Uncinectomy

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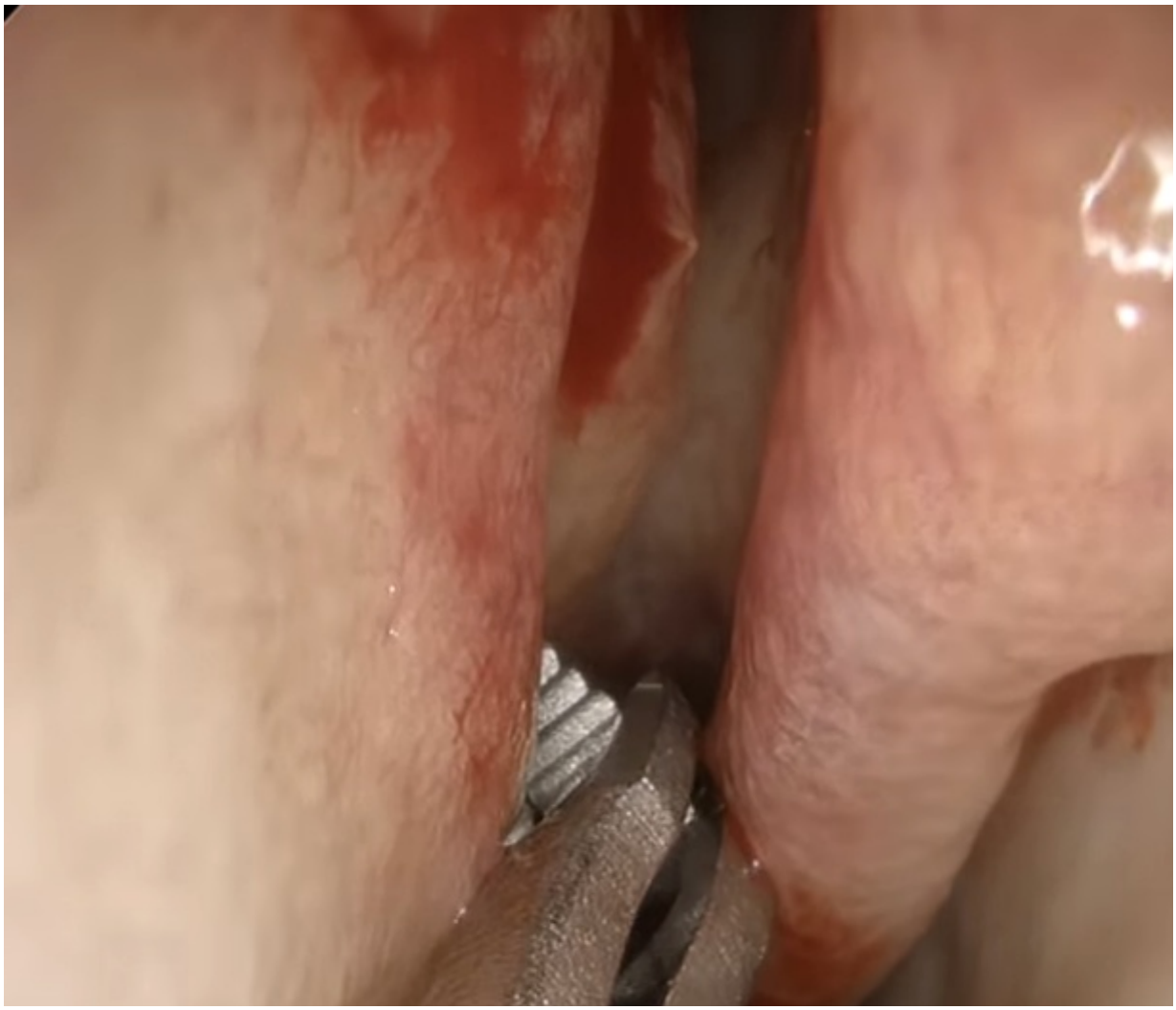


Introduction:

Uncinectomy is the first step in middle meatal antrostomy. Removal of uncinate opens up the middle meatus. Open approaches to maxillary sinus were first described in early 1700's. The famous procedure Caldwell - Luc surgery was first described in US by George Walter Caldwell and Henri Luc of France in 1893 and 1897. Subsequent studies added to the knowledge of physiologic drainage pattern of the maxillary sinus which was dependent on the mucociliary clearance mechanism led to the introduction of Endoscopic sinus surgery.

Functional endoscopic sinus surgery is based on the surgical approach performed by Messerklinger and Wigand via the ostiomeatal complex. FESS has become the standard surgical treatment for chronic maxillary sinusitis.

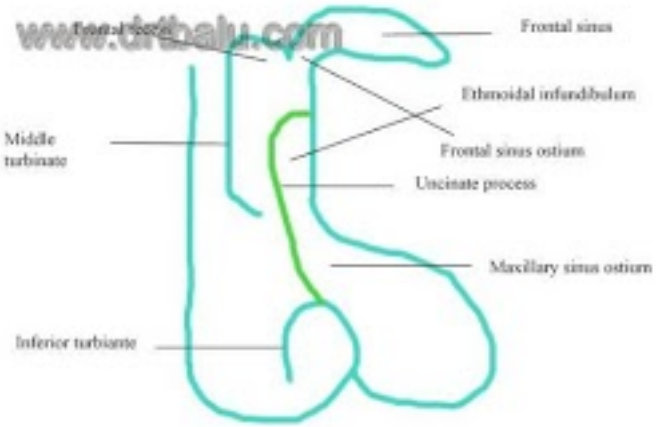
The uncinate process is the most important component of osteomeatal complex. This structure prevents direct contact of the inspired air with the maxillary sinus mucosal lining. It acts like a shield and plays a role in the mucociliary activity. This should not be considered as a vestigial structure, on the other hand it plays a vital role in the ventilatory mechanisms of the nasal cavity. This thin semicircular piece of bone is considered to be a key component of the ventilation of the nasal cavity. This small piece of bone also serves to protect the anterior sinuses from bacteria and allergens by preventing the nonsterile / contaminated inspired air from reaching the sinus surfaces. At this juncture it must be stressed that inadvertant and injudicious removal of this piece of bone would result in greater exposure of the sinus mucosa to non sterile / contaminated inspired air.

Anatomy of Uncinate process:

The uncinate process is a wing shaped (boomerang shaped) piece of bone. It forms the first layer or the lamella of the middle meatus. Anteriorly it attaches to the posterior edge of the lacrimal bone, and inferiorly to the superior edge of the inferior turbinate. Superior attachment of the uncinate process is highly variable. It may be attached to the lamina papyracea, or the roof of ethmoid sinus, or sometimes to the middle turbinate. It should be pointed out that the configuration of the ethmoidal infundibulum and its relationship to the frontal recess depends largely on the behavior of the uncinate process.

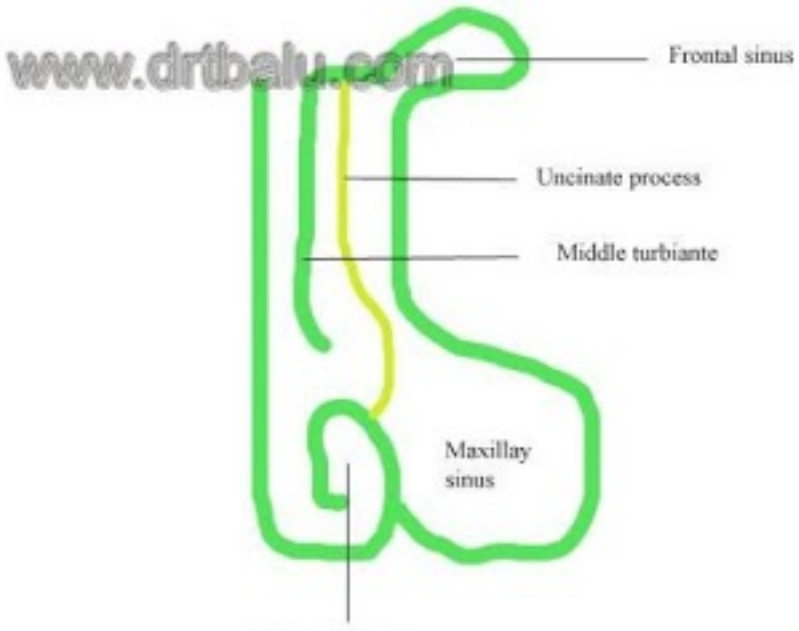
The uncinate process can be anatomically classified into three types depending on its superior attachment. The anterior incision of the uncinate is not clearly identifiable as it is covered with mucosa which is continuous with that of the lateral nasal wall. Sometimes a small groove is visible over the area where the uncinate process attaches itself to the lateral nasal wall.

Type I Uncinate:



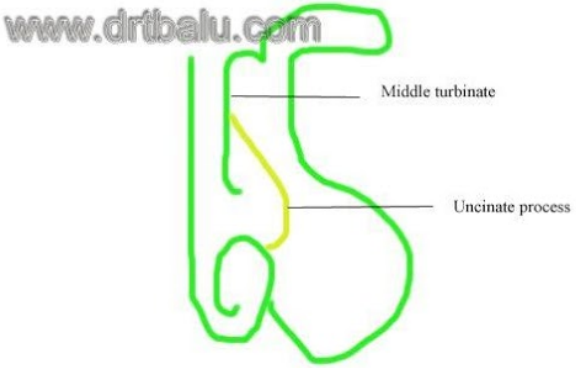
In type I uncinate the process bends laterally in its upper most portion and gets inserted into the lamina papyracea. The ethmoidal infundibulum in this scenario is closed superiorly by a blind pouch known as the recessus terminalis (terminal recess). In this type the ethmoidal infundibulum and the frontal recess are separated from each other so that the frontal recess opens into the middle meatus medial to the ethmoidal infundibulum as shown in the figure above. The opening of the frontal recess lie between the uncinate process and the middle turbinate. Drainage and ventilation routes of the frontal sinus run medial to the ethmoidal infundibulum.

Type II Uncinate:



Here the uncinate process extends superiorly to the roof of the ethmoid. The frontal sinus opens directly into the ethmoidal infundibulum. In these cases a disease in the frontal recess may spread to involve the ethmoidal infundibulum and the maxillary sinus secondarily. Sometimes the superior end of the uncinate process may get divided into three branches one getting attached to the roof of the ethmoid, one getting attached to the lamina papyracea, and the last getting attached to the middle turbinate.

Type III Uncinate:



In this type the superior end of the uncinate process turns medially to get attached to the middle turbinate. Here also the frontal sinus drains directly into the ethmoidal infundibulum.

Uncinate process should be removed in all endoscopic sinus surgical procedures in order to open up the middle meatus. In fact this is the first step in endoscopic sinus surgery.

Rarely the uncinate process itself may be heavily pneumatised causing obstruction to the infundibulum.

Atelectatic uncinate process;

In this scenario the free end of the uncinate process shows hypoplasia and gets attached to the medial wall of orbit or to the inferior section of lamina papyracea. This condition is generally seen together with an opacified hypoplastic maxillary sinus. This scenario should be identified from CT images before surgery otherwise it would cause orbital complications as the surgeon could inadvertantly enter into the orbit while performing uncinectomy in this area.

Surgical Procedure:

Uncinectomy which the priliminary step to middle meatal antrostomy is performed ideally under general anesthesia. It can also be performed under local anesthesia. The author prefers general anesthesia because it causes less discomfort to the patient and the risk of aspiration is minimal when compared to the procedure performed under general anesthesia. This is because 4% xylocaine which is used to anesthetize the nasal mucosa trickles down the throat and anesthetizes the posterior pharyngeal wall also. During surgery the patient will not be able to feel the secretion in the throat and hence swallowing reflex is blunted leading to aspiration. Some surgeons prefer to inject 0.5 ml of 2% xylocaine with adrenaline into the lateral nasal wall over the uncinate area before incising it. This procedure is expected to reduce bleeding during the surgery. The author does not infiltrate uncinate process because the threat of bleeding is virtually non existent in hypotensive anesthesia which is preferred for all endoscopic sinus surgical procedures. On the other hand inadverntant entry of xylocaine into the orbit may cause transient medial / inferior rectus palsy.

Classic uncinectomy:

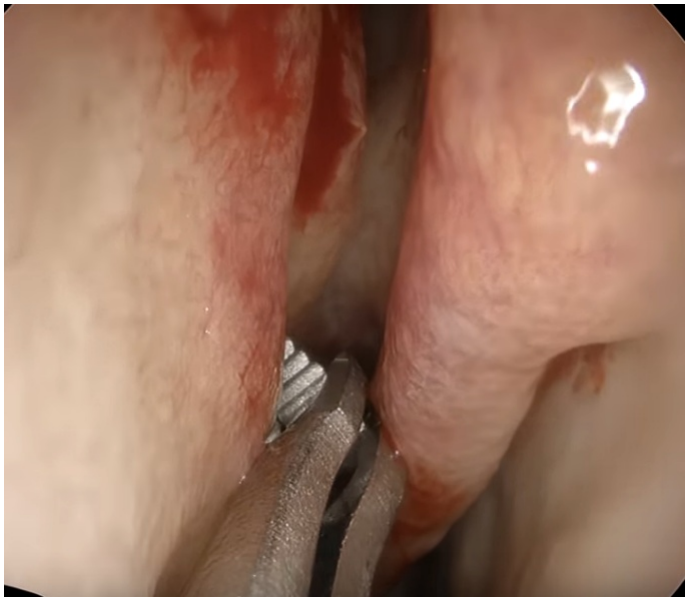
This is begun after decongesting the nasal mucosa by packing it with 4% xylocaine with 1 in 1 lakh units adrenaline. This decongests the nasal mucosa thereby reducing the bleeding and creating more intranasal space for the surgeon to work. The incision is placed over the anterior end of the uncinate process, which feels softer to palpation with sickle knife when compared to the hardness of the lacrimal bone that lies anterior. The incision can be given in either both inferior to superior or from superior to inferior direction.

After the incision using a sickle knife the uncinate is medialized and removed using a Blakesley forceps (straight one). Small tags especially the inferior portion of the uncinate can be removed using a 45 degree Blakesley forceps. The free edge of the uncinate process should be grasped for total removal. It can be removed by a medial turn of the forceps towards the nasal septum. Removal of uncinate process opens up the middle meatus of the nasal cavity.

Image showing sickle knife used to incise the uncinate process

Swing door technique:

Reverse cutting / Back biting forceps is used in this technique. As a first step the inferior free margin of uncinate process overlying the maxillary ostium is cut. An incision is made in the superior margin to form a flap from the uncinate. The hinged uncinate (on its anterior margin) can be moved with an elevator or ball probe. An angled true cut forceps is used to grasp the free edge of the uncinate process in order to remove it. This step is followed by submucosal removal of the horizontal process of the uncinate process and subsequent trimming of the mucosa to fully visualize the maxillary ostium. Once the uncinate process is removed the natural ostium of the maxillary sinus can easily be identified.



Back biting forceps is seen being used to cut the inferior portion of the uncinate process

Back biting forceps seen nibbling the inferior portion of uncinate process

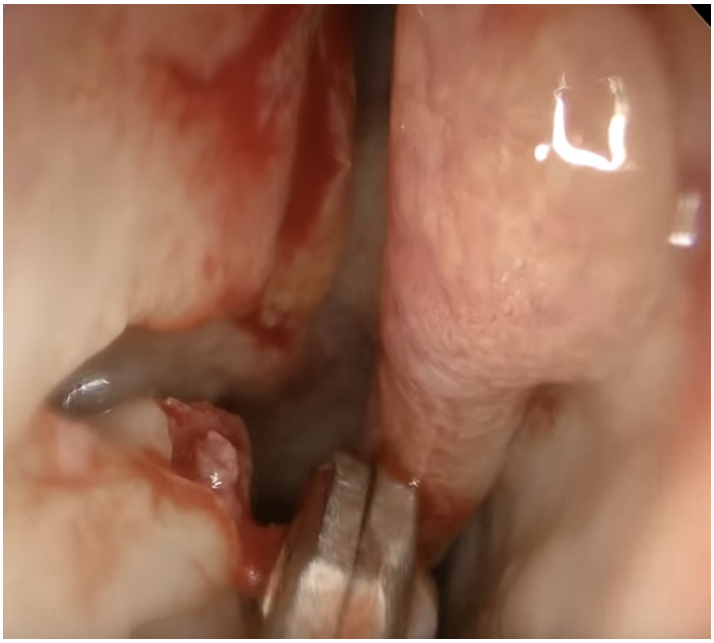


Image showing back biting forceps biting into the superior portion of uncinate process

Image showing the scenario after uncinate process is removed

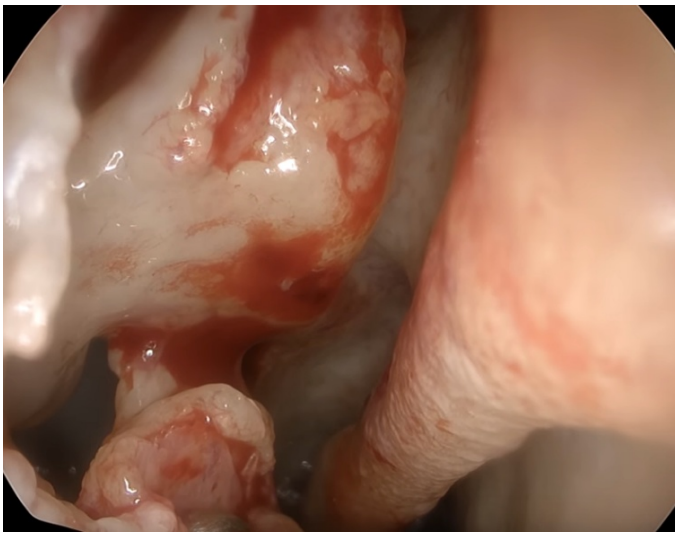
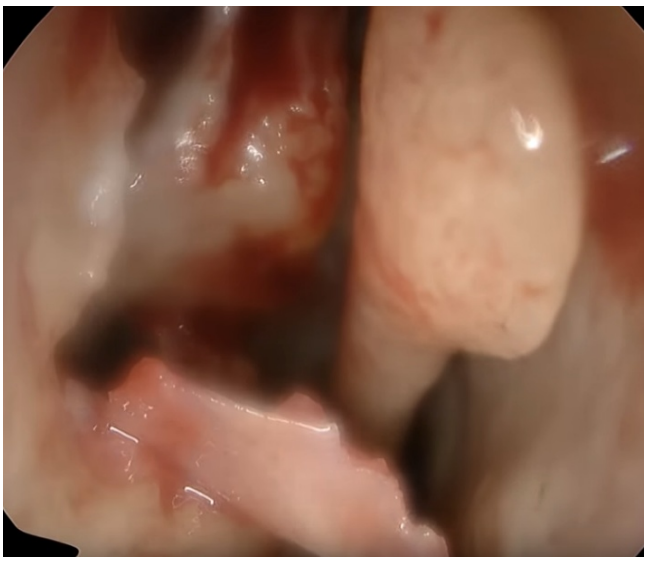


Image showing horizontal portion of the uncinate process



Horizongal portion of uncinate process seen being mobilized

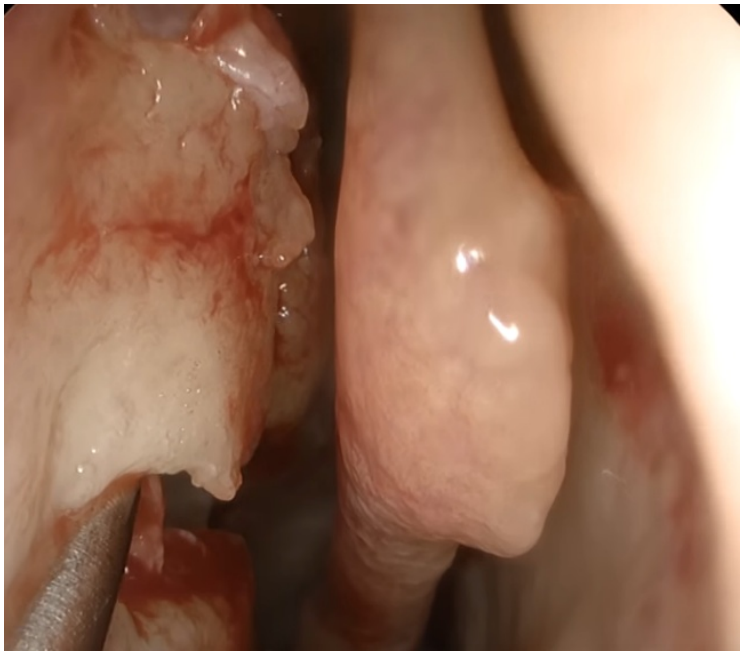


Image showing middle portion of uncinate being mobilized before removal. (swing door technique).

Complications:

1. Bleeding

2. Injury to orbital contents

3. Injury to lacrimal duct (seen in swing door technique when using back biting forceps)

In order to minimize complications during uncinectomy the possible variations pertaining to uncinate process should be borne in mind and studied by CT imaging before embarking on this procedure.