

Odontogenic Sinusitis: *International Multidisciplinary Consensus Statement*

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Disclosures

- None

Learner Objectives

- After this presentation you should:
 - 1) Know when to suspect odontogenic sinusitis (ODS) based on certain clinical features
 - History, nasal endoscopy, and imaging
 - 2) Know when to refer patients to appropriate providers for disease confirmation
 - Multidisciplinary approach: Otolaryngologist confirms sinusitis, dental specialist confirms odontogenic source

Craig JR, Poetker DM, Aksoy U, et al. Diagnosing odontogenic sinusitis: An international multidisciplinary consensus statement. *Int Forum Allergy Rhinol.* 2021;11:1235-1248.

Epidemiology

- Odontogenic sinusitis (ODS) most common among 40–60 year olds with a slight female predominance
- ~50% previous dental surgery or infection
- Only 1/3 will report associated dental pain
- Estimated 10% of cases of chronic maxillary sinusitis are odontogenic, though this has been reported to be as high as 75% among patients with unilateral maxillary disease
- Overall incidence of odontogenic sinusitis low, but increasing over the last decade

Etiology

- Periapical disease
 - Extension of dental caries into the dental pulp resulting in pulpitis and apical infection
 - First molar (35.6%), second molar (22%), third molar (17.4%), and second premolar (14.4%)
- Periodontitis
- Failed root canal
- Infected implant

Consensus on diagnosing odontogenic sinusitis

- ODS is distinct from rhinosinusitis
 - Infectious sinusitis secondary to a dental source, with no primary sinonasal inflammation
 - No formalized diagnostic criteria have been established
 - ODS treatment and outcomes are very different from rhinosinusitis

Consensus on diagnosing odontogenic sinusitis

Three surveys were conducted in this study to highlight 4 important aspects of diagnosing ODS:

1. Suspecting ODS based on different clinical features
2. Confirming sinusitis
3. Confirming odontogenic sources of sinusitis
4. Utility of multidisciplinary collaboration

Suspecting ODS and confirming sinusitis

- Otolaryngologist survey

Odontogenic sinusitis

- Features that can facilitate ODS suspicion: unilateral disease, infectious symptoms, nasal endoscopy findings, bacterial sinus cultures, and CT findings

Suspecting ODS and confirming sinusitis

- ODS patients generally have symptoms consistent with rhinosinusitis
- Foul smell may be more specific for ODS
- ODS patients may be asymptomatic
 - Dental pain may not be present
- Prior dental procedures may increase the likelihood of ODS

Suspecting ODS and confirming sinusitis

- Nasal endoscopy: purulence, edema, or polyps in the middle meatus, or maxillary sinus
- Purulence is more likely in ODS compared to rhinosinusitis
- Sinus cultures facilitate suspicion of an odontogenic source
 - α -hemolytic streptococci, anaerobes, and other oral bacteria

Suspecting ODS and confirming sinusitis

- CT findings: unilateral maxillary sinus opacification is more representative of ODS compared to isolated mucosal thickening or mucus retention cysts
- Relative sparing of posterior ethmoid and sphenoid sinuses

Suspecting ODS and confirming sinusitis

- *Near perfect consensus*: always assess maxillary dentition when there is maxillary sinus opacification on CT
 - Although majority will demonstrate overt dental findings, some will not have identifiable pathology on CT
 - Often missed by radiologists

Suspecting ODS and confirming sinusitis

- Confirming sinusitis with objective evidence
 - **Nasal endoscopy** considered the most important method for confirming sinusitis, with CT scan adding further support
 - Some patients are asymptomatic, and therefore symptoms are not required for diagnosing ODS (unlike diagnostic criteria for rhinosinusitis)

Suspecting ODS and confirming sinusitis

- CT scans can suggest sinusitis by demonstrating sinus opacification or mucosal thickening, these findings are nonspecific, and nasal endoscopy is more effective in confirming infectious sinusitis
- Nasal endoscopy not 100% sensitive/specific
 - some ODS patients can have normal nasal endoscopies or other sinus pathologies can have infectious findings

CT and nasal endoscopy findings

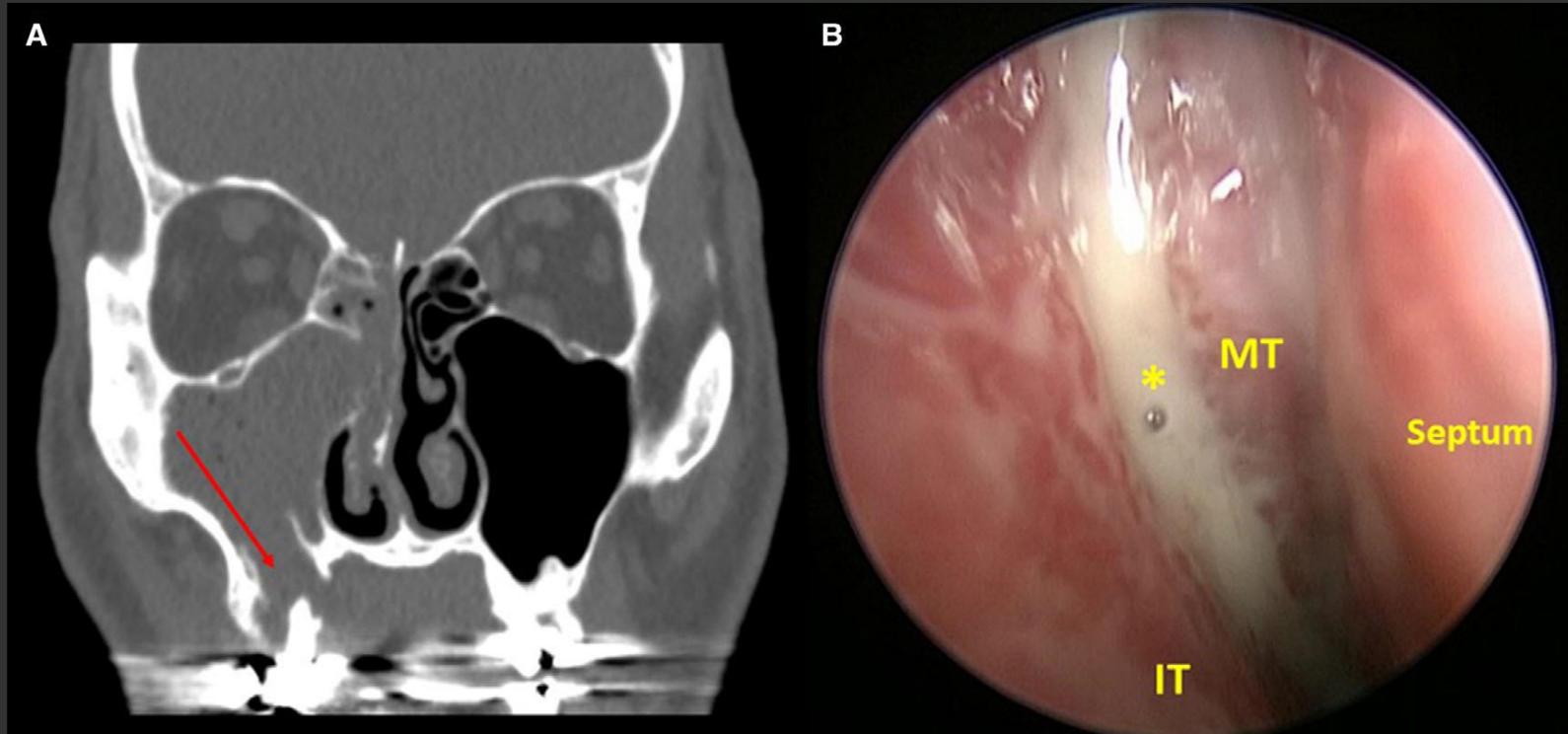


FIGURE 1 Craig et al

UP = uncinate process
MT = middle turbinate

Confirming odontogenic sources of sinusitis

- Dental specialist survey

Confirming odontogenic sources of sinusitis

- Confirming odontogenic pathology is pivotal to diagnosing ODS
- Endodontic disease is one of the most common causes of ODS
 - Apical periodontitis due to pulpal necrosis or failing root canal therapy

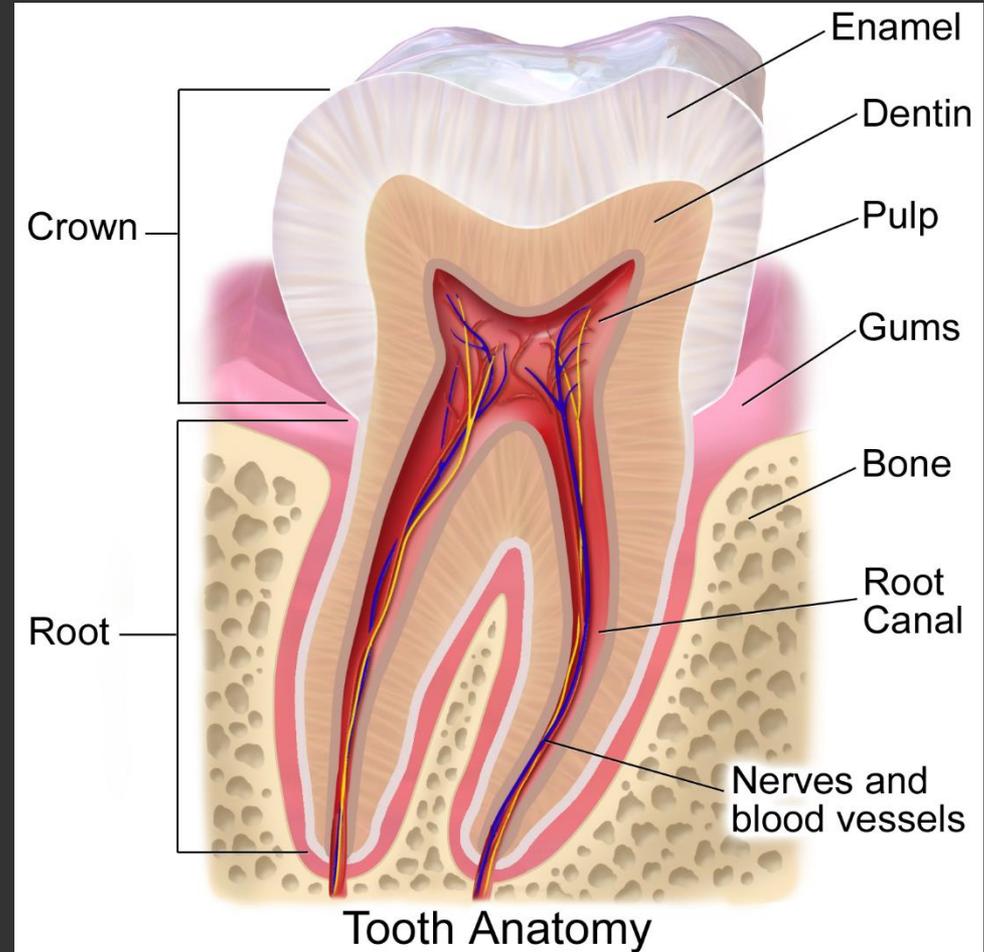
Confirming odontogenic sources of sinusitis

- Strong consensus was reached for 2 statements about endodontic disease causing ODS
 1. Dental caries alone should not cause ODS
 2. ODS due to apical periodontitis (AP) should be due to necrotic or partially necrotic pulp, or failing root canal therapy

Tooth Anatomy

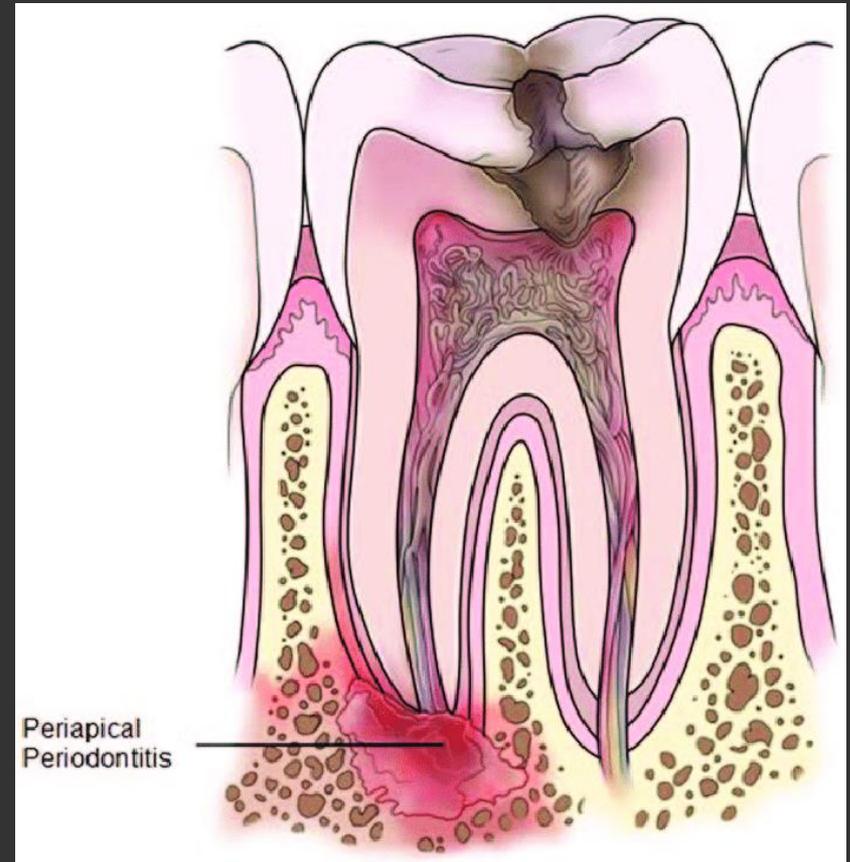
The pulp is a mass of **connective tissue** that resides within the center of the tooth, directly beneath the layer of dentin

“Pulp horns” extend into the apical region



Apical periodontitis

Apical periodontitis (AP) is an inflammatory disease of the apical periodontium as a sequelae of pulp death



Confirming odontogenic sources of sinusitis

- Diagnosing endodontic disease
 - clinical pulp testing
 - periapical imaging

Confirming odontogenic sources of sinusitis

- To evaluate for endodontic disease, cold pulp testing is an optimal initial test of pulp vitality

Pulp test responses are typically absent in ODS because infected teeth are usually nonvital

Detects pulpal necrosis with a diagnostic accuracy of 82% to 95%,



Confirming odontogenic sources of sinusitis

- Cone-beam CT is superior to periapical radiography for detecting AP
- Advantages:
 - Eliminates superimposition of anatomical structures
 - High contrast resolution
 - Distinguishes differences between tissues differing in physical density by less than 1% compared to 10% for conventional films

Confirming odontogenic sources of sinusitis

- Disadvantages of cone-beam CT (CBCT):
 - More costly and is not as widely available
 - AP causing ODS is not always detectable on CBCT
 - Insufficient for displaying contrast within soft tissues
 - Details of pathology on teeth and bone may not be obvious
 - Metal artifacts

Confirming odontogenic sources of sinusitis

- Orthopantomography and periapical radiographs are acceptable initial imaging modalities to evaluate for dental sources of sinusitis
- Dental bite-wing X rays are not acceptable when evaluating ODS



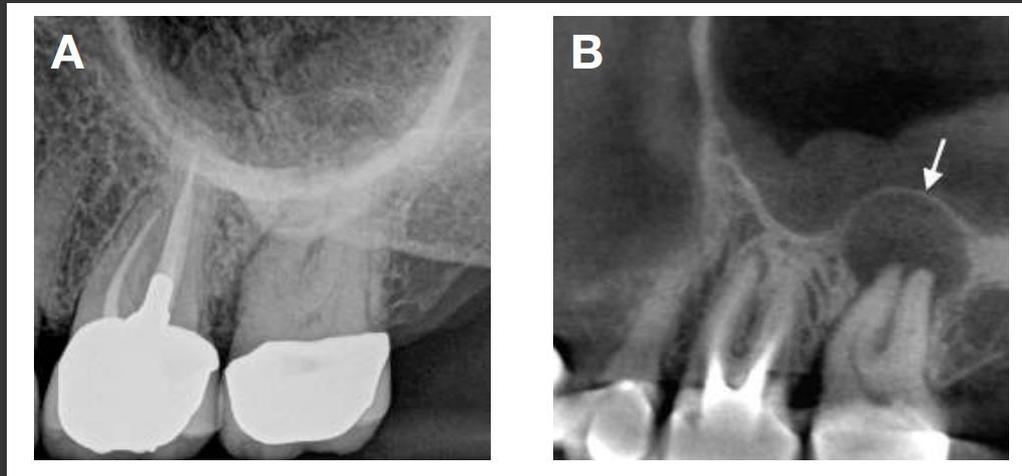


Figure 1 AAE position statement 2018

A. Periapical radiograph

- Posterior left maxilla
- Abnormalities of left 2nd maxillary molar obscured by the zygoma

B. CBCT

- Same molar with osteoperiostitis “periapical lucency”





Confirming odontogenic sources of sinusitis

- Assess for oroantral communications
- Diagnosed by oral examination
 - Can be very small, pinpoint
 - If oroantral fistula is not certain on inspection, have patients blow their noses against occluded nostrils, and clinicians can probe the potential fistula sites

Confirming odontogenic sources of sinusitis

- Dental implant-related ODS
 - Patients with ODS and a prior dental implant should be referred to a dental specialist to determine whether the implant requires removal

Multidisciplinary collaboration to diagnose ODS

- Strongest consensus was reached that multidisciplinary evaluations by both otolaryngologists and dental specialists are generally beneficial when evaluating for ODS

Multidisciplinary collaboration to diagnose ODS

- Both specialties should screen for sinusitis symptoms and dental pain, pathologies, or prior treatments
- Otolaryngologists should confirm the sinusitis, and dental specialists should confirm the odontogenic pathology
- Referral to dental specialists for evaluation potentially treatable dental source of sinusitis, or an unknown source of unilateral sinusitis
- Referral to ENT for CT findings of maxillary sinusitis

Multidisciplinary Approach to Diagnosing ODS

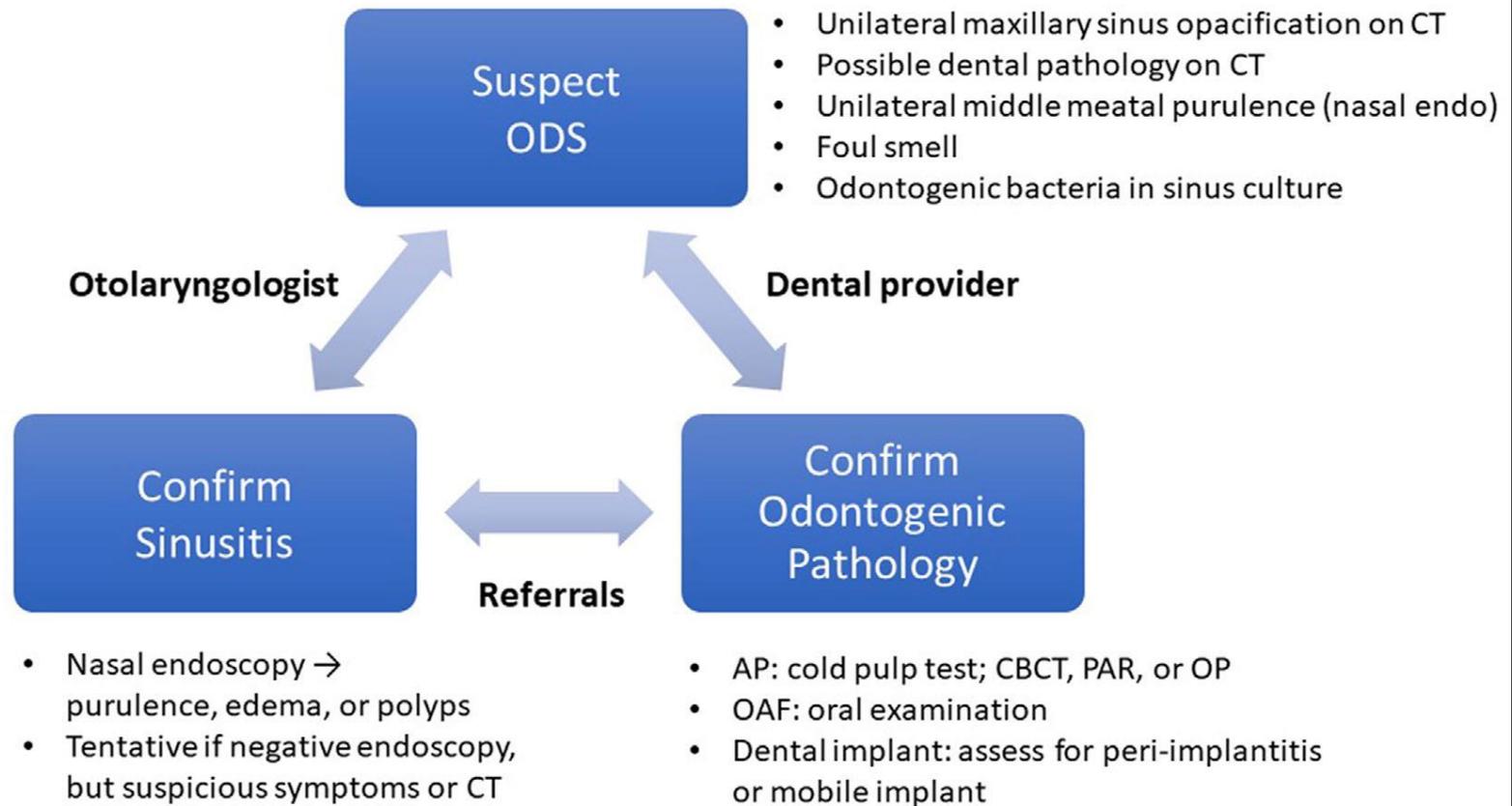


FIGURE 1 Craig et al

Important clinical scenarios

1. Unilateral maxillary sinus opacification on CT, but no overt dental pathology on CT

Absent periapical bone (red arrow), later confirmed apical periodontitis due to pulpal necrosis

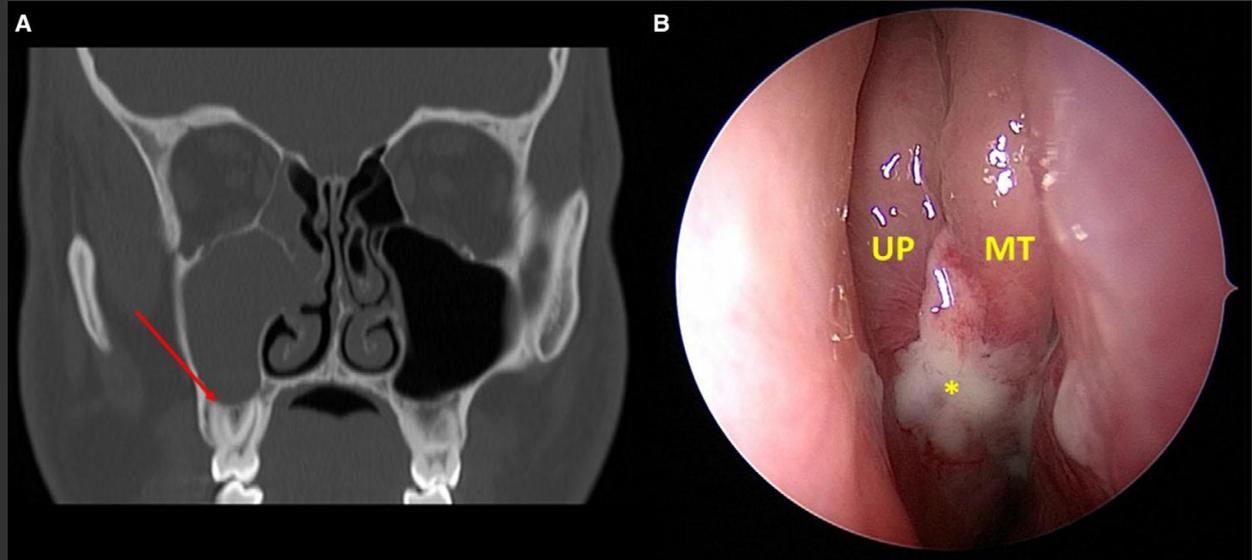


FIGURE 3 Craig et al

UP = uncinate process
MT = middle turbinate

Important clinical scenarios

2. Dental pathology and any degree of maxillary sinus disease on CT, not necessarily with sinusitis symptoms

Reactive sinus mucosal inflammation due to the adjacent dental pathology, but did not have infectious odontogenic sinusitis

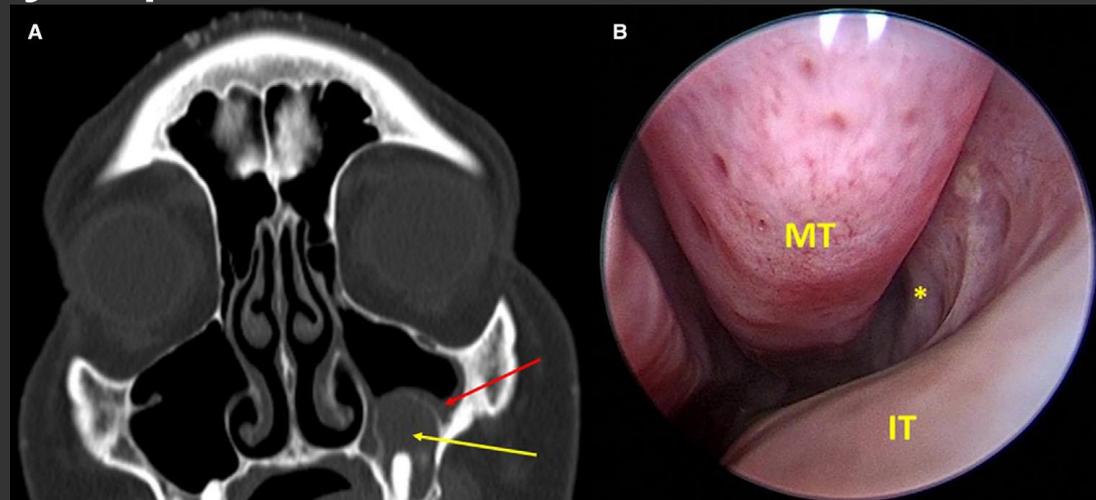


FIGURE 4 Craig et al

MT = middle turbinate
IT = inferior turbinate *middle meatus

Important clinical scenarios

3. High ODS suspicion based on clinical features but negative dental evaluation

- Repeat dental evaluation for persistent infectious sinusitis despite adequate endoscopic sinus surgery and antimicrobial therapy
- Either the initial dental evaluation falsely negative or the dental disease progressed and become detectable

Important clinical scenarios

4. CT showing any maxillary sinus disease after maxillary sinus grafting

- Nasal endoscopy utmost importance in confirming or refuting whether CT findings of opacification or mucosal thickening represents infectious sinusitis
- If nasal endoscopy was normal, this would suggest an infected graft, but not ODS

Important clinical scenarios

5. ODS diagnosed but believed to have no treatable dental pathology (statement that did not reach consensus).

- Otolaryngologists should consider referring ODS patients to dental specialists, regardless of their perception of the dental pathology being treatable or not

Summary

- Do:
 - Inquire consistently: sinonasal symptoms including foul smell; dental pain; and history of maxillary dental procedures
 - Suspect ODS based on certain clinical features: *assess for maxillary dental pathology in all patients with maxillary sinus opacification on CT*
 - Perform nasal endoscopy to evaluate for mucopurulence or inflammation in suspected cases
 - Refer patients to appropriate providers for disease confirmation

Summary

- Do not:
 - Use same diagnostic criteria for ODS as rhinosinusitis, *patients may be asymptomatic*
 - Rely on nasal endoscopy alone
 - Isolated maxillary sinus mucosal thickening and mucus retention cysts on CT generally do not represent ODS, unless there is concurrent nasal endoscopic evidence of infection or inflammation