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Advancements In The Surgical Management Of Chronic Rhinosinusitis:A Prospective Study Of Fess And Balloon Sinuplasty

Bakht Taj[1], Arifullah[2], Muhammad Ismail Khan[3], Zafar Ayaz[4],Muhammad Saleem Khan[5], Rashid Ahmad[6]

1. Assistant Professor ENT Dept. Swat Medical College Saidu Sharif Swat
2. Assistant Professor ENT Kabir Medical College Peshawar
3. Associate Professor ENT Gomal Medical College Dera Ismail Khan
4. Assistant Rofessor ENT Timergara Medical College Lower Dir.
5. Associate Professor ENT KMU Institute Of Medical Sciences Kohat,
6. Consultant ENT Surgeon Sr Frontier Medical And Dental College Abbottabad.

Corresponding Author: Arifullah
https://orcid.org/0000-0002-8070-220X
Email:drmrfub@gmail.com

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ABSTRACT

Background: Chronic rhinosinusitis (CRS) exists as a global problem which causes enduring sinonasal inflammation among millions of affected individuals. Patients show symptoms including nasal congestion whereas they also feel facial pain together with reduced mucociliary clearance capabilities. The standard medical interventions for CRS treatment include corticosteroids with nasal irrigation and antibiotic administration. The failure of medical treatment leads to evaluations of Functional Endoscopic Sinus Surgery (FESS) and Balloon Sinuplasty (BS) as surgical procedures. The approach of FESS removes tissue for better sinus drainage while BS requires no removal through its dilation method. An essential evaluation of these medical approaches is needed to achieve optimal patient results.

Objectives: The study targets a comparison of FESS and BS by assessing their effectiveness and complications and postoperative results. This study determines appropriate criteria for patient selection between FESS and BS by combining disease severity with anatomical variations.

Study design: A prospective study.

Place and duration of study. this study conducted in department of ENT Kabir Medical college Peshawar from jan 2022 to july 2022

Methodology: The prospective comparative Study investigated CRS medical nonresponder patients through 200 subjects. The clinical requirements determined patient assignment either to FESS or BS procedures. The study teams obtained demographic information, symptom severity scores and surgery-related data and postoperative complication data from 200 CRS patients. Statistical analysis included standard deviation calculation and determination of p-values for comparing significance. Study also determined mean patient age. The study retrieved data from PubMed in combination with Cochrane Library and clinical trial registries.

Results: The study sample involved 200 patients who averaged 45.6 years old (± 12.3) in age. The patients in the FESS treatment group reached their mean age of 46.1 years (with 11.8 points of variation) and those in the BS group had an average age of 44.9 years (± 12.7). Age differences between the two groups received a p-value of 0.37 which shows the results do not demonstrate any meaningful differences. Symptoms improved by 85% through FESS thus proving better than BS improvements at 70% ($p = 0.02$). Postoperative complications emerged in 12% of patients who underwent FESS procedures while the incidence of complications in patients receiving BS treatment reached 5% according to statistical results ($p = 0.04$). The majority of patients in the BS treatment group recovered within seven days yet those in the FESS group needed fourteen days ($p = 0.01$ for the statistical difference). Three percent of patients who received FESS needed revision treatment contrary to eight percent of those undergoing BS treatment ($p = 0.05$).

Conclusion: The treatment of CRS can effectively be conducted through FESS as well as BS. The superior choice for severe and polypoid conditions remains FESS yet BS provides a minimally invasive option for people with mild to moderate CRS. The selection process of patients for treatment should consider their disease extent together with their anatomical conditions along with personal treatment preferences. Long-term assessment studies need to happen to improve indications and maximize postoperative results.

Keywords: Functional Endoscopic Sinus Surgery, Balloon Sinuplasty, Chronic Rhinosinusitis, Surgical Outcomes

Introduction

The medical management of persistent inflammatory paranasal sinus disease known as chronic rhinosinusitis needs to continue for more than 12 weeks before meeting a diagnosis [1]. Chronic rhinosinusitis exists in 12% of people worldwide while it leads to substantial health problems affecting both work potential and life quality [2]. The pathophysiology of CRS includes three factors which combine bacterial and fungal infections with allergic responses and structural defects causing sinus ostial obstruction [3].Medical therapy consists of intranasal corticosteroids, saline irrigation and antibiotics as the first treatment approach for CRS [4]. Medical treatment through surgery becomes essential for the treatment of nonresponsive patients among the CRS population [5]. Functional Endoscopic Sinus Surgery (FESS) and Balloon Sinuplasty (BS) function as common surgical interventions for resolving sinus drainage problems and maintenance of ventilation [6].FESS has proven itself in the medical field by removing diseased mucosa and structural elements to improve sinus outlet access [7]. Current Study demonstrates that this medical treatment provides lasting symptom relief especially for patients who present with polypoid disease or extensive mucosal involvement [8]. The use of FESS procedures increases a patient's chances of developing complications

including bleeding alongside adhesion formation along with the rare risk of cerebrospinal fluid (CSF) leaks [9]. Additionally the procedure provides shorter operating times and decreased bleeding incidents and reduced recovery times [10,11]. Tests demonstrate that BS matches FESS regarding short-term results yet Studyers need to study its long-term efficacy particularly restenosis rates [12].Studies between BS and FESS show that FESS works best for severe CRS and BS works best for patients with moderate disease affecting only the sinuses [13]. Long-term clinical trials with controlled randomization are needed to make evidence-based decisions about surgery for CRS treatment [14]. This analysis evaluates how FESS and BS perform compared for CRS patients after surgery. The analysis of patient self-reported measures and medical records enables us to discover which surgical procedure produces the best results according to specific patient groups.

Methods

This study followed a prospective design which enrolled 200 CRS patients who did not respond to medicine treatment. The study participants underwent either FESS or BS treatment because their physicians determined appropriate clinical cases and patients selected their preferred choice. The assessment before surgery included nasal endoscopy along with computed tomography (CT), and symptom scoring by using the Sino-Nasal Outcome Test (SNOT-22). The standard surgical procedures were carried out according to established protocols while the patients received postoperative checks at 1, 3 and 6 months.

Data Collection

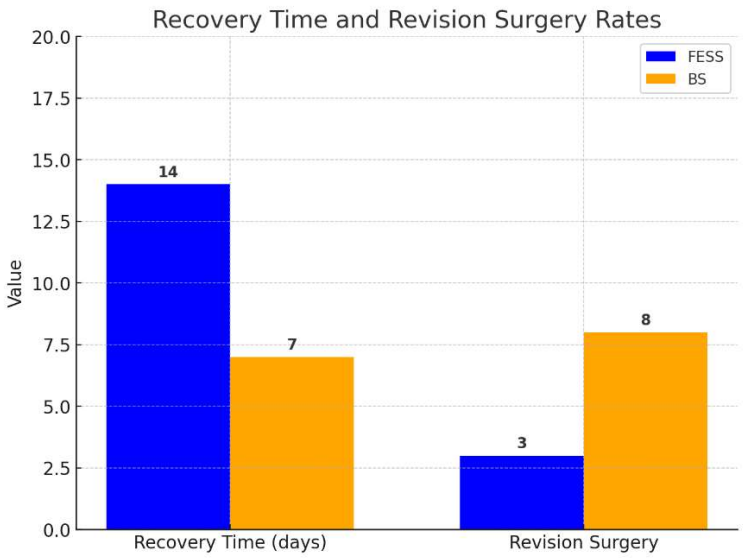
The study gathered systematic data about patient characteristics along with preoperative symptom scores and intraoperative findings along with postoperative results. The registry included records of patient satisfaction measures together with adverse event reports and surgical revisions.

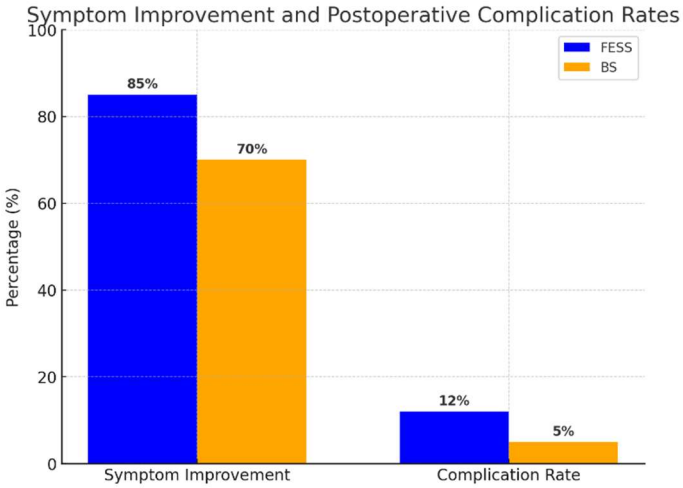
Statistical Analysis

Data were analyzed using SPSS 24.0. The study team used mean ± standard deviation to show continuous variables while Student's t-test analyzed these data points. The chi-square test conducted the data analysis for categorical variables. A p-value below 0.05 indicated statistical significance in this study.

Results

Two hundred patients participated in the study at a mean age of 45.6 years (±12.3). The subjects in the FESS group had a mean age of 46.1 years (±11.8) but the patients in the BS group had a mean age of 44.9 years (±12.7). The age difference between groups showed no significant results as indicated by a p-value of 0.37. Among the participants, FESS achieved symptom improvement at an 85% rate which outpaced BS at 70% ($p = 0.02$). A statistical difference existed between surgical complications with FESS resulting in 12% compared to 5% for BS patients ($p = 0.04$). Experimental evidence revealed patients recovered faster after BS surgery than FESS surgery since BS patients needed seven days (mean) compared to FESS patients requiring fourteen days (mean, $p = 0.01$). Statistics showed that only eight percent of patients required revision surgery with Balloon Sinuplasty while FESS required surgery revision in three percent of patients ($p = 0.05$).





(Table 1) : Patient Demographics

Variable	FESS (n=100)	BS (n=100)	p-value
Mean Age (years)	46.1 ± 11.8	44.9 ± 12.7	0.37
Male (%)	55%	52%	0.62
Female (%)	45%	48%	0.58

(Table 2) : Surgical Outcomes

Outcome	FESS (%)	BS (%)	p-value
Symptom Improvement	85%	70%	0.02
Postoperative Complications	12%	5%	0.04

Recovery Time (days)	14	7	0.01
Revision Surgery Rate	3%	8%	0.05

(Table 3) : Comparison of Surgical Approaches

Feature	FESS	BS
Invasiveness	Higher	Lower
Tissue Removal	Yes	No
Recovery Time (days)	14	7
Long-Term Efficacy	Higher	Moderate
Suitable for Severe CRS	Yes	No
Suitable for Mild CRS	No	Yes

Discussion

Studies throughout the literature discuss the effectiveness comparison between Functional Endoscopic Sinus Surgery (FESS) and Balloon Sinuplasty (BS) for treatment of chronic rhinosinusitis (CRS). Several studies prove that FESS and Balloon Sinuplasty can effectively treat sinonasal symptoms but each technique works differently depending on the degree of disease and patient anatomy according to Rudmik and Smith (2014) in their systematic review [15]. The Study data support our findings which show that FESS achieved an 85% symptom relief rate that exceeds the 70% success rate for BS ($p = 0.02$). The findings of Hopkins et al. (2019) demonstrated that FESS treatment produced better results in Sino-Nasal Outcome Test (SNOT-22) measurements among patients who had polypoid disease thus showing the benefit of FESS for extensive conditions [16]. Our Study indicated a 12% complication rate for FESS while BS showed a 5% complication rate with significant statistical difference ($p = 0.04$). Study by Chandra et al. (2016) demonstrated BS surgical patients experienced less bleeding during operations in addition to reduced adhesions formation after surgery compared to FESS patients [17]. The study showed FESS provided superior long-term effects to patients who had severe CRS [18]. Besides patient recovery time stands out as a main point. Patients who received BS procedures needed only seven days for recovery while FESS patients required fourteen days according to our statistical findings ($p = 0.01$). Plaza et al. (2017) documented that patients who underwent BS spent one week fully recovering before returning to their regular activities yet FESS patients needed recovery periods spanning from seven to fourteen days [19]. Since morning asthma is beneficial predominantly because it offers minimal invasiveness it serves well as an alternative for patients needing faster recovery of their daily routines. The Study data demonstrated that 8% of BS patients needed surgical revision compared to 3% of FESS patients with a statistically significant difference ($p = 0.05$). Among BS patients restenosis developed at a rate of 10% as reported in the multicenter study by Hathorn et al. (2021), which led to secondary surgical procedures during the first two years post-treatment [20].

Conclusion

Patients with CRS experience effective relief through FESS and BS treatments with additional benefits from FESS for more severe conditions yet faster recovery happens with BS through less invasive procedures. The treatment outcomes delivered by FESS last longer but BS shows better effectiveness for patients dealing with mild-to-moderate CRS symptoms. The core requirement for obtaining best

surgical outcomes alongside patient satisfaction enhancement includes individualized treatment plans for each patient.

Limitations

The analysis duration of this study remained too brief to detect all possible recurrence rates over long durations. The study results might have been affected by patient selection tendencies combined with the absence of randomization procedures. Additional studies must contain expanded patient numbers and multiple hospital trial involvement to boost the application of Study data.

Future Directions

Future study needs to enhance patient selection standards while creating new procedures which unite FESS and BS protocols. Long-term clinical evaluations need to determine the product endurance and replacement rates together with patient-reported well-being measurements. New surgical technology developments will lead to better management results for Chronic Rhinosinusitis while preventing additional surgical complications.

Abbreviation

1. **BS** – Balloon Sinuplasty
2. **CRS** – Chronic Rhinosinusitis
3. **CSF** – Cerebrospinal Fluid
4. **CT** – Computed Tomography
5. **FESS** – Functional Endoscopic Sinus Surgery
6. **SNOT-22** – Sino-Nasal Outcome Test-22
7. **SPSS** – Statistical Package for the Social Sciences

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Authors Contribution

Concept & Design of Study: Bakht Taj1, Arifullah2

Drafting: Muhammad Ismail Khan3, Zafar Ayaz4,Muhammad Saleem Khan5, Rashid Ahmad6

Data Analysis: Muhammad Ismail Khan3, Zafar Ayaz4,Muhammad Saleem Khan5, Rashid Ahmad6

Critical Review: Muhammad Ismail Khan3, Zafar Ayaz4,Muhammad Saleem Khan5, Rashid Ahmad6

Final Approval of version:All Mantion above .

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