

ARTICLE REVIEW

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SFH**

The International Frontal Sinus Anatomy Classification (IFAC) and Classification of the Extent of Endoscopic Frontal Sinus Surgery (EFSS)

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FRONTAL SINUS

- The frontal sinus is often cited as the most challenging area to approach in endoscopic sinus surgery (ESS).
- This space is usually occupied by a number of cells that affect the direction and position of this drainage pathway.

FRONTAL RECESS

- The **medial wall** formed by the **lateral lamella** of the cribriform plate and the **vertical lamella** of the middle turbinate

The **lateral wall** is formed by the **lamina papyracea** and **lacrimal bone**.

- The **anterior ethmoidal artery** may be situated in the posterior region of the roof of the frontal recess.

EPOS

- The EPOS classification gives the surgeon a general idea as to where a cell is **positioned** but it **does not** give enough details of cell **relationships** in this region.

Frontoethmoidal cells [10.3]: much debate took place regarding the classification of these cells ^(45,46). Our suggestion is to classify them as anterior (Figure 26) or posterior (Figure 27), and medial (Figure 28) or lateral, with respect to the frontal recess/inner walls of the frontal sinus. An intersinus septal cell is therefore a medial frontoethmoidal cell. This classification replaces the term 'bullae frontalis' ^(28,47).

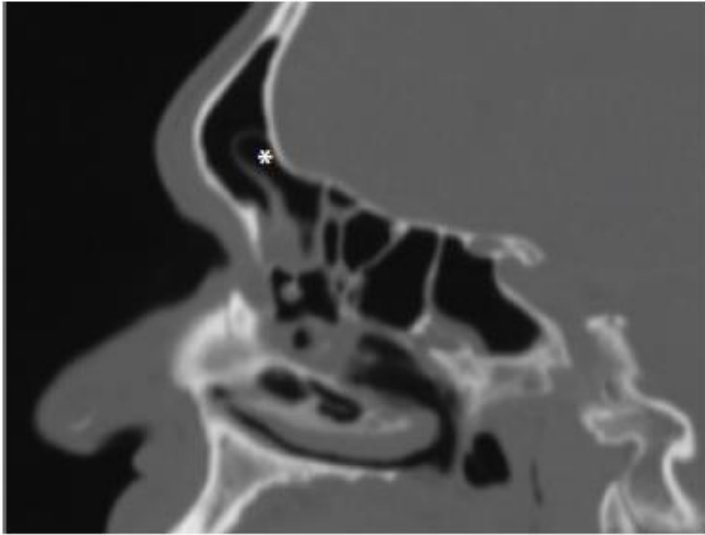


Figure 27. Posterior frontoethmoidal cell (*).



Figure 26. Anterior frontoethmoidal cell (*).

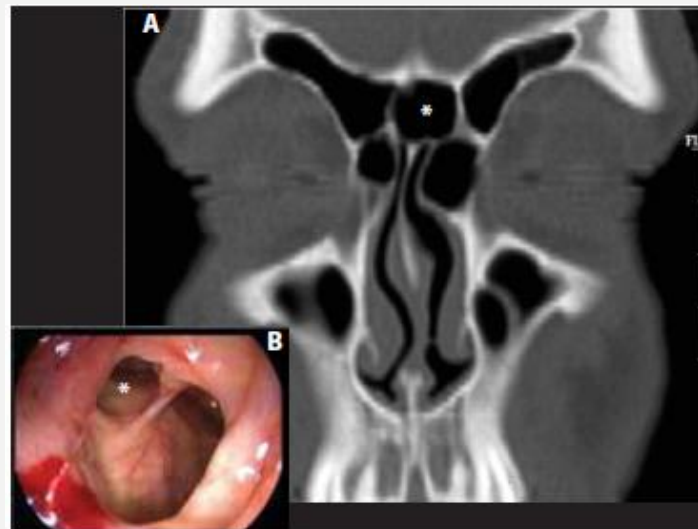
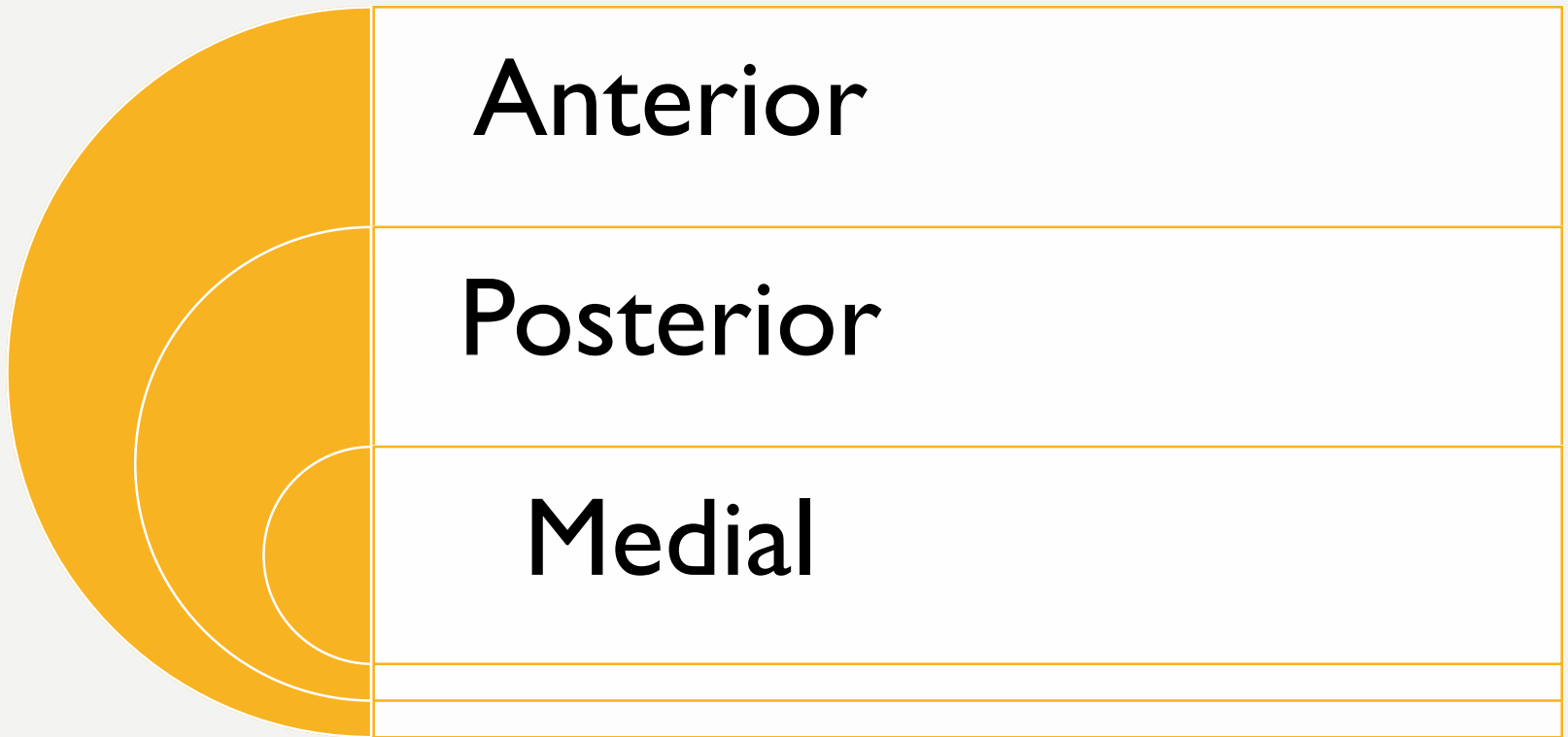


Figure 28. A) and B) Medial frontoethmoidal cell (*). (Postoperative view in B).

- In the view of the authors of this work, a **more precise** naming based on the **position** of the cells allows a more complete picture of the anatomy to be established.
- In addition it allows **easier communication** between surgeons and **more accurate teaching** of the necessary surgical steps in frontal sinus ESS.

CELL TYPES



ANTERIOR CELLS

Agger nasi cell

Supra agger cell

Supra agger frontal cell

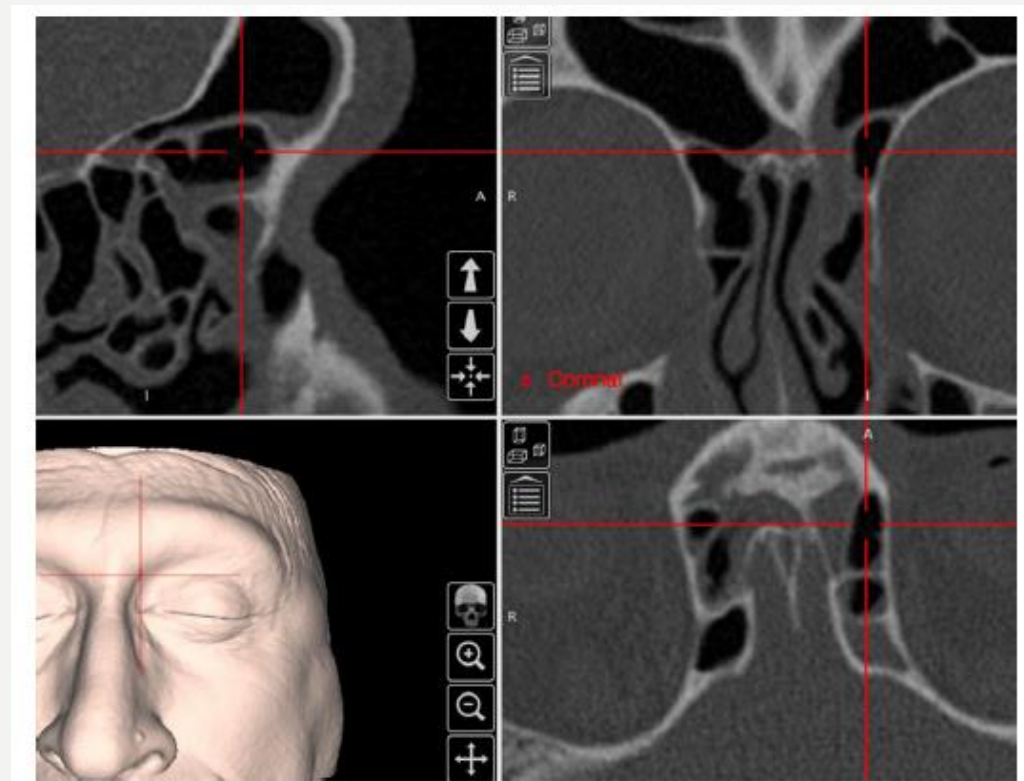
- **Agger nasi cell :**
- Cell that sits either anterior to the origin of the middle turbinate or sits directly above the most anterior insertion of the middle turbinate into the lateral nasal wall.



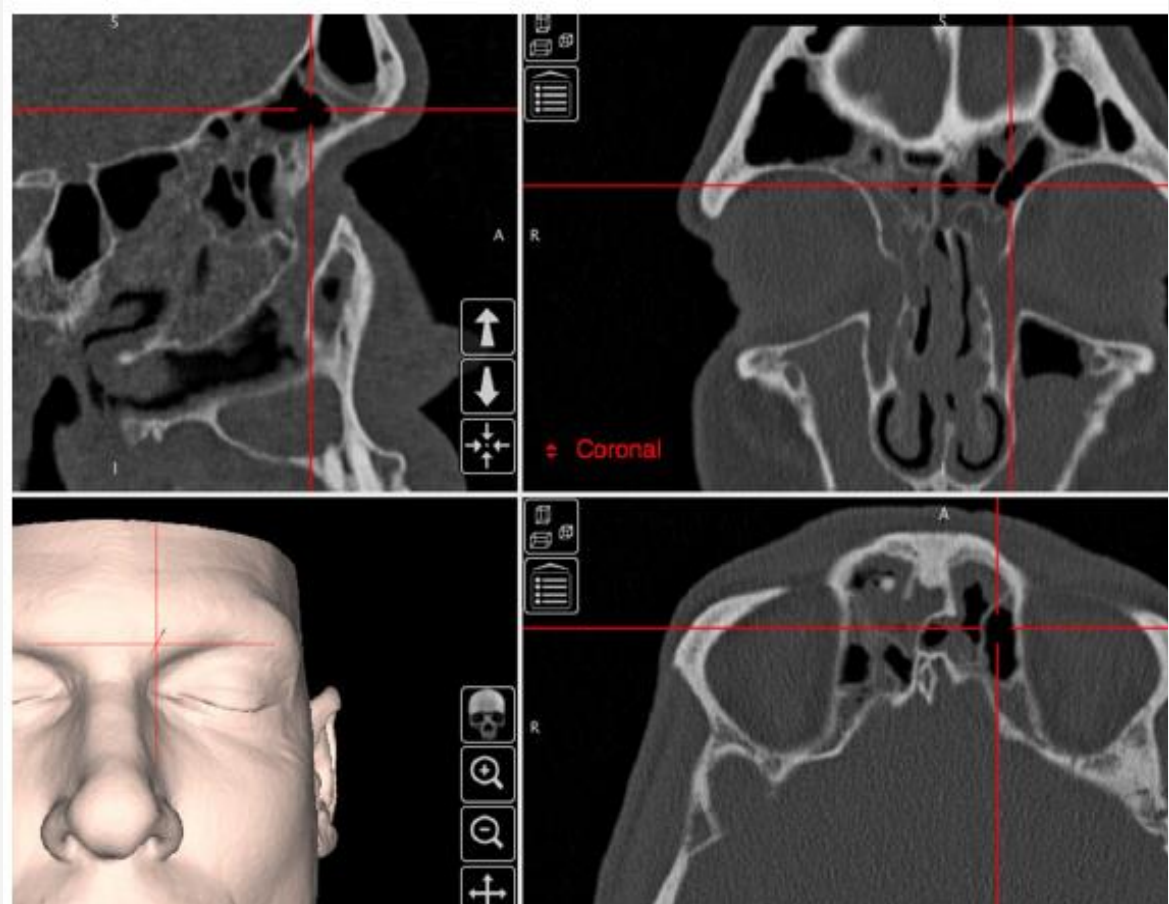
- **Supra agger cell:**
- Anterior-lateral ethmoidal cell, located **above** the agger nasi cell (not pneumatizing into the frontal sinus).
- It is usually laterally based.
- **Single** cell or consist of a **number of cells** sitting above the ANC
- affect the frontal drainage pathway depending as to whether it is situated medially or laterally.



- **Supra agger frontal cell :**
- AnterAnterior-lateral ethmoidal cell that extends into the frontal sinus. A **small** SAFC will **only extend into the floor** of the frontal sinus **large** SAFC may **extend significantly into** the frontal sinus and may even reach the roof of the frontal sinus.



- **Supra agger frontal cell :**
- Sinus **large** SAFC may **extend significantly into** the frontal sinus and may even reach the roof of the frontal sinus.



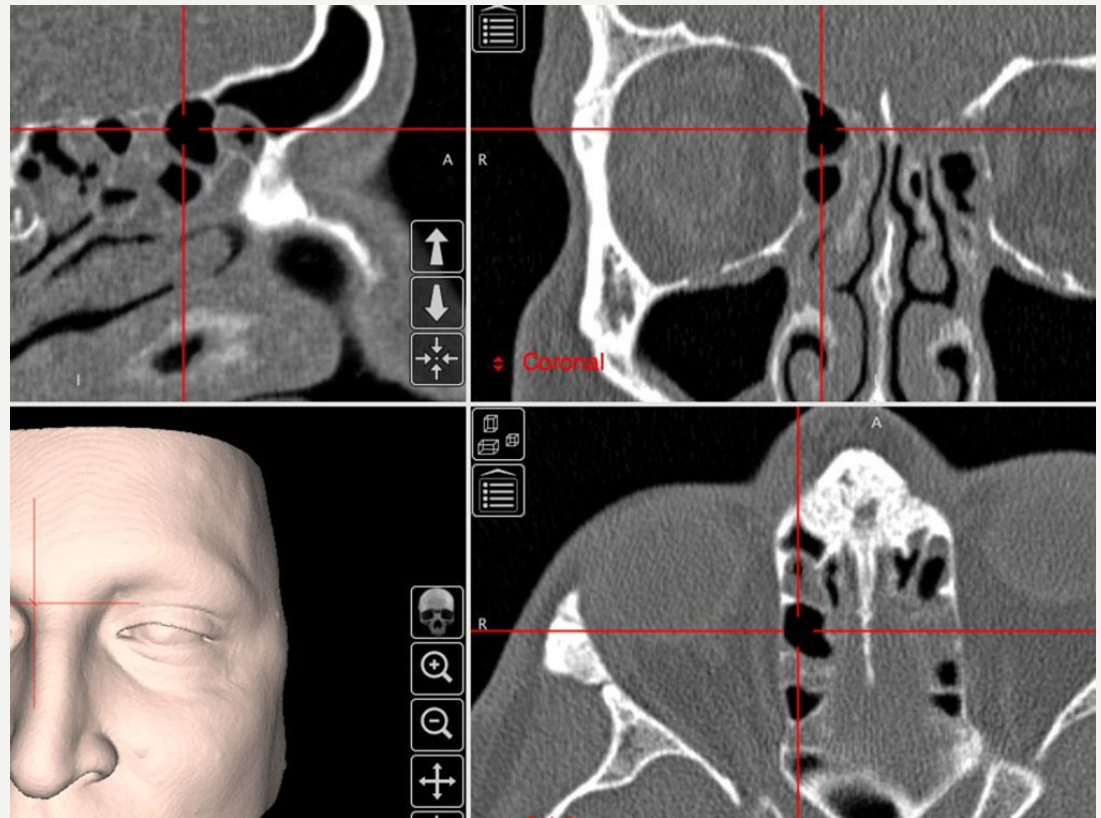
POSTERIOR CELLS

Supra bulla cell

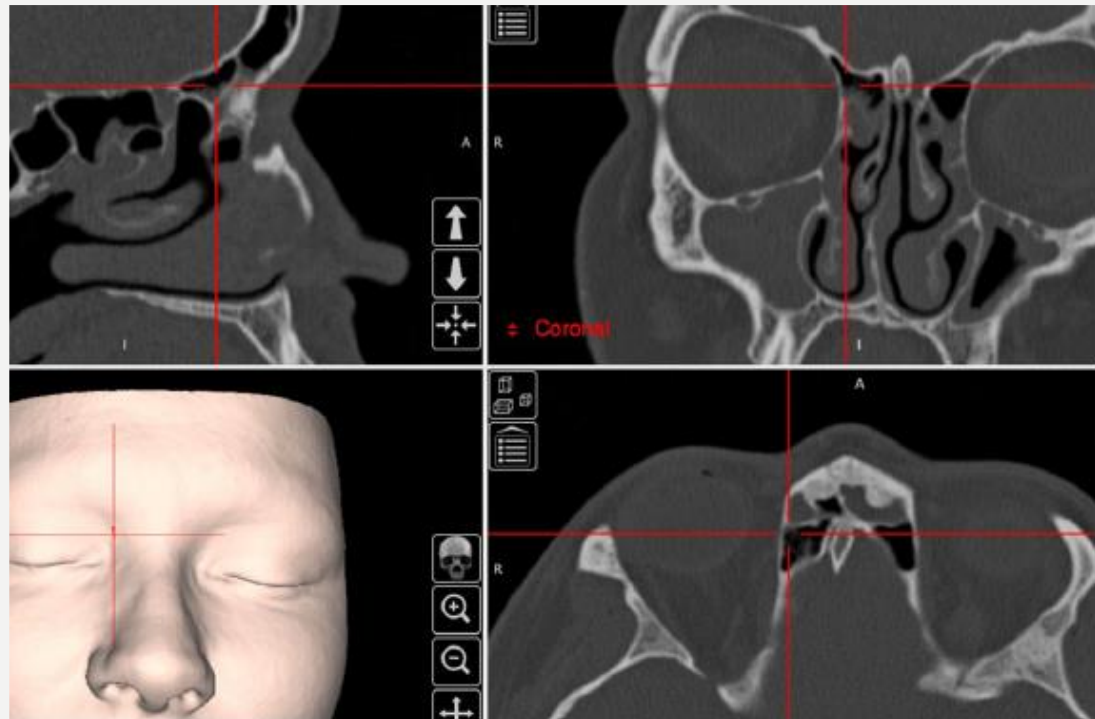
Supra bulla frontal cell

Supraorbital ethmoid cell

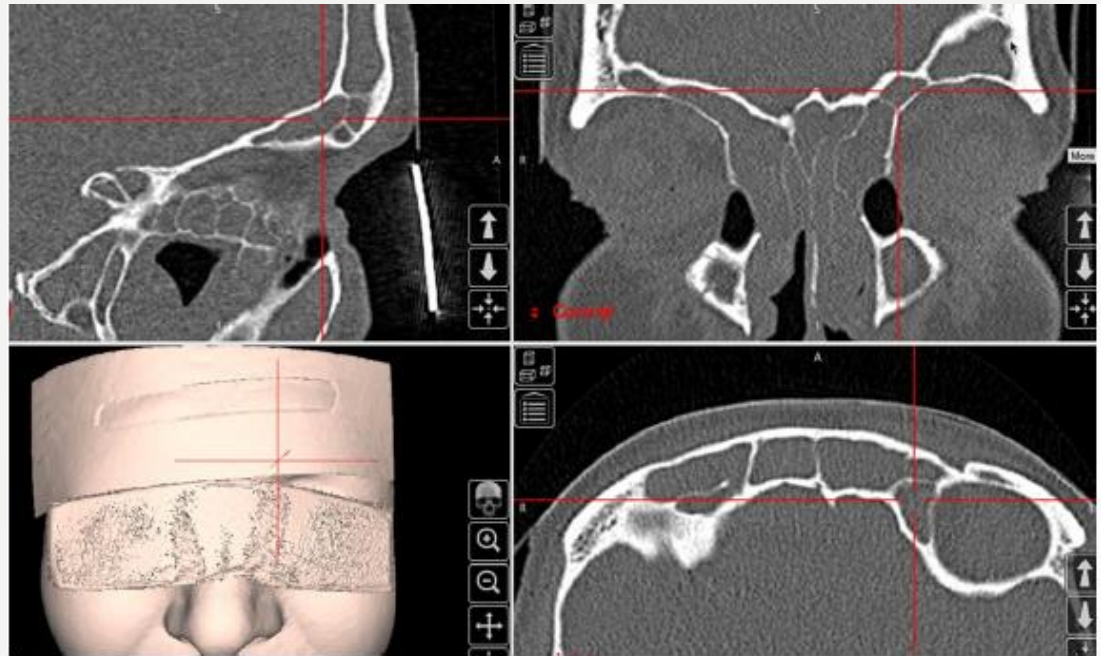
- **Supra bulla cell :**
- Cell above the bulla ethmoidalis that does not enter the frontal sinus.



- **Supra bulla frontal cell :**
- Cell that originates in the supra-bulla region and pneumatizes along the skull base into the posterior region of the frontal sinus.
- The skull base forms the posterior wall of the cell.



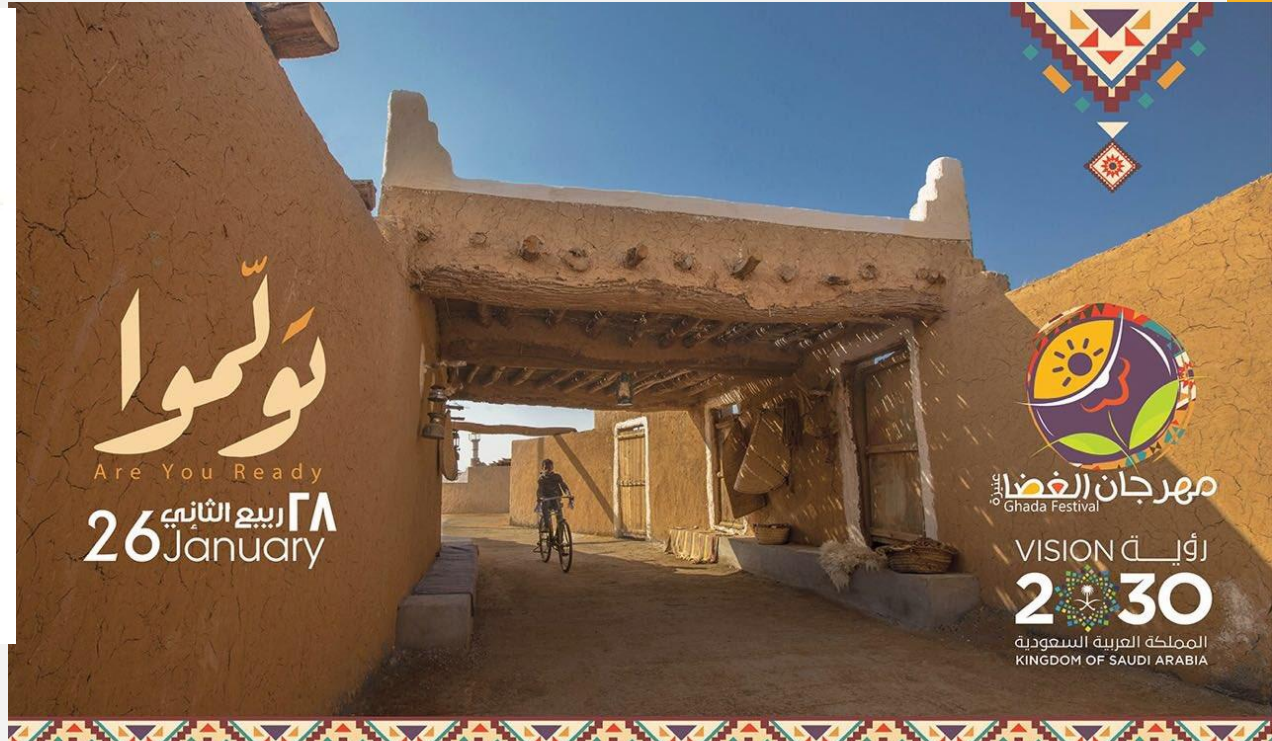
- **Supraorbital ethmoid cell :**
- An anterior ethmoid cell that pneumatizes around, anterior to, or posterior to the **anterior ethmoidal artery** over the roof of the orbit.
- It often forms part of the posterior wall of an extensively pneumatized frontal sinus and may only be separated from the frontal sinus by a bony septation.



MEDIAL CELLS

Frontal septal cell

Cell type	Cell name	Definition	Abbreviation
Anterior cells (push the drainage pathway of the frontal sinus medial, posterior or posteromedially)	Agger nasi cell	Cell that sits either anterior to the origin of the middle turbinate or sits directly above the most anterior insertion of the middle turbinate into the lateral nasal wall.	ANC
	Supra agger cell	Anterior-lateral ethmoidal cell, located above the agger nasi cell (not pneumatizing into the frontal sinus).	SAC
	Supra agger frontal cell	Anterior-lateral ethmoidal cell that extends into the frontal sinus. A small SAFC will only extend into the floor of the frontal sinus, whereas a large SAFC may extend significantly into the frontal sinus and may even reach the roof of the frontal sinus.	SAFC
Posterior cells (push the drainage pathway anteriorly)	Supra bulla cell	Cell above the bulla ethmoidalis that does not enter the frontal sinus.	SBC
	Supra bulla frontal cell	Cell that originates in the supra-bulla region and pneumatizes along the skull base into the posterior region of the frontal sinus. The skull base forms the posterior wall of the cell.	SBFC
	Supraorbital ethmoid cell	An anterior ethmoid cell that pneumatizes around, anterior to, or posterior to the anterior ethmoidal artery over the roof of the orbit. It often forms part of the posterior wall of an extensively pneumatized frontal sinus and may only be separated from the frontal sinus by a bony septation.	SOEC
Medial cells (push the drainage pathway laterally)	Frontal septal cell	Medially based cell of the anterior ethmoid or the inferior frontal sinus, attached to or located in the interfrontal sinus septum, associated with the medial aspect of the frontal sinus outflow tract, pushing the drainage pathway laterally and frequently posteriorly.	FSC



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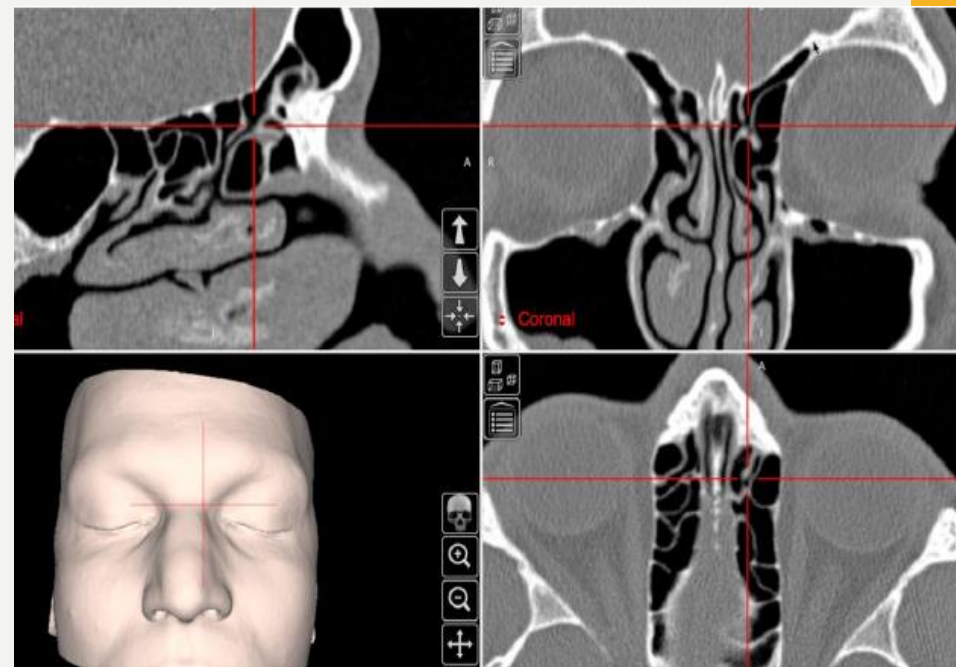
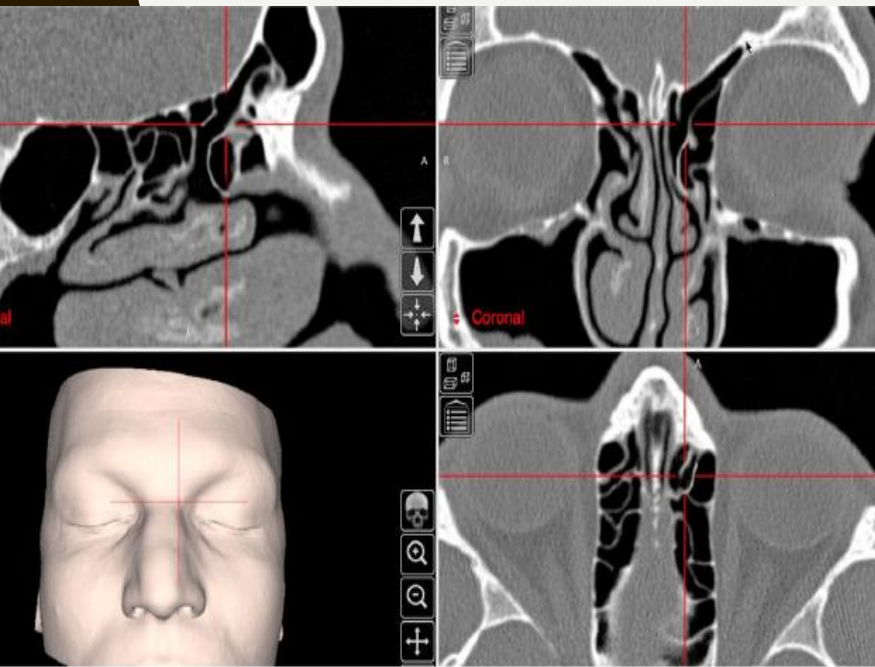




INTERNATIONAL CLASSIFICATION OF THE EXTENT OF EFSS

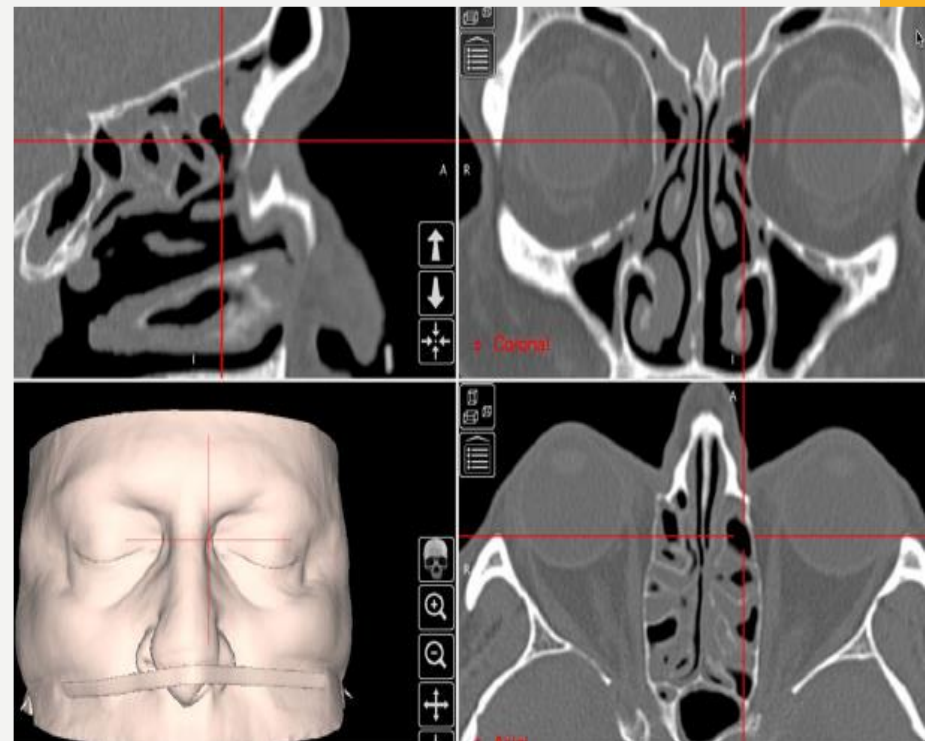
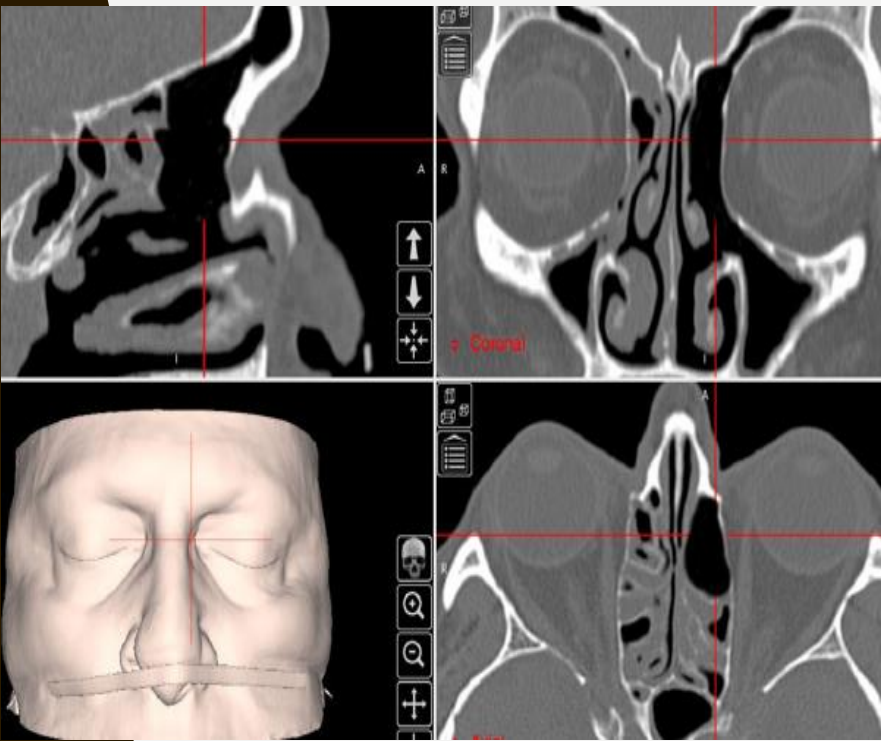
GRADE 0

- Balloon sinus dilation (no tissue removal)



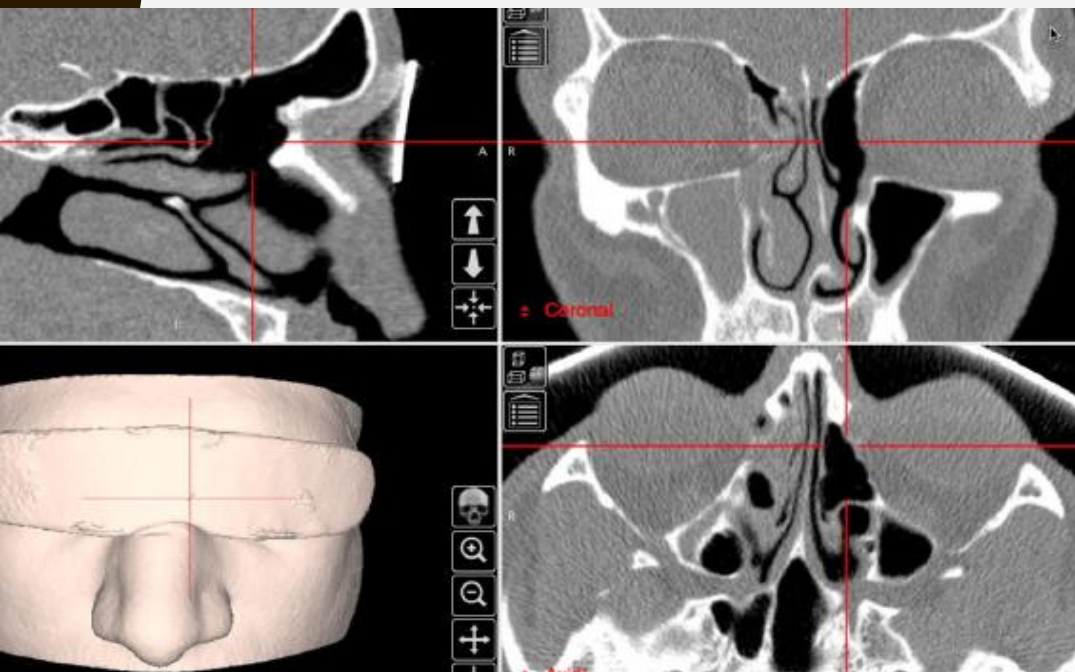
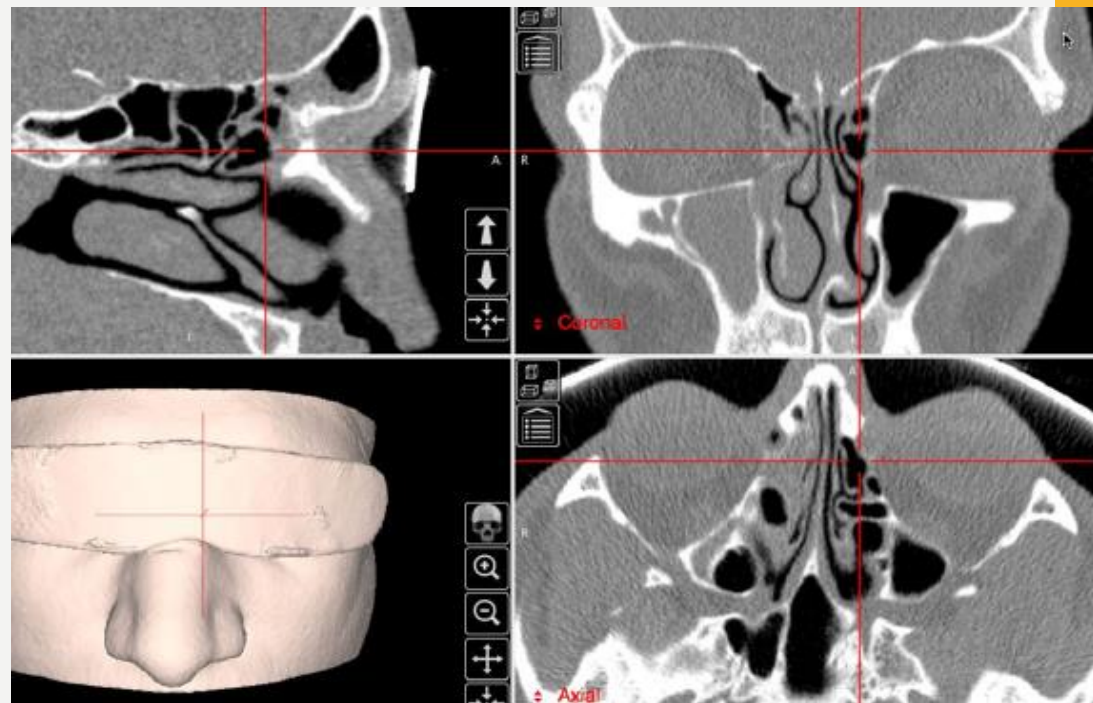
GRADE 1

- Clearance of cells in the frontal recess (that do not directly obstruct the frontal sinus ostium) without any surgery within the frontal ostium. These are SACs and SBCs that do not encroaching on or obstruct the frontal ostium



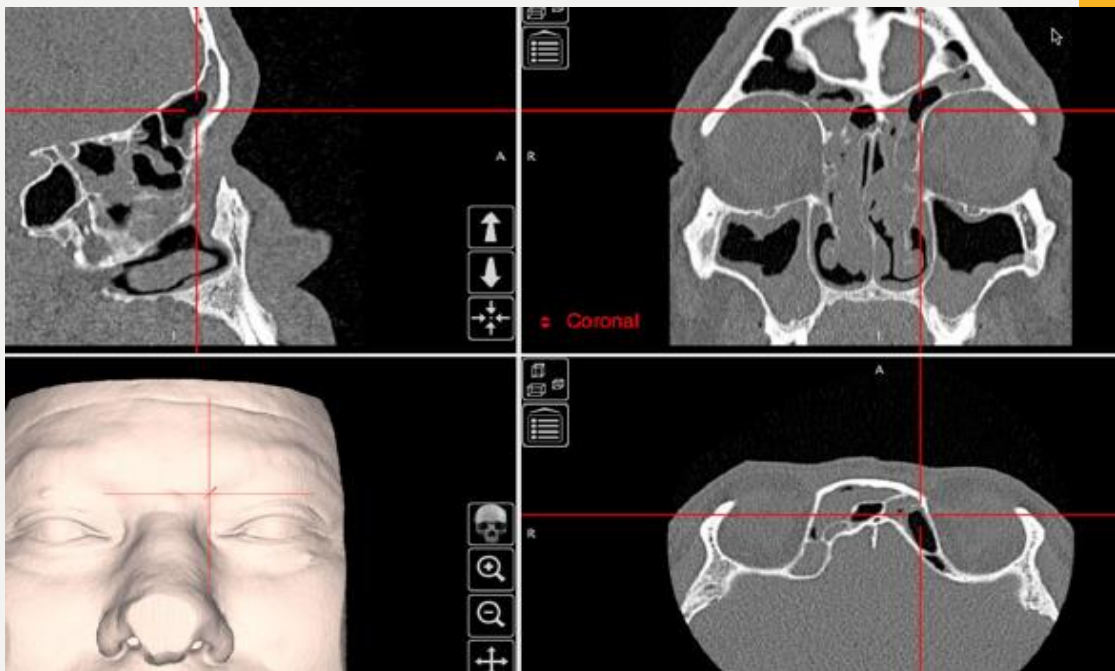
GRADE 2

- Clearance of cell/s **directly** obstructing the frontal sinus ostium. These are **SACs** or **SBCs** that encroach on and obstruct the frontal sinus drainage.
- Typically, these cells occupy the space directly below the frontal sinus ostium and narrow the drainage pathway of the frontal sinus. This **does not** include patients with **SAFCs, SBFCs, or FSCs**.



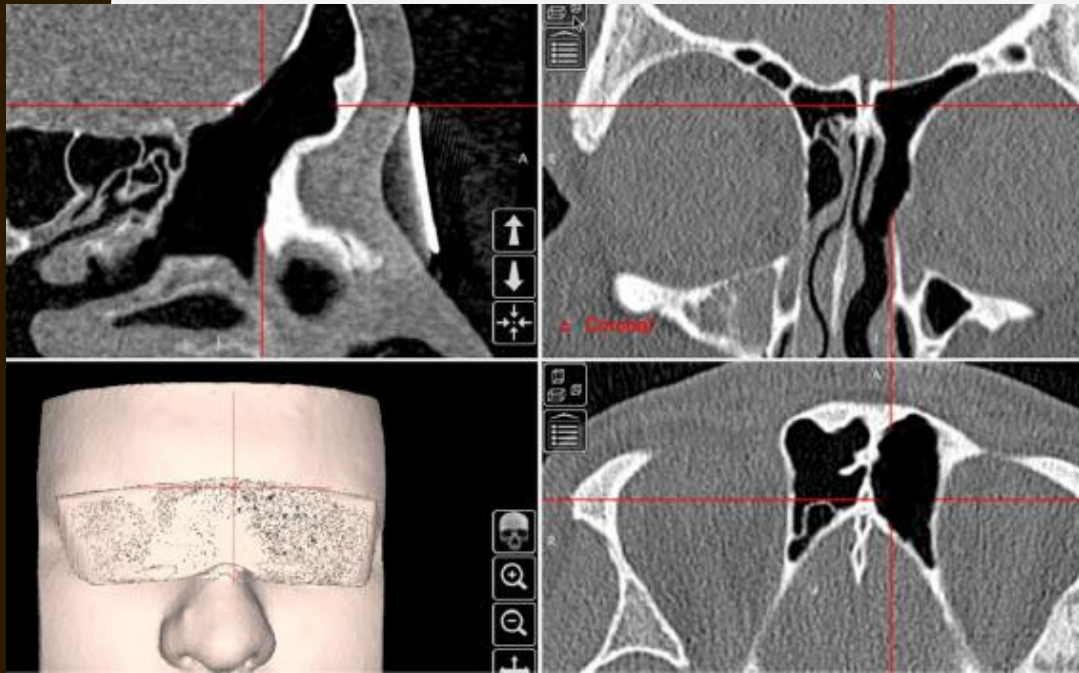
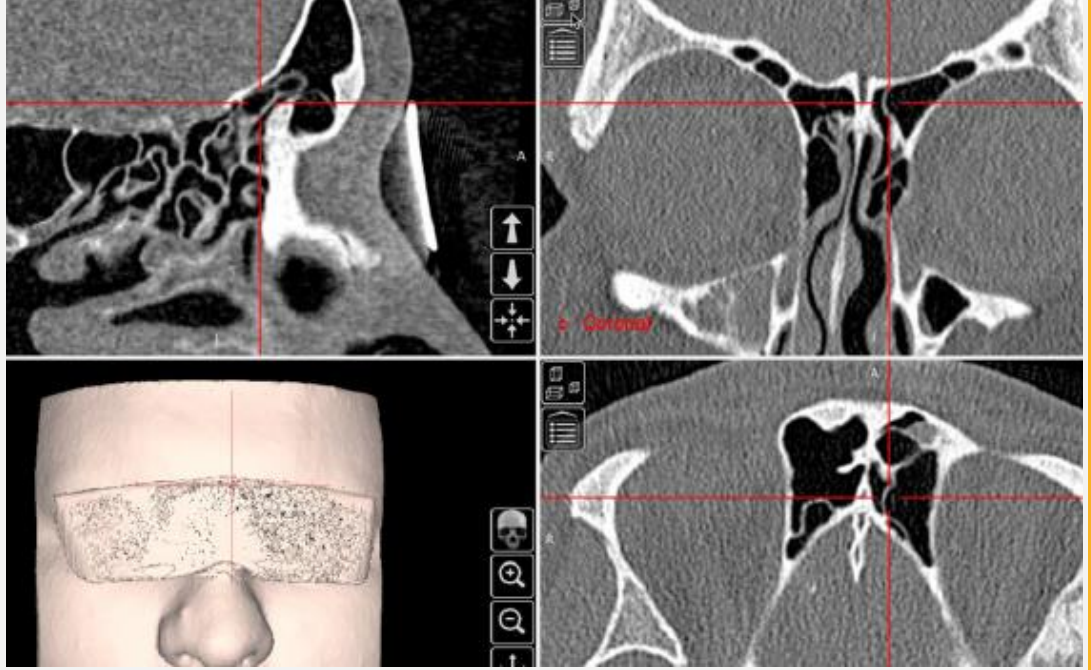
GRADE 3

- Clearance of cell pneumatizing **through** the frontal ostium into the frontal sinus **without enlargement** of the frontal ostium.
- These are typically **SAFCs, SBFCs, and FSCs**



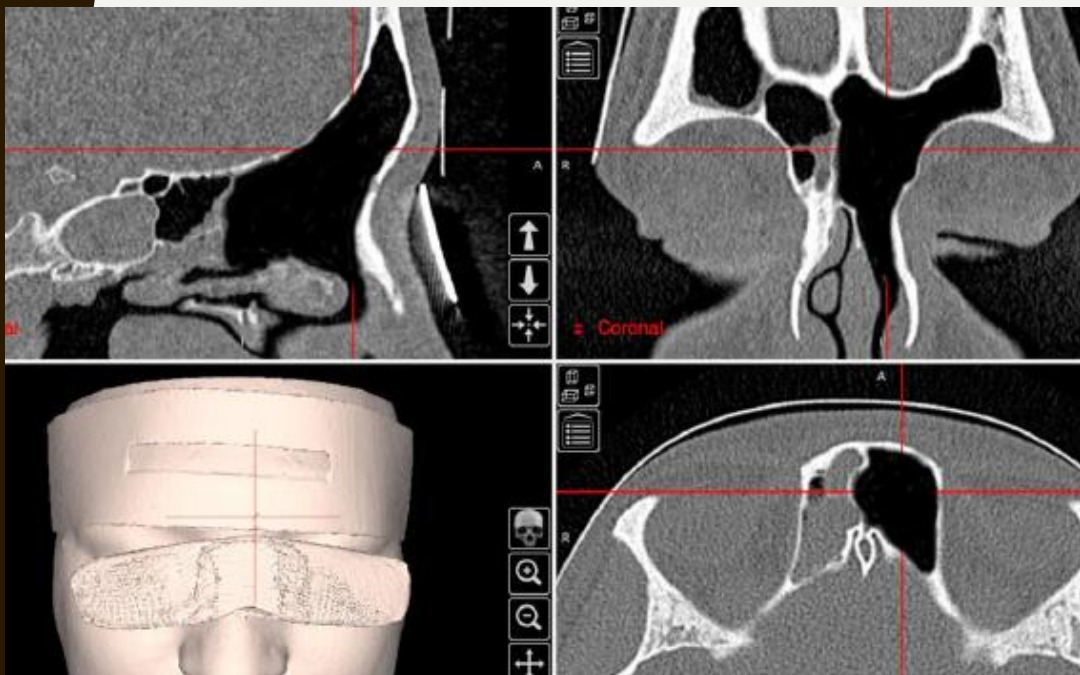
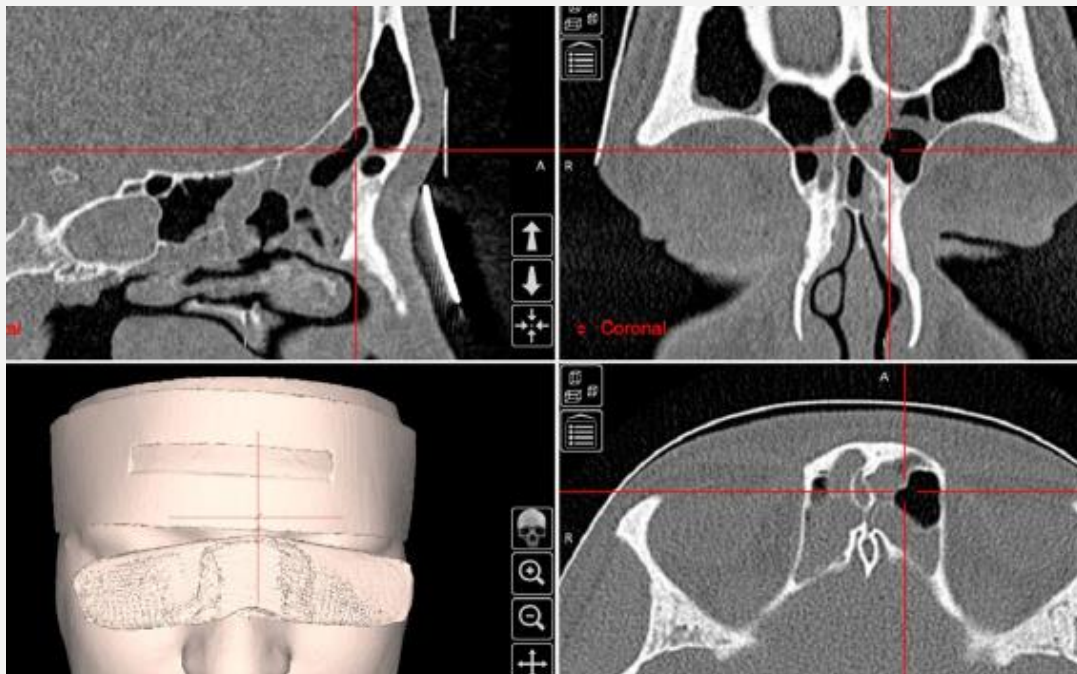
GRADE 4

- Clearance of a cell pneumatizing **through** the frontal ostium into the frontal sinus **with enlargement** of the frontal ostium.
- These are typically **large SAFCs, large SBFCs, or FSCs** with a narrow frontal ostium (narrow anteroposterior [AP] diameter)



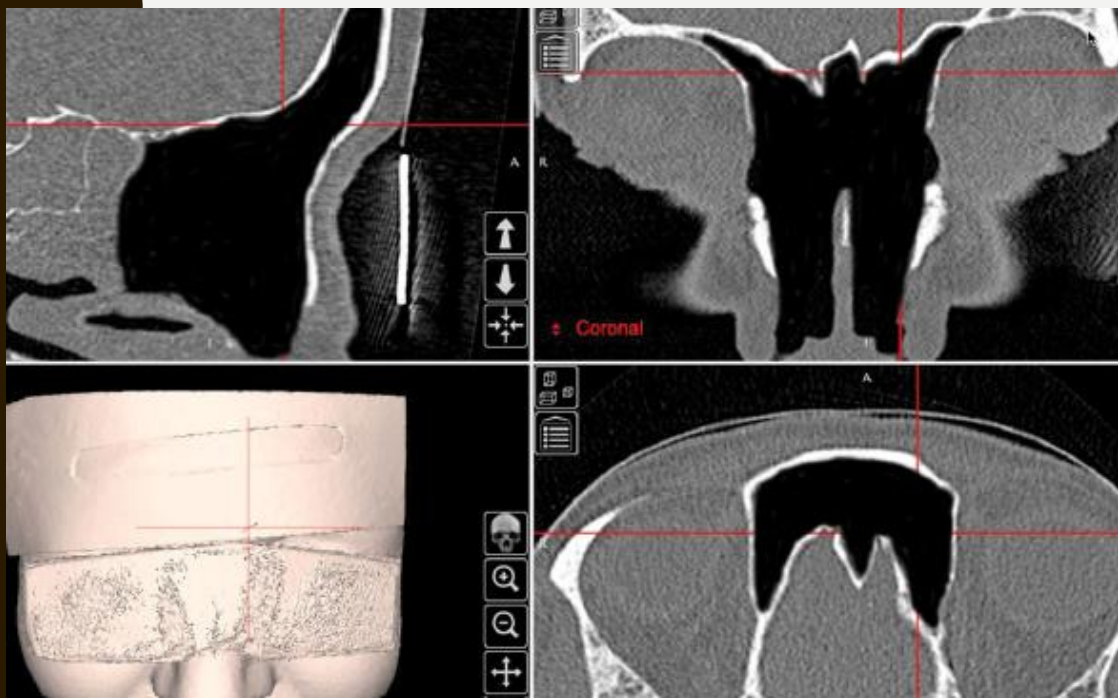
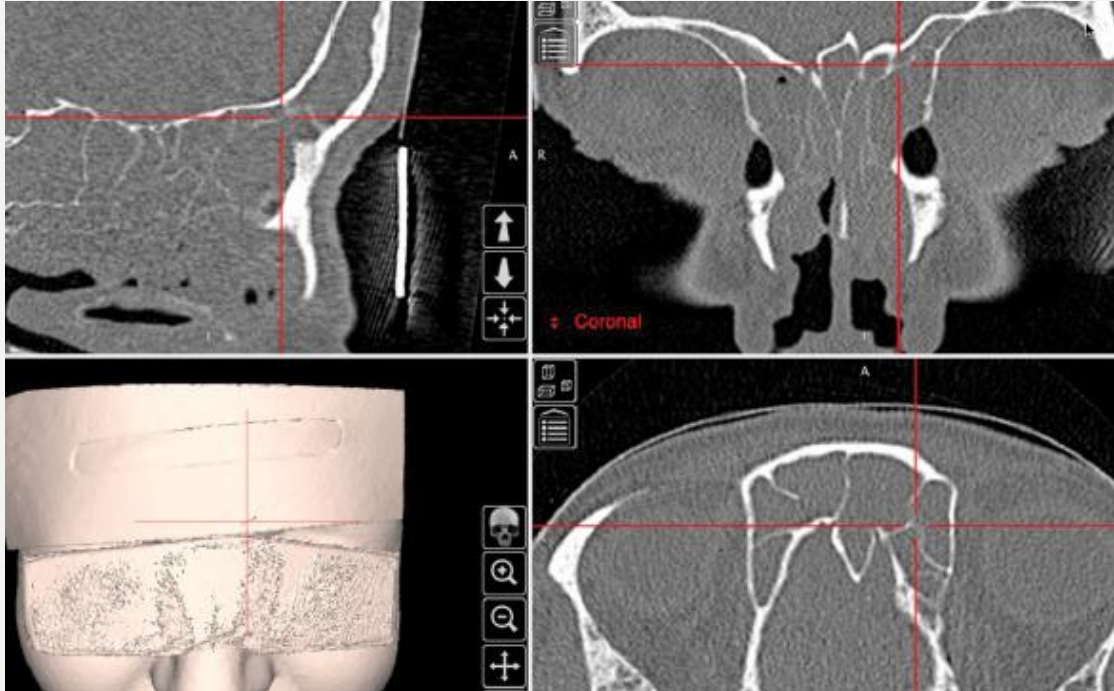
GRADE 5

- Enlargement of the frontal ostium from the **lamina papyracea** to the **nasal septum** (unilateral frontal drillout with removal of the floor of the frontal sinus).
- These are typically **large SAFCs, large SBFCs or FSC** with a narrow frontal ostium (narrow AP diameter) where the surgeon deems that the AP diameter is compromised to the extent that maximum unilateral AP neo-ostium is required.



GRADE 6

- Removal of the **entire floor of the frontal sinus** with joining of the left and right ostia into a **common ostium** with septal window–frontal drillout/modified Lothrop or Draf 3.
- This surgery is most often performed :
- after **failure** of previous standard sinus surgery where the frontal ostium is stenosed with **scar tissue or new bone formation**
- **large SAFCs, large SBFCs, or FSCs** with a narrow frontal ostium (narrow AP diameter).



THANK YOU