# Odontogenic Disease of the Maxillary Sinus

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#### Maxillary Sinus

- The maxillary sinuses are air-containing spaces that occupy maxillary bone bilaterally. They are the first of the paranasal sinuses (e.g., maxillary, ethmoid, frontal, and sphenoid) to develop embryonically and begin in the third month of fetal development as mucosal invaginations or pouching of the ethmoid infundibula.
- The initial maxillary sinus development, also termed primary pneumatization, progresses as the invagination expands into the cartilaginous nasal capsule.
- Secondary pneumatization begins in the fifth month of fetal development as the initial invaginations expand into the developing maxillary bone.
- By the time a child reaches age 12 or 13 years, the sinus will have expanded to the point at which its floor will be on the same horizontal level as the floor of the nasal cavity

The maxillary sinus is significantly larger in adult patients who are edentulous in the posterior maxilla compared with patients with complete posterior dentition

The maxillary sinus is the largest of the paranasal sinuses. It is also known as the antrum or the antrum of Highmore. The term antrum is derived from the Greek word meaning "cave."

Nathaniel Highmore, an English physician in the 1600s, described a sinus infection associated with a maxillary tooth, and his name has long been associated with sinus nomenclature





The maxillary sinus is described as a four-sided pyramid, wit the base lying vertically on the medial surface and forming the lateral nasal wall. The apex extends laterally into the zygomatic process of the maxilla. The upper wall, or roof, of the sinus is also the floor of the orbit. The posterior wall extends the length of the maxilla and dips into the maxillary tuberosity. Anteriorly and laterally, the sinus extends to the region of the first bicuspid or cuspid teeth. The floor of the sinus forms the base of the alveolar process



Superio turbinate

Middle

turbinate

The adult maxillary sinus averages 34 mm in the anteroposterior direction, 33 mm in height, and 23 mm in width. The volume of the sinus is approximately 15 to 20 mL.



The sinuses are primarily lined by respiratory epithelium, a mucus-secreting pseudostratified and ciliated columnar epithelium. The cilia and mucus are necessary for the drainage of the sinus because the sinus opening, or ostium, is not in a dependent (inferior) position but lies two-thirds the distance up the medial wall and drains into the nasal cavity



Beating of the cilia moves the mucus produced by the lining epithelium and any foreign material contained within the sinus toward the ostium, from which it drains into the nasal cavity. The cilia beat at a rate of up to 1000 strokes per minute and can move mucus a distance of 6 mm/min



#### **Maxillary Sinus**

- Development
  - Present at birth
  - Biphasic growth
  - Level of the floor
- Structure
  - Volume & shape
  - Walls, floor, roof



#### Anterior Sinus Anatomy



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- Purpose of sinuses
  - Resonating chamber for voice
  - Decrease weight of skull
  - Warm & moisten air
  - Shock absorbers
  - Immune system

#### Lateral Sinus Anatomy



- Aerated at birth
  - Maxillary sinuses
- Age 6-7
  - Frontal /sphenoidal sinuses
- Puberty- approx 17-18 yrs
  - Ethmoid

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#### Maxillary Sinuses

- Largest sinuses
  - 3.5 cm high
  - 2.5 3 cm wide
  - 15 ml volume
- Within maxilla
  - Above upper teeth
- Paired & symmetric



• Communicates with middle nasal meatus

#### Osteomeatal complex – coronal view



- Pathways of communication
  - Frontal, ethmoid and maxillary
- 2 key passageways
  - Infundibulum
  - Middle nasal meatus

#### Osteomeatal Complex





#### Paranasal Sinuses Protocols

- Lateral
- PA (Caldwell)
- Parietoacanthial (Waters)
- Parietoacanthial (Open mouth Waters)
- SMV

#### Lateral Sinuses



#### Waters for Maxillary sinuses



- Upright
- Chin on IR
- MSP & MML perp
- OML 37 degrees
- Suspend respiration
- CR horizontal and exiting acanthion

#### Waters



# Open Mouth Waters for Maxillary / sphenoid sinuses



- Upright
- Chin on grid
- OML 37 degrees
- Open mouth
- Suspend respiration
- CR horizontal and exiting acanthion

#### Acute Sinusitis



#### Acute Sinusitis



#### Mucous Retention Cysts



#### Chronic Sinusitis



- MMT: mucous membrane thickening
- OFS: opacified frontal sinus
- OES: opacified ethmoid sinus
- OMS: opacified maxillary sinus
- M: mucocoele

# Clinical Examination

#### **Clinical Examination**

- Nasal Discharge
- Redness in Vestibule
- Pain on Tapping
- Transillumination
- Nasal and Sinus endoscopy









#### Rdiographic Examination

- PA
- Panoramic View
- Water's
- Lat Skull

#### Computed Tumography

- Mucosal Thickening
- Air fluid level
- Opacification
- Radiolucent or Radiopaque lesion





#### Nonodontogenic Infections of the Maxillary Sinus

 Historically the consensus has been that the maxillary sinus is usually not colonized by any bacteria and is essentially sterile. More recent studies using updated techniques have occasionally shown that some bacteria may be cultured from a healthy paranasal sinuses



- Discomfort, facial swelling, erythema, malaise, fever, and drainage of foul-smelling mucopurulent material into the nasal cavity and nasopharynx
- Aerobic (Primarly), anaerobic, or mixed bacteria may cause infections of the maxillary sinuses
- The important aerobes are Streptococcus pneumoniae, Haemophilus influenzae, and Branhamella catarrhalis. Anaerobes include Streptococcus viridans, Staphylococcus aureus, Enterobacteriaceae, Porphyromonas, Prevotella, Peptostreptococcus, Veillonella, Propionibacterium, Eubacterium, and Fusobacterium.

Table 16-1 Factors Associated with a History of Rhinosinusitis*	
Major Factors	Minor Factors
Facial pain/pressure	Headache
Facial congestion/fullness	Maxillary dental pain
Nasal drainage/discharge	Cough
Postnasal drip	Halitosis (bad breath)
Nasal obstruction/blockage	Fatigue
Hyposmia/anosmia (decreased or absent sense of smell)	Ear pain, pressure, or
Fever (acute sinusitis only)	fullness
Purulence on nasal endoscopy (diagnostic by itself)	Fever



#### Odontogenic Infections of the Maxillary Sinus

- Odontogenic sources account for approximately 10% to 12% of all maxillary sinusitis cases
- Are more likely to be caused by anaerobic bacteria, as is the usual odontogenic infection. Rarely does H. influenzae or S. aureus cause odontogenic sinusitis.
- The predominant organisms are aerobic and anaerobic streptococci and anaerobic Bacteroides, Enterobacteriaceae, Peptococcus, Peptostreptococcus, Porphyromonas, Prevotella, and Eubacterium.

# Treatment of Maxillary Sinusitis

#### Sinusitis

#### Acute: 1 week

#### Subacute: 4-12 week

Chronic: more than 12 week

#### Treatment of Acute Maxillary Sinusitis

- Humidification of inspired air
- Decongestant
  - Psudoehphedrine
  - Phenylephrine
  - Oxymethazoline
  - Antihistamin
- NSAIDs
- Antibiotics
  - Non-Odontogenic
    - Amoxicillin-Clauvlanate
    - Sulaphamethaxazole- trimetoperim
    - Cefuroxime
    - Azithromycin
  - Odontogenic
    - Clindamycin
    - Methronidazole

# • If the patient fails to respond to this initial treatment regimen within 72 hours, it is necessary to reassess the treatment and the antibiotic.

- The results of the culture and sensitivity tests should be evaluated, and changes should be made if indicated. As many as 25% of the organisms cultured from acute sinus infections are β-lactamase producers, and many may be anaerobic, especially if the infection is odontogenic.
- If the organism(s) causing the infection are β-lactamase producers, another antibiotic such as the combination agent trimethoprimsulfamethoxazole (Bactrim, Septra) may be effective. Cefaclor or a combination of amoxicillin and clavulanate potassium (Augmentin) has also been shown to be effective.

#### Treatment of Chronic Maxillary Sinusitis

- The diagnosis and treatment of chronic maxillary sinusitis is difficult and may include allergy testing, nasal or septal surgery, and surgical debridement of the sinuses
- The goal of sinus surgery is to remove abnormal tissue from within the sinus cavity and restore normal drainage through the ostium.
- Caldwell-Luc procedure
- Antrostomy



#### Chronic Sinusitis

- Chronic sinusitis with an allergic fungal component may also be treated with antifungal agents including itraconazole (200 mg PO bid).
- Children with severe chronic sinusitis should first have thorough work-up and appropriate treatment for conditions such as allergy, GERD, CF, and immunodeficiency.





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#### Antral Pseudocysts

- Pseudocysts, mucoceles, and retention cysts are benign accumulations of fluid underneath or surrounded by sinus epithelium
- The antral pseudocyst is seen in 2% to 10% of panoramic radiographs
- surgical ciliated cysts or postoperative maxillary cysts



#### Smarter Triad





Complications of Oral Surgery Involving the Maxillary Sinus Displacement of Tooth, root

Extraction (Surgical Vs Non-Surgical)

Sinus Lifting Complication

#### OAC

#### Nose Blowing test

Determining the size of perforation

Management of perforation

OAC

# Small

# Medium

Large

#### Small Perforation

#### **Clot Stabilization**

#### Sinus precaution Orders

Sinus Decongestant Therapy

Ab Therapy

SPO

# No nose blowing

# Not drinking with pipe

SDT

# Antihistamins

# Phenyl Ephrine

N.S 0.9%

ABs

# Co-Amoxclave 625 mg Q8h

# Clindamycin 300 mg Q8h

#### Medium Perforation



#### Large Perforations

### Surgical Closure

SPO

SDT

ABs









Lip





















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#### Buccal fat Pad Flap





#### BFP with AF





#### Sinus Lift Complication

Sinus membrane is severely lacerated or avulsed

#### Sinus is overfilled.

#### Misch Sinus Volume Classification





#### Historical Perspective

- In 1893 American Physician George Caldwell and French Laryngologist Henry Luc accessed the maxillary sinus by creating a lateral window
- In 1975 Hilt Tatum introduced a technique to increase alveolar bone height.
- In 1980 Boyne using Culdwell-luc procedure to augment the alveolar bone height





# Subantral classification SA-2

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>12 mm

#### Lateral Window Approach





#### Innervation



#### **Neurovascular Supply**







