

Review of Swing-door and Classical Method of Ucinectomy in Endoscopic Sinus Surgery

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Abstract

Introduction:

This study aims to review the classical and swing door methods of ucinectomy during endoscopic sinus surgery and compare the most standard techniques regarding their efficiency and safety.

Materials and Methods:

One hundred Cases of sinusitis were selected and operated for Functional Endoscopic Sinus Surgery (FESS). Out of these, in 50 ucinectomies classical ucinectomy was done whereas in another 50 ucinectomies swing door technique was used. Initially patients were medically managed and treated according to their symptoms and prior management. Patients who had received previous adequate medical management were evaluated with CT scan of the paranasal air sinuses. If disease still persists then they were operated for FESS. The most familiar two methods of doing ucinectomy are the classic method, introduced by Stammberger in 1986, and Wormald's swing-door technique in 1998.

Results: In this review classical method was used in 50 ucinectomies. Out of this, ethmoidal complex injury was noted in 30 cases, missed maxillary ostium syndrome (incomplete removal) was reported in 3 patients and orbital fat exposure was encountered in 1 patient. As compared to 50 ucinectomies done with swing door technique, incomplete removal was evident in 1 case and lacrimal duct injury was reported in 1 case. The swing-door technique appears to be associated with a slightly higher risk of injury to the lacrimal duct. Simultaneously, incidence of orbital penetration, incomplete removal, ethmoidal complex injury and ostium non-identification was more common in the classic method.

Conclusion: The swing door technique for ucinectomy produces good postoperative results, with fewer complications, as compared to the standard technique.

Keywords: Classical, Endoscopic surgery, Functional, Sinus, Swing-door technique, Ucinectomy

1. INTRODUCTION

Stammberger has established the concept of functional endoscopic sinus surgery (FESS) in 1986. It is based on opening the drainage pathway of the sinuses while keeping the large sinuses untouched. The area of concern is the ostiomeatal complex, a functional unit comprising the middle meatus drainage pathway, which consists of the uncinate process, ethmoid infundibulum and the anterior ethmoid complex. The uncinate is usually involved in inflammatory conditions of the sinuses very early in the disease process, and ucinectomy is

usually the first step in FESS. The standard method of performing uncinectomy and middle meatus antrostomy (MMA), is effective but is associated with risk like lamina papyracea lesions, orbital hematoma, loss of vision, naso-lacrimal duct stenosis and obstruction of maxillary sinus ostium(1). Wormald and McDonogh (1998) proposed a new method of uncinectomy named “swing door technique”, that allows the uncinata to be removed flush with the lateral nasal wall and easy identification of natural ostium of the maxillary sinus and to avoid complications(2). Chronic sinusitis (3,4) is a common problem encountered by otolaryngologists worldwide. Treatment of chronic sinusitis is initially medical and those refractory to medical treatment are treated surgically (5). In 1901 Hirschmann first used a modified Nitzecystoscope to examine the sinuses. Speilberg was then the first to use an endoscope to examine the maxillary sinus through the inferior meatus. However, Maltz coined the term sinuscopy and used an endoscope specially made by Wolfe. The development of compact, straight and angled telescopes, plus the pioneering work of Messerklinger, Wigand and others then sparked an interest in endoscopic sinus surgery (referred to 6-11) and functional endoscopic sinus surgery (FESS) continues to gain popularity among otolaryngologists. Uncinectomy is the first step performed in FESS (6-8). The technique of performing uncinectomy by various methods depends on training and personal preferences. Most surgeons are comfortable with the various methods of uncinectomy. A prospective controlled study was undertaken to find out efficacy of swing door method of uncinectomy and MMA and the results are reported. In this study 100 uncinectomies were performed using the classical uncinectomy method described by Stammberger or the swing-door method described by Wormald. This study aims to review the classical and swing door methods of uncinectomy during endoscopic sinus surgery and compare the most standard techniques regarding their efficiency and safety.

2. MATERIALS AND METHODS

A total of 100 uncinectomies that were performed in patients who underwent FESS were included in the study, of those 50 were uncinectomies using the swing-door method and 50 were uncinectomies using the conventional method as a control group. Initially patients were medically managed according to their symptoms and prior course of management. Patients who had received previous adequate medical management were evaluated with a CT scan (12) of the paranasal sinuses. If disease still persisted then patients underwent FESS. Only patients with non-polypoid sinusitis were included in the study, those not responding to medical management were also included. Patients suffering from sinusitis for more than six months and diagnosed with chronic maxillary sinusitis were selected. Computed tomography (CT) of the paranasal sinus was done, and only patients with disease limited to the maxillary sinus were recruited, so that the total number of eligible patients was limited. Patients with involvement of other sinuses or anatomic variations of the osteomeatal area were excluded from the study. Patients with symptomatic deviated nasal septum were also excluded, and only patients with mild deviated nasal septum that was deemed not likely to be a cause of any problem during FESS were included in the study. Routine blood and urine tests, pre-anaesthetic check-ups and xylocaine sensitivity testing was done for all patients. Written informed consent was obtained from all participants. The patients were divided into two groups by the use of alternating surgical techniques; the first patient was operated on using the classical technique then the second one was operated on using the swing-door technique and so on.

Surgical procedure

Patients underwent FESS under intravenous sedation and local anesthesia and under general anesthesia. The procedure began with decongestion of the nose followed by infiltration of the tissues with a solution of lignocaine 1% with adrenaline. The lignocaine/adrenaline solution was injected into the lateral nasal wall near the uncinate process using a 2 mL syringe with a slightly bent 26-gauge needle to facilitate the injection. Next, the superior inlet and the anterior face of the middle turbinate were injected submucosally with the lignocaine/adrenaline solution.

Classical technique

Uncinectomy was performed by giving an incision with either the sharp end of a Frere's elevator or a sickle knife. The incision was placed at the most anterior portion of the uncinate process, which is softer on palpation in comparison to the firmer lacrimal bone, where the nasolacrimal duct is located. Then, Blakesley forceps were used to grasp the free uncinate edge and remove it. Complete uncinectomy is important for subsequent visualization.

Swing door technique

Reverse cutting forceps or backbiting forceps were used in this technique. The inferior free margin overlying the maxillary ostium was cut first and then an incision was made in the superior margin to form a flap from the uncinate which is hinged on the anterior margin and can be moved with an elevator or ball probe. Then, angled tricut forceps were used to grasp the free edge of the uncinate and remove it. This was followed by submucosal removal of the horizontal process of the uncinate and subsequent trimming of the mucosa to fully visualize the maxillary ostium.

Once the uncinate process was removed, the true natural ostium of the maxillary sinus could be identified. The protected eye was palpated at this juncture as necessary to ensure no dehiscence of the lamina papyracea and to confirm the location of the lamina. The natural ostium is typically at the level of the inferior edge of the middle turbinate about one third of the way back. Care should always be taken to avoid penetrating the lamina papyracea.

3. RESULTS

In this review the classical method was used in 50 uncinectomies, which formed the control group. Out of these cases, injury to the ethmoidal complex was noted in 3 patients, missed maxillary ostium syndrome (incomplete removal) was reported in 3 patients and orbital fat exposure was encountered in 1 patient. 50 uncinectomies performed with the swing-door method, incomplete removal was evident in 1 patient and lacrimal duct injury was reported in 1 patient. The incidence of orbital penetration, incomplete removal, ethmoidal complex injury and ostium non-identification was significantly less with the Swing-door technique. However, 1 lacrimal injuries occurred with the swing-door technique compared to no lacrimal injuries with the classical technique. Statistical analysis of the differences in the results of the two techniques showed significant difference. This evidence underscores how the swing door technique successfully combines the conservation goals of the anterograde (anterior-to-posterior) approach and the anatomic virtues of the retrograde (posterior-to-anterior) approach to ethmoidectomy in the overall group of 100 uncinectomies that were performed. It was observed that the swing door technique for uncinectomy gives good postoperative results, with fewer complications, when compared to the standard technique.

4. DISCUSSION

The distance between the uncinate and lamina papyracea can be as narrow as 0.1 mm and varies between the two sides. An air cell lateral to the uncinate is found in some people; it increases the distance considerably. The base of the uncinate is directly attached anteriorly to the lacrimal bone and the nasolacrimal duct. Uncinectomy and middle meatalantrostomy are probably the commonest procedures performed during endoscopic sinus surgery. They are related to each other, so when one of them is done, the other is required. They are described as basic and simple procedures. Although standard method of performing uncinectomy is effective, but may have associated risks. If the incision into the uncinate with sickle knife is attempted flush with the lateral nasal wall, there is increased risk of penetrating the orbit more so if an anatomical variation of uncinate is present. In addition, a hypoplastic maxillary sinus or the absence of anterior ethmoid air cell may also bring the sickle knife in close proximity to the lamina papyracea with an increased risk of orbital penetration. Wormald & McDonogh proposed a new method for performing an uncinectomy (swing door technique) that allows the uncinate to be removed flush with the lateral nasal wall and easy identification of natural ostium of the maxillary sinus (2). In our (OPD) we often encounter patients with recurrent sinusitis requiring revision surgery (7). On endoscopy often some remnant of the uncinate can be seen in many cases. Thus, out of curiosity about the two methods and in an attempt to find a better way of doing an uncinectomy this study was carried out.

The uncinate process can be identified in both coronal and axial CT scans according to its length, inclination (medial or lateral) and its relation to the anterior end of the middle turbinate. The superior attachment of the uncinate determines the pattern of frontal sinus drainage with drainage going into the ethmoid infundibulum when the uncinate process is attached to the fovea ethmoidalis or the middle turbinate or directly into the middle meatus when the uncinate process is attached laterally to the lamina papyracea or the ethmoid cell. Therefore, the antrosuperior attachment of the uncinate process is a good landmark for the frontal sinus ostium. During surgery, the uncinate process can be identified with gentle pressure that reveals its resilience or palpated with a curved probe.

The sickle knife is the traditional instrument for uncinectomy. However, it has some disadvantages such as the occurrence of frequent injury to the inferior turbinate with the proximal part of its cutting edge and injury to the ethmoid bulla with its tip. The main advantage of a sickle knife is that it is a thru-cutting instrument. In contrast, reverse cutting (back biting) forceps are an excellent instrument for uncinectomy. The forceps, particularly when used for the swing-door technique, have many advantages including precise or selective thru cutting of the free edge of the uncinate process with no tendency to injure the inferior turbinate or the ethmoid bulla. The risk of injury to the nasolacrimal duct is not realistic as the newly developed forceps are too delicate to injure the thick bone of the nasolacrimal duct that can be observed on coronal and axial CT scans. Moreover, with precise technique the tip of the cutting blade can easily be seen while cutting.

The key surgical principles of uncinectomy are as follows:

- 1) A complete uncinectomy is necessary in order to perform an anterior ethmoidectomy and prevent recurrence of sinusitis;

2) Identification of the maxillary sinus ostium is necessary to find the plane of the lamina papyracea; and

3) It is necessary of perform anterograde (anterior-to-posterior) dissection of the anterior ethmoid cells up to the basal lamella and retrograde (posterior-to-anterior) dissection of the posterior ethmoid cells with no damage to the ethmoidal complex.

In the traditional anterior-to-posterior uncinectomy described by Messerklinger, an anterior inferior uncinuate remnant may remain. This remnant can hide the natural ostium of the maxillary sinus and cause it to be missed. This series of events is what Parsons and colleagues (13) called the “missed ostium sequence”. When performing revision endoscopic sinus surgery, the surgeon might find that the previous middle meatalantrostomy has been placed at the wrong location.

The traditional method of performing an uncinectomy has a risk of penetration of the lamina papyracea with orbital fat exposure. If the orbital penetration is not recognized, major complications may follow. Sometimes there is a disruption in the ethmoidal complex while removing the uncinuate completely. When patients complain of recurrent sinusitis following endoscopic sinus surgery, a recirculation phenomenon in the maxillary sinus may be the cause. Similarly, when the missed maxillary sinus ostium syndrome is identified, endoscopic surgery to connect the natural maxillary ostium with the surgically created middle meatal window can remedy the condition.

5. CONCLUSIONS

Uncinectomy is a safe procedure in experienced hands whatever technique is used. It is usually the first step in endoscopic sinus surgery and the first surgical maneuver the new rhinologist has to learn. Good understanding of the anatomy and the ability to read the CT scan of the paranasal sinuses in three dimensions are of paramount importance to perform safe and effective surgery. The traditional method of uncinectomy has a risk of injury to the lamina papyracea, also there are more possibilities of incomplete FESS, recurrence and missed maxillary ostium syndrome. In the present study it was observed that swing door method gives good postoperative results with lesser complications as compared to the Classical method. Where India is concerned, FESS is in the developing phase, except at premier institutes. Young surgeons are not well trained in endoscopic surgery. So swing door technique is better for them to get good results with minimum complications.

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