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Functional Endoscopic Sinus Surgery and Conventional Surgery in the Management of Chronic Sinusitis

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ABSTRACT

Background & objective: The interest in functional endoscopic sinus surgery (FESS) in the management of chronic sinusitis is increasing day by day. The proponents of FESS for the treatment of chronic sinusitis claim that it is superior to conventional sinus surgery in the management of the disease, but there are limited studies addressing the issue. The present study was undertaken to make a comparative evaluation between FESS and conventional surgery in the treatment of chronic sinusitis.

Materials & Methods: This prospective study was conducted between October 2005 to March 2006 in the Department of ENT and Head-Neck Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), and Dhaka Medical College Hospital (DMCH), Dhaka. A total of 60 patients of chronic sinusitis with failed conservative treatment or chronic sinusitis with polyps admitted for surgical treatment were included. Selected patients irrespective of age and sex were randomly assigned to either FESS (n=30) or conventional surgery (n=30) followed by respective interventions. Baseline clinical characteristics, image findings and outcome variables were studied.

Result: Majority of the patients (around 70%) in either group was in their second and third decades of life. Males were a bit higher in the FESS group. Nasal obstruction was the predominant complaints (75%) followed by nasal discharge (68.3%) and headache (66.7%). X-ray of paranasal sinuses showed opacity in maxillary antrum and nasal fossa in 90% and mucosal thickening in maxillary antrum in 58.3% cases. CT scan showed isodense shadow in ethmoid region and nasal fossa (86.7%) with blocked osteomeatal complex (OMC) on both sides (73.3%) and mucosal thickening in maxillary antrum (46.7%). The indications for FESS were chronic sinusitis with ethmoidal polyp (73.3%), while that for conventional surgery was chronic sinusitis alone (56.7%). Majority (83.3%) of the FESS group and two-thirds (66.7%) of the conventional group had unilateral operation. Most (90%) of the FESS group required nasal or antral packing during procedure than that of the conventional group (43.3%) ($p<0.001$). Complete recovery was significantly higher in the former group (70%) than that in the latter group (40%) ($p = 0.047$). Shorter hospital stay (up to 2 days) was observed in majority of the former group patients (0.001). In terms of complications, periorbital oedema was appreciably lower and numbness of the cheek was completely absent in FESS group than those in the Conventional group ($p < 0.001$ and $p = 0.005$ respectively).

Conclusion: Functional endoscopic sinus surgery offers higher success and lower morbidity than conventional surgery in the management of chronic sinusitis with or without polyp. However, proper training is mandatory to acquire proficiency in FESS.

Key words: Functional endoscopic sinus surgery (FESS), conventional surgery and chronic sinusitis.

INTRODUCTION

Sinusitis remains one of the most overlooked and misunderstood problem in clinical practice. Incorrect diagnosis and treatment of sinusitis lead to chronic sinusitis, aggravation of symptoms as well as complications such as intracranial and intraorbital infection, which can be quite serious.[1] For normal physiologic function

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of paranasal sinuses, the ostia must be patent, the cilia must be functioning effectively and the secretion should be normal. Retention of secretion in the paranasal sinuses can be due to one or more of the following: obstruction of ostia, reduction in the number or impaired function of cilia or overproduction or change in the viscosity of secretion.[2] Diagnosis of chronic sinusitis can be made on clinical history, physical and radiological examination. Proper treatment of chronic sinusitis is essential to maintain normal life. The treatment may be medical and surgical. While medical treatment includes antibiotic, decongestant, steroid and analgesic, surgical treatment is functional or radical.[3]

Previously it was believed that mucosa had become chronically inflamed and irreversibly damaged and as such it had to be removed. This was the rationale behind conventional surgery like the Caldwell-Luc surgical technique, which involves the removal of diseased lining of the maxillary antrum and antral washout. Similarly the external surgical approaches to ethmoid and frontal sinuses were designed for "radical operation" in which disease was completely cleared. These procedures left scars and caused significant morbidity. Caldwell-Luc procedure also caused numbness of teeth and cheek.[4]

To overcome these demerits and limitations of Caldwell-Luc procedure, Functional Endoscopic Sinus Surgery (FESS) emerged. The rationale behind the FESS is that localized pathology in the osteomeatal complex blocks the ostia and leads to inflammation in the dependent sinuses. The surgical intervention in this procedure is designed to remove the osteomeatal blockage and restore normal sinuses ventilation and mucociliary function. FESS, like all minimal invasive surgery is designed to have an excellent outcome with minimal patient discomfort. As mentioned, the main advantage of FESS compared with conventional surgery is that it is less invasive and scars with damage to the nerve supply of the teeth are avoided. The use of endoscope permits a better view of surgical field leading to meticulous cleaning of the surgical cavity with consequent lower rate of complication.[5] Functional endoscopic sinus surgery can be performed under both local or general anesthesia. However, Local anesthesia with deep sedation is preferable because sensory information remains intact along the periorbital and skull base region. Other beneficial effects of local anesthesia are minimum bleeding during operation, less hospital stay and less cost.

Because of the above merits, the interest in endoscopic sinus surgery is increasing day by day. The surgeons who employ FESS for the treatment of chronic sinusitis in Bangladesh generally claim that it is superior to conventional sinus surgery in the management of the disease,[4] but there is paucity of studies regarding its efficacy on chronic sinusitis. That purpose the present study was undertaken to make a comparative evaluation between FESS and conventional surgery in the treatment of chronic sinusitis.

Materials & Methods

This prospective study was conducted over a period of 6 months between October 2005 to March 2006 in the Department of ENT and Head-Neck Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka and Dhaka Medical College and Hospital (DMCH). A total of 60 patients of chronic sinusitis resistant to conservative treatment or chronic sinusitis with polyps admitted for surgical treatment were included in the study. The patients of any age and either sex were randomly assigned to either FESS (n = 30) or conventional surgery (n = 30) and received their respective interventions. Baseline clinical characteristics, image findings and outcome variables were studied. Data were processed and analysed using software SPSS (Statistical Package for Social Sciences) version 16.0. The test statistics used to analyse the data were descriptive statistics, Chi-square (c^2) or Fisher's Exact Test with level of significance being set at 0.05 and p-value < 0.05 was considered as significant.

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Operative procedure

After applying suitable vasoconstrictor in the nasal cavity, the middle turbinate (the most important landmark for FESS), was first identified as at this level lies the uncinate process. First uncinectomy was done exposing the ethmoidal bullae. Then anterior and posterior group of cells were removed. Sphenoid sinus was exposed for removal of disease, if present. Natural ostium of maxillary sinus was inspected, and if found obstructed, was opened, cleared off the pathology and widened. The frontal recess was inspected and opened when there is frontal disease. The concha bullosa of the middle turbinate was removed to deal with disease and to enlarge the OMC.

RESULT

Majority of the patients (66.7% in FESS and 73.3% in Conventional group) in either group was in the age range of 21 - 40 years (p = 0.547). In the FESS group males outnumbered the females, but in the conventional group male-female distribution was almost equal (p = 0.602) (Table I). Nasal obstruction was the predominant complaints (75%) of the study patients followed by nasal discharge (68.3%) and headache (66.7%). The next common complaints were sneezing (48.3%), hyposmia (45%), recurrent sore throat (43.3%) and snoring (41.3%). In X-ray of paranasal sinuses, over 90% exhibited opacity in maxillary antrum and nasal fossa and 58.3% mucosal thickening in maxillary antrum. CT scan showed isodense shadow in ethmoid region and nasal fossa (86.7%) with blocked OMC on both sides (73.3%) and mucosal thickening in maxillary antrum (46.7%) (Table II). The indications for FESS was chronic sinusitis with ethmoidal polyp (73.3%), while that for conventional surgery was chronic sinusitis alone

TABLE I. Comparison of demographic characteristics between groups

Demographic characteristics*	Group FESS (n=30)	Conventional (n=30)	p-value
Age			
£ 20	6(20.0)	3(10.0)	
21 - 40	20(66.7)	22(73.3)	0.547
> 40	4(13.3)	5(16.7)	
Sex			
Male	18(60.0)	16(53.3)	0.602
Female	12(40.0)	14(46.8)	

Figures in the parentheses indicate corresponding %;
** Chi-squared Test (c^2) was done to analyz the data.*

TABLE II. Distribution of respondents by presenting symptom (n = 60)

Presenting symptom	Frequency	Percentage
Complaints		
Nasal obstruction	45	75.0
Nasal Discharge	41	68.3
Headache	40	66.7
Sneezing	29	48.3
Hyposmia	27	45.0
Recurrent sore throat	23	43.3
Snoring	25	41.3
Facial pain	9	15.0
Nasal bleeding	2	3.3
Findings in X-ray paranasal sinuses OM view		
Opacity in maxillary antrum and nasal fossa	55	91.7
Mucosal thickening in maxillary antrum	35	58.3
Septal deviation	11	18.3
Antral polyp	5	8.33
Findings of CT Scan		
Isodense shadow in ethmoid region and nasal fossa	13	86.7
Blocked OMC (both sides)	11	73.3
Mucosal thickening in maxillary antrum	13	46.7
Paradoxical middle turbinate	1	6.7
Agger nasi puneumatization	1	6.7
Concha bullosa	1	6.7

**Total will not correspond to 100% for multiple responses*

in 17(56.7%), chronic sinusitis with antrochoanal polyp in 10(33.3%) and chronic sinusitis with ethmoidal polyp in 3(10%) cases (Table III). Most (83.3%) of the patients in FESS group and two-thirds (66.7%) of the conventional group had unilateral operation (Table IV). Ninety percent of the FESS group required nasal or antral packing during procedure as compared to 43.3% of the Conventional group ($p < 0.001$). Majority (90%) of the FESS group had shorter hospital stay (up to 2 days) as opposed to 50% of the Conventional group ($p=0.001$). Complete recovery was significantly higher in the former group (70%) than that in the latter group (40%) ($p = 0.047$). In terms of complications following intervention, periorbital oedema was appreciably lower in FESS group (6.7%) than that in the conventional group (56.7%) ($p < 0.001$). Numbness of the cheek was completely absent in the former group compared to 23.3% in the latter group ($p = 0.005$) (Table V).

TABLE III. Distribution of study patients by their indications for surgical treatment

Indications*	Group FESS (n=30)	Conventional (n=30)	p-value
Chr. sinusitis with ethmoidal polyp	22(73.3)	3(10.0)	
Chr. sinusitis with antrochoanal polyp	5(16.7)	10(33.3)	<0.001
Chr. sinusitis	3(10.0)	17(56.7)	

Figures in the parentheses indicate corresponding %;
** Chi-squared Test (c^2) was done to analyze the data.*

TABLE IV. Comparison of site of operation between groups

Site of operation*	Group FESS (n=30)	Conventional (n=30)	p-value
Unilateral	25(83.3)	20(66.7)	0.136
Bilateral	5(16.7)	10(33.3)	

Figures in the parentheses indicate corresponding %;
**Chi-squared Test (c^2) was done to analyze the data.*

TABLE V. Comparison of different outcome between groups

Outcome*	Group FESS (n=30)	Conventional (n=30)	p-value
Need of nasal and antral packing during procedure	27(90.0)	13(43.3)	< 0.001
Duration of hospital stay			
Up to 2 days	27(90.0)	15(50.0)	0.001
>2 days	3(10.0)	15(50.0)	
Outcome of surgery			
Completely recovery	21(70.0)	12(40.0)	
Partial recovery	4(13.3)	5(16.7)	0.047
No recovery	5(16.7)	13(43.3)	
Complications			
Haemorrhage	6(20.0)	9(30.0)	0.371
Periorbital oedema	2(6.7)	17(56.7)	<0.001
Ecchymoses of eye	1(3.3)	3(10.0)	0.301
Crusting	13(43.3)	9(30.0)	0.284
Synechiae	4(13.3)	6(20.0)	0.488
Infection	1(3.3)	3(10.0)	0.301
Numbness of cheek	0(0.0)	7(23.3)	0.005

Figures in the parentheses indicate corresponding %;
**Chi-squared Test (c^2) was done to analyze the data.*

Discussion

The present study was done at BSMMU and Dhaka Medical College Hospital where both conventional surgery and FESS are regularly practised for the management of sinonasal diseases. Majority of the patients (66.7% in FESS and 73.3% in conventional group) in the present study ranged from 21-40 years indicating that sinusitis is a disease of young and early middle aged folks which is quite consistent with the findings of Venkatachalam (over 70% were in age group 21-40 years).[6] A male predominance was observed (56%) in the study which compares with other studies.[7,8]

Clinical evaluation revealed that nasal obstruction is the predominant complaint (75%) followed by nasal discharge (68.3%), headache (66.7%),

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sneezing (48.3%), hyposmia (45%), recurrent sore throat (43.3%) and snoring (41.3%). These findings are consistent with findings of Rice.[9] X-ray of paranasal sinuses showed opacity in maxillary antrum and nasal fossa in 90% cases and mucosal thickening in maxillary antrum in 58.3% cases. This result contrasts with other study where opacity in antrum was found in 100% cases, mucosal thickening in 42.8% cases and septal deviation in 18.6% cases.[10] Plain X-ray paranasal sinuses is not very informative for FESS but it is less expensive, can be done in the most centres and gives us guideline to perform other investigations such as CT scan. In this study, out of 60 patients preoperative CT scan was done in 15(25%) cases. Of them 86.7% showed isodense shadow in ethmoid region and nasal fossa. Blocked OMC on both sides and mucosal thickening in maxillary antrum were observed in 73.3% and 46.7% cases respectively. This results are inconsistent with other studies,[6,11,12] Lund et al[12] showed concha bullosa in 30%, everted uncinate process 21%, paradoxical middle turbinates 26%, Haller (intra-orbital) cells 15%, Aggar nasi pneumatization 42% and Onodi cells in 12% cases.

The major indication for FESS was chronic sinusitis with ethmoidal polyp (73.3%), while that for conventional surgery was chronic sinusitis alone (56.7%), chronic sinusitis with antrochoanal polyp (33.3%) and chronic sinusitis with ethmoidal polyp (10%). In this study 70% patients in FESS group were operated under general anaesthesia. Local anaesthesia was given in rest 30% cases. However, reverse is the case in conventional surgery where 21(70%) cases were operated under local anaesthesia and the rest 9(30%) under general anaesthesia. This result is consistent with other studies.[7,13] Local anaesthesia is usually less risky because of less bleeding, less chance of orbital and intracranial complications, for the skull base and periorbital area are highly pain sensitive.

In FESS, unilateral procedure was done in majority (83.3%) of the cases and bilateral in 16.7% cases. In conventional surgery, unilateral procedure was done in two-third (66.7%) of the cases and bilateral in one-third (33.33%) of the cases. In terms of outcome, FESS was considered superior, for 70% of this group experienced complete recovery compared to 40% of the conventional group. This is similar to the findings of Drake-Lee study,[14] but inconsistent with the findings of other studies.[10,15,16] Postoperative complications like periorbital oedema, haemorrhage, synaechiae were also much lower in the former group. Numbness of the cheek was completely absent in the former group compared to 23.3% in the later group. No life threatening complications such as CSF leak, orbital injury, blindness was noted in either group. Complications in other similar studies were reported to range from 9-29%. Gross et al reported 9% complication rate out of 123 cases.[13] Stankiewicz[17] reported 29% complications in 90 patients operated upon, with 7 major and 19 minor complications. Schaefer[18] reported 14% minor and no major complications. Stammberger[19] reported two cases of CSF leak and no other major complications in 4000 cases. Besides, in majority (90%) of the FESS group, the duration of hospital stay was 1-2 days. But in conventional group 50% had duration of 1-2 days. In FESS, out of 24 patients with nasal polyp there was no recurrence but in conventional surgery out of 13 patients with nasal polyp 2 recurred with recurrence rate being 6.7%.

So it is clear from the above discussion that FESS offers higher success and lower morbidity than conventional surgery (like antral washout, intranasal antrostomy, Caldwell-Luc operation, ethmoidectomy etc. Functional endoscopic sinus surgery which offers clear illumination of the sinonasal cavity, a prerequisite to deal with diseased tissues while preserving normal healthy structures. Most often surgery can be safely and effectively done under local anaesthesia.

However, proper training in the anatomy by cadaveric dissection is mandatory to acquire proficiency in functional endoscopic sinus surgery.

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