

# A clinical study of complications of functional endoscopic surgery (FESS) at a tertiary hospital

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## Abstract

**Background:** Functional Endoscopic Sinus Surgery (FESS) is a set of minimally invasive surgical techniques which allow direct visual examination and opening of the sinuses. As with any invasive treatment modality an extensive list of complications has been reported in the literature so far. Present clinical study was aimed to study complications of functional endoscopic surgery (FESS) at a tertiary hospital. **Material and Methods:** Present study was single-center, prospective, observational study, conducted in patients 18-60 years, either gender, with CRS with or without polyps and patients with mucocoeles posted and operated for FESS. **Results:** During study period 120 patients satisfying study criteria were considered for present study. Majority of patients were from 19-30 years age group (45.83 %) followed by 31-40 years age group (28.33 %). Male patients (64.17 %) were more as compared to female (35.83 %). In patients undergoing FESS, multiple surgeries were performed simultaneously such as uncinectomy (100 %), middle meatal antrostomy (100 %), anterior ethmoidectomy (100 %), posterior ethmoidectomy (76.67 %), sphenoidectomy (30 %), frontal recess surgery (25.83 %) and 3 reduction of the middle turbinate (0.83 %). In present study we noted only 1 major complication as CSF leak (0.83 %) which was effectively managed by endoscopy. Few minor complications as synechiae requiring treatment (4.17 %), periorbital emphysema (1.67 %), epistaxis requiring packing (1.67 %), periorbital ecchymosis (0.83 %) and sinus infection (0.83 %), all were managed conservatively and successfully. **Conclusion:** FESS is one of the most commonly performed operations in otorhinolaryngology and is generally a safe procedure, with a low rate of complications but as with any surgical intervention, it carries risks and major complications may occur.

**Keywords:** Functional Endoscopic Sinus Surgery (FESS), Chronic Rhinosinusitis (CRS), nasal polyps, complications

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## INTRODUCTION

Functional Endoscopic Sinus Surgery (FESS) is a set of minimally invasive surgical techniques which allow direct visual examination and opening of the sinuses for the treatment of Chronic Rhinosinusitis (CRS) which has not responded to medical treatment. FESS is the gold standard for treatment of chronic rhinosinusitis (CRS), with or

without nasal polyposis and allergic fungal sinusitis refractory to optimal medical treatment.<sup>1</sup> FESS confers the advantage of being minimally invasive and allows for sinus air cells and sinus ostia to be opened under direct visualization.<sup>2,3,4</sup> The primary goal of FESS is to return the mucociliary drainage of the sinuses to normal function. FESS is a complex procedure, due to the sinuses' location near the cranium and orbit as well as its propensity for bleeding, this is a delicate procedure that requires skill and precision.<sup>5</sup> As with any invasive treatment modality an extensive list of complications has been reported in the literature so far. The major complications associated with FESS include severe hemorrhage, leakage of cerebral spinal fluid, and visual disturbances. Examples of minor complications are mild hemorrhage, periorbital hematoma and cellulitis, subcutaneous emphysema, and epiphora.<sup>2,4</sup> Present clinical study was aimed to study complications of functional endoscopic surgery (FESS) at a tertiary hospital.

## MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in Department of otorhinolaryngology, at District Civil Hospital, Sindhudurg, India. Study duration was of 3 years (January 2018 to December 2020). Study was approved by institutional ethical committee.

**Inclusion criteria:** patients 18-60 years, either gender, with CRS with or without polyps and patients with mucoceles posted and operated for FESS.

**Exclusion criteria:** Patients with diagnosed benign and malignant tumours. Patients with pathologies like lesions of the pituitary, orbit, lacrimal apparatus, intracranial complications of sinusitis. Patients with gross septal deviation, patients with bleeding diathesis and other general conditions like diabetes and hypertension.

Study was explained to patients and a written informed consent was taken. All the patients were subjected to detailed history of wide spectrum of presenting symptoms viz. facial pain, headache, nasal discharge, nasal obstruction and nasal mass. A thorough ENT examination with special emphasis on anterior and posterior rhinoscopy and elicit sinus tenderness was done. The diagnosis of CRS was made in accordance with history and objective findings. Routine laboratory investigations, nasal endoscopy, radiological assessment (X-ray of the paranasal sinuses Water’s view and sometimes lateral view including nasopharynx) and CT Scan PNS were done whenever required. All patients underwent Functional Endoscopic Sinus Surgery, in supine position with head elevated to 30 degree and slightly turned to right, under General anaesthesia. The ‘Messerklinger Technique’ of FESS was followed in all the patients, this is an anterior to posterior approach. the surgical procedure consist of septoplasty, polypectomy uncinectomy, anterior ethmoidectomy, middle meatal antrostomy, posterior ethmoidectomy, partial middle turbinectomy. The surgery was performed by two senior surgeons. (experienced more than 5 years). After the surgery the middle meatus was packed with removable gauze packing for 7days. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

## RESULTS

During study period 120 patients satisfying study criteria were considered for present study. Majority of patients were from 19-30 years age group (45.83 %) followed by

31-40 years age group (28.33 %). Male patients (64.17 %) were more as compared to female (35.83 %).

**Table 1: Age and gender distribution**

Characteristics	No. of cases	Percentages
<b>Age (years)</b>		
19-30	55	45.83
31-40	34	28.33
41-50	21	17.50
51- 60	10	8.33
<b>Gender</b>		
Male	77	64.17
Female	43	35.83

In patients undergoing FESS, multiple surgeries were performed simultaneously such as uncinectomy (100 %), middle meatal antrostomy (100 %), anterior ethmoidectomy (100 %), posterior ethmoidectomy (76.67 %), sphenoidectomy (30 %), frontal recess surgery (25.83 %) and reduction of the middle turbinate (0.83 %)

**Table 2: Surgical procedures performed.**

Surgery	No. of cases	Percentages
Uncinectomy	120	100.00
Middle meatal antrostomy	120	100.00
Anterior ethmoidectomy	120	100.00
Posterior ethmoidectomy	92	76.67
Sphenoidectomy	36	30.00
Frontal recess surgery	31	25.83
Reduction of the middle turbinate	1	0.83

In present study we noted only 1 major complication as CSF leak (0.83 %) which was effectively managed by endoscopy. Few minor complications as synechia requiring treatment (4.17 %), periorbital emphysema (1.67 %), epistaxis requiring packing (1.67 %), periorbital ecchymosis (0.83 %) and sinus infection (0.83 %), all were managed conservatively and successfully. We did not noted any major complications such as Orbital haematoma (post septal), Loss of vision, Diplopia, Meningitis, Brain abscess, Focal brain damage, Haemorrhage requiring transfusion, Carotid artery injury, Epiphora, Blindness, CNS deficits Or any Minor complications such as Dental or lip pain or numbness, Bronchospasm, Dental or lip pain or numbness or anosmia. No mortality was observed.

**Table 3: Complications**

Complication	No. of cases	Percentages
<b>Major</b>		
CSF leak	1	0.83
<b>Minor</b>		
Adhesions requiring treatment	5	4.17
Periorbital emphysema	2	1.67
Epistaxis requiring packing	2	1.67
Periorbital ecchymosis	1	0.83
Sinus infection	1	0.83

## DISCUSSION

Chronic rhinosinusitis (CRS) also manifest nasal polyposis. Various studies have shown that 80% of polyp arise from middle meatal mucosa, uncinata process and infundibulum.<sup>2,3</sup> Multiple factors including infection, allergy, trauma, chemicals, metabolic disease and psychogenic factor have all been implicated as possible etiology of nasal polyposis.<sup>4</sup> Medical therapy forms the mainstay of management in CRS, but when this fails to improve symptoms or in the presence of actual or impending complications, surgery is usually considered. FESS complications are usually classified as major (CSF leak; orbital complications including orbital ecchymosis, diplopia or reduction of visual acuity; significant intra-operative or immediate post-operative hemorrhage) or minor (adhesions, infection, minor bleeding and post-operative pain).<sup>6</sup> Among 100 patients diagnosed as chronic sinusitis or sino nasal polyposis, planned for FESS, Shyras JAD<sup>7</sup> had noted 1% of major complications and 12% of minor complications. Major factors influencing the occurrence of complications are extension of the disease pathology and anatomical variations of the paranasal sinuses. Scott *et al.*,<sup>8</sup> in their study on 315 patients documented a complication rate of 2.5% (epistaxis, infection and swallowed nasal pack) also reported possible additional complications includes pain, vasovagal attack and swallowed nasal pack which terminated the procedures. The National Sinonasal Audit of 3128 patients reported a total adverse event rate of 6.6 %, most of which was related to minor bleeding. 0.4 % had major complications, 0.2 % were orbital complications. Five patients had a peri-orbital haematoma and 2 had peri-orbital emphysema. None had a reduction in visual acuity or extra-ocular movements. 0.06 % had a CSF leak, which were addressed intraoperatively and a further two returned to theatre because of major post-operative hemorrhage. After multivariate analysis, there was a statistically significant increase in complication rates with increasing SNOT-22 and Lund-Mackay CT scores, and extent of polyposis.<sup>9</sup> Outpatient FESS can be considered a low-risk surgical procedure, with similar rate of major complications (cerebrospinal fluid leak, meningitis, hemorrhage, orbital injuries) recorded for both primary and revision cases (0.36% vs. 0.46%, odds ratio=1.26; 95% confidence interval: 0.79–2.00).<sup>10</sup> Similar findings were noted in present study. Razzak, M. A, *et al.*<sup>11</sup> studied 60 (sixty) patients, 22(36.67%) patients were operated for Ethmoidal polyp, 19(31.67%) for chronic rhinosinusitis, 9(15%) for Antrochoanal polyp, 6(10%) for Rhinosporidiosis and 4(6.67%) for Inverted papilloma. Per operative difficulties were gross DNS 07 (11.67%), unusual bleeding 6(10%), concha bullosa 5(8.33%). Post operative complications were periorbital ecchymoses

(10%), Synechia (1.67%), Epiphora (1.67%), infection(1.67%). Complete relief of symptoms were noted in 81.67% cases.

Suzuki *et al.*,<sup>12</sup> found an overall incidence of surgical complications after FESS at 0.5%, with the corresponding rates for cerebrospinal fluid leak 0.09%, orbital injury 0.09%, and hemorrhage requiring surgery 0.1%. James G. Krings *et al.*,<sup>6</sup> conducted a retrospective cohort analysis of 78,944 primary FESS cases, 288 major complications were identified representing a complication rate of 0.36% (95% CI 0.32%–0.40%). The major complication rate following revision cases (n = 19; 0.46%) and primary cases (n = 288; 0.36%) was similar (OR=1.26; 95% CI 0.79–2.00). Multivariate analysis showed that patients who were >40 years old, had a primary payer of Medicaid, had surgery involving the frontal sinus, or had image guidance during surgery were at higher risk for major complications. In a retrospective study of 1658 patients who underwent FESS for chronic rhinosinusitis with or without polyps or mucocele, Seredyka-Burduk M *et al.*<sup>13</sup>, 32.68% of the patients required revision surgery and only 10.1% had been previously operated in same Department. Overall complications occurred in 11 patients (0.66%). Minor complications were observed in 5 patients (0.3%) with the most frequent being periorbital ecchymosis with or without emphysema. Major complications were observed in one patient (0.06%) and were related to a lacrimal duct injury. Severe complications occurred in 5 cases (0.3%), with 2 cases and referred to a retroorbital hematoma, optic nerve injury (2 cases) and one case of extraocular muscle injury. Similar findings were noted in present study. The orbit and its content is at risk during ESS because the lamina papyracea is very thin or may be incomplete. This site is the most potential risk area, especially when we do not have a good quality of vision or using powered instrumentation. The minor complications are referred to lamina papyracea injury mostly during maxillary antrostomy or ethmoidectomy. This complications are mostly seen with hypoplastic maxillary sinus or Silent Sinus Syndrome (SSS).<sup>14,15,16</sup> In cases of Outpatient FESS, surgery itself presents an independent risk factor for an unanticipated overnight hospital admission, and for early hospital readmission due to nasal bleeding, pain, or intolerance of nasal packing or dressing.<sup>17,18</sup> From its introduction, the concepts of endoscopic sinus surgery continue to evolve because of increased understanding of the anatomy, improved endoscopes and video equipment, newer instrumentation, and improved technology. Pre-operative imaging of the patient to understand the extent of the disease and anatomical variations, thorough knowledge of anatomy, identification of key landmarks, preservation of normal sinus mucosa, meticulous intra operative tissue handling, periodic saline irrigation, proper hemostasis and

using technologically advanced instruments are the major factors, which can definitely reduce the occurrence of complications and improve the patient outcome.<sup>7</sup> The use of FESS allows for a much less invasive and traumatic procedure, resulting in shorter surgery and healing times, less postoperative discomfort, and fewer surgical complications

## CONCLUSION

FESS is one of the most commonly performed operations in otorhinolaryngology and is generally a safe procedure, with a low rate of complications but as with any surgical intervention, it carries risks and major complications may occur.

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