Anatomy and Complications: Safe Sinus

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KEYWORDS

• Anatomy • Endoscopic sinus surgery • Complications • Safety

KEY POINTS

- Preoperative assessment of the imaging is crucial to identify sites of potential complications and to create a roadmap of the surgical plan.
- The maxillary sinus ostium is never anterior to the middle turbinate.
- The orbital floor is a great landmark, because the skull base is always superior to it.
- Beware of Onodi cells and atelectatic maxillary sinuses.
- Meticulous dissection and mucosal preservation techniques are key in preventing postoperative synechiae and fibrosis.

INTRODUCTION OR OVERVIEW: NATURE OF THE PROBLEM

Complications can occur at any point during or after a procedure. Knowledge of anatomy of the sinuses, their variations, and their surrounding structures should be well understood. To prevent complications, areas of potential hazard are assessed preoperatively using diagnostic imaging.

SAFE SINUS SURGERY: SINUS ANATOMY

Safe sinus surgery is predicated on knowledge of anatomy and the potential complications that lie therein. The paranasal sinuses are bordered by critical vascular and neurologic structures, including the brain, eye, nerves, carotid artery, and cavernous sinus.

Complications can be categorized in many ways: intraoperative versus postoperative, early versus late, by severity, or by anatomic site. In this article, the anatomy and potential complications are described as they relate and are seen during the stepwise

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Abbreviations

CSF	Cerebrospinal fluid
CT	Computed tomography
LP	Lamina papyracea
NLD	Nasolacrimal duct
SPA	Sphenopalatine artery
UP	Uncinate process

process of a typical endoscopic sinus surgery. Therefore, numerous pearls are mentioned to alert the reader to the potential complication at the relevant step.

Middle Turbinate

The middle turbinate is often the first structure encountered in performing endoscopic sinus surgery. Its position, size, shape, and potential pneumatization may cause unwanted obstruction in the surgical visual field. Improper handling of the middle turbinate may lead to postoperative synechiae or lateralization, change in olfaction, and even cerebrospinal fluid (CSF) leak. The middle turbinate has 4 attachment sites.[1] Its attachment anteriorly to the aggar nasi region forms the anterior buttress. It is attached vertically in the sagittal plane to the cribriform plate, laterally in the coronal plane to the lateral nasal wall, and laterally in the axial (or horizontal) plane to the lateral nasal wall. One of the most common minor complications is postoperative synechiae.[2,3] Therefore, maneuvers and techniques have been developed to minimize this complication. A relaxing incision of the basal lamella is made at the junction of the coronal and sagittal planes of the middle turbinate.[4] This strategy allows for a more stable medialization of the middle turbinate. Removing the horizontal portion of the basal lamella weakens the stability and may result in lateralization; therefore, this should be avoided.

Postoperative hyposmia is certainly one of the risks of sinus surgery and should be discussed as part of the informed consent. Olfactory fibers descend from the olfactory cleft onto the superior turbinate and septum and occupy a space between 2 and 10 cm.[2,5] The incidence of postoperative hyposmia has been studied in various circumstances and using various techniques, including removal of the inferior portion of the superior turbinate,[6] removing the middle turbinate entirely or in part,[7,8] and also when septal deviation is corrected.[9,10] In all circumstances, the incidence is low and may be related either to the removal of olfactory neuroepithelium or by altering the flow of air. In addition to olfactory injury, dissection medial to the middle turbinate may result in a CSF leak and thus should be avoided or performed with extreme caution.[2]

When an obstructive concha bullosa is present, it may be advantageous to remove the lateral half of it. Not only does this procedure facilitate dissection of the sinuses, it is important for postoperative debridement as well as to prevent synechiae. There are numerous techniques in the surgical management of the concha bullosa. One must avoid destabilizing the middle turbinate if puncturing the concha bullosa. Because the concha bullosa is lined with functional mucosa on the inside, one must be careful to preserve the portion on the remnant middle turbinate for functional purposes.

Uncinate

A proper uncinectomy is key for good visualization during endoscopic ethmoidectomy, maxillary antrostomy, and when approaching the frontal sinus. Therefore, an incomplete uncinectomy is often the reason for failure of sinus surgery. Knowledge