Central Skull Base Anatomy and Developmental Lesions

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Hôpital général juif
Jewish General Hospital

McGill

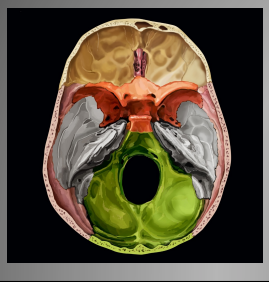
Disclosures

- Shareholder, Real Time Medical Inc.

Outline

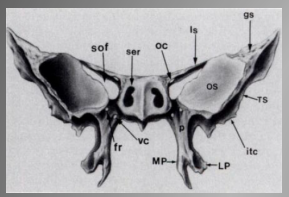
- Clinically oriented overview of central skull base (CSB) anatomy (+/- pathology)
- Relation to important anatomic structures and nearby spaces
- Review of variants and development lesions affecting the CSB

Overview: Central Skull Base



- Anterior boundary: Planum sphenoidale posterior margin (tuberculum sellae) medially & LWS laterally
- Posterior boundary: Dorsum sella medially & petrous ridges laterally

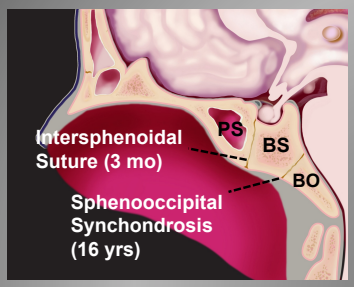
Sphenoid bone

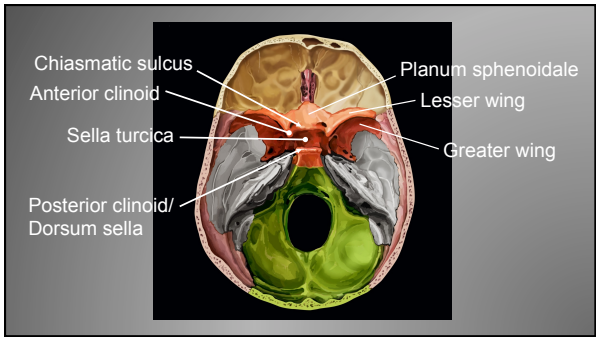


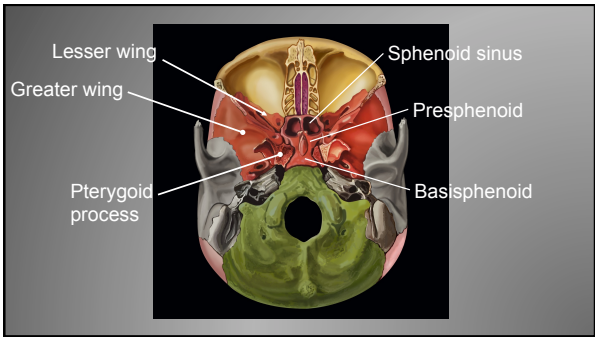
Laine et al. Radiographics 1990 "CT and MR imaging of Central Skull Base: Part 1, pp591-602.

Components:

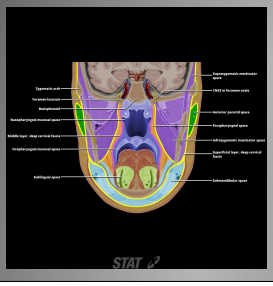
- *Central body*
- *Greater wing*
- *Lesser wing*
- *Pterygoid processes*







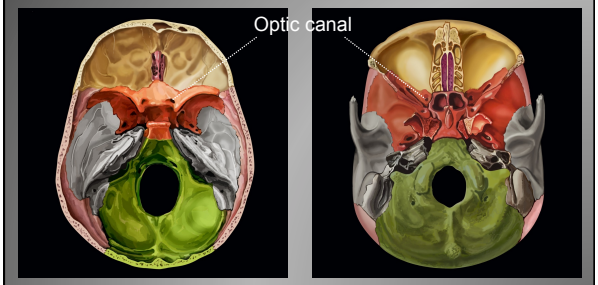
Relationships of Central Skull Base

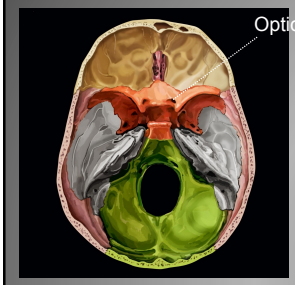


- Superior: Temporal lobes, pituitary, cavernous sinus, Meckel cave, CN1-4, CN6, CNV1-3
- Inferior: Anterior roof of pharyngeal mucosal space, masticator, parotid & parapharyngeal spaces

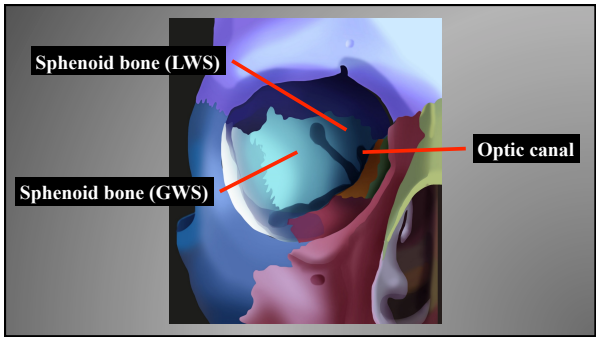
Foramina and Fissures of Central Skull Base

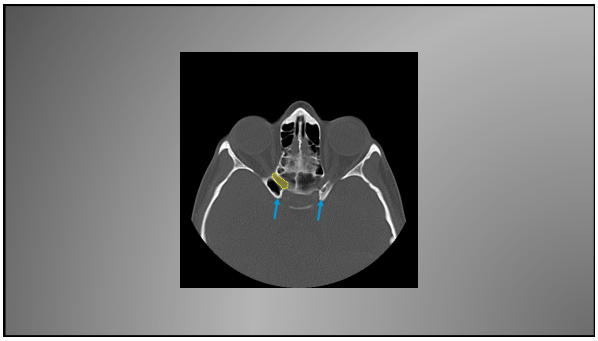
(with selected examples of pathology highlighting anatomic structures)

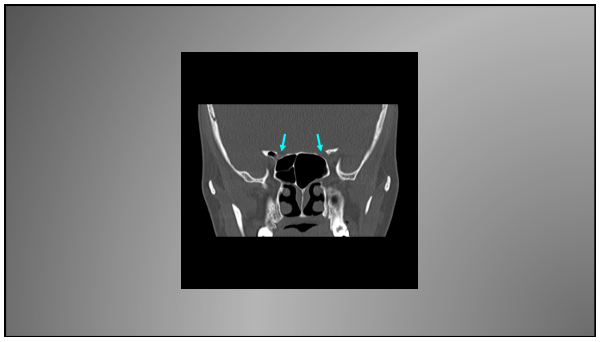


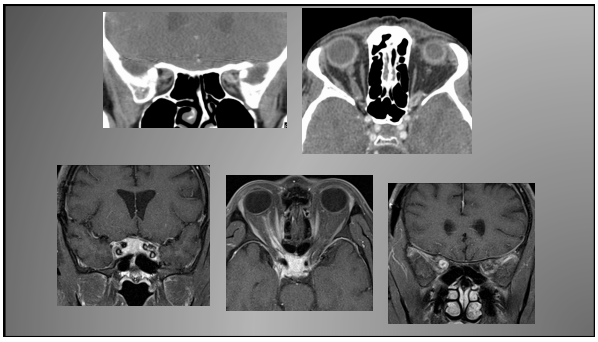


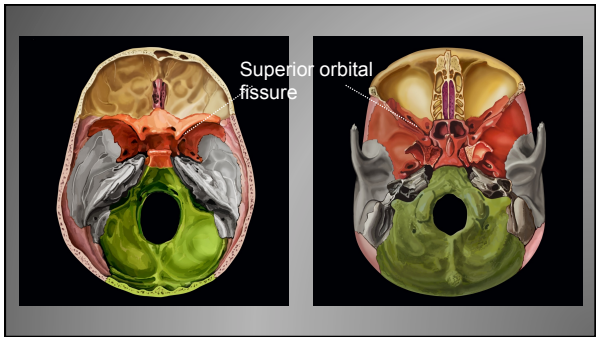
- Transmits: CN2 with dura, arachnoid & pia, CSF & ophthalmic artery
- Formed by LWS, superomedial to superior orbital fissure

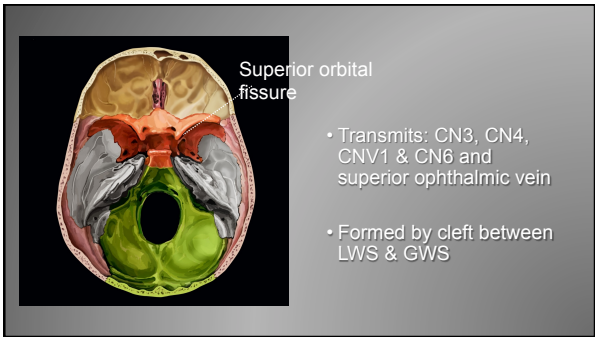

Sphenoid bone (LWS)
Optic canal
Sphenoid bone (GWS)

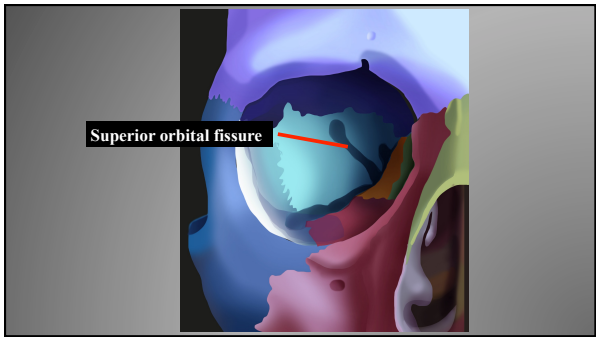


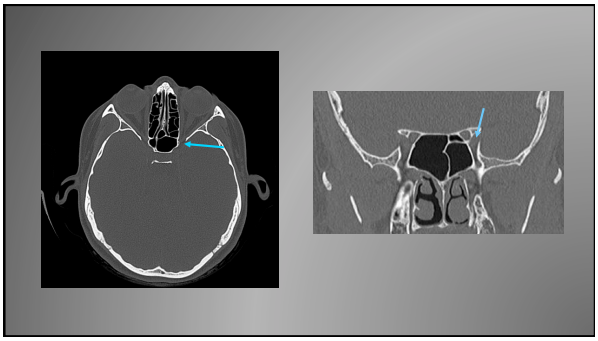


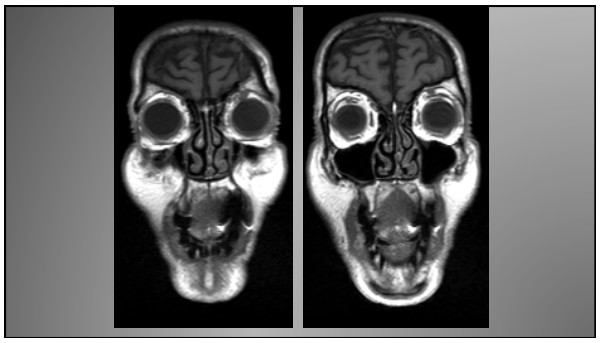


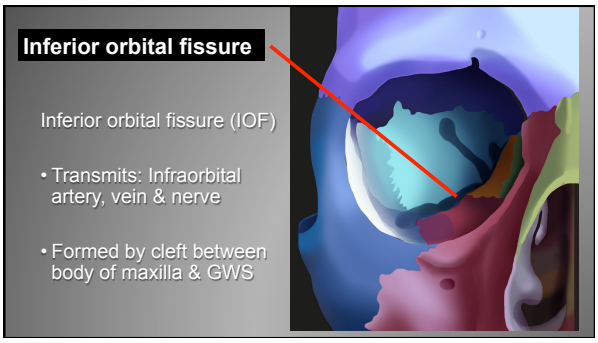

Superior orbital fissure

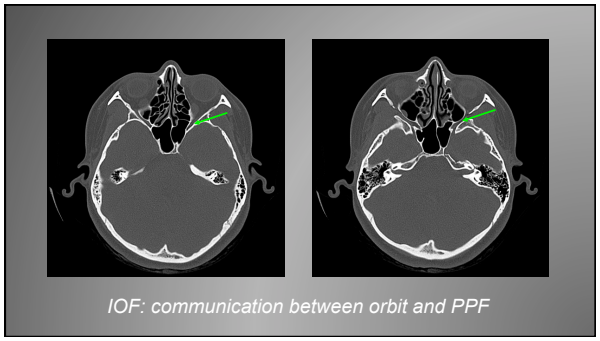

Superior orbital fissure
• Transmits: CN3, CN4, CNV1 & CN6 and superior ophthalmic vein
• Formed by cleft between LWS & GWS

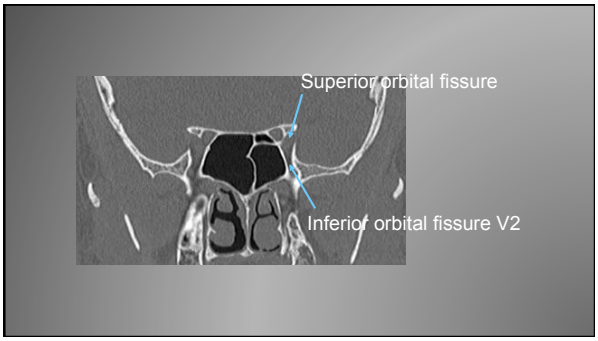

Superior orbital fissure

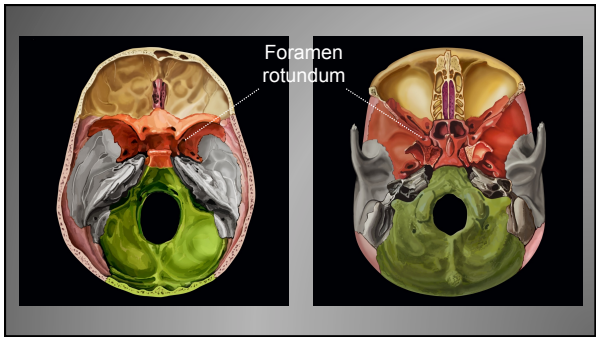


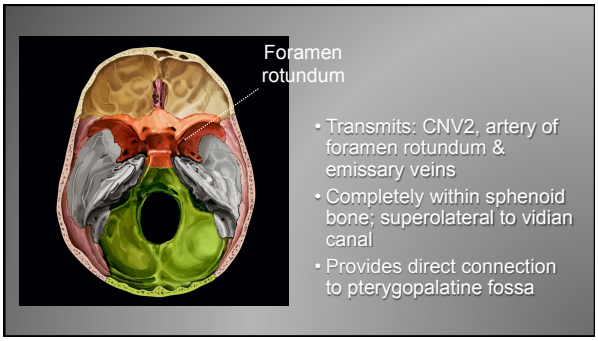


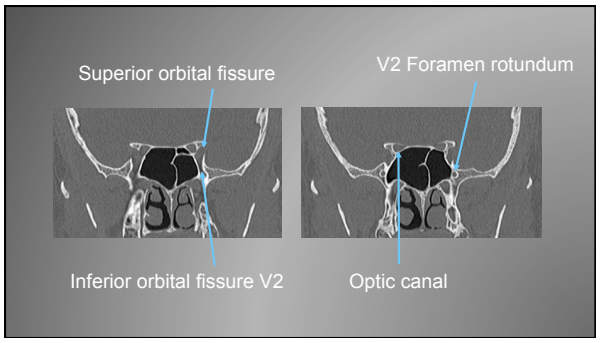

Inferior orbital fissure
Inferior orbital fissure (IOF)
• Transmits: Infraorbital artery, vein & nerve
• Formed by cleft between body of maxilla & GWS

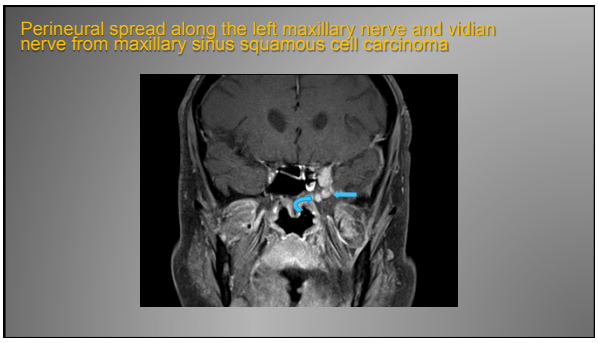

IOF: communication between orbit and PPF

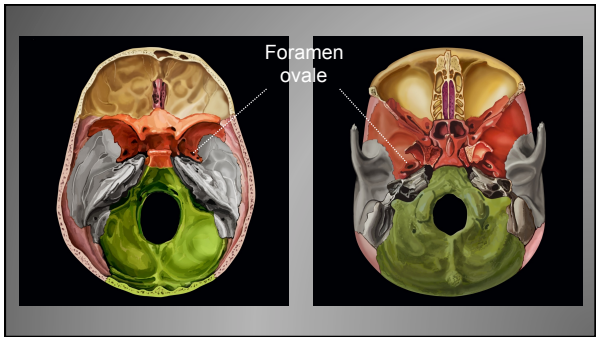

Superior orbital fissure
Inferior orbital fissure V2

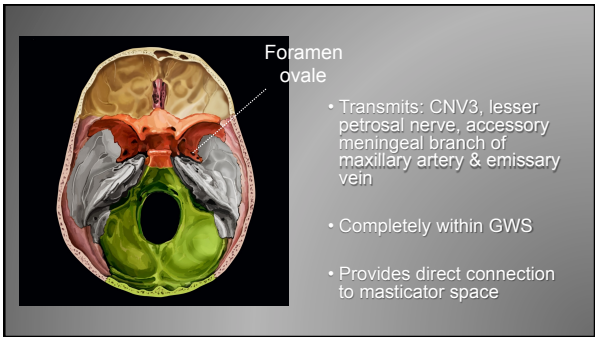

Foramen
rotundum

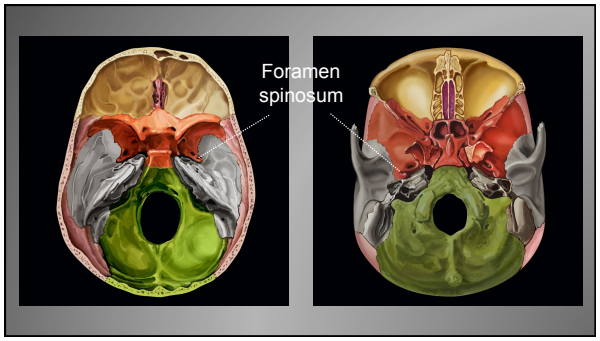

Foramen
rotundum
• Transmits: CNV2, artery of foramen rotundum & emissary veins
• Completely within sphenoid bone; superolateral to vidian canal
• Provides direct connection to pterygopalatine fossa

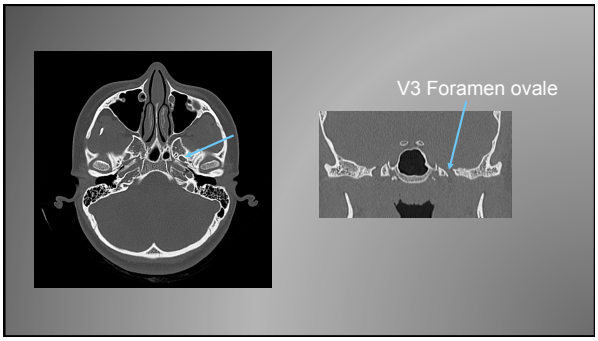

Superior orbital fissure
V2 Foramen rotundum
Inferior orbital fissure V2
Optic canal

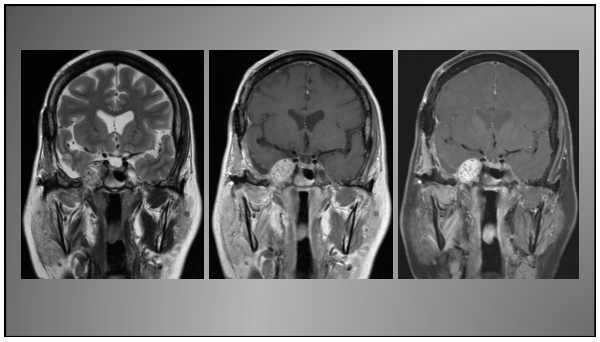

Perineural spread along the left maxillary nerve and vidian nerve from maxillary sinus squamous cell carcinoma

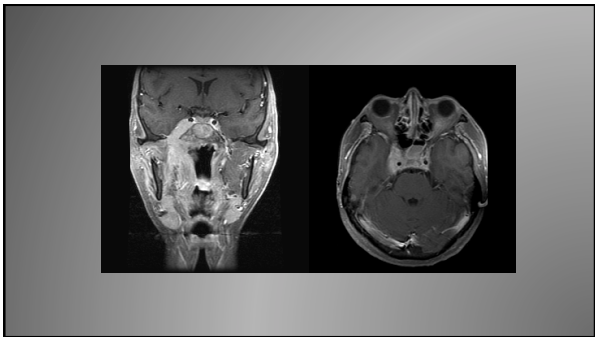

Foramen
ovale

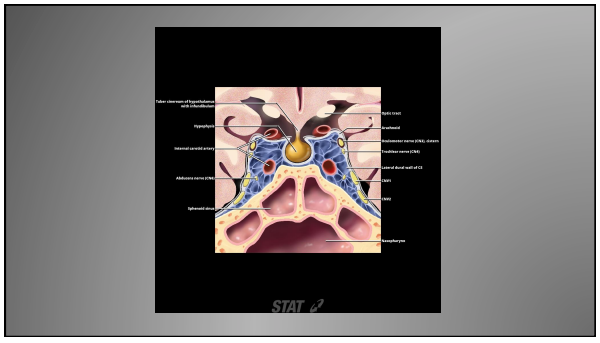

Foramen
ovale
• Transmits: CNV3, lesser petrosal nerve, accessory meningeal branch of maxillary artery & emissary vein
• Completely within GWS
• Provides direct connection to masticator space


Foramen
spinosum


V3 Foramen ovale



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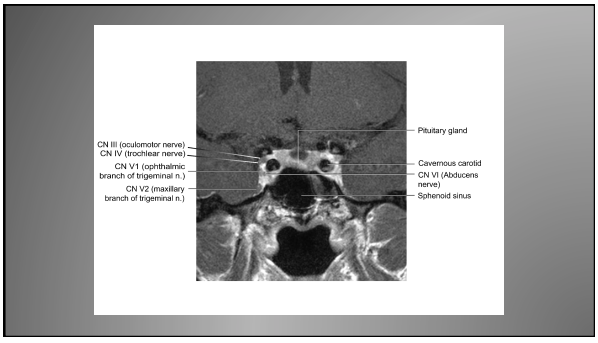
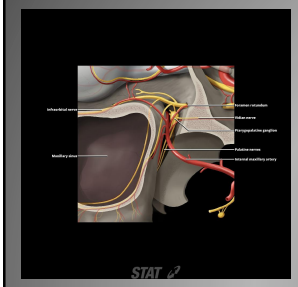
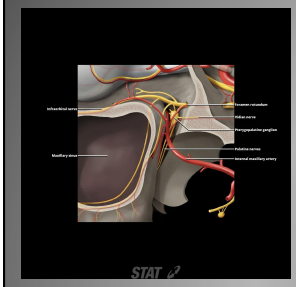

CN III (oculomotor nerve)
CN IV (trochlear nerve)
CN V1 (ophthalmic branch of trigeminal n.)
CN V2 (maxillary branch of trigeminal n.)
Pituitary gland
Cavernous carotid
CN VI (Abducens nerve)
Sphenoid sinus

Pterygopalatine Fossa (PPF)

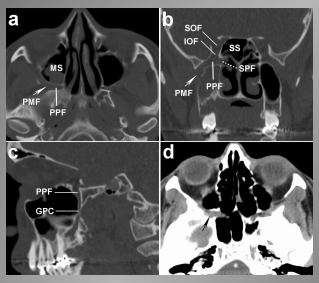


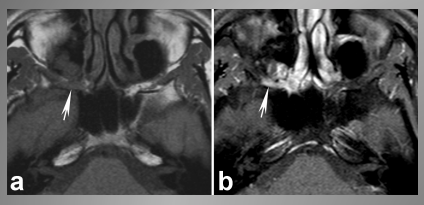
PPF is important anatomic landmark for potential routes of spread of disease throughout deep face



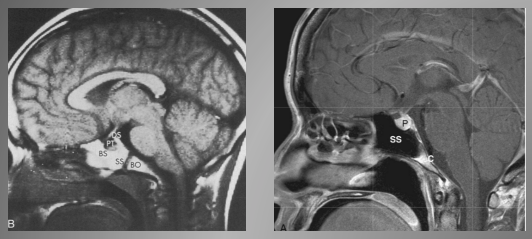
PPF is a 3 dimensional box:

- Anterior wall: Posterior wall of maxillary sinus
- Posterior wall: Pterygoid plates and inferior aspect of LWS
- Roof: IOF
- Floor: Narrowing to palatine canals
- Medial wall: Perpendicular plate of palatine bone with sphenopalatine foramen
- Lateral wall: Narrowing to pterygomaxillary fissure

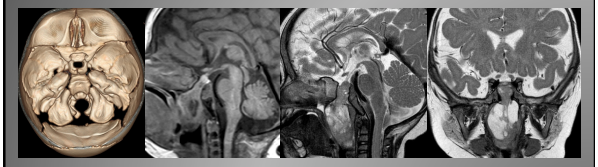




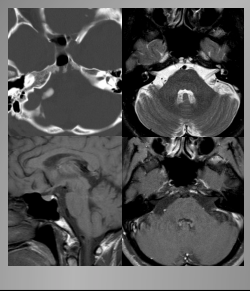
Developmental or Benign Lesions & Anatomic Variants



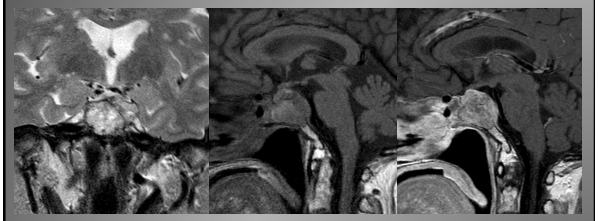
From Curtin & Hagiwara, Embryology, Anatomy, and Imaging of the Central Skull Base. In Som & Curtin, 5th Ed. (2011)

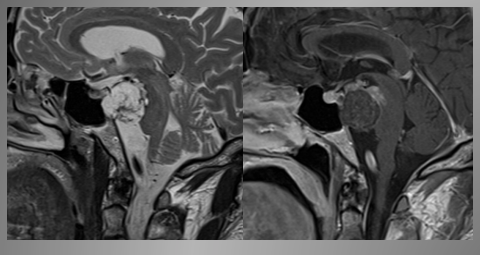


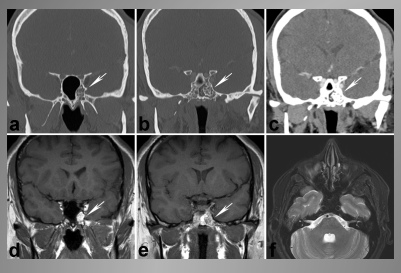
Ecchordosis physaliphora

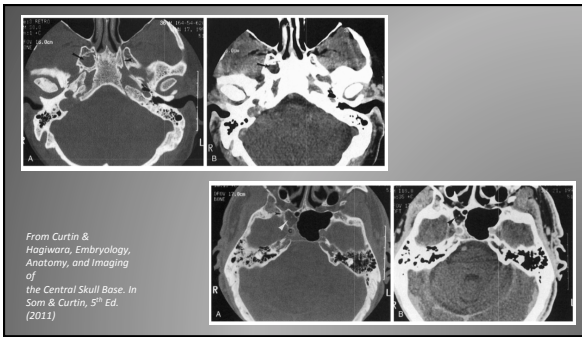


Chordoma









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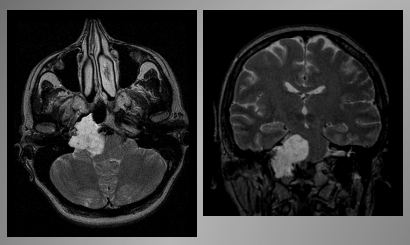
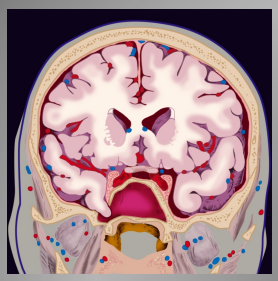
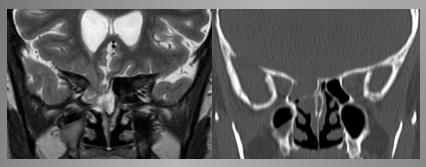
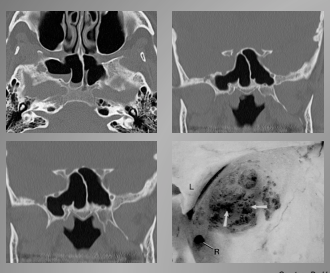
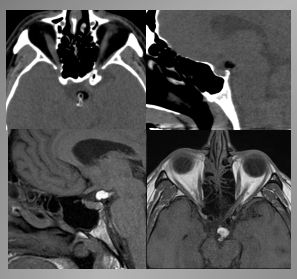


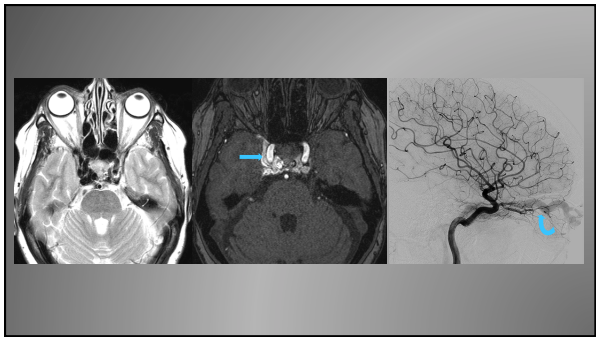




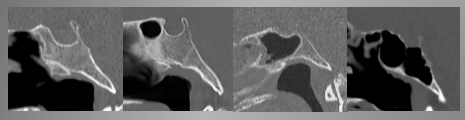


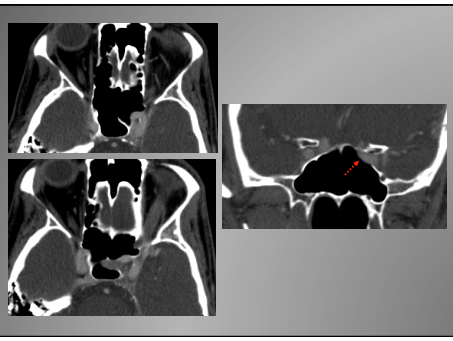
Courtesy Dr. Hugh D. Curtin

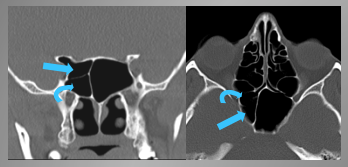


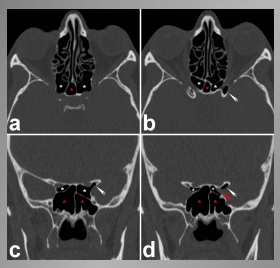


Other Anatomic Variants of Importance









Summary/Conclusion

- CSB anatomy complex with multiple important relations
- Familiarity with key anatomic components and pathways is essential for proper scan interpretation
- Familiarity with developmental lesions & variants important to avoid misdiagnosis and for surgical planning