The safety of doing limited endoscopic sinus surgery without CT scan guidance

Basil M. N. Saeed,
Dept. of Surgery, College of Medicine, Mosul University

Abstract

To assess the safety of performing limited endoscopic sinus surgery (E.S.S.) in the absence of CT scans facilities. A prospective case-series study. ENT department, Al-Jamhori Teaching hospital during the period of March 2006 to August 2007. Seventy-three (73) patients underwent endoscopic sinus surgery. Plain sinus X-ray was the main radiological investigation because of the lack of CT scan facilities. Major complications, namely hemorrhage requiring legation or orbital decompression, intracranial injury, optic nerve injury and cerebrospinal fluid (C.S.F.) leak were not reported in any patient. We conclude that limited E.S.S. can be safely performed in the absence of CT scan facilities.

Key words: Endoscopic Sinus Surgery (E.S.S.), Computerized Tomography Scan (CT) scan, Complications of E.S.S.

Introduction

The introduction of endoscopes in sinus surgery has brought about a revolution in the approach to surgery of the paranasal sinuses. The technique was developed by Messerklinger in (1978) and Wigand in (1981). In 1986 the procedure was further refined by Stammberger and Kennedy (1). The most common indications for endoscopic sinonasal surgery (E.S.S) are: Chronic sinusitis refractory to medical treatment, recurrent sinusitis, nasal polyposis, antrochoanal polyps, sinus mucoceles, dacryocystorhinostomy (DCR), cerebrospinal fluid leak (CSF) closure and choanal atresia repair (2). A CT scan before E.S.S. is mandatory to identify the extent of the disease and the fine detailed anatomy, both pre-requisites to the safe practice of E.S.S (3).

Possible complications of endoscopic sinonasal surgery include hemorrhage, C.S.F. leak, optic nerve injury, nasolacrimal duct injury and recurrence (4).

The objective of this study is to assess the safety of performing limited endoscopic sinus surgery in the absence of CT scan guidance when such facilities are not available.

Patients & Methods

Because of the unavailability of CT scan facilities in our locality while conducting this study, careful selection of patients was done to include 73 candidates in this prospective study which was done in the period (from March/ 2006 until August/2007). Patients were treated at the Department of Otorhinolaryngology in Al-Jamhori Mosul Teaching Hospital. Their ages were between 8-60 years with a mean of (33.4) year.

The indications of E.S.S. were nasal polyposis (40 patients), antrochoanal polyps (17 patients), and chronic sinusitis (16 patients). Ten patients with nasal polyposis had previous surgeries done in the traditional method, 8 patients had one previous surgery, and 2 patients had previous 2 surgeries. Two patients with antrochoanal polyps had a previous traditional nasal polypectomy. Patients with multiple revision surgeries were not included in the study.

Patients who were diagnosed clinically to have chronic sinusitis (16 patients), were assessed by plain X-ray and endoscopic examination. They were treated medically for 3 weeks with broad-spectrum antibiotics and mucolytics, and nasal steroid sprays were given to allergic patients.

Patients with persistent manifestations were re-assessed and those with abnormal X-ray and/ abnormal endoscopic findings were included in this study. There was 42 male patients with a mean age of (36.8) years, and 31 female patients with a mean age of (28.7) years. Two patients with antrochoanal polyps were 8 and 12 years old. Forty-seven (47) patients underwent bilateral procedure while 26 patients had a unilateral procedure, with

120 sides operated. All patients had plain sinus X-rays taken into two views, occipitomental and lateral.

The operative procedures: The endoscopic sinus operations were done under general anesthetic in all patients except three with nasal polyposis and bronchial asthma who had the operation done under local anaesthetic.

The procedure included removal of nasal polyps via the endoscope in patients with nasal polyposis and antrachoanal polyps (Fig.1 and 2), and in all patients uncinectomy, opening of the ethmoidal bulla and middle meatal antrostomy were done (Fig.1-4). In patients with previous operations where the landmarks were obscure, the operation was very careful to remove the obstructing polyps and cleaning the middle meatus from the polypoid mucosa as much as possible with middle meatal antrostomy was done to widen the maxillary ostium and to remove the diseased mucosa (Fig.2). Thirteen (13) patients needed partial middle tubinectomy for paradoxical or hypertrophic middle turbinate (Fig.5). The upper part of the uncinate process in the region of the frontal recess was not removed and manipulations in this region were limited. Twenty-four (24) patients had septoplasty done in the conventional method for co-existent septal deviation.

The ipsilateral eye was left uncovered with regular checking by inspection and gentle pressing every now and then to see if dehiscence in its medial wall is present Table I describe the clinical summery and operative procedures performed.

The same surgeon (author) performed all surgeries; the postoperative care was done by the surgeon or by the senior resident. The patients were followed up regularly for six weeks up to 6 months (a mean of 2 months). Two patients (8 and 12) year old needed a second look under general anesthetic for nasal debridement. All patients were given antibiotics for 2 weeks. Patients with nasal polyposis or allergy were given nasal steroid sprays.

Results

Seventy-three (73) patients underwent E.S.S. for nasal polyposis (40 patients), antrochoanal polyps (17 patients) and chronic sinusitis (16 patients). Forty-seven (47) patients had bilateral E.S.S and twenty-six (26) patients had unilateral E.S.S., with 120 sides operated. Twenty-four (24) patients had additional septoplasty to correct co-existent septal deviation. Ten patients with nasal polyposis and two patients with antrochoanal polyps had previous surgeries done in the traditional way.

In one patient, who had a previous single polypectomy for nasal polyposis, there was orbital fat prolapse after uncinectomy. In two patients, with no previous surgery, dehiscence of the medial orbital wall was found during the procedure when pressing the orbit. In these cases the operation was discontinued on that side and there were no serious postoperative complications.

Minor complications after E.S.S.occurred in 9 patients (12.3%). The patient who had mild orbital fat prolapse during the procedure developed mild periorbital hematoma which resolved in 10 days with no sequel, six (6) patients developed adhesions in the middle meatus or between the middle turbinate and the septum, and one patient had temporary epiphora which resolved in 2 weeks.

No major complications, namely, severe hemorrhage, orbital injury, optic nerve injury or C.S.F. leak occurred. The postoperative course was smooth and the recovery period was good. Table II summarizes the complications in E.S.S.

Discussion

Functional endoscopic sinus surgery (F.E.S.S.) is a minimally invasive technique used to restore sinus ventilation. A preoperative CT scan is essential for safe and complete performance (5,6). All patients should have coronal CT scan with 3 mm cuts , and axial scans are needed when a frontal sinusotomy or sphenoidotomy is likely to be performed and in revision cases (3,4,7,8,9).

There is no previous study that seeks the safety of doing endoscopic sinonasal procedures when CT scan is not available. It is probable that when CT scan facility is absent, endoscopic facilities is lacking too.

In our case, and because of the lack of CT scan facilities in our locality while conducting this study, patients were carefully selected with avoidance of multiple revision

cases. All endoscopic surgeries were performed by the same surgeon and the surgeries were limited. The safety of this procedure was considered if no major complications occurred.

Major complications include hemorrhage, intracranial injury, and visual disturbances. Minor complications, which are not life threatening, include periorbital hematoma, subcutaneous orbital emphysema, epiphora, synechiae and recurrence. Reported complication rates vary among investigators, however, there appears to be a correlation between complication rates and surgical experience (10,11).

In a survey of British Otolarngologist (Cumberworth and Mackay 1994), the estimated complication rate was 0.23% predominantly C.S.F leak, followed by problems related to bleeding (12,13). On the other hand, a national prospective audit carried out in the United Kingdom in 1994 reported no major complications (14). This is probably that operations were carefully selected and were limited as our study did.

However, a meta-analysis of case series in the United States found an overall major complication rate of 1.1% with no significant difference between conventional and endoscopic techniques (15). It is relatively common in England and Wales to carry out conventional sinonasal surgery without obtaining preoperative CT scan (16). In our study we used the endoscope to achieve minimal procedures in the absence of CT scan.

The study of the French series of patients noted major complications during sinus surgery occurred in patients with extensive polyposis (17). This is probably due to the extensive nature of surgery in these patients and this agrees with our study that the risk of complications will be less if the operation is limited.

No major complications were reported in the above patients. Minor complications which could occur after any sinonasal surgery and not CT dependant, was not taken as a measure of safety.

The present study conclude that limited and minimal endoscopic sinonasal surgeries can be safely performed in indicated cases without CT scan guidance when this facility is not available, provided the surgeon have good surgical experience in the endoscopic technique and be very diligent with the lowest threshold to complications. This is best applicable to patients with antrochoanal polyps, non-revision cases of nasal polyposis and chronic rhinosinusitis. Otherwise when CT scan facility is available, no E.S.S. should be done without CT scan.

References

1. Anand VK, Glasgold MJ. Functional Endoscopic Sinus Surgery. In: Bleach N., Milford C. and Hasselt A.V. (Eds). Operative Otorhinolaryngology. Black Science Ltd.UK, 1997; p.193

2. Mackay IS, Lund VJ. Surgical Management of Sinusitis. In: Mackay I.S. and Bull T.R. Scott-Brown's Otolaryngology. Sixth ed. Reed Educational and Professional Publishing Ltd. UK, 1997; pp4/12/16-4/12/26

3-Lund VJ, Savy L, Lloyd G. Imaging for endoscopic sinus surgery in adults. *Journal of Laryngology & Otology* 2000; 114:395-397.

4-Lee KJ. Essential Otolaryngology. Eighth ed. McGraw-Hill Companies, Inc. USA, 2003; P.398

5-Stammberger H. F.E.S.S. Endoscopic Diagnosis and Surgery of the Paranasal Sinuses and Anterior Skull Base. The Messerklinger Technique and Advanced Applications from the Graz School. Printed by: Braun-Druck GmbH, D-78532 Tuttingen, Germany, 2000.

6-Patel A.M. Functional Endoscopic Sinus Surgery: Article by Ankit M. Patel. Last Updated Oct 31, 2005. Available at: www.emedicine.com/ent/topic758.htm Accessed Dec 20, 2006.

7-Cohen NA,Kennedy DW. Revision endoscopic sinus surgery. *Otolaryngol Clin North Am* 2006; 39(3):417-35

8-Ali A, Kurien M, Shyamkumar NK. S. Anterior skull base: High risk areas in endoscopic sinus surgery in chronic sinusitis: A computed tomographic analysis. *Indian J Otolaryngol Head Neck Surg* 2005; 57:5-8

9-Aygun N, Zinreich SJ. Imaging for functional endoscopic sinus surgery. *Otolaryngol Clin North Am* 2006; 39(3):403-16

10- Lund VJ, Wright A, Yiotakis J. Complications and medicolegal aspects of endoscopic sinus surgery. *J R Soc Med* 1997; 90(8):422-428

11-Hudgins PA. Complications of endoscopic sinus surgery. The role of radiologist in prevention. *Radiol Clin North Am* 1993; 31 (1): 21 32

12-Cumberworth VL, Sudderick RM, Mackay IS. .Major complications of functional endoscopic sinus surgery.*Clin Otolaryngol* 1994; 19(3):248-53.

13- Sharp HR, Crutchfield I, Rowe-Jones J.M, Mitchell DB. Major complications and consent prior to endoscopic sinus surgery. *Clin. Otolaryngol* 2001; 26(1): 33-38.

14-Harkness P, Brown P, Fowler S, Topham J. A national audit of sinus surgery. Results of the Royal of Surgeons of England comparative audit of ENTsurgery. *Clin Otolaryngol* 1997; 22:147-151.

15-May M, Levin HL, Jester SJ, Schaitkin B. Complications of endoscopic sinus surgery: analysis of 2108 patients–incidence and prevention. *Laryngoscope* 1994; 104:1080-1083.

16-Hopkins C, Brown JP, Slack R, Lund VJ, Topham J, Reeves BC, Copley LP, Brown P, Meulen JHP. Complications of Surgery for Nasal Polyposis and Chronic Rhinosinusitis: The Results of a National Audit in England and Wales. *Laryngoscope* 2006; 116: 21-26.

17- Dessi P, Castro F, Trigelia JM, Zanaret M, Cannoni M. Major complications of sinus surgery: a review of 1192 procedures. *J Laryngol Otol* 1994; 108:212-215.

Table (1): Clinical summery and operative procedures*

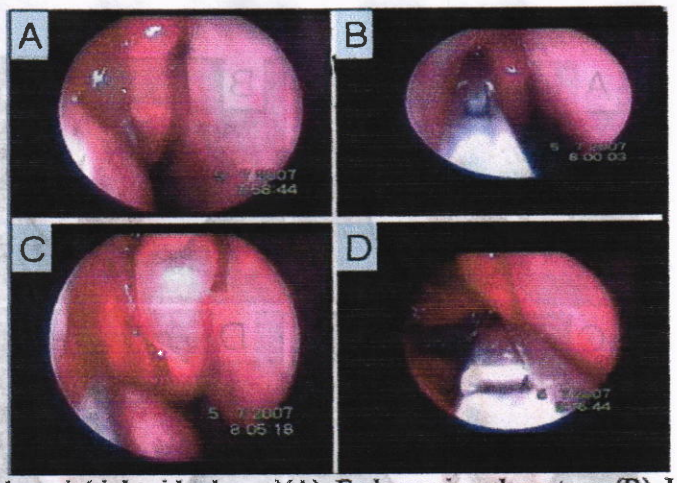
Diag.	No.	Pr.sur.	Rev.sur.	Unil	Bil	Unc.	Ant.ethm	Max.ethm	Sept.	Turb.sur
N.P	40	30	10	0	40	31	33	40	9	4
A.C.P	17	15	2	17	0	17	13	17	5	3
Ch.S	16	16	0	9	7	16	16	16	10	6
G.A	70									
L.A	3									
Males	42									
Females	31									
Total no.	73	61	12	26	47	62	64	73	24	13

*Abbreviations: Diagnosis(Diag.), Nasal Polyposis(N.P.), Antrochoanal polyp (A.C.P.), Chronic Sinusitis(Ch.S.), General Anesthesia(G.A.), Local anesthesia(L.A.), Surgery(Surg.), Revision(Rev.),Unilateral(Unil.), Bilateral(Bil.), Uncinectomy(Unc.), Anterior ethmoidectomy(Ant. Ethm.), Maxillary Antrostomy(Max. Antr.), Septoplasty (Sept.), Turbinate (Turb.).

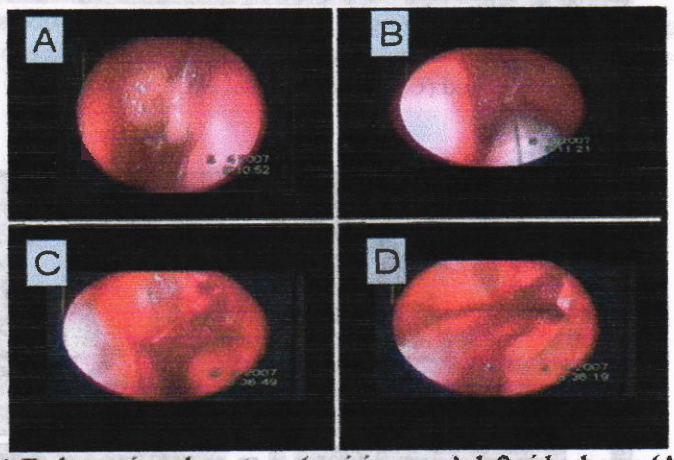
Table (2): Complications of E.S.S.*

Diagnosis	Minor complications reported			
	adhesions	Periorbital hematoma	epiphora	Minor orbital fat prolapsel dehiscence
N.P (40 patients)	3	1	0	2
A.C.P. (17 patients)	1	0	1	0
Ch.S. (16 patients)	2	0	0	0

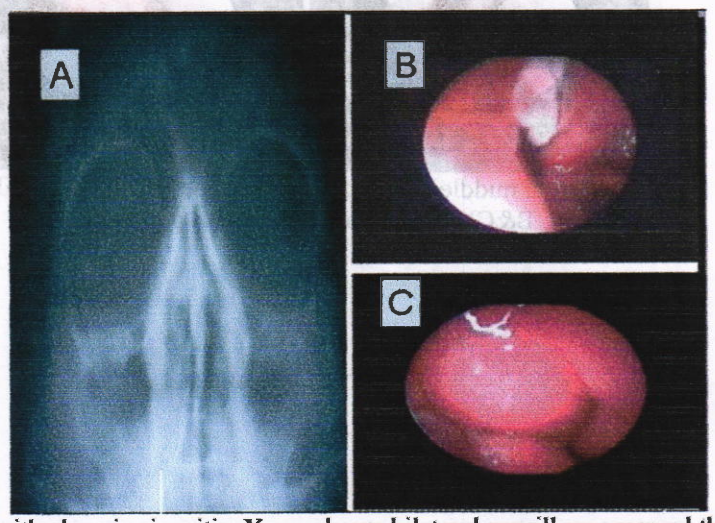
*Minor complications were consuming 12.3%, No major complications were reported



Fig(1): Nasal polyposis(right side shown)(A). Endoscopic polypectomy(B). Uncinectomy(C). Enlargement of the maxillary ostium with backbiter(D).



Fig(2) Endoscopic polypectomy(revision case), left side shown (A&B). The middle meatus is clear of obvious polyps(C). Middle meatus antrostomy (D).



Fig(3): Patient with chronic sinusitis. X-ray shows bilateral maxillary mucosal thickening (A). A polyp exits from previous left inferior antrostomy (B), and edematous swelling of the right middle and inferior turbinates (C).

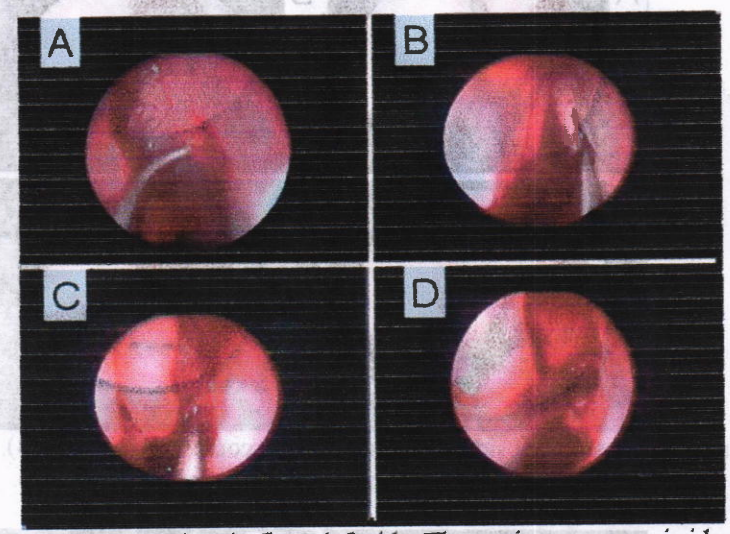


Fig.(4): the same patient in fig.3, left side. The uncinate process is identified and uncinectomy performed (A&B). The ethmoidal bulla is opened and cleared (C). Middle meatal antrostomy (D).

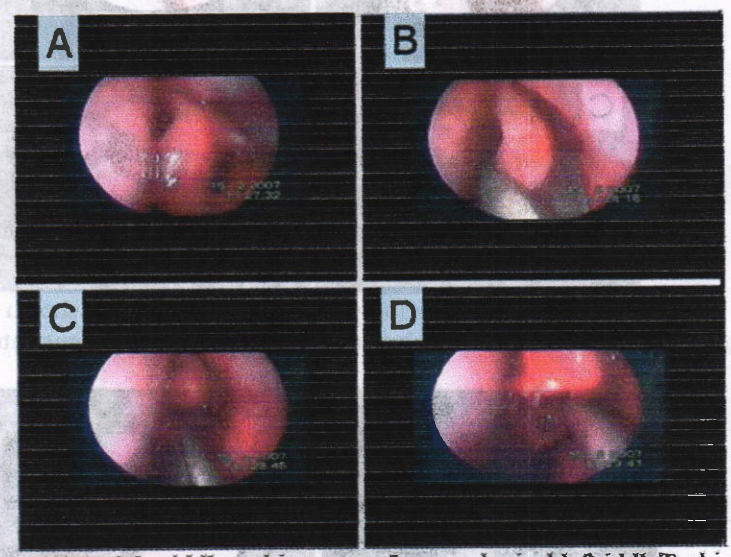


Fig (5): Partial middle turbinectomy for paradoxical left iddleTurbinate (A, B&C). See the turbinate is also peumatized(D).