

"وقل رب زدني علما"

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Introduction

In 1978, Messerklinger documented the first systematic and detailed description of endoscopic findings of the sino-nasal cavity. He observed that infection starts in the ethmoids and secondarily affects the maxillary and frontal sinuses. Because the middle meatus and the anterior border of the middle turbinate are the areas of greatest insult during nasal inspiration, they easily become infected.

In 1984, Kennedy and colleagues introduced the concept of functional endoscopic sinus surgery (FESS) to the US.

A systematic approach to nasal endoscopic examination permits visualization of the anatomic and pathologic details of the osteomeatal complex. Surgical correction of these structures allows for restoration of normal anatomic boundaries and the reestablishment of normal draining patterns for the sinuses. This systematic approach is the theoretical basis of functional endoscopic sinus surgery.

When performing FESS however, knowledge of the nasal and sinus cavity anatomy, as well as its relationship to the skull base and the orbits is of primary importance. In 1912, Mosher reported that intranasal ethmoidectomy was a blind and potentially dangerous procedure. Even when performing FESS, there is loss of depth perception due to the monocular view offered by the endoscope. This monocular view could confuse the inexperienced operator resulting in potentially disastrous sequelae.

Complications of FESS :

Incidence depends on experience. Knowledge of the surgical anatomy by the endoscopic operator is paramount to prevent complications. Even the most experienced surgeon may encounter problems. Reported complication rates vary among investigators, however, there appears to be a correlation

between complication rates and surgical experience. This finding is evident in the work done by Stankiewicz. In his first series of FESS patients, he reported a complication rate of 29% and in his second series he reported a complication rate of 2.2%.

Despite the availability of newer instrumentation, complications may still occur. The surgeon not familiar with the proper implementation of this kind of instrumentation in the context of the challenging surgical anatomy of the nose can easily become disconcerted. We strongly advocate continual clinical correlation of the surgical anatomy with the patient's CT scan during the procedure. We also strongly recommend, especially for the inexperienced operator, frequent cadaveric practice with nasal endoscopes.

The major complications that can occur during endoscopic sinus surgery include hemorrhage, intracranial injury, and visual disturbances. Examples of minor complications include periorbital hematoma and cellulitis, subcutaneous orbital emphysema, epiphora, synechiae, and natural ostia closure. **Prevention of complications.** Most complications can be easily prevented if the otolaryngologist is organized in his approach to the patient requiring surgery. A comprehensive history and physical examination may give the earliest warning signs of impending surgical complications. Evaluation and treatment of bleeding disorders and the discontinuation of coagulopathic medications can be done prior to the surgical procedure. Preoperative endoscopic examination and confirmation of disease with a CT scan are mandatory. Showing the patient the CT scan and explaining the disease are essential. Informed consent, surgical expectations, and all possible complications must be discussed with the patient.

Postoperative care is just as critical as preoperative assessment and the intraoperative technique, in preventing complications. Patients must be prepared to irrigate the nasal cavity with saline solutions and use nasal steroid sprays. Repeating office evaluations for cleaning further reduces the possibility of postoperative scarring, synechia, and disease recurrence. We decongest and

topically anesthetize patients in our office so that a thorough endoscopic evaluation and cleaning can be done. Both the physician performing, and the patient receiving functional endoscopic sinus surgery must commit to nasal care until such time that the physician and patient concur that successful treatment of the disease has been achieved.

Aim of the work

The aim of this work is to study and assess the complications of endoscopic sinus surgery retrospectively on patients attended ENT department (Al-Azhar university Hospital – Assiut).

Anatomy And Embryology

The anatomy of the paranasal sinuses is complex and varies greatly between human beings.

EMBRYOLOGY

Classic anatomic treatises attribute initial paranasal sinus development to lateral nasal wall ridges called ethmoturbinals. A series of five to six ridges first appear during the eighth week of development; through regression and fusion, however, three to four ridges ultimately persist . The first ethmoturbinal regresses during development; its ascending portion forms the agger nasi, while its descending portion forms the uncinate process. The second ethmoturbinal ultimately forms the middle turbinate, the third ethmoturbinal forms the superior turbinate, and the fourth and fifth ethmoturbinals fuse to form the supreme turbinate. These structures are all considered to be ethmoid in their origin. An additional ridge, the maxilloturbinal, arises inferior to these structures. This ridge ultimately forms the inferior turbinate but is not considered ethmoid in its embryologic origin. (2).

As the furrows evaginate and continue to develop, they form the anlage of the frontal sinus as well as the various anterior ethmoid cells. Kasper (1936), expanded on the embryologic theme proposed by Schaeffer, maintaining that the first frontal furrow ultimately formed the most anterior ethmoid cell, usually the agger nasi cell; the second frontal furrow most commonly formed the frontal sinus; and the third and fourth furrows formed other anterior ethmoid cells. However, any of these furrows could actually become the frontal sinus; hence a wide variability in the nasofrontal connection is evident. The frontal sinus can, therefore, be formed by a direct extension of the whole frontal recess into the frontal bone, from an anterior ethmoid cell, or, occasionally, from the ventral extremity of the ethmoid infundibulum. By 16 weeks, the future maxillary sinus begins to develop from the inferior aspect of the infundibulum.

Bingham et al (1991), observed all three turbinates to arise from the lateral cartilaginous nasal capsule.

Although investigators differ with regard to the subtle aspects of the embryology of the paranasal sinuses, the major sinuses clearly originate in the ethmoid region. Select ethmoid cells pneumatize into appropriate facial bones to ultimately form the major sinuses. Development of the sphenoid sinus deserves special attention. During the third month of fetal development, the nasal mucosa invaginates into the posterior portion of the cartilaginous nasal capsule.

Anatomy

In this chapter, the anatomy of the paranasal sinuses will be discussed with special emphasis on the ethmoid sinuses and the ethmoid structures that are important in endoscopic sinus surgery. With experience, these structures are relatively easy to recognize during surgery and are valuable in maintaining orientation in ethmoid procedures.

The basal lamella of the middle turbinate is especially important, as it divides the anterior and posterior ethmoids. The frontal, maxillary, and anterior ethmoids arise from, and therefore drain into, the middle meatus. The posterior ethmoid cells arise from, and therefore drain into, the superior and supreme meati, while the sphenoid sinus drains into the sphenoethmoid recess.

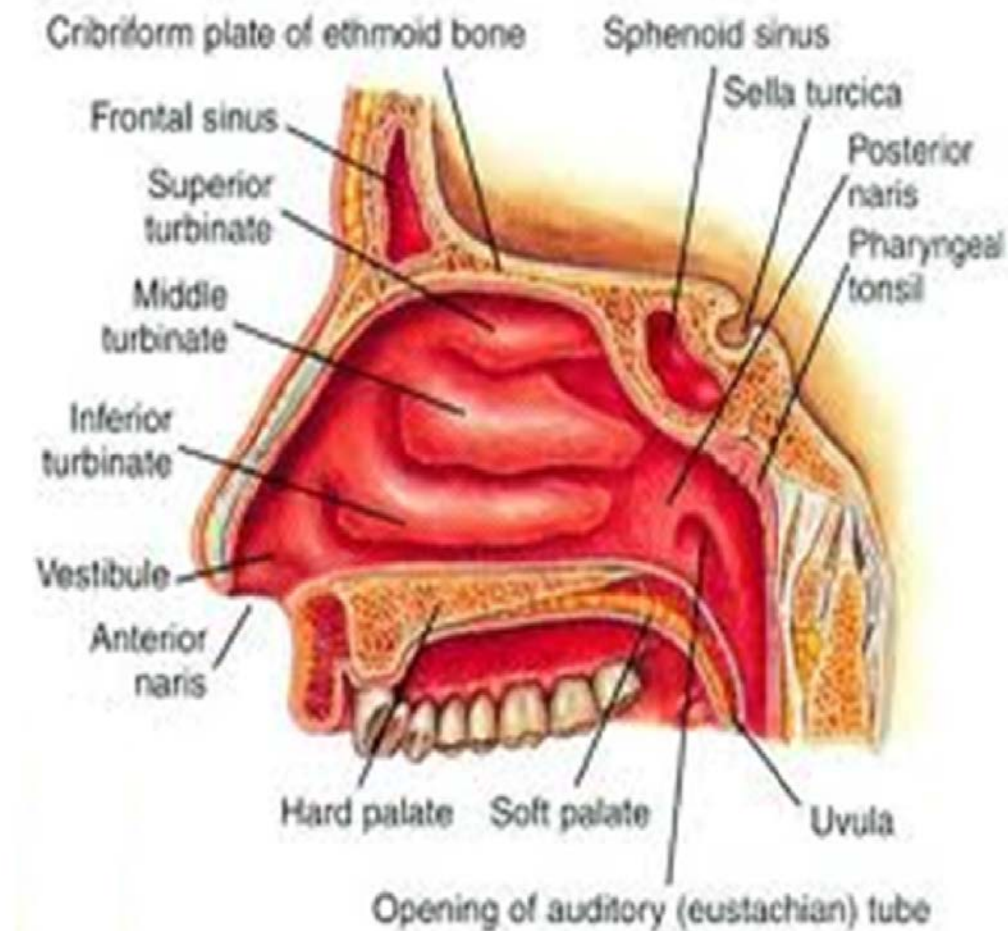


Figure 1 : lateral nasal wall (Stammberger , 1991) (75)

Anterior Ethmoid

Agger Nasi:

On anterior rhinoscopy, a prominence can be easily appreciated at and just anterior to the middle turbinate's insertion into the lateral nasal wall. In many but not all cases, the agger nasi region is pneumatized by an anterior ethmoid cell, referred to as the agger nasi cell. This cell usually takes its origin from the superior aspect of the infundibulum or the frontal recess region(1,2,3,4,6) . The agger nasi cell is bordered anteriorly by the frontal process of the maxilla, superiorly by the frontal recess/sinus, anterolaterally by the nasal bones, inferomedially by the uncinate process of the ethmoid bone,

and inferolaterally by the lacrimal bone. The intimate relationship of the cell to the lacrimal bone readily explains the finding of epiphora in select patients with sinus disease. The superior aspect of the cell serves as the anteromedial floor of the frontal sinus and a significant portion of the anterior border of the frontal recess. This is relevant for understanding the pathophysiology of frontal sinusitis and the surgical treatment of the frontal sinus. In a small percentage of patients, the pneumatization can be significant, and bulla formation of the uncinate may occur.(6,7)

Uncinate Process:

The uncinate process is most easily appreciated by viewing a sagittal gross anatomic specimen after deflecting the middle turbinate superiorly. Here, the lateral nasal wall is made not of bone but rather middle meatal mucosa, a small layer of intervening connective tissue, and sinus mucosa. An opening into the maxillary sinus, the accessory ostium, can often be seen here and can be mistaken for the natural maxillary sinus ostia. Accessory ostia are frequently encountered in the posterior fontanelle region, occurring in approximately 20 to 25% of patients.(9)

Returning to its superior aspect, the uncinate projects posterior and superior to the middle turbinate attachment and most commonly bends laterally to insert on the lamina papyracea of the orbit. Stammberger (1991), highlights that the superior portion of the uncinate can divide to attach to the lamina papyracea, skull base, and middle turbinate. The uncinate process forms the anteromedial boundary of the ethmoidal infundibulum. For most of its course, the uncinate is a three-layer structure, comprising nasal or middle meatal mucosa on its anteromedial aspect, ethmoid bone, and infundibular mucosa on its more posterolateral aspect. If lateral displacement of the uncinate with accompanying atelectasis of the infundibulum is not appreciated during infundibulotomy incision, inadvertent orbital injury can occur.(10)

Ethmoid Bulla:

The ethmoid bulla is one of the most constant and largest of the anterior ethmoid air cells. It is located within the middle meatus directly posterior to the uncinate process and anterior to the basal lamella of the middle turbinate . The cell is based on the lamina papyracea and projects medially into the middle meatus. Superiorly, the anterior wall of the ethmoid bulla can extend to the skull base and form the posterior limit of the frontal recess. Anatomic variations can occur in the ethmoid bulla. When highly pneumatized, the ethmoid bulla can be one of the largest ethmoid air cells and can lie in the lower aspect of the middle meatus. The hiatus semilunaris superior is the cleft formed between the posterior wall of the ethmoid bulla and the basal lamellae of the middle turbinate and is the passageway through which the middle meatus communicates with the lateral sinus (retro and suprabullar recess).(2)