

## FUNCTIONAL ENDOSCOPIC SINUS SURGERY

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### Abstract

Treatment of sinonasal diseases is either conservative or surgical. The recent advances in surgical management is the use of endoscopic sinus surgery (ESS) as it causes less morbidity, complication, pain and above all, less recurrence rates.

This study aimed to evaluate the effectiveness of ESS for the treatment of nasal & paranasal sinus diseases and to address the postoperative complications.

A prospective study was done at the Department of Otolaryngology in Basrah Teaching Hospital in the period from January 2016 to August 2019. One hundred twenty six patients with sinonasal diseases were involved in this study, more than this number of patients was operated upon but they either refused participation in this study or dropped from follow-up.

The main indications of surgery were; chronic rhinosinusitis without nasal polyp (33%), chronic rhinosinusitis with nasal polyp (28.6%), Allergic fungal sinusitis & mycetoma (17.4%), and acute recurrent sinusitis (16%).

Main presenting symptoms were; nasal obstruction (85.7%), nasal discharge (69%), headache and facial pain (66.6%) and hyposmia and or anosmia (57.9%).

The majority of operated upon patients were primary cases (98 patients, 77.7%), while (28 patients, 22.2%) were revision cases. The commonest causes of revision were; retained or incompletely removed uncinata process in 28.5% of cases, followed by incomplete removal or persistence of anterior ethmoid cells in 21.4% cases.

In this series complications occurred in 15%, which were generally minor (9.5%), major complications occurred in 5.5% of operated upon patients. The commonest major complication is sever bleeding which was reported in 4.7% and anosmia which was reported in one patient. No CSF leak, retro orbital haemorrhage, or blindness was reported.

Most of the patients in this series were improved (88.8%), complete symptom improvement occurred in (75 patients, 59.5%), partial improvement (37 patients, 29.3%), while (14 patients, 11%) were not improved.

In conclusion, functional endoscopic sinus surgery is a safe surgery for sinonasal diseases, it carry good success rate with non-significant major complications.

*Key words: Nasal Sinus, Functional Surgery, Endoscopy*

### Introduction

Endoscopic sinus surgery (ESS) is a recent addition in the management of chronic sinusitis. Surgical treatment of chronic sinusitis, until late, has been based on the concept that diseased sinus mucosa should be radically removed to enable new healthy mucosa to grow in its place for which most popular operation in the past has been Caldwell-Luc procedure. Messerklinger's work on sinus mucosa and mucociliary transport has

now shown that pathology is not primarily in larger sinuses, but is always secondary to impaired drainage caused by the disease in the ethmoidal air cells blocking their natural ostia in the middle meatus<sup>1,2</sup>.

It has now been clearly established that if the ostium of the unhealthy sinus is unblocked surgically by removal of diseased ethmoidal air cells, the rest of the diseased mucosa reverts back to

normal. Functional endoscopic sinus surgery is a set of minimally invasive surgical techniques which permit direct visual examination and opening of the sinuses for the treatment of chronic rhinosinusitis which has not improved by medical treatment<sup>3,4</sup>. The use of FESS allows for a much less invasive and traumatic surgery, consequent in shorter surgery and healing times, less postoperative awkwardness, and littler surgical complications.

Rhinosinusitis is inflammation of the mucosal membrane lining the nasal cavities and the paranasal sinuses. Rhinosinusitis lasting more than 12 weeks is classified as chronic rhinosinusitis (CRS)<sup>5,6</sup>.

The aims of treating CRS are to remove underlying causes, diminish sinus inflammation, and drain nasal passages. Medical treatment is the first-line treatment for CRS. Treatment options may include nasal saline sprays, nasal lavage, antibiotic therapy, nasal corticosteroids, oral or injected corticosteroids, decongestants, over-the-counter pain relievers, leukotriene modifiers, and antihistamines. Patients who do not respond to medical therapy are candidates for sinus surgery<sup>7</sup>.

The aim of present study is to evaluate the effectiveness of FESS for the treatment of nose & paranasal sinus diseases, and to address the postoperative complications.

### Patients and Methods

This prospective study was performed at Department of Otorhinolaryngology in Basrah Teaching Hospital, in the period from January 2016 to August 2019. The study included one hundred twenty six patients who were clinically, endoscopically and radiologically suggestive to have sinonasal diseases and not responded to usual medical treatment.

Malignant diseases of nose and paranasal sinuses were excluded. Preoperative CT of sinus and nasendoscopy serves as a road map for surgery. Surgery was performed usually under general anesthesia except in 5 patients (2 pregnant women in first trimester and 3 patients with uncontrolled DM, and hypertension). Patients were put in supine position with elevation of head. After proper nasal mucosal decongestion, the 0o and 30o endoscopes were commonly used along with special Blakesly straight and angled forceps. Following the 1st pass (examination of nasopharynx and inferior meatus), the scope was moved medial to middle turbinate to see sphenoethmoidal recess, opening of posterior ethmoids and sphenoidal sinus (second pass). Third pass, when endoscope was passed into middle meatus to see OMC also called key area.

Uncinate process, ethmoidal bulla, hiatus semilunaris and frontal recess were visualized, uncinectomy was done to visualize the opening of maxillary sinus, ethmoidal bulla if enlarged is also removed by opening at its medial and inferior portion with a Blakesley's forceps.

Posterior ethmoidectomy was done by identifying the ground lamella posterior to the bulla, which was pierced by a upcutting forceps, any other pathology was also dealt likewise, merocele pack was kept to be removed after 24 hours<sup>8,9</sup>, then patients were followed-up for 6 months.

### Results

The study included 126 patients, 71 of them were males and 55 were females, male to female ratio was 1.29:1, their age ranged from 9 to 74 years, the commonest operated upon age group was 41-50 years, this is clearly demonstrated in table I.

Table I: Demographic characteristics of the studied patients.

Age group	Males	Femals	Total no.	%
11-20	4	10	14	11
21-30	9	14	23	18.2
31-40	13	9	22	17.4
41-50	19	9	28	22.2
51-60	13	8	21	16.6
61-70	11	5	16	12.6
70-	2	0	2	1.5
Total	71	55	126	100

Table II, shows the presenting symptoms of the studied patients, the commonest symptom was nasal obstruction, congestion or blockage (85.7%), followed by nasal discharge, headache and facial pain (69% and 66.6%) respectively.

Table II: The presenting symptoms of included patients.

Presenting symptom	No.	%
Nasal obstruction (congestion and block)	108	85.7
Nasal discharge	87	69
Headache and Facial pain	84	66.6
Hyposmia and anosmia	73	57.9
Voice changes	41	32.5
Snoring	36	28.5
Nosebleed	12	9
Significant sneezing	8	6

The commonest indication of FESS in the present series was chronic rhinosinusitis (78 patients, 61.6%) of the studied patients, 42 patients have rhinosinusitis without nasal polyps, while 36 have chronic rhinosinusitis with nasal polyps, as shown in table III.

Table III: Indications of functional endoscopic sinus surgery

Indications of FESS	No.	%
• Chronic rhinosinusitis without nasal polyp	42	33
• Chronic rhinosinusitis with nasal polyp	36	28.6
• Allergic fungal sinusitis and mycetoma	22	17.4
• Acute recurrent rhinosinusitis	8	6.3
• Inverted papillomas	5	3.9
• Frontoethmoidal mucoceles	4	3
• Removal of foreign body in maxillary sinus.	4	3
• Antrochoanal polyp	3	2.3
• Drainage of periorbital abscess	2	1.5

The majority of the patients were operated upon for the first time (primary cases), which involved 98 patients that equal to (77.7%), while revision surgery was performed for 28 patients (22.2%), this is clearly illustrated in figure 1.

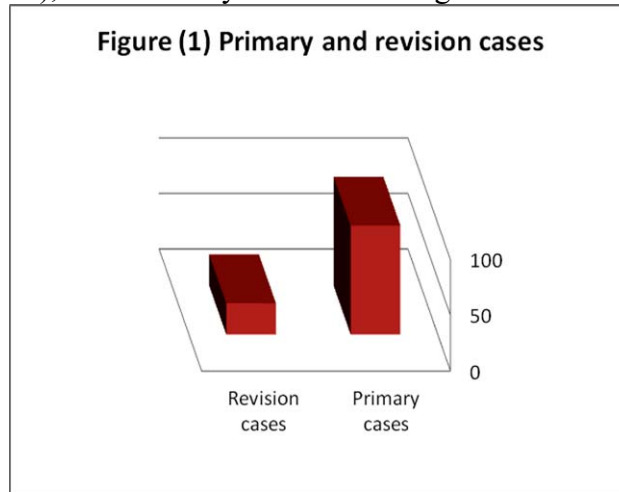
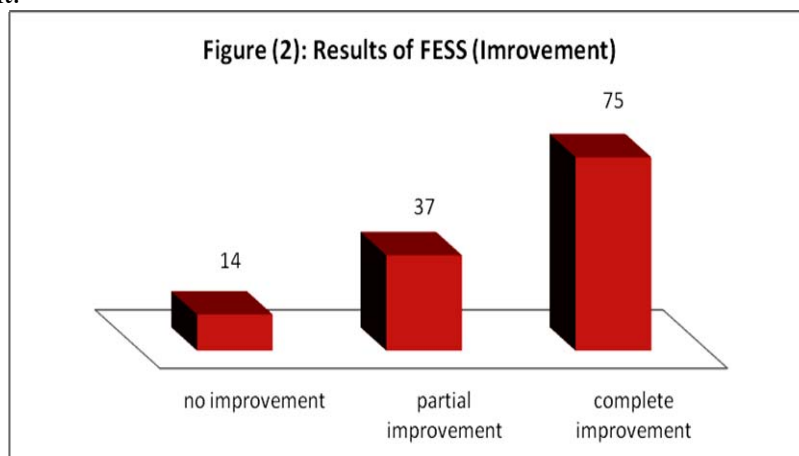


Table IV, display the main causes of revision surgery, the commonest cause was recurrent nasal polyposis which comprised 28.5%, followed by persistent anterior ethmoid cells (21.4%).

Table IV: Causes of revision surgery.

Causes of revision surgery	No.	%
• Recurrent nasal polyposis	8	28.5
• Persistent Anterior ethmoidal	6	21.4
• lateralization of remnant of middle turbinate	4	14.3
• Recurrent allergic fungal rhinosinusitis	4	14.3
• Persistent agger nasi cells	3	10.7
• Persistent/recurrent frontal sinus disease	3	10.7

Figure 2, shows the results of FESS performed for the studied patients, the majority (112 patients, more than 88%) were improved, in 59.5% (75 patients), the recovery was complete and 29.3% (37 patients), was partial, while 14 patients (11%), there was no improvement.



The complications of FESS occurred in 19 patients (15%). The majority were minors (12 patients, 9.5%), most of them were synechia, while in 7 patients (5.5%), the complications were majors and common major complications were severe intraoperative and postoperative bleeding, this is shown in table V.

Table V: Complications of FESS.

Major Complications	No.	%
Bleeding	6	4.7
Intraoperative	4	3
Postoperative	2	1.5
Anosmia	1	0.7
Minor Complications	No.	%
Synechia	7	5.5
Dental pain and parasthesia	3	2.3
Stenosis of maxillary sinus ostium	2	1.5

## Discussion

The age of this study participants was between 9-74 years while in many studies<sup>10-13</sup> it was 35.7 to 43.2 years, and 54.0 years in one study<sup>11</sup>.

Males were 71 and females were 55. The gender distribution reported in other studies<sup>10-13</sup> was males proportion ranging from 54 to 67%, these results are nearly comparable with the present study.

In Shahbaz<sup>14</sup> study, fifty patients from all age groups i.e., 6-65 years were studied and treated endoscopically. Out of 50 cases 13 were females and 37 were males, this finding is nearly similar to ours.

The commonest indication of FESS in the present series was chronic rhinosinusitis (78 patients, 61.6%) of the studied patients, 42 patients have rhinosinusitis without nasal polyps, while 36 were have chronic rhinosinusitis with nasal polyps, this is goes with Dale H. Rice report, he stated that the two basic indications for FESS, are chronic bacterial sinusitis and recurrent bacterial sinusitis<sup>15</sup>. Absolute indications for sinus surgery include bilateral extensive and massive obstructive nasal polyposis with complications and relative indications for sinus surgery include persistent chronic adult rhinosinusitis in spite of aggressive medical therapy<sup>16</sup>.

In the present study, the majority of patients operated upon were for the first time (primary cases), which involved 98 patients that equal to 77.7%, while revision surgery was performed for 28 patients (22.2%). In 17 out of 28 (60.7%) a nonendoscopic procedures were performed and 11 (39.2%) patient were by endoscopy. The main causes were recurrent nasal polyposis which comprised 28.5%, followed by persistent anterior ethmoid cells 21.4%.

As with all surgical interventions, the aim of FESS should provide appropriate resolution of pathology without recurrence of disease. Despite this admirable aim, the reality is that up to 20% of patients will require revision FESS within 5 years, 43% of which will be within the first postoperative year<sup>17</sup>. A lack of anatomical and physiological understanding can increase the need for revision surgery<sup>18</sup>. Risk factors for requirement of revision surgery are listed below<sup>19-22</sup>. Both the surgeon and patient should be aware that revision FESS carries an increased overall risk of complications and need for further revision surgery<sup>23-25</sup>. The following are risk factors for requiring revision FESS<sup>26</sup>: Nasal polyposis, Inverted Papilloma,

Allergic fungal rhinosinusitis, Frontal sinus disease, Cystic fibrosis, Obesity, Immune deficiency, Smoking, and Female gender.

In the current study, the revision surgeries performed for those who did FESS is only 8% (11 out of 126), which is nearly equal or below these studies which stated that majority of patients undergoing FESS will require a single operation, 10–19% of patients will require revision surgery<sup>27-29</sup>.

In the current study, the commonest symptom was nasal obstruction, congestion or blockage (85.7%), followed by nasal discharge, headache and facial pain (69% and 66.6% ) respectively, this in agreement with Shahbaz et al study, but not comparable with a study performed for 250 patients in which they found that majority of symptoms were nasal discharge and sinogenic pain (128 and 91) respectively<sup>30</sup>.

The majority of patients underwent FESS in our study. More than 88% were improved, in 59.5%, the recovery was complete and 29.3% was partial improvement, while 14 patients (11%), there was no improvement, this result is better than many studies which recorded that improvement is more than 75%<sup>31,32</sup>, probably the cause behind that is the short followup period in the present study, but it is much less than a study performed for 120 patients as they found that 97.5% of patients noted improvement of their complaints (85%, marked improvement; 12.5% mild improvement)<sup>33</sup>.

In 2003, a review of the literature by Lieu and Piccirillo<sup>34</sup> revealed 35 studies that showed improvement of symptoms after FESS ranging from 69 to 94%.

Shahbaz found that FESS with one year followup, resulted in improvement of nasal obstruction 92%, rhinorhea 88%,

post nasal drip 88% and snoring 90%.

The complications of FESS in the present study occurred in 19 patients (15%). The majority were minors (12 patients, 9.5%), mainly were synechia, while in 7 patients (5.5%), the complications were majors and common major complications were severe intraoperative and postoperative bleeding.

A study performed in U.K. showed that FESS major complication rate was 0.23%. Cerebrospinal fluid leak was the most common serious complication accounting for 24 of the 36 reports<sup>35</sup>.

Dalziel et al<sup>36</sup>, found the complication rates be less than 1%. He stated that causes for decrement include improved training and instrumentation.

Complication rates have been reduced as training, experience, comfort with endoscopes and powered instruments have increased. In experienced hands, minor complication rates of 5% and major complication rates below 1% were cited<sup>37-39</sup>.

Lieu and Piccirillo<sup>40</sup> identified 35 articles pertaining to the use of sinus surgery for CRS, with patient improvement associated with FESS ranging from 68.9% for good outcome<sup>41</sup> to 94% with at least 50% improvement<sup>42</sup>.

**Conclusion:** Functional endoscopic sinus surgery (FESS) is a minimally invasive surgical procedure which allow direct thorough visual examination and re-opening of the sinuses for the treatment of set of sinonasal diseases, which has not responded to medical treatment. The use of FESS permits for a much less aggressive and traumatic procedure, resulting in shorter time for surgery and healing process, with very good improvement, less postoperative awkwardness, and relatively fewer surgical complications.

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