Revisiting the Ethmoid Roof and Anterior Ethmoidal Arteries - Danger Areas in Functional Endoscopic Sinus Surgery (FESS)

The endoscopic sinus surgery is one of the most common and performed procedures in a rhinosinusitis scenario

Indications

Chronic rhinosinusitis
Mucocele
Choanal atresia
Nasal polyposis
Sellar and parasellar tumors
Optic nerve decompression
Epistaxis and epiphora → low lacrimal tract obstruction
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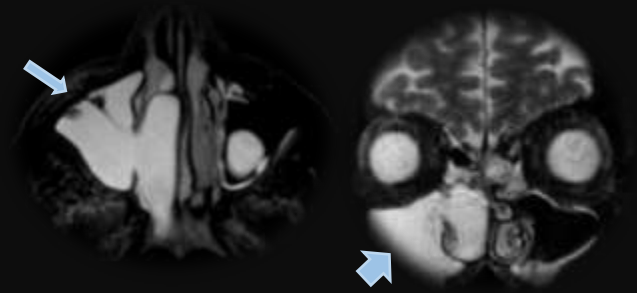
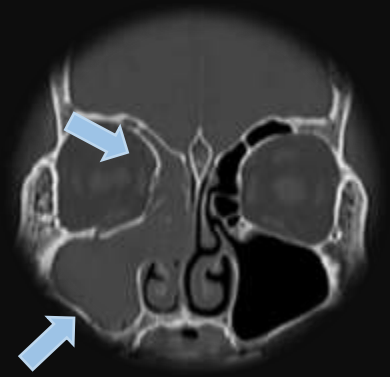
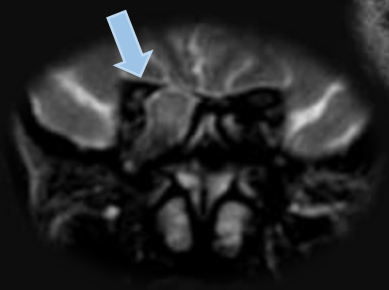


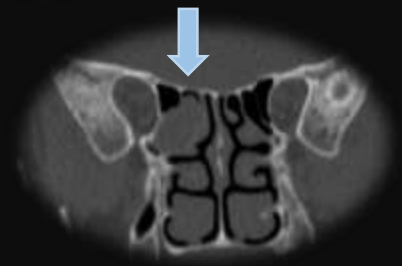
Coronal and axialT2 MRI illustratting a antrochoanal polyp in a 66 years male patient

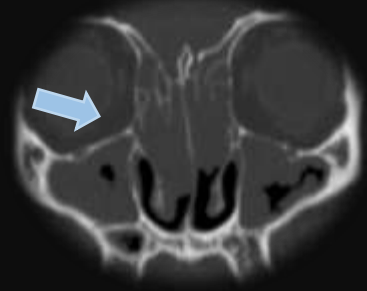


Coronal CT illustratting a fungal sinusitis in a 72 years male patient



Coronal CT and MRI illustratting a mucocele in a 62 years female patient





Coronal CT illustratting a nasal polyposis in a 43 years male patient

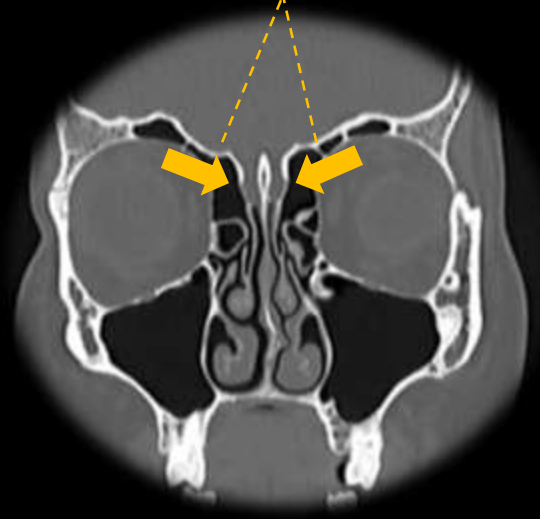
Key points to procedure:

- Anatomy of paranasal sinus, ethmoid roof → CT scan, MRI
- The radiologists must elaborate the report in order to inform the surgeon all of the anatomic repairs, abnormalities and variants, such as the lesions limits and other features

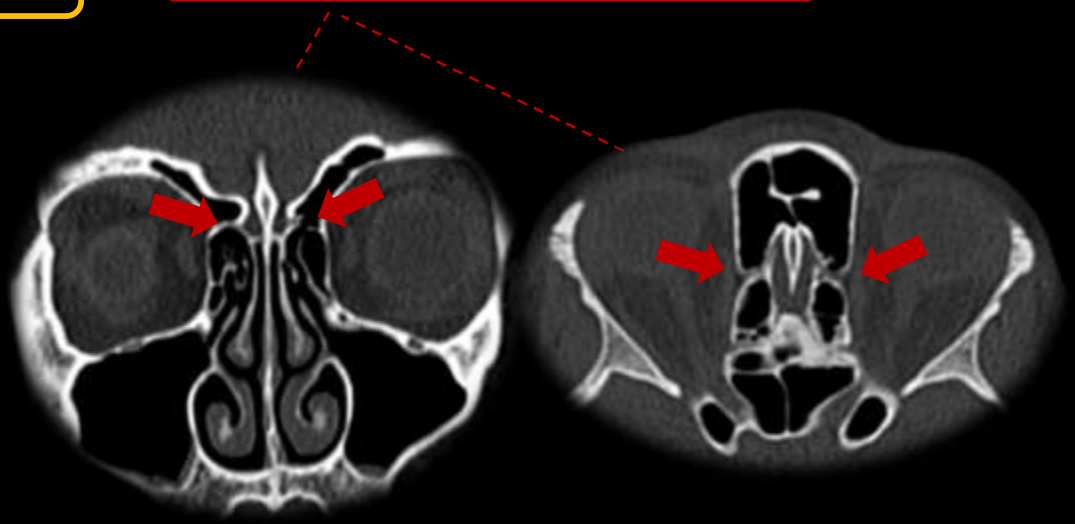
The Role of Image Anatomy

The roof of the ethmoidal labyrinth is composed of the ethmoidal fovea
Medially,
the ethmoidal fovea joins the lateral lamella of the
lamina cribriform
The depth of the olfactory fossa is determined by the height of the lateral lamella of the cribriform plate

ANTERIOR ETHMOIDAL FORAMEN



ANTERIOR ETMOIDAL ARTERY CHANNEL

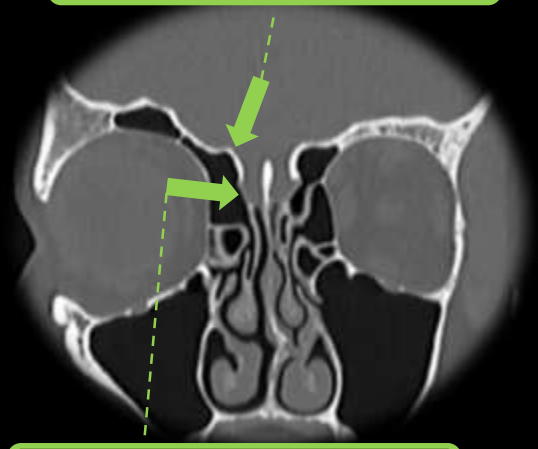


FOVEA ETHMOIDALIS

LATERAL LAMELLA

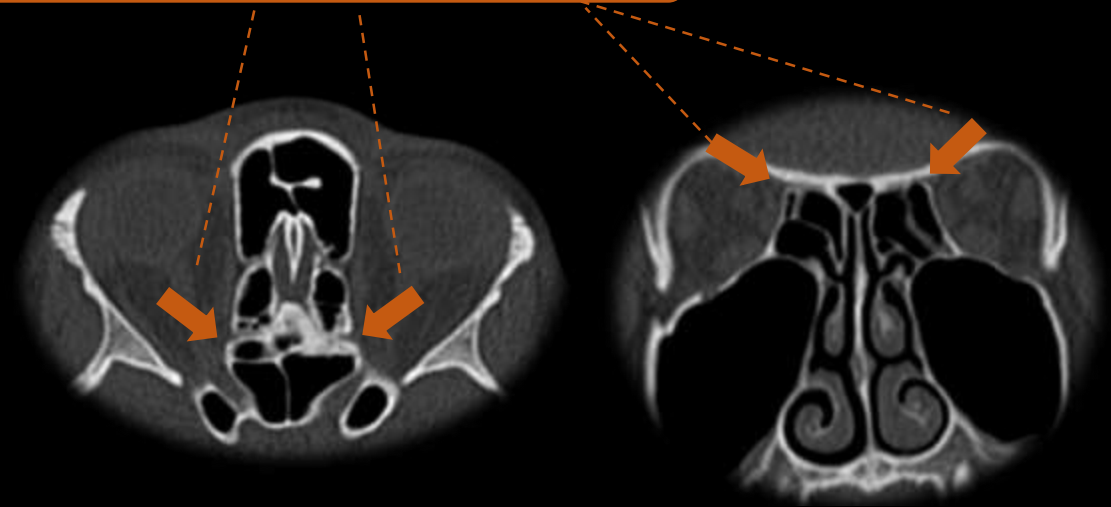
ANTERIOR ETHMOIDAL SULCI

FOVEA ETHMOIDALIS



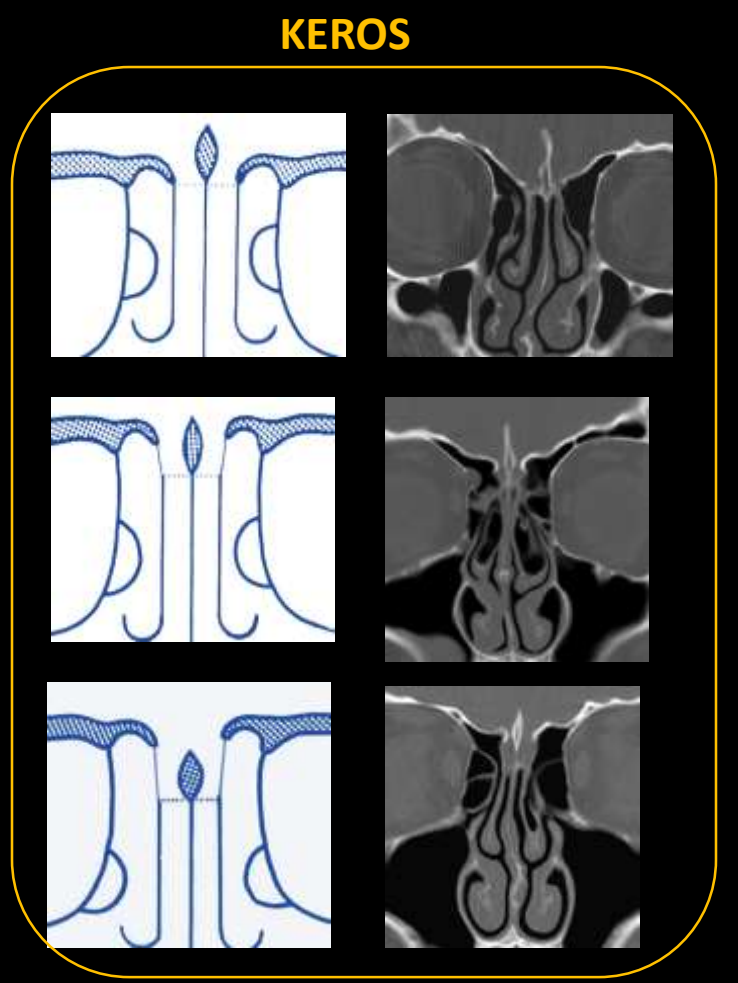
LATERAL LAMELA

POSTERIOR ETMOIDAL ARTERY CHANNEL



Key Points

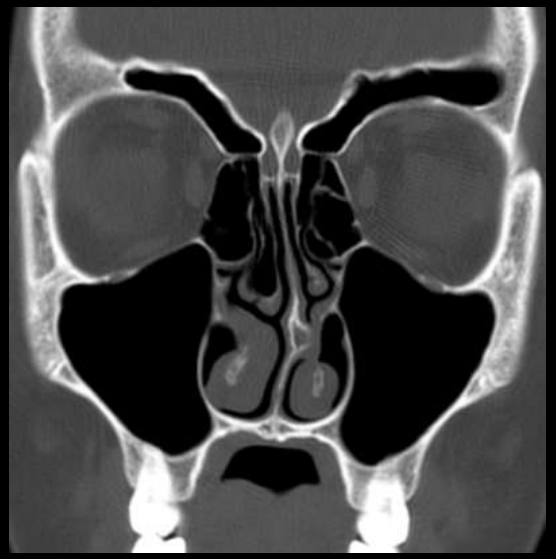
- ✓Measure the depth of the olfactory fossa → Keros Classification
- ✓Check the symmetry in relation to the height and lateral inclination of the lateral lamella of the cribriform plate
- ✓Identify the anatomical repairs → the course of AEA in the medial wall of the orbit and in the lateral wall of the olfactory fossa
- ✓Check the correlation between supraorbital pneumatization and the path of the anterior ethmoidal artery canal

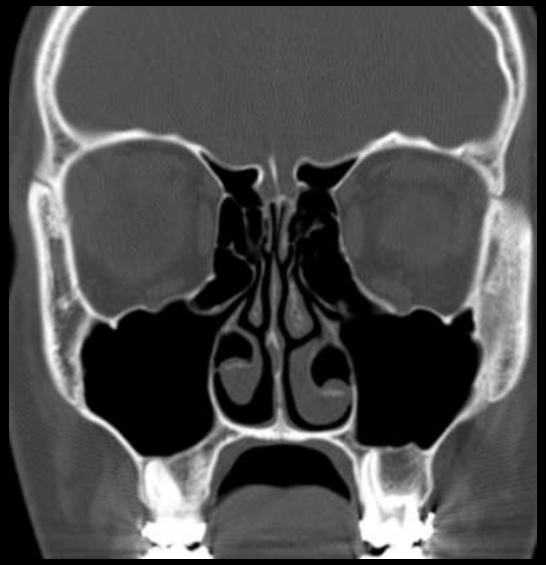


Key Points

Anatomic Repairs

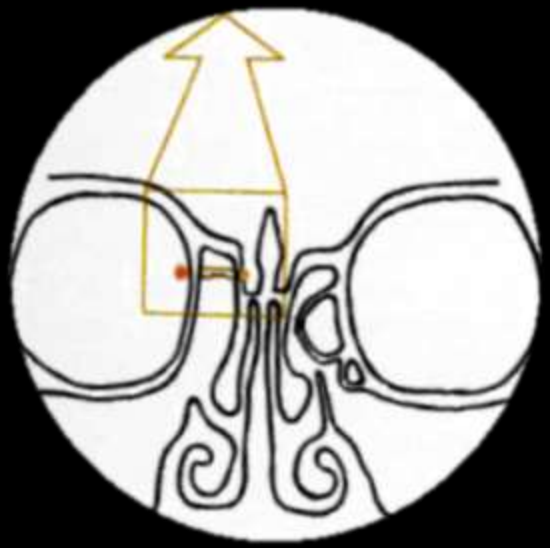
Supraorbital Pneumatization

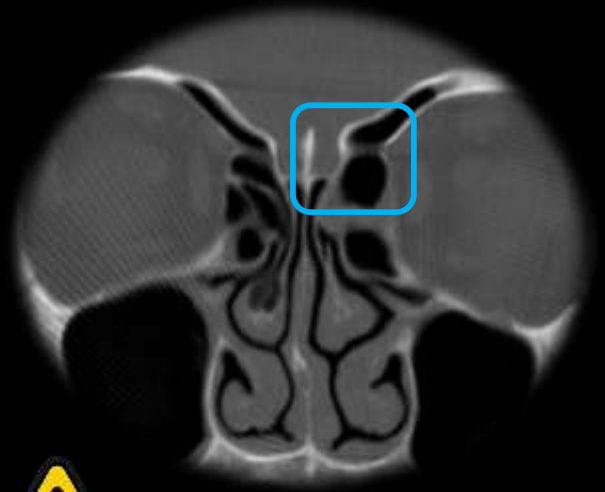




Morphology of the roof of the ethmoid sinus and depth of the olfactory fossa

Anterior Ethmoidal Artery (AEA) and Lateral Lamella (LL) – Critical Spots





- ✓ Lateral lamella
- ✓ Cribriform plate
- ✓ AEA path
- ✓ Firm fixation of dura mater to thin bony walls

Arterial injury during the endoscopic surgery

One of the most common postoperative complications is the injury to the AEA→ bleeding → ↑ Intra-orbital pressure→ ↑ risk of optic nerve damage

AEA injuries can result in massive hemorrhage or rhinorrhea secondary to CSF leak→ it is crucial the knowledge of the exact location and course of the AEA → to avoid intracranial and orbital complications