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Original Research Article

Outcomes of functional endoscopic sinus surgery with and without partial middle turbinate resection in chronic rhinosinusitis: A comparative study

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Abstract

Background: Chronic rhinosinusitis (CRS) is a prevalent inflammatory condition often requiring functional endoscopic sinus surgery (FESS) when medical management fails. The role of the partial middle turbinate resection in functional endoscopic sinus surgery is controversial. This study compares outcomes of FESS with and without partial middle
turbinectomy in CRS patients.

Materials and Methods: A prospective comparative study was conducted in the Department of ENT, Rajiv Gandhi Institute of Medical Sciences (RIMS), Adilabad, Telangana, India from January 2023 and July 2024 for 18 months. The analysis of data was done on 100 patients diagnosed with chronic rhinosinusitis for 3 months and were randomized into two groups: Group A (FESS with partial middle turbinectomy, n=50) and Group B (FESS without partial middle turbinectomy n=50). Outcomes were assessed using Lund-MacKay endoscopic scores and clinical symptoms at 1st week, 6th weeks, and 3rd months post-operatively.

Results: The most common age group affected was 31 to 40 years, and the male patients outnumbered the female patients. The nasal discharge was found to be the most common symptom encountered by the patients in the study (92% in group A, 88% in group B). The study showed that the patients in Group A had significantly improved the various parameters of the Lund MacKay score parameters, such as oedema, discharge, scarring, synechiae and crusting in the 6th week and 3rd month post-operative period than Group B.

Conclusion: Partial middle turbinate resection during FESS enhances postoperative outcomes in CRS, reducing complications and symptoms. The study also recommends further studies with a large sample size to confirm the findings.

Keywords: Chronic rhinosinusitis, Functional endoscopic sinus surgery, Partial middle turbinectomy, Lund-mackay score, Nasal discharge.

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1. Introduction

Chronic rhinosinusitis (CRS) is a multifactorial inflammatory condition of the nasal and sinus mucosa persisting for ≥12 weeks[1], affecting 5–12% of the global population.[2] In India, approximately one in eight individuals (134 million) are affected.[3] It usually presents as chronic rhinosinusitis without nasal polyposis or Chronic rhinosinusitis with nasal polyposis and allergic fungal rhinosinusitis. Recurrent sinusitis is when the patient had episodes of sinusitis for more than four episodes per year. CRS presents with nasal discharge, obstruction, facial pain, and olfactory disturbance, driven by factors including infection, allergy, and structural abnormalities.[4] The American Academy of Otolaryngology defines CRS by ≥2 cardinal symptoms (nasal obstruction, discharge, facial pain/pressure, hyposmia/anosmia) for ≥12 weeks, confirmed by endoscopy or imaging.[5] The primary pathophysiology involved in the disease's causation was found to be an obstruction to the nasal passage, which obstructs the drainage of the sinuses. Also, it reduces the oxygen tension inside the sinuses. This further creates a foci of bacteria and ciliary dysfunction contributes to the exacerbation of the symptoms.

Medical management, including nasal steroids and antibiotics, are the first-line treatment.[6] However, for refractory cases, functional endoscopic sinus surgery is the gold standard.[7] Partial middle turbinate resection during

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FESS is controversial, with some studies suggesting improved sinus drainage and drug delivery, while others find no definitive benefit.[8] This study evaluates the outcomes of FESS with and without partial middle turbinectomy in CRS patients using the Lund-MacKay scoring system.

2. Aims and Objectives

2.1. Aim

To evaluate the outcome of the endoscopic sinus surgery with or without partial middle turbinate resection among patients with chronic rhinosinusitis.

2.2. Objectives

1. To study the outcome of FESS with partial middle turbinate resection
2. To study the outcome of FESS without partial middle turbinate resection.
3. To compare the outcomes of FESS with or without partial middle turbinate resection.

3. Materials and Methods

This study was carried on all the patients with chronic rhinosinusitis symptoms for more than 3 months not getting relieved with medical line of management with radiological evidence and requiring surgical intervention admitted in department of ENT at Rajiv Gandhi Institute of Medical Sciences (RIMS), Adilabad, Telangana, after taking approval from institutional ethics committee, 100 were included in the study satisfying inclusion and exclusion criteria, randomized into 2 groups. Group A and B undergoing functional endoscopic sinus surgery with and without partial middle turbinectomy respectively. The patients are followed upto 3 months postoperatively at 1st week, 6th week, and at 3rd month, regarding improvement of clinical symptoms and complications following surgery.

3.1. Inclusion criteria

1. Patients of both sexes in between 18-65 yrs of age.
2. Patients diagnosed with Chronic rhinosinusitis for a period of 3 months, unresponsive to medical management.
3. Only patients willing to participate in the study will be included by giving informed written consent.

3.2. Exclusion criteria

1. Patients with less than 18 years of age and more than 65 years
2. Patients with anatomical anomalies of middle turbinate.
3. Patients diagnosed with acute infection, allergic bilateral sino-nasal polyposis or prior sino-nasal surgery.
4. Immunocompromised status, pregnancy or lactating mother.
5. Unstable hemodynamic disorders, bleeding disorders, Comorbidities with uncontrolled hypertension, uncontrolled Diabetes mellitus.
6. Patients who are unwilling for surgery, unfit during the anaesthesia.

3.3. Study design

Institutional Prospective comparative study.

3.4. Statistical analysis

Data will be entered into Microsoft excel and analysis will be done using the statistical package for social sciences, IBM SPSS - version 25.Descriptive statistics (frequency, percentage) and the chi- square test were used to compare outcomes. A p value < 0.05 was considered significant.

3.5. Surgical procedure

All cases were performed under local anesthesia (2% lignocaine with adrenaline 1:100,000) while following strict aseptic protocols. The patient is positioned in reverse Trendelenburg, using 0 – degree 4mm Hopkins rod endoscopic sinus surgery. partial middle turbinectomy was performed in group A patients.

Technique of partial middle turbinectomy

1. The procedure is performed under endoscopic vision using curved turbinectomy scissors after functional endoscopic sinus surgery.
2. A cut is made in the anterior lower third of middle turbinate, corresponding to ethmoidal infundibulum.
3. A second cut is made joining the first from below upwards, freeing a small wedge – shaped portion of the turbinate, removed with help of blekesley forceps.
4. Nasal packing placed and removed after 1st day or 2nd day.
5. Follow-up done for 3 months postoperatively at 1st week, 6th week, and at 3rd month, regarding improvement of clinical symptoms and complications following surgery.

Figure 1:

Regarding partial middle turbinectomy whether it affects the stability of middle turbinate or not?

1. Making precise cuts to remove anterolateral part of middle turbinate thus preserving its posterior-superior attachment to maintain stability.
2. It serves as a landmark for extended ethmoidectomy, position of orbit and roof of nasal cavity.
3. To maintain function like humidification, airflow regulation and olfaction.

4. Results

After the initial assessment, total 100 patients were randomly divided into two groups; in the Group A, the patients were subjected to functional endoscopic sinus surgery with partial middle turbinectomy, whereas the patients in Group B underwent only functional endoscopic sinus surgery.

On exploring the distribution of the patients based on the age between the groups, in group A, majority of the patients about 40% were found to be in between 31 and 40 years whereas in Group B, majority 34% were between 41 to 50 years (Table 1). Based on the symptom of presentation, the study showed that in Group A, nasal discharge was the most common symptom which accounts for 92% of the cases, whereas in group B, nasal discharge noted in 80%(Table 2)

Table 1: Distribution – patients based on age concerning groups

Age (in years)	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
18-30	10	20	12s	24
31-40	20	40	16	32
41-50	15	30	17	34
51-65	5	10	5	10
Total	50	100	50	100

Table 2: Distribution - patients based on the symptoms of presentation

Symptom of presentation	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Nasal discharge	46	92	44	88
Nasal obstruction	40	80	38	76
Facial pain	29	58	30	60
Disturbance in smell	19	38	16	32

4.1. Score

Preoperative DNE showed mild edema in 70% of Group A and 66% of Group B, with severe edema in 30% and 34%, respectively. Thick, purulent discharge was observed in 80% of Group A and 76% of Group B (Table 3).

Table 3: Distribution - patients based on the preoperative DNE

Preop DNE score	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Edema				
Mild	35	70	33	66
Severe	15	30	17	34
Discharge				
Clear thin discharge	10	20	12	24
Thick purulent discharge	40	80	38	76

At 3 months post-surgery, Group A had significantly lower rates of edema (10% vs. 40%, p=0.001), discharge (8% vs. 24%, p=0.029), scarring (20% vs. 40%, p=0.029), synechiae (10% vs. 40%, p=0.001), and crusting (12% vs. 40%, p=0.001) compared to Group B (Table)

Table 4: Comparison of Lund-MacKay score between the groups at the end of 3rd postoperative month.

Variable	Group	N (%)	DNE score		p-value
			0	1	
Oedema	Group A	50 (100)	45 (90)	5 (10)	0.001
	Group B	50 (100)	30 (60)	20 (40)	
Discharge	Group A	50 (100)	46 (92)	4 (8)	0.029
	Group B	50 (100)	38 (76)	12 (24)	
Scarring	Group A	50 (100)	40 (80)	10 (20)	0.029

	Group B	50 (100)	30 (60)	20 (40)	
Synechiae	Group A	50 (100)	45 (90)	5 (10)	0.001
	Group B	50 (100)	30 (60)	20 (40)	
Crusting	Group A	50 (100)	44 (88)	6 (12)	0.001
	Group B	50 (100)	30 (60)	20 (40)	

4).Group A showed greater resolution of symptoms, particularly facial pain and nasal discharge, attributed to improved sinus drainage and drug delivery. [No Table/Results]

At the end of post op 3rd month, Group A showed greater resolution of symptoms particularly nasal discharge (6% vs 24% showing p = 0.011) and facial pain (8% vs 24% showing p = 0.029) attributed to improved sinus drainage and drug delivery.

Table 5: Comparison between group A & group B at the end of 1st week, 6th week & 3rd month.

Variable	**Group**	**N (%)**	**Nasal discharge**		**p-value**
			Present	**Absent**	
Post-op 1st week	Group A	50 (100)	36 (72)	14 (28)	0.516
	Group B	50 (100)	33 (66)	17 (34)	
Postop 6th week	Group A	50 (100)	8 (16)	42 (84)	0.037
	Group B	50 (100)	14 (28)	36 (72)	
Post op 3rd month	Group A	50 (100)	3 (6)	47 (94)	0.011
	Group B	50 (100)	12 (24)	38 (76)	
Variable	Group	N (%)	**Facial pain**		**p-value**
			Present	**Absent**	
Post-op 1st	Group A	50 (100)	20 (40)	30 (60)	
week	Group B	50 (100)	21 (42)	29 (58)	0.838
Postop 6th week	Group A	50 (100)	9 (18)	41 (82)	0.160
	Group B	50 (100)	15 (30)	35 (70)	
Post op 3rd month	Group A	50 (100)	4 (8)	46 (92)	0.029
	Group B	50 (100)	12 (24)	38 (76)	

5. Discussion

Chronic rhinosinusitis (CRS) is a prevalent ENT condition, with medical management as the primary treatment. However, recurrence and relapse are common, necessitating functional endoscopic sinus surgery as the gold standard treatment for refractory cases. FESS restores sinus drainage and ventilation, and partial middle turbinate resection with FESS has been shown to enhance outcomes. Studies, such as Mahdavinia et al.[9] indicate that CRS incidence increases with age, particularly after 40, and is more common in patients over 18. Additionally, Velasquez et al.[10] highlight a higher CRS burden among individuals of lower socioeconomic status, potentially linked to environmental or healthcare access factors.

Ahn et al.[11] reported a higher prevalence of CRS in rural populations, attributing this to lower education levels, increased smoking, alcohol consumption, and comorbidities such as asthma. Conversely, Ghatee et al.[12] found CRS to be more common in urban areas, likely due to elevated air pollution and allergen exposure. Zheng et al.[13] observed no significant rural-urban disparity, suggesting that genetic or other systemic factors may also contribute to CRS prevalence. These discrepancies highlight the multifactorial etiology of CRS, necessitating region-specific approaches to prevention and management.

In our study, nasal discharge emerged as the predominant symptom in both study groups, followed by obstruction, facial pain, and smell disturbance. This aligns with the diagnostic criteria emphasize that purulent nasal discharge as a hallmark of CRS. We observed thick, purulent nasal discharge in 80% of Group A and 76% of Group B. Their findings indicate that impaired mucociliary clearance in CRS patients leads to thickened, entrapped secretions, predisposing to infection. In contrast, clear, watery discharge is more characteristic of allergic rhinitis or early acute rhinosinusitis, underscoring the importance of symptom differentiation in diagnosis.

The efficacy of partial middle turbinate resection during FESS is supported by Santhosh et al,[14] who found that patients undergoing this procedure (Group 1) exhibited greater improvement in clinical features, as evidenced by lower MacKay scores, compared to those without resection (Group B). Partial middle turbinectomy thus serves as a beneficial adjunctive procedure, significantly improving postoperative outcomes in CRS patients with inflammatory paranasal sinus disease, making it a valuable consideration in surgical management.

However, the studies showed that the partial resection of the middle turbinate does not eliminate the possibility of synechiae formation in the nasal cavity but helps reduce the reduction to a lesser extent than the control group. The study by Brescia G. et al.[15] also showed that the partial resection of

the middle turbinate improved intraoperative access. Also, they were found to decrease the formation of synechiae and had better postoperative drug delivery than the control group of the patients.

In a randomised control trial by Hudon MA et al.[16] Regarding the resection and the preservation of the middle turbinate in treating a patient with chronic rhinosinusitis. There is a significant reduction in the Perioperative Sinus Endoscopy (POSE) and Lund-Kennedy (LKES) scores pre-operatively and at 1, 3 and 6 months in the middle turbinate resection group when compared to the preservation group and the study also found that the frontal sinus score was found to be small on both the groups at the 6th postoperative month. Our study noted a more significant reduction of facial pain among patients with partial resection of the middle turbinate. The study also found that the partial resection of the middle turbinate helps open the sinus, obstructed in the osteomeatal complex region. The frontal sinus also drains in that region, so the reduction of the middle turbinate, the obstruction that causes the sinusitis, was relieved immediately. The rate of the delivery of the drug to the opened sinus region was found to be higher. The aeration of the opened sinus was also higher, so the reduction rate of facial pain was higher among the patients who had functional endoscopic sinus surgery along with the partial middle turbinate reduction than in the patients who didn't have middle turbinate reduction.[17]

6. Conclusion

Partial middle turbinate resection during FESS significantly improves clinical outcomes in CRS patients, reducing Lund-MacKay scores and symptom severity. This procedure is recommended as an adjunct to FESS in refractory CRS cases. So, the study recommends partial resection of the middle turbinate, which can be done among patients with CRS undergoing functional endoscopic sinus surgery.

7. Source of Funding

None.

8. Conflict of Interest

None.

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