



## How I do it?

### Middle meatal antrostomy: a novel manoeuvre to avoid orbital injury

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**The endoscopic middle meatal maxillary antrostomy is one of the most commonly performed endoscopic procedures. Because of the intimate relation of the orbit to the maxillary sinus, such procedure carries the possibility of major orbital complications. Accordingly, we describe a manoeuvre that helps confirm proper placement of the instruments within the maxillary sinus during surgery, obviating orbital insult.**

**Keywords: Maxillary sinus, Ostium, Middle meatal antrostomy, Orbit, Insult, Maxillary sinusitis, Safe and effective, Complications.**

#### INTRODUCTION

Middle meatal antrostomy (MMA) has become the state of the art in management of maxillary sinusitis. It constitutes part of functional endoscopic sinus surgery (FESS) in most cases.<sup>(1)</sup> Unfortunately, MMA is not without possible complications. The rate of orbital complications after FESS is very low, the most common of which is orbital oedema after fracturing the lamina papyracea.<sup>(2)</sup>

There are limited identifiable landmarks as to where a natural obstructed maxillary sinus ostium (MO) should be located.<sup>(3)</sup> These landmarks are the uncinate process remnant, bulla ethmoidalis and inferior turbinate. Sometimes it is difficult to visualize or identify the MO especially in extensive disease or revision surgery. Revision endoscopic sinus surgery is often more difficult and challenging because of the severe pathology, massive polyps, hyperostotic ethmoid cells, and altered anatomic reference points.<sup>(4)</sup>

Accordingly, the goal of this article is to describe a practical manoeuvre to perform safe and effective maxillary antrostomy.

#### PROCEDURE

The uncinate process is usually removed (uncinectomy) partially or completely according to the planned extent of

surgery. An angled tool (maxillary seeker, J curette and /or curved suction tips) is then used to probe the MO at bulla, uncinate angle posteriorly and inferiorly just above the inferior turbinate. The angled tool should be directed laterally and inferiorly and not laterally and superiorly.

The CT scan should be there and the space between the floor of orbit and inferior turbinate should be carefully assessed beforehand. (Fig. 1) Directing the angled tool laterally and superiorly just few millimetres above natural ostium may violate the orbit.

**Kamel's manoeuvre:** It is advisable that one should move the angled tool first inferiorly and then superiorly. If the surgeon realized that air is encountered on downward movement (maxillary sinus cavity) and bone is hit on upward movement (floor of orbit) this means that the tool is in maxillary sinus (proper location) (Fig. 2). If the surgeon realized that bone is hit on downward movement (orbital floor) and soft tissue is felt and the globe moves (observed by the nurse and/or assistant) on upward movement (Fig. 3) one should stop immediately (wrong location). In this case any trial of ostial widening may proceed to periorbita, fat, muscle, vessel, nerve and/or globe damage with drastic sequelae. This is especially true if the shaver and/or thru-cut tools are to be used.



Fig 1. CT scan coronal cut showing left ostiomeatal complex. The space between the floor of the orbit and inferior turbinate should be carefully assessed before endoscopic surgery.



Fig 3. If the surgeon realized that bone is hit on downward movement (orbital floor) and soft tissue is felt and the globe moves (observed by the nurse and/or assistant) on upward movement one should stop immediately (wrong location).



Fig 2. The uncinate process is removed and an angled tool e.g. maxillary seeker is then used to probe the maxillary ostium. It is advisable to move the seeker first inferiorly and then superiorly. If the surgeon realized that air is encountered on downward movement (maxillary sinus cavity) and bone is hit on upward movement (floor of orbit) this means that the tool is in maxillary sinus (proper location).

## DISCUSSION

During 210 cadaver dissection courses directed and/or instructed by the senior author starting in early 1990s, difficulties for beginners to locate MO and maxillary sinus were noted.

The ostium of the maxillary sinus is located immediately below the orbital floor, and thus below the lamina papyracea in the posterior part of the infundibulum.

Perforating the lateral wall of the infundibulum superior to the ostium violates the orbit.<sup>(5)</sup> Blind probing or nibbling with the forceps may lead to higher incidence of orbital complications.<sup>(6)</sup>

Identifying the natural ostium is of particular importance in difficult situations including gross anatomical variations, massive ostiomeatal complex pathological abnormalities and revision cases. Gross anatomical variations include those of the uncinate process, bulla ethmoidalis, middle turbinate, lamina papyracea and/or orbital floor.<sup>(7)</sup> Preoperative CT study should include location of inferior turbinate, configuration of lamina papyracea and angulations of orbital floor. This is of particular importance in case of hypoplastic maxillary sinus.<sup>(2)</sup>

Unfortunately, there is no simple definite manoeuvre to help verify that one is in the maxillary sinus proper.

To confirm proper location within the maxillary sinus, some advice trans-canine antrostomy, which is invasive and can insult the integrity of sinonasal framework especially in sinonasal fungal infection or tumour. During this approach, branches of the infraorbital and anterior superior alveolar nerve may be injured because of their proximity to the canine fossa.<sup>(8)</sup>

Others recommend computerized image guidance but sometimes the imaging guidance system is not calibrated accurately. If the calibration is off by even a few millimeters this can make a difference with possible complications.<sup>(9)</sup> It represents a tool that assists FESS surgeons but is no substitute for intimate understanding of each patient's anatomy.<sup>(10)</sup> More over it is expensive and not available in all operating rooms.<sup>(3)</sup>

The so-called bulb press test described by Stankiewicz is beneficial to identify any insult to the lamina papyracea. The orbital fat movement is monitored transnasally by the endoscope while the eye is palpated.<sup>(9)</sup> This is true in case of orbital entry, when it is too late and one got lost into the orbit.

Balloon technology has become a relevant tool in sinus surgery. The wire is either used under fluoroscopy or a lighted wire can be used. The wire can be mal-positioned and miss the natural ostium. As a result, dilatation of the accessory ostium, submucosal passage of the balloon, and orbital penetration can occur.<sup>(11)</sup>

The suggested Kamel's manoeuvre offers early orientation of instrument location. In case of breach of the orbit the surgeon will realize that the tool is in the orbit and will immediately stop. This avoids proceeding inadvertently with widening at the expense of orbital contents that may result in intra-orbital bleeding, muscle damage or even globe or optic nerve insult.

## CONCLUSION

The suggested manoeuvre is simple and easy to confirm proper location within the maxillary sinus before widening the maxillary ostium. It gives early alarm in case of inadvertent penetration of the lamina papyracea precluding further insult and possible major orbital complication. This manoeuvre would be of great benefit when it is difficult to visualize or identify the maxillary ostium especially in extensive disease or revision surgery. It could be resorted to by beginners in all cases and by experts in case of difficult situations.

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