopy findings and preoperative pathology based on the presence or absence of associated nasal polyposis. The severity of chronic rhinosinusitis has been graded by multiple questionnaire based evaluation systems. SNOT 20, rhinosinusitis quality of life questionnaire, rhinosinusitis disability index and chronic sinusitis survey are some of the most common clinical evaluation scores used. The Lund-Mackay system is a widely accepted system for radiological evaluation of chronic rhinosinusitis[1]. The aim of this study is to verify if there are any factors associated with favourable outcomes post Functional endoscopic sinus surgery.

MATERIAL AND METHODS

This is a prospective observational study of forty patients diagnosed with chronic rhinosinusitis and who have been diagnosed as refractory to medical management. Patients were labelled refractory when their symptoms persisted after maximal medical therapy for a period of 6 weeks. All patients underwent diagnostic nasal endoscopy pre-operatively followed by CT Paranasal sinuses which was graded using the Lund-Mackay system. Symptom scores were evaluated using the SNOT 20 questionnaire. The diagnostic nasal endoscopy was scored using the Lund-Mackay endoscopy staging system. All patients underwent FESS surgery and their postoperative symptom scores recorded after 6 months. All patients

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were started on post-operative nasal steroid sprays at the 3rd postoperative week for a total period of 3 months.

Inclusion Criteria

Patients diagnosed with chronic rhinosinusitis. Chronic rhinosinusitis with sinonasal polyposis

Exclusion Criteria

Prior nasal surgeries. Sinonasal tumours. Acute sinusitis. Paediatric sinusitis. Granulomatous diseases'. Chronic smokers

Table 1: Lund-Mackay Radiological grading for CT-PNS[1]

Sr. No	Sinus System	Right	Left
1	Maxillary	0,1,2	0,1,2
2	Anterior Ethmoidal	0,1,2	0,1,2
3	Posterior Ethmoidal	0,1,2	0,1,2
4	Sphenoidal	0,1,2	0,1,2
5	Frontal	0,1,2	0,1,2
6	OMC	0,2	0,2
	Total	**0-12**	**0-12**

0- Clear, 1- Partial opacification, 2- Total opacification

RESULTS

In our series of 40 patients with chronic rhinosinusitis, the minimum age of the patient was 17 years and the maximum was 62years with mean of 35.60 ± 13.38 years. 19 patients were male and 21 patients were female with no sexual predominance observed. 16 of the 40 patients had chronic sinusitis with nasal polyps and 24 patients had chronic sinusitis without polyps with an average of 40% and 60% respectively. 11 patients of the 40 patients had an history of associated atopy. 5 patients had bilateral pansinusitis on CT PNS whereas only 1 patient had unilateral pansinusitis. In atopic individuals with lower preoperative SNOT scores show no significant postoperative SNOT score improvements. Non atopic individuals with low preoperative SNOT scores demonstrated no significant reductions of scores post FESS. The largest group of patients had SNOT scores between 20-40 implying mild to slight problem. These patients also demonstrated the greatest reduction in postoperative SNOT scores. Though both atopic and non-atopic individuals in mild to slight category showed significant reduction in postoperative scores, a greater percentage (91.66%) of non-atopic individuals showed improvement when compared to atopic individuals (75%). According to chi-square test the comparison of preoperative and postoperative SNOT scores of atopic individuals did not show a statistically significant improvement (p = .153). Non atopic individuals however showed a statistically significant improvement (p = .001). Preoperative CT PNS revealed a greater percentage of patients with limited sinonasal disease (85%) as opposed to pansinusitis (15%). Higher SNOT scores preoperatively were seen in patients with pansinusitis whereas lower SNOT scores (<40) formed a major percentage (79.4%) of scans demonstrating limited disease. Patients of Chronic rhinosinusitis with polyps had higher preoperative SNOT scores as opposed to patients with chronic rhinosinusitis. Patients with nasal polyposis demonstrated a reduction in post-operative SNOT scores though not as significant a fall as compared to chronic rhinosinusitis withoutpolyps patients. It is our observation that in chronic rhinosinusitis patients, refractory to medical management Endoscopic sinus surgery improves the quality of life by decreasing postoperative SNOT scores. Atopy plays a major role in determining outcomes as atopic individuals don't show significant improvement post FESS. Patients with limited disease on CT PNS do better postoperatively as opposed to patients with pansinusitis.

Table 1: Pre-op SNOT* Post-op SNOT* Atopy Crosstabulation

Atopy				Post-op SNOT			Total
				Very mild problem	Mild to slight problem	Moderate problem	
Yes	Pre-op SNOT	Very mind problem	Count % of Total	3 27.3%	0. 0%	0.0%	3 27.3%
		Mild to slight problem	Count % of Total	3 27.3%	1 9.1%	0.0%	4 36.4%
		Moderate Problem	Count % of Total	0 .0%	2 18.2%	19.1%	3 27.3%
		Severe Problem	Count % of Total	0 .0%	1 9.1%	0.0%	1 9.1%
	Total		Count % of Total	6 54. 5%	4 36. 4%	19. 1%	11 100. 0%
No	Pre-op SNOT	Very mind problem	Count % of Total	12 41. 4%	0 . 0%	0. 0%	12 41. 4%
		Mild to slight problem	Count % of Total	11 37. 9%	1 3. 4%	0 . 0%	12 41. 4%
		Moderate Problem	Count % of Total	1 3. 4%	2 6. 9%	2 6. 9%	5 17. 2%
	Total		Count % of Total	24 82.8%	3 10. 3%	2 6. 9%	29 100. 0%

Table 2: Chi-square Tests

Atopy		Value	df	Asymp. Sig. (2-sided)
Yes	Pearson chi-square	9.369[a]	6	.153
	Likelihood Ratio	11.844	6	.066
	Linear-by-Linear Association	5.290	1	.021
	N of valid Cases	11		
No	Pearson Chi-square	18.065[b]	4	.001
	Likelihood Ratio	15.959	4	.003
	Linear-by-Linear Association	11.615	1	.001
	N of valid Cases	29		

a. 12 cell (100.0%) have expected count less than 5. The minimum expected count is 0.09
b. 7 cell (77.8%) have expected count less than 5. The minimum expected count is 34

Table 3

Pan sinusitis(U/B)				Post-op SNOT			Total
				Very mild problem	Mild to slight problem	Moderate problem	
Unilateral	Pre-op SNOT	Mild to slight problem	Count % of Total	1 100.0%	0. 0%	0. 0%	1 100.0%
	Total		Count % of Total	1 100.0%	0. 0%	0 .0%	1 100.0%
Bilateral	Pre-op SNOT	Very mind problem	Count % of Total	2 40.0%	0. 0%	0. 0%	2 40.0%
		Mild to slight problem	Count % of Total	1 20.0%	1 9.1%	0 .0%	1 20.0%
		Moderate Problem	Count % of Total	0 .0%	2 40. 0%	0 .0%	2 40. 0%
	Total		Count % of Total	3 60. 0%	2 40. 0%	0 .0%	5 100. 0%
None	Pre-op SNOT	Very mind problem	Count % of Total	13 38. 2%	0 . 0%	0 . 0%	13 38. 2%
		Mild to slight problem	Count % of Total	12 35. 3%	2 5.9%	0 . 0%	14 41. 2%
		Moderate Problem	Count % of Total	1 2. 9%	2 5. 9%	3 8. 8%	6 17.6%
		Severe Problem	Count % of Total	0 . 0%	1 2.9%	0 . 0%	1 2.9%
	Total		Count % of Total	26 76. 5%	5 14. 7%	3 8.8%	34 100. 0%

Table 4: Chi-square Tests

Pan sinusitis(U/B)		Value	df	Asymp. Sig. (2-sided)
Unilateral	Pearson chi-square N of valid Cases	1[a]		
Bilateral	Pearson Chi-square	5.000[b]	2	.082
	Likelihood Ratio	6.730	2	0.35
	Linear-by-Linear Association	3.333	1	.68
	N of valid Cases	5	4	
None	Pearson Chi-square	26.945[c]	6	.000
	Likelihood Ratio	24.065	6	.001
	Linear-by-Linear Association	14.883	1	.000
	N of valid Cases	34		

a. No statistics are computed because Pre-op SNOT and post-op SNOT are constant
b. 6 cells (100.0%) have expected count less than 5. The minimum expected count is 40.
c. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .09

Table 5

Pan sinusitis(U/B)				Post-op SNOT			Total
				Very mild problem	Mild to slight problem	Moderate problem	
Unilateral	Pre-op SNOT	Very mind problem	Count % of Total	4 33.3%	0. 0%	0. 0%	4 33.3%
		Mild to slight problem	Count % of Total	6 50.0%	1 8.3%	0 .0%	7 58.3%
		Moderate Problem	Count % of Total	1 8.3%	0 0.0%	0 .0%	1 8.3%
	Total		Count % of Total	11 91.7%	1 8.3%	0 .0%	12 100.0%
Bilateral	Pre-op SNOT	Very mind problem	Count % of Total	9 40.9%	0. 0%	0. 0%	9 40.9%
		Mild to slight problem	Count % of Total	6 27.3%	1 4.5%	0 .0%	7 31.8%
		Moderate Problem	Count % of Total	0 . 0%	2 9. 1%	3 13.%	5 22.7%
		Severe Problem	Count % of Total	0 . 0%	1 4. 5%	0 .0%	1 4. 5%

	Total		Count % of Total	15 68. 2%	0 18.2%	3 13.6%	22 100. 0%
None	Pre-op SNOT	Very mind problem	Count % of Total	2 33.3%	0 .0%	0 . 0%	2 33.3%
		Mild to slight problem	Count % of Total	2 33.3%	0 .0%	0 . 0%	2 33.3%
		Moderate Problem	Count % of Total	0 .0%	2 33.3%	0 . 0%	2 33.3%
	Total		Count % of Total	4 66.7%	2 33.3%	0 . 0%	6 100. 0%

Table 6: Chi-square Tests

Pan sinusitis(U/B)		Value	Df	Asymp. Sig. (2-sided)
Unilateral	Pearson Chi-square	.779[a]	2	.677
	Likelihood Ratio	1.142	2	. 565
	Linear-by-Linear Association	.176	1	.674
	N of valid Cases	12		
Bilateral	Pearson Chi-square	22.629[b]	6	.001
	Likelihood Ratio	24.611	6	.000
	Linear-by-Linear Association	12.245	1	.000
	N of valid Cases	22		
None	Pearson Chi-square	6.000[c]	2	0. 50
	Likelihood Ratio	7.638	2	0.22
	Linear-by-Linear Association	3.750	1	0.53
	N of valid Cases	6		

a. 5 cells (83.3%) have excepted count less than 5. The minimum excepted count is 0.8
b. 11 cells (91.7%) have excepted count less than 5. The minimum excepted count is 14
c. 6 cells (100.0%) have excepted count less than 5. The minimum excepted count is 67

DISCUSSION

The major challenge in treating recalcitrant chronic rhinosinusitis remains achieving a fine balance between tangible surgical outcomes and patient expectations post-surgery. To this effect a knowledge of favourable factors to achieve good subjective outcomes remains rather elusive. Numerous studies have been published studying preoperative endoscopy scores, computed tomography scores and histopathological types with outcomes. Many of these studies lack adequate randomization coupled with lack of long term follow up. Kennedy et al[3] in their study on prognostic factors in ethmoid sinus surgery in 120 patients noted that there was a strong correlation only between disease severity and surgical outcome. We do concur with this observation as in our study patients with nasal polyposis and pansinusitis do have less favourable outcomes post FESS. Noon and Hopkins[4] in their review article on outcomes in Endoscopic sinus surgery have concluded that there has been a shift in measuring outcomes from objective measures to patient reported outcomes. Bradley et al[5] in their study demonstrated that preoperative CT scans neither correlated with preoperative symptom scores nor with the improvement shown post endoscopic sinus surgery. Bhattacharyya[6] examined the relationship between severity of histopathological inflammation in rhinosinusitis without polyps and surgical outcomes and found no significant correlation. Rudmik L et al[7] in a study group of smokers undergoing endoscopic sinus surgery demonstrated no difference in quality of life post-surgery between light smokers and heavy smokers though postoperative endoscopy scores were significantly worse in heavy smokers. Our study excluded smokers to eliminate this confounding factor. Schlosser RJ et al[8] compared postoperative endoscopy scores with outcomes and demonstrated that outcomes matched endoscopy scores in patients with polyposis. Conversely outcomes did not match endoscopy scores in chronic rhinosinusitis without polyposis. Our study has a limitation of a short follow up period of 6 monthspost-surgery. It remains to be seen if the significant improvements in SNOT scores achieved are sustainable over a longer period of follow up. Our study also demonstrates that the extent of disease on CT scans correlates with postoperative outcomes.

CONCLUSION

Endoscopic sinus surgery does improve patient reported outcomes post-surgery, though outcomes vary among individuals. It is our contention that history of atopy and presence of nasal polyposis are not associated with as favourable outcomes as individuals without atopy. Patients without polyposis and limited disease on computed tomography also have a more favourable outcome post-surgery.

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