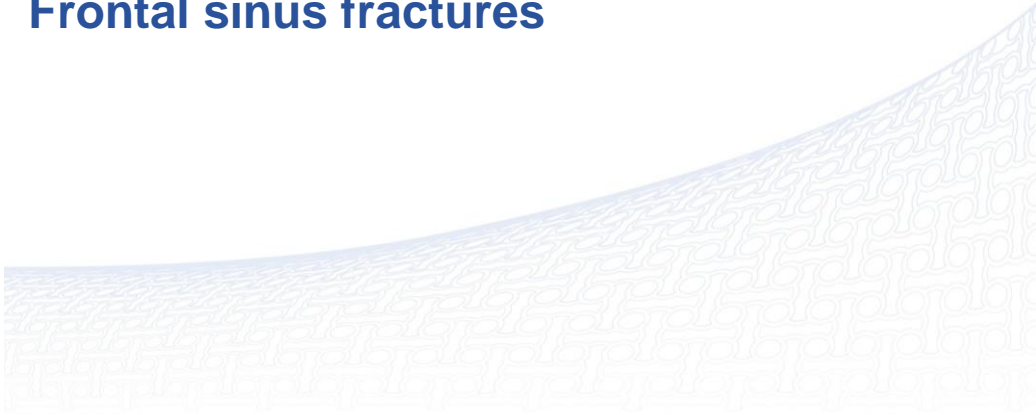


## Frontal sinus fractures



Version 2 (December 12, 2018)

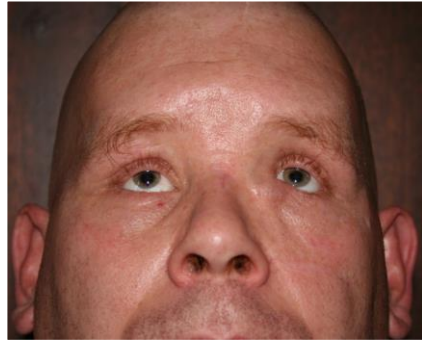
Faculty can add a clinical or imaging picture of a FS fracture

## Learning objectives

- Recognize signs and symptoms of frontal sinus fractures
- Select appropriate imaging modalities and interpret the findings
- Formulate principles of management

## Clinical findings

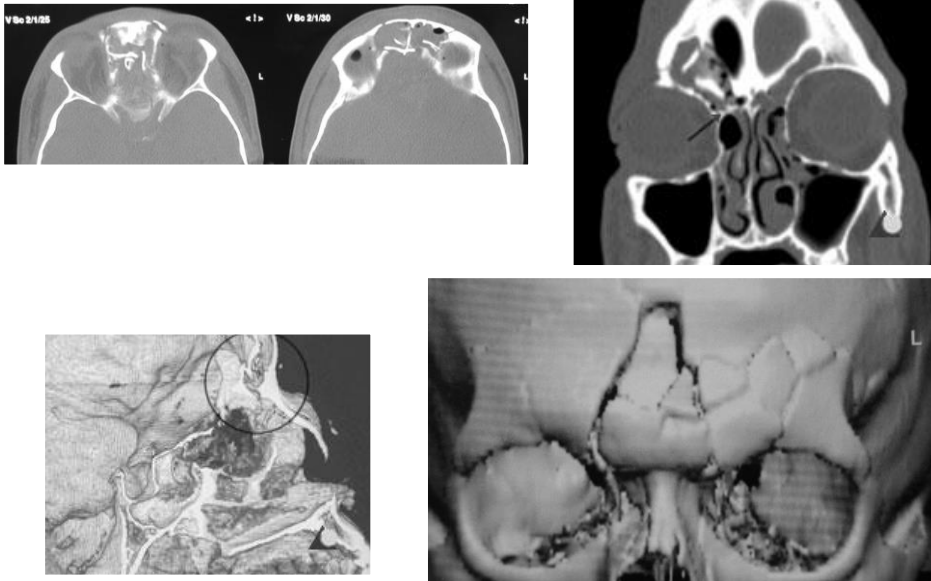
- Forehead depression
- Paresthesia of supraorbital nerve
- Skin laceration
- Anosmia
- Cerebrospinal fluid (CSF) leakage (rhinorrhea)



 AOCMF

May have disturbance of ocular movement

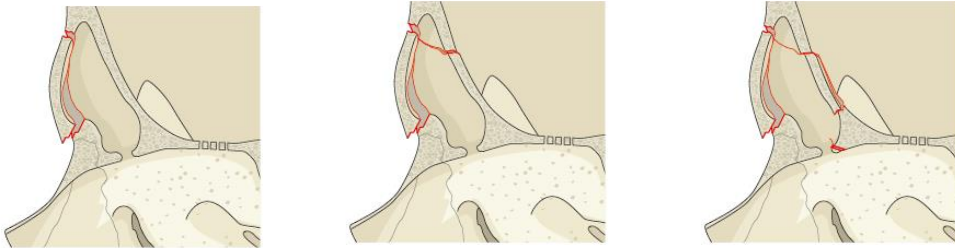
## CT scan required for definitive diagnosis



Most frontal sinus fractures require high-resolution computed tomographic examination with axial, coronal, sagittal and 3-D reconstruction.

## Classification

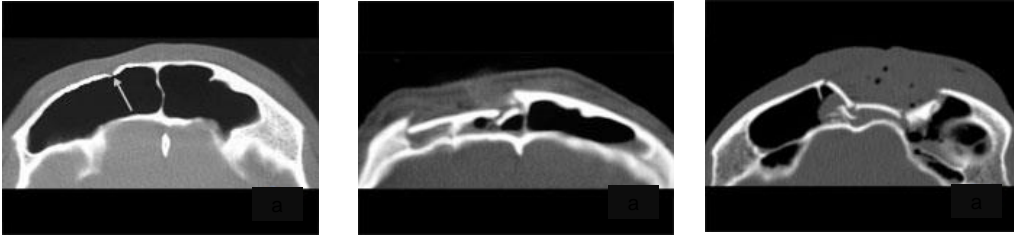
- Isolated anterior wall fracture
- Posterior wall fracture (with or without compromise of the anterior wall)
- Nasofrontal duct injury (isolated or combined with wall fractures)



 AOCMF

Remark: In some parts of the world, **duct** may not be the appropriate word.  
Alternative: **recess**, **outflow**.

## Anterior wall fractures



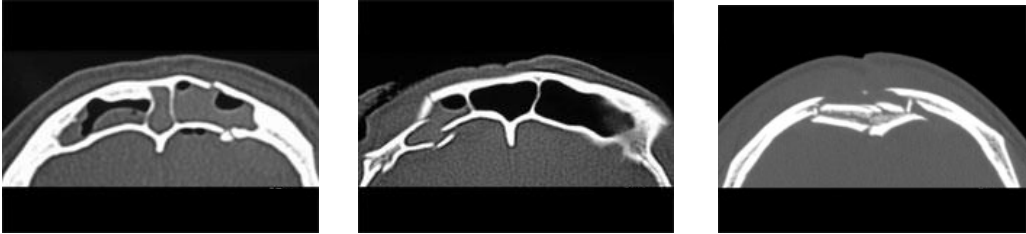
Usually represents esthetic issue, rarely functional deficit



From left to right pictures:

- Minimally displaced
- Moderate displacement
- Severe comminution

## Posterior wall fractures

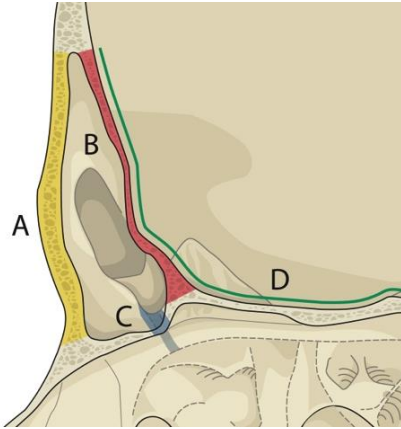


Severity related with nasofrontal outflow compromise and CSF leak

From left to right, images show:

- Small displacement
- Large displacement
- Moderate to severe comminution

## Treatment options

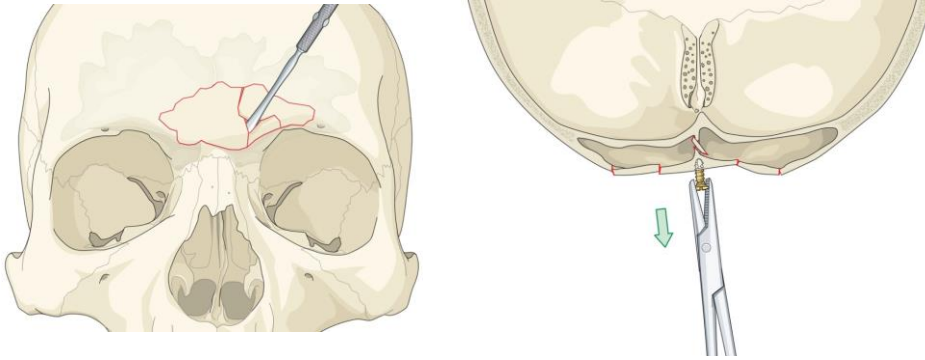


- Observation
- Open reduction and internal fixation (ORIF)
- Obliteration
- Cranialization

- A. Anterior wall fracture
- B. Posterior wall fracture
- C. Nasofrontal duct fracture
- D. Dural tear

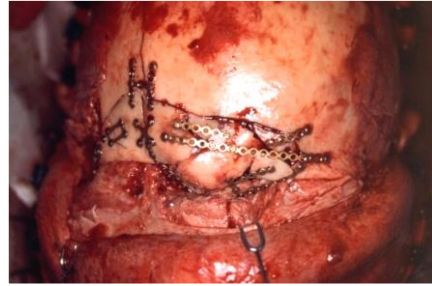
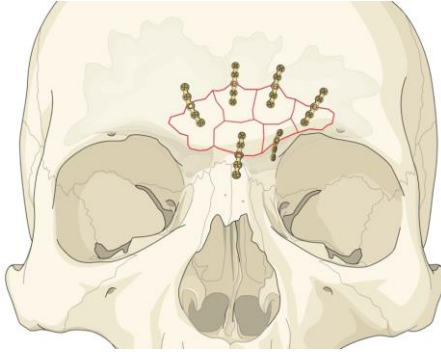


## Anterior wall



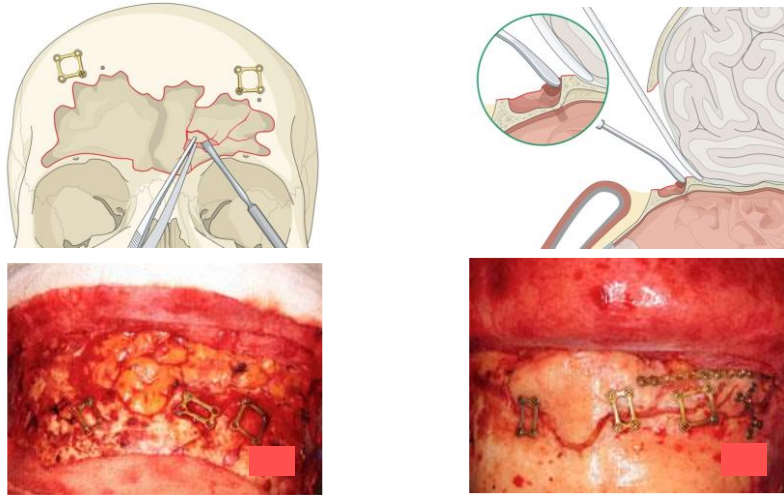
- Nondepressed isolated fractures may be observed
- Depressed fractures need open or minimally invasive reduction

## Anterior wall



- **Multiple or significantly displaced fractures**—ORIF or camouflage
- **Severe comminution**—occasionally bone graft or mesh
- Coronal approach or through laceration (or endoscopically assisted)

## Anterior wall fracture with nasofrontal duct obstruction



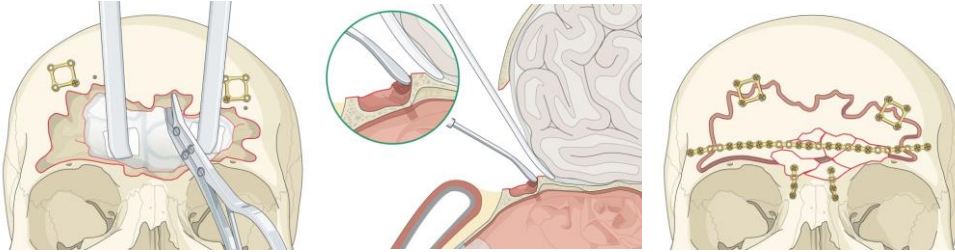
- Usually sinus obliteration (most common procedure)
- Functional reconstruction is another option



All options for obliteration should be mentioned (eg, bone, fat, and muscle).

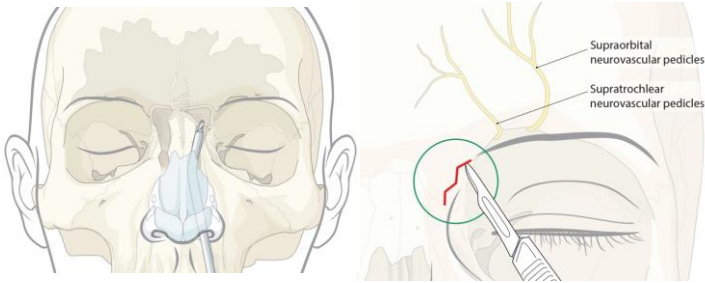
Remark: In some parts of the world, **duct** may not be the appropriate word.  
Alternative: **recess**, **outflow**.

## Posterior wall fracture with or without CSF leak

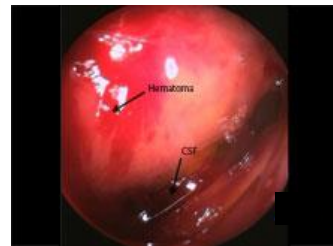


- Minimally displaced fractures of the posterior wall without CSF leak may be observed if outflow duct patent
- Comminution + displacement + CSF leak with outflow duct obstruction—cranialization (or less frequently obliteration)

## Endoscopic approach



- Secondary reconstruction frontal sinus drainage
- Diagnosis of penetrating frontal sinus injury



## Take-home messages

- CT for diagnosis and treatment planning
- Isolated anterior wall fractures represent an esthetic issue
- Management of posterior wall fractures is dependent on nasofrontal outflow compromise and CSF leak
- Management goal is to create a safe sinus, preventing deformities, meningitis, sinusitis, and mucocele