Paranasal Sinus Mucoceles

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Outline

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Introduction

What is a mucocele?

Mucoceles are epithelium-lined, mucus-containing sacs that completely fill a paranasal sinus

Caused by obstruction of the sinus ostium or obstruction of a mucous secreting gland

- Benign
- Expansion can cause destruction of surrounding structures
- Infected \(\rightarrow\) mucopyocele
Epidemiology

- Rare in United States
- Can take as many as 10-15 years to produce symptoms
- Most commonly found in frontal and ethmoid sinuses
- Japan – increased incidence of maxillary sinus mucoceles
- Radical surgery was common for sinusitis
Prevalence

- 1978 Natvig and Larsen – 112 patients with mucoceles from 1947 to 1974
  - 77% Frontal Sinus
  - 14% Frontal/anterior ethmoid
  - 5% Anterior ethmoid
  - 1% Posterior ethmoid
  - 3% Maxillary
Anatomy

Maxillary Sinus
Anatomy

Frontal Sinus
Anatomy

Frontal Sinus
- Funnel-shaped
- Vary in size and shape
- Generally have central septum
- Floor slopes inferiorly to the midline
- Primary ostium located on the floor close to the midline

Frontal Recess
- Hourglass-like narrowing between frontal sinus and anterior middle meatus
- Obstruction results in a loss of ventilation and mucus clearance from frontal sinus
Anatomy

Sphenoid Sinus

- Internal carotid artery
- Cavernous sinus
- Oculomotor nerve
- Trochlear nerve
- Optic nerve
- Abducent nerve
- Maxillary nerve
- Sphenoidal sinus
- Internal carotid artery
- Optic nerve
- Abducent nerve
- Maxillary nerve
Physiology

- Sinuses are lined by ciliated respiratory epithelium
- Mucous blanket on surface
- Cilia propel mucus in specific pattern of flow – mucociliary clearance
Maxillary Sinus

- Mucous flow originates in the antral floor
- Flow is directed centripetally toward primary ostium
Frontal Sinus

- Mucous flows up medial wall, laterally across roof, and medially along floor
- Some mucous exits through primary ostium
- The rest is recirculated
Appearance

• Macroscopically
  » Thick walled grayish cyst

• Histology
  » Pseudo-stratified columnar epithelial cells
  » Few ciliated cells
  » Sterile mucus and cholesterol crystals
  » Hypertrophic goblet cells
  » Fibrous thickening of submucosa
Pathophysiology

• Obstruction of ostium or outflow tract or of mucus secreting gland
  - Inflammation
  - Trauma/Surgery
    - Fractures
    - Caldwell Luc Procedure
  - Mass
  - Radiotherapy → scarring
Caldwell Luc Procedure
Pathophysiology

- Secretion of mucus continues → accumulation
- Pressure increases
  - Bone devascularization
  - Osteolysis
Pathophysiology

- Inflammation – cytokines
  - IL-1, -6
  - TNF alpha
  - PGE2
- Bone resorption by osteoclasts
Clinical Features

- Headache
- Facial pressure
- Facial swelling/deformity
- Dental Pain
- Nasal Obstruction
- Ophthalmic manifestations
  - Proptosis, Periorbital pain, Impaired ocular mobility, Blurred/loss of vision, Diplopia
- Neurologic manifestations
  - Confusion
  - Meningitis
  - CSF leak
Ophthalmic Manifestations

- Maxillary, Frontal, Anterior ethmoids –
  - Proptosis, Periorbital pain, decreased ocular mobility
  - Pressure on globe pushes it outwards
  - Expansion on to extraocular muscles restricts movement
Ophthalmic Manifestations

• Sphenoid, posterior ethmoids –
  – Blurred vision & decreased ocular mobility
  – Expansion of sinus wall may compress optic nerve or compromise its blood supply → optic atrophy
  – Direct spread of suppuration → optic neuritis
  – Involvement of abducent or oculomotor nerve can cause palsy
Complications

• Vision loss
  – Associated with sudden onset of visual loss by spread of infection or inflammation to optic nerve → poor prognosis (permanent blindness)
  – Gradual vision loss caused by ischemia → better prognosis (resolution of ophthalmic symptoms)
Suspicious Historical Elements

- Facial trauma
- Surgery
- Allergic/inflammatory sinus disease
Imaging

- CT scan
  - Sinus walls bow radially outwards
  - Thin or thick sinus walls
  - Bony erosions
  - Mucocele appears homogeneous and airless
45 year old male with left maxillary sinus mucocele
37 year old male with bilateral postoperative maxillary sinus mucoceles
Imaging

• MRI
  – Protein and water concentrations vary
  – Viscosity varies
  – Not best imaging modality
  – Good for differentiating mucocele from sinonasal tumors (particularly contrast enhanced)
    » Mucoceles have thin peripheral linear enhancement
    » Tumors have diffuse enhancement
Treatment

• Surgical removal or drainage is the only way to prevent intracranial and/or orbital complications

• Surgery
  » External
  » Endoscopic
  » Both
External

- Indicated if orbital or intracranial involvement
- Good for fronto-ethmoidal mucoceles
- Several different variations
  - Riedel
  - Killian
  - Lynch-Howarth
  - Lothrop
Riedel’s Procedure

- Removal of anterior wall and floor of frontal sinus
- Entire mucosal lining removed
Lynch-Howarth

- Curved incision from inferomedial eyebrow, along upper third of nose
- Medial wall of orbit perforated
Osteoplastic Flap

- Cut is made through eyebrows
- Scalp is lifted
- Frontal sinus obliterated with fat
- Bone replaced
- Better cosmesis
Endoscopic Approach

• Endoscopic management with marsupialization
  – Complete removal of the cyst lining is not required
  – Recurrence rates are near 0%
  – Goal is establishment of sinus drainage
Recurrence

- Risk factors
  - Surgery during acute infection
  - Presence of multiple mucoceles
  - Significant extension outside the sinus wall
Surveillance

- Periodic nasal endoscopy in the office is recommended to assess patency of ostium
- Recurrences are few if adequate drainage is established
- It can take many years for mucoceles to recur
Case Presentation

- 50 yo female
- Referred for chronic sinus issues
- Chief complaint of significant left facial pain and pressure for the past 9 years
- PMH significant for allergic rhinitis and previous episodes of acute sinusitis
- PSH significant for Le Fort I Osteotomy with maxillary advancement procedure done as a child
  - Dental cyst found on CT one year previously
  - Patient lost job and was without insurance so was not evaluated by OMFS
Case Presentation

• Physical Exam
  – No polyps or masses
  – Extraocular muscles intact
  – Nasal mucosa showed no crusting, hypertrophy, or congestion
Case Presentation

• Dental cyst found on CT one year previously

• Repeat CT
  – CT scan read “expansile unilocular homogeneous lesion with thin sclerotic margins associated with the left posterior most tooth apex”
Case Presentation

• Patient was seen by OMFS
• Curettage and lavage of the left maxillary sinus and I&D of abscess was performed
• Pain and pressure resolved but returned two weeks later
Case Presentation

- CT was reviewed in conjunction with an assessment of the surgery notes
- Lesion was determined to be a mucocele abutting the floor of the maxillary sinus around her teeth
Case Presentation
Case Presentation

- FESS and antral puncture with marsupialization of the maxillary mucocele
- 1 month after surgery patient had no more complaints of facial pain or pressure
Summary

• Mucoceles are late complications of sinus ostium obstruction or mucous gland obstruction
• Expansile lesions that are capable of bony destruction and compromise of surrounding structures
• Endoscopic sinus surgery is the first choice for treatment
• External approaches may be necessary
Sources


Sources


