

Major complications of sinus surgery: a review of 1192 procedures

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Abstract

Based on this review of 1192 intranasal sinus procedures under endoscopic control with video assistance, the risk of major complications was estimated to be about 1.3 per cent. Ethmoidectomy was the most hazardous procedure. Operation by a right-handed surgeon standing on the right side of the patient was an added risk factor. We stress ways of achieving prevention, perioperative recognition of cerebrospinal fluid leaks and proper management of complications.

Key words: Nose, surgery, complications; Orbit; Haematoma; Cerebrospinal fluid

Introduction

In addition to minor complications such as synechia, endonasal sinus surgery can lead to blindness and even death. The purpose of this retrospective review of the experience of one surgeon using an endoscopically guided, video-assisted technique was to evaluate the incidence of major complications, compare our results with those previously reported and discuss methods of prevention and management.

Material and methods

From May 1987 to December 1991, 1192 endoscopic sinus surgery procedures were performed on 386 patients in the ENT Department at our Institution. Each procedure was considered independently because of the risk of separate complications (i.e. a bilateral ethmoidectomy was considered as two ethmoidectomies). Depending upon the underlying disease, some patients underwent more than one procedure during the same intervention. The male/female sex ratio was 2:1 and ages ranged from three to 80 years with a mean age of 40 years. The indications for surgery are listed in Table I. As shown in Table II, 109 patients (28 per cent) had undergone previous nasal or sinus surgery. None of these patients had experienced

complications associated with their previous surgery. Full details of the different procedures performed are given in Table III.

All operations were performed by the same right-handed surgeon under general anaesthesia with endoscopic guidance. The operating field was visualized using a 25° forward-oblique telescope via a video camera on a TV screen rather than by direct vision.

Anterior ethmoidectomy was performed according to a standardized technique as follows: after removal of the uncinata process, the pre-bullar and bullar cells are cleared without going beyond the ground lamella of the middle turbinate.

When required, posterior ethmoidectomy was performed using the front-to-back technique. After anterior ethmoidectomy, the posterior ethmoid was entered through the ground lamella of the middle turbinate and cleared as far as the presphenoid cell.

Sphenoidotomy was performed alone or in association with ethmoidectomy but only if the CT scan demonstrated sphenoid involvement. Sphenoidotomy was never performed simply as means of locating landmarks.

Middle meatal antrostomy was performed according to the back-to-front technique. After opening the posterior fontanelle zone or locating an accessory ostium, enlarge-

TABLE I
INDICATIONS FOR ENDONASAL SURGERY

Pathology	No. of patients	Percentage
Polyposis	238	61.7
Chronic sinusitis	118	30.7
Aspergillosis	9	2.3
Antro-choanal polyp	9	2.3
Inverted papilloma	8	2
Fronto-ethmoidal mucocele	4	1

TABLE II
PREVIOUS SURGERY IN 109 PATIENTS

Previous surgery	No. of patients
Polypectomy	46
Caldwell-Luc	18
Transantral ethmoidectomy	6
Intranasal ethmoidectomy	17
Middle meatal antrostomy	5
Maxillary sinus puncture	17

TABLE III
PROCEDURES PERFORMED IN 386 PATIENTS

Procedure	Unilateral	Bilateral	Total No.
Anterior ethmoidectomy	25	18 (n = 36)	61
Total ethmoidectomy	23	184 (n = 368)	391
Sphenoidotomy	15	88 (n = 176)	191
Middle meatal antrostomy	81	210 (n = 420)	501
Inferior meatal antrostomy	12	18 (n = 36)	48
Total			1192

ment was performed from back-to-front using a backward-cutting Ostrum-Terrier forceps. Middle meatal antrostomy includes the maxillary ostium. Inferior meatal antrostomy consists simply in fenestration of the inferior nasoantral bony wall.

In 45 patients one of the following additional procedures was also performed: partial bilateral inferior turbinectomy (n = 34), septoplasty (n = 8), or sublabial exposure of the maxillary sinus (n = 3).

Results

Out of 1192 procedures in 386 patients, five serious life- or vision-threatening complications occurred. They were three orbito-palpebral haematomas and two cerebrospinal fluid leaks. There were no deaths. Retrobulbar haematoma, injury to the optic nerve, carotid artery damage, excessive bleeding requiring surgery, and ocular motility damage were not observed in this series. Major complications occurred in 1.3 per cent of patients and accounted for 0.4 per cent of the total number of procedures.

Case reports

Patient 1

A 62-year-old man presenting with nasal polyposis, diagnosed four years earlier, underwent ethmoidectomy, sphenoidotomy and bilateral middle meatal antrostomy. The patient was not asthmatic and had negative skin tests for allergy. He had previously undergone polypectomy. After aspiration of the nasal fossae, we noted that the middle turbinates had been inadvertently removed in a previous procedure. After anterior ethmoidectomy, orbital fat appeared in the operative area whenever pressure was applied to the eyeball. The procedure was completed and a conventional Merocele[®] pack was placed. Four hours after the end of the procedure, ecchymoses appeared above and below the right medial canthal region. Visual acuity and ocular motility were not affected. These ecchymoses regressed over the next seven days accompanied by treatment with amoxicillin (2 g/d) and methylprednisolone (60 mg/d).

Patient 2

A 55-year-old man with nasal polyposis, diagnosed eight years earlier, underwent complete bilateral ethmoidectomy. The patient was not asthmatic or allergic but he had also undergone polypectomy four years earlier at which both middle turbinates had been removed. As in the previous patient, fat appeared in the operative area during anterior ethmoidectomy. The patient was treated as described above and recovered fully within eight days.

Patient 3

A 45-year-old man with nasal polyposis, diagnosed five years earlier, underwent bilateral ethmoidectomy. The patient was not asthmatic or allergic and had not undergone previous surgery. After aspiration of the nasal fossa, the middle turbinates were located. Perforation of lamina papyracea with orbital fat extrusion occurred when the ethmoid bulla was opened. Three hours after the procedure a painless ecchymosis appeared below the medial canthal region with no loss of visual acuity for ocular motility. Antibiotic and corticosteroid treatment was administered at the same doses and duration as in the previous two patients. Ecchymosis regressed within six days and the patient recovered fully.

Patient 4

A 62-year-old man with nasal polyposis, diagnosed 10 years earlier, underwent bilateral ethmoidectomy with bilateral middle meatal antrostomy. The patient was not asthmatic or allergic but he had undergone previous bilateral transantral ethmoidectomy. Excision of a polyp in the right ethmoid near the ground lamella of the ethmoid bulla led to exposure of the dura mater with cerebrospinal fluid leakage. The defect was recognized peroperatively and covered by affixing a naso-septal flap using fibrin glue. No packaging was used. Intravenous antimicrobial therapy using amoxicillin (6 g/d) and sulphamethoxazole-trimethoprim (800 mg/d) was administered without corticosteroids until discharge from the hospital nine days later. After two years of follow-up, meningitis or other complications have not occurred.

Patient 5

A 57-year-old man with nasal polyposis underwent ethmoidectomy and bilateral middle meatal antrostomy. He was asthmatic and skin tests for allergy were positive. The operation which was apparently uneventful was terminated by placement of a Corticotulle[®] pack. Conventional antibiotic prophylaxis and corticosteroid therapy using amoxicillin (2 g/d) and methylprednisolone (40 mg/d) were initiated immediately after the operation. The next morning, the patient had a fever of 38.5°C and complained of headache and slight stiffness at the back of the neck. Despite the pack, a clear watery discharge came out of the right nostril whenever the patient tilted his head forward. The patient was returned to the operating room and the pack was removed under general anaesthesia but the defect in the roof of the ethmoid could not be located. The patient was placed in the high pelvic position in order to reveal the cerebrospinal leak but the defect could still not be located. Finally after bilateral compression of the jugular veins a micro defect was recognized in the roof of the bulla cell area. The leak was repaired by affixing a naso-septal flap using fibrin glue and covering the area with lyophilized dura mater. No packing was used. Intravenous antimicrobial therapy using amoxicillin (6 g/d) and sulphamethoxazole-trimethoprim (800 mg/d) was administered without corticosteroids for one week. In the evening after the re-operation, fever and pain abated. No complications have been observed after three years of follow-up.

Discussion

Based on the results of this study, the overall risk of

major or potentially major complications secondary to endoscopic nasal and sinus surgery is 1.3 per cent (five out of 386 patients). However it should be noted that all of the complications in our series occurred in patients undergoing ethmoidal surgery for nasal polyposis, and that if only this type of procedure is considered the risk of serious complications is 2.1 per cent (five out of 281). The latter figure is in accordance with corresponding data from comparable series of operations performed by a single surgeon (Eichel 1982; Lawson, 1991). Interestingly Maniglia (1991) who analysed complications that came to his attention from various sources rather than from his own experience indicated higher complication rates. As stressed by Stankiewicz (1989), a surgeon's experience and skill probably account for these variations in complication rates.

Intranasal ethmoidectomy is the procedure associated with the highest risk. No complications were encountered during the 191 sphenoidotomies, 501 middle meatal antrastomies, and 48 inferior meatal antrastomies performed in our series. However this is not a consistent finding since Davis *et al* (1991) reported four orbital haematomas associated with middle meatal antrotomy. Interestingly Davis and his colleagues performed enlargement from the maxillary ostium to the fontanelle after removal of the uncinat process. We prefer the back-to-front technique and do not routinely perform uncinectomy in every case. This limits exposure of the lamina papyracea and the roof of the anterior ethmoid. Maniglia (1989; 1991) indicated that sphenoidotomy is associated with a high risk of optic nerve injury or internal carotid artery damage. As a consequence we do not perform sphenoidotomy simply as a means of locating landmarks during ethmoidectomy.

All the complications occurred on the right side. In their series of 1000 ethmoidectomies, Freedman and Kern (1979) reported 13 complications involving the right side and two involving the left. Lawson (1991) reported that all orbital complications and cerebrospinal fluid leaks occurred on the right side. The predominance of right-sided complications is probably related to the difficulty for a right-handed surgeon to perform surgery on the right side. The surgeon who performed the operations described in this study is right-handed and always stands on the right side of the patients regardless of which side is being treated.

All the complications occurred during anterior ethmoidectomy. Damage of the lamina papyracea is more likely there since the anterior ethmoid is not as wide as the posterior ethmoid. However the narrowness of the anterior cells cannot account for damage of the roof. In this regard, based on his microscopic examination of 34 resection specimens, Onishi (1981) reported that the anterior roof of the ethmoid cells was thin and that the bone was particularly thin in relation to the anterior and posterior ethmoidal arteries.

Three of the five patients who presented major complications in our series had undergone previous endonasal surgery. Out of the 238 patients with nasal polyposis, 109 had undergone previous surgery and 129 had not. The complication rate was 1.5 per cent in the group with no previous surgery (two out of 129) and 2.75 per cent in the group with previous surgery. Even if this difference is not statistically significant ($p > 0.05$) we think that the lack of

landmarks such as the middle turbinates may induce perioperative difficulties and increase the risk of complications.

We consider haematoma of the medial canthal region as a major complication although all patients in this series recovered fully. Indeed this complication results from damage to the lamina papyracea which can lead to ocular motility problems and retrobulbar haematoma. Immediate intraoperative diagnosis is the key to avoiding catastrophic consequences. We always inspect the lateral wall of the ethmoidal cavity during surgery to detect movement transmitted when gentle pressure is applied to the eyeball. If such movement is observed, we rule out any procedure involving the lamina papyracea and removal of any soft tissue in the ethmoidal cavity which might potentially be orbital fat.

Two cerebrospinal fluid leaks occurred in our series. In one case the underlying defect was recognized and repaired perioperatively. In the other case, the defect was located the day after the procedure. It is difficult to identify leakage of clear fluid in a haemorrhagic operating field. Placing the patient in the high pelvic position in order to lower the head and having an assistant compress the jugular veins helped us to detect the cerebrospinal fluid leak.

The fact that all our procedures were video-assisted did not seem to affect the incidence of perioperative complications. We prefer this method because it is more comfortable for the surgeon and allows zoom views of the operative area and the incidence of complications would appear to be comparable to those of surgeons using direct view.

Conclusions

Although the incidence has decreased in recent years, major complications of intranasal surgery still occur. In our experience we observed that such complications are most frequently associated with ethmoidectomy for nasal polyposis. The risk of complication is particularly high in the anterior ethmoidal cavity. For a right-handed surgeon, the right side is the most vulnerable. The difficulty and importance of diagnosing defects perioperatively in order to avoid or limit the consequences should be stressed. In this regard, detection of movement of the lamina papyracea when pressure is applied to the eyeball and compression of the jugular vein to reveal a cerebrospinal fluid leak can be useful manoeuvres. We find the use of video camera to visualize the operating field is more comfortable and appears to have no effect on the incidence of complications.

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