RHINOSINUSITIS

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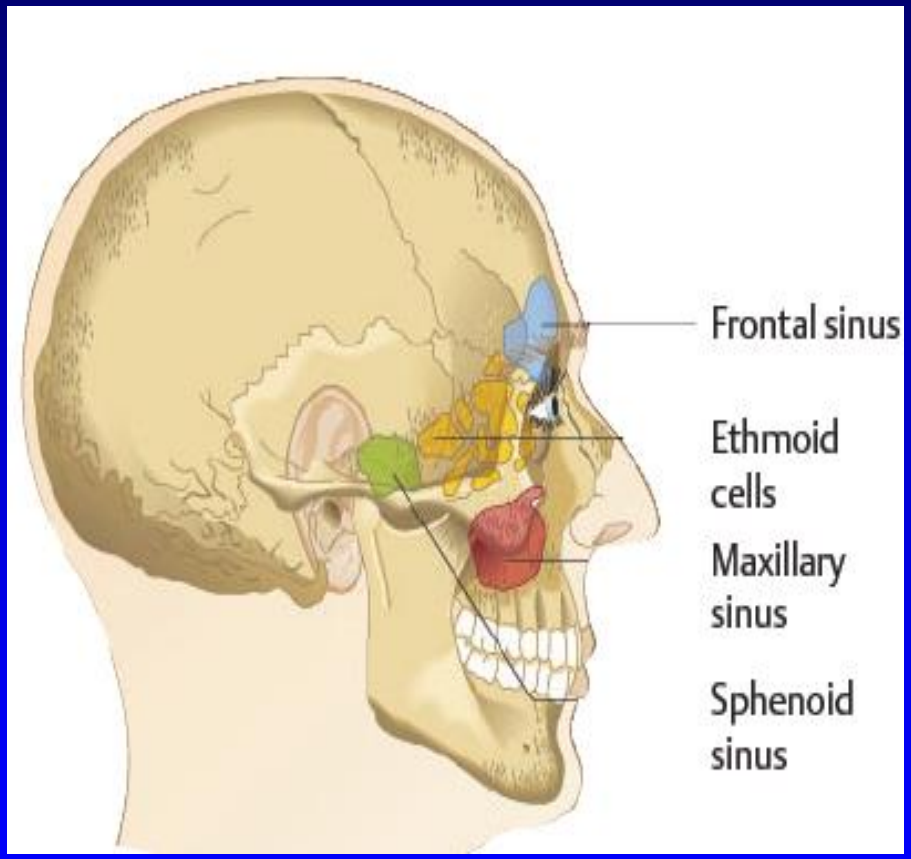
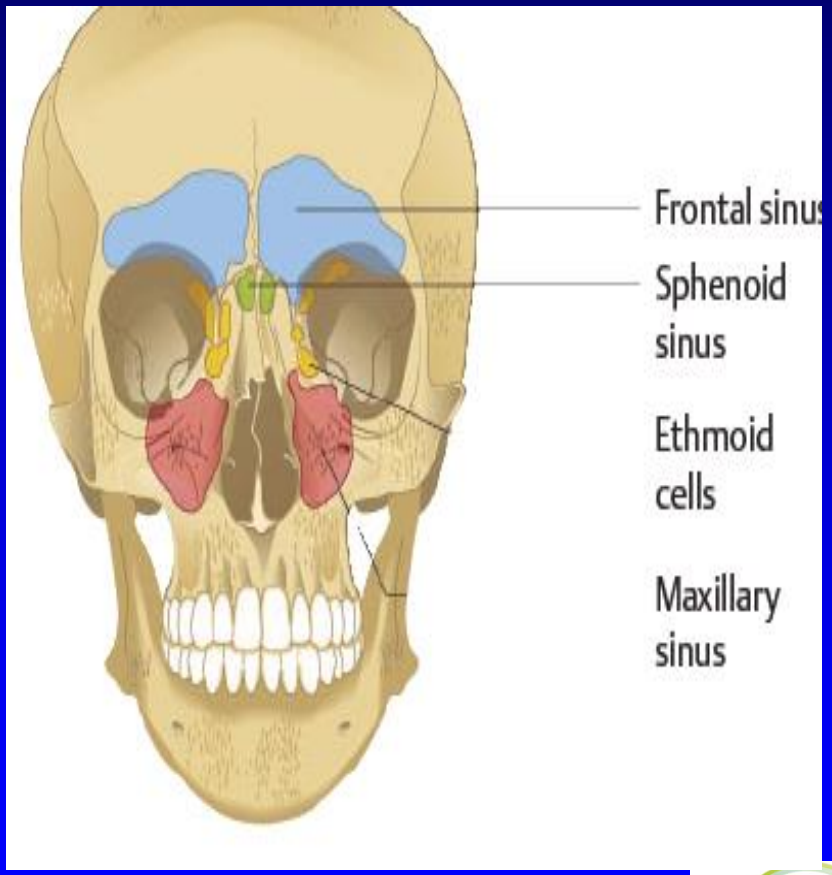
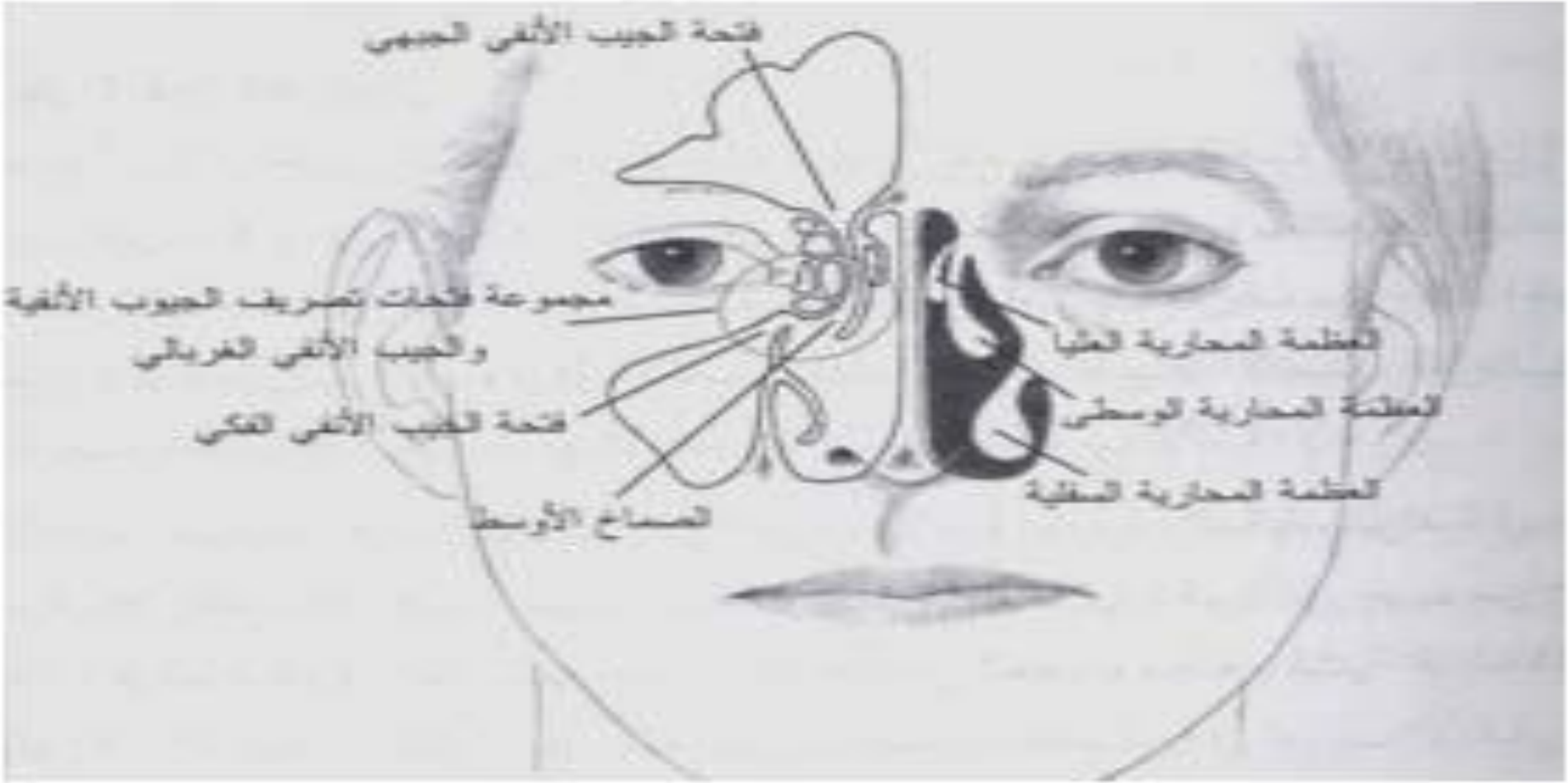
Four Pairs PNS

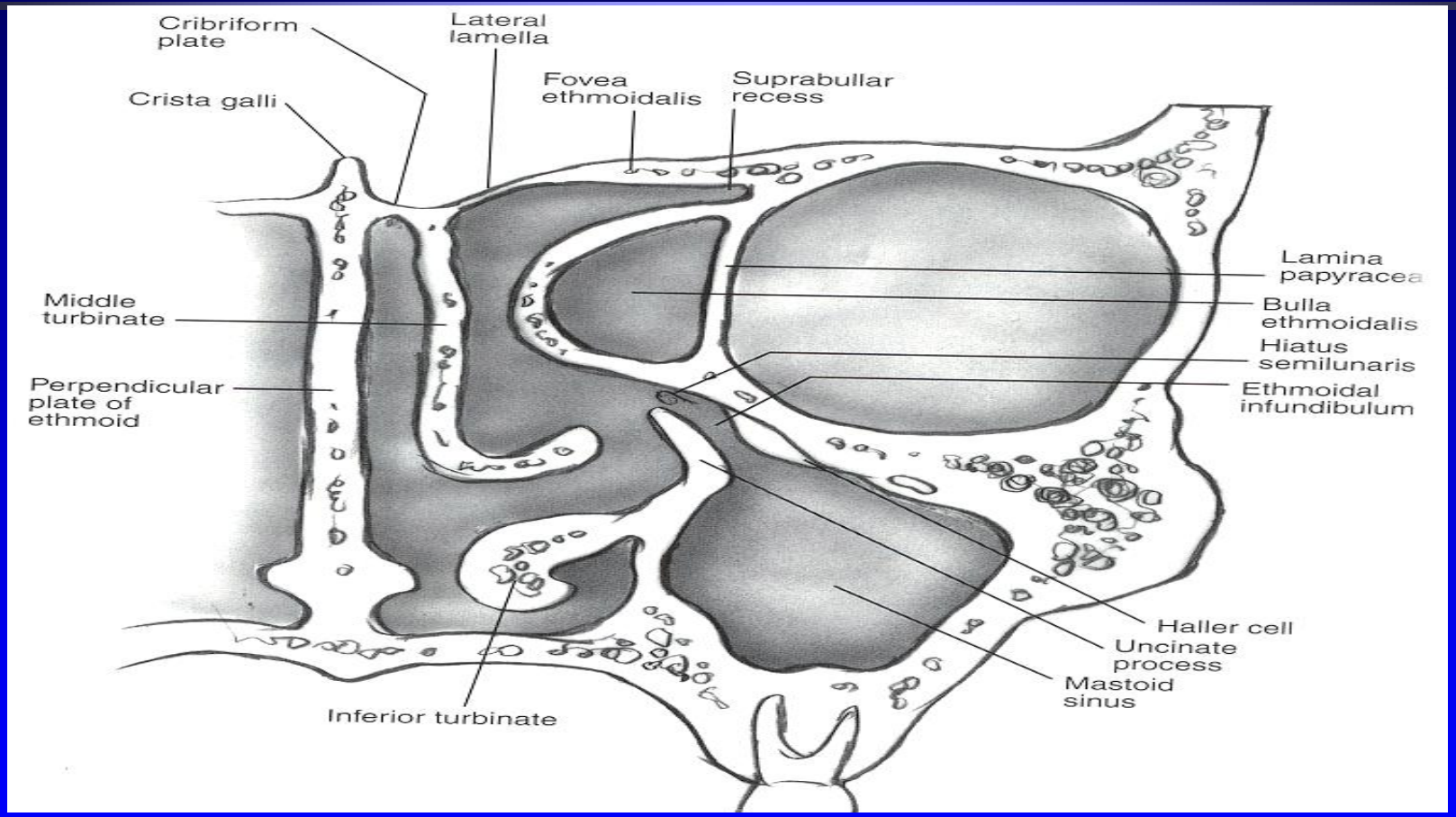




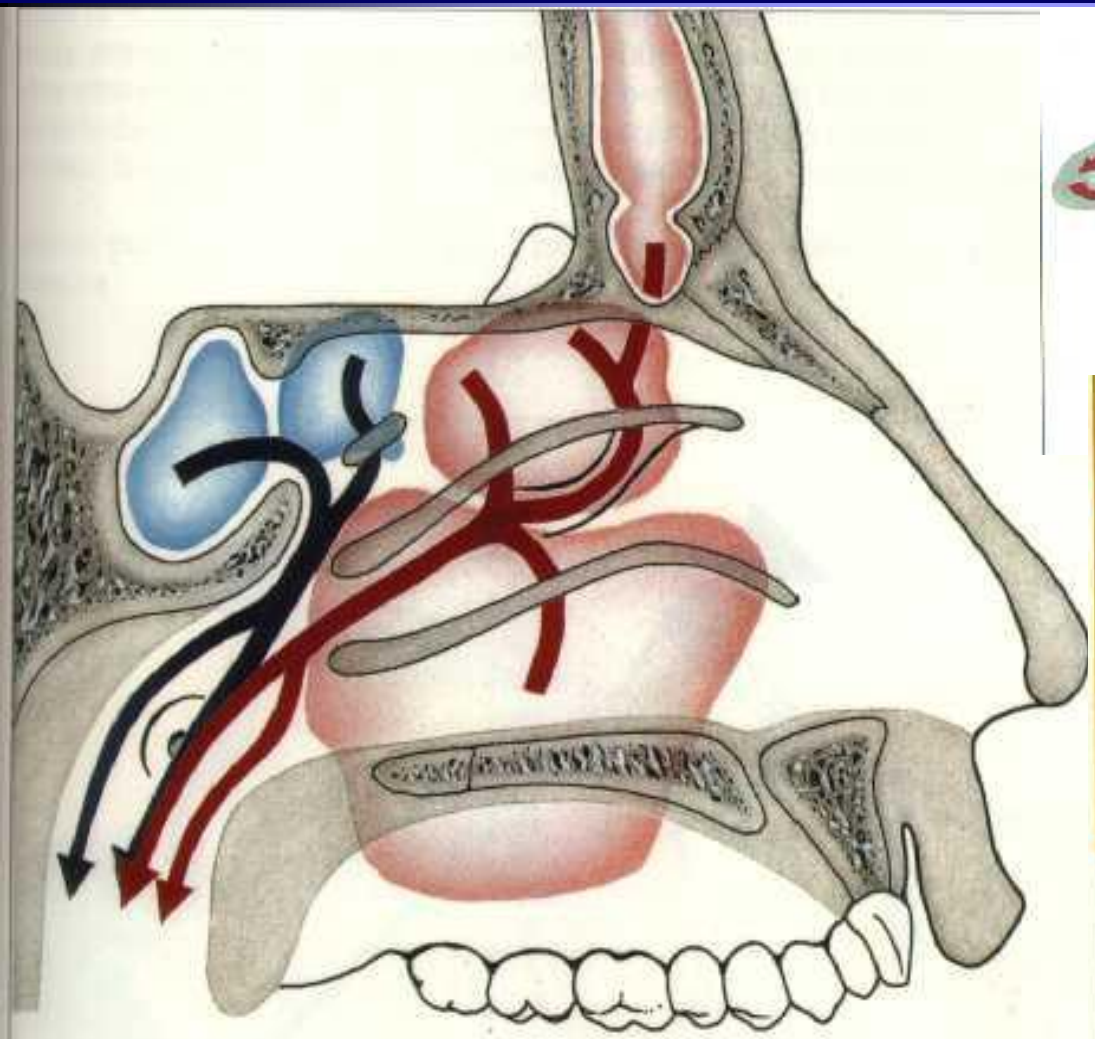
LATERAL NASAL WALL

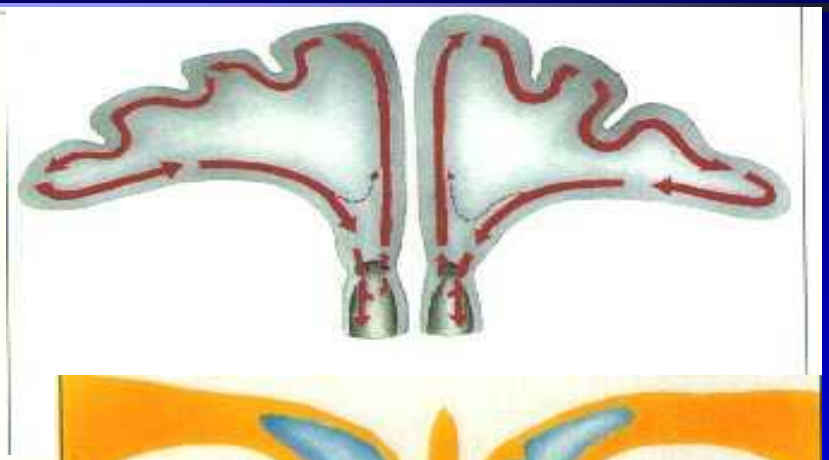


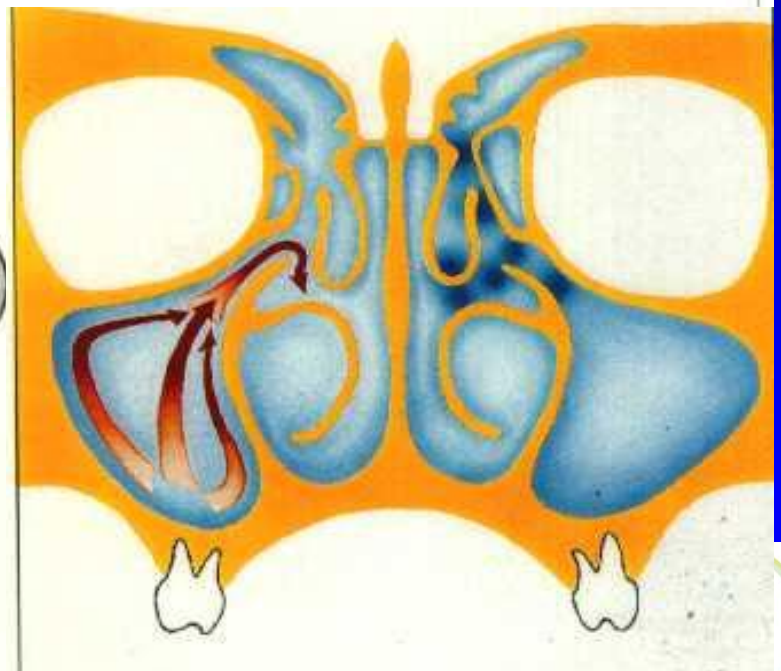
OMC


Cribriform plate
Lateral lamella
Fovea ethmoidalis
Suprabullar recess
Crista galli
Lamina papyracea
Middle turbinate
Bulla ethmoidalis
Hiatus semilunaris
Perpendicular plate of ethmoid
Ethmoidal infundibulum
Haller cell
Uncinate process
Mastoid sinus
Inferior turbinate

Nasal mucosa Histology
Ciliary Pattern in Sinuses Mucosa







Pathophysiology of Rhinosinusitis,

- Most important pathologic process in disease is **obstruction of natural ostia**
- Obstruction leads to hypooxygenation
- Hypooxygenation leads to **ciliary dysfunction** and **poor mucous quality**
- Ciliary dysfunction leads to retention of % Bacterial

Acute Rhinosinusitis

- Disease lasting **less than three weeks**

Chronic Rhinosinusitis

- **Chronic rhinosinusitis** is defined as disease lasting **more than three months**
  - **Chronic rhinosinusitis with nasal polyps**
  - **Chronic rhinosinusitis without nasal polyps**

Etiology

- **Inflamatory:**
  - **URTI**
  - **Allergy**
- **Mechanical:**
  - **Naso/Septal Deformity**
  - **OMC Obstruction**
  - **Turbinate Hypertorophy**
  - **Polyps**
  - **Tumours**
  - **Large Adenoid**
  - **Foreign Bodies**
  - **Cleft Palate**
  - **Choanal Atresia**
- **Systemic Disease**
  - **Cyctic Fibrosis**
  - **Immotile cilia Syndrome**
  - **Kartegener's Syndrome**
- **Miscellaneous:**
  - **Swimming**
  - **Flying**
  - **Diving**

Diagnosis of Chronic Rhinosinusitis

Major Factors

Facial pain/pressure

Facial congestion/fullness

Nasal obstruction/blockage

Nasal discharge/purulence/discolored postnasal drainage

Hyposmia/anosmia

Purulence in nasal cavity on examination

Fever

Minor Factors

Headache

Fatigue

Halitosis

Dental pain

Cough

Ear pain/pressure/fullness

Strong History of Sinusitis

- One of the following situations:
  - Two major factors
  - One major factor and two minor factors
  - Pus in the nose on examination

Nasal Exam

Fig. 2.1 Anterior rhinoscopy

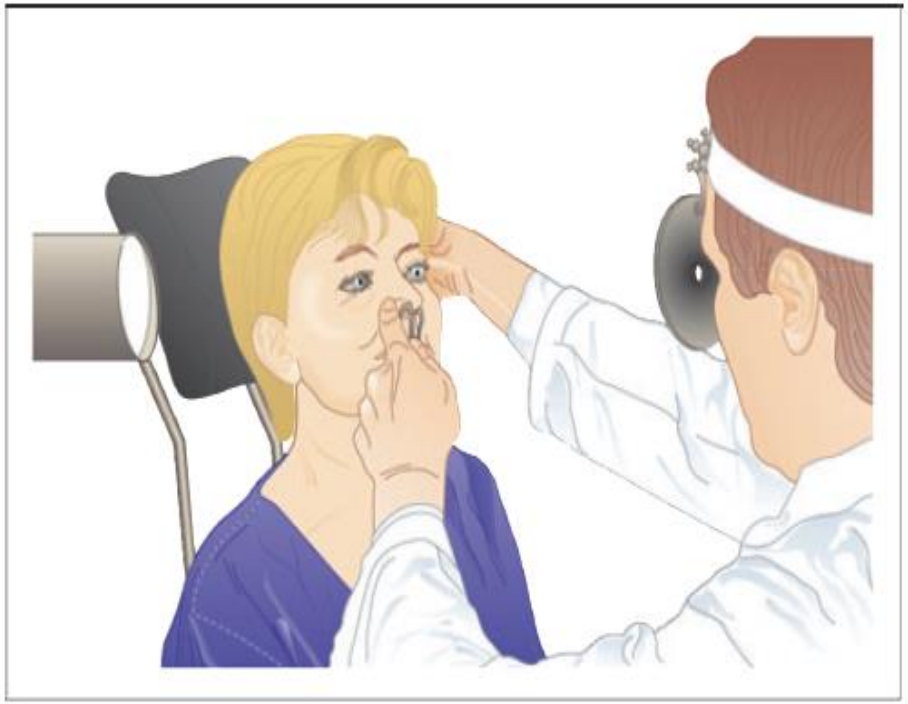
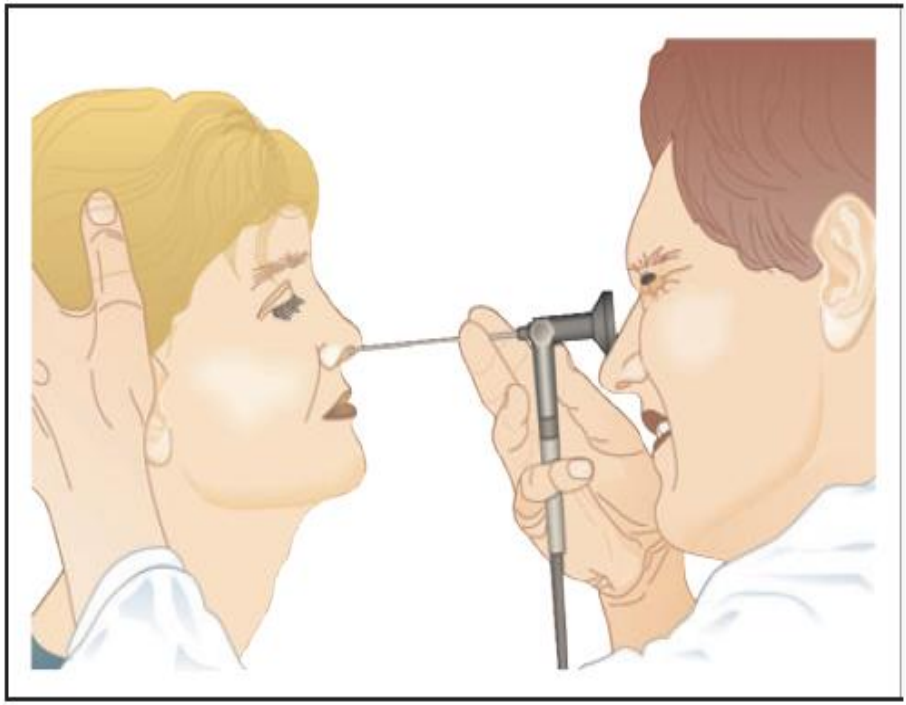
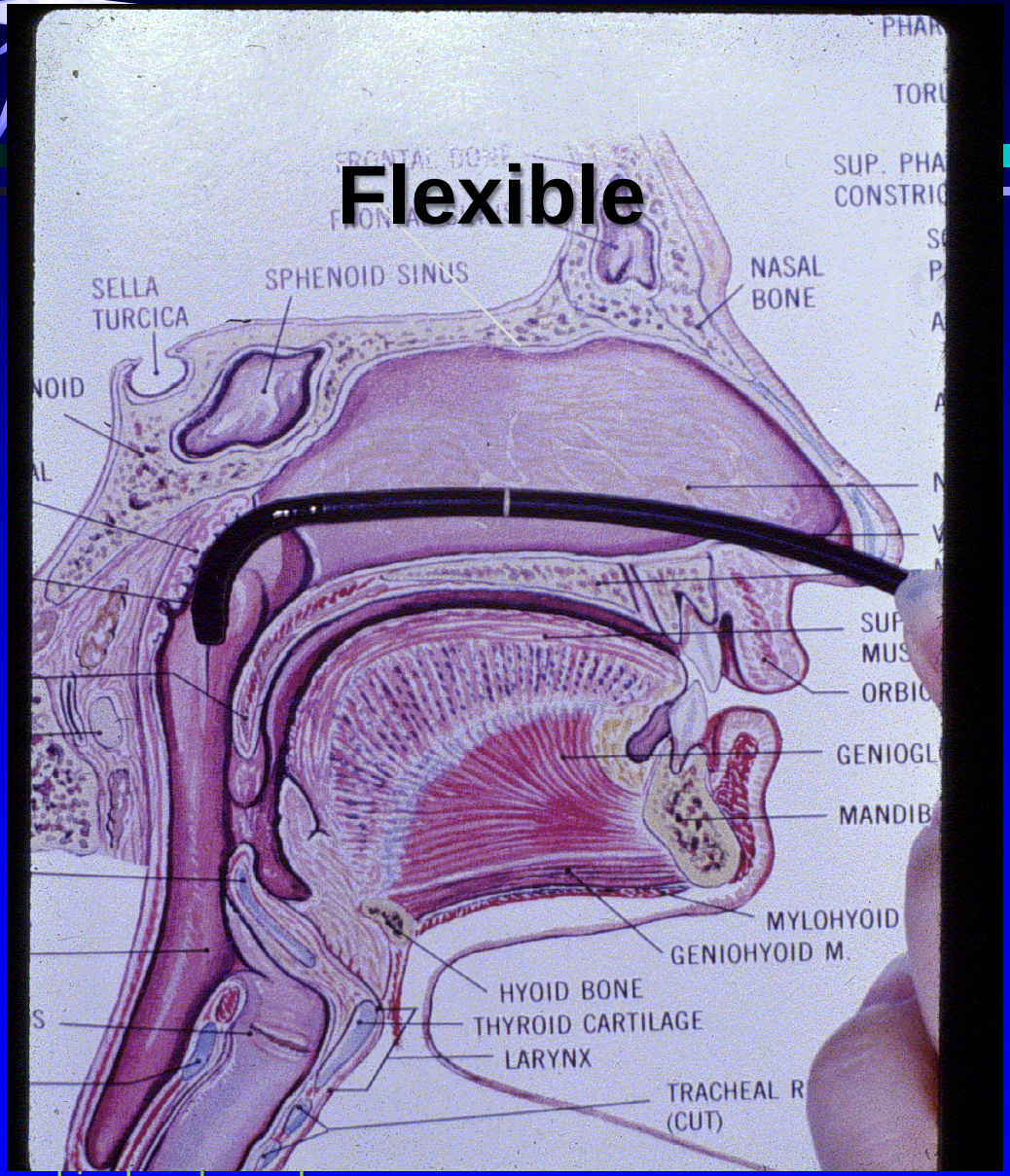
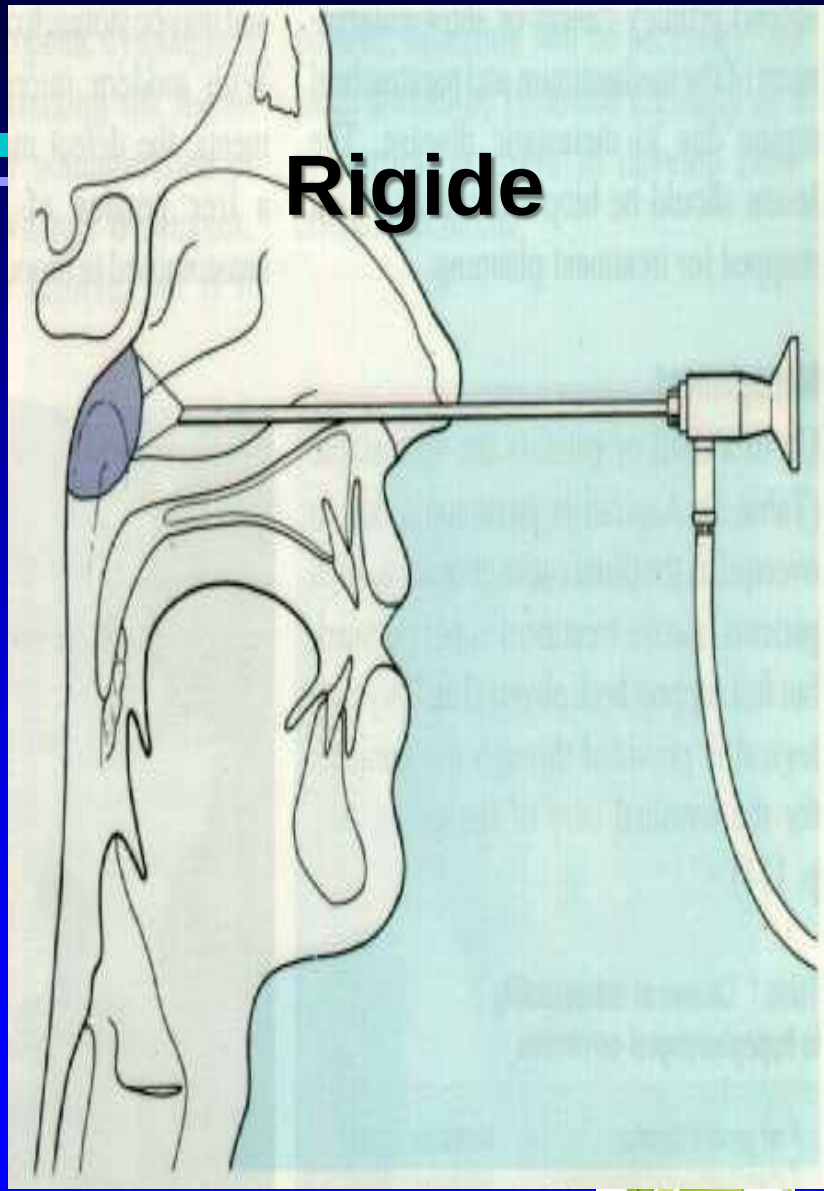


Fig. 2.2 Nasal endoscopy

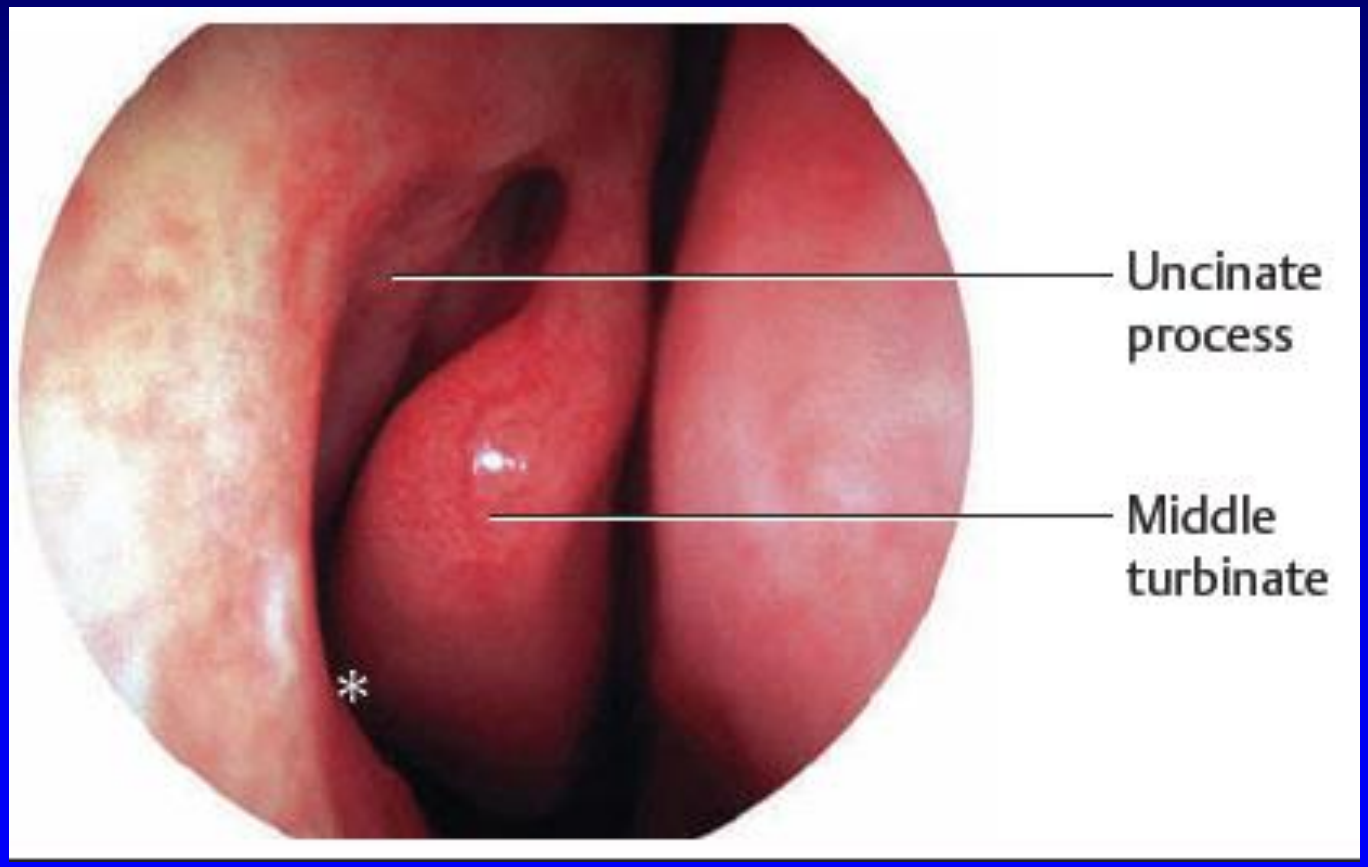


Nasal Endoscopy

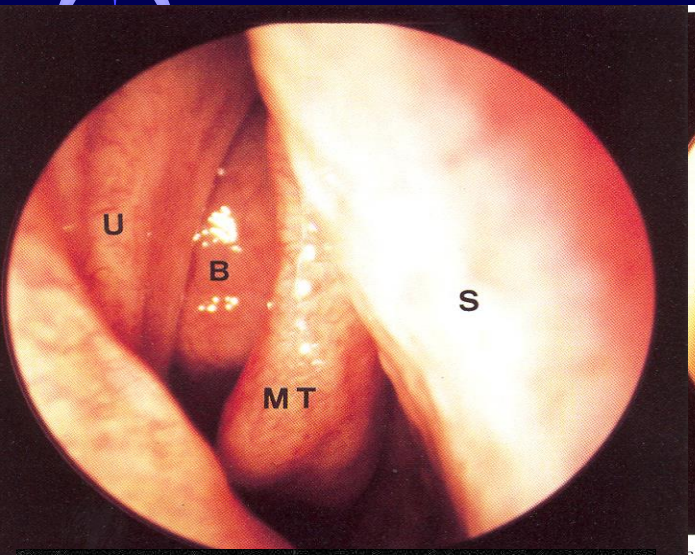


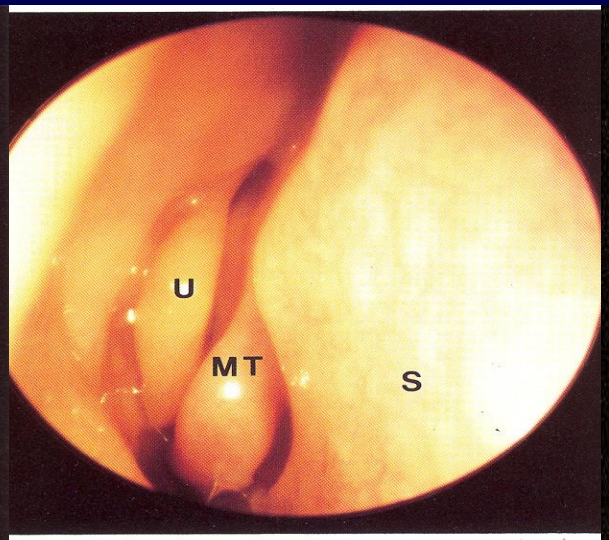


Endoscopy landmarks

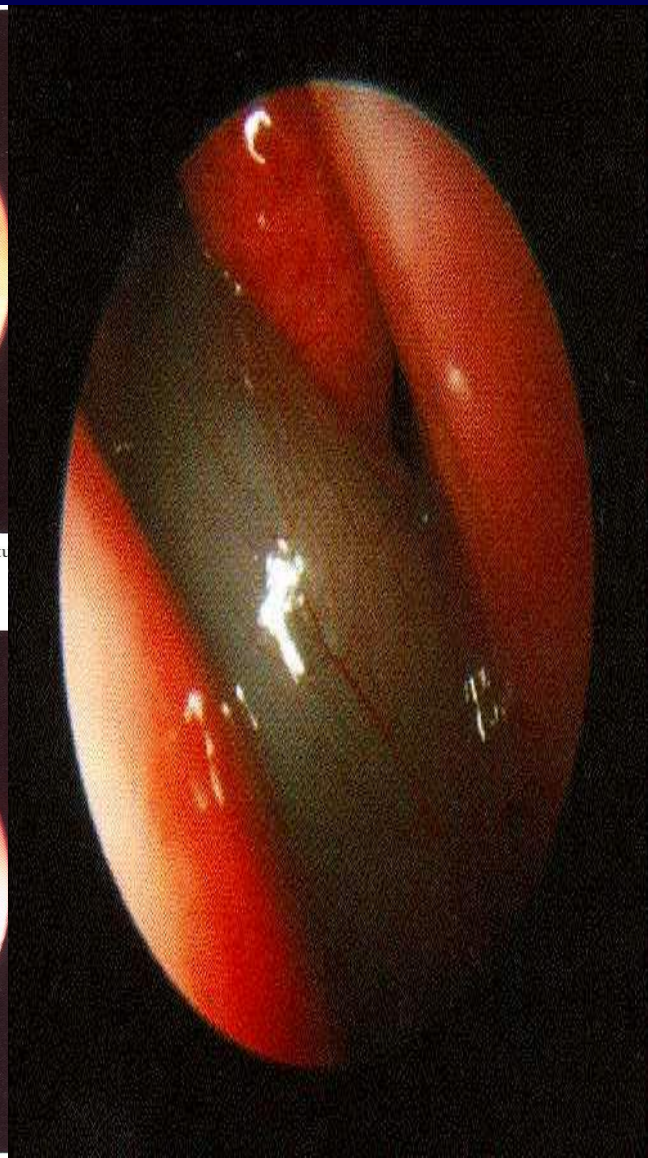


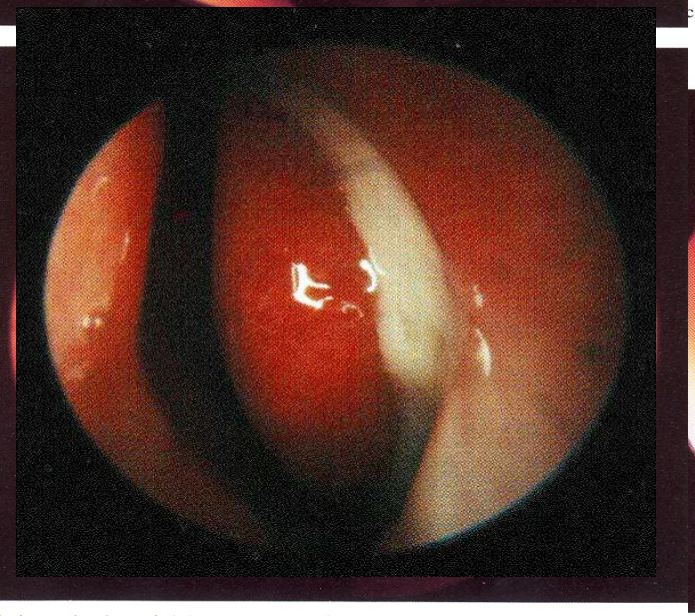
Endoscopy Finding

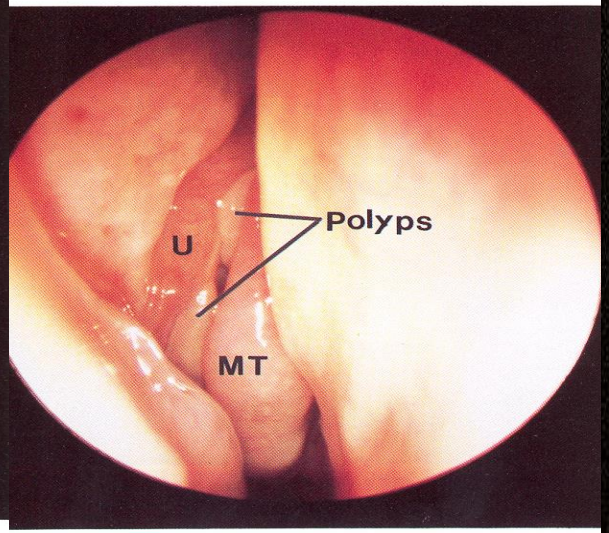




copic view of right uncinate process (U) hypertrophy. MT: middle tu





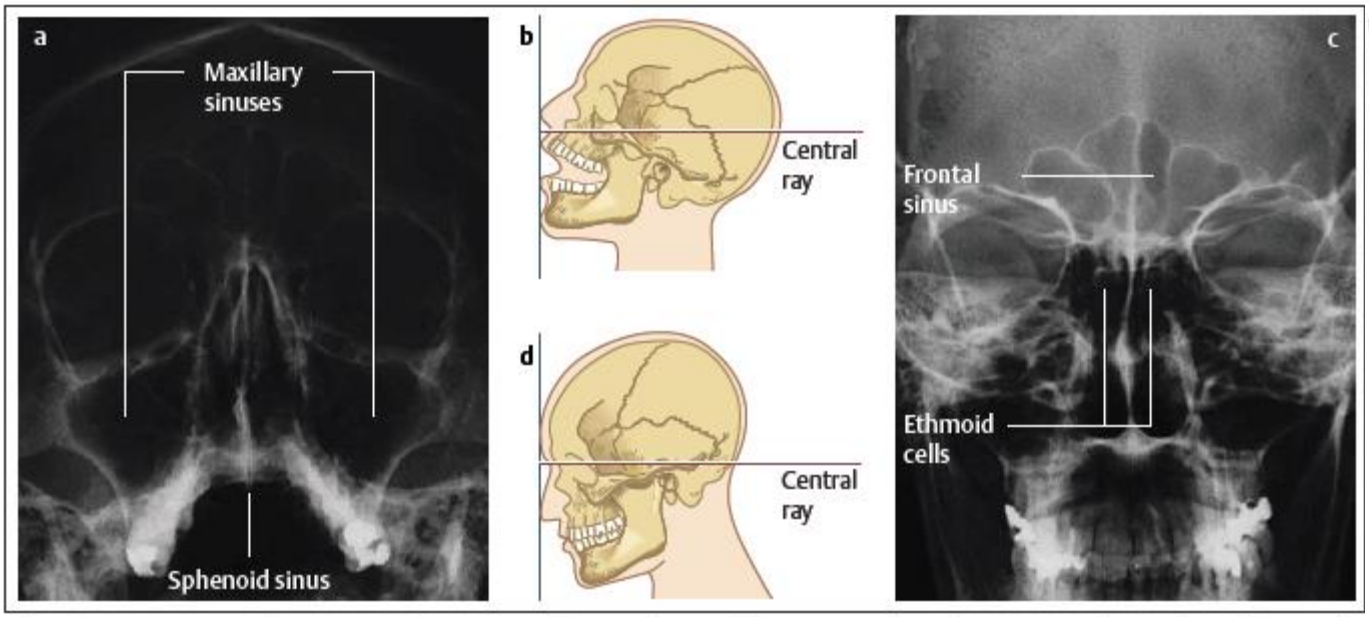


Radiography

- Identify which sinus involved and extnt of the disease
- Road map for surgery

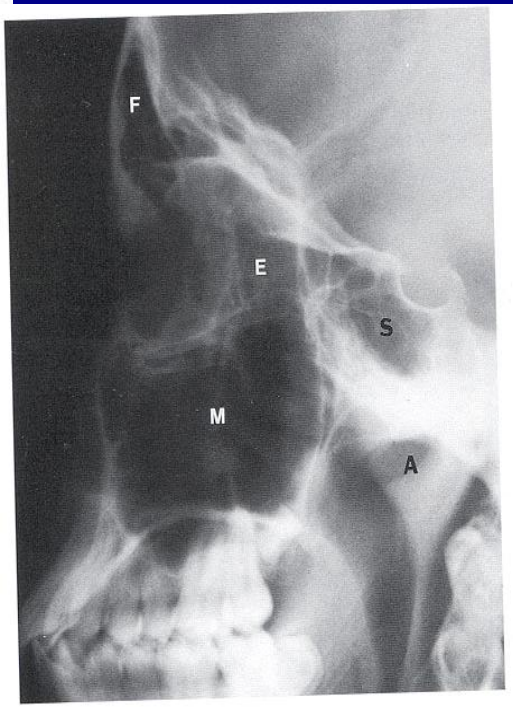
- Plain X Rays
  - Traditional views
    - Water's
    - Caldwell
    - Lateral
    - Submentovertex
- CT Scan
- MRI

Plain Radiography



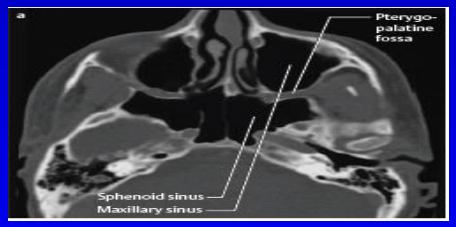
a,b The occipitomental projection demonstrates the maxillary sinus and gives a limited view of the sphenoid sinus.

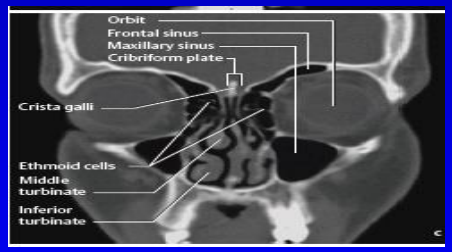
c,d The occipitofrontal projection is better for evaluating the ethmoid cells and frontal sinus.



Computed Tomography

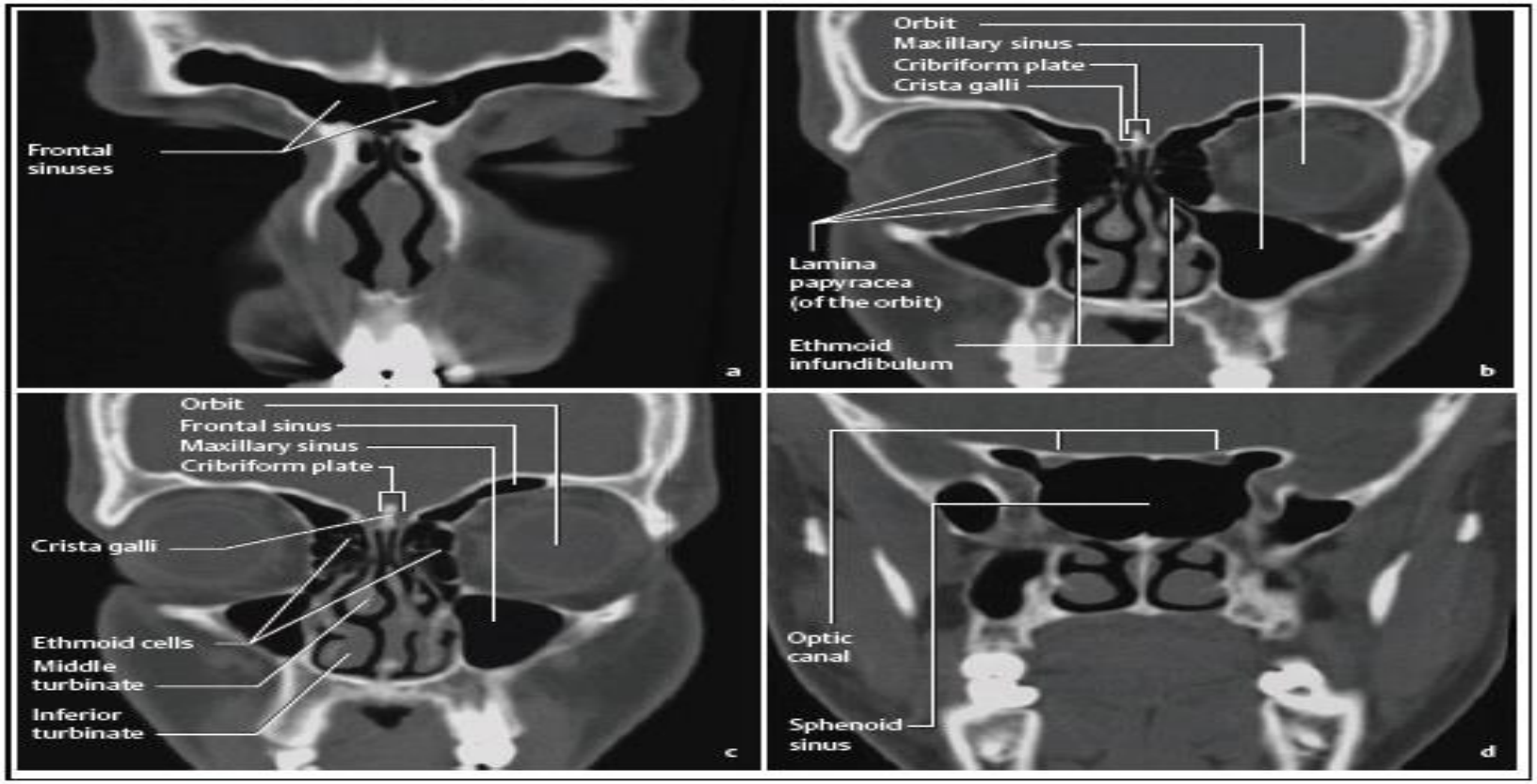
- Study Type
  - Coronal perpendicular 2 Hard Palate
  - Axial Paralell 2 Hard Palate
    - Reformatted Sagital





- Multiplannr CT Scan axail and reformatted other cuts

Coronal CT Scan



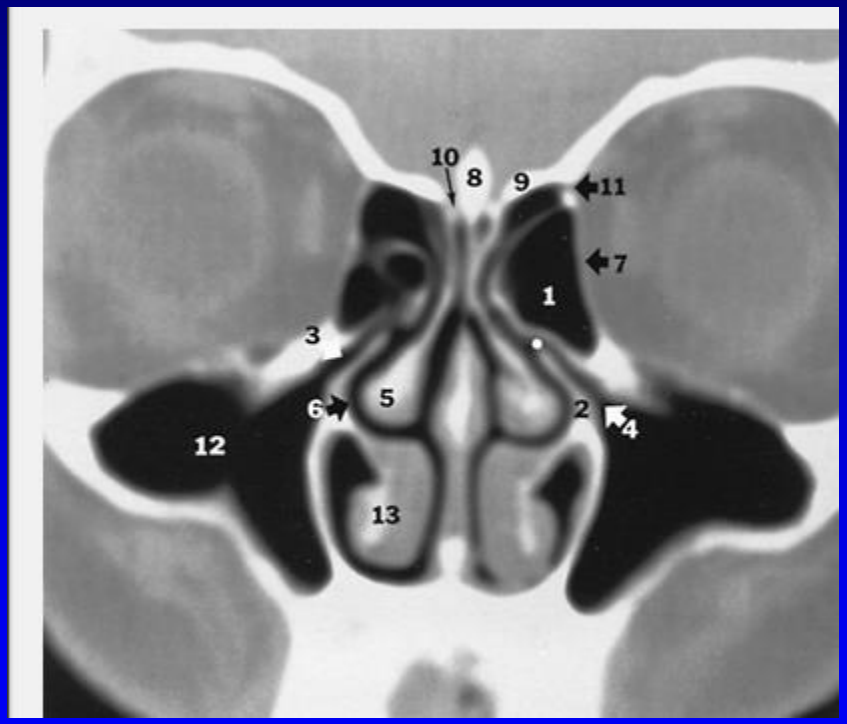
Scan Acquisition

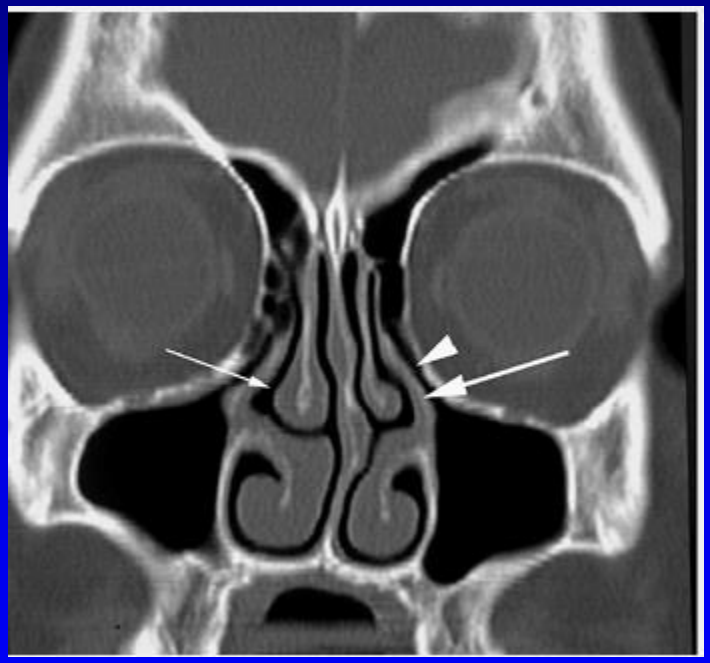
Scans can be acquired using the sequential, single-slice technique *(conventional CT)* or a continuous spi-

Interpretation

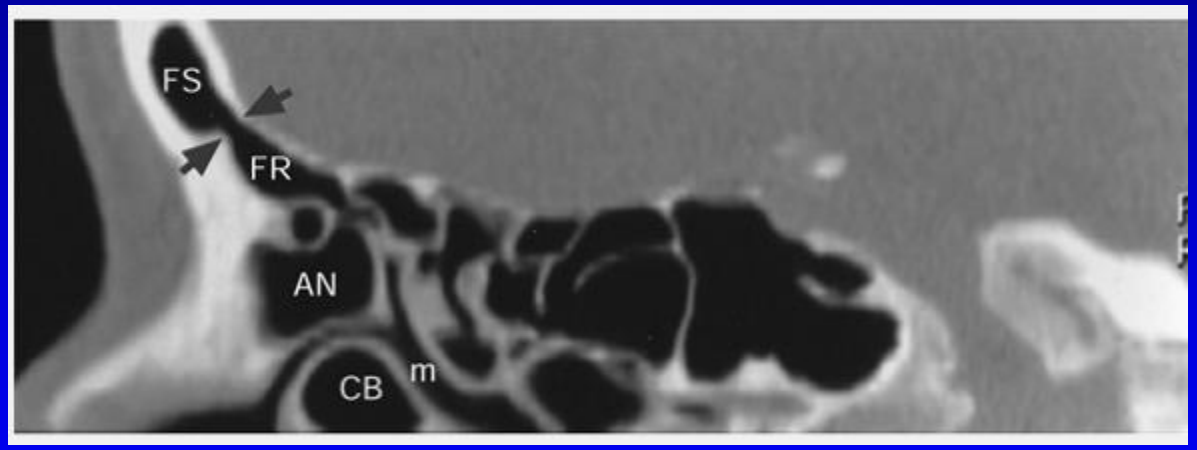
Normally aerated paranasal sinuses exhibit air density on CT scans—i.e., they appear black. The normal

Coronal CT Scan

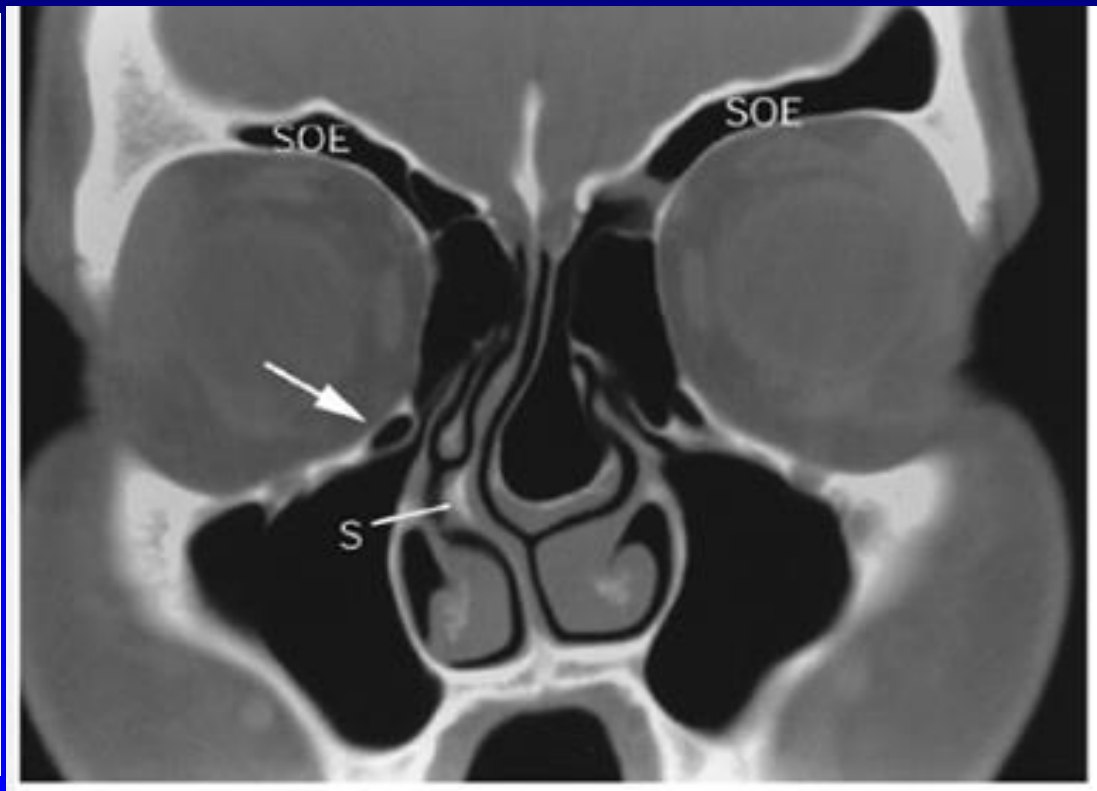




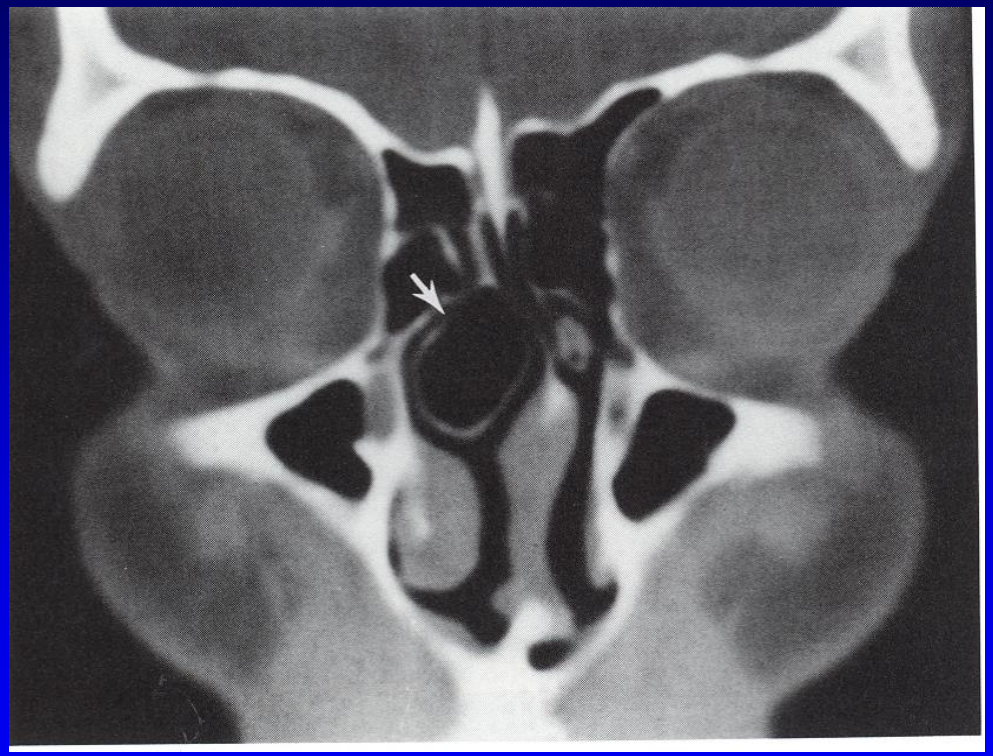
Sagital CT Scan

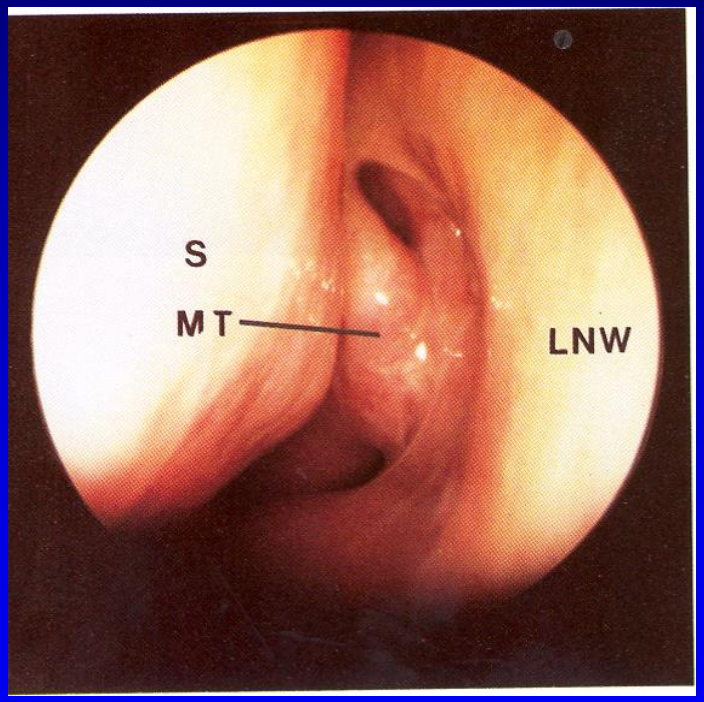


Anatomic Variation

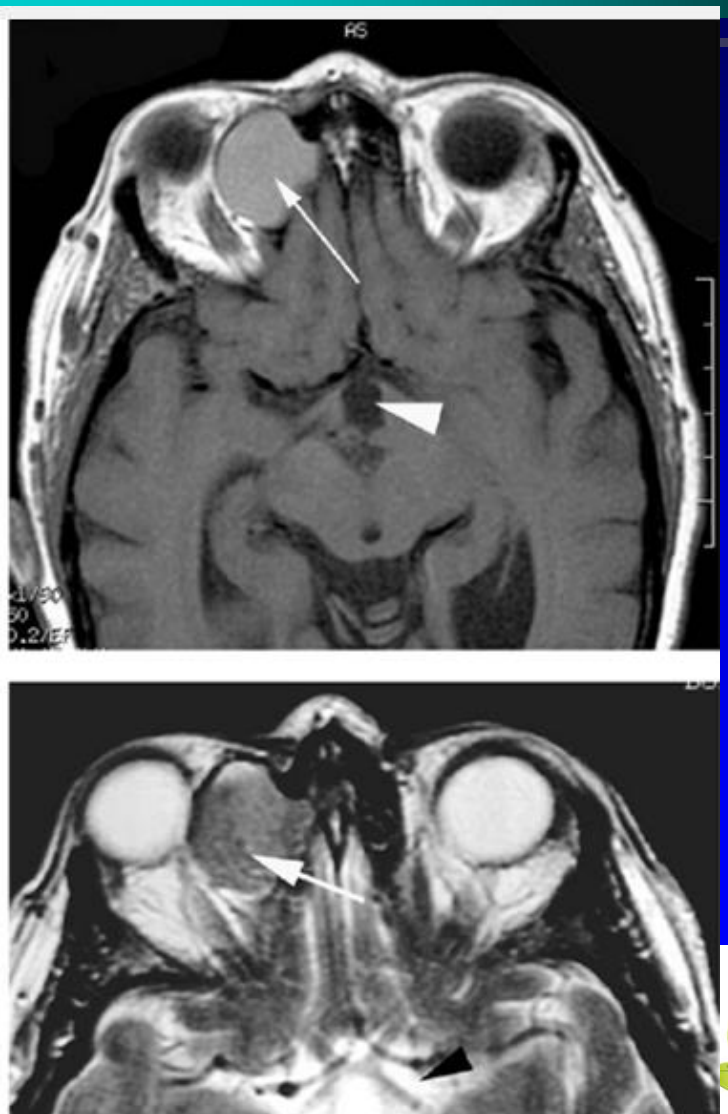


Concha Bullosa



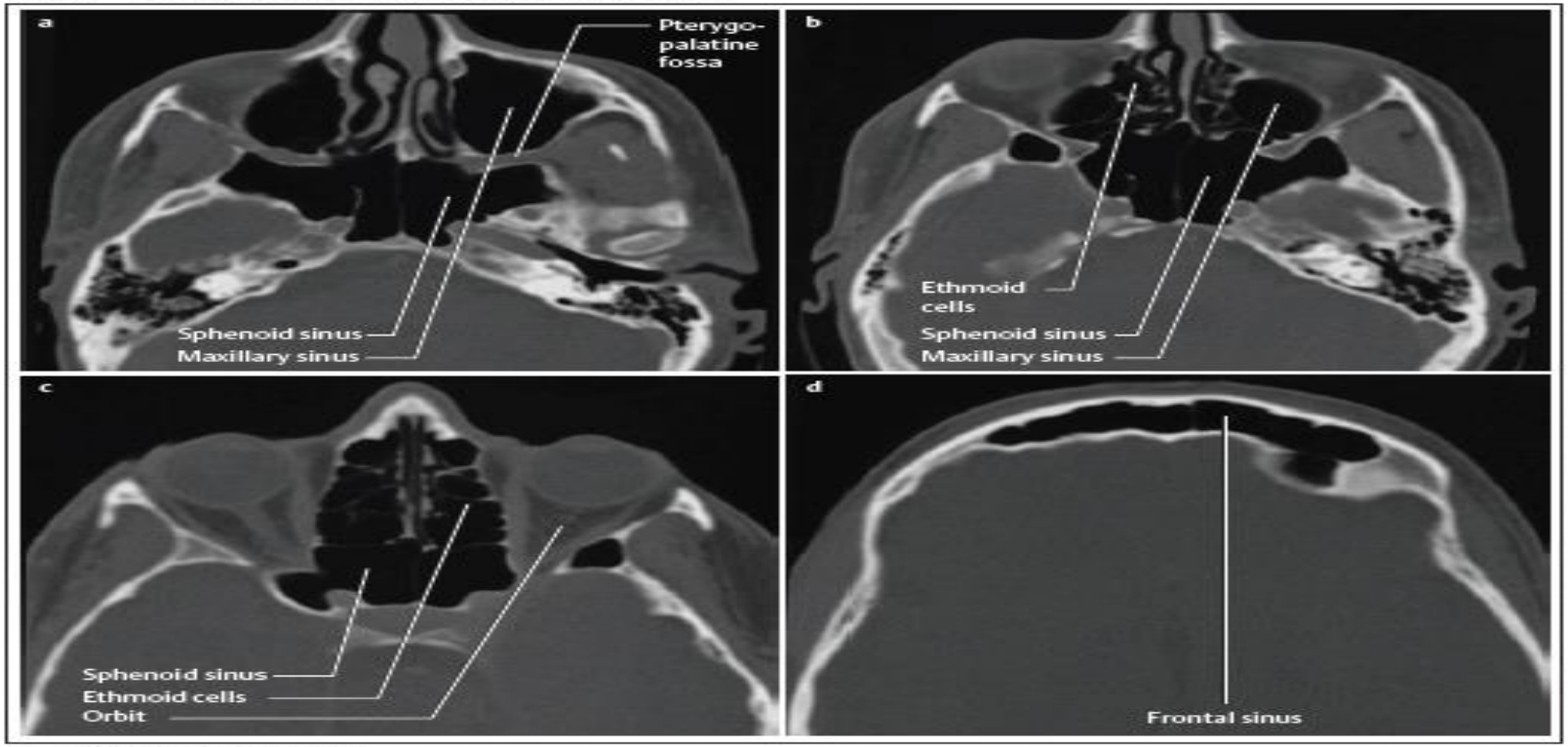


MRI



Axail CT Scan

Fig. 2.9 Computed tomography of the paranasal sinuses



Four axial CT scans are shown.

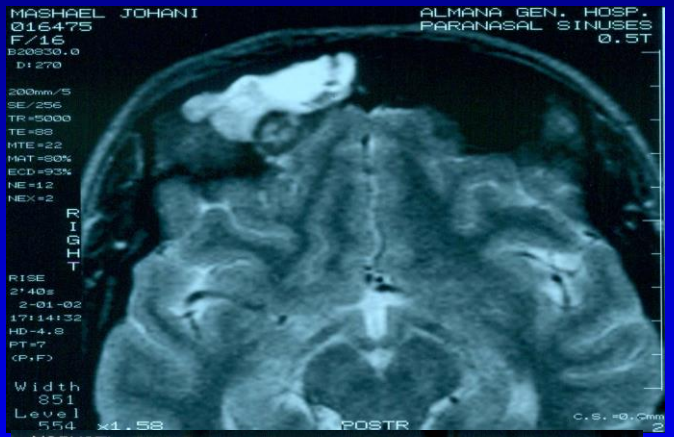
that involve the paranasal sinuses in addition to the cranial cavity or orbit (e.g., tumors and congenital malformations such as encephaloceles). It can also supply information that is useful in differentiating

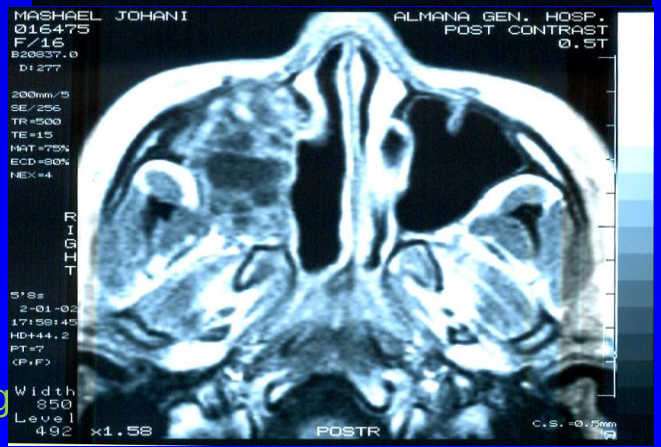
At present, MRI is contraindicated in most patients with electrically controlled devices such as a cardiac pacemaker, insulin pump, cytostatic pump, or cochlear implant. By contrast, modern internal fixation ma-

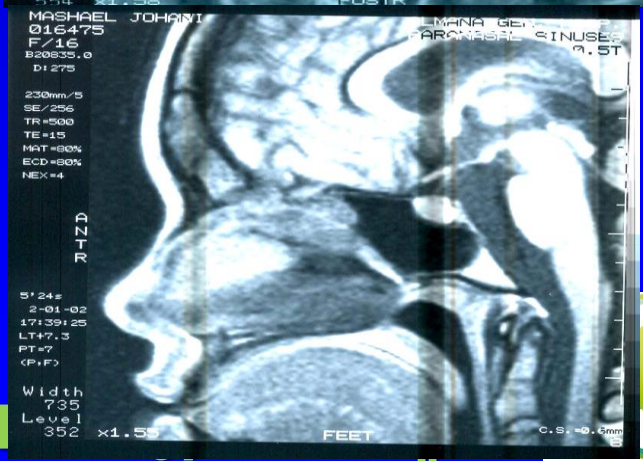
Indications

- Gold standard for CRS
- Planning surgery or failed medical management
- Indications
  - Clinical unresponsiveness to medical therapy
  - Immunosuppressed patient
  - Severe symptoms or signs
  - Life threatening complications

MRI Indicated for Disease Extension







Microbiology in Acute sinusitis

Sinus Swab & Aspirate

- *Streptococcus pneumoniae* *20-30%*
- *Moraxella catarralis* *15-20 %*
- *Hemophilus influenzae* *16-20 %*
- *Streptococcus Pyogens* *2-5 %*
- *Sterile* *20-35%*
- *Anearobs* *2-5%*
- Rare viruses, anaerobes, Staphylococcus
- Normal flora in the sinus-- controversy

Microbiology in Chronic Sinusitis

- Gram Negative
  - Bacteroid
  - Klebcilla
- Anearobs
- Staph aureus
- Usually Polymicrobial

Medical Management

- Antibiotic for 10 – 14 days (Pen, Cephalo)
- Decongestant
  - Topical
  - Systematic
- Steroid Topical spray
- Symptomatic treatment
- Treat the underlying cause

Recalcitrant Rhinosinusitis

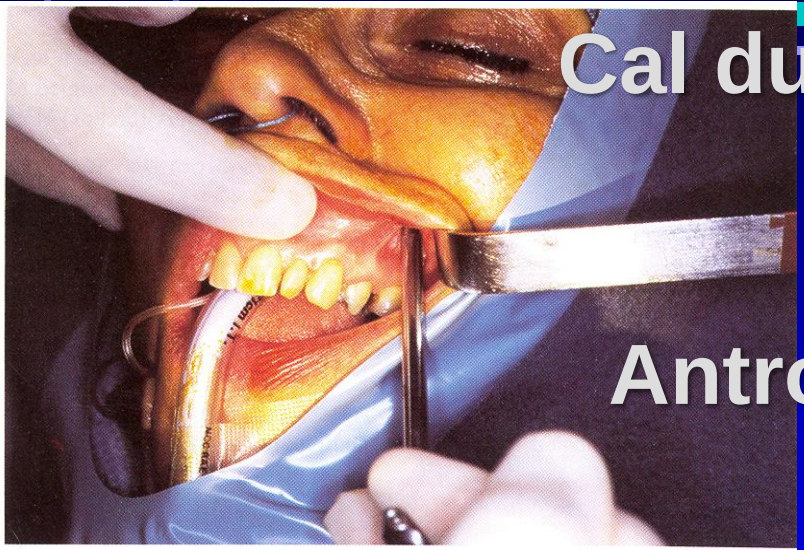
- Allergy
- Immunodeficiency
- Cystic fibrosis
- Ciliary dismotility disorders
- **Gastroesophageal Reflux Disease**

- **Rpeat treatment 2x or 3x over 2-3 Months**
- **Obtain CT Scan**

Complications or severe illness

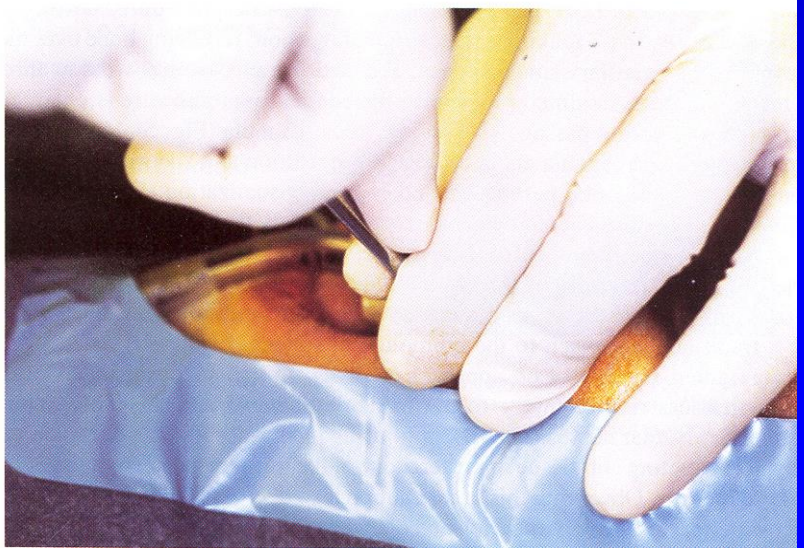
- IV Cefotaxime or Ceftriaxone
- Clindamycin

Surgical Approach old

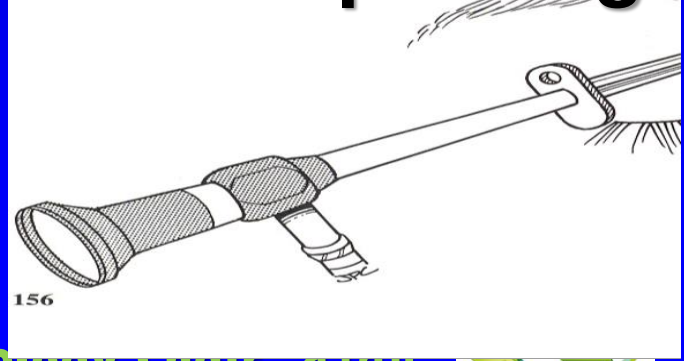


Cal dual luc

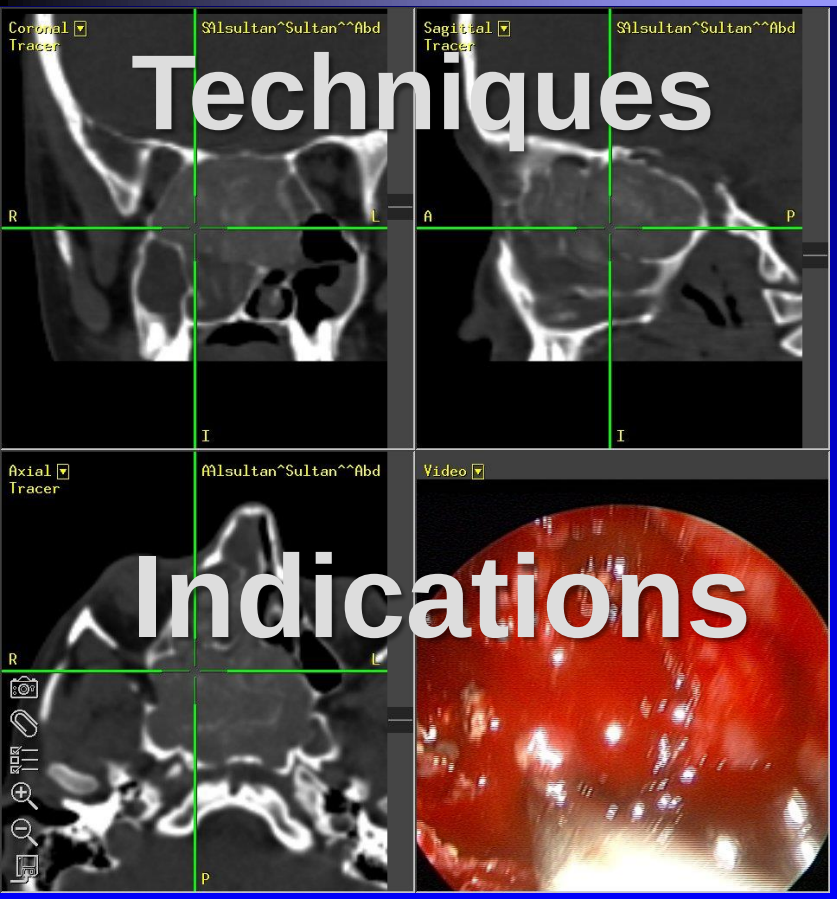
Antrostomy



Frontal Sinus triphining



Functional Endoscopic Sinus Surgery (FESS)

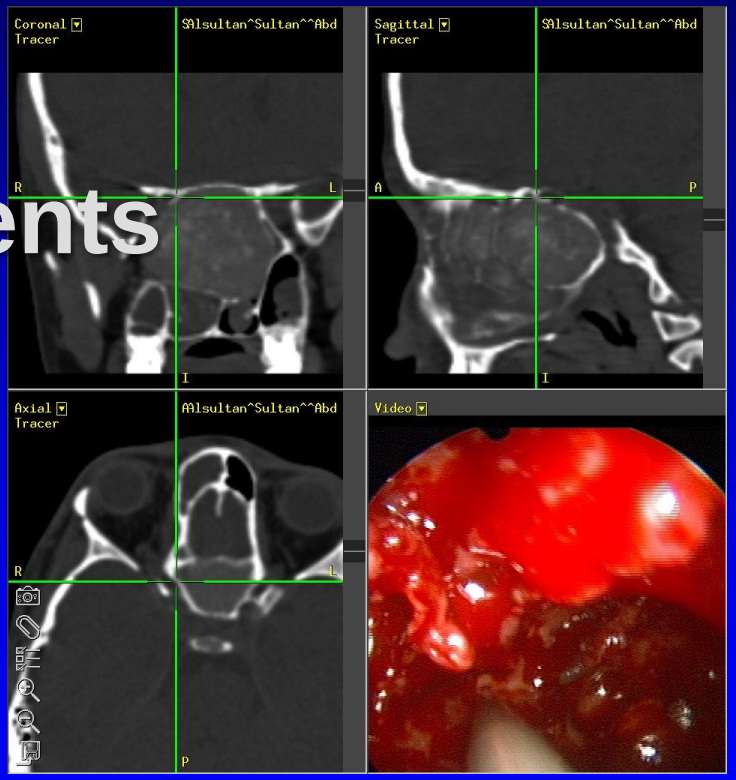


Techniques

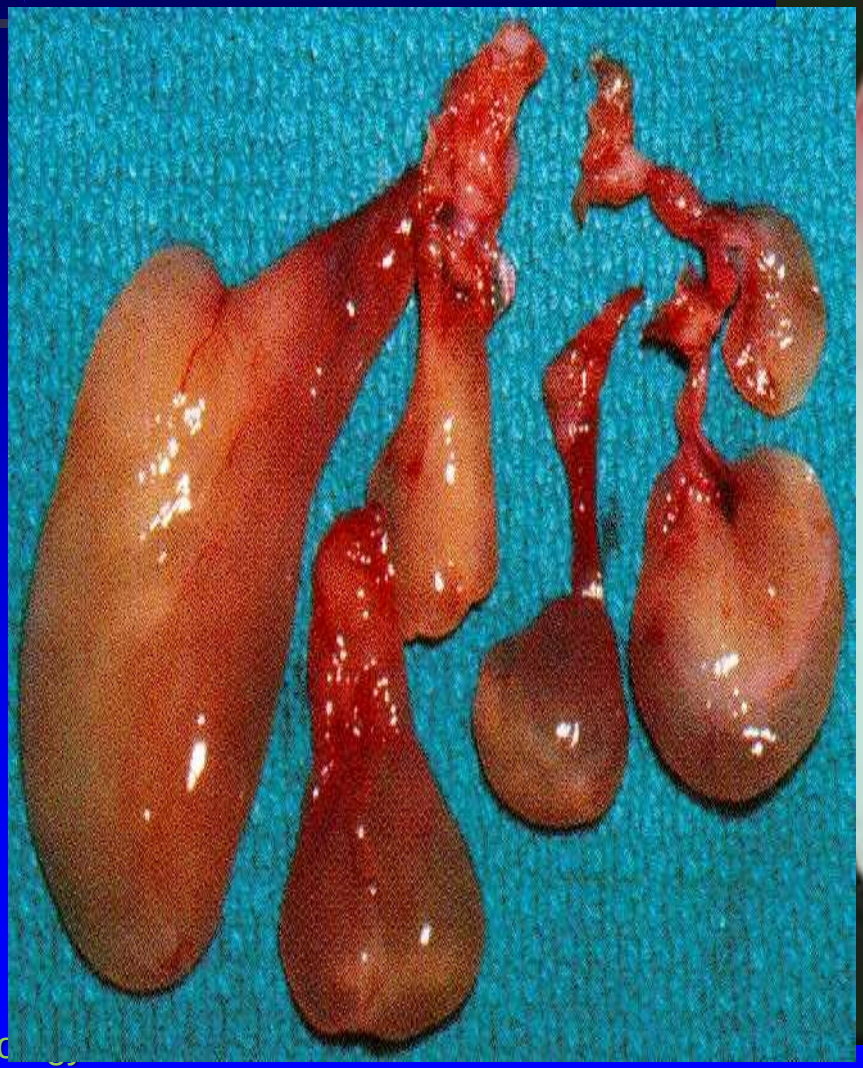
Indications

Computer Assisted Surgery

Power Instruments



FESS

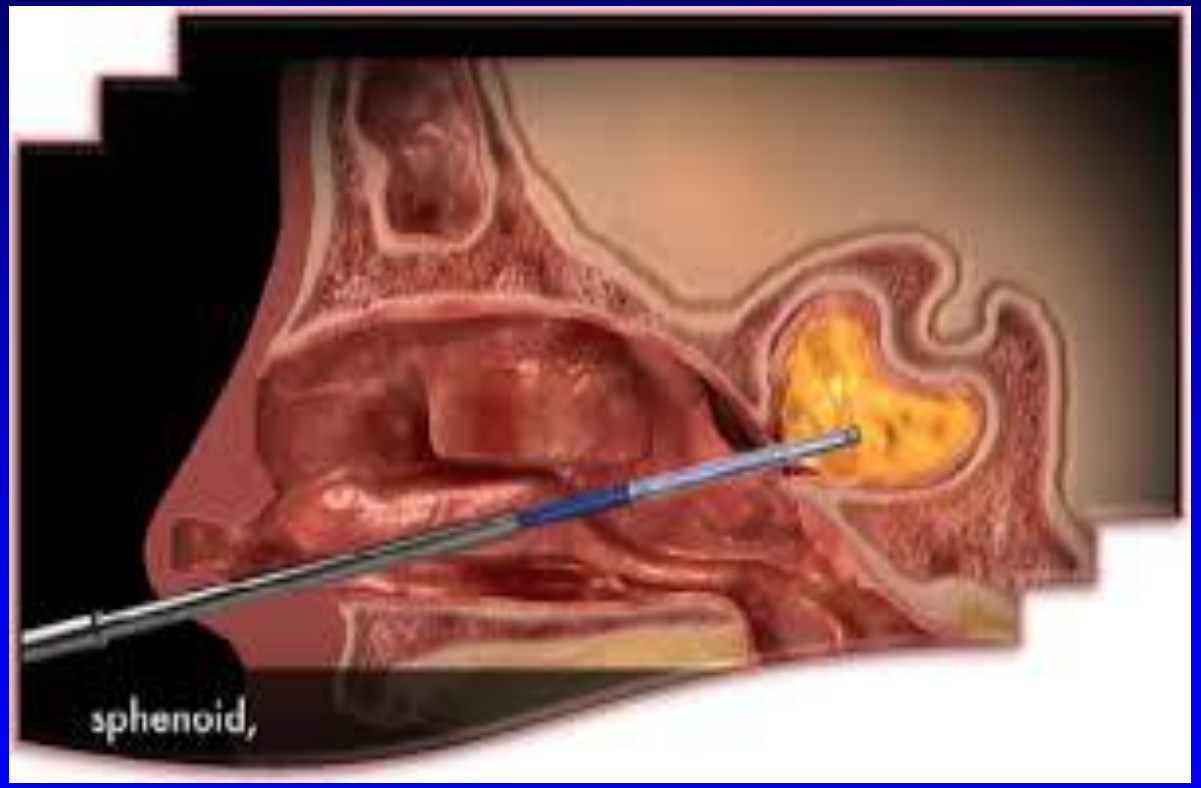


Excellent results

- 71% normal at one year
- Meta analysis 89% success
  - with 0.6% complications

Balloon Sinoplasty


ILLUSTRATIONS / ACCLARENT, INC

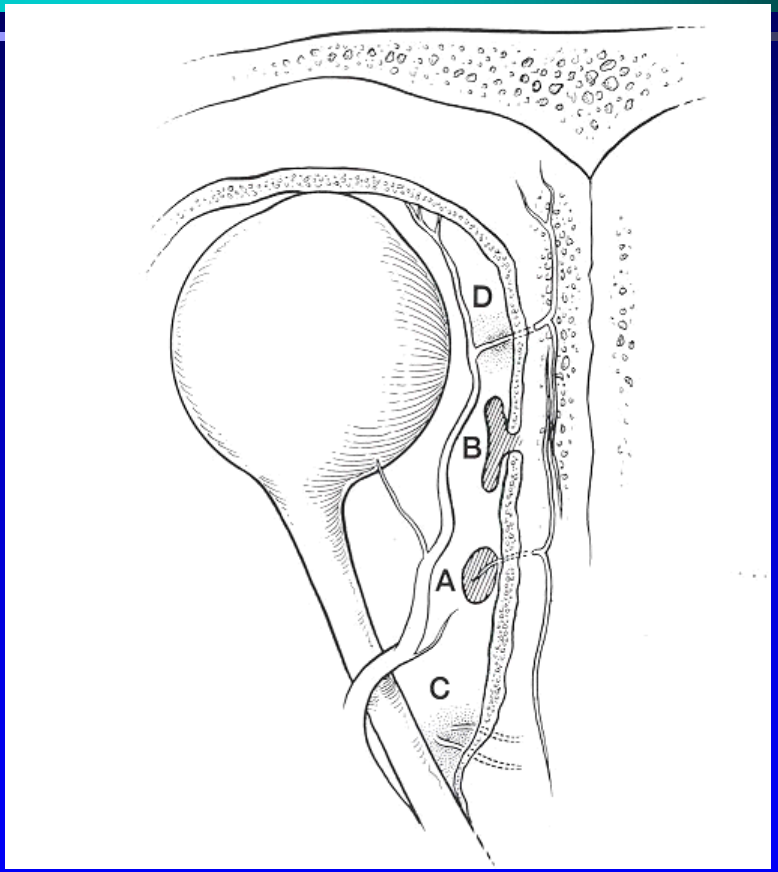

sphenoid,

Sinusitis Complications

- Orbital
- Cranial
- Extracranial

Orbital Complications

- Routes of spread
  - arterial
  - venous
  - lymphatic
  - direct



Complications of Acute sinusitis: Orbital (Chandler)

- Five classifications of orbital complications
  1) Inflammatory edema: lid edema otherwise normal.
  2) Orbital cellulitis: diffuse edema
  3) Subperiosteal abscess: usually seen near lamina papyracea
  4)Orbital abscess: collection within orbit
  5) Cavernous sinus thrombosis: bilateral

Chandler Clasifications

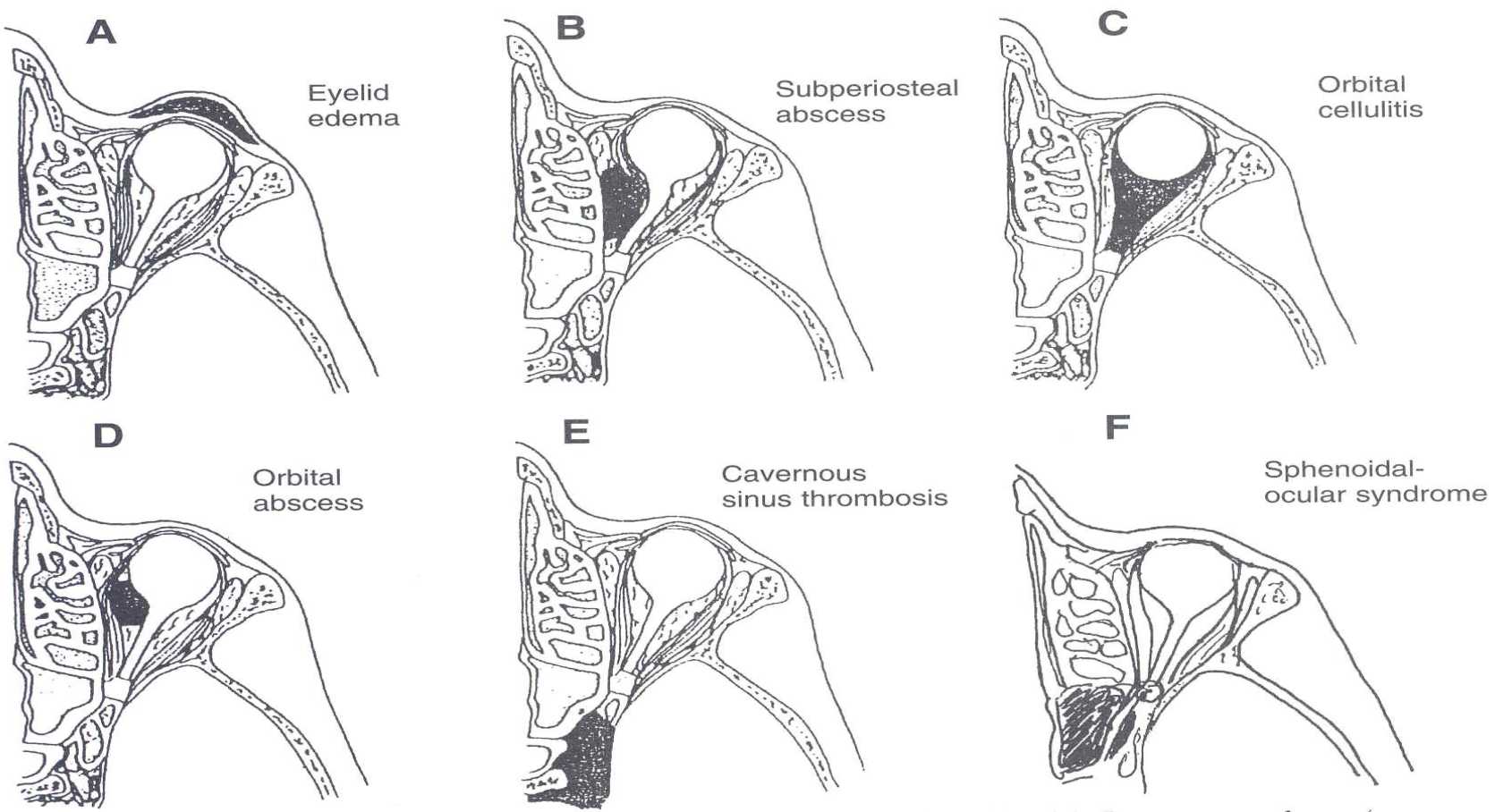
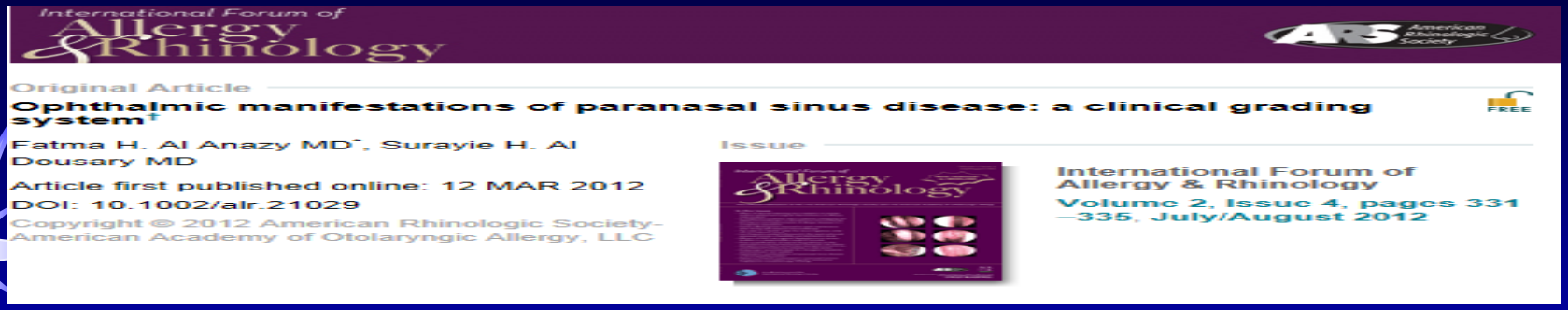


Fig. 4.—Classifications of Orbital Complications of Sinusitis=A, Periorbital inflammatory edema (pre-

Al Anazi & Al Dousary Classification


International Forum of Allergy & Rhinology

Original Article

Ophthalmic manifestations of paranasal sinus disease: a clinical grading system†

Fatma H. Al Anazy MD*, Surayie H. Al Dousary MD

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Chandler's classification ;Based on Eye Acute Infection and their anatomic location

- Clinical grading system that doesn't require Imaging
- Encompass Acute orbital infection and chronic Sinogenic pathology causing orbital manifestation.
- Radiologic findings does not correlate well with clinical severity
- Chronic Paranasal sinus disease in (74 %) of the cases.

Grade	Presentation	Number	ARS	AFS	CRS
I Anatomical Disturbance	Proptosis	**15(36%)**	**0**	**10**	5
II Functional Involvement	Epiphoria Diplopia Ophthalmoplegia Ptosis	**11(26%)**	**0**	**8**	3
III Orbital Infection	Orbital cellulitis, Pre septal-cellulitis Orbital abscess Subpereostial abscess	**11(26%)**	**3**	**3**	5
IV Visual Impairment	Visual Impairment, blindness	**5(12%)**	**1**	**4**	0

Complications

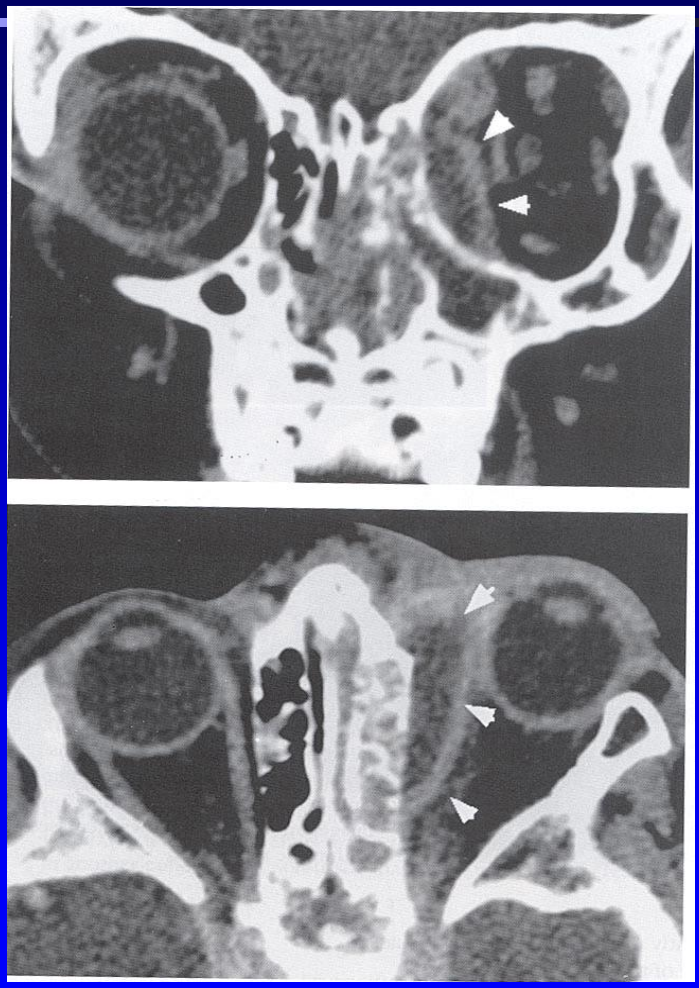
- Stage I
  - periorbital inflammatory edema
  - obstruction of venous channels
  - no vision loss
  - no EOM limitation

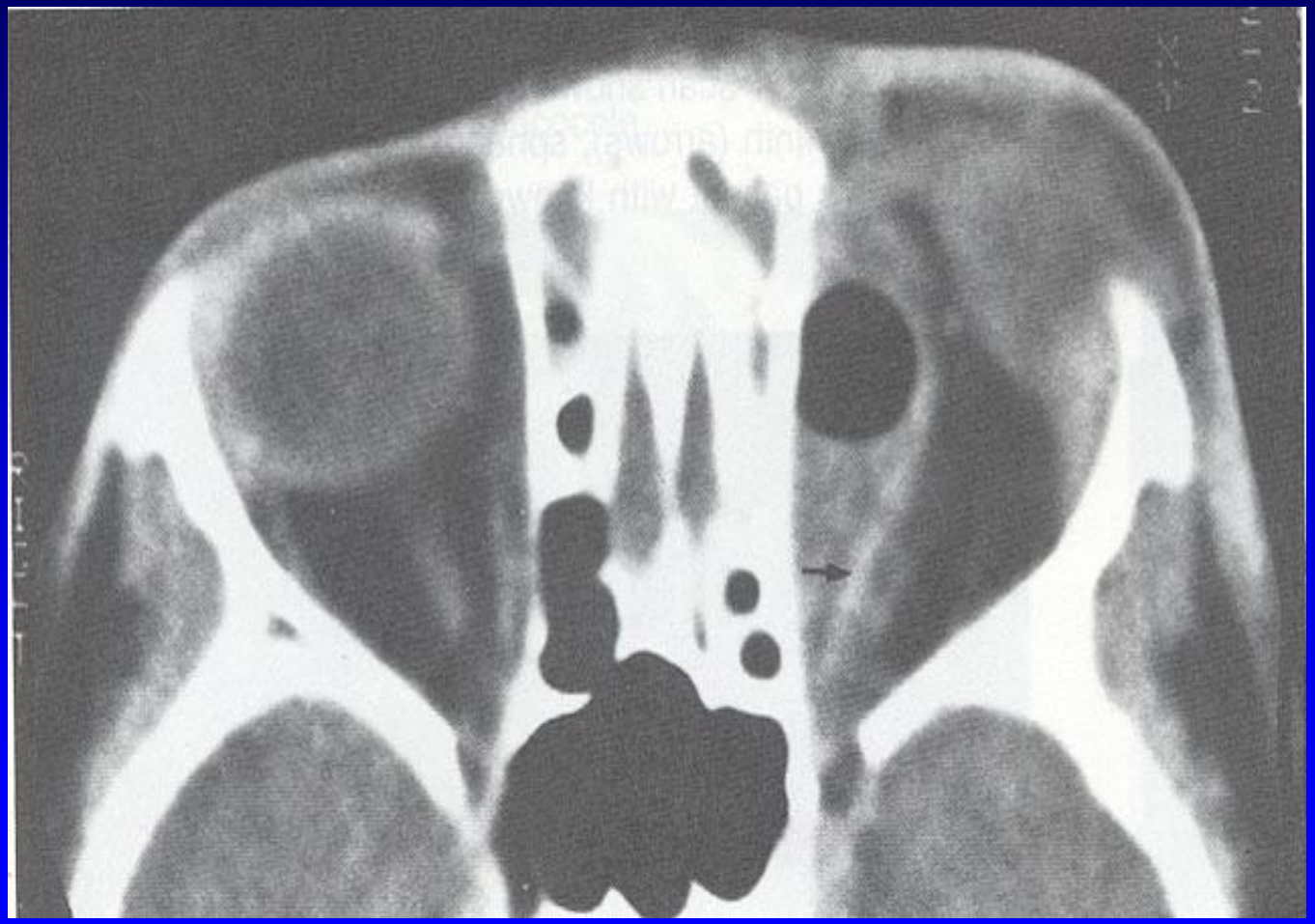
Complications

- Stage II
  - orbital cellulitis with edema, chemosis, proptosis, pain
  - no abscess
  - opthalmoplegia may occur due to edema or spasm
  - no visual loss

Complications

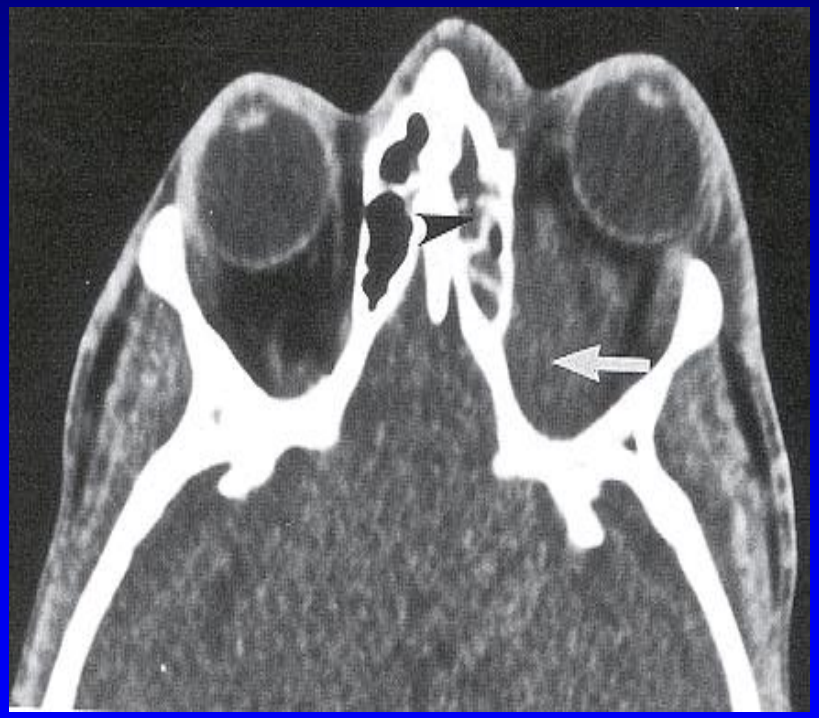
- Stage III
  - subperiosteal abscess
  - globe displaced laterally or downward
  - orbital cellulitis present with decreased EOM
  - vision decreased





Complications

- Stage IV
  - orbital abscess
  - severe proptosis and chemosis
  - usually no globe displacement
  - opthalmoplegia present
  - visual loss (13%) due to ischemia or neuritis

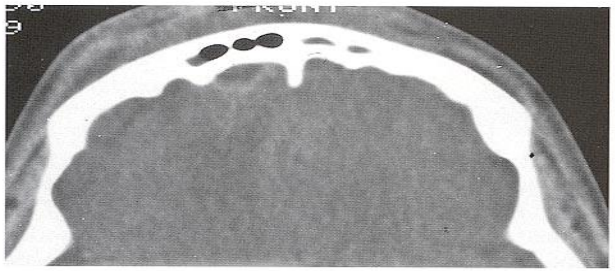


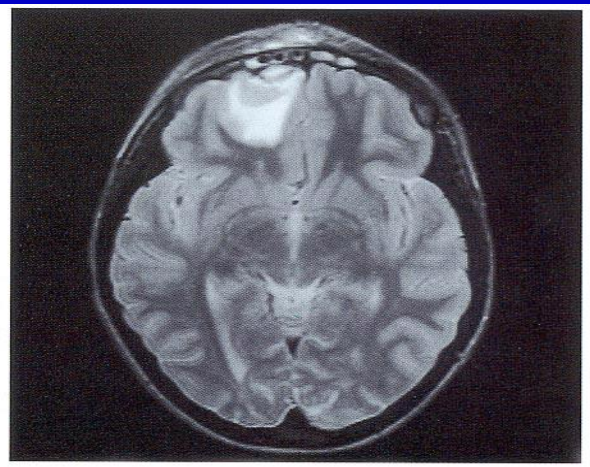
Complications

- Stage V
  - cavernous sinus thrombosis
  - progressive symptoms
  - proptosis and fixation
  - CN II, IV, VI
  - meningitis
  - high mortality

Intracranial Complications

- Meningitis Common in Children
- Subdural or Epidural Abscess
- Cerebral Abscess
  -





Mucoceles

- Mucoceles are **chronic**, cystic lesions of the sinuses lined by pseudostratified epithelium
- **Expand slowly**, often requiring many years
- **Etiology** is debated. Either due to obstruction of ostia or to simple obstruction of minor salivary gland
- **30% are idiopathic**

Other Complications

- Osteitis: **diagnose initially with technetium bone scan (osteoblastic** activity) and gallium bone scan (inflammation), follow with gallium scans; Rx: parenteral antibiotics, surgical debridement, sinus surgery
- Pot's Puffy Tumor: **frontal bone osteomyelitis, soft doughy swelling** of forehead, high risk of intracranial extension; Rx: parenteral antibiotics, trephination, may require surgical debridement
- Superior Orbital Fissure Syndrome: **fixed globe, dilated pupil (CN** III, IV, VI), ptosis, hypesthesia of upper eyelid (CN V1); Rx: urgent surgical decompression
- Orbital Apex Syndrome: **similar to Superior Orbital Fissure** Syndrome with added involvement of optic nerve (papilledema, vision changes)
- Sinocutaneous Fistula: **usually begins as a frontal osteomyelitis**

Fungal Sinusitis

- **Invasive**

  Presence of fungal hyphae within the mucosa, submucosa, bone, or blood vessels of the paranasal sinuses

  - **Acute Invasive Fungal Sinusitis**
  - **Chronic Invasive Fungal Sinusitis**
  - **Chronic Granulomatous Invasive Fungal Sinusitis**

- **Noninvasive**

  Absence of fungal hyphae within the mucosa and other structures of the paranasal sinuses

  - **Allergic Fungal Sinusitis**
  - **Fungus Ball (fungus Mycetoma)**

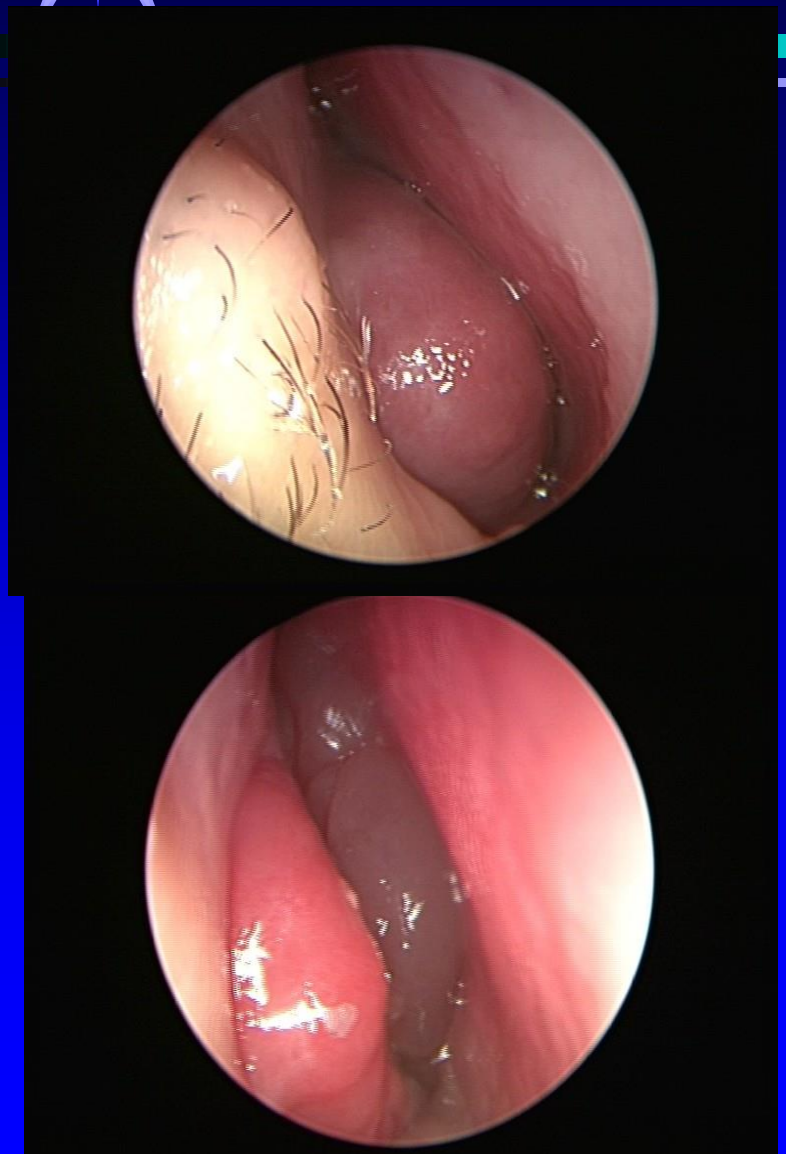
Allergic fungal Sinusitis

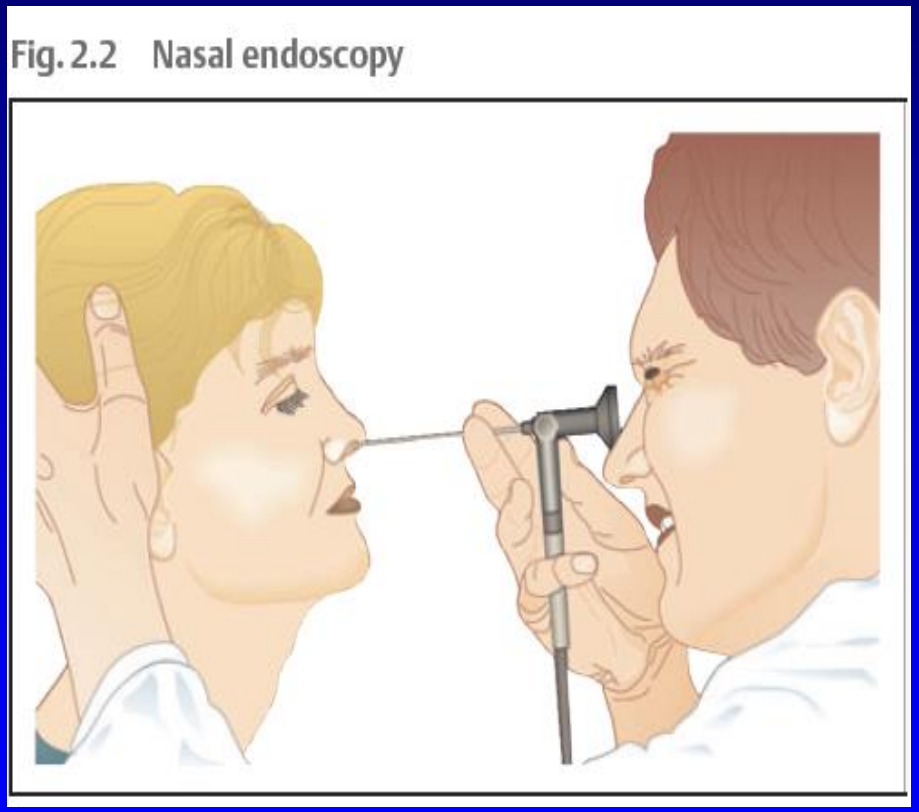
- Nasal obstruction
- Allergic rhinitis, or chronic sinusitis
  - Nasal congestion, Purulent rhinorrhea, Postnasal Drainage, or Headaches
- Patients with AFS are atopic
  - Unresponsive to antihistamines, Intranasal Corticosteroids, and prior immunotherapy
- Patients with AFS always are immunocompetent
- 5-10% of chronic rhinosinusitis patients actually cases of AFS
- Two thirds of patients report a history of allergic rhinitis
- 90% of patients demonstrate elevated specific IgE to one or more fungal antigens.
- 50% of patients in a series by Manning et al had asthma.
- No linkage to aspirin sensitivity has been established.

Examination

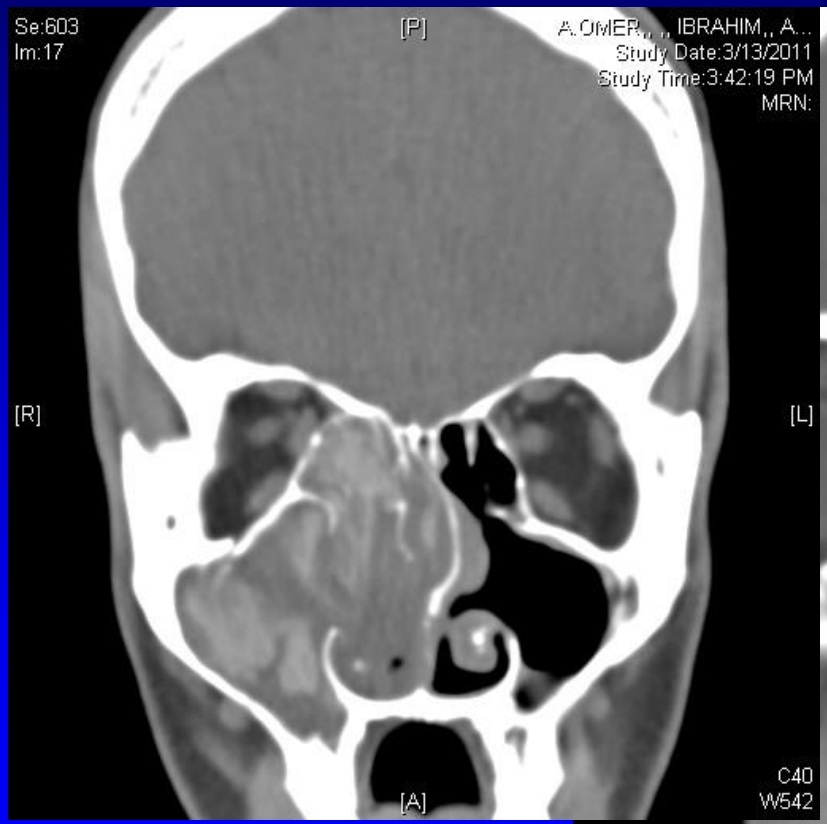
- Findings typically is broad
  - Intranasal inflammation and polyposis
- Facial dysmorphism:
  - Proptosis
  - Telecanthus
  - Malar flattening
  - More often was seen in children than in adults (42% vs 10%)
- Orbital Features
  - Proptosis usually occurs over long periods, no diplopia
  - Visual loss from AFS caused by compression of the ophthalmic nerve or inflamatory process

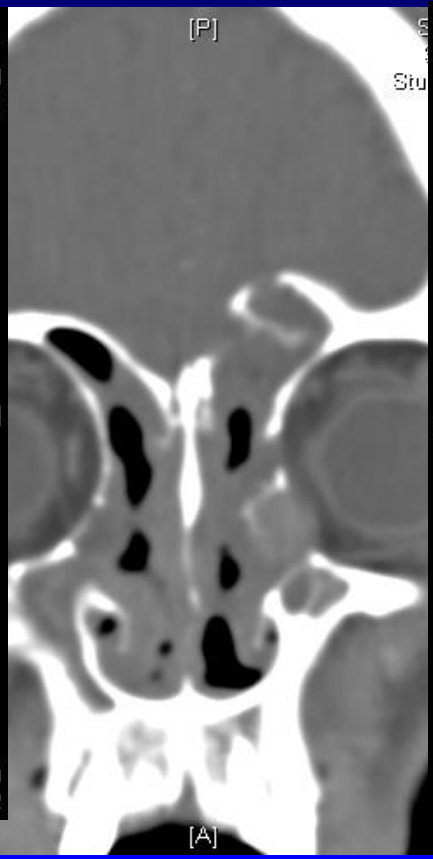
Nasal Polyps



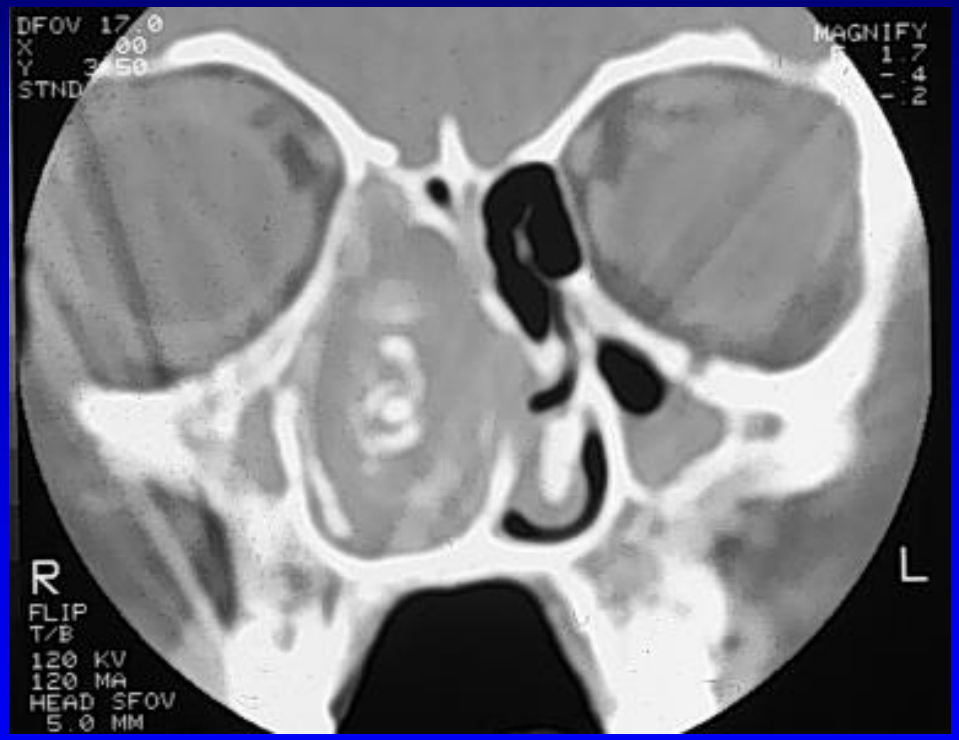


CT Scan Features

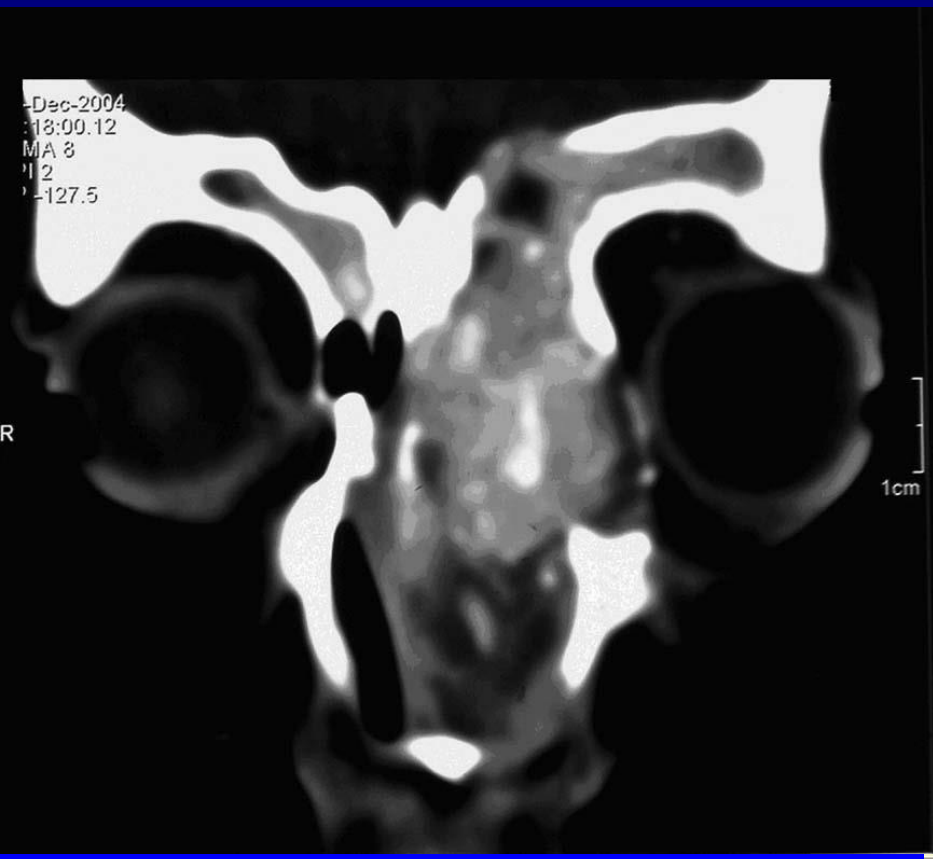


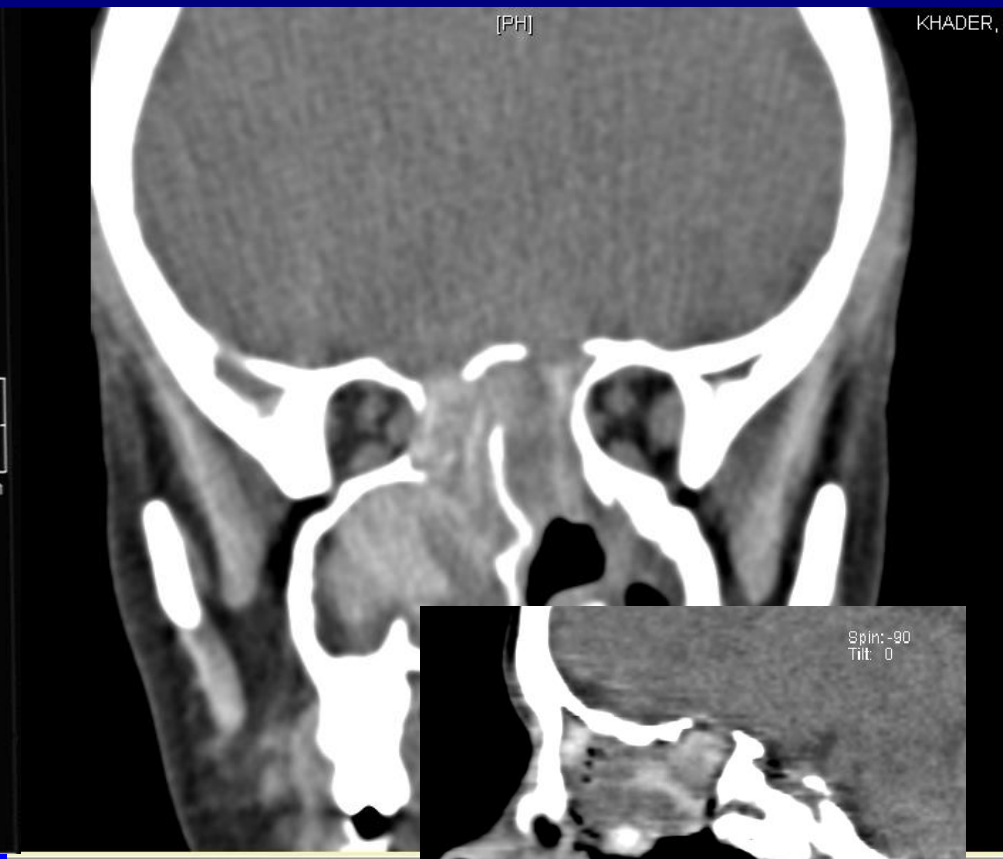


Allergic Fungal Sinusitis

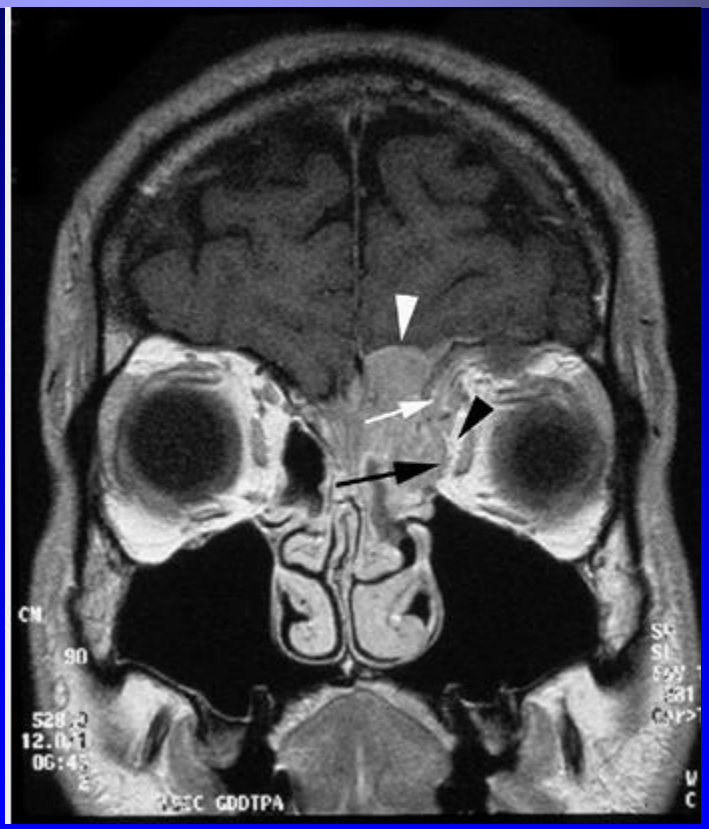


AFS & Skull Base Erosion

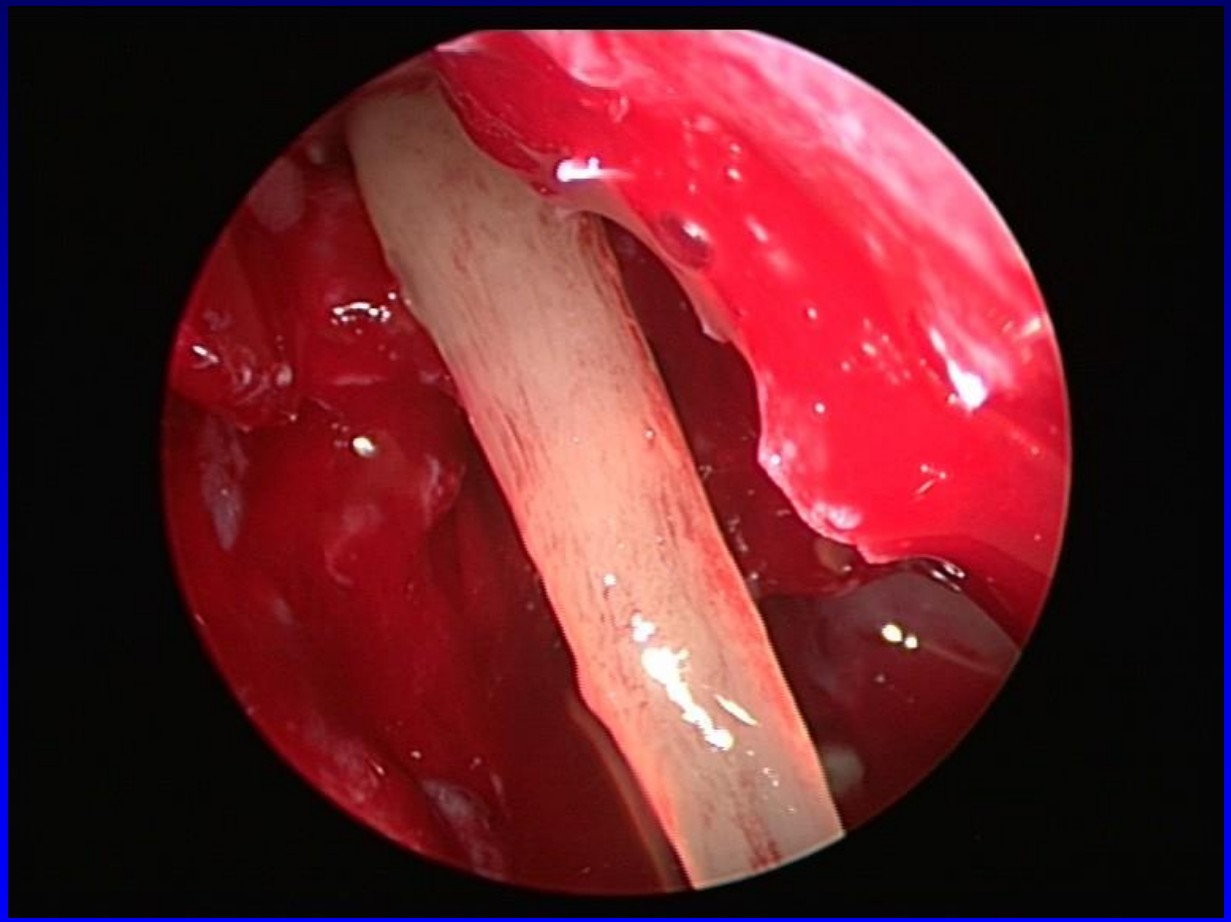




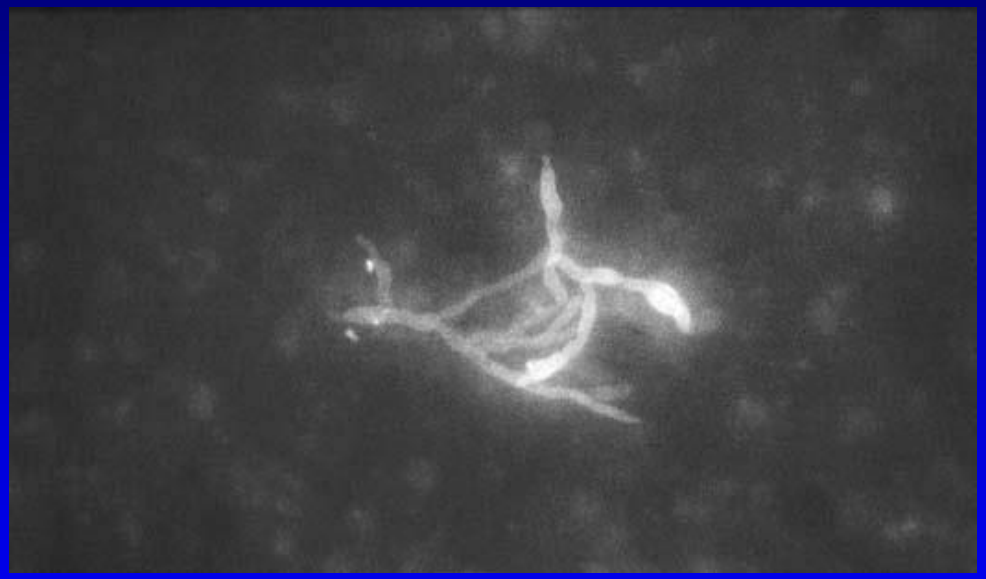
Pathology Extensions



Mucin



Positive Fungal Stain or Culture



AFS Treatment

- The treatment of choice
  - **Endoscopic debridement (FESS)**
    - a perioperative short course of **steroids**.
- **Postoperative** mold containing **immunotherapy** is a promising therapeutic advance in limiting recurrence.
- The role of systemic **antifungal** therapy is inadequately studied.
  - **Itraconazole** orally is well tolerated and effective in vitro against common causes of AFS.

Recurrence

Unilateral Nasal Mass

- Allergic Fungal Sinusitis
- Antrochoanal Polyp
- Inverted Papilloma
- Carcinoma

Invasive fungal sinusitis

- Mucormycosis is encountered in dust and soil and enters through the respiratory tract
- Ketoacidosis predisposes to mucormycosis, as the fungus thrives in acidic environments
- Initially seen as engorgement of turbinates, followed by ischemia and necrosis of the turbinates and adjacent nose
- The fungus invades vascular channels and causes hemorrhagic ischemia and necrosis
- Frequently fatal. 90% mortality in immunocompromised

Treatment

- Treated with **radical surgical debridement**
- **Amphotericin B**
- **Correction of underlying immunosuppression**