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COMPARE THE OUTCOMES OF PARTIAL RESECTION VS. PRESERVATION OF MIDDLE TURBINATE IN ENDOSCOPIC SINUS SURGERY CHRONIC RHINO-SINUSITIS: A RANDOMIZED CONTROLLED TRIAL

Original Research

Nouman Yaqoob*[1], Muhammad Asad Chughtai[2], Huma Sharif[1]
[1]Department of ENT, POF Hospital Wah Cantt, Pakistan.
[2]Professor, Department of ENT, POF Hospital Wah Cantt, Pakistan.
Corresponding Author: Nouman Yaqoob, Department of ENT, POF Hospital Wah Cantt, Pakistan, Khanjazz326@gmail.com
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ABSTRACT

Background: Chronic rhinosinusitis (CRS) remains a prevalent inflammatory disorder requiring functional endoscopic sinus surgery (FESS) when medical therapy fails. The role of the middle turbinate during FESS continues to be debated, particularly regarding whether partial resection or preservation offers better postoperative outcomes. Limited prospective evidence comparing these approaches has contributed to ongoing variation in surgical practice. Understanding the influence of middle turbinate management on symptom relief and surgical recovery is essential for optimizing patient outcomes in CRS.

Objective: To compare postoperative outcomes of partial middle turbinate resection versus preservation in patients undergoing FESS for chronic rhinosinusitis.

Methods: A randomized controlled trial was conducted including 102 adults aged 20–60 years diagnosed with CRS. Participants were allocated equally into two groups (51 each): FESS with middle turbinate resection and FESS with turbinate preservation. Preoperative clinical assessment included demographic parameters and baseline POSE scores. All surgeries were performed under standardized operative protocols. Postoperative POSE scores were recorded four weeks after surgery. Data analysis involved comparison of mean POSE score changes between groups using appropriate statistical tests, with significance set at $p < 0.05$.

Results: The mean age was 35.2 ± 10.1 years in the resection group and 36.5 ± 9.8 years in the preservation group. Males constituted 56.9% of the resection group and 52.9% of the preservation group. Mean BMI values were similar at 24.8 ± 2.5 kg/m² and 25.1 ± 2.7 kg/m², respectively. Mean preoperative POSE scores were 5.6 ± 1.2 for resection and 5.8 ± 1.3 for preservation. Postoperative POSE scores improved to 2.0 ± 0.8 in the resection group and 3.4 ± 1.1 in the preservation group. The mean POSE score reduction was 3.6 ± 1.4 for resection and 2.4 ± 1.5 for preservation, demonstrating a statistically significant difference between groups ($p < 0.001$).

Conclusion: Both middle turbinate resection and preservation were viable options during FESS; however, partial resection resulted in greater early postoperative improvement based on POSE scores. These findings support selective middle turbinate resection as a beneficial technique when performed with appropriate patient selection and surgical expertise.

Keywords: Chronic Rhinosinusitis, Endoscopic Sinus Surgery, Middle Turbinate Preservation, Middle Turbinate Resection, Postoperative Outcomes, Randomized Controlled Trial, Turbinate Management.

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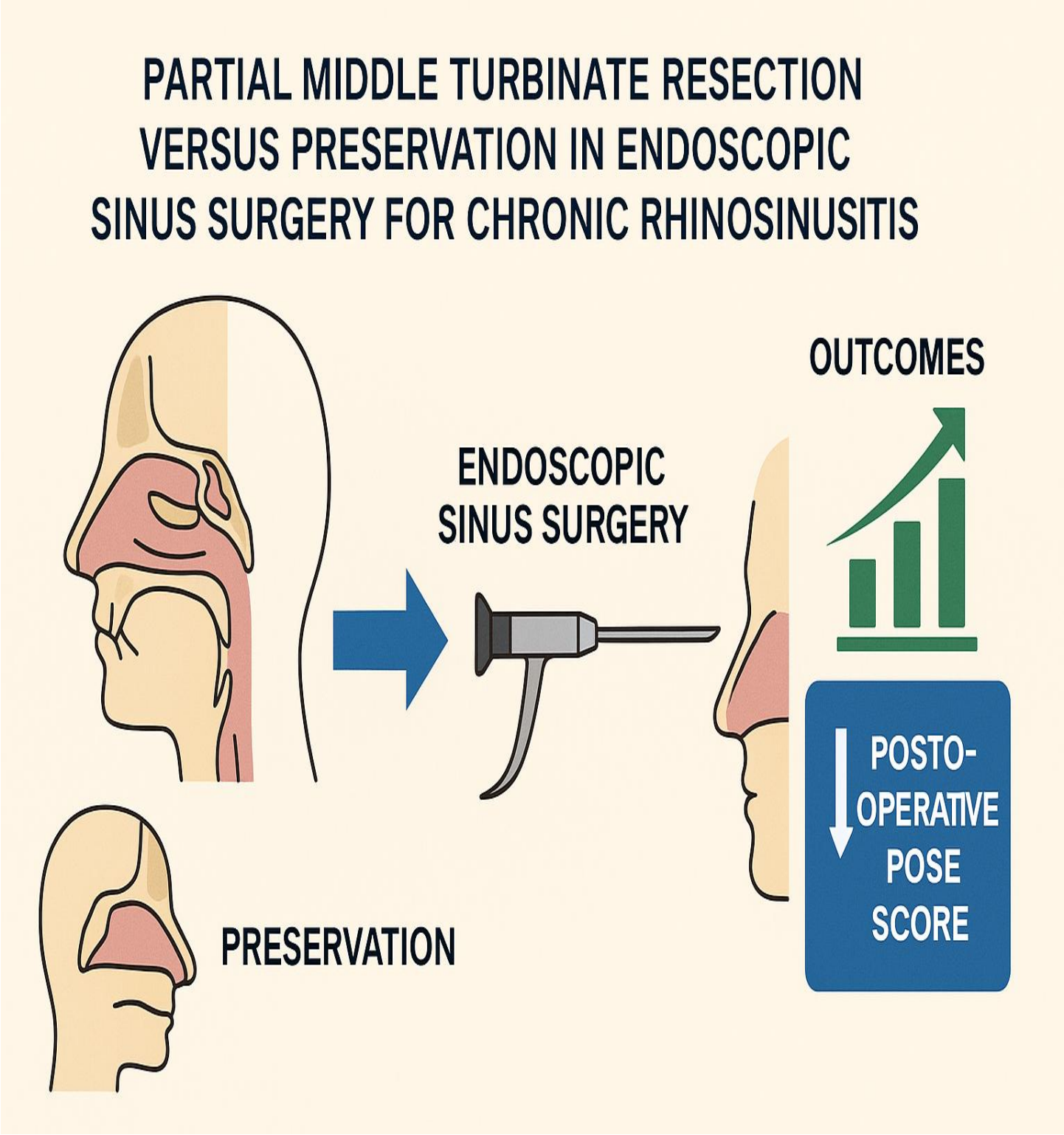

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INTRODUCTION

Chronic rhinosinusitis (CRS) is recognized as a multifactorial inflammatory disorder involving the nasal and paranasal mucosa, presenting with diverse clinical patterns that range from diffuse sinonasal inflammation to isolated unilateral sinus disease (1,2). Despite its high global prevalence and significant impact on quality of life, the precise etiopathogenesis of many CRS cases—particularly idiopathic CRS—remains poorly defined, further complicating clinical decision-making and long-term management strategies (3). Functional endoscopic sinus surgery (FESS) has emerged as the gold-standard intervention for medically refractory CRS, both with and without nasal polyps, owing to its ability to restore sinus ventilation and mucociliary function through targeted modification of the lateral nasal wall and reopening of the complex osteomeatal pathways (4,5). Within this surgical context, the management of the middle turbinate (MT) continues to provoke debate. Historically, surgeons have favored preservation of the MT based on concerns that resection may compromise anatomic landmarks, increase the risk of postoperative frontal sinusitis, or complicate future revision procedures (6). Conversely, proponents of MT resection argue that removal may enhance surgical visualization, optimize postoperative delivery of topical therapies, and potentially reduce polyp recurrence by minimizing stagnant recesses that favor persistent inflammation (7). Emerging evidence suggests that MT excision may reduce postoperative synechiae formation and improve endoscopic outcomes, as highlighted by Hudon et al., who reported more favorable perioperative POSE score changes in resected MT sides compared with preserved ones (8). However, despite these insights, contemporary literature remains limited by a scarcity of prospective comparative studies, leaving uncertainty regarding the optimal approach to MT management in FESS. This knowledge gap restricts the ability of surgeons to make fully evidence-based decisions and hampers the development of clear guidelines that balance surgical efficacy, complication risk, and long-term patient outcomes. Addressing this deficit is crucial to strengthening clinical consensus and improving patient counseling in the perioperative setting. Therefore, the objective of this study is to prospectively compare outcomes between middle turbinate preservation and resection during endoscopic sinus surgery, aiming to clarify their relative benefits and risks and provide evidence-informed guidance for optimal surgical practice.

METHODS

The study was designed as a randomized controlled trial conducted in the Department of ENT, Pakistan Ordnance Factories Hospital, Wah Cantt, from 6 October 2024 to 5 April 2025. Ethical approval was obtained from the College of Physicians and Surgeons Pakistan (CPSP/REU/ENT-2022-153-1451, dated 05 October 2024), and all participants provided informed written consent prior to enrollment. Male and female patients aged 20–60 years with a clinical diagnosis of chronic rhinosinusitis (CRS) were recruited through non-probability consecutive sampling. CRS was diagnosed when patients reported at least twelve weeks of two or more cardinal symptoms—mucopurulent nasal discharge, nasal obstruction, and facial pain with a VAS score >4—alongside objective evidence of inflammation in the middle meatus or anterior ethmoid region, such as mucosal edema, purulent secretions, or visible nasal polyps. Patients with nasal polyposis syndrome or a prior history of nasal surgery were excluded to avoid confounding anatomical or inflammatory variations. A total sample of 102 participants (51 per group) was determined using OpenEpi software, based on anticipated postoperative POSE score differences between middle turbinate (MT) resection and preservation groups, with power set at 80% and a significance level of 5%. Participants were randomized into two equal groups (A and B) through blocked randomization to maintain allocation balance. Group A underwent functional endoscopic sinus surgery (FESS) with MT resection, whereas Group B underwent FESS with MT preservation. All procedures were performed under general anesthesia by an experienced ENT surgeon, assisted consistently by the primary researcher to minimize procedural variability. In the preservation arm, the middle turbinate was medialized and retained as a key anatomical landmark unless disease severity or surgical access necessitated minimal manipulation. In the resection arm, partial MT resection was undertaken only when essential, typically toward the end of the procedure unless access to the osteomeatal complex was severely compromised at the outset. Approximately a 1-cm wedge of the anterior MT was removed in a postero-inferior direction using angled scissors (9-11). All patients received nasal packing for hemostasis, and postoperative care was standardized across groups. POSE scores were recorded one day prior to surgery and again at 4 weeks postoperatively to assess clinical improvement. Data were entered and analyzed using IBM SPSS version 25. Descriptive statistics included frequencies and percentages for categorical variables such as gender and comorbidities, while quantitative variables including age, BMI, disease duration, and POSE scores were analyzed using mean ± SD or median (IQR), depending on normality assessed through the Shapiro–Wilk test. Between-group comparisons of postoperative POSE scores were conducted using the independent samples t-test, with $p \leq 0.05$ considered statistically significant.

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RESULTS

A total of 102 patients were included in the analysis, with 51 allocated to the group undergoing functional endoscopic sinus surgery (FESS) with middle turbinate resection and 51 to the group undergoing FESS with middle turbinate preservation. The baseline demographic characteristics were comparable between the two groups. The mean age was 35.2 ± 10.1 years in the resection group and 36.5 ± 9.8 years in the preservation group, with most patients falling between 20 and 40 years of age (62.7% in Group A and 58.8% in Group B). Males comprised a slightly higher proportion in both groups, representing 56.9% of Group A and 52.9% of Group B. The mean body mass index was 24.8 ± 2.5 kg/m² in Group A and 25.1 ± 2.7 kg/m² in Group B, with more than half of the participants in each group having a BMI greater than 24 kg/m². Disease duration was similar across groups, with Group A showing a mean duration of 14.2 ± 6.3 months and Group B 13.8 ± 6.1 months. A duration exceeding 12 months was noted in 58.8% of Group A and 52.9% of Group B. Hypertension was present in 23.5% of Group A and 29.4% of Group B, while diabetes mellitus was documented in 15.7% and 19.6%, respectively. Pre-operative POSE scores demonstrated no meaningful difference between the groups, with Group A recording a mean of 5.6 ± 1.2 and Group B a mean of 5.8 ± 1.3. At four weeks postoperatively, POSE scores improved in both groups but to a significantly greater extent in Group A, which demonstrated a mean score of 2.0 ± 0.8 compared with 3.4 ± 1.1 in Group B. The mean reduction in POSE score was 3.6 ± 1.4 in the resection group and 2.4 ± 1.5 in the preservation group, yielding a statistically significant between-group difference ($p < 0.001$). These findings indicate a more pronounced symptomatic improvement in patients in whom the middle turbinate was resected.

Table 1: Mean ± SD of patients according to baseline demographics and clinical parameters (n = 102)

Parameters	Group A (n = 51)	Group B (n = 51)
Age (years)	35.2 ± 10.1	36.5 ± 9.8
BMI (kg/m2)	24.8 ± 2.5	25.1 ± 2.7
Disease duration (months)	14.2 ± 6.3	13.8 ± 6.1

Table 2: Frequencies and percentages of patients according to baseline demographics and clinical parameters (n = 102)

Parameters	Subgroups	Group A (n=51)	Percentage (%)	Group B (n=51)	Percentage (%)
Age (years)	20-40	32	62.7%	30	58.8%
	41-60	19	37.3%	21	41.2%
Gender	Male	29	56.9%	27	52.9%
	Female	22	43.1%	24	47.1%
BMI (kg/m2)	≤24.0	23	45.1%	22	43.1%
	>24.0	28	54.9%	29	56.9%
Disease duration	≤12 months	21	41.2%	24	47.1%
	>12 months	30	58.8%	27	52.9%
Comorbidities					
Hypertension	Present	12	23.5%	15	29.4%
	Absent	39	76.5%	36	70.6%
Diabetes	Present	8	15.7%	10	19.6%
	Absent	43	84.3%	41	80.4%

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Table 3: Comparison of Pre-Op and Post-Op POSE Scores Between Groups (n = 102)

Parameters	Group A (n=51)	Group B (n=51)	P value
Mean Pre-Op POSE Score	5.6 ± 1.2	5.8 ± 1.3	0.562
Mean Post-Op POSE Score	2.0 ± 0.8	3.4 ± 1.1	<0.001
Mean Difference	3.6 ± 1.4	2.4 ± 1.5	<0.001

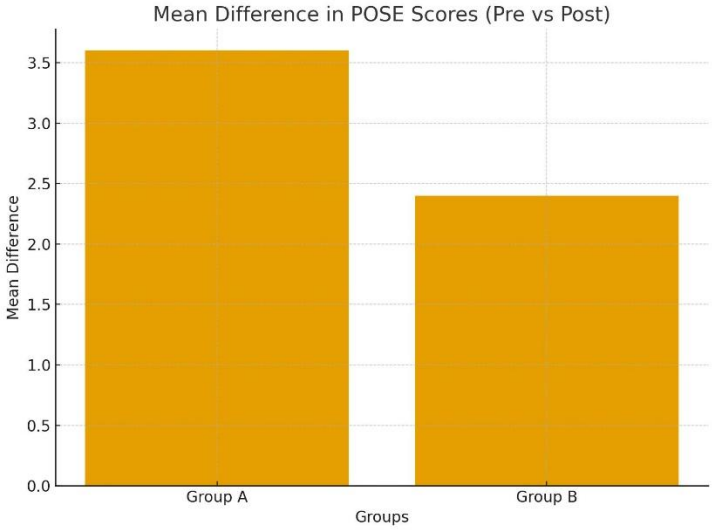

Figure 2 Mean Difference in POSE Scores (Pre vs Post)

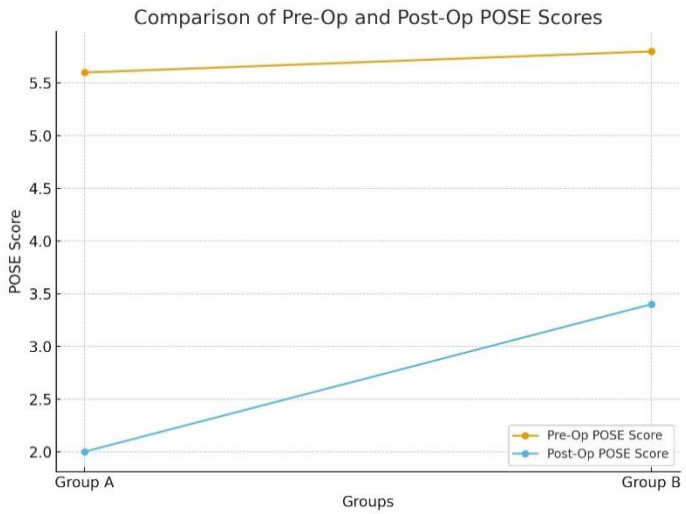

Figure 2 Comparison of Pre-Op and post-op POSE Scores

DISCUSSION

The findings of this randomized controlled trial demonstrated that functional endoscopic sinus surgery performed with middle turbinate resection yielded superior early postoperative outcomes compared with middle turbinate preservation. This was reflected by significantly lower postoperative POSE scores in the resection group, indicating a greater reduction in symptom burden during the early healing phase. The magnitude of improvement closely aligned with previously reported postoperative differences, confirming that partial middle turbinate removal enhances sinus ventilation and reduces early postoperative morbidity (12,13). These outcomes may be explained by the improved surgical exposure achieved during resection, which facilitates more complete clearance of diseased tissue and reduces the likelihood of postoperative adhesions, thereby promoting more efficient mucociliary recovery and decreasing obstruction-related symptoms. Gender-based analysis revealed a modest trend toward better postoperative scores among male patients in both groups; however, the differences were small and clinically insignificant. No prior research has specifically examined gender variation in postoperative outcomes following middle turbinate resection, and the present findings suggest that the benefits of resection were consistent across genders, with no differential physiological response that would alter surgical decision-making (14-16). Similarly, comorbidities such as hypertension and diabetes were slightly more prevalent in this cohort than in some previously published CRS populations, yet they did not influence postoperative improvement. Stratified analyses confirmed that patients with these comorbidities experienced outcomes comparable to those without such conditions, supporting earlier work indicating that, with consistent perioperative care, common chronic conditions exert minimal effect on short-term endoscopic recovery (17,18). The longstanding debate surrounding middle turbinate management reflects the turbinate's dual role as an important anatomic landmark and a potential contributor to postoperative complications when left intact in a crowded or inflamed nasal cavity. Earlier literature emphasized the risks associated with resection, including iatrogenic frontal sinusitis and loss of orientation within the middle meatus. More contemporary studies, however, have demonstrated that partial resection can support improved delivery of topical therapies and reduce polyp regrowth by widening the surgical corridor and minimizing points of contact that predispose to adhesion formation (19-21). The present trial

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contributes to this evolving understanding by providing controlled evidence that partial resection, when performed selectively and anatomically, enhances early objective outcomes without compromising safety.

A major strength of this study was the randomized controlled design, which minimized allocation bias and provided a more robust comparison than prior retrospective analyses. Standardized surgical technique, uniform postoperative care, and consistent evaluation using POSE scoring further enhanced internal validity. Despite these strengths, limitations must be acknowledged. The follow-up period was restricted to four weeks, which represented an early postoperative phase when healing was still ongoing. Studies with longer follow-up durations have shown that differences between resection and preservation may become more pronounced over time, particularly regarding long-term recurrence, adhesion formation, and the need for revision surgery (22). Additionally, the study did not evaluate anatomical healing parameters such as synechiae formation, mucosal edema, or endoscopic grading, which are often used to correlate structural recovery with patient-reported symptom improvement. Future research would benefit from incorporating detailed endoscopic scoring, evaluating long-term outcomes, and exploring whether specific patient subgroups—such as those with severe anatomical variations or recurrent disease—derive greater benefit from middle turbinate resection. Overall, the study provided meaningful evidence supporting partial middle turbinate resection as a favorable adjunct to endoscopic sinus surgery in patients with chronic rhinosinusitis. The findings reinforced growing consensus that careful, anatomically guided resection can optimize postoperative functional outcomes while maintaining surgical safety, and they highlighted the need for extended follow-up and broader outcome measures to refine clinical guidance further.

CONCLUSION

The study concluded that functional endoscopic sinus surgery performed with partial middle turbinate resection led to more favorable postoperative outcomes than procedures in which the turbinate was preserved, supporting its role as a beneficial adjunct when applied with appropriate surgical judgment. These findings highlight the practical value of carefully selected resection in improving symptom relief and optimizing early recovery in patients with chronic rhinosinusitis. The results reinforce the importance of surgeon expertise and individualized patient assessment, while also underscoring the need for longer-term studies to refine clinical protocols and further clarify the role of middle turbinate management in endoscopic sinus surgery.

AUTHOR CONTRIBUTIONS

Author	Contribution
Nouman Yaqoob*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Asad Chughtai	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Huma Sharif	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published

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