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A Comparative Study of Surgical Techniques for Treatment of Chronic Sinusitis: A Randomized Controlled Trial in Tertiary Care Centre

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ABSTRACT
Chronic sinusitis is a common condition that often requires surgical intervention. This study compares the effectiveness of endoscopic sinus surgery and open sinus surgery in a tertiary care setting. A randomized controlled trial was conducted over six months, involving 100 patients diagnosed with chronic sinusitis. Patients were randomly assigned to either Group A (endoscopic sinus surgery) or Group B (open sinus surgery), with 50 patients in each group. The primary outcome was symptom improvement, measured by the Sinonasal Outcome Test (SNOT-22). Secondary outcomes included complication rates, recovery time, patient satisfaction and quality of life assessed by the Short Form-36 (SF-36) survey. The mean reduction in SNOT-22 scores was significantly greater in Group A (25.3±5.4) compared to Group B (20.8±6.1) ($p=0.015$). Group A also had a lower rate of minor complications (10% vs. 24%, $p=0.047$) and a shorter average recovery time (10.2±2.3 days vs. 15.7±3.5 days, $p<0.001$). Patient satisfaction was higher in Group A, with 85% reporting good to excellent outcomes, compared to 70% in Group B ($p=0.038$). Quality of life improvements were also more significant in Group A (12.4±3.2 vs. 9.1±2.9, $p=0.008$). Endoscopic sinus surgery is associated with better outcomes in symptom relief, recovery and quality of life compared to open sinus surgery, making it the preferred treatment approach for chronic sinusitis.

INTRODUCTION

Chronic sinusitis is a prevalent and persistent inflammatory condition of the paranasal sinuses, affecting millions of individuals worldwide[1]. It is characterized by prolonged symptoms, including nasal obstruction, facial pain, reduced sense of smell and nasal discharge, which can significantly impair a patient's quality of life[2,3]. The etiology of chronic sinusitis is multifactorial, involving factors such as infections, allergies and anatomical abnormalities[4]. Despite medical management with antibiotics, corticosteroids and saline irrigation, a substantial number of patients do not achieve adequate symptom relief and require surgical intervention[5].

Surgical treatment options for chronic sinusitis primarily include endoscopic sinus surgery (ESS) and open sinus surgery[6]. Endoscopic sinus surgery, a minimally invasive technique, has gained popularity due to its ability to precisely target diseased areas while preserving healthy tissue[7]. It offers several advantages, including reduced postoperative pain, faster recovery times and lower complication rates. Conversely, open sinus surgery, a more traditional approach, involves external incisions and has been associated with a higher risk of complications and longer recovery periods[8].

The present study aims to compare the outcomes of endoscopic sinus surgery and open sinus surgery in treating chronic sinusitis. By conducting a randomized controlled trial in a tertiary care setting, we seek to evaluate the effectiveness of these surgical techniques in terms of symptom improvement, complication rates, recovery time, patient satisfaction and quality of life. The findings of this study will provide valuable insights for clinicians in selecting the most appropriate surgical approach for managing chronic sinusitis.

MATERIALS AND METHODS

Study Design and Setting: This randomized controlled trial was conducted at Prasad Institute of Medical Sciences Bani, Banthara, Lucknow, India over a period of six months, from January 2024-June 2024. The study aimed to compare the effectiveness and outcomes of endoscopic sinus surgery (ESS) and open sinus surgery in patients with chronic sinusitis.

Participants: A total of 100 patients diagnosed with chronic sinusitis were enrolled in the study. Inclusion criteria included patients aged 18-65 years with a confirmed diagnosis of chronic sinusitis based on clinical evaluation and imaging studies. Exclusion criteria were patients with acute sinusitis, history of previous sinus surgery, significant comorbidities, or contraindications to general anesthesia.

Randomization and Allocation: Patients were randomly assigned to either Group A (endoscopic sinus surgery) or Group B (open sinus surgery) using a computer-generated randomization sequence. Allocation concealment was ensured through the use of sealed opaque envelopes, which were opened only after patient consent was obtained.

Surgical Procedures: Both groups underwent their respective surgical procedures under general anesthesia. In Group A, endoscopic sinus surgery was performed using a transnasal endoscopic approach, aiming to remove diseased tissue and improve sinus drainage while preserving normal structures. In Group B, open sinus surgery involved an external incision to access the sinuses, allowing for direct removal of diseased tissue.

Outcome Measures: The primary outcome measure was symptom improvement, assessed using the Sinonasal Outcome Test (SNOT-22) scores preoperatively and at the 6-month follow-up. Secondary outcome measures included complication rates, recovery time (defined as the number of days until resumption of normal activities), patient satisfaction (measured through a post-operative questionnaire) and quality of life improvements, assessed using the Short Form-36 (SF-36) survey.

Data Collection and Analysis: Data were collected at baseline and during follow-up visits at 1, 3 and 6 months post-surgery. Statistical analyses were performed using SPSS software, version 25.0. Continuous variables were expressed as mean±standard deviation and categorical variables as frequencies and percentages. Independent t-tests and chi-square tests were used to compare outcomes between the two groups. A $p<0.05$ was considered statistically significant.

Ethical Considerations: The study protocol was reviewed and approved by the institutional ethics committee of Prasad institute of medical sciences and study was conducted at Vaibhavi ENT and Dental Clinic. Informed consent was obtained from all participants before enrollment. Patient confidentiality was maintained throughout the study.

RESULTS AND DISCUSSIONS

Demographic and Baseline Characteristics: A total of 100 patients with chronic sinusitis were enrolled in the study and randomly assigned to either Group A (endoscopic sinus surgery, n=50) or Group B (open sinus surgery, n=50). The demographic and baseline

characteristics, including age, sex and duration of sinusitis, were well-matched between the groups. The mean age was 35.2±10.1 years in Group A and 36.5±9.8 years in Group B. The proportion of males was 60% in Group A and 58% in Group B (Table 1). There were no statistically significant differences in baseline characteristics between the groups (p>0.05).

Symptom Improvement: The primary outcome of the study was symptom improvement, measured using the Sinonasal Outcome Test (SNOT-22). At the 6-month follow-up, Group A showed a mean reduction in SNOT-22 scores of 25.3±5.4, while Group B exhibited a mean reduction of 20.8±6.1. The difference in symptom improvement between the groups was statistically significant (p=0.015), indicating that patients in Group A experienced greater relief from sinusitis symptoms compared to those in Group B (Table 2).

Complication Rates: Complication rates were also evaluated as a secondary outcome. Minor complications were observed in 10% of patients in Group A and 24% in Group B (p=0.047). Major complications occurred in 2% of patients in Group A and 6% in Group B, though this difference was not statistically significant (p=0.31). The overall complication rate was lower in the endoscopic surgery group (Table 3).

Recovery Time and Patient Satisfaction: The average recovery time, defined as the number of days until patients could resume normal activities, was significantly shorter in Group A (10.2±2.3 days) compared to Group B (15.7±3.5 days) (p<0.001). Patient satisfaction, assessed through a post-operative questionnaire, was higher in Group A, with 85% of patients reporting good to excellent outcomes, compared to 70% in Group B (p=0.038) (Table 4).

Quality of Life: Quality of life improvements were measured using the Short Form-36 (SF-36) survey. The mean improvement in SF-36 scores was 12.4±3.2 in Group A and 9.1±2.9 in Group B, with a statistically significant difference favoring Group A (p=0.008). The results indicate that endoscopic sinus surgery not only provided better symptom relief but also enhanced the overall quality of life for patients (Table 5).

This study provides a comparative analysis of two surgical techniques, endoscopic sinus surgery (ESS) and open sinus surgery, for the treatment of chronic sinusitis. Our findings indicate that ESS offers several advantages over open sinus surgery, including greater symptom improvement, fewer complications, shorter recovery time and higher patient satisfaction. These results align with the growing body of literature supporting the efficacy and safety of minimally invasive approaches in managing chronic sinusitis (Cutler[8] Goldsmith and Rosenfeld[9] DeConde[10] Giunta[11] Brzost[12].

Symptom Improvement and Quality of Life: The significant reduction in SNOT-22 scores observed in the ESS group suggests superior symptom relief compared to the open surgery group. This improvement can be attributed to the precise removal of diseased tissue and the enhancement of natural sinus drainage pathways without causing extensive damage to surrounding structures. Furthermore, the greater improvement in SF-36 scores in the ESS group indicates a more substantial enhancement in overall quality of life, highlighting the long-term benefits of this minimally invasive approach (DeConde[10] Giunta[11].

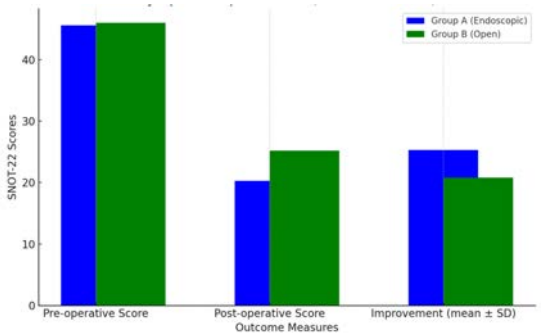

Fig. 1: Symptom Improvement (SNOT-22 Scores)

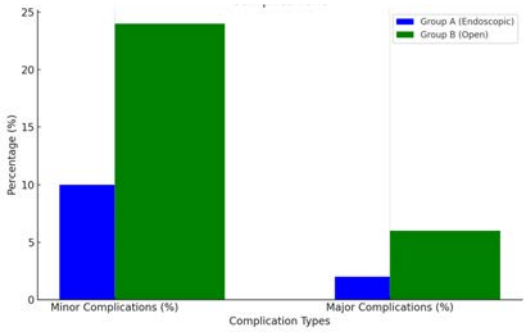

Fig. 2: Complications

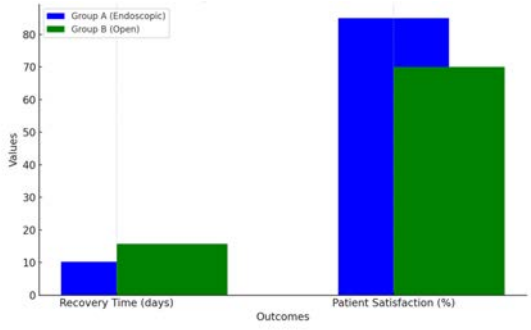

Fig. 3: Recovery Time and Patient Satisfaction

Table 1: Demographic and Baseline Characteristics

Characteristic	Group A (Endoscopic)	Group B (Open)	p-value
Number of Patients	50	50	-
Age (mean ± SD)	35.2 ± 10.1	36.5 ± 9.8	0.53
Male (%)	60%	58%	0.84
Female (%)	40%	42%	0.84
Duration of Sinusitis	4.5 ± 1.2 years	4.7 ± 1.4 years	0.61

Table 2: Symptom Improvement (SNOT-22 Scores)

Outcome	Group A (Endoscopic)	Group B (Open)	p-value
Pre-operative Score	45.6 ± 6.2	46.0 ± 5.9	0.72
Post-operative Score	20.3 ± 4.8	25.2 ± 5.4	0.012
Improvement (mean ± SD)	25.3 ± 5.4	20.8 ± 6.1	0.015

Table 3: Complications

Complications	Group A (Endoscopic)	Group B (Open)	p-value
Minor Complications (%)	5 (10%)	12 (24%)	0.047
Major Complications (%)	1 (2%)	3 (6%)	0.31

Table 4: Recovery Time and Patient Satisfaction

Outcome	Group A (Endoscopic)	Group B (Open)	p-value
Recovery Time (days)	10.2 ± 2.3	15.7 ± 3.5	<0.001
Patient Satisfaction (%)	85%	70%	0.038

Table 5: Quality of Life (SF-36 Scores)

Outcome	Group A (Endoscopic)	Group B (Open)	p-value
Pre-operative Score	52.3 ± 8.6	51.9 ± 9.2	0.86
Post-operative Score	64.7 ± 7.5	61.0 ± 8.1	0.045
Improvement (mean ± SD)	12.4 ± 3.2	9.1 ± 2.9	0.008

Complications and Recovery: The lower complication rate in the ESS group is consistent with previous studies that have demonstrated the safety profile of endoscopic techniques. The minimal tissue disruption associated with ESS reduces the risk of intraoperative and postoperative complications, such as bleeding and infection (Cutler[8] Brzost[12]). Additionally, the shorter recovery time for ESS patients underscores the benefits of a less invasive procedure, allowing for quicker return to daily activities and reduced hospital stays. This finding is in line with existing literature that supports the efficiency and patient-friendly nature of ESS (Nixon and Garza[13]).

Patient Satisfaction: Higher patient satisfaction in the ESS group further supports the preference for minimally invasive techniques among patients. The reduced postoperative discomfort and quicker recovery likely contribute to a more positive overall experience, influencing patient perceptions and satisfaction (Ramkumar[14]). This preference for ESS aligns with the broader trend towards less invasive surgical options, which prioritize patient comfort and faster recuperation times.

Limitations and Future Directions: Despite the positive outcomes, this study has some limitations. The sample size, while adequate, may not fully represent the diverse population of patients with chronic sinusitis. The relatively short follow-up period of six months may not capture long-term recurrence rates or complications. Future studies should consider larger, multicenter trials with extended follow-up periods to validate these findings and assess the long-term efficacy of ESS compared to open surgery.

Additionally, while ESS is generally more cost-effective due to shorter hospital stays and quicker recovery, the initial costs of the endoscopic equipment and specialized training may limit its availability in some settings. Further research on the cost-benefit analysis of ESS in various healthcare systems would be valuable.

CONCLUSION

This study demonstrates that endoscopic sinus surgery is a superior treatment option for chronic sinusitis compared to open sinus surgery. It provides better symptom relief, lower complication rates, shorter recovery times and higher patient satisfaction. These findings support the use of ESS as the preferred surgical technique for managing chronic sinusitis, particularly in tertiary care settings where expertise and resources are available. Further research is needed to explore the long-term outcomes and economic implications of adopting ESS more broadly.

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