

# Functional Endoscopic Sinus Surgery( FESS)

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## Abstract

**Background:** To study the management of the patients of various nasal and para nasal sinuses diseases with endoscopic sinus surgery in terms of age, gender, disease pattern, surgical procedures, complications and recurrence rate.

**Methods:** In this descriptive study 146 patients of different sinonasal disease treated with endoscopic sinus surgery were included. Patients with CSF leak, nasolacrimal duct obstruction , polyps,with and without history of allergy and asthma were included. Patients with mucormycosis, invasive fungal sinusitis, malignancy and very elderly were not included. Pre-operative CT scan was a pre requisite in all patients. Fibreoptic light was passed through the canaliculi to identify the lacrimal sac or after dilating the puncta with a lacrimal probe,it was passed into the superior and inferior canaliculi to know the position of lacrimal sac .The lacrimal sac is located lateral to the maxillary line at its superior edge. Drill was used to create a window.All patients had their visual acuity , colour vision and funduscopy done prior to surgery. Flourescein dye was used for CSF rhinorhea demonstration prior to CSF leak repair preoperatively. On the 4<sup>th</sup> postoperative day the patients had removal of their crusts and had examination of nasal cavity.

**Results:** Mean age was 33 years. The commonest presenting feature was nasal obstruction and nasal discharge. Most of the patients had allergic fungal sinusitis though we did manage to do isolated cases of sphenoiditis, a couple of DCR and of CSF Rhinorrhea. The most common complication we encountered was recurrence of disease followed by periorbital pain and bruising and pain.

**Conclusion:** Endoscopic sinus surgery is the standard of care in modern rhinology and more work is required in our country to promote its training and use for the betterment of patients.

**Key Words:** Functional Endoscopic Sinus Surgery( FESS) ,Rhinology, Sinus surgery

## Introduction

FESS (Functional Endoscopic Sinus Surgery) is a relatively recent surgical procedure that uses nasal endoscopes using Hopkin rod lens technology through

the nostrils to avoid cutting the skin. FESS came into existence due to the pioneering work of Dr messerklinger and stamburger.<sup>1</sup> Later on workers like Wigand<sup>2</sup> and others have shown convincingly that the keystone to the pathogenesis and persistence of chronic maxillary and frontal sinus infection is the osteomeatal complex.<sup>2</sup> Stamburger did experimental and fluoroscopic studies in which he showed that the mucociliary movement of the para nasal sinuses always follow a definite pathway and is always towards the natural ostium.<sup>3</sup> Nasal polyps are the common presentation of patients having chronic sinusitis or allergic fungal sinusitis. They are difficult to treat because of multifactorial causes. A nasal polyp is an oedematous hypertrophied mucosa and submucosa of nose and paranasal sinuses. The cause of eye involvement and proptosis is usually disease in the ethmoids.<sup>4</sup>

The technique utilizes telescopes 4mm (adult use) and 2.7 mm (pediatric use) with a variety of viewing angle (0degree to 30,45,70,90 and 120 degrees). These telescopes provide good illumination inside nasal cavity and sinuses. Fess surgery is mostly directed towards the osteomeatal complex situated beneath the middle turbinate; this is the area which receives drainage from anterior ethmoids, maxillary and frontal sinuses. The term functional was introduced to distinguish this type of surgery from non endoscopic conventional procedures and this procedure has now been widely accepted as the treatment of choice for chronic inflammatory sinus disease.<sup>5</sup>

The diagnosis of chronic sinusitis is based on clinical presentation, nasal endoscopy and computed tomography scans. The scans highlight the extent of pathology its relation to roof of ethmoids and the orbit and the anatomy of the middle turbinate with the osteomeatal complex.<sup>6</sup> High definition cameras, monitors and a host of tiny articulating instruments aid in identifying and restoring the proper drainage of these sinuses. Biopsies can also be taken. We use powered instruments which include microdebrider or shaver having suction and irrigation facility attached. Pathologies were addressed using micro forceps and shaver which cut and sucks the polyps. All sinuses can be assessed through this modality by means of this surgery. The steps are uncinectomy, infundibulotomy,

bullae resection, antrostomy, sphenoidotomy and frontal recess dissection.

### Patients and Methods

This study was carried in the department of ENT Head and Neck Surgery Holy Family hospital from June 2010 to December 2013. A total of 146 patients of different sinonasal disease treated with endoscopic sinus surgery patients were studied retrospectively. There was no age or sex restriction. Patients with CSF leak, nasolacrimal duct obstruction, polyps, with and without history of allergy and asthma were included in our study. Patients with mucormycosis, invasive fungal sinusitis, malignancy and very elderly were not included in our study.

Pre-operatively all patients were prepared for general anaesthesia. After admission all patients were given a course of antibiotic and steroids for five days and anti allergic if they had a family history of allergy. All patients were assessed if they were asthmatic and clinically if they had any wheeze. If their asthma was controlled at the time of admission they were prepared to be operated on the list. Uncontrolled asthma patient were first referred and managed by the medical department and then referred back for surgery. Pre-operative CT scan was a pre requisite in all patients where axial and coronal cuts at 5mm were done without contrast of nose, para nasal sinuses, orbit and brain. In Patients with CSF leak omnipaque dye was given to visualize the area of leak. All patients undergoing DCR underwent checking of their canaliculi in eye OPD prior to endoscopic DCR. In this technique the fiberoptic light is passed through the canaliculi to identify the lacrimal sac or after dilating the puncta with a lacrimal probe, it is passed into the superior and inferior canaliculi to know the position of lacrimal sac, the lacrimal sac is located lateral to the maxillary line at its superior edge and we have used drill to create a window at this area because it created a wide exposure of sac without heating or damaging the surrounding structure at the edge of bone. All patients had their visual acuity, colour vision and fundoscopy done prior to surgery. Patients were given hypotensive anaesthesia so that there was minimal bleeding. Use of 1:1000 adrenaline packs were done pledgets of which were placed intra-nasally for 5 minutes prior to local injection into the mucosa. Savlon was used for defogging and saline for irrigation of nasal cavity to remove blood drops and to clear the nasal cavity. Fluorescein dye was used for CSF rhinorrhoea demonstration prior to CSF leak repair preoperatively. All tissues removed as polyps or cheesy material were divided into two portions. One

was kept in formalin and sent for histopathology the other was kept in saline and sent for fungal staining and culture. Postop nasal douching of nasal cavity with saline was started. Patients with allergic fungal sinusitis were started on steroids for at least three months post operatively. The patients were discharged on 2<sup>nd</sup> post operative day and were called on 4<sup>th</sup> post operative day for check up. On the 4<sup>th</sup> postoperative day the patients had removal of their crusts and had examination of nasal cavity and had nasal douching along with checking of vision. Post operatively for 6 weeks, patients were given preferably intranasal steroids. Vision was checked in all patients and stents were removed in DCR patients after 6 weeks. Precautions were advised to all patients having CSF Rhinorrhoea repair. Avoidance of nasal straining, and use of stool softeners were used for patient with CSF rhinorrhoea. Antibiotics were continued for another two weeks and post operative CT scan were repeated after two months.

### Results

Out of one hundred and forty six (146) patients, one hundred and forty four (144) patients were available for follow up. The total number of males were 88, with a male to female ratio of 1:2:1. The mean age was 33 years. Maximum number of cases were done in 2013 followed by 2012, 2011, and then 2010 (Table 1). The most common symptom was nasal obstruction 60% (Table 2). Polyps (80%) and Intra nasal discharge (70%) were the most common signs (40%) (Table 3; Figure 1&2). Concha bullosa with paradoxical middle turbinate were common anatomical variations that we encountered (Figure 1&2). The most common cases were of sinonasal polyposis due to allergic fungal sinusitis 71%, followed by Dacrocysto rhinostomy (20%), DCR (14%), CSF Repair (5%), chronic sinusitis (3%), DNS (1.3%), isolated sphenoiditis (1.3%), and epistaxis (2.3%). The recurrent rate is high after simple polypectomy. All patients were followed up for a period of one year. Good results were achieved as 95% of our patients showed improvement in nasal obstruction and rhinorrhoea improved in 80%. We had a total of 17% patients who presented with recurrence of disease these were the patients of allergic fungal sinusitis, this was followed by 12 patients of post operative pain and peri-orbital swelling and bruising (Table 4).

Table 1. Number of cases in each year.

Year	Number of Patients
2010	18
2011	23
2012	45
2013	60

**Table 2: Presenting symptoms**

Nasal Symptoms	%age involvement
Nasal Destruction	60 %
Sneezing	47 %
Anterior Nasal Discharge	44 %
Visual Disturbance	20 %
Proptosis	20 %
Headache	15 %
Epiphora	12 %

**Table 3: Nasal signs**

Nasal Signs	%age involvement
Polyp	80 %
Intra nasal Discharge	70 %
Peri-orbital Swelling	40 %
Low Visual acuity	32 %
Hyperteleorism	15 %
Tenderness Sinuses	15 %

**Table 4. Complications**

Complication encountered	Number of cases
Nasal bleeding requiring transfusion	NIL
CSF Leak	NIL
Peri-orbital Fat exposure	3
Orbital Hematoma	NIL
Injury to internal carotid artery	NIL
Injury to optic nerve	NIL
Meningitis	NIL
Recurrence	15
Peri-orbital bruising & emphysema	6



**Figure 1: Preoperative scan of sphenoiditis**



**Fig 2 Post op scan of sphenoiditis**

## Discussion

Functional Endoscopic Sinus Surgery has become one of the most common surgical procedures performed in major cities of Pakistan. It basically addresses the sinus disease at the osteomeatal complex which comprises unciniate process, the middle meatus, and hiatus semilunaris. It aims at the removal of tissue obstructing the osteomeatal complex and facilitation of drainage while conserving the normal non-obstructing anatomy and mucous membrane. Use of powered instruments during FESS requires great care and a wide knowledge of the anatomy related to the orbit.

There are sufficient reports on the incidence of complications after endonasal surgery of paranasal sinuses. The most dangerous is blindness<sup>10</sup> resulting from damage to optic nerve. However the frequency of this complication is very low. Comparing our results with a study done by Ghori et al the complications in our study group showed recurrence of polyps were 17%, while in their case was 12%.<sup>11</sup> They also had no major complication like our study though minor complications like peri orbital pain, bruising, headache and adhesions were present in their study as well. The major symptoms were the same in both the studies which were nasal obstruction and nasal discharge. Good results were achieved also in both the studies. Their patients had 92% improvement in nasal obstruction and 88% got better with reduced rhinorrhea (Table 5)

FESS was well established by first third of the century. It is based on commendable anatomical studies of Zuckerkandl, Onodi and Greenwald. The term FESS was coined by Kennedy<sup>12</sup>. Further pioneer work was done by Messerklinger and Stamburger. Functional endoscopic sinus has become the standard for chronic polypoidal sinusitis. Anatomical and technical knowledge gained from cadaver sections and surgical experience has helped us in preventing complications. The field of FESS is not only limited to domain of Otorhinolaryngology. It also extends to ophthalmology, cranium and middle fossa pathological condition. The anatomy must be demonstrated with computed tomography before endoscopic surgery in order to avoid complications<sup>13</sup>. This field encompass surgery related to orbital decompression, lacrimal obstruction, optic nerve decompression and pituitary tumour surgery.

**Table 5. Comparison with local study**

Comparison variable	Study of Ghori et al	Present study
Total no of patients	50	144
Most common Symptom	Nasal obstruction and nasal discharge	Nasal obstruction and anterior discharge
Major diagnosis	Sino-nasal Polyposis	Sino-nasal Polyposis
Major complication	None	None
Minor complications	Recurrence, peri-orbital pain and adhesions	Recurrence, periorbital pain and periorbital fat exposure

One of FESS protocols included conducting radiological studies of orbit, brain and paranasal sinuses. This helped surgeons in appreciating the various anatomical variations, the extent of the disease process and its relation with vital structures. The axial views help in showing the relationship of disease with medial rectus and lamina papyracea and the coronal views for sinus and orbital anatomy particularly at cribriform plate (floor of anterior cranial fossa). Anatomical variations appreciated, on CT scan were dehiscent or absent lamina papyracea, paradoxical middle turbinate, concha bullosa and rudimentary sphenoid sinus. These anatomical factors can lead to blockage of osteomeatal complex.<sup>14</sup> CT Scan only correlate with surgical findings in only 84% percent of the orbital complications of sinus involvement. <sup>14</sup> Magnetic resonance imaging is better for fungal infections of the paranasal sinuses and orbit

## Conclusion

1. Sinus endoscopy is a method of diagnosing sinonasal symptoms and disease. Functional endoscopic sinus surgery has provided a safe, efficient method for dealing with identified nasal disease.
2. FESS provides an illuminated way into the nasal cavity so that chronic sinusitis and sinus nasal polyposis can be managed with great success.

## References

1. Messerklinger W. Endoscopy of the Nose, Baltimore Urban and Schwarzenberg, 1978.
2. Wigand, E.M. Endoscopic surgery of the paranasal sinuses and anterior skull base. New York Thieme Medical Publishers Inc. 1990.
3. Stammberger H. Endoscopic Endonasal Surgery-Concepts in treatment of recurring rhinosinusitis Part 1. Anatomic and pathophysiologic consideration. Part 2. Surgical Technique. Otolaryngol. Head Neck Surg, 2011;94:143-56.
4. Khan NH, Moin M, Khan MA, Hameed A. Unilateral proptosis: a local experience. Biomedica, 2012;20(2):1114-16.
5. Haque MR. A study of functional endoscopic sinus surgery technique. Mymensingh Med J. 2004;13:39-42.
6. Moulin G. Radiologic imaging of chronic sinusitis in the adult. J Radiol. 2003;124:151-19.
7. Jokinen K and Karja J. Endonasal dacryostomy rhinostomy. Arch Otolaryngol, 1974;100:41-44.
8. Dalzivi. K Systematic review endoscopic sinus surgery for nasal polyps. Health Technol Assess 2013;7:1-159
9. Israr A and Azhar H. Nasal polyps a recurrent problem. Pakistan Postgraduate Medical Journal 1994;5:30-34.
10. Bernal SM, Sudhoff H, Dazert S. Complications after endonasal surgery of the paranasal sinuses for inflammatory disease. Laryngotology 2004;83:23-28.
11. Ghori S M, Aziz B, Pal MB. An Analysis of functional Endoscopic Sinus Surgery (FESS) for Sinus Disease. FJMHS 2012;6:827-830.11)
12. Kennedy DW. Functional endoscopic sinus surgery. Technique. Arch Otolaryngol 1985;111:643-9.
13. Drake Lee AB. Nasal Polyps. Hosp Med. 2004;65(5):264-67.
14. Daniels DL, Yu S, Peck P, Houghton VM. Computed tomography and magnetic resonance imaging of orbital apex. Radiol Clin North Am 1987;24:803-17.