

Sinonasal imaging

Siddhartha Gaddamanugu,

Associate Professor, Radiology ,University of Alabama Heersink School of Medicine,
Birmingham, Alabama



Disclosures

NONE

Goals of this 30-minute lecture



Anatomy: critical variant Anatomy

Infection

Rare inflammatory conditions

Malignancy

The Preoperative Sinus CT: Avoiding a “CLOSE” Call with Surgical Complications¹

William T. O'Brien, Sr, DO
Stefan Hamelin, MD
Erik K. Weitzel, MD

Although functional endoscopic sinus surgery is an effective means of treating patients with recurrent and refractory sinusitis, the procedure is not without risk of serious surgical complications. Preoperative computed tomography (CT) affords radiologists the opportunity to prospectively identify anatomic variants that predispose patients to major surgical complications; however, these critical variants are not consistently evaluated or documented on preoperative imaging reports. The purpose of this review is to illustrate important anatomic variants and landmarks on the preoperative sinus CT with a focus on those that predispose patients to surgical complications. These critical variants and landmarks can be quickly recalled and incorporated into the preoperative imaging report through the use of the mnemonic “CLOSE”: Cribriform plate, Lamina papyracea, Onodi cell, Sphenoid sinus pneumatization, and (anterior) Ethmoidal artery. This approach will greatly enhance the value of the preoperative imaging report for referring otolaryngologists and help reduce the risk of surgical complications.

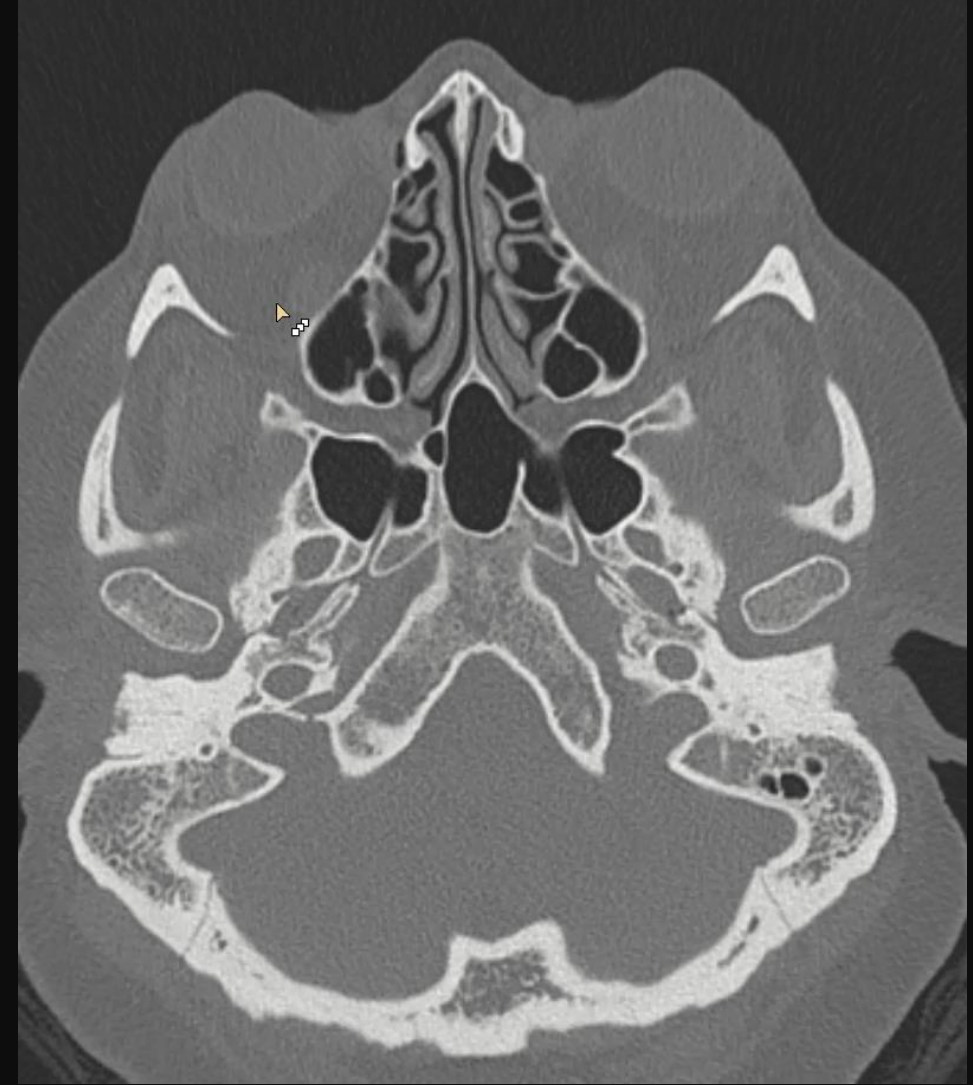
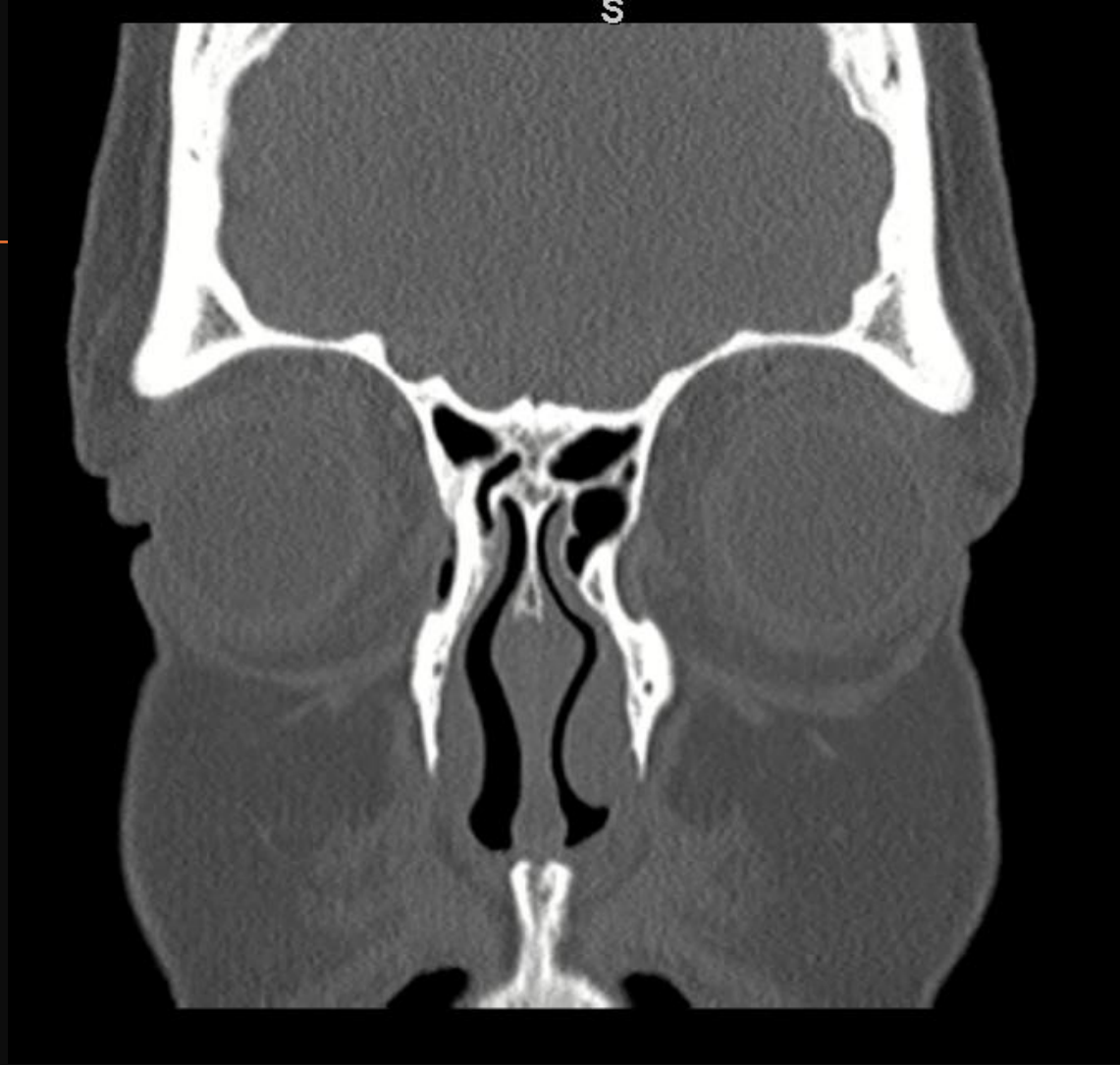
©RSNA, 2016

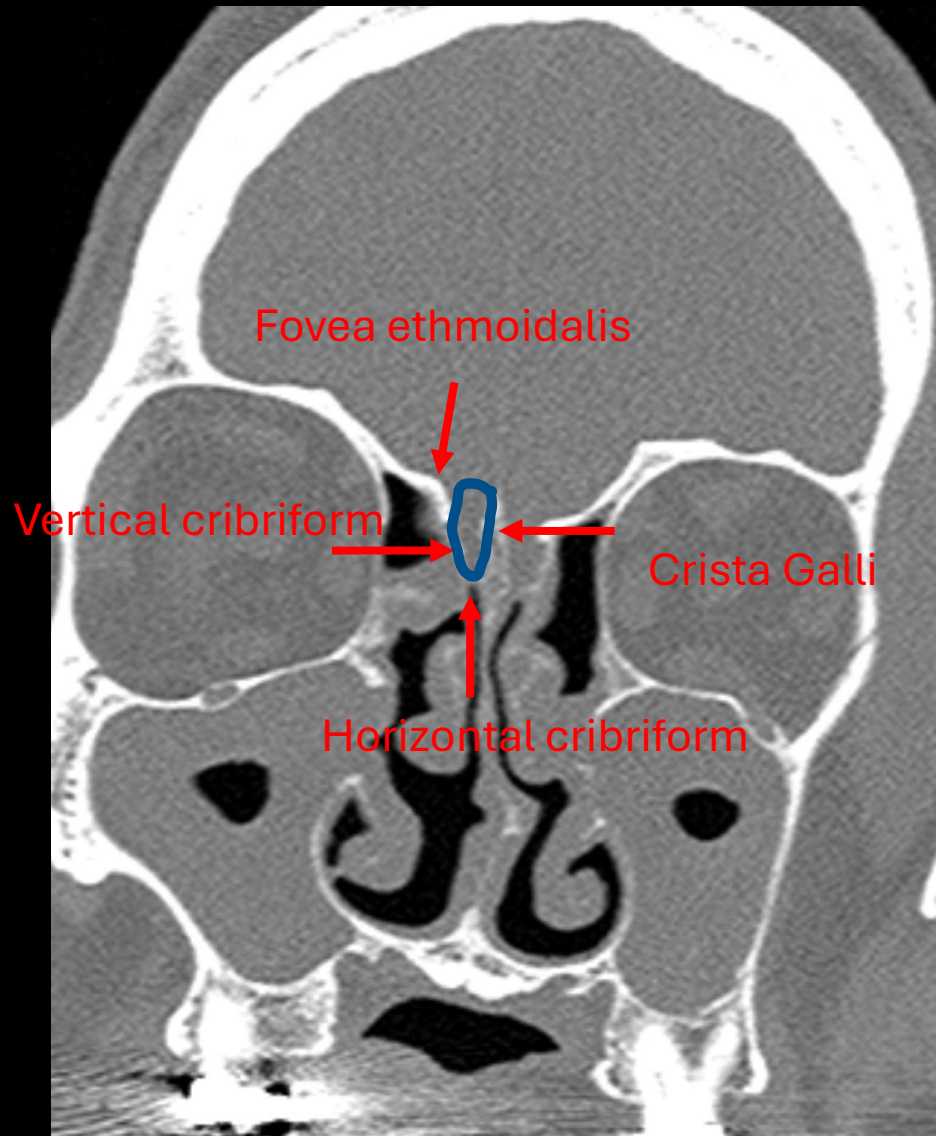
Online supplemental material is available for this article.

¹From the Department of Radiology, University of California, Davis School of Medicine, Sacramento, Calif (W.T.O.); Department of Radiology, Uniformed Services University of the

Anatomy

- **C** ; Cribriform plate
- **L** ; Lamina Papyracea
- **O** ; Onodi air cell
- **S** ; Sphenoid pneumatization
- **E** ; Ethmoid notch





Depth of olfactory recess :Keros grading

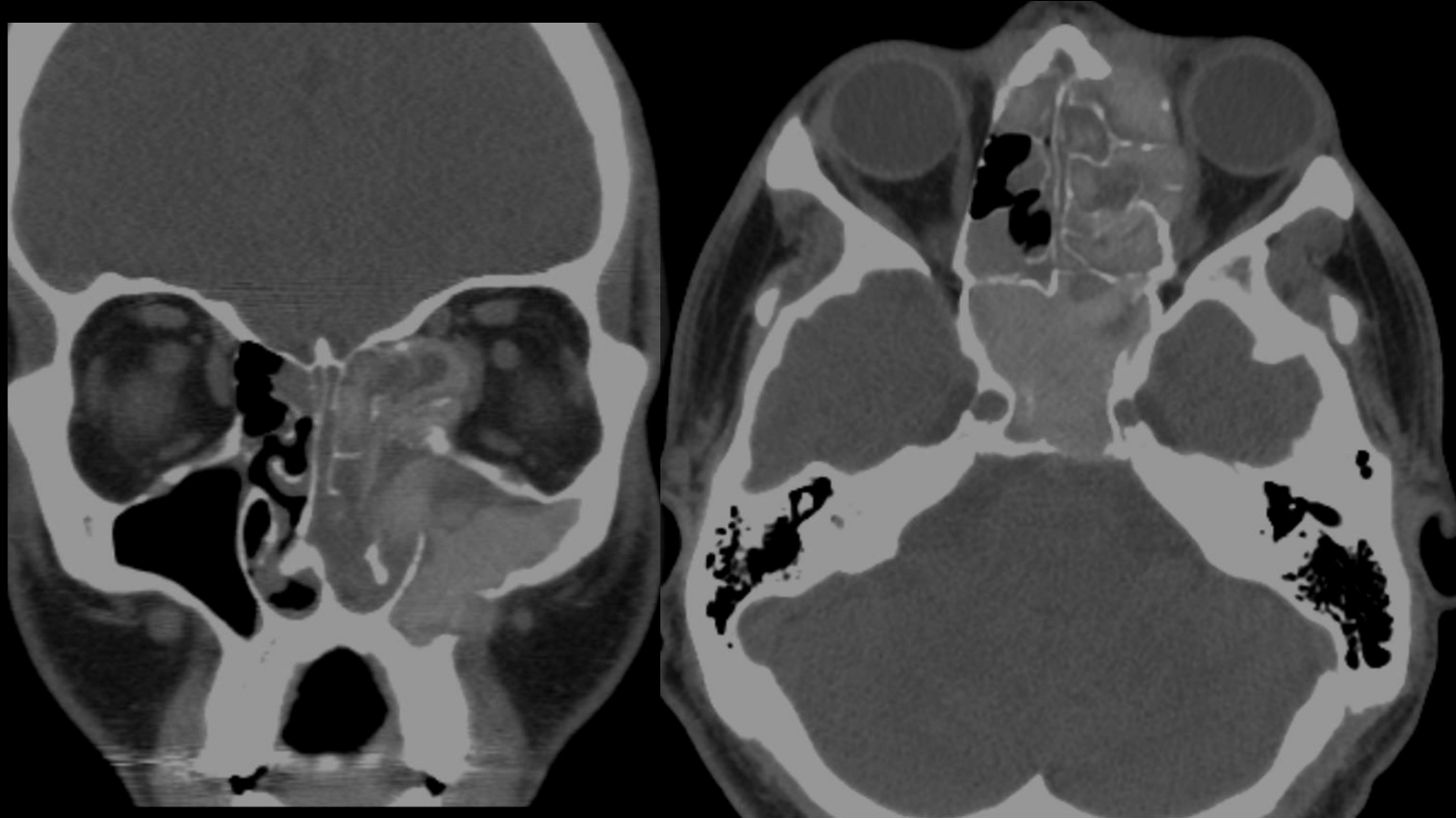
- Depth > 7mm Keros type 3
- Risk of skull base injury in Functional sinus surgery

Inflammation



Pan Sinus opacification /nasal cavity opacification- called CRS –Chronic Rhinosinusitis from NASAL POLYPOSIS
Treatment- Local steroids and nasal irrigation

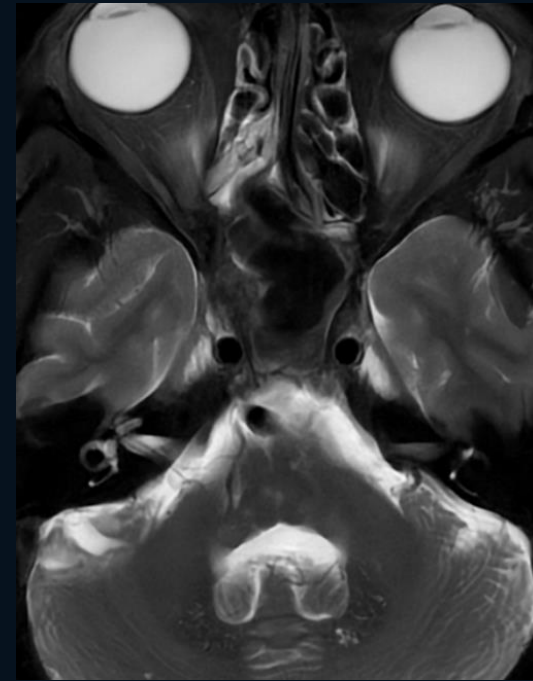
Inflammation



Hyperdense secretions with Pan sinus involvement

Sinus expansion with destruction

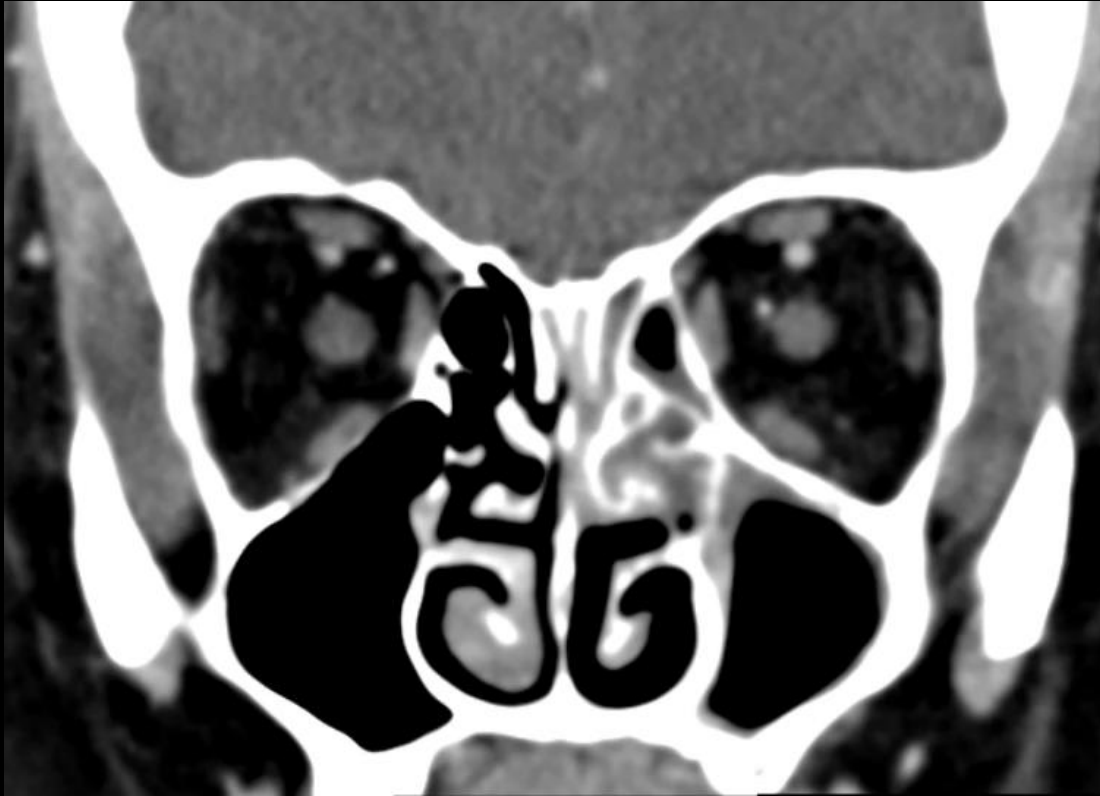
ALLERGIC FUNGAL SINUSITIS



Infection

- Chronic single sinus involvement with hyperdense contents; Mycetoma (Aspergillus).
- Treatment; Surgical resection

More serious infections- Left facial pain and blurry vision in an immunocompromised

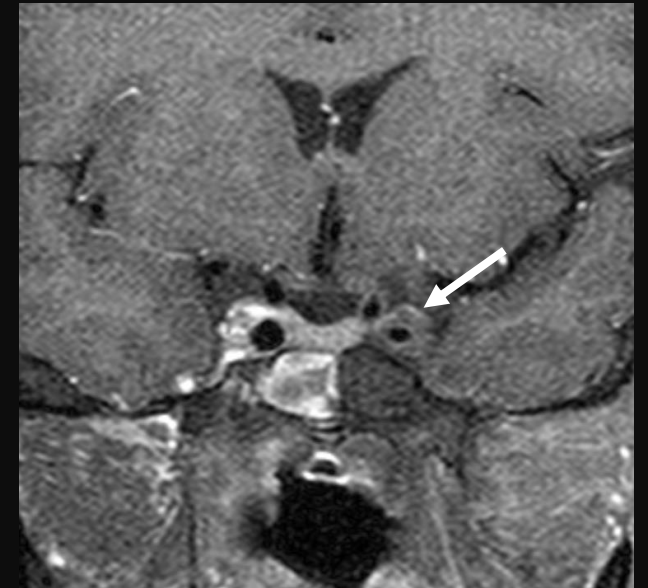


Poorly enhancing middle turbinate- Invasive fungal sinusitis (Mucor, Rhizopus and Aspergillus)

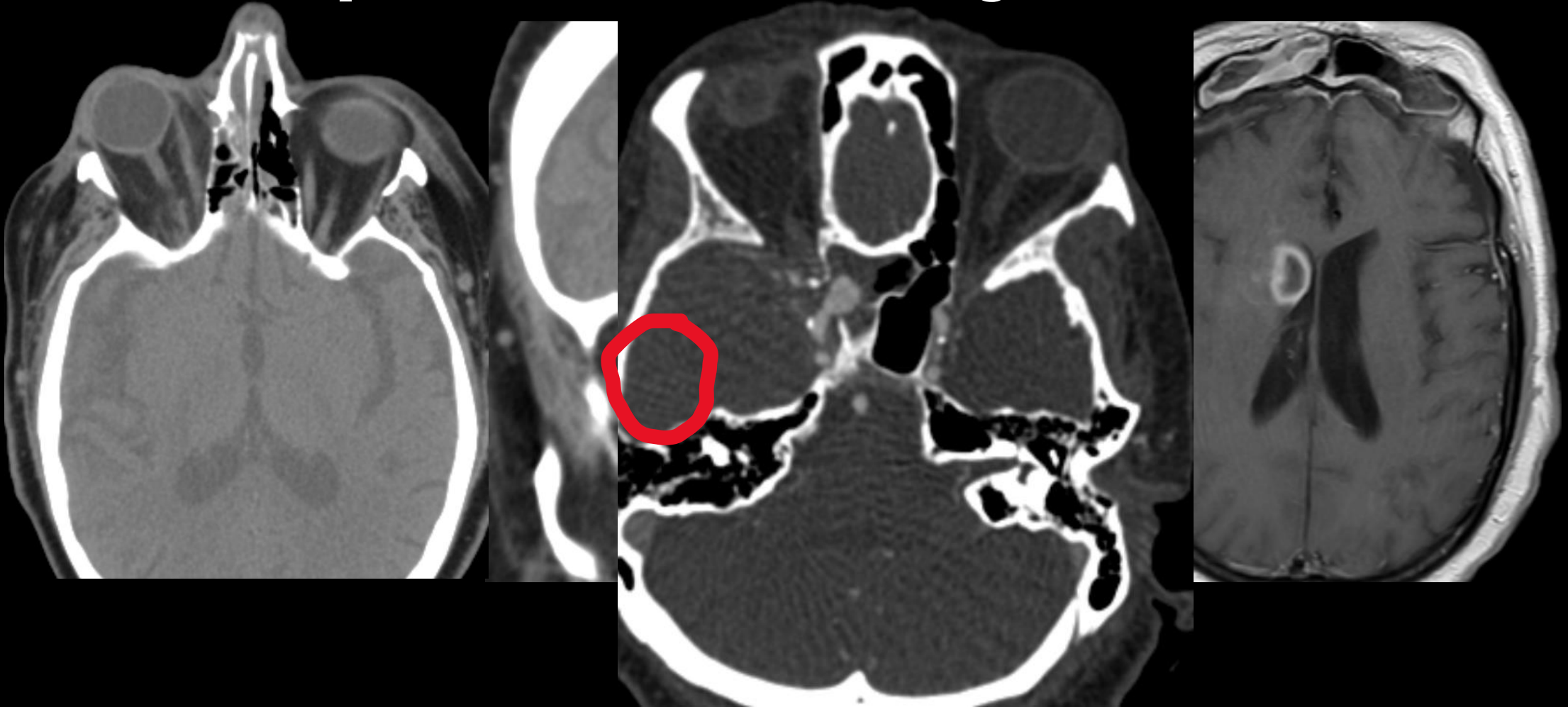
Absent bony destruction

Acute Invasive fungal sinusitis-Complication

- MRI better suited for complications
- Orbital abscess
- Cavernous sinus thrombosis
- Meningitis/Emphyema and Cerebral abscess
- Internal carotid occlusion-Infarcts

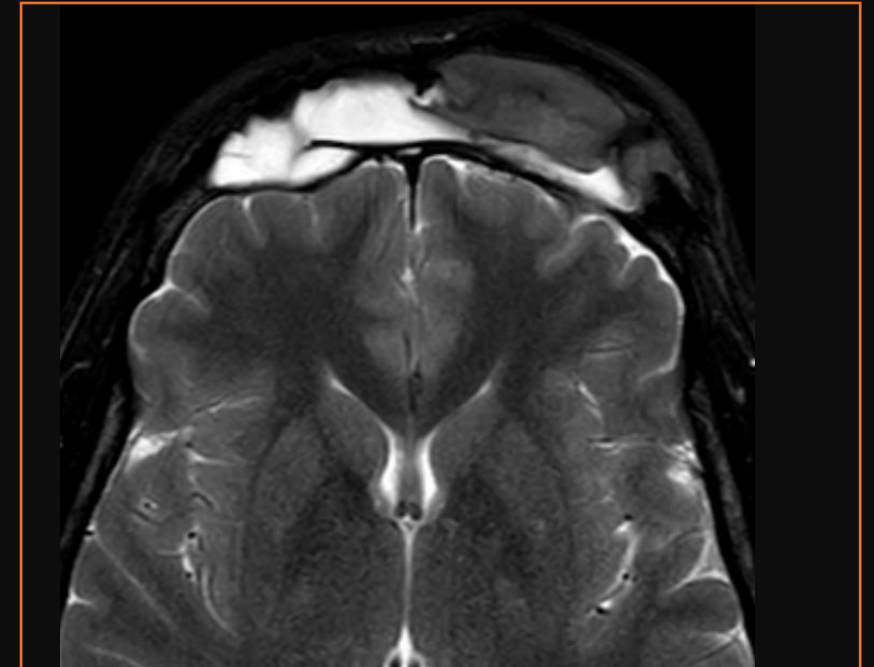
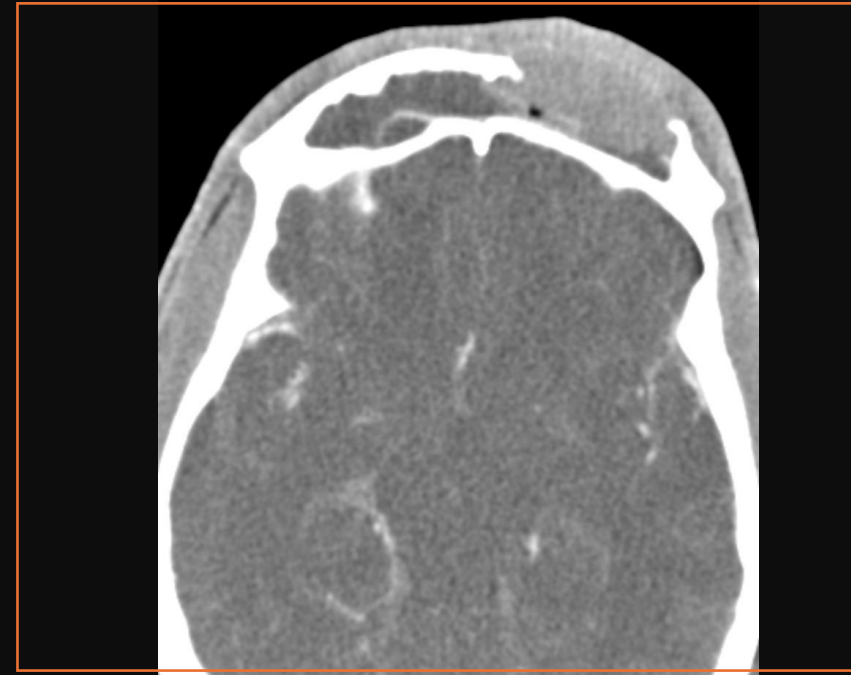


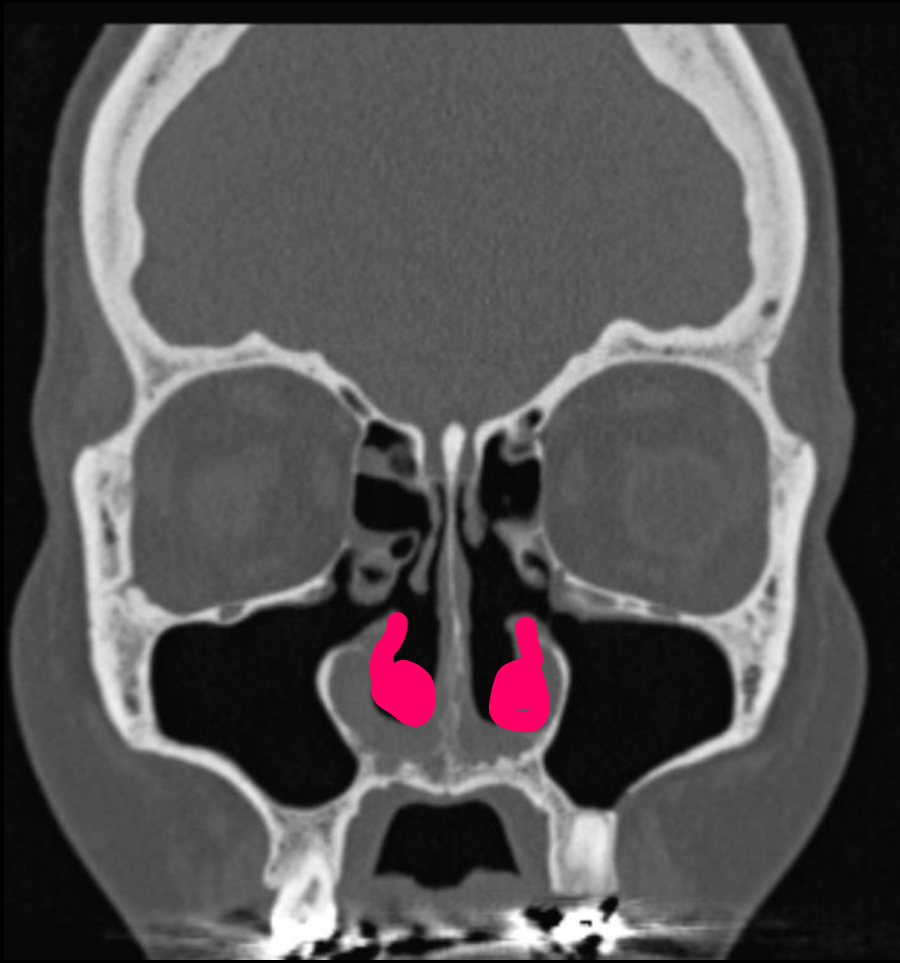
Complications of Invasive fungal sinusitis



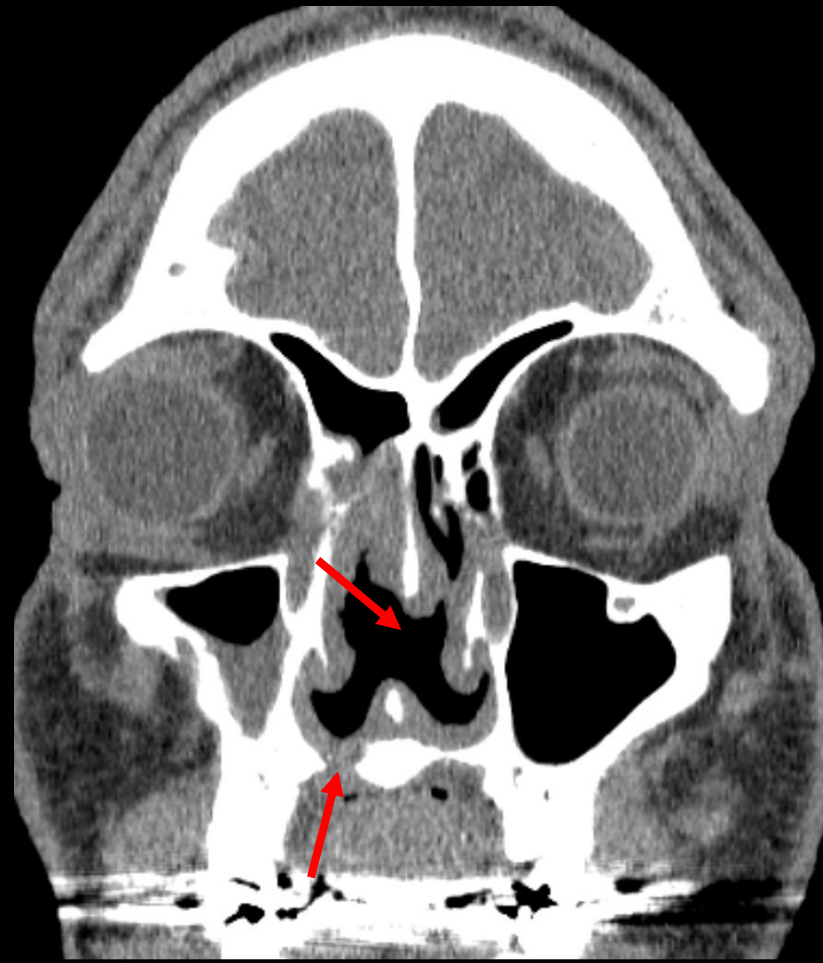
Chronic granulomatous invasive fungal sinusitis

- Chronic invasive fungal sinusitis may be granulomatous or non granulomatous
- Imaging can mimic malignancy because of bone destruction
- T2 hypointense
- Immunocompetent ; treatment Surgery and Antifungal treatment





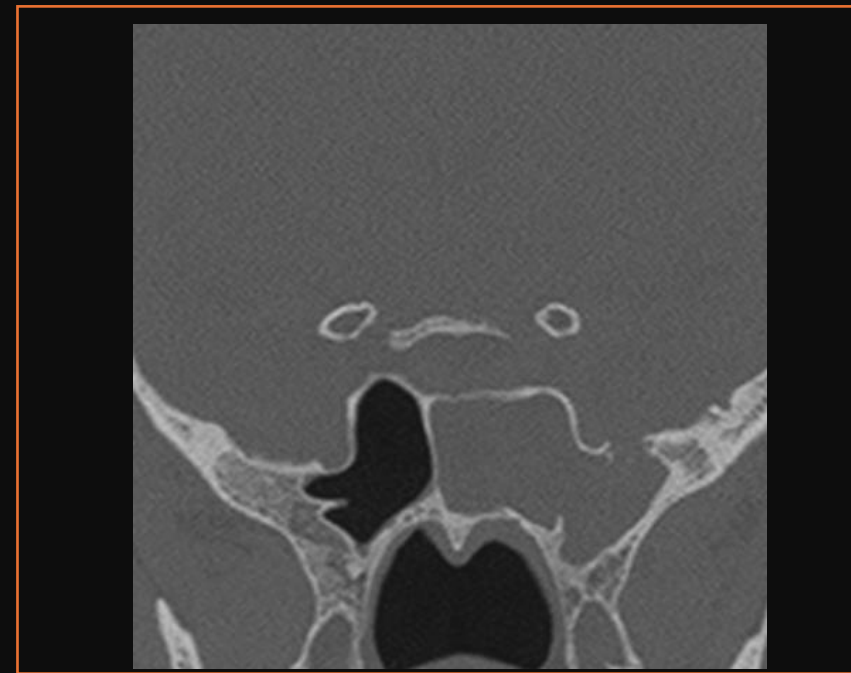
Sarcoidosis



Granulomatosis Polyangitis

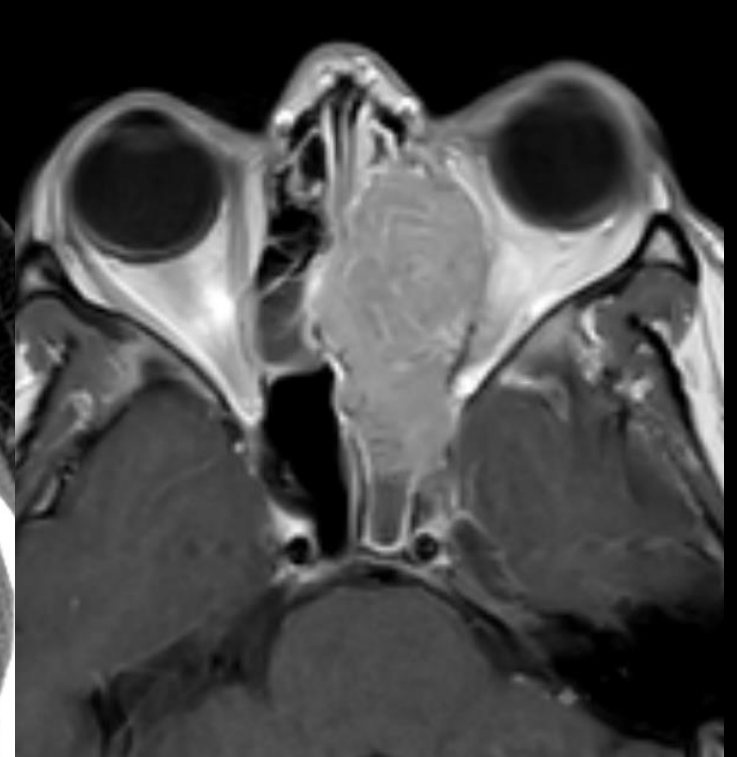
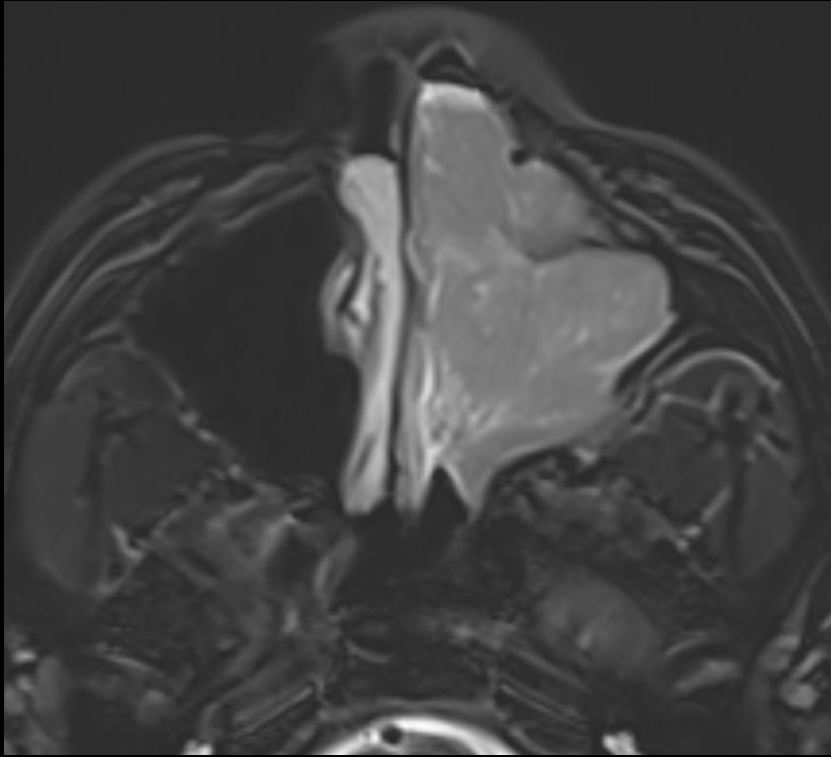
Non infective granulomatous disease: mucosal thickening with osseous erosion :Turbinates, septum

- Complete opacification of sphenoid sinus – Lateral pneumatization
- Defect in superolateral roof
- Diagnosis –Cephalocele
- Underlying IIH (idiopathic Intracranial hypertension)



Sinonasal tumors – WHO 5th edition

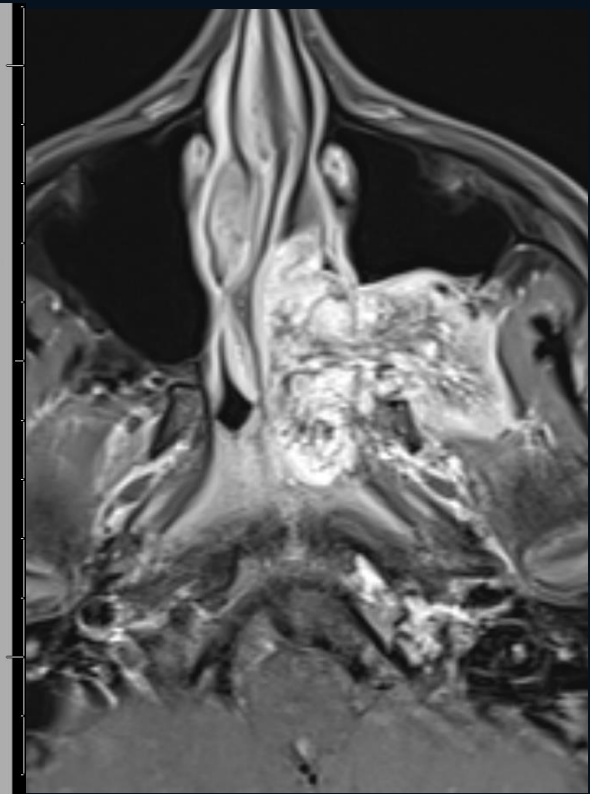
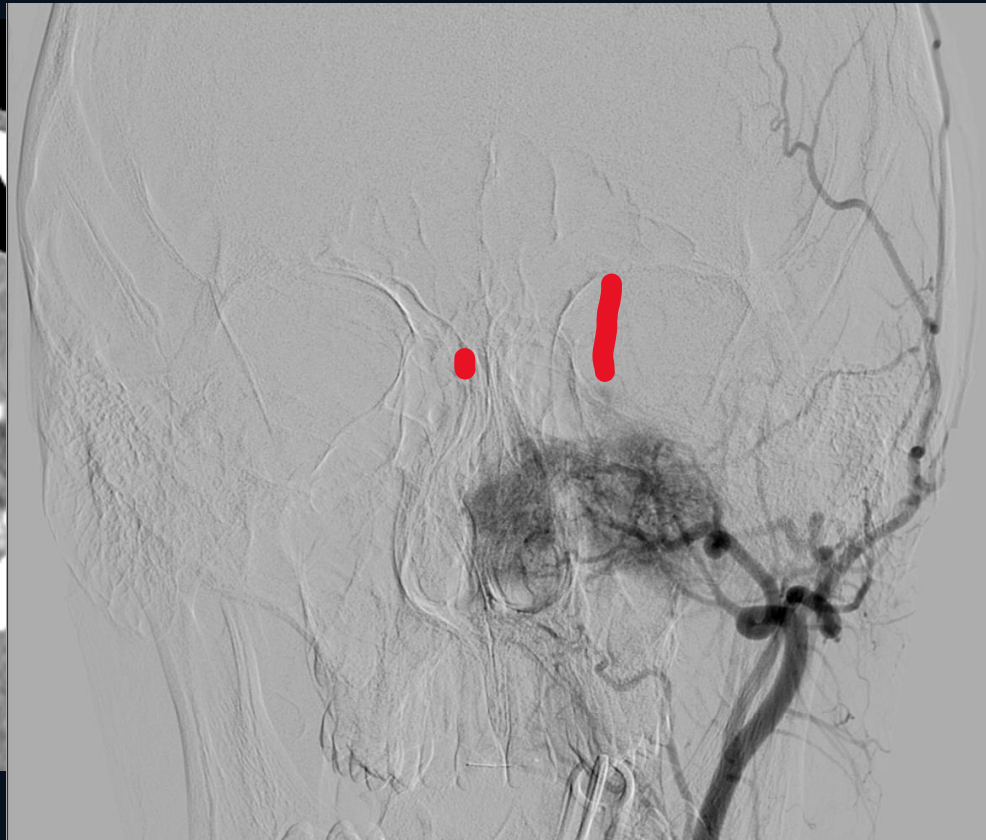
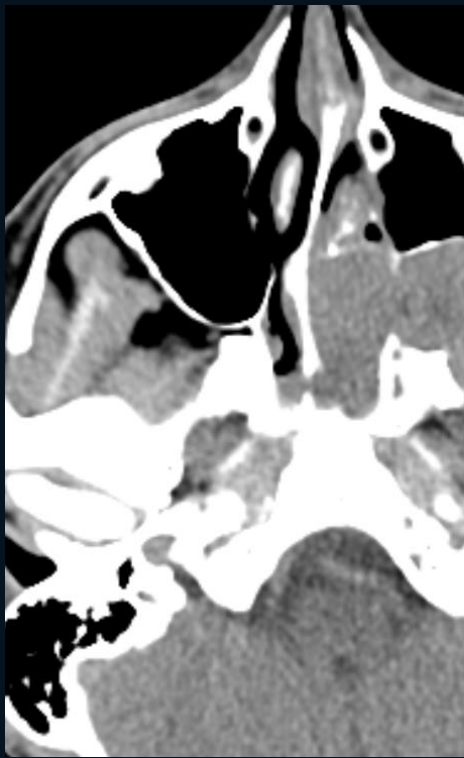
- **Hamartoma's**
- **Respiratory epithelial lesions**
 - Papilloma (inverted, exophytic and oncocytic)
 - Carcinoma
 - Squamous cell , Sinonasal Undifferentiated (SNUC)
 - Adenocarcinoma
- **Mesenchymal tumors**
 - Sinonasal tract Angiofibroma (previously JNA) , Chordoma
- **Others;**
 - Sinonasal melanoma , Olfactory Neuroblastoma



Inverted Papilloma – Lateral nasal cavity, Cerebriform pattern on T2 and post contrast (Inflammatory polyp –T2 bright)

Bone destruction can imply degeneration to Squamous cell.

High rate of recurrence



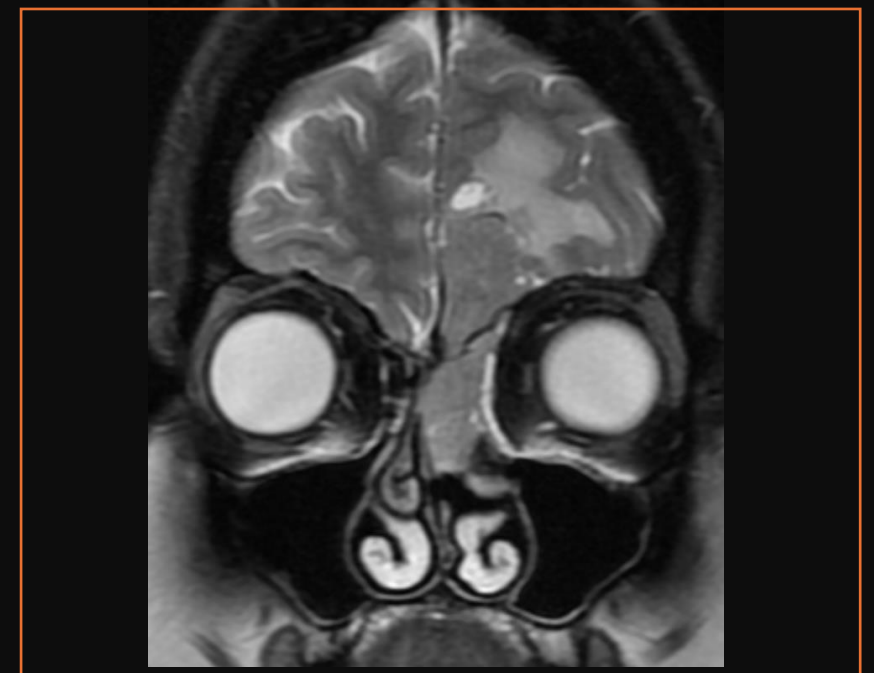
Sinonasal tract angiofibroma (previously Juvenile Nasopharyngeal angiofibroma)

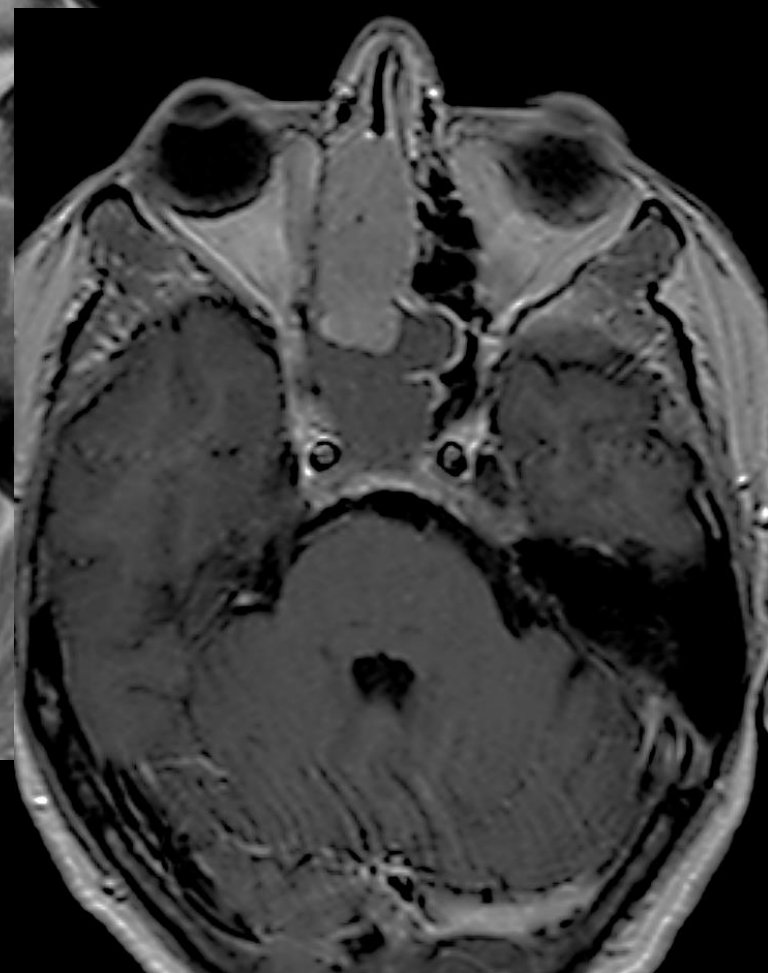
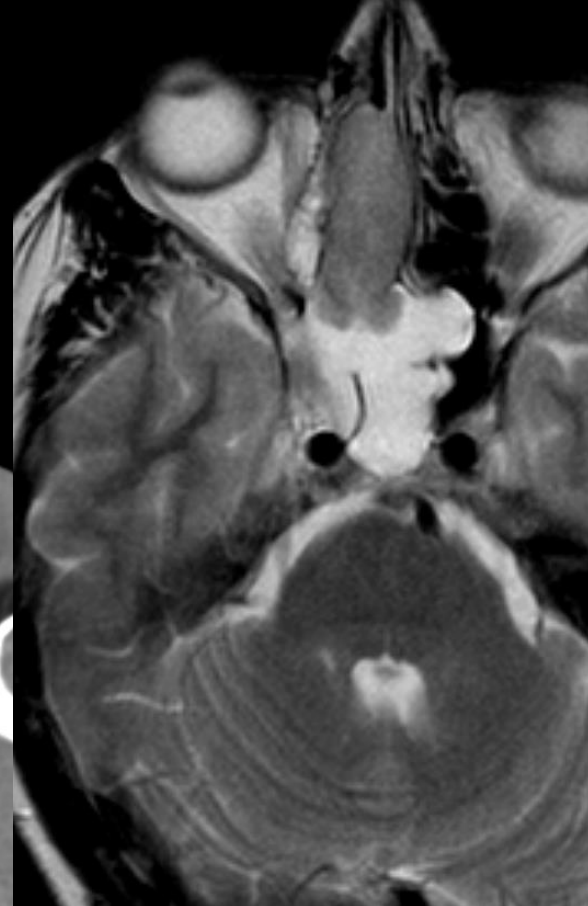
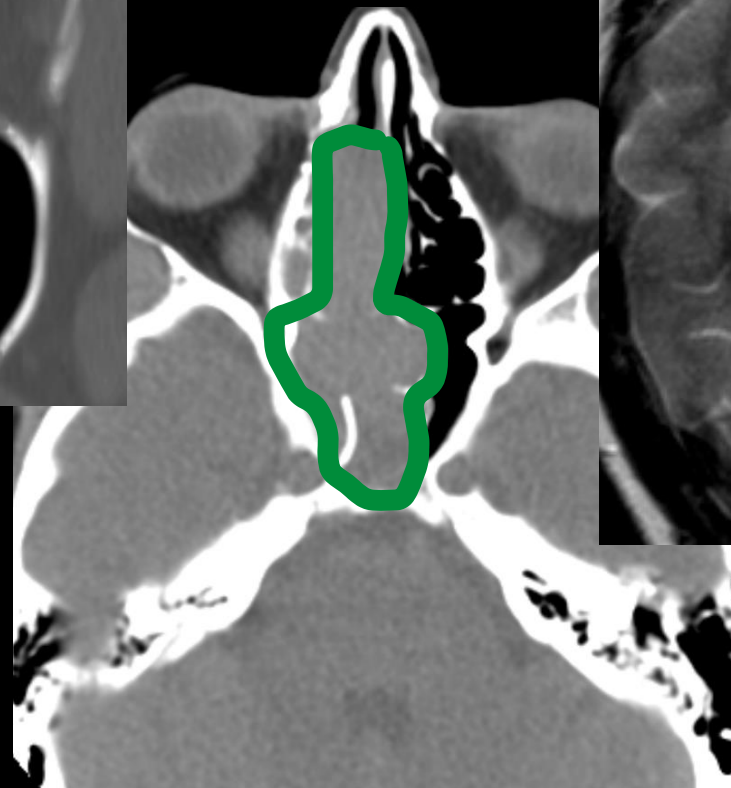
Epistaxis, teenage boys

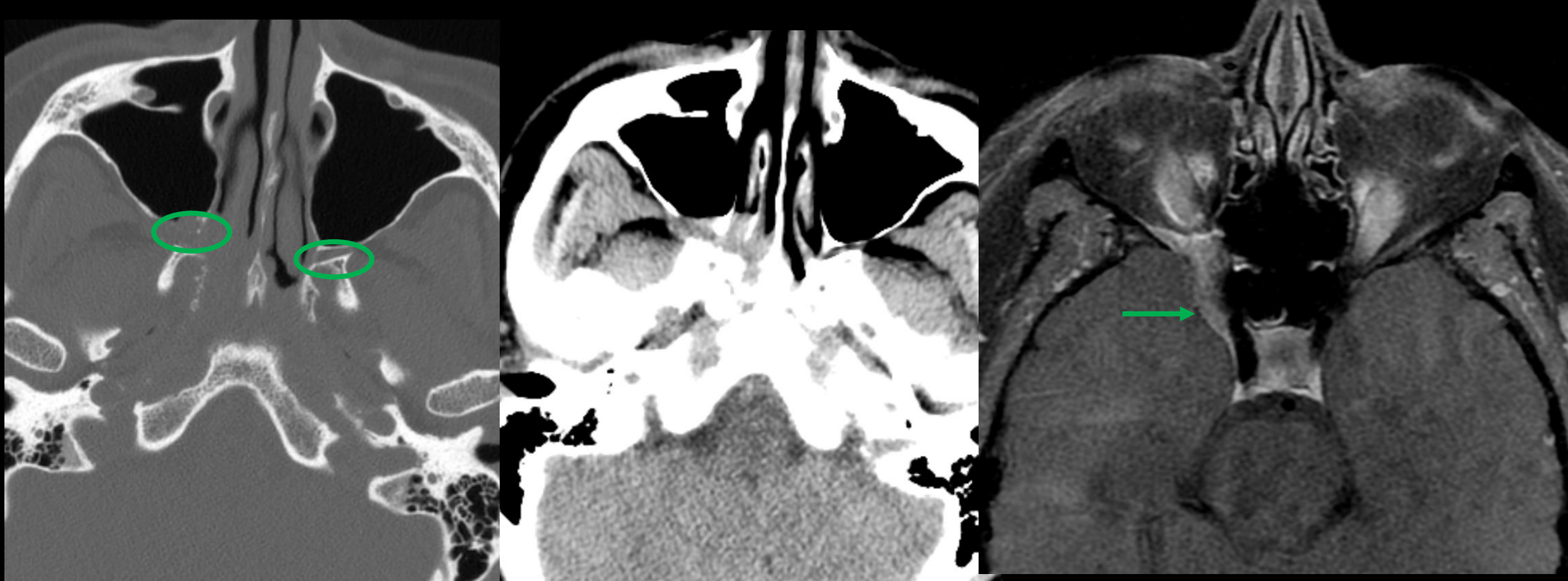
Location centered in Sphenopalatine foramen- bone remodelling ,sometimes locally aggressive

Treatment- Embolization followed by Surgery

- Olfactory Neuroblastoma; AKA Esthesineuroblastoma
- Dumbbell shaped mass with waist at cribriform plate
- Higher incidence of nodal metastasis compared to other sinonasal malignancies







High risk of Perineural tumor spread (PTS) with sinonasal malignancies- Adenoid cystic cancer has highest risk

V2(maxillary division) most likely nerve; MRI required for staging and to assess for PTS

Check Pterygopalatine fossa

Conclusion

- Sinonasal pathology is heterogenous ranging from uncomplicated sinus infection to invasive sinus infection
- Most sinonasal tumors have similar imaging appearance. MRI imaging for defining extent of tumor, extrasinus extension and PTS.
- Sinonasal anatomic variations are common and are useful for endoscopic surgeon prior to functional endoscopic sinus surgery

References

- Sinonasal Tumors: What the Multidisciplinary Cancer Care Board Wants to Know Gregory D. Avey, MD RadioGraphics 2024; 44(10):e240035
- The Preoperative Sinus CT: Avoiding a “CLOSE” Call with Surgical Complications William T. O’Brien, Sr, DO Stefan Hamelin, MD Erik K. Weitzel, MD Radiology: Volume 281: Number 1—October 2016 n radiology.rsna.org
- Imaging Features of Invasive and Noninvasive Fungal Sinusitis: A Review¹ Manohar Aribandi, MD Victor A. McCoy, Carlos Bazan III, MD RadioGraphics 2007; 27:1283–1296 Published online 10.1148/rg.275065189



THANK YOU FOR YOUR ATTENTION !!!!