



# Frontal Sinus: *Anatomy and Endoscopic Approach*

Stil Kountakis, MD, PhD

Professor

Chief, Division of Rhinology

**Georgia Health Sciences University**

Department of Otolaryngology / Head & Neck Surgery



**Georgia Health  
Sciences University**

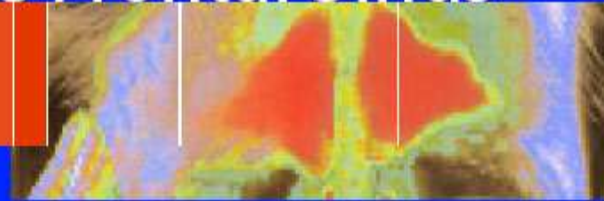
Kountakis et al. *Eds.*

Stilianos Kountakis  
Brent Senior  
Wolfgang Draf  
*Editors*

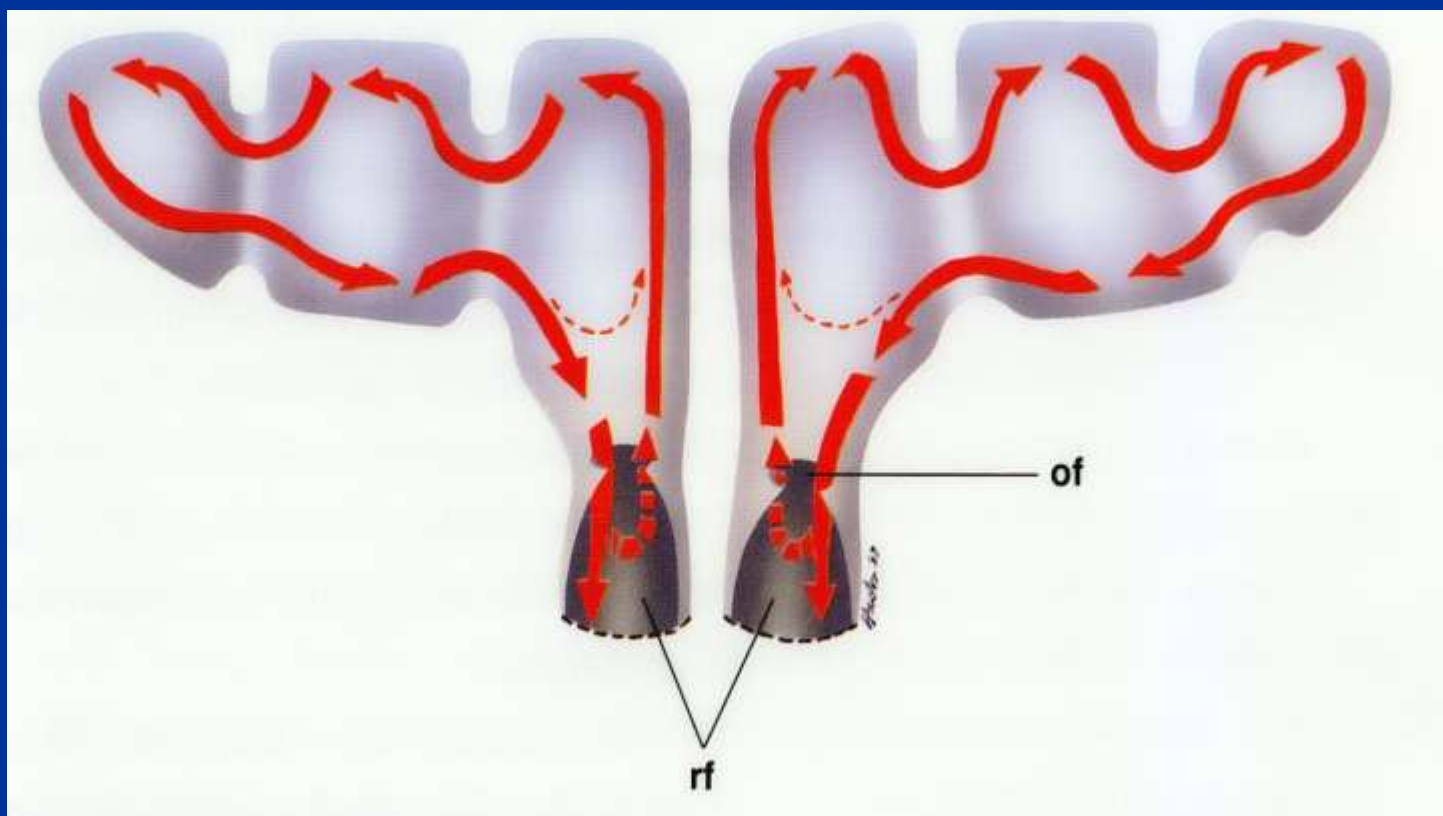
# The Frontal Sinus

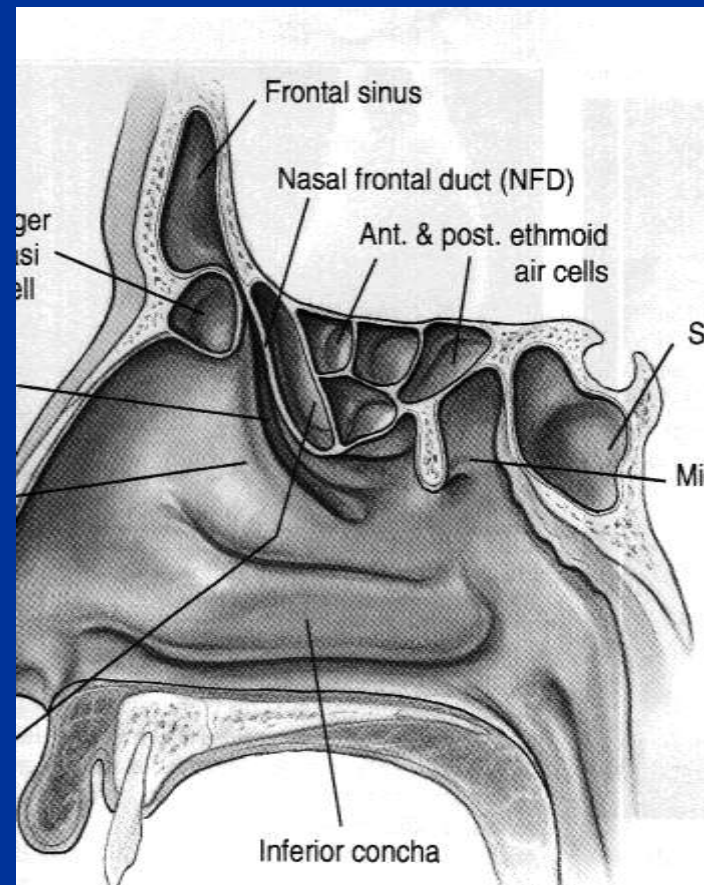
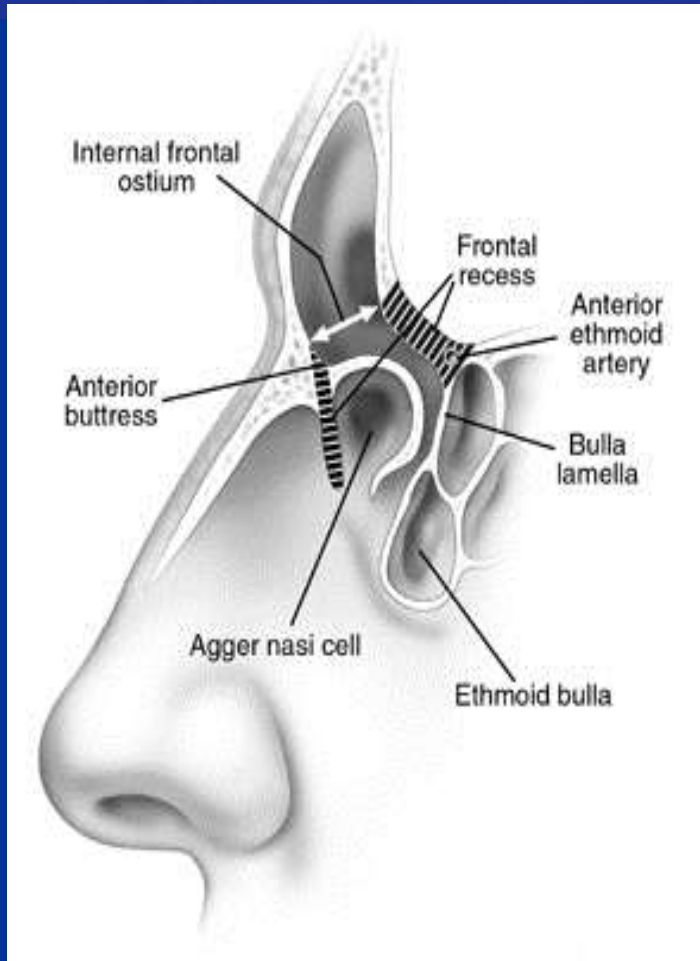


The Frontal Sinus



## FS Mucociliary Clearance (Messerklinger)





Frontal cell - Type I

Frontal cell - Type II



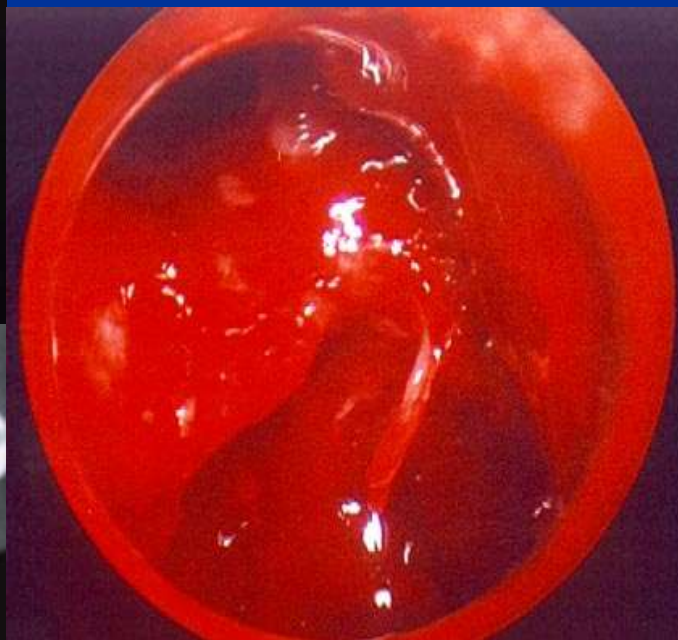
## Frontal cell - Type III



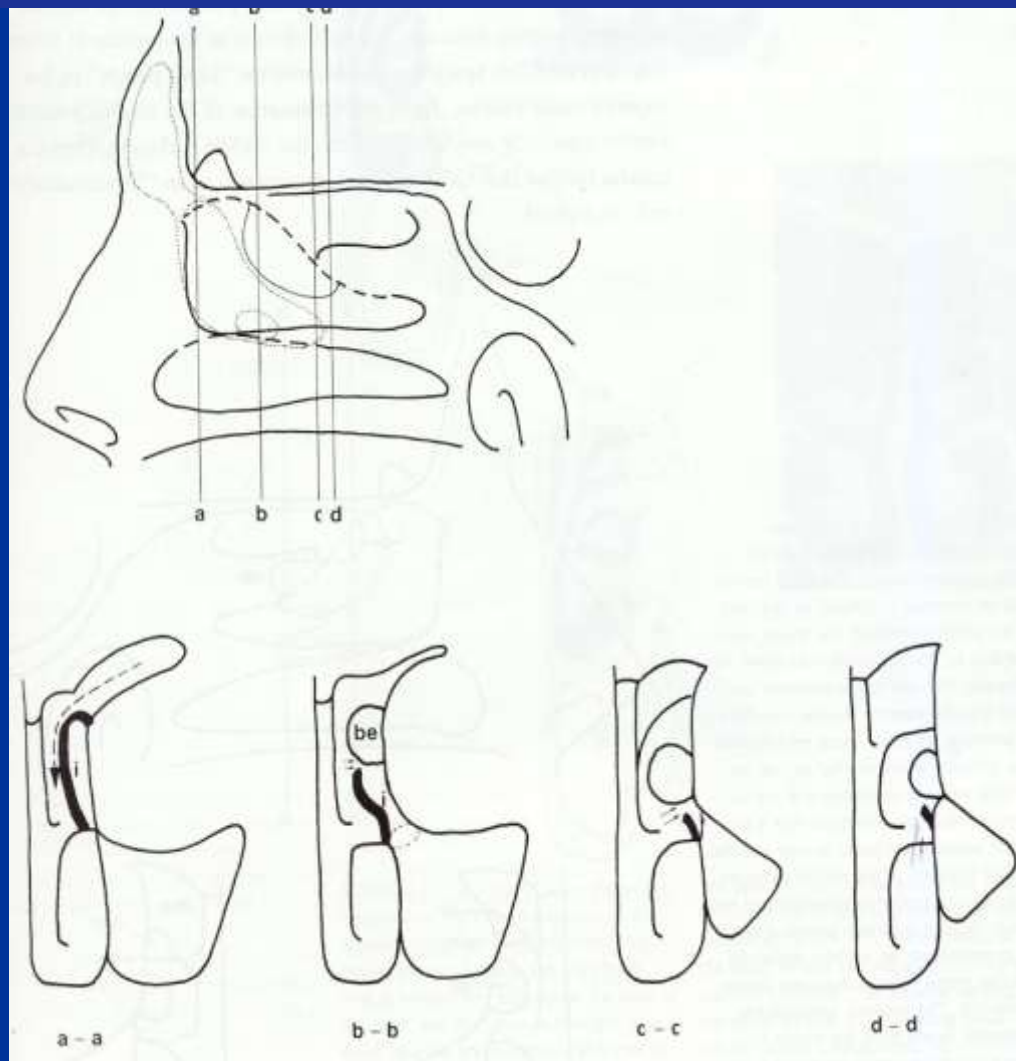
## Frontal cell - Type IV



## Frontal Cell type I

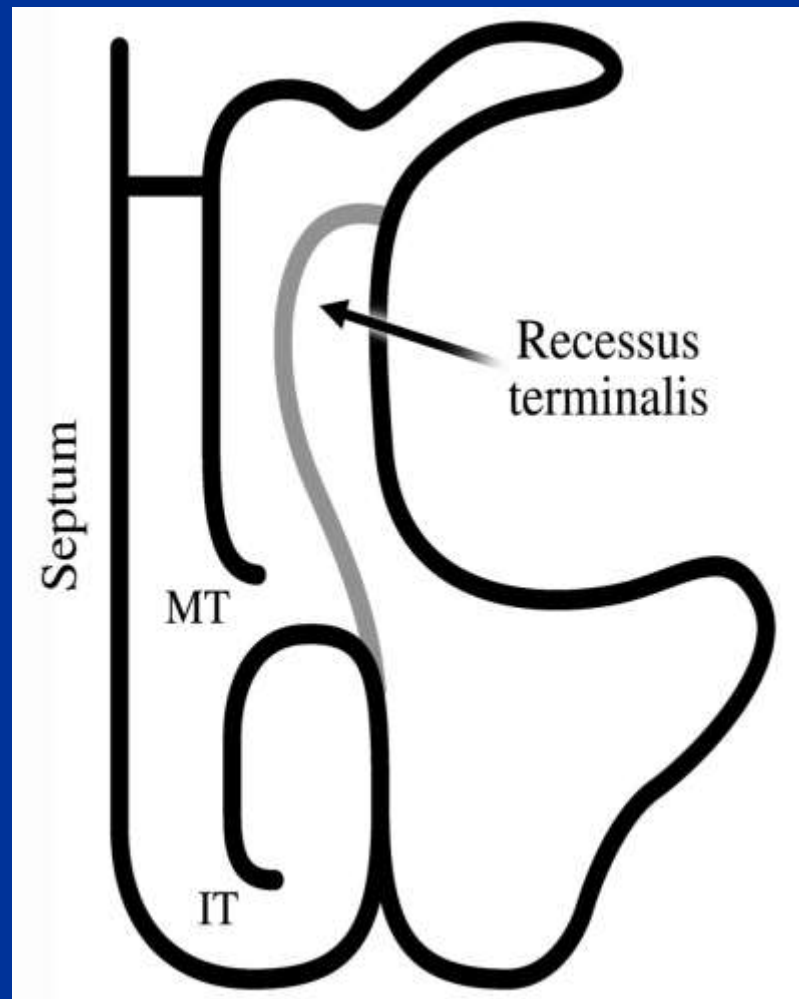


# Uncinate Process

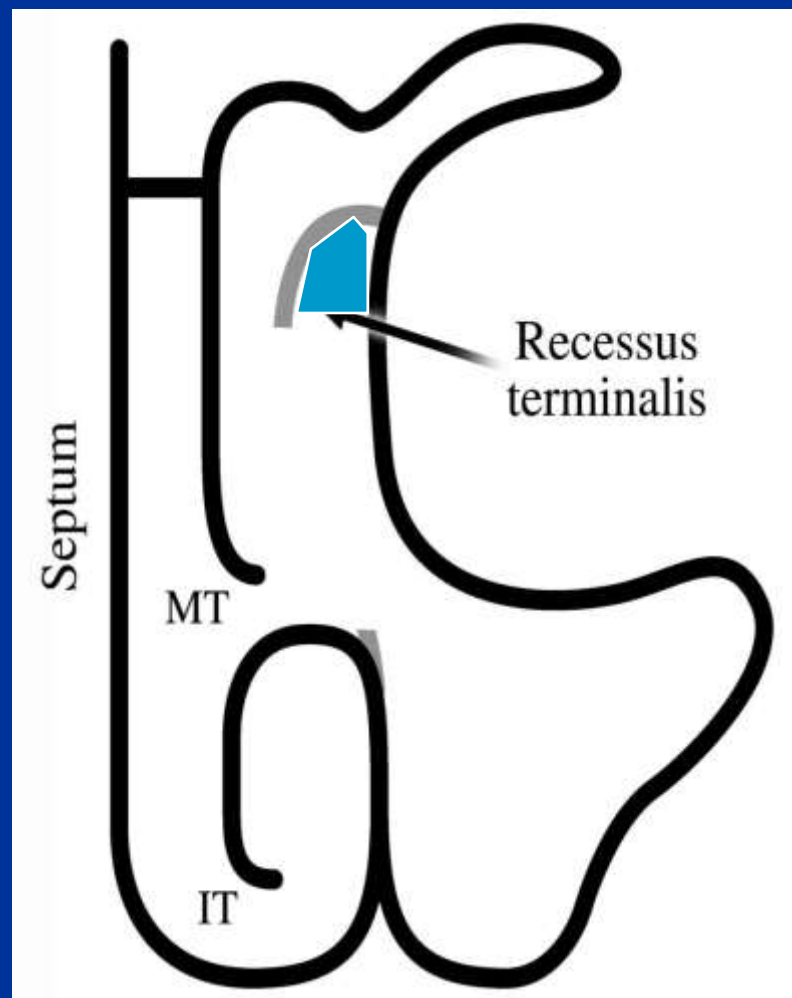




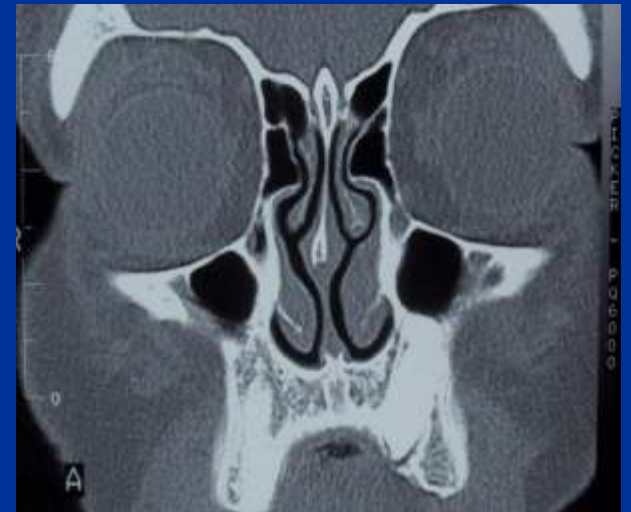
# Uncinate to Lamina Recessus Terminalis



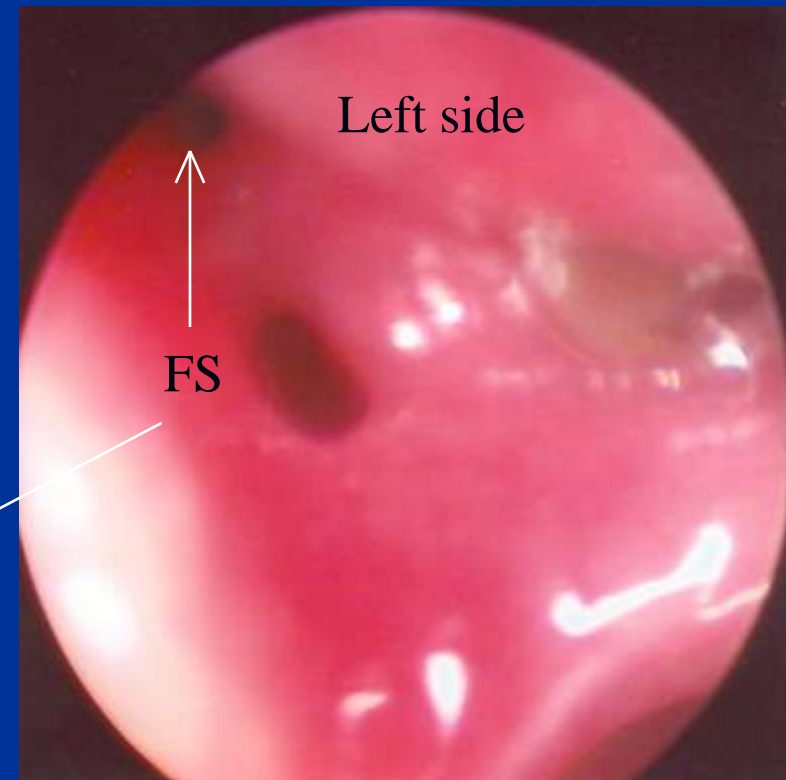
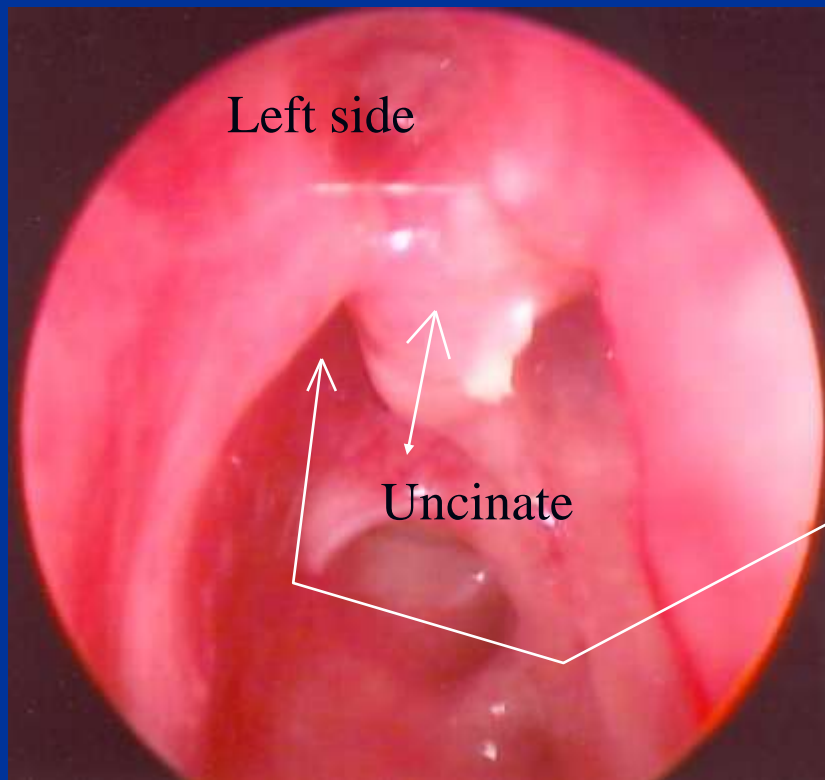
# Uncinate to Lamina Recessus Terminalis



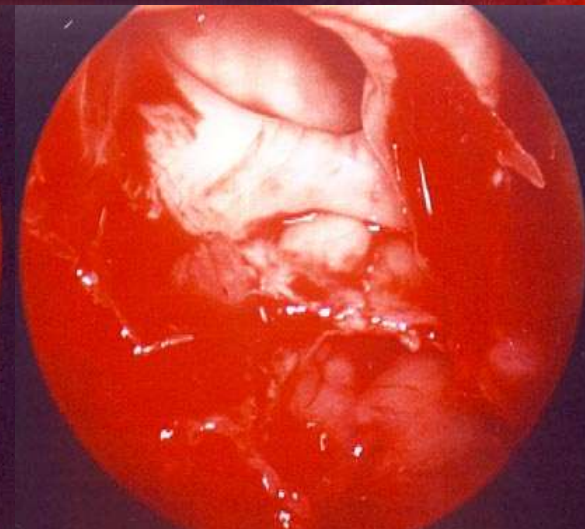
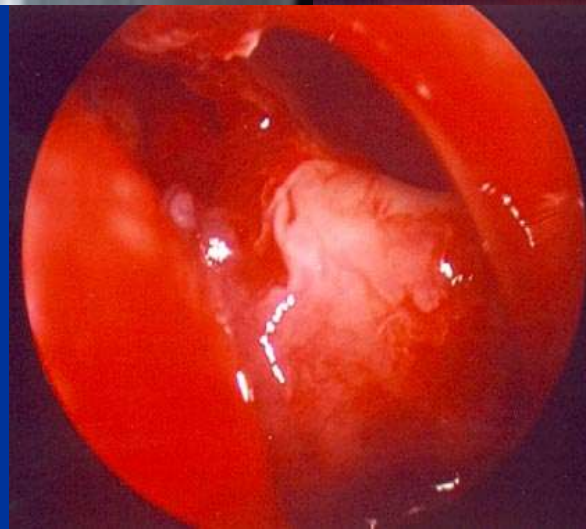
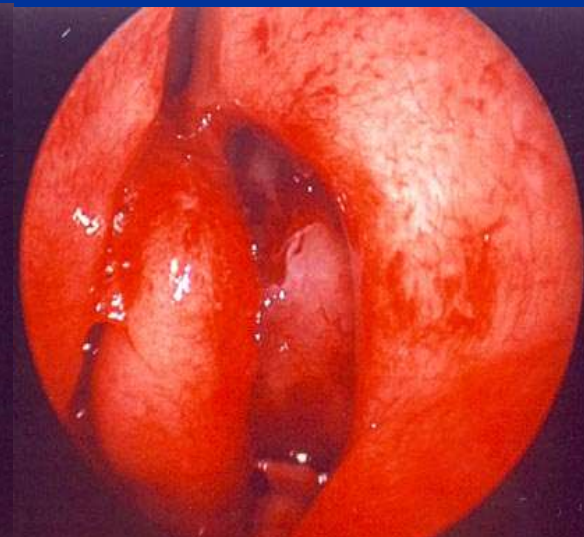
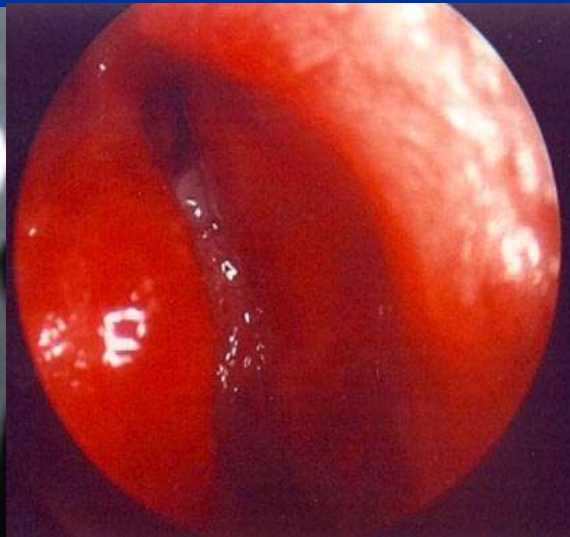
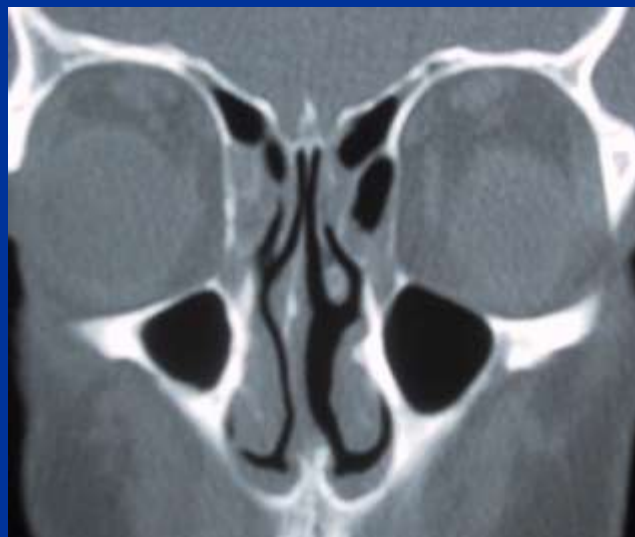
## Uncinate to Lamina



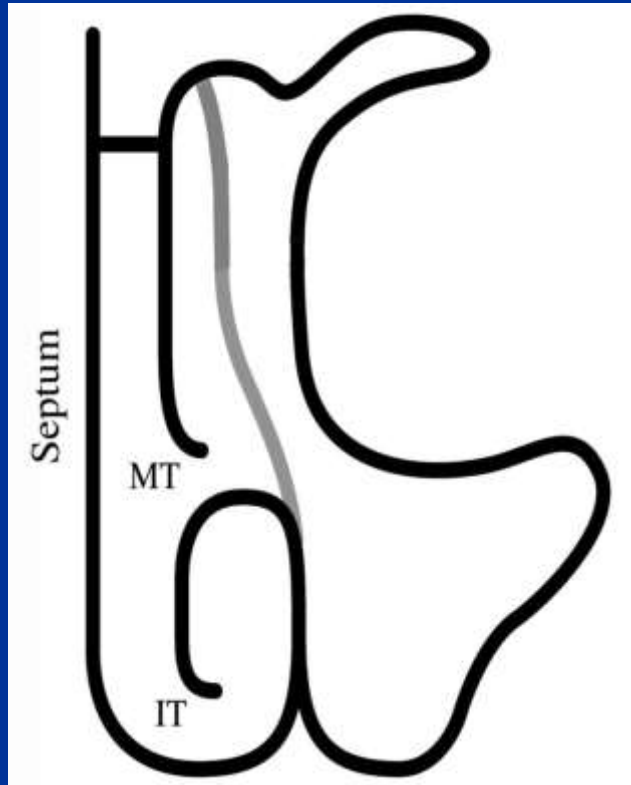
## Uncinate to Lamina



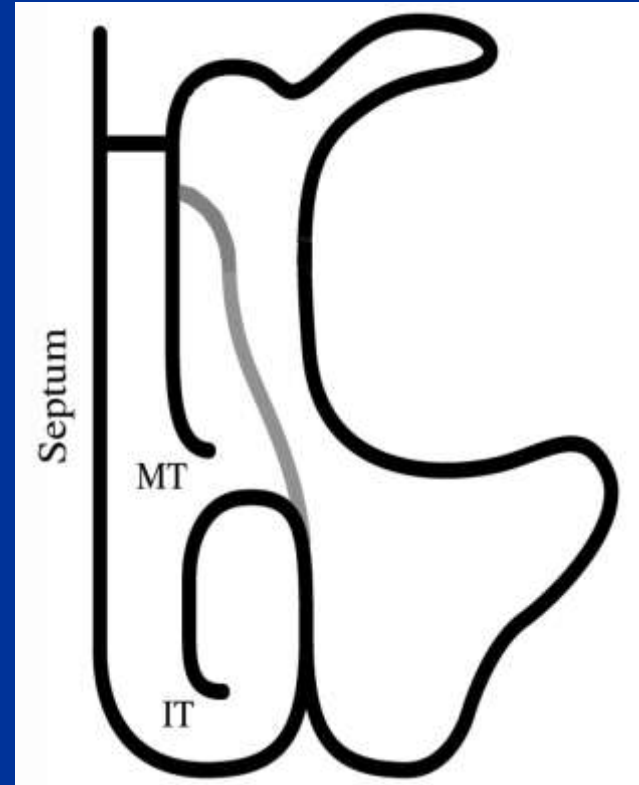
# Uncinate to Lamina



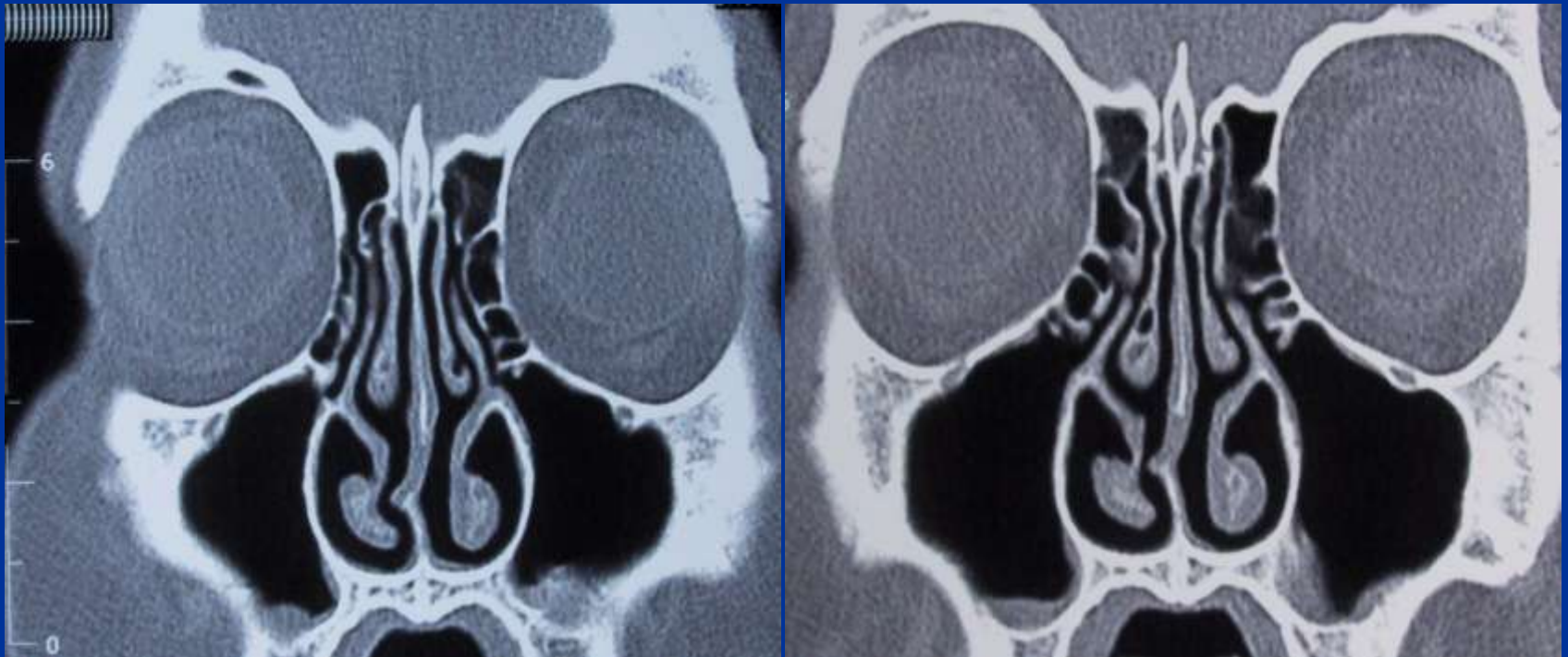
## Uncinate to Skull base



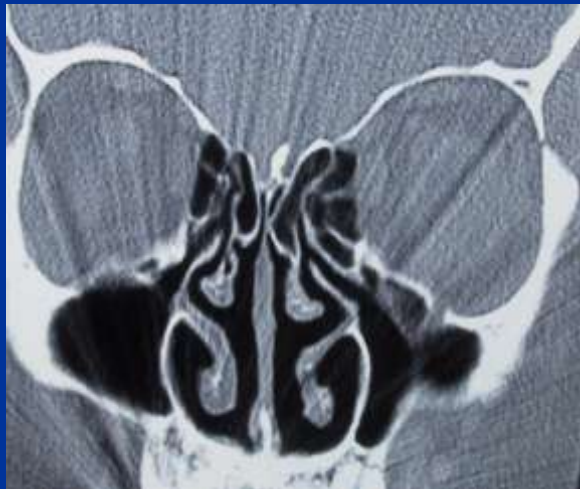
## Uncinate to Middle Turbinate



## Uncinate to Skull base



## Uncinate to Middle Turbinate

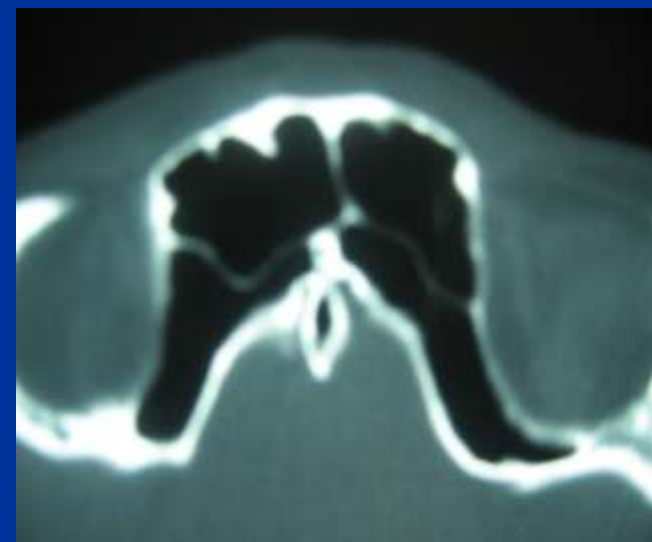
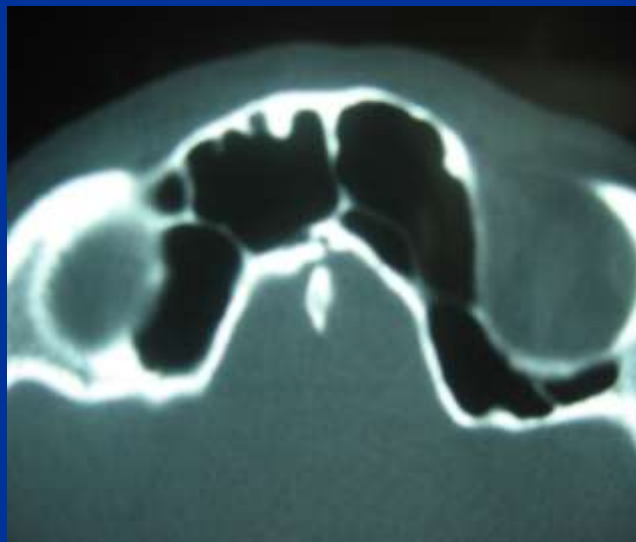
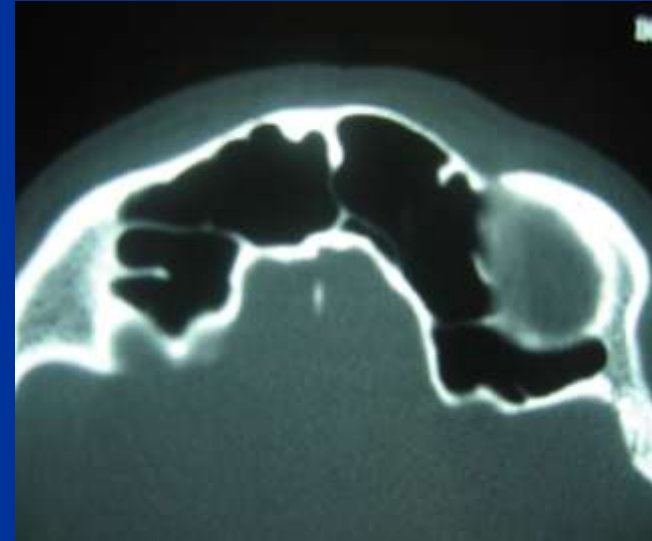




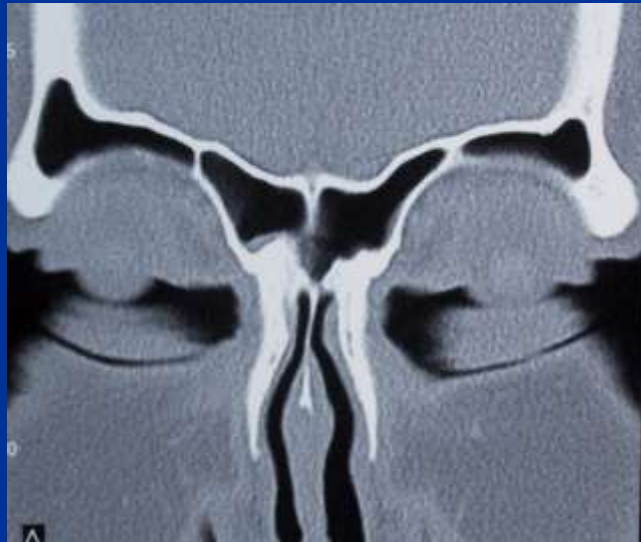
## Uncinate to Lateral Lamella of Cribriform



# Supraorbital Ethmoid Air Cell

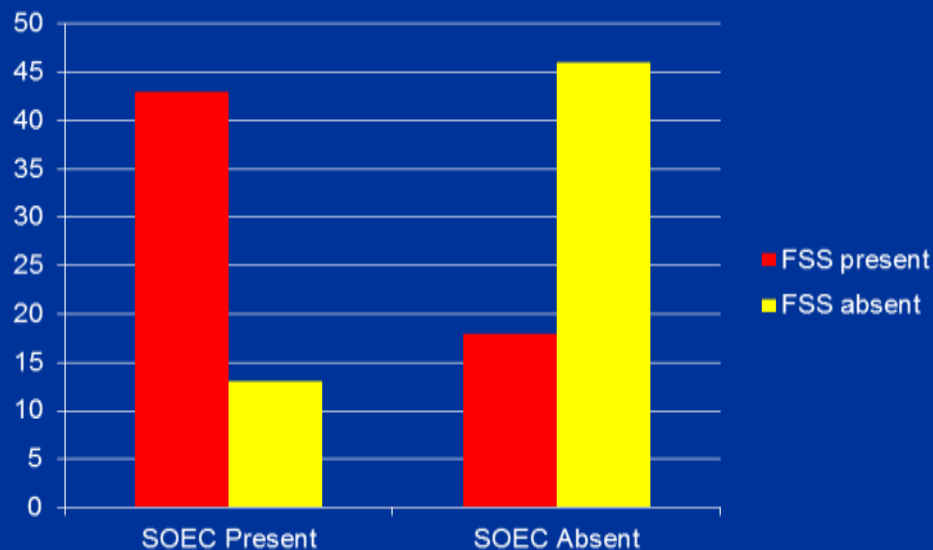


# Supraorbital Ethmoid Air Cell



# Frontal Sinus Septations and SOE cells

$p=10^{-7}$	Frontal Septations	SOECells
YES	61	43 (70%)
NO	59	13 (22%)

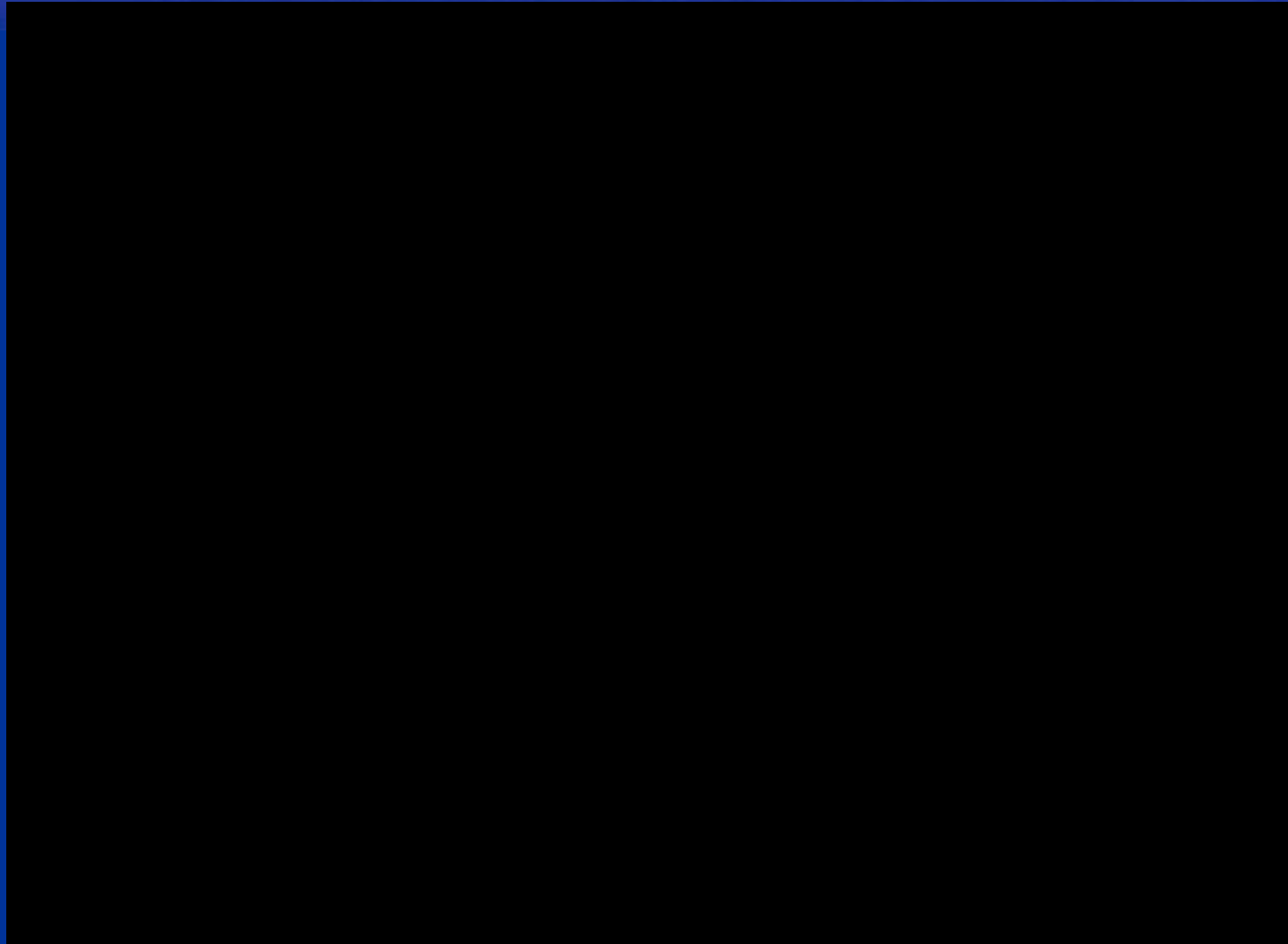


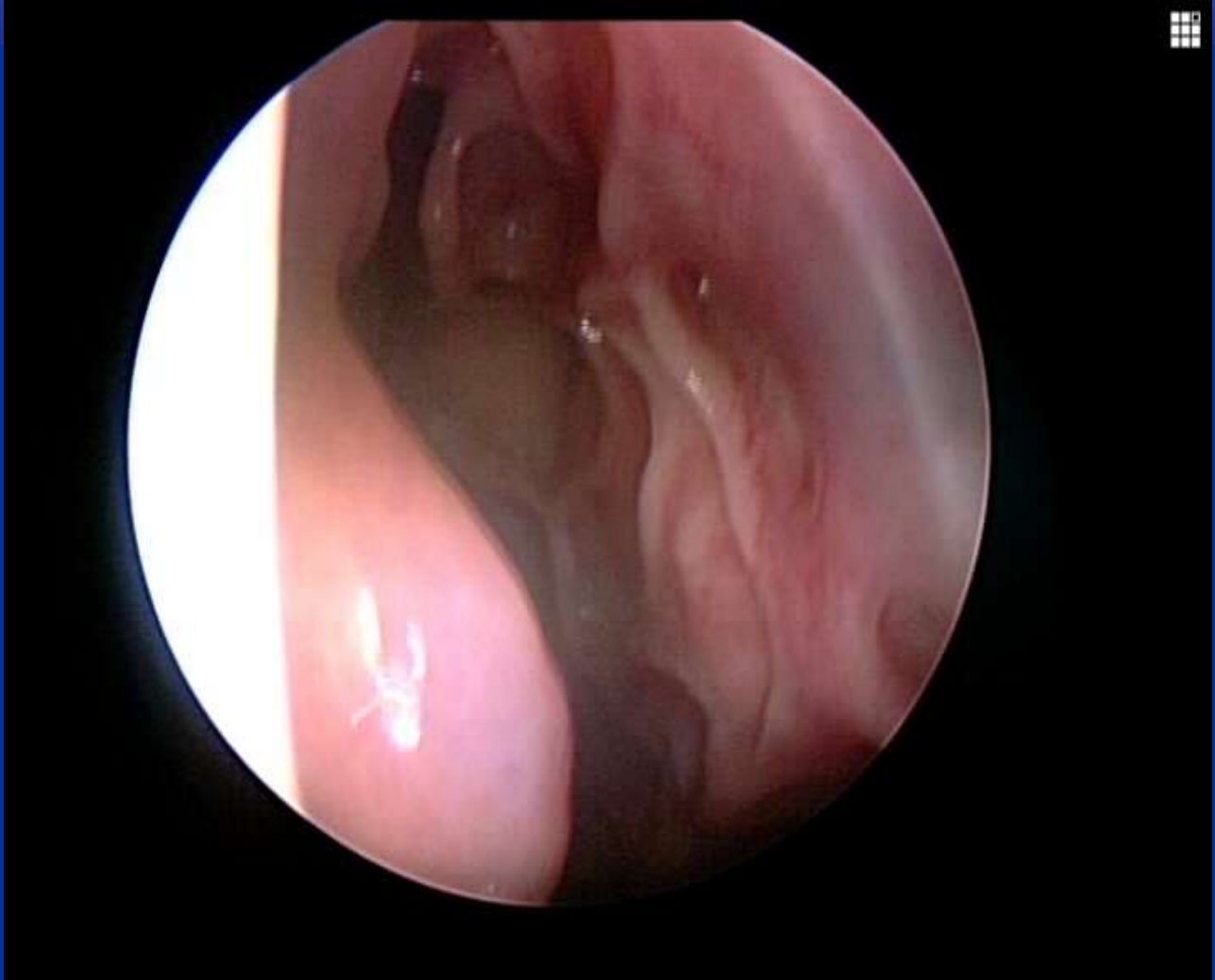
Kountakis, SE et al, Triological-COSM, San Diego, CA May 2012

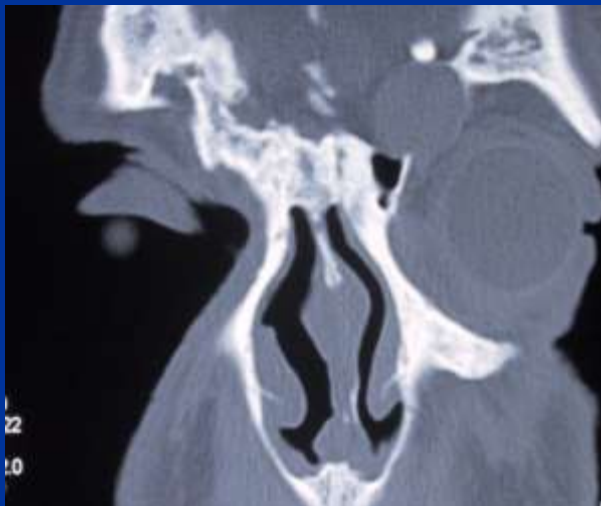
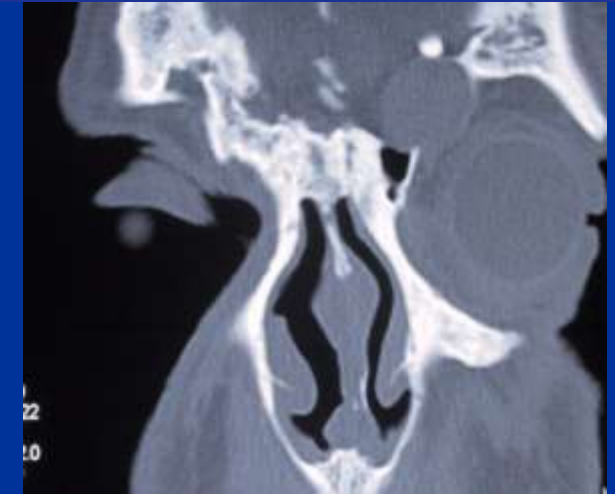
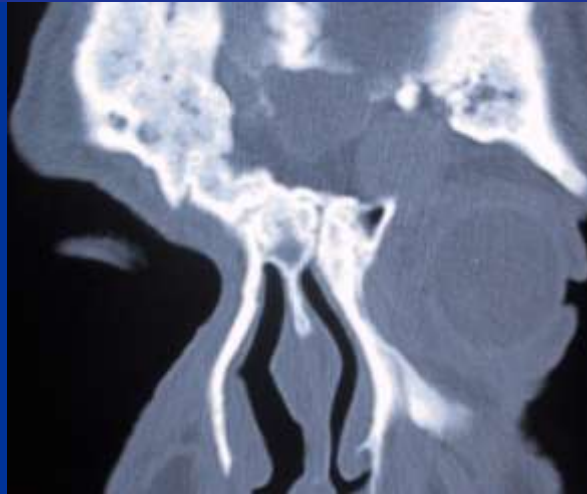
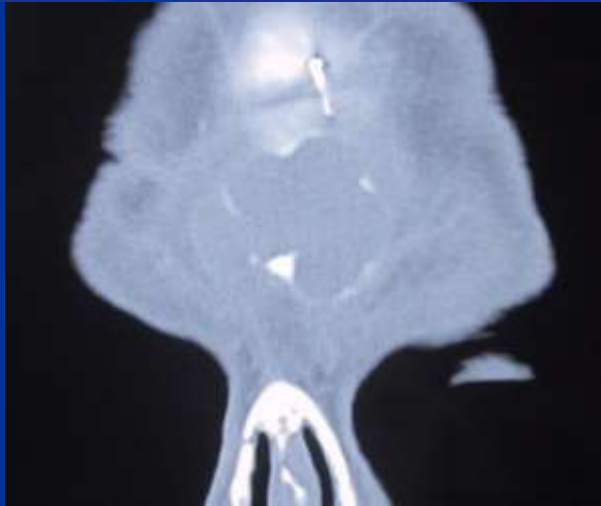
# Supraorbital ethmoid cell as a landmark for the anterior ethmoidal artery



# SOE and Anterior Ethmoidal Artery









# SOE cells and orbital proptosis

<b>p=0.006</b>	<b>Proptosis</b>	<b>SOE</b>
<b>YES</b>	<b>16</b>	<b>15 (94%)</b>
<b>NO</b>	<b>50</b>	<b>13 (26%)</b>

**14 of 15 SOEC  
 were the cause  
 of proptosis**

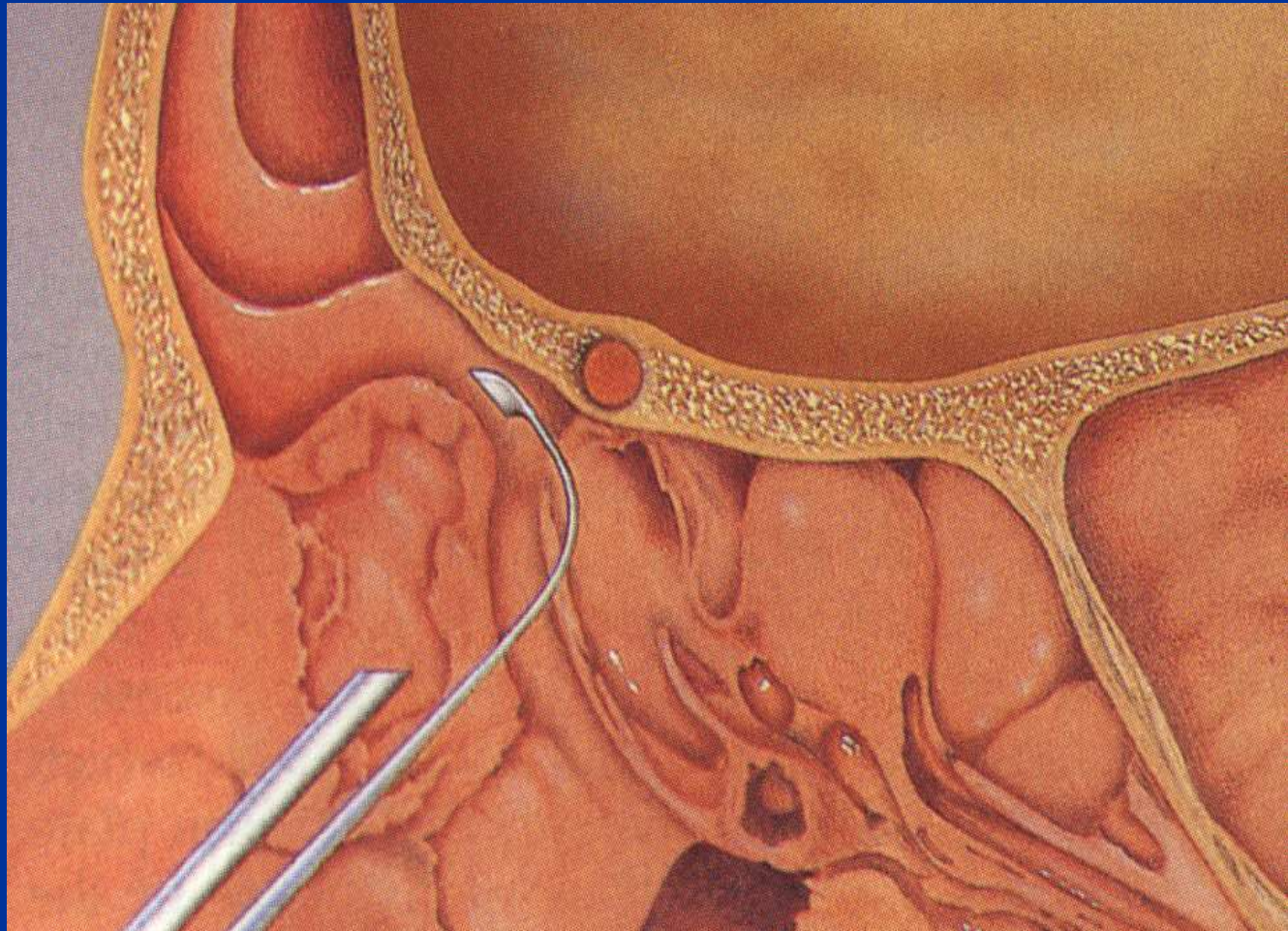
Comer B, Kountakis, SE.

In Press, International Forum of Allergy and Rhinology

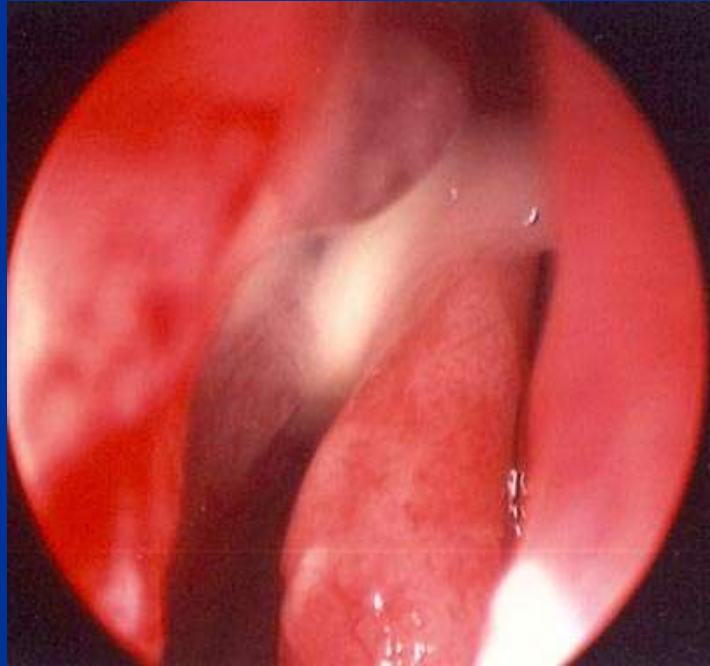
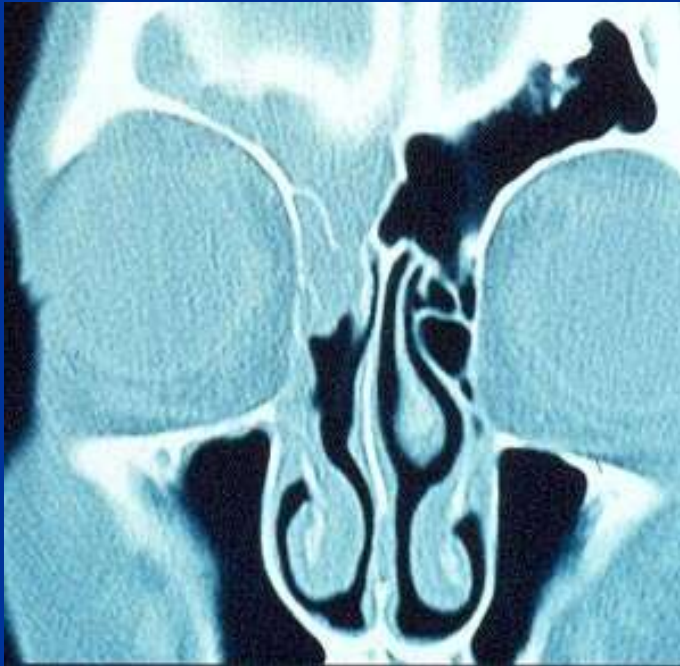
## Draf procedures of the frontal sinus

- I Anterior ethmoidectomy with drainage of the frontal recess without touching the frontal ostium
- II A Removal of ethmoidal cells protruding into the frontal sinus (“uncapping the egg”) creating an opening between the middle turbinate medially and the lamina papyracea laterally
- II B Removal of the frontal sinus floor between the nasal septum and the lamina papyracea laterally
- III Endoscopic modified Lorthrop procedure (Frontal Drill out): removal of the frontal sinus floor bilaterally and the upper part of the nasal septum

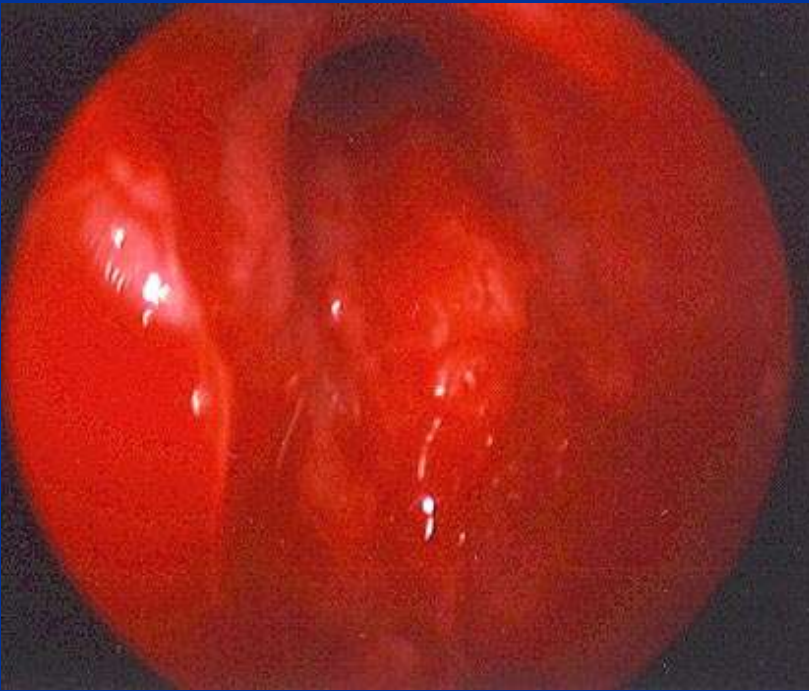
## Surgical Techniques - “uncapping the egg”



- Agger Nasi vs Frontal Cell obstructing frontal recess



- One year post-op

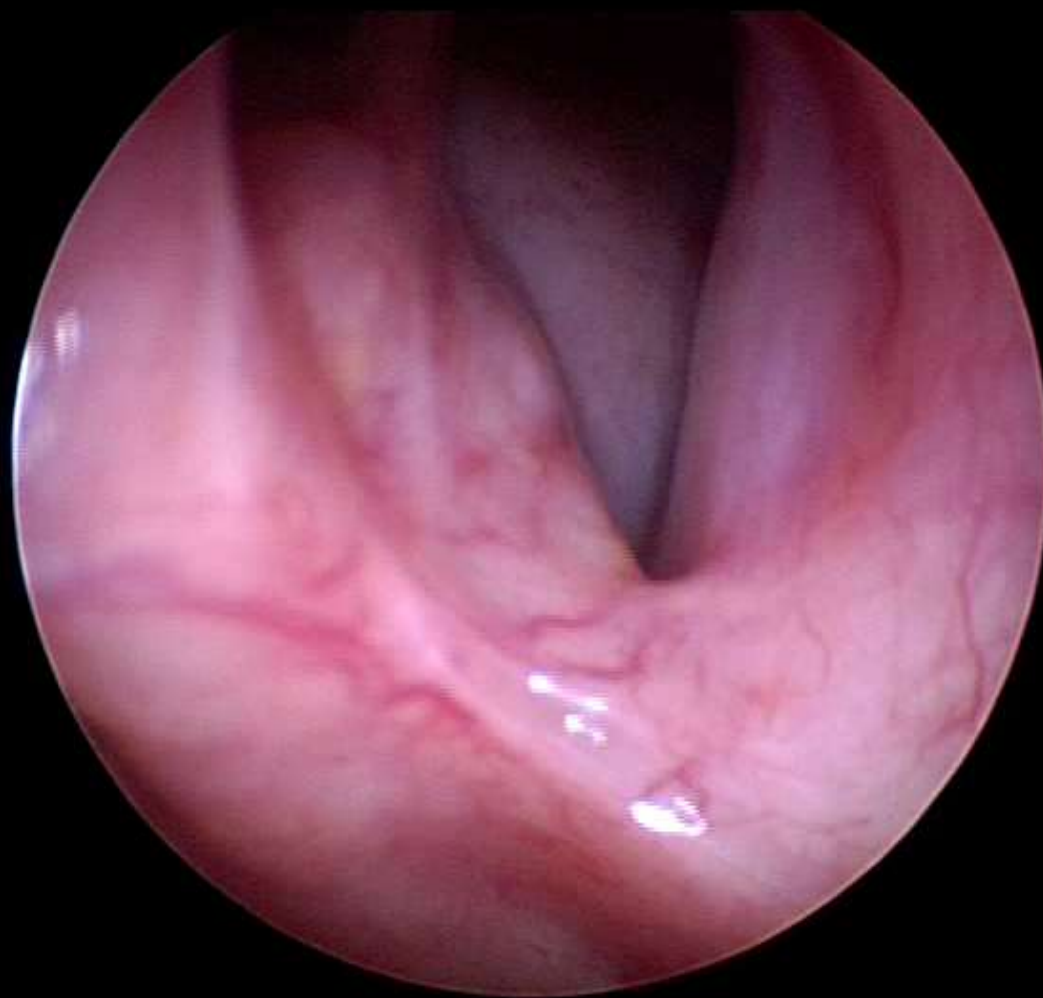


- **Advanced frontal techniques**
  - Revision cases - scarring in the frontal recess
  - Frontal stents
  - Combination approaches-  
Mini-trephination + endoscopic
  - Endoscopic modified Lothrop: the last step before frontal sinus obliteration
  - FS obliteration: last resort

# Draf IIB

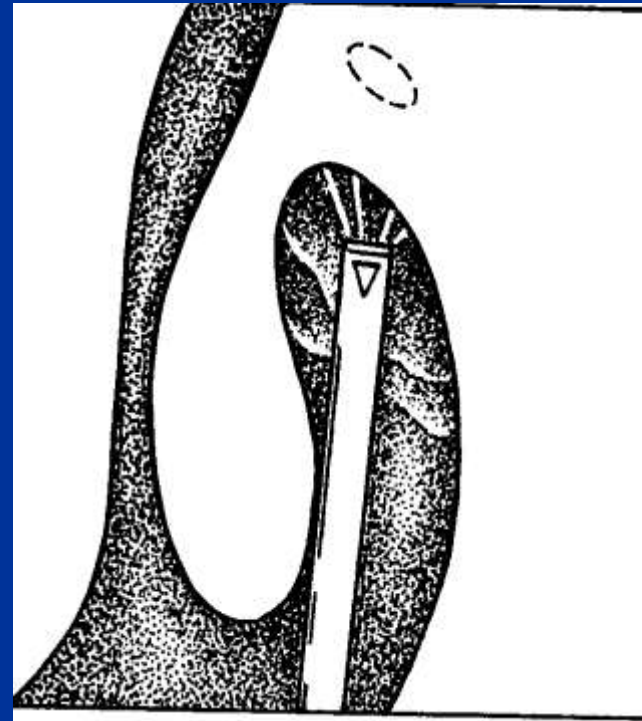
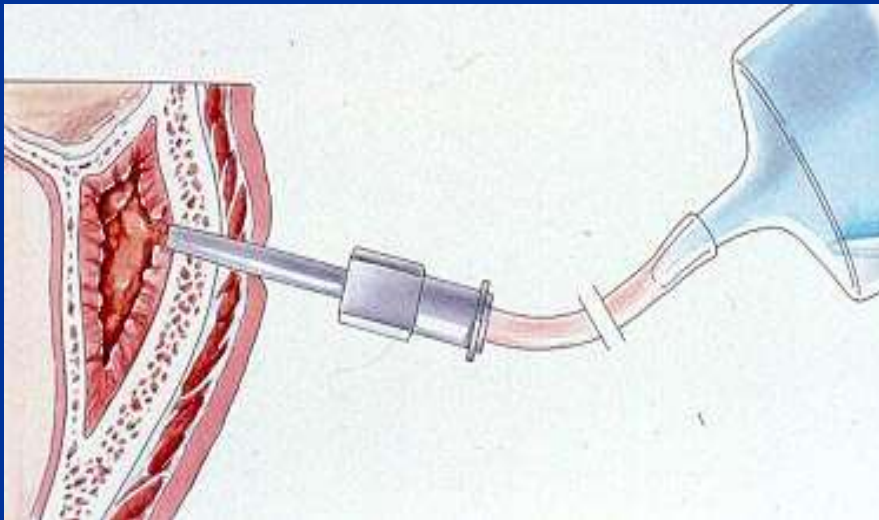


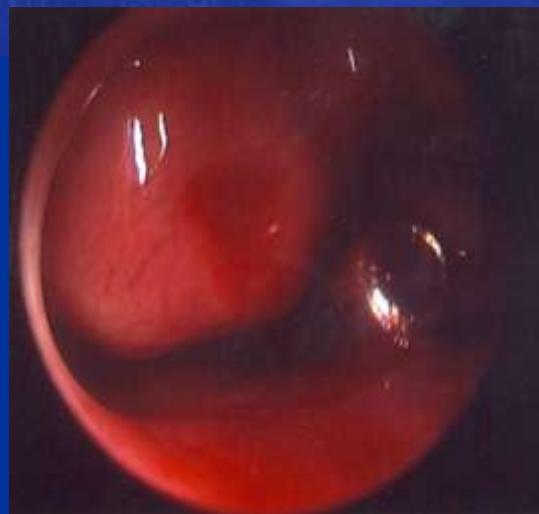
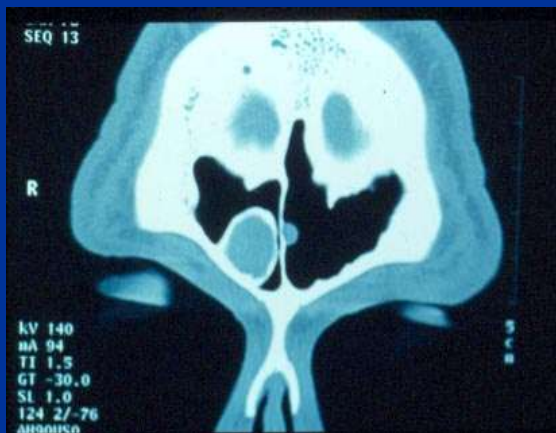
Draf IIB  
Video  
1 year post-op





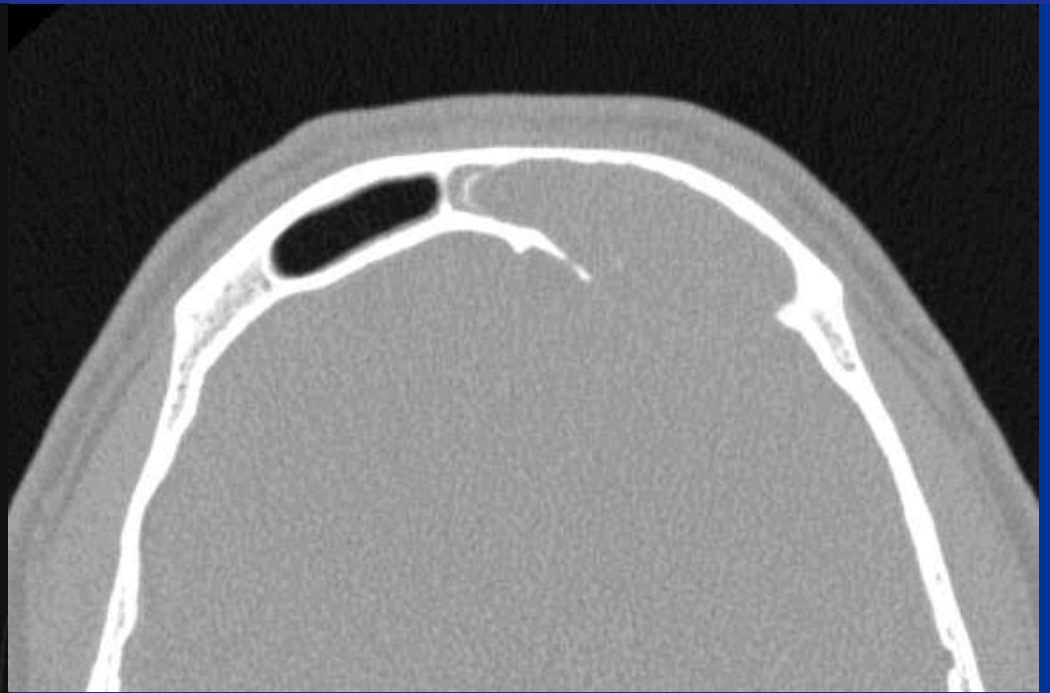
- Revision FESS -  
frontal
- Mini-trephination





Frontal Cell Type IV  
Combination approach





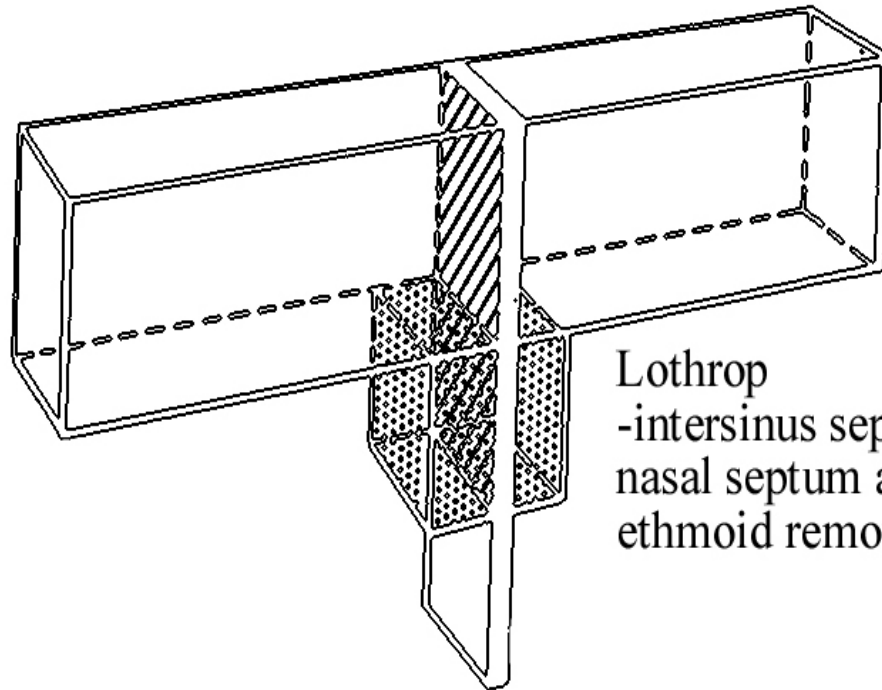




Video  
2 years post-op

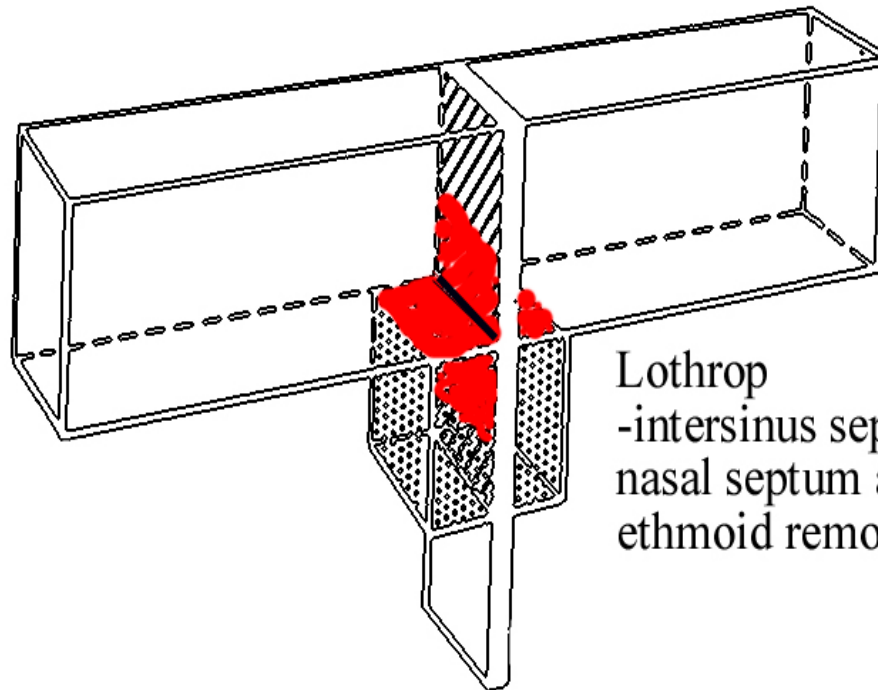


# Lothrop



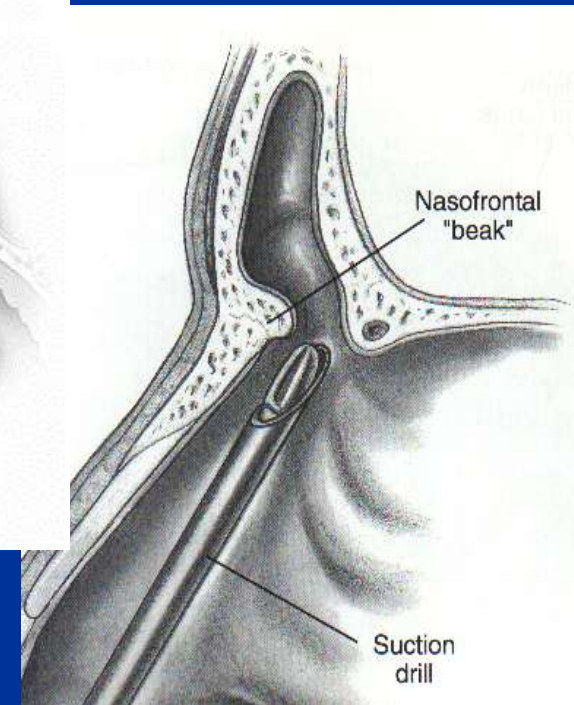
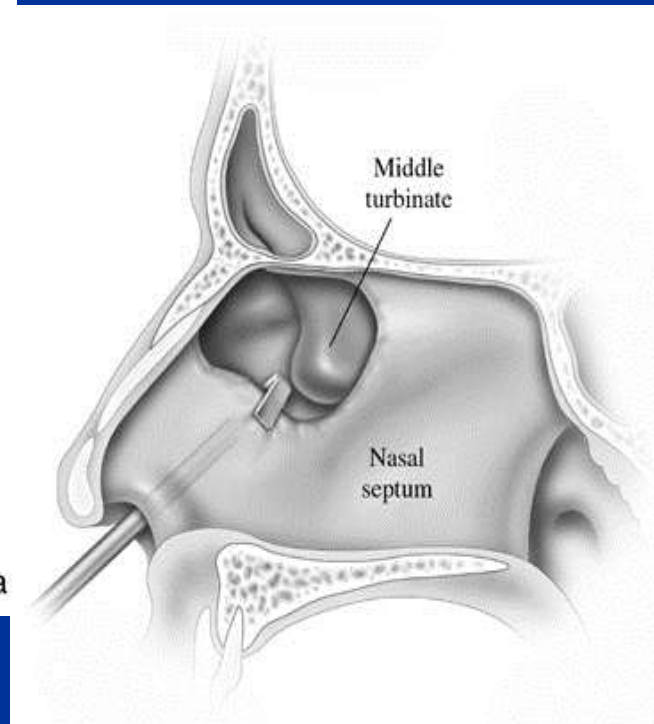
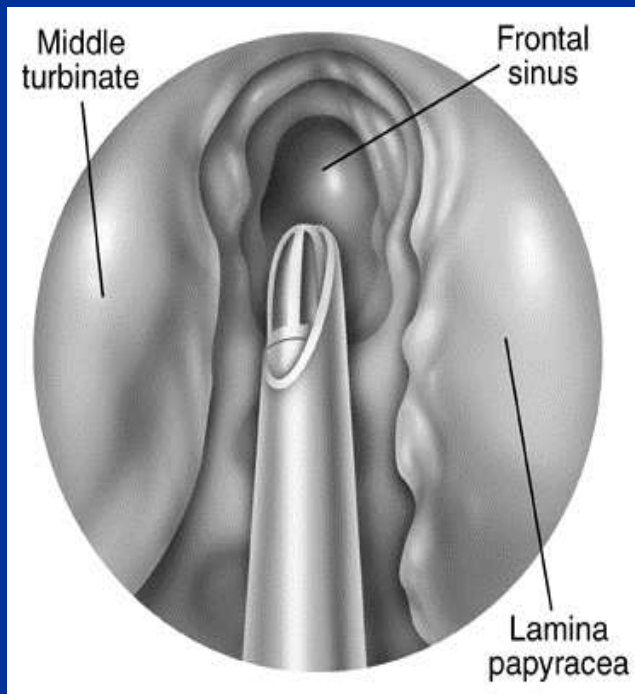
Lothrop  
-intersinus septum, superior  
nasal septum and anterior  
ethmoid removed.

## Modified Lothrop



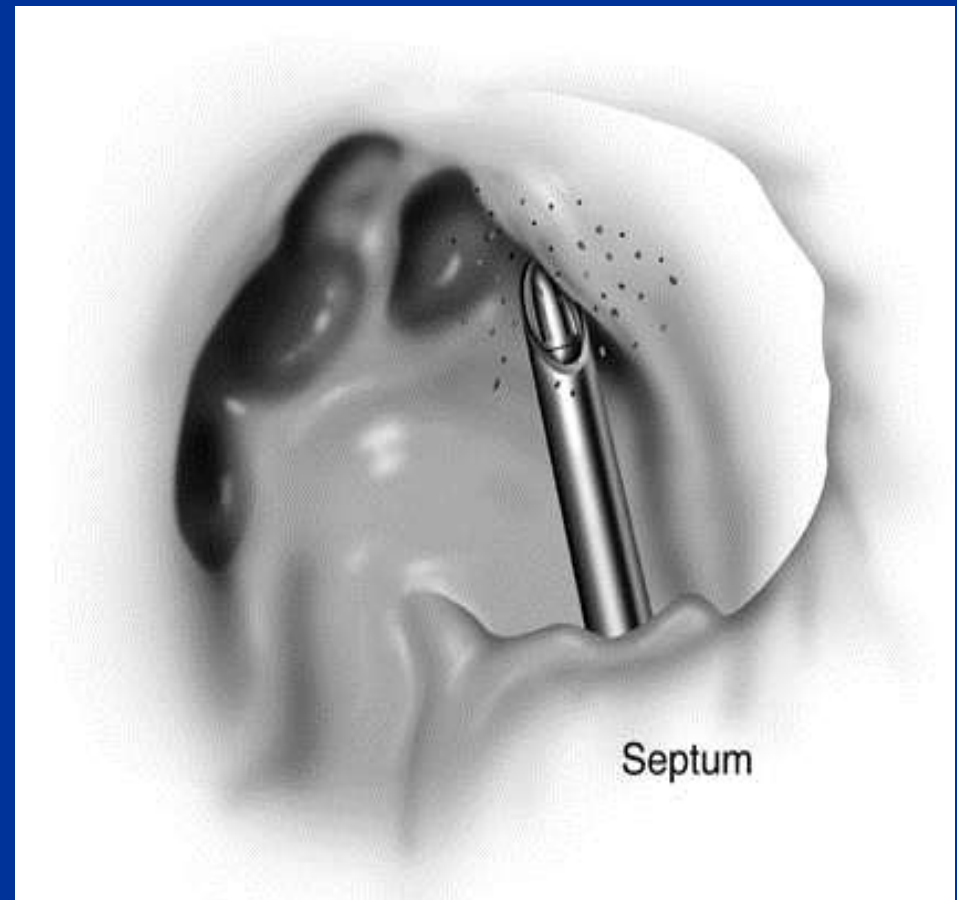
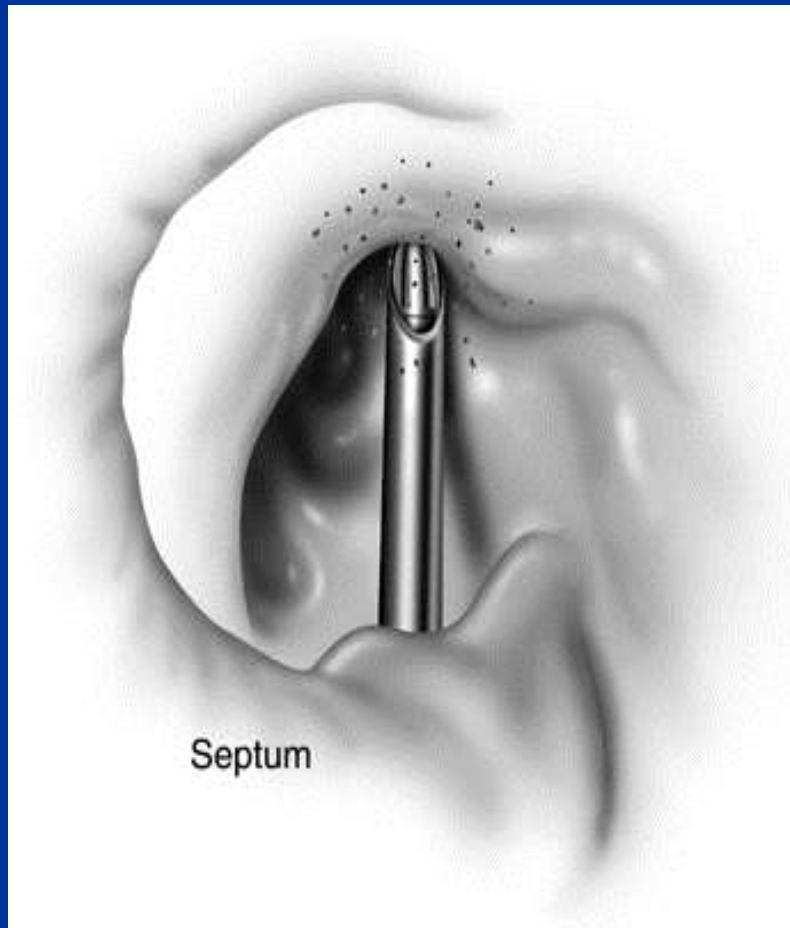
Lothrop  
-intersinus septum, superior  
nasal septum and anterior  
ethmoid removed.

# Endoscopic Modified Lothrop





## Endoscopic Modified Lothrop

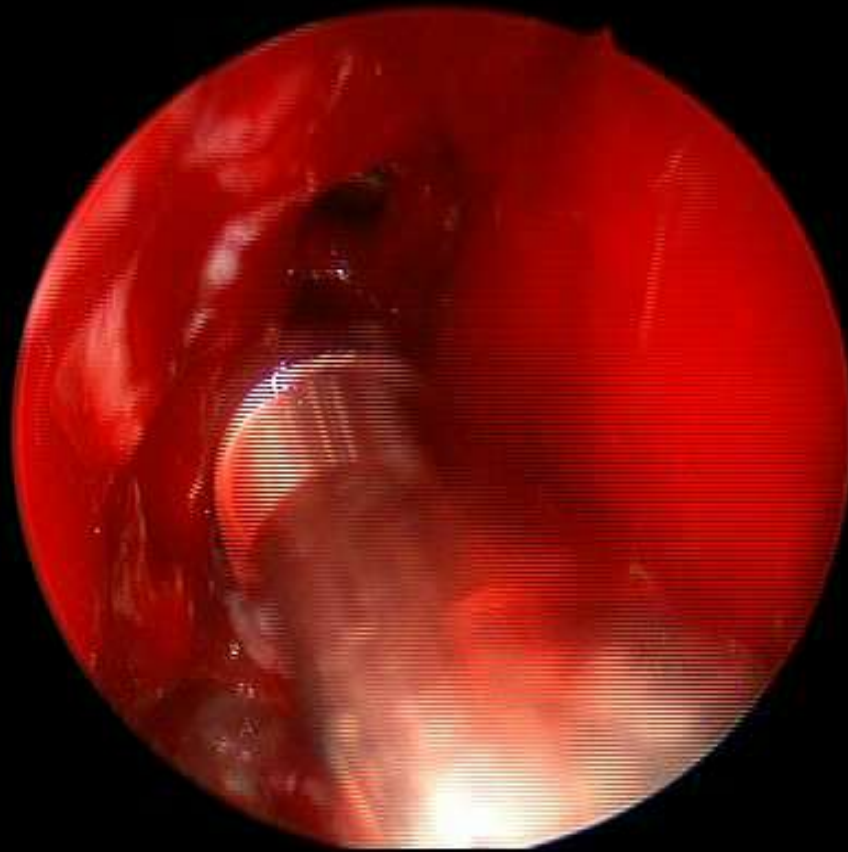


- **Indications**
  - Persistent chronic frontal sinusitis with failure of appropriate medical therapy and after unsuccessful primary endoscopic frontal sinusotomy
  - Inverted papilloma
  - Osteoma – other benign tumors
  - Trauma
  - Last resort procedure prior to osteoplastic frontal sinus obliteration

- **Contraindications**
  - Hypoplastic frontal sinus and frontal recess
  - Lack of experience by the surgeon
  - Lack of proper instrumentation
  - Sinus disease located in a supra-orbital ethmoid air cell and not in the frontal sinus

- EMLP - 1 year post-op





## Draf III, Endoscopic Modified Lothrop for Inverted Papilloma

2 weeks post-op



3 months post-op

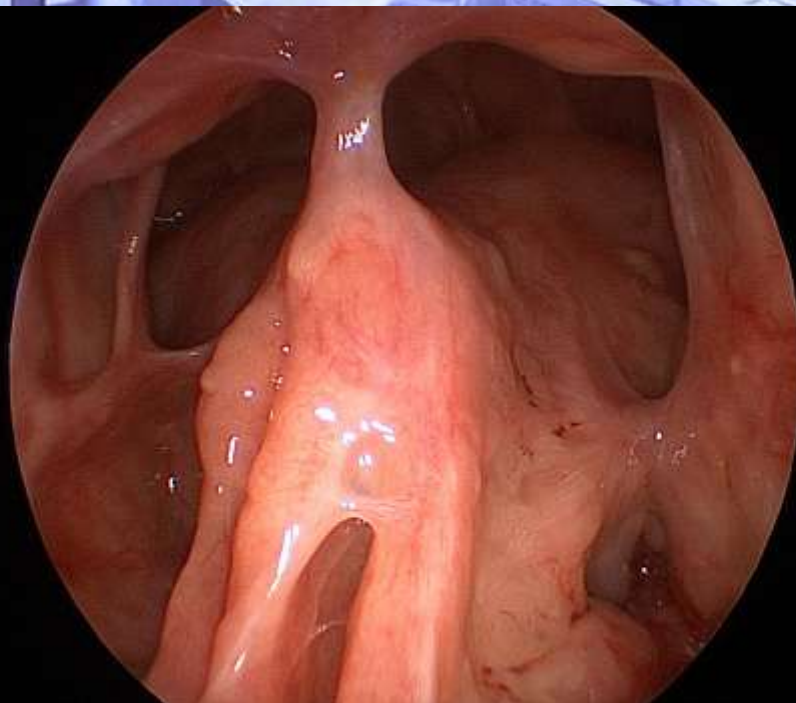


IMAGE  
HD 1  
KARL STORZ - ENDOSKOPE

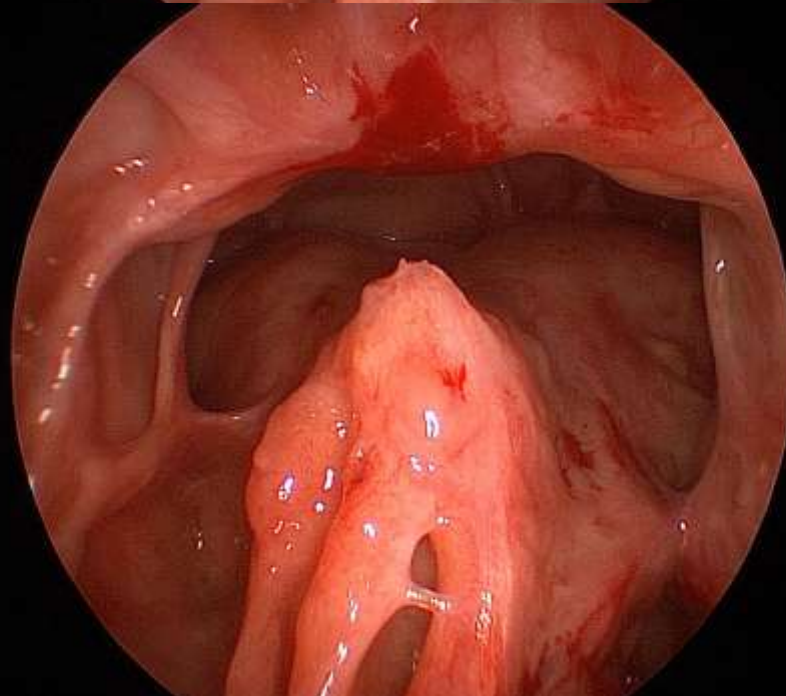
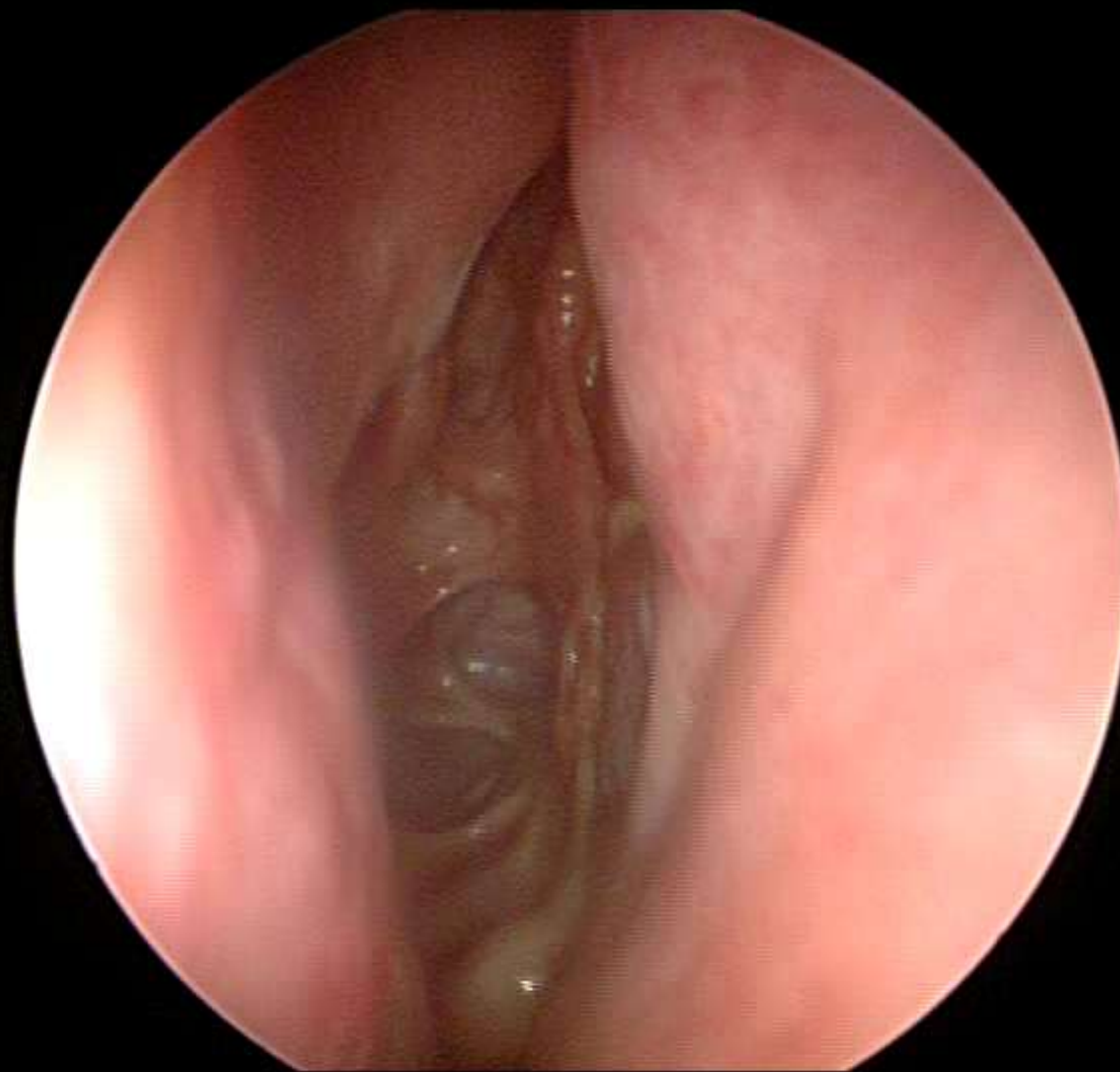


IMAGE  
HD 1  
KARL STORZ - ENDOSKOPE

1 year  
Post-op





**Thank you!**