



“A CLINICAL STUDY ON COMPREHENSIVE MANAGEMENT OF CHRONIC ALLERGIC RHINOSINUSITIS AND ITS EFFECT ON QUALITY OF LIFE.”

ENT

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ABSTRACT

Introduction Functional Endoscopic Sinus Surgery (FESS) has been used for the treatment of Chronic Rhinosinusitis (CRS). It results in improved quality of life in 85% CRS patients. Most recently, Sino Nasal Outcome Test (SNOT-22) questionnaire, developed for the assessment of changes in symptoms and extent of post-operative improvement and quality of life amongst CRS patients. This study was undertaken to evaluate efficacy of surgical management in CRS patients using SNOT-22 questionnaire. **Material & methods** This prospective, observational study included 55 patients aged 18-50 years with diagnosed to have CRS and who were undergoing FESS for the treatment of CRS. Assessment of severity of symptoms was done using VAS for assessment of severity of nasal symptoms, 4-point scale symptom/severity score and SNOT-22 for assessment of quality of life at pre-operative visit and at 1st month, 2nd month and 3rd month post-operatively. **Results** The mean age of the subjects was 26.8±8.163 years with male: female ratio of 23:32. Nasal discharge as the most common presenting complaint (92.7%) [Figure 1] with predominantly watery (40.0%) or mucoid (38.2%) discharge. Deviated nasal septum, inferior turbinate hypertrophy, middle turbinate hypertrophy was seen in 83.6%, 41.0% and 24.0% patients respectively. A significant reduction in SNOT-22 score was observed after the FESS [48.0 (37.0-56.0) pre-operatively vs 10.0 (8.0-14.0) at 3 months] (p value <.05). Post-operative CT score [0.0 (0.0-2.0)] was significantly less than the pre-operative Lund Mackay CT score [4.0 (4.0-10.0)] (p value <.05). FESS also resulted in significant reduction in symptom severity scores. **Conclusion** FESS is effective in relieving symptoms of patients with CRS. FESS results in significant improvement in SNOT-22 score, Symptom severity score, LMCT score, DNE score and VAS can be observed in patients with CRS at 1-month, 2-month and 3-month follow up.

KEYWORDS

Chronic rhinosinusitis, SNOT-22, quality of life, Functional endoscopic sinus surgery.

INTRODUCTION

Chronic rhinosinusitis (CRS) is a very common otorhinolaryngologic disease affecting 30% of population⁽¹⁾ which usually results from untimely treatment or improper treatment or incomplete treatment of acute sinusitis⁽²⁾. This chronic inflammatory disease mainly affecting the nasal and sinus mucosa for a duration of more than 12 weeks.⁽³⁾

It is a multifactorial disease and has complex pathogenesis involving enhanced proinflammatory potential, reduced immune function and tissue remodelling^(2,3). Immunologic responses to viral, bacterial, and fungal infection along with the formation of biofilm are considered responsible for CRS⁽³⁾. Allergies, anatomic variations in the nasal cavity, anatomic variations in the paranasal sinuses (paradoxical turbinate, concha bullosa), congenital disorders such as cystic fibrosis, immotile cilia syndrome, some neoplasms and exposure to tobacco predisposes an individual to the development of CRS.⁽³⁾

CRS manifests as symptoms such as nasal congestion, mucoid or purulent discharge from nose, post nasal discharge, decreased olfactory sensation, facial pain, and head pain^(2,3). It poses great impact on quality of life^(1,4). Individuals with CRS have reported significantly reduced disease-specific quality of life and generic quality of life⁽⁵⁾. Almost 94% of all patients have restricted quality of life.⁽⁶⁾ The major factor contributing to negative quality of life otologic/facial pain⁽⁷⁾. The management of CRS can be done conservatively or using surgical

approach. These days, a minimally invasive technique viz. Functional Endoscopic Sinus Surgery (FESS) is being widely used. It involves removal of the patient's lesion site and along with the expansion of the nasal sinus opening⁽²⁾. It results in improved quality of life in 85% CRS patients⁽⁶⁾. Although surgery has limitation that it cannot provide complete control of inflammation and cannot enhance immune function when used alone. Therefore, it is combined with auxiliary methods such as drug treatment including antibiotics, glucocorticoids, and immunomodulators⁽²⁾.

Most recently, Sino Nasal Outcome Test (SNOT-22) questionnaire, developed for the assessment of changes in symptoms and extent of post-operative improvement and quality of life⁽¹⁾ has been considered to be the most appropriate, easy-to-use instrument to assess CRS with ease of clinical interpretation⁽⁸⁾. Therefore, in this study evaluation of efficacy of surgical management in CRS patients using SNOT-22 questionnaire has been done.

METHODS:

Time Of Study: Prospective Study

Sample: 55 Patients

Duration And Place Of Study :

The study was done from April 2021 to June 2021 in the Department of ENT, Tertiary care centre in Central India.

Inclusion Criteria

- Patients aged 18-50 years.
- Patients willing to participate in the study.
- Patients of CRS refractory to conservative management.

Exclusion criteria

- Pregnant women.
- Lactating mother.
- Patients with respiratory symptoms due to other proven illness.

This prospective, observational study was conducted in the Department of Otolaryngology and Head and Neck Surgery, Mahatma Gandhi Memorial Medical College and MY hospital, Indore, India after obtaining approval from the institutional ethics committee. The study included 55 subjects aged 18-50 years diagnosed to have CRS and who were undergoing FESS for the treatment of CRS. Study was conducted over a period of (from July 2021 to July 2022). Subjects with CRS refractory to conservative management were treated with FESS. Pregnant women, lactating mothers and patients with respiratory symptoms due to other proven illness were excluded from the study. Enrolment of subjects in the study was done using convenience sampling technique.

Methodology

A detailed history of the patient including age, gender, presenting complaints and symptoms.

Detailed clinical examination of the ear, nose and throat was conducted.

Anterior rhinoscopy was performed in all the patients and posterior rhinoscopy was performed in selected patients. Indirect laryngoscopy and diagnostic nasal endoscopy were done.

Nasal endoscopy was performed on each patient with a 4 mm 0° nasal endoscope under local anaesthesia employing standard three pass technique. Lund Kennedy Endoscopic Scoring system was used to score the endoscopic details⁽⁹⁾

Assessment of severity of symptoms was done using VAS for assessment of severity of nasal symptoms,⁽¹⁰⁾ 4-point scale symptom/severity score,⁽¹¹⁾ and SNOT-22 for assessment of quality of life at pre-operative visit and at 1st month, 2nd month and 3rd month post-operatively⁽¹²⁾. Clinical and Computed tomography was also performed. CT scan paranasal sinuses: A coronal section was done in practically all cases who underwent this investigation whereas a select few had to undertake axial sections in addition as well.

Radiological examination was done and paranasal sinus CT images were scored according to the Lund-Mackay system at pre-operative visit and at 3-month follow up.

Statistical analysis plan-

Data were analysed using SPSS (Statistical Package for Social Sciences) 21.0 version, IBM, Chicago. Descriptive statistics was performed, data was described as number (percentage) and median (inter-quartile range). Comparison of continuous variables between pre-operative and post-operative visits was done using Friedman test followed by post hoc analysis. Correlation between continuous variables was analysed using Spearman's correlation coefficient. P value < .05 was considered statistically significant.

RESULTS

This study included 55 patients with the mean age of 26.8±8.163 years with male:female ratio of 23:32. Our study found nasal discharge as the most common presenting complaint (92.7%) [Figure 1] with predominantly watery (40.0%) or mucoid (38.2%) discharge, 7 (12.7%) patients expressed mucopurulent discharge whereas 5 (9.1%) exhibited no discharge. Nasal endoscopic examination revealed slightly different findings compared to clinical examination. Deviated nasal septum was a common observation (83.6%), inferior turbinate hypertrophy was a frequent finding compared to middle turbinate hypertrophy (41.0% vs 24.0%) and polyps were non-existent in most of the patients (69.1%). [Table 1] CT discovered mucosal changes in frontal sinus, maxillary sinus, anterior ethmoidal sinus, posterior ethmoidal sinus, sphenoid sinus and osteomeatal complex in 11 (20.0%), 48 (87.3%), 29 (52.7%), 12 (21.8%), 9 (16.4%) and 15 (27.3%) patients respectively.

All the patients were treated with comprehensive approach involving conservative management followed by surgical management (FESS). Uncinectomy and middle meatus antrostomy was performed in all the patients in the present study (100.0%). [Table 2]

The assessment of quality of life before and after FESS using SNOT-22 questionnaire showed significant improvement in quality of life of the patients. The SNOT-22 score was significantly greater pre-operatively [48.0 (37.0-56.0)] as compared to post-operatively [10.0 (8.0-14.0) at 3 months] (p value < .05). [Table 3] Pair-wise comparison on post hoc analysis revealed that the at each post-operative visit SNOT-22 score was significantly less compared to the pre-operative score (p value < .05). It was also found that there was significant gradual improvement in patients' symptoms and quality of life till 3rd month (p value < .05). After 2nd month further reduction in SNOT-22 score was observed however, this reduction was non-significant compared to previous score (p value > .05). Post-operative improvement experienced by the patients was evident from the significant changes in VAS score and symptom score and was in accordance with the changes in nasal endoscopy score and LMCT score. [Table 3]. There was significant gradual improvement in VAS score till 3rd month (p value < .05). Similar to SNOT-22 score, significant reduction in symptom score, nasal endoscopy score was observed till 2nd month (p value < .05). After 2nd month further reduction in symptom score and nasal endoscopy score was observed, however, this reduction was non-significant compared to previous score (p value > .05). The post-operative CT score [0.0 (0.0-2.0)] was significantly less than the pre-operative CT score [4.0 (4.0-10.0)] (p value < .05). There was a statistically significant weak correlation between symptom severity score and CT score (p value < .05). There was a statistically non-significant weak correlation between symptom severity score and DNE score (p value > .05).

DISCUSSION

Comprehensive management of CRS include both the conservative and surgical management. Surgical intervention for the treatment of CRS includes the removal of the patient's lesion site along with the expansion of the nasal sinus opening with Functional Endoscopic Sinus Surgery (FESS)⁽²⁾. Utilizing surgical treatment and endoscopic instrumentation, can help in managing CRS with minimal morbidity⁽¹³⁾. FESS allows restoring ventilation and mucociliary clearance⁽¹⁾. It has been found to improve quality of life in 85% CRS patients⁽⁶⁾. Therefore in the present study efficacy of surgical management in CRS patients using SNOT-22 questionnaire was done. In the present study, number of female patients was more than the number of male patients (58.2% vs 41.8%). **Laababsi R et al. (2019)** also reported female preponderance.⁽¹⁾

The most common clinical feature seen in patients with CRS has been reported to be nasal obstruction (seen in 81–95% of patients)⁽¹⁴⁾. In the present study also the most common clinical feature noticed was nasal obstruction (92.7%). Presenting complaints arranged in decreasing order of occurrence: Nasal Discharge (92.7%) > Nasal Obstruction (85.5%) > Headache (72.7%) > Sneezing (54.5%) > Post nasal drip (50.9%) > Disturbed Olfaction (47.3%) > Pressure/pain in eyes (30.9%) > Pressure/pain in ears (29.1%) > Cough (29.1%) > Epistaxis (14.5%). Similar to our findings, **Bunzen DL et al. (2006)** had also reported nasal obstruction (83.3%), cacosmia/halitosis (80%), hyposmia/anosmia (63.15%), headache (62%) as common clinical features amongst patients with CRS⁽¹⁵⁾. **Bakhshae M et al. (2014)** also reported the similar findings with nasal obstruction to be the commonest finding⁽³⁾. On assessing the type of nasal discharge, in the present study, majority of the patients were found to have watery discharge (40.0%) and mucoid discharge (38.2%), mucopurulent discharge was seen in 12.7% and no discharge was seen in 9.1% patients. Mucopurulent discharge signifies bacterial infection of sinus⁽¹⁶⁾. Watery nasal discharge usually represents viral infection of sinus⁽¹⁷⁾.

Deviated nasal septum hinders the normal physiological function of the nose⁽¹⁸⁾. DNS is an important contributing factor in the development of CRS⁽¹⁹⁾. Conforming to this fact, in the present study, deviation of nasal septum was found in 89.1% patients on clinical examination and in 83.6% on nasal endoscopy. Previous studies have also reported high prevalence of DNS amongst CRS patients⁽²⁰⁾. We found hypertrophy of inferior turbinate in 67.3% patients. Most of the patients had bilateral hypertrophy of inferior turbinate (56.4%), middle turbinate was found to be affected in 43.6% patients. Similar were the findings of **Pullar**

AN et al. (2018), they reported presence of hypertrophied inferior turbinate in 40.0% patients and hypertrophied middle turbinate in 14.0% patients⁽²⁰⁾. Nasal polyps resulting from chronic inflammation are commonly seen in patients with CRS⁽²¹⁾. In this study, nasal polyps were found in 32.7% patients on nasal endoscopy. In agreement to this study, **Bhattacharya N et al. (2019)** in their study mentioned that in US population nasal polyps were found to be present in 25-30% patients with CRS⁽²²⁾. Other studies have reported a prevalence of polyps in up to 70% of the patients with CRS.⁽⁵⁾

In the present study resection of middle turbinate was done in 43.6% patients. **Scangas GA et al. (2019)** reported significant improvement in QOL of patients with CRS after bilateral turbinate resection⁽²³⁾. However, **Soudry E et al. (2019)** find no significant difference in quality of life of patients treated with BTR (Bilateral inferior turbinate resection) and ESS (Endoscopic sinus surgery) compared to ESS alone. But their study had a limitation of very small sample size of patients undergoing BTR and ESS and so there was a chance of bias in results⁽²⁴⁾. Uncinectomy i.e., resection of uncinate process is an essential step in performing FESS⁽²⁵⁾. Therefore, Uncinectomy was performed in all the patients in the present study (100.0%). Ethmoidectomy was performed in 74.5% patients, Polypectomy in 30.1% patients, Sphenoidectomy in 16.4% patients and Middle meatus antrostomy in 100.0% patients.

On comparing the SNOT-22 score, a significant reduction in score was observed post-operatively compared to pre-operative scores [48.0 (37.0-56.0) vs 10.0 (8.0-14.0) at 6th month]. Similar to our findings, **Gheriani H et al. (2006)** had reported good outcomes in all patients CRS patients after FESS irrespective of the severity of the disease found in pre-operative CT.⁽²⁶⁾ **Kurien R et al. (2018)** reported significant improvement in SNOT-22 score after FESS in both; CRS patients with and without polyp,⁽²⁷⁾ and **Laababsi R et al. (2019)** reported significant improvement in the scores of pre and postoperative SNOT-22 in Unilateral CRSs Nasal Polyp group [37.13±9.307 (IQR=14) versus 14.11±8.531 (IQR=7)] and also in Bilateral CRSs Nasal Polyp group [41.76±6.949 (IQR=10) versus 18.57±8.495 (IQR=16)] **Bharath M et al. (2018)** employed SNOT-20 questionnaire for the assessment of symptoms at 1 week, 2 weeks, 1 month, 3 months, and 6 months. They reported a significant difference in overall SNOT-20 score as well as improvement in symptoms at the end of 6 months⁽²⁸⁾.

In the present study, not only SNOT-22 score revealed good outcomes, but also VAS score revealed the same. The pre-operative VAS score was significantly greater than post-operative VAS score (p value <.05) [4.0 (4.0-5.0) vs 1.0 (0.0-1.0) at 3rd month]. It was also found that there was significant gradual improvement in VAS score till 6th month (p value <.05). **Pyakurel PA et al. (2010)** also reported a significant reduction in VAS symptom score after the FESS procedure [5.7 (pre-operatively) vs 2.23 (post-operatively)]⁽²⁹⁾. Present study showed significant improvement in Nasal endoscopy score and symptom score after FESS [pre-operative symptom score: 5.0 (4.0-6.0) vs post-operative symptom score at 6th month 0.0 (0.0-1.0)] (p value <.05). Similar to our study **Bunzen DL et al. (2006)**, **Basillo FMA et al. (2010)**, **Chakravarti A et al. (2011)** also reported significant improvement in symptoms of CRS patients after FESS^(30,31,32). Due financial restraints, CT evaluation was done twice and not at each follow up visits in this study.

The results showed that the post-operative CT score was significantly less than the pre-operative CT score [4.0 (4.0-10.0) vs 0.0 (0.0-2.0)] (p value <.05). **Chakravarti A et al. (2011)** in their study reported good outcomes in patients with CRS after FESS irrespective of their CT score.⁽³²⁾ Our results were in agreement to the findings of the study done by **Laababsi R et al. (2019)**. They reported significant improvement in CT score of CRS patients after FESS.⁽³⁾

This study had found statistically significant weak correlation between LMCT score and symptom severity. The correlation between DNE score and Symptom severity score was found to be weak and statistically non-significant. In agreement to our findings, **Chakravarti A et al. (2011)** also reported poor correlation between CT score and clinical features.⁽²⁹⁾

Findings of the present study indicated towards the effectiveness of FESS in relieving symptoms of CRS and in improving quality of life patients with CRS.

Limitation of present study

Present study was a hospital-based study and thus results of the study cannot be generalized.

CONCLUSION

The most prevalent clinical signs and symptoms amongst patients with CRS include Nasal Discharge (92.7%), Nasal Obstruction (85.5%), Headache (72.7%), Sneezing (54.5%), Paroxysmal Nocturnal Dyspnea (50.9%), Disturbed Olfaction (47.3%), Pressure/pain in eyes (30.9%), Pressure/pain in ears (29.1%), Cough (29.1%), Epistaxis (14.5%).

FESS is effective in relieving symptoms of patients with CRS. After FESS a statistically significant improvement in SNOT-22 score, Symptom severity score, LMCT score, DNE score and VAS can be observed in patients with CRS at 1 month, 2 month and 3 month.

There is significantly weak correlation between LMCT score and symptom severity. There no significant correlation between DNE score and symptom severity.

Conflict of interest None

Funding and resource No external source of funding

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Table 1. Distribution of study subjects (N= 55) according to clinical and nasal endoscopy findings.

		Clinical examination		Nasal endoscopy	
		Number	Percentage	Number	Percentage
Deviated Nasal Septum	Present	49	89.1	46	83.6
	Not present	6	10.9	9	16.4
Inferior turbinate hypertrophy	Right	1	1.8	1	1.8
	Left	5	9.1	5	9.1
	Bilateral	35	63.6	31	56.4
	Not present	14	25.5	18	32.7
Middle turbinate hypertrophy	Right	7	12.7	7	12.7
	Left	4	7.3	4	7.3
	Bilateral	13	23.6	13	23.6
	Not present	31	56.4	31	56.4
Polyps	Right	2	3.6	2	3.6
	Left	5	9.1	4	7.3
	Bilateral	6	10.9	11	20.0
	Not present	42	76.4	38	69.1

Table 2. Distribution of study subjects (N=55) based on procedure performed during FESS.

Procedure performed		Number	Percentage
Uncinectomy		55	100.0%
Ethmoidectomy		41	74.5%
Polypectomy		17	30.1%
Sphenoidectomy		9	16.4%
Middle meatus antrostomy		55	100.0%
Concurrent procedure	Septoplasty	46 (Out of 46 patients with DNS)	100.0%
	Middle turbinate resection	24 (Out of 24 patients with middle turbinate hypertrophy)	100.0%
	Inferior turbinate diathermy	19 (Out of 37 patients with inferior turbinate hypertrophy)	51.5%

FESS- Functional Endoscopic Sinus Surgery; DNS- Deviated Nasal Septum;

Table 3. Comparison of SNOT-22 score, VAS score, symptom score before and after the treatment.

Scoring criteria	Median (Inter-quartile range)				P value ^Ω
	Pre-operative	At 1st month	At 2nd month	At 3rd month	
SNOT-22 score	48.0 (37.0-56.0)	21.0 (16.0-26.0)	13.0 (10.0-17.0)	10.0 (8.0-14.0)	.001*

VAS score	4.0 (4.0-5.0)	2.0 (1.0-2.0)	1.0 (1.0-2.0)	1.0 (0.0-1.0)	.001*
Symptom score	5.0 (4.0-6.0)	1.0 (1.0-2.0)	1.0 (0.0-1.0)	0.0 (0.0-1.0)	.001*
Nasal endoscopy score	4.0 (4.0-6.0)	1.0 (0.0-2.0)	0.0 (0.0-1.0)	0.0 (0.0-1.0)	.001*
LMCT score	4.0 (4.0-10.0)	Not recorded	Not recorded	0.0 (0.0-2.0)	.001*

^aFriedman test. *p value<.05 was considered statistically significant. SNOT-Sino Nasal Outcome Test; VAS- Visual Analogue Scale; LMCT- Lund Mackay Computed Tomography

Table 4. Correlation between symptom severity score and CT score and DNE score.

(N=55)	Spearman's correlation coefficient	P value
Symptom severity score & LMCT score	.306	.023*
Symptom severity score & DNE score	.191	162

*p value<.05 was considered statistically significant. LMCT- Lund Mackay Computed Tomography; DNE- Nasal endoscopy score

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