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A Study on Complications of Functional Endoscopic Sinus Surgery for Chronic Rhinosinusitis

Dr. V. Arvind Raj[1], Dr. Abishek Anish[2], Dr. M.D Prakash[3]

[1-2]Department of ENT, Sri Venkateshwara ENT Institute, BMCRI, Bangalore, India
[3]Professor Department of ENT, BMCRI – Sri Venkateshwara ENT Institute, Bangalore, India

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Corresponding Author:

Dr. M.D Prakash
Professor Department of ENT, BMCRI – Sri Venkateshwara ENT Institute, Bangalore, India

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ABSTRACT

Background: Functional Endoscopic Sinus Surgery (FESS) is a widely adopted surgical modality for the management of chronic rhinosinusitis (CRS). Despite advances in surgical technique, imaging, and instrumentation, post-operative complications remain a clinical concern, particularly in high-volume tertiary care institutions where postgraduate training is conducted. This study aimed to determine the incidence of major and minor complications following FESS.
Methods: This is a prospective cohort study conducted at the Sri Venkateshwara ENT Institute, BMCRI, Bangalore, India, between June 2023 and August 2023. Twenty patients aged 16–75 years who underwent FESS for CRS were enrolled after obtaining informed consent. Patients with bleeding diathesis, uncontrolled diabetes or hypertension, and pregnant females were excluded. Post-operative complications were recorded using a structured questionnaire and clinical assessment.
Results: The most common minor complications were post-operative bleeding (45%) and pain (45%). Infection/purulent nasal discharge and crusting occurred in 15% of patients each. Anosmia was reported in 20% and adhesions/nasal obstruction in 20%. Epiphora was noted in 26.3% of patients. Among major complications, orbital ecchymosis occurred in 10% and diplopia in 5%. No patient experienced CSF rhinorrhoea or epistaxis requiring blood transfusion.
Conclusions: FESS carries a spectrum of minor and major complications. The absence of life-threatening complications in this cohort underscores the importance of meticulous surgical technique, thorough preoperative CT review, and comprehensive post-operative follow-up. Structured training and standardised complication monitoring protocols are essential in postgraduate teaching institutions.

Keywords*: functional endoscopic sinus surgery; FESS; chronic rhinosinusitis; surgical complications; post-operative outcomes; rhinology.*

INTRODUCTION

Chronic rhinosinusitis (CRS) is a prevalent inflammatory condition of the paranasal sinuses and nasal mucosa, characterised by sinonasal symptoms persisting for more than twelve weeks. Functional Endoscopic Sinus Surgery (FESS) has become the cornerstone of surgical management for CRS refractory to maximal medical therapy (1). The procedure, first described in the 1980s, aims to restore sinus ventilation and mucociliary clearance by targeting the ostiomeatal complex under direct endoscopic visualisation (2).

Despite advances in computed tomography (CT)-guided navigation, improved instrumentation, and greater understanding of sinonasal anatomy, FESS is associated with a spectrum of complications ranging from minor, self-limiting events to potentially life-threatening sequelae. Complications are broadly classified into orbital, neurological, and vascular categories, with orbital complications being the most commonly encountered serious adverse events (3).

In tertiary teaching hospitals with high patient volumes, the early identification and management of post-operative complications is particularly challenging. Postgraduate surgical trainees are frequently involved in the operative care of these patients, making structured complication monitoring even more critical. At our institution, BMCRI – Sri Venkateshwara ENT Institute, Bangalore, India, the patient load is substantial, and FESS is performed regularly as part of both routine clinical care and postgraduate surgical training.

The factors contributing to FESS complications are multi-factorial and broadly encompass surgeon-related variables, patient-related variables, anaesthetic factors, and technical errors. A thorough understanding of these variables, combined with structured checklists and systematic follow-up, is essential to minimise adverse outcomes (4).
This study was undertaken to determine the incidence of major and minor complications following FESS in a cohort of patients managed at our institution, with the aim of informing surgical training and institutional quality improvement initiatives.

MATERIALS AND METHODS

Study Design

This was a prospective cohort analysis conducted at the Department of Otorhinolaryngology, Sri Venkateshwara ENT Institute, BMCRI, Bangalore, India, between June 2023 and August 2023. The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical clearance was obtained from the institutional ethics committee, and written informed consent was obtained from all participants prior to enrolment.

Participants

A total of 20 consecutive patients who underwent FESS for chronic rhinosinusitis during the study period were enrolled. The inclusion criteria were: (I) patients willing to provide written informed consent; (II) age 16–75 years; and (III) confirmed diagnosis of CRS necessitating FESS.

Exclusion criteria were: (I) unwillingness to provide informed consent; (II) age below 16 or above 75 years; (III) known bleeding diathesis; (IV) uncontrolled diabetes mellitus or hypertension; and (V) pregnancy.

Surgical Technique and Post-operative Care

All procedures were performed under general anaesthesia using standard FESS technique, incorporating endoscopic visualisation and powered instrumentation as indicated. Hypotensive anaesthesia was employed to improve intraoperative visibility. Post-operatively, patients received nasal saline irrigations, topical corticosteroids, and systemic antibiotics as clinically indicated. All patients underwent structured follow-up with nasal endoscopy for debridement and monitoring of complications.

Outcome Measures

Complications were systematically recorded using a structured assessment proforma administered at post-operative follow-up visits. Outcomes were classified as minor (self-limiting, not requiring additional surgical intervention) or major (requiring surgical or intensive medical intervention, or resulting in functional deficit). The following were assessed: post-operative bleeding, pain, infection/purulent nasal discharge, crusting, anosmia/hyposmia, adhesion formation/nasal obstruction, epiphora, severe headache, orbital ecchymosis, diplopia, CSF rhinorrhoea, and epistaxis requiring blood transfusion.

RESULTS

Twenty patients underwent FESS during the study period and were included in the final analysis. The findings are summarised in Table 1.

Table 1 Post-operative complications following FESS (n=20)

Complication	Yes (n/N)	Incidence (%)	Category
Bleeding	9/20	45	Minor
Post-operative Pain	9/20	45	Minor
Infection/Purulent Discharge	3/20	15	Minor
Epiphora/Watering Eye	5/19	26.3	Minor
Anosmia/Loss of Smell	4/20	20	Minor/Major
Loss of Smell (at follow-up)	2/19	10.5	Minor/Major
Crusting	3/20	15	Minor

Complication	Yes (n/N)	Incidence (%)	Category
Adhesions/Nasal Obstruction	4/20	20	Minor
Severe Headache	2/20	10	Minor
Orbital Echymosis/Redness	2/20	10	Major
Double Vision/Diplopia	1/20	5	Major
Epistaxis Requiring Transfusion	0/20	0	Major
CSF Leak/Watery Nasal Discharge	0/20	0	Major

Minor Complications
Post-operative bleeding and pain were the most frequently encountered minor complications, each occurring in 9 of 20 patients (45%). Infection with purulent nasal discharge was observed in 3 patients (15%), and crusting was present in 3 patients (15%). Anosmia or hyposmia was reported in 4 of 20 patients (20%) at the initial post-operative assessment; at subsequent follow-up, persistent loss of smell was noted in 2 of 19 patients (10.5%). Adhesion formation with nasal obstruction occurred in 4 patients (20%). Epiphora was documented in 5 of 19 patients (26.3%), and severe headache was reported by 2 patients (10%).

Major Complications
Orbital ecchymosis occurred in 2 of 20 patients (10%), and diplopia was noted in 1 patient (5%). These were managed conservatively. Importantly, no patient experienced CSF rhinorrhoea or epistaxis requiring blood transfusion, representing an absence of the most serious potential FESS complications in this cohort.

DISCUSSION

The present study characterises the post-operative complication profile of FESS in a cohort managed within a high-volume tertiary care teaching institution. Consistent with the published literature, minor complications such as bleeding, pain, and crusting were the most commonly observed adverse events, while major complications were infrequent (3,5).

Post-operative haemorrhage requiring intervention remains one of the most common minor complications of FESS, with reported rates varying considerably across published series (3). In our cohort, bleeding was observed in 45% of patients, consistent with the range reported in similar studies. The use of hypotensive anaesthesia and post-operative nasal irrigation are established strategies to reduce this risk (6).

Anosmia following FESS presents a significant medico-legal consideration. Although olfactory disturbance may be pre-existing or related to the underlying CRS, iatrogenic injury to the olfactory epithelium during surgery is a recognised risk. Authors have emphasised that anosmia should be explicitly discussed during pre-operative informed consent (7). In our series, anosmia was reported in 20% of patients, highlighting the importance of pre-operative olfactory function documentation.

Orbital complications, while reported in only 0.07% of cases in contemporary endoscopic series – substantially lower than the pre-endoscopic era – remain among the most feared FESS complications (3). Our finding of orbital ecchymosis in 10% and diplopia in 5% of patients may reflect the training environment, where attention to the lamina papyracea, the thin bony boundary between the ethmoid sinuses and the orbit, is of paramount importance.

CSF rhinorrhoea, though historically estimated to occur in approximately 5% of cases, was not observed in our cohort (8). This may in part reflect the small sample size. The potentially serious sequela of meningitis mandates that this complication be recognised and repaired promptly. Similarly, vascular injury involving the anterior ethmoidal artery or the internal carotid artery (ICA), the latter protected by a wall of less than 0.5 mm that is dehiscent in approximately 25% of individuals, represents a surgical emergency requiring familiarity with the anatomical course of these structures (9).

The relatively high rate of epiphora (26.3%) in our cohort warrants attention. Injury to the nasolacrimal duct during medial maxillectomy or uncinectomy is a recognised complication and underscores the importance of careful technique and thorough understanding of the relevant surgical anatomy (10).

CONCLUSIONS

This prospective cohort study confirms that FESS is associated with a spectrum of minor and major complications. The most common adverse events in our cohort were post-operative bleeding, pain, and epiphora. The absence of CSF leak and haemorrhage requiring transfusion is encouraging. Minimisation of FESS complications demands a thorough knowledge of the complex anatomy of the nose and paranasal sinuses, meticulous review of pre-operative CT imaging, and a low

threshold for halting the procedure when visualisation is inadequate. Critical anatomical zones, including the cribriform plate and lamina papyracea, must be approached with extreme caution.

Prevention of minor complications is facilitated by nasal saline irrigation, post-operative endoscopic debridement, management of co-morbid conditions, and hypotensive anaesthesia. Regular, structured post-operative follow-up is essential. In teaching hospitals, these principles should be formalised into training curricula and departmental complication audit processes.

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FOOTNOTE
Reporting Checklist: This study is reported according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines.

Data Sharing Statement: Available at https://theajo.com.

Conflicts of Interest: The author has no conflicts of interest to declare.

Ethical Statement: This study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Institutional ethical clearance was obtained prior to commencement. Written informed consent was obtained from all participants.

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