Tampereen yliopisto
Tampere University
Human Potential Unlimited.

TYKS Turku University Hospital

eshnr
european society of
head and neck radiology

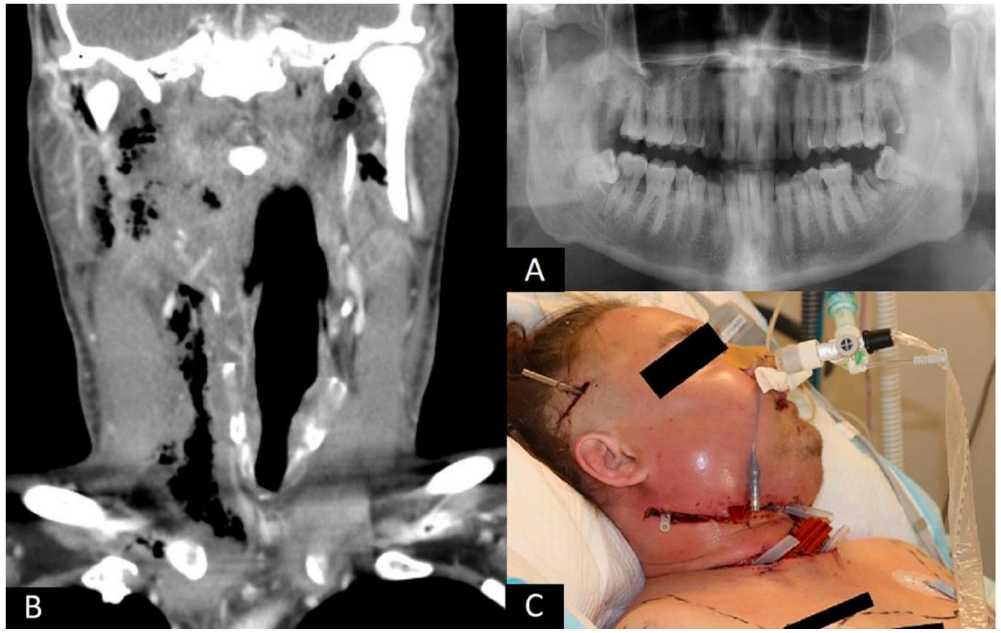
Head and neck infections

Jussi Hirvonen, MD, PhD, EDiNR, EBiHNR
Professor of Radiology, University of Tampere/FI
Turku University Hospital, Turku/FI

jussi.hirvonen@utu.fi

@jussihirvonen

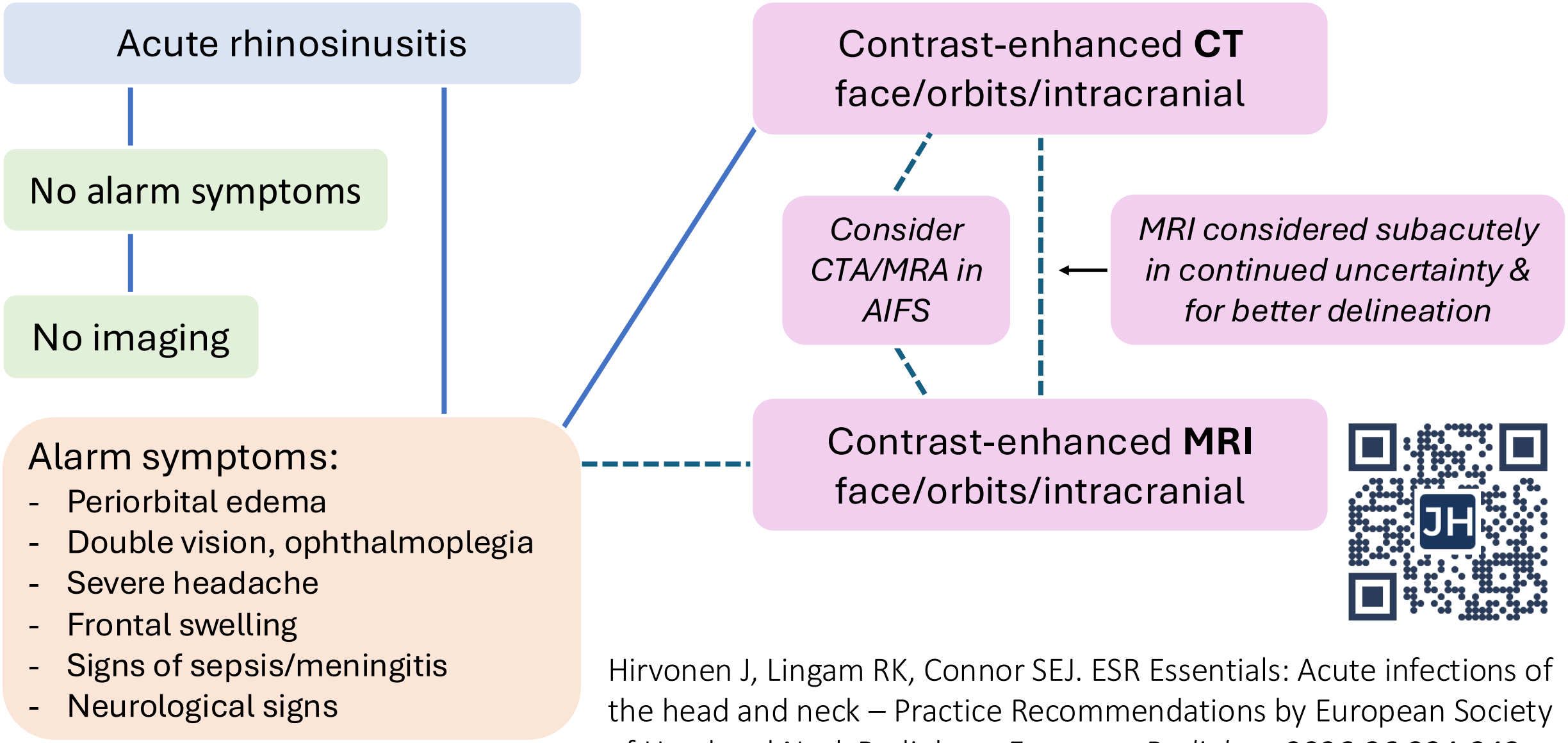
No disclosures



Purpose

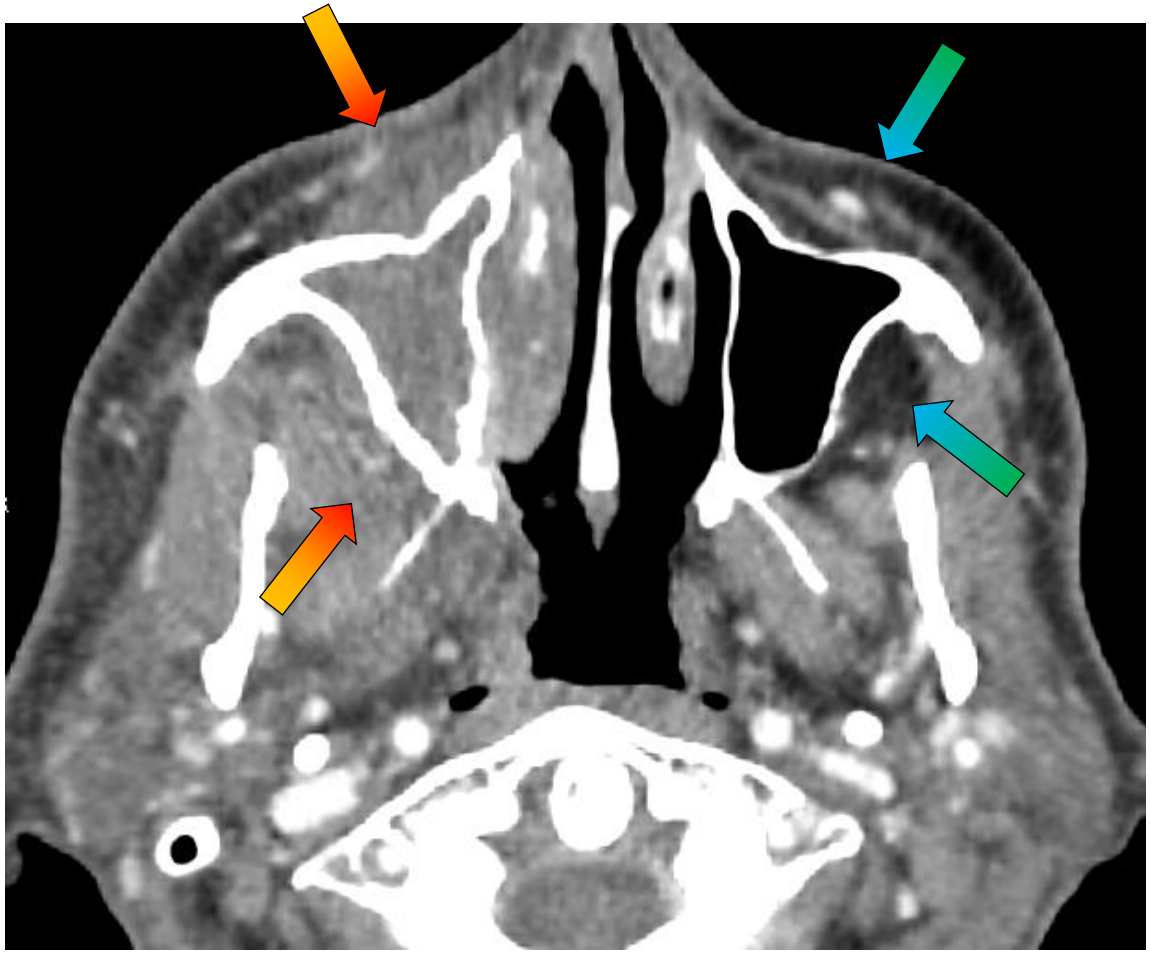
1. To present a practical imaging approach to acute head and neck infections, based on the ESR Essentials recommendations
2. To recognise critical findings and complications: complicated sinusitis, deep neck abscesses, airway compromise, descending mediastinitis, and vascular thrombosis

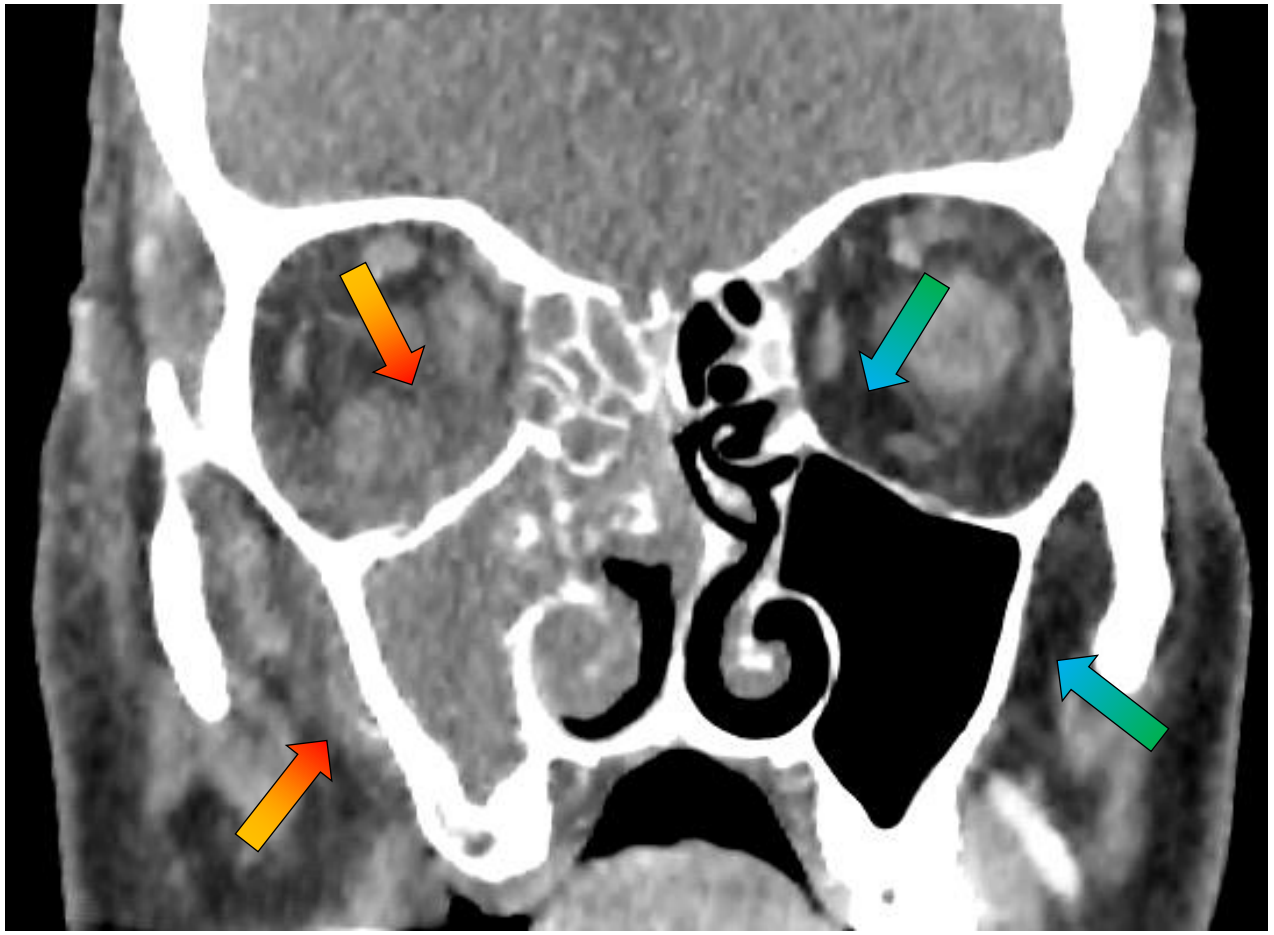
Diagnostic imaging flowchart in acute rhinosinusitis



Hirvonen J, Lingam RK, Connor SEJ. ESR Essentials: Acute infections of the head and neck – Practice Recommendations by European Society of Head and Neck Radiology. *European Radiology* 2026;36:334-343

Complicated sinusitis: extrasinus extension

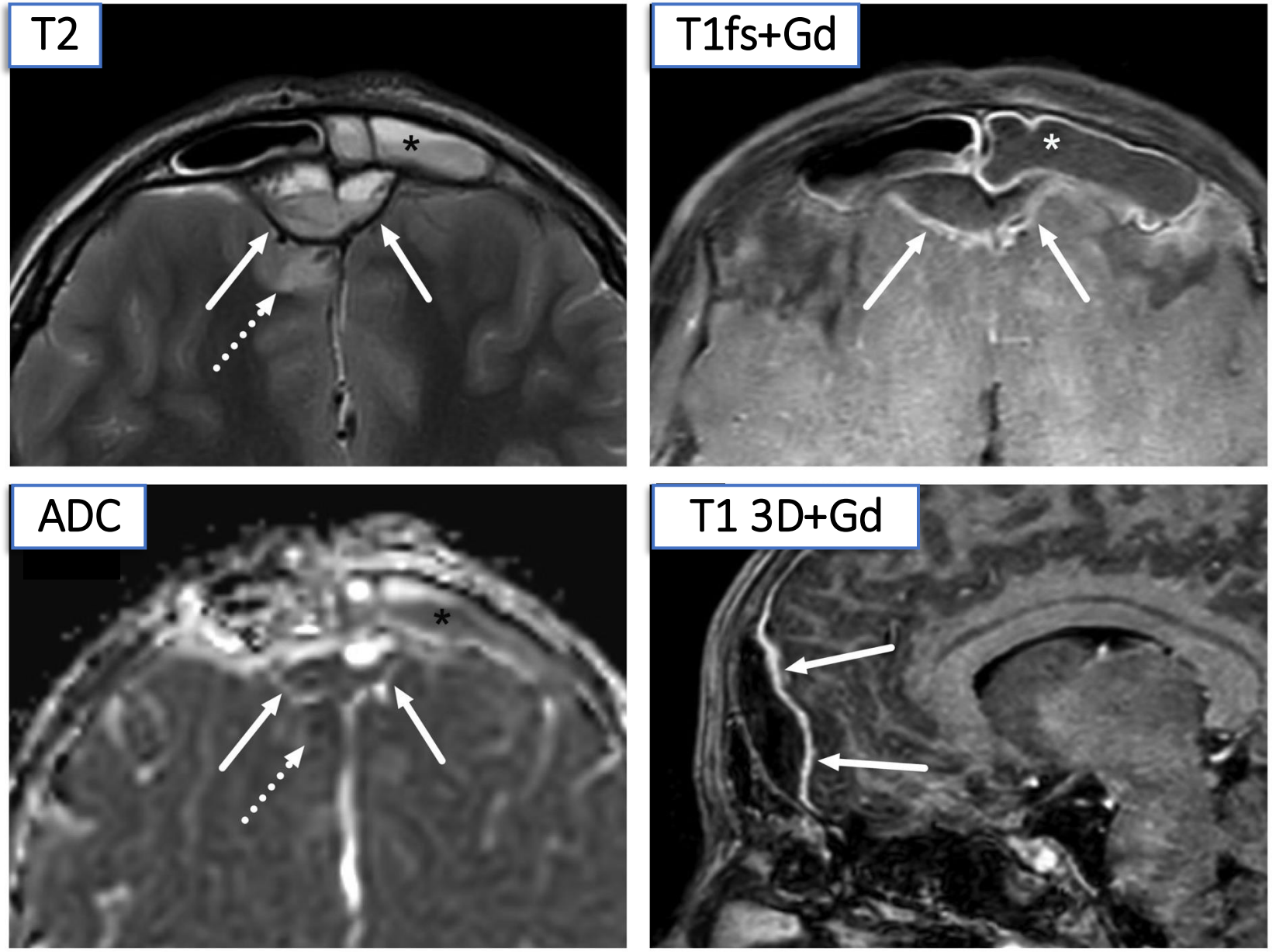




Beware: Cone-beam CT (CBCT) lacks soft tissue contrast to fully characterise extrasinus extension!

Complicated acute frontal sinusitis

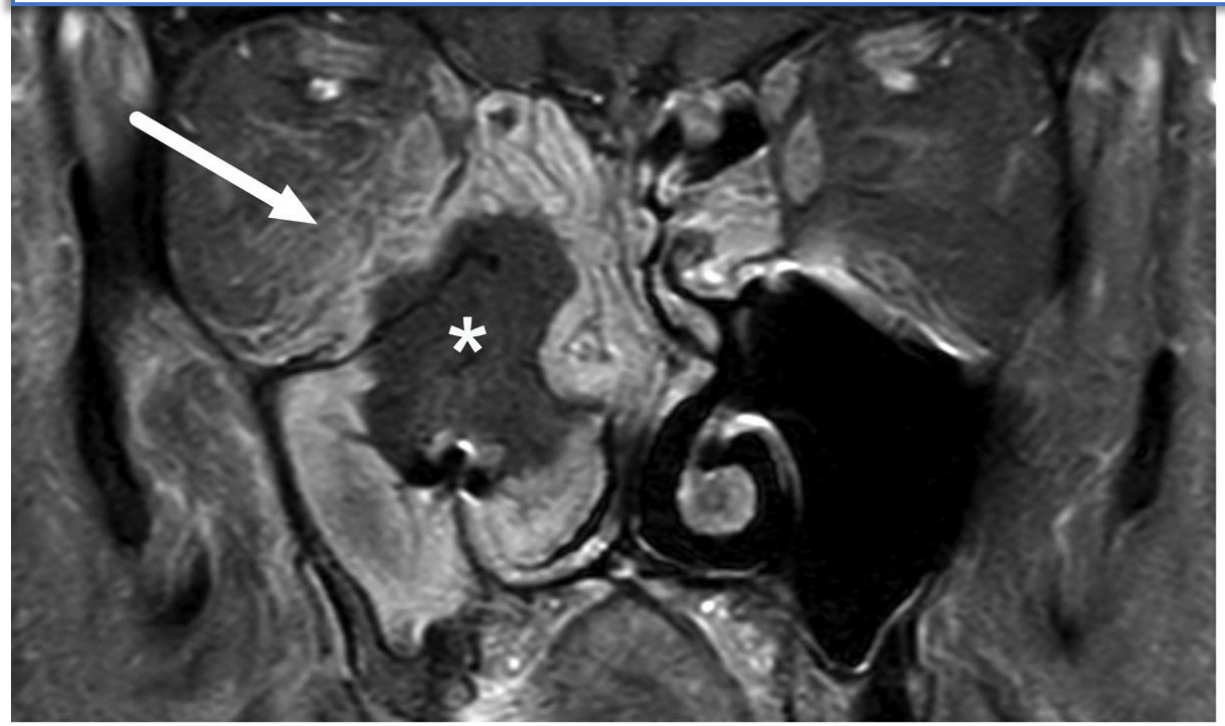
MRI highly recommended!



Epidural empyema
(intracranial epidural abscess)
Pachymeningitis
Early cerebritis

Acute invasive fungal sinusitis (AIFS)

Loss of mucosal contrast enhancement (”black turbinate sign”)



MRI highly recommended!

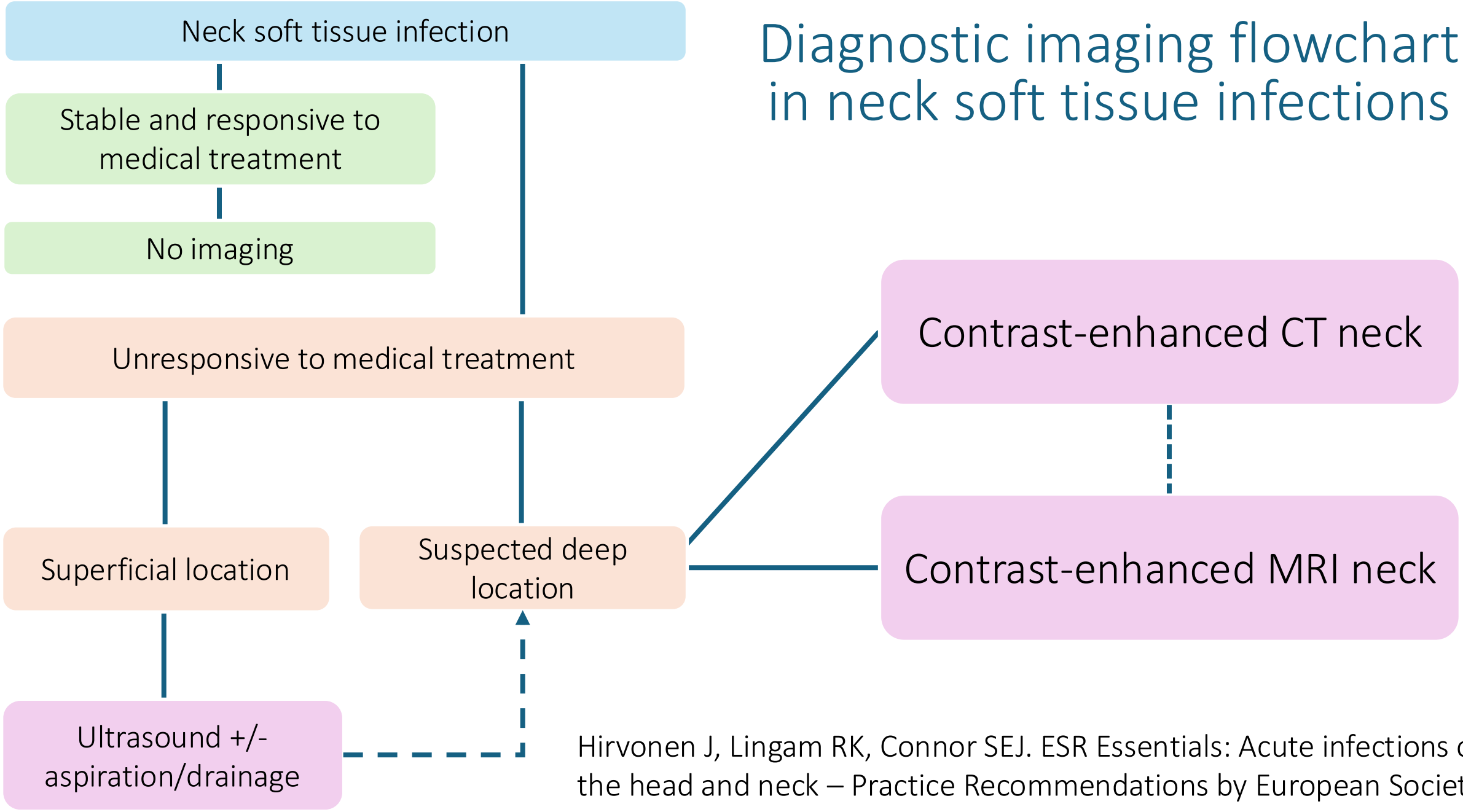
Mucor, *Aspergillus;* immunocompromised patients; high mortality rate (50–80%)

Consider CTA/MRA

Deep neck infections

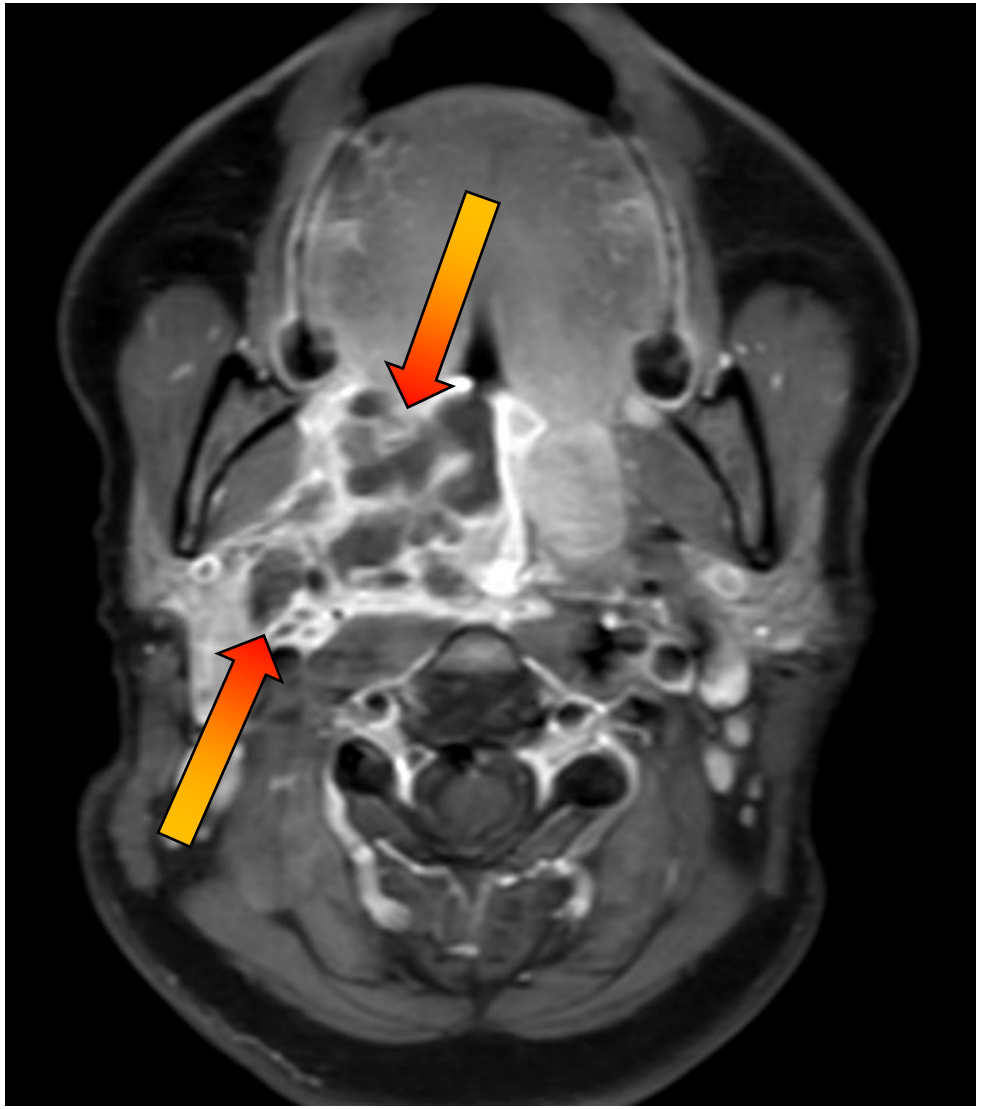
- **Mostly pharyngotonsillar (throat) or odontogenic (teeth)**
  - Multibacterial etiology
  - Look for extension into deep neck spaces
- **Look for surgically drainable abscesses**
  - CT: mass effect, low-density core, rim enhancement
  - MRI: high T2SI, no enhancement on T1C, low ADC on DWI
  - Irregular shape suggests poor prognosis
- **Rule out complications**
  - Vascular thrombosis
  - Airway compromise
  - Descending mediastinitis

Diagnostic imaging flowchart in neck soft tissue infections



Hirvonen J, Lingam RK, Connor SEJ. ESR Essentials: Acute infections of the head and neck – Practice Recommendations by European Society of Head and Neck Radiology. *European Radiology* 2026;36:334-343

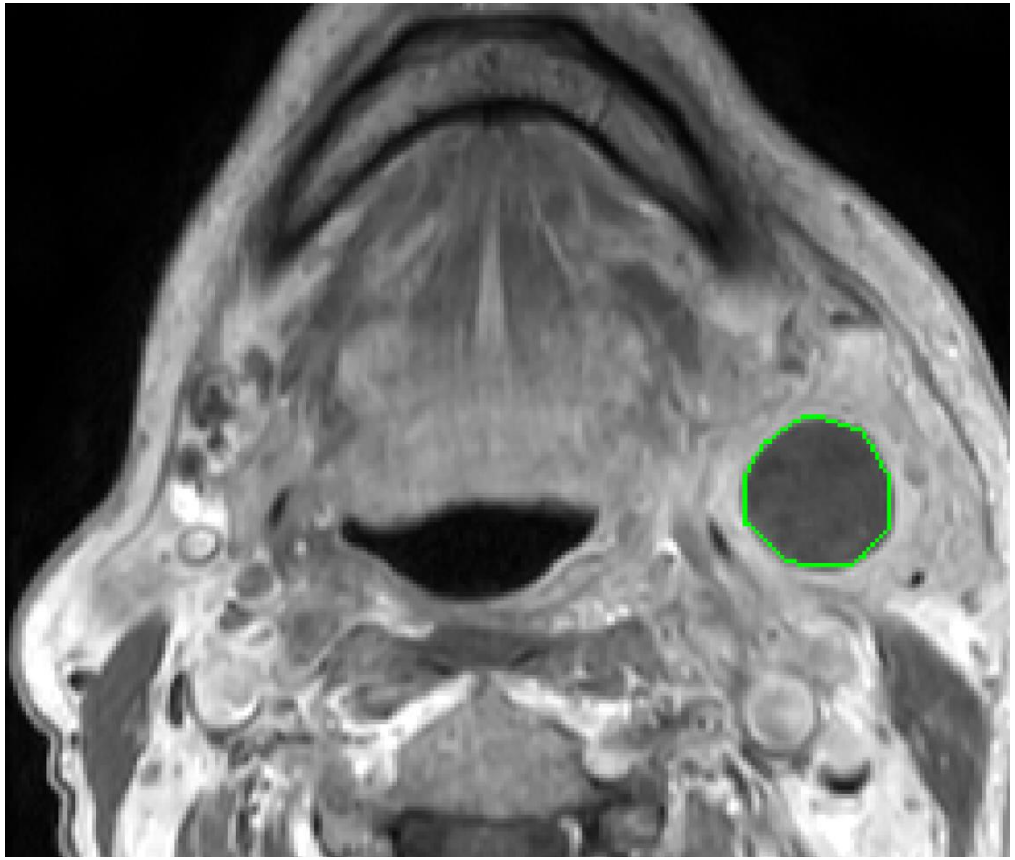
Computed tomography



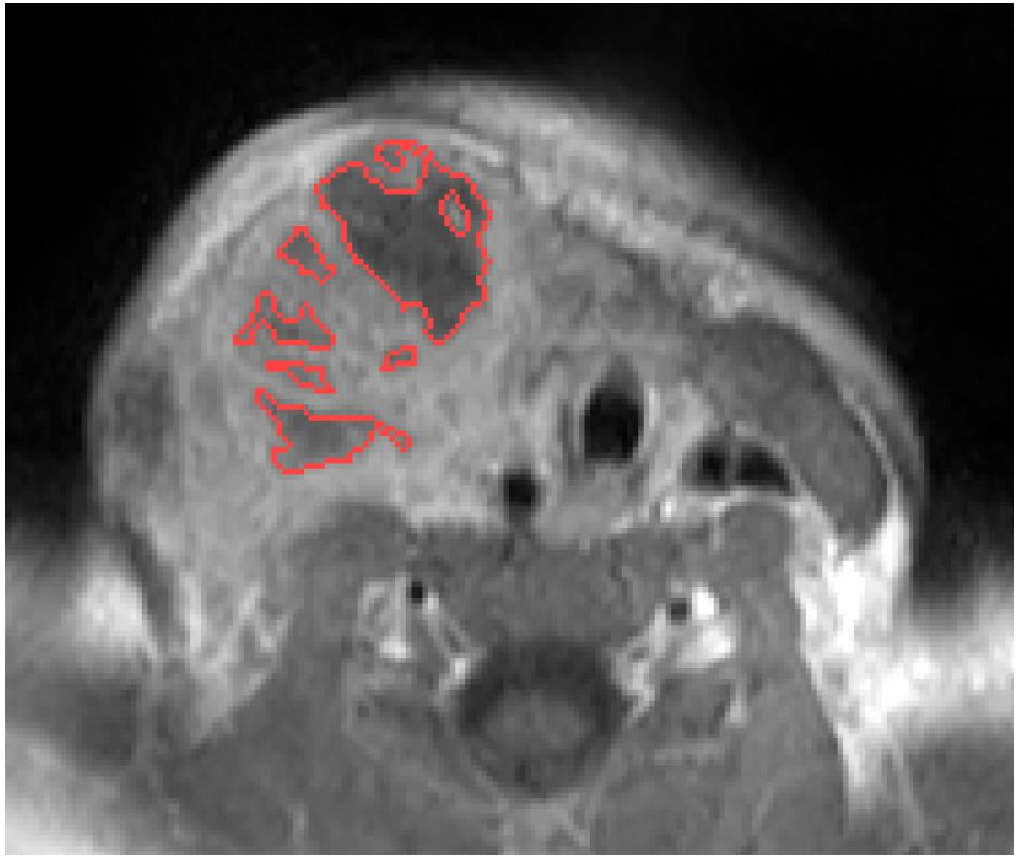
Magnetic resonance imaging

Abscess irregularity carries a poor prognosis

Round abscess; Volume = 6.4 cc
Sphericity = 0.76
Good outcome

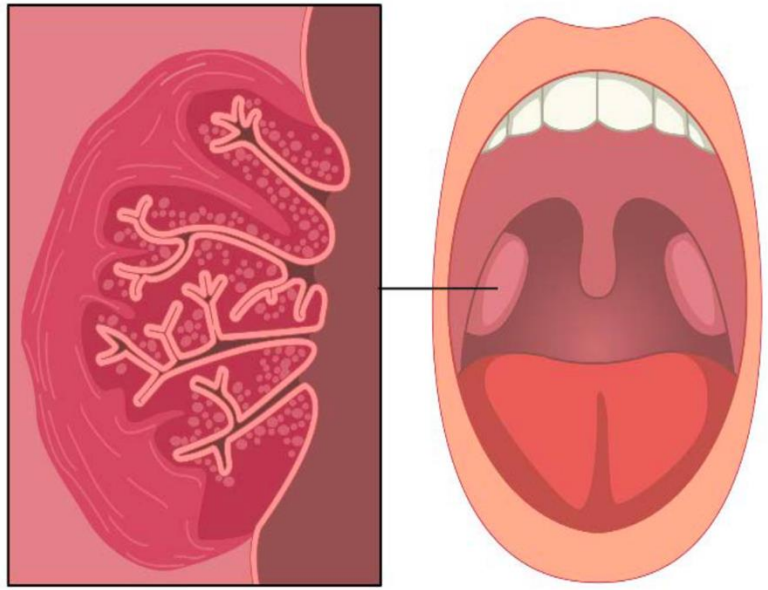


Irregular abscess; Volume = 6.1 cc
Sphericity = 0.29
Intensive care unit + prolonged stay



Overview of tonsillar infections

- Palatine tonsils have lymphoid tissue (part of Waldeyer's ring)
- Tonsillar crypts are formed by deep invaginations of the epithelium into the tonsil, increasing surface area for interactions between antigens and lymphoid tissue
- Tonsillitis may be viral or bacterial
- Peritonsillar abscess (PTA, quincy) forms between tonsillar capsule and pharyngeal constrictor muscle
  - Tonsil lymphatics or minor salivary glands
- Parapharyngeal abscess (PPA) directly or as complication of PTA

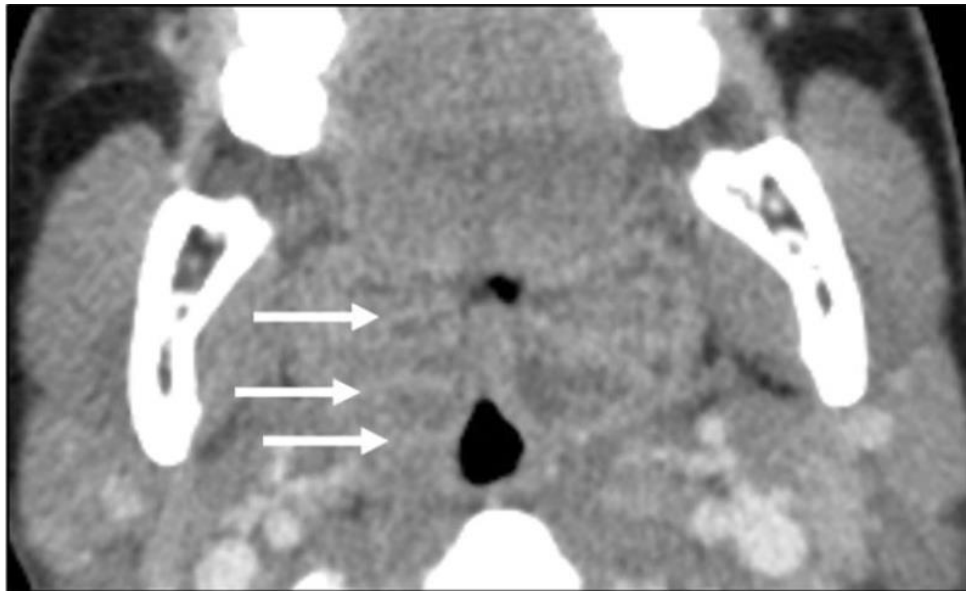


Klug TE (2017) Peritonsillar abscess: clinical aspects of microbiology, risk factors, and the association with parapharyngeal abscess. Dan Med J 64:B5333

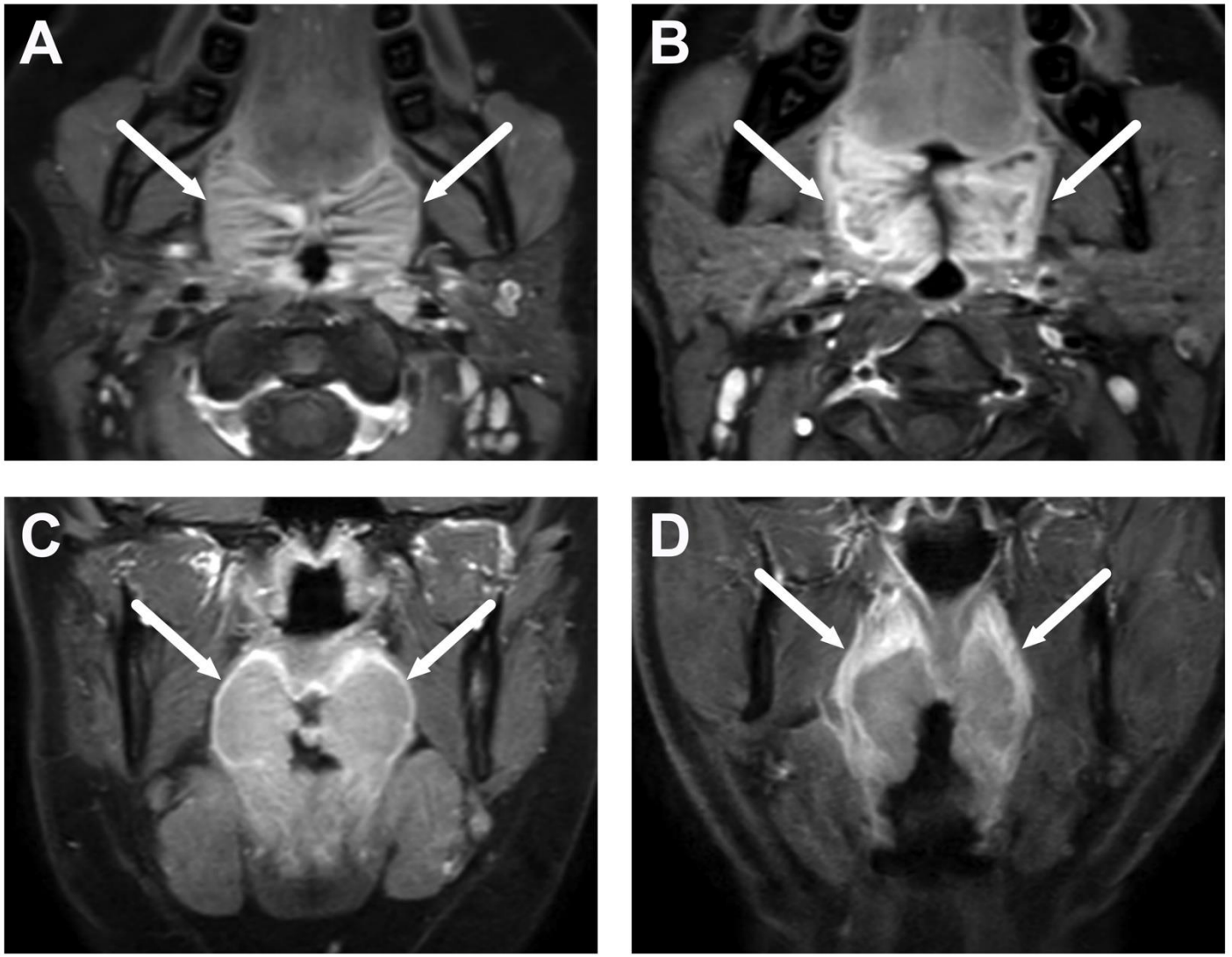
Tonsillitis with no abscess

”Tonsillitis”
”Peritonsillitis”

Look for <u>tiger-stripe appearance</u>
(fluid within tonsillar crypts)

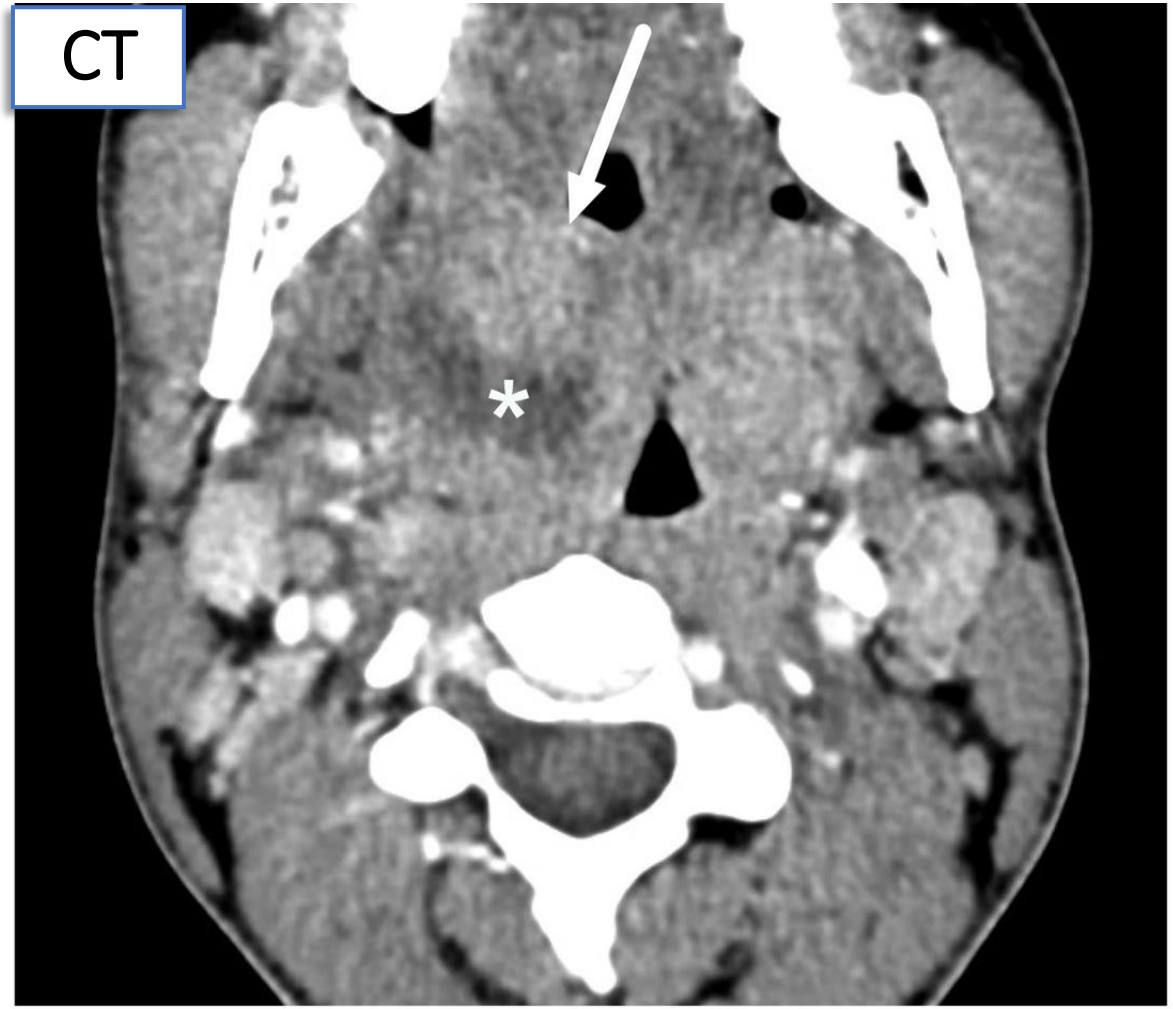


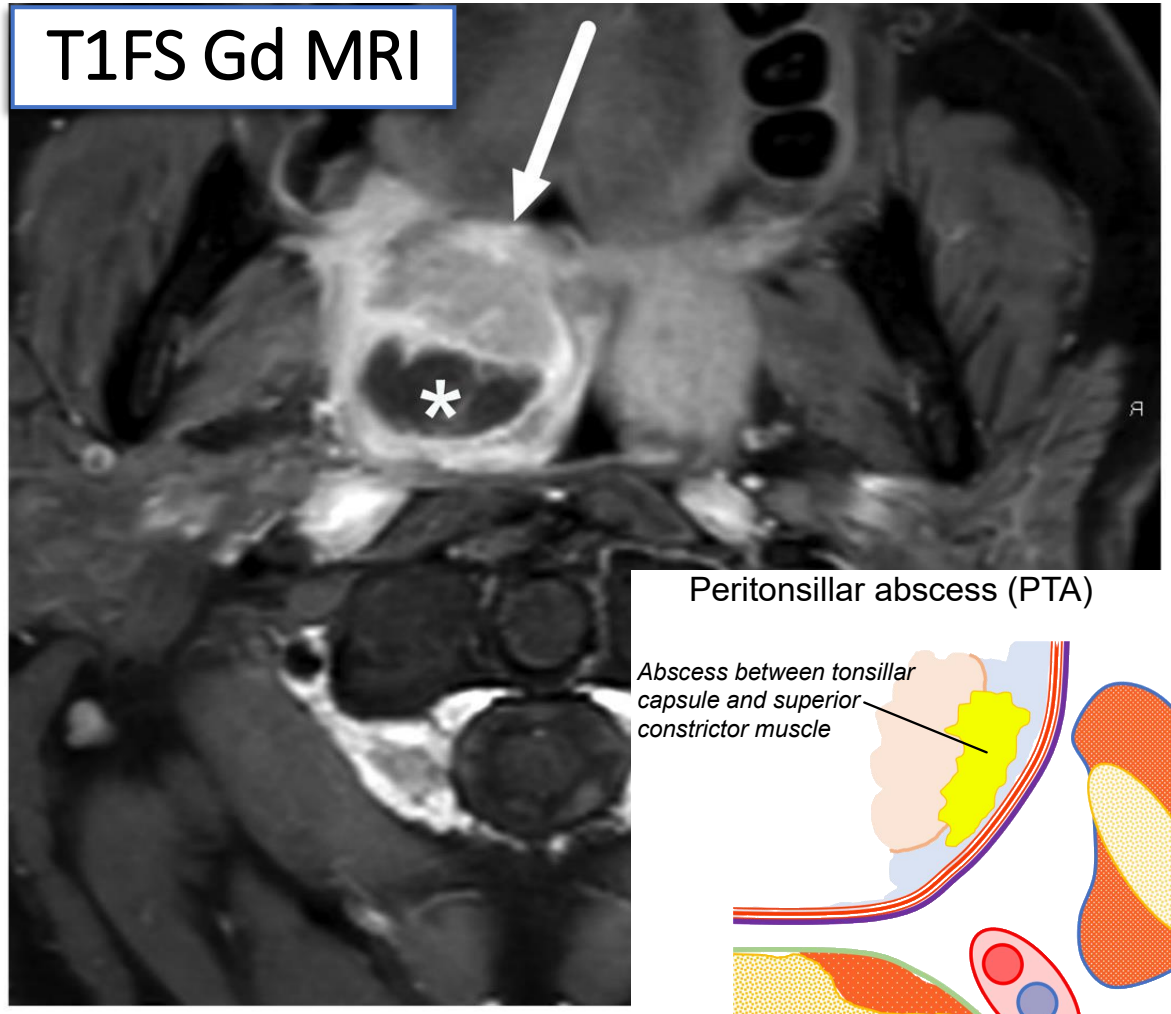
Bhatt *Emerg Rad* 2018

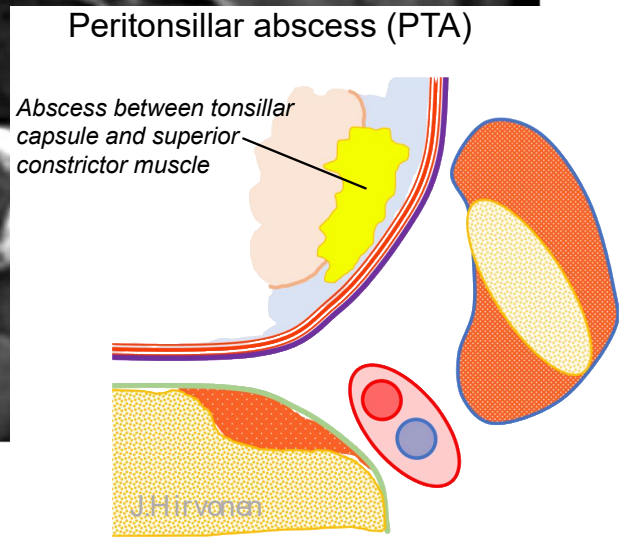


Hirvonen *Insights Imaging* 2023

Peritonsillar abscess (PTA)

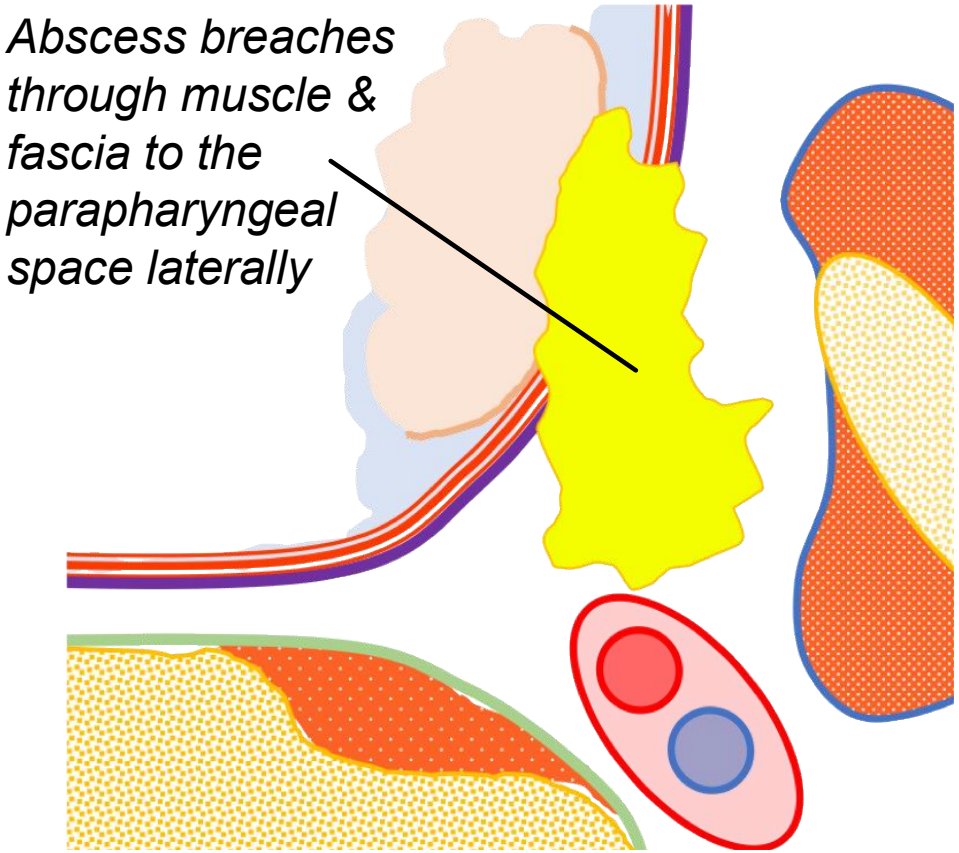


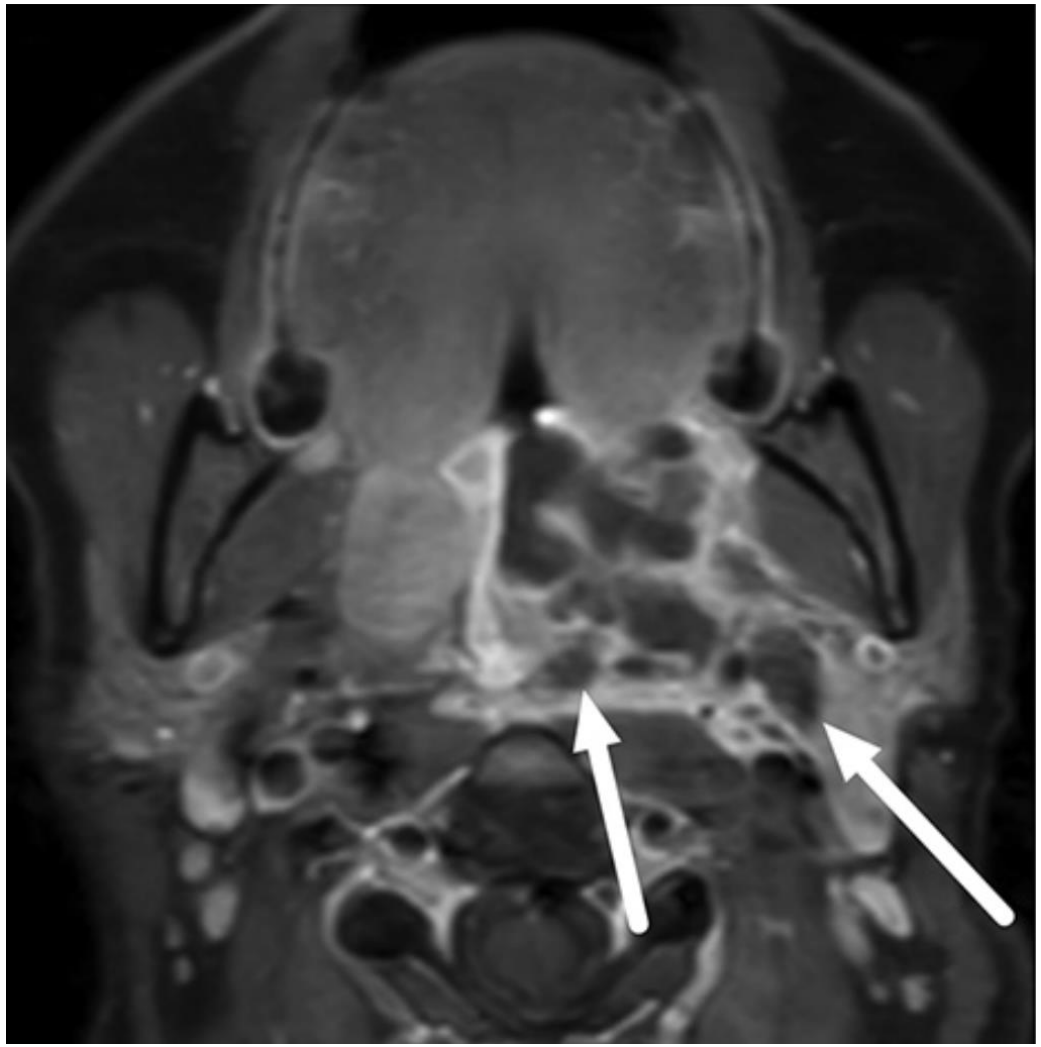




Deep extension of PTA into PPS/RPS

Parapharyngeal abscess (PPA)

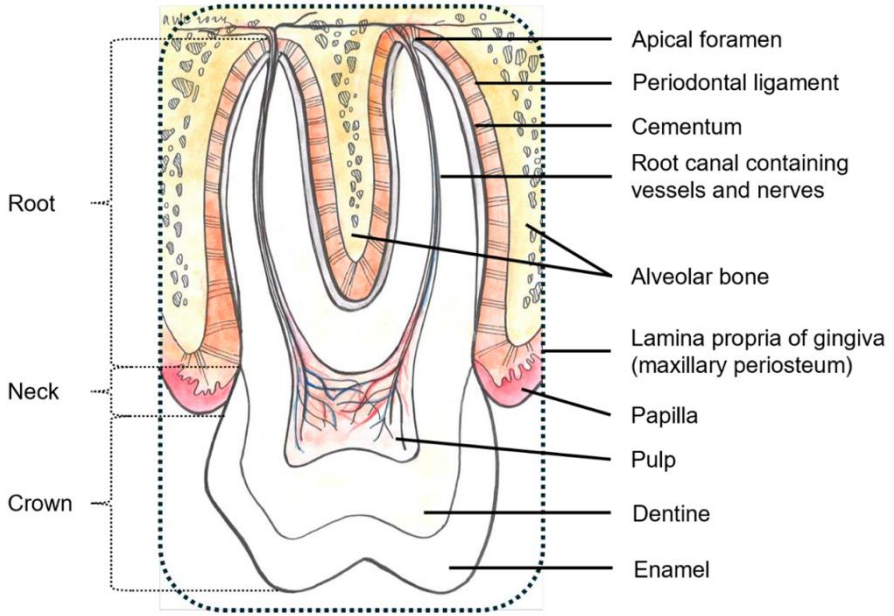




Heikkinen *et al*. *AJNR Am J Neurorad* 2022

Overview of odontogenic infections (OI)

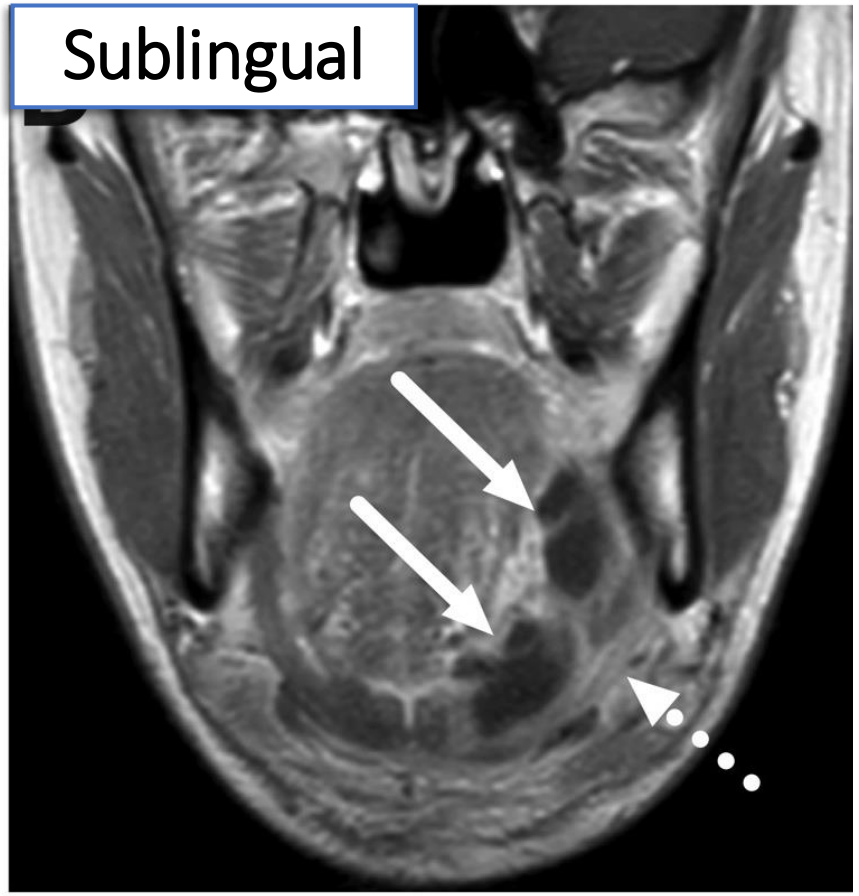
- Periapical periodontitis and postoperative infections are the most common causes
- Mandibular molars are the most common teeth
- Polymicrobial etiology involving both aerobic and anaerobic microbes
  - *Str. anginosus* group most severe
- Deeply extending OI suggested by toothache, fever, breathing or swallowing difficulties, trismus, facial and neck swallowing
- Imaging required to demonstrate drainable abscesses and rule out complications

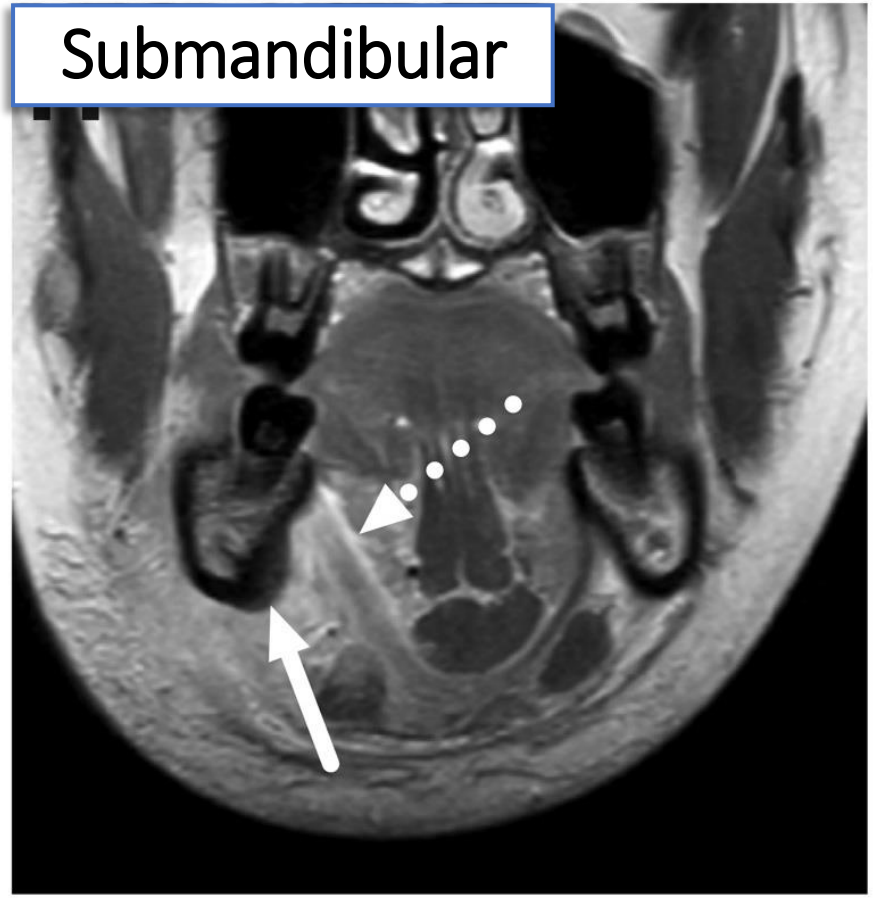


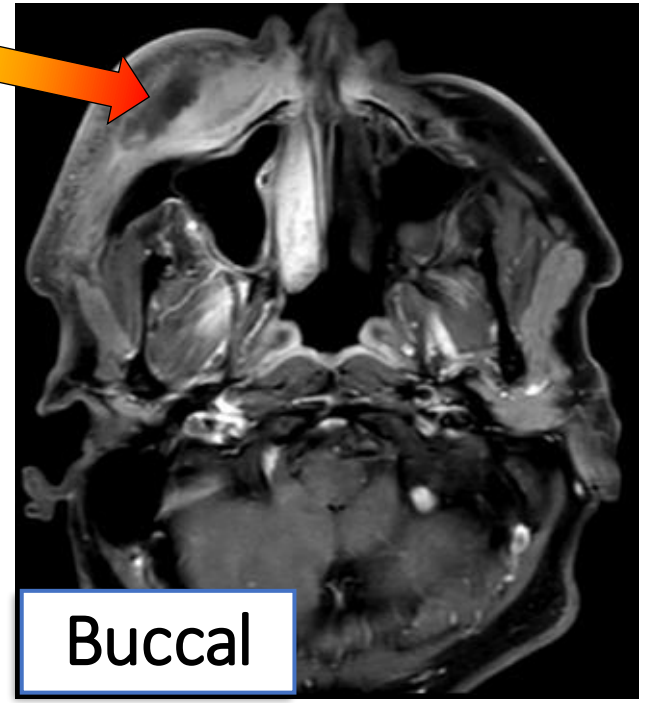
Dr. Annina Wuokko-Landén

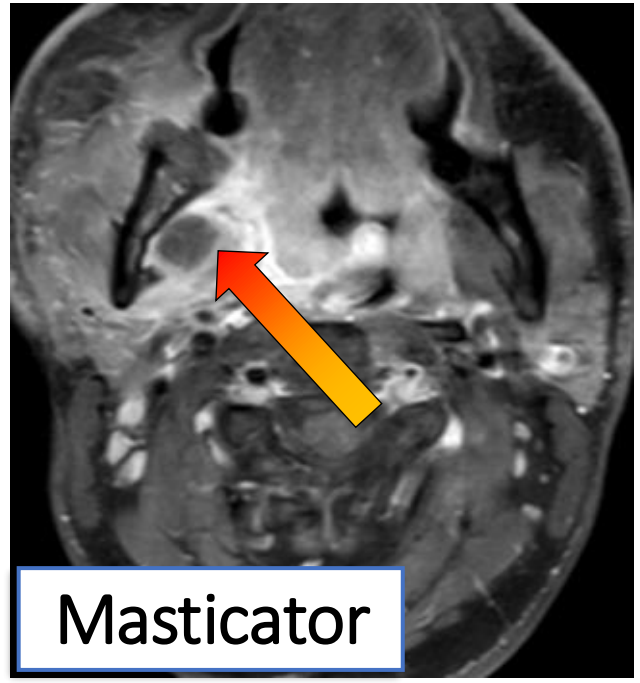
Oral cavity: mostly odontogenic abscesses

- Tooth decay
- Periapical changes
- Bone marrow changes
- **Abscesses**



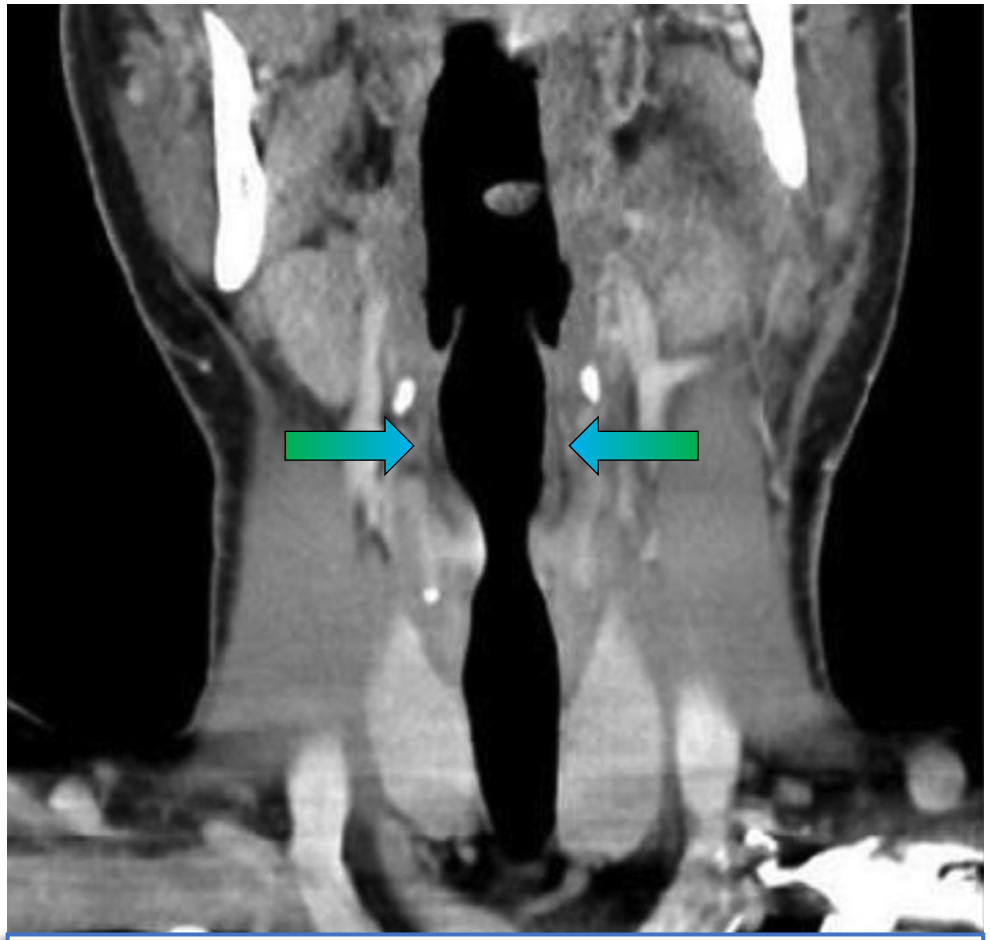






Heikkinen *Oral Radiology* 2023

Imaging assessment of airway compromise

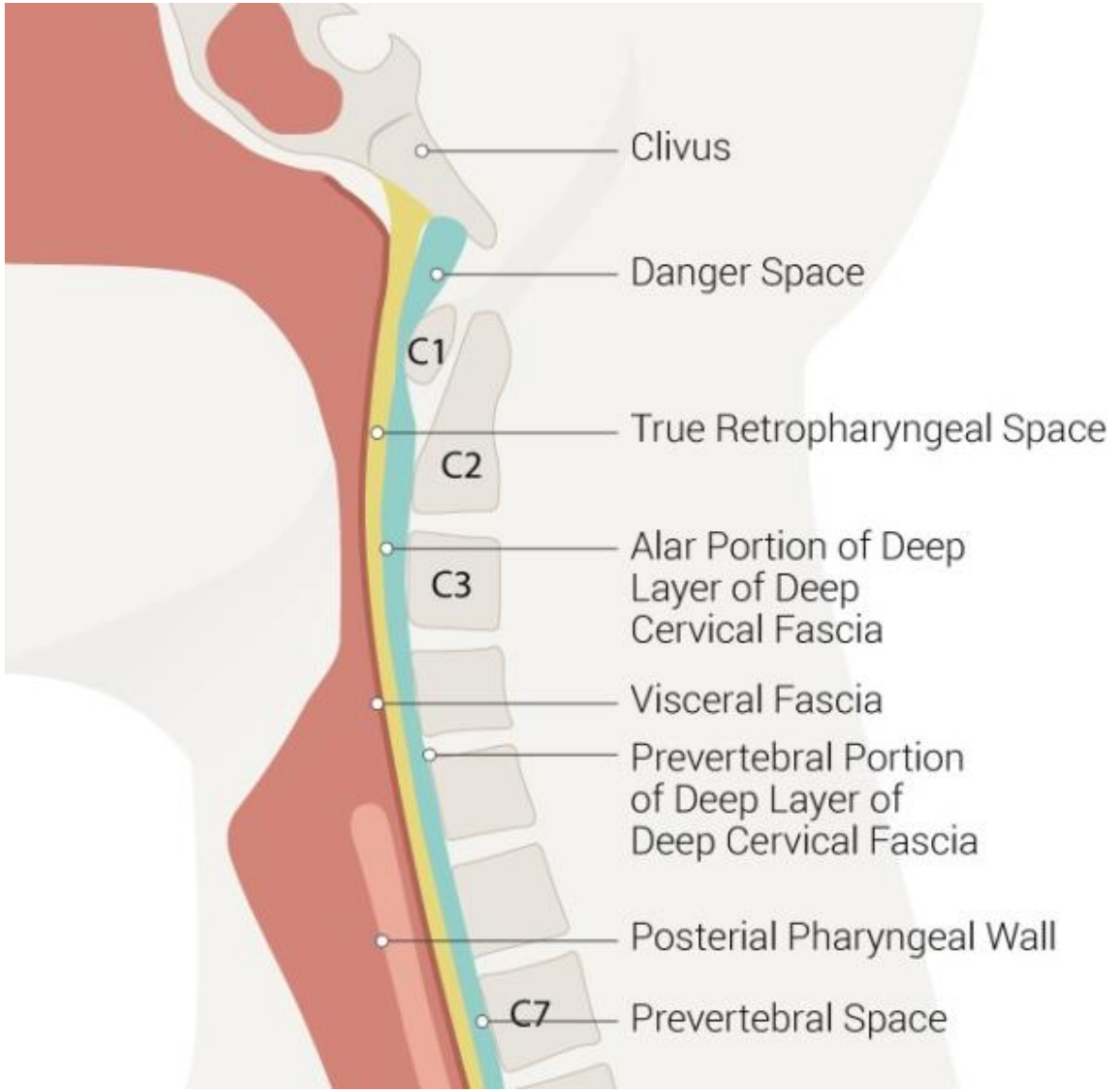


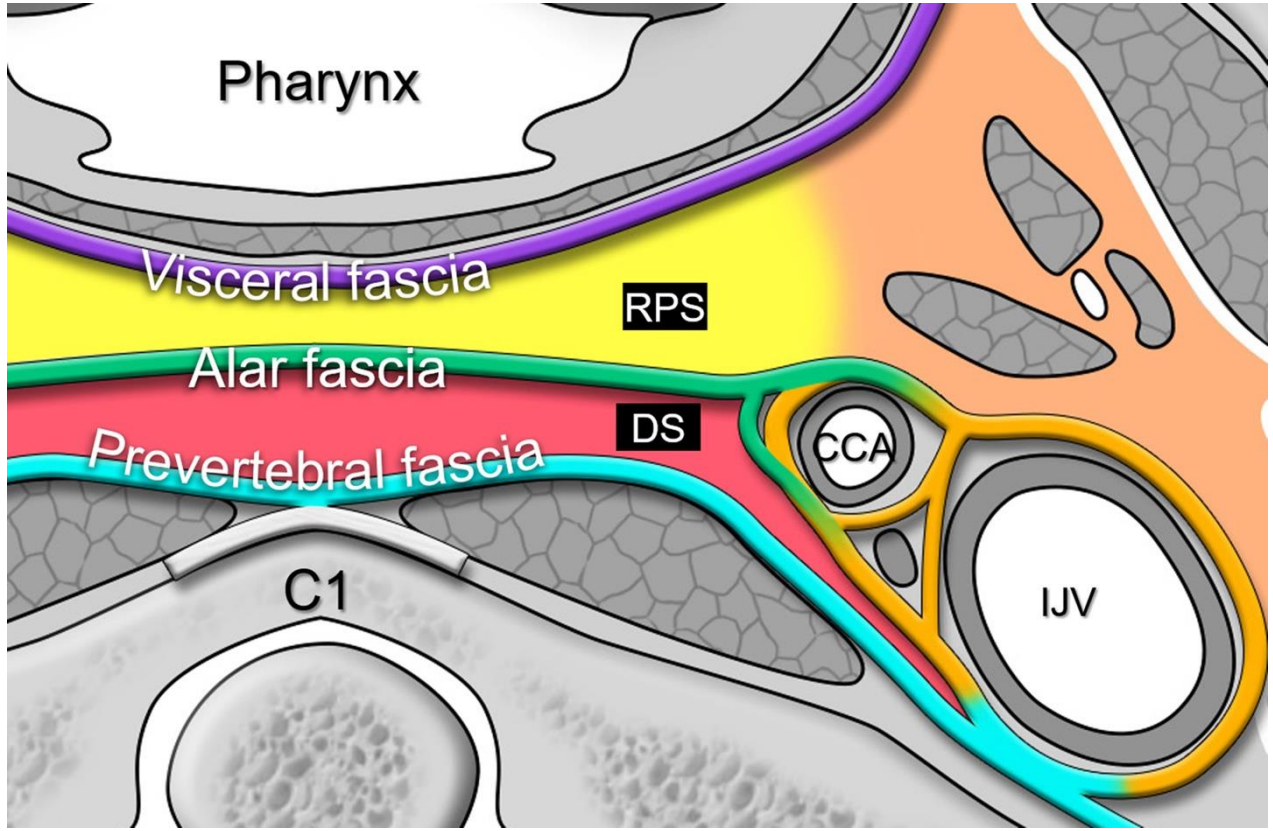
Uncompromised

Compromised

Rautaporras et al. Journal of Stomatology oral and Maxillofacial Surgery 124 (2023) 101424

Retropharyngeal space – gateway to the mediastinum



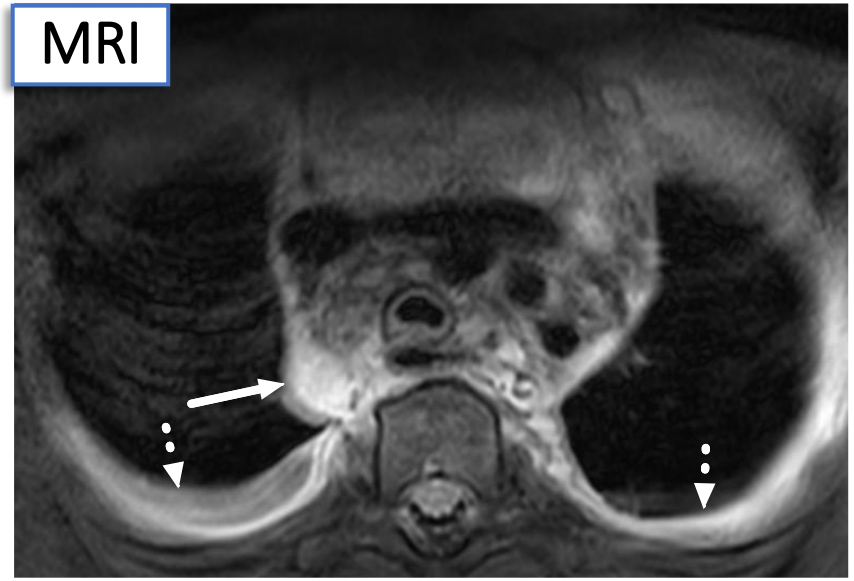


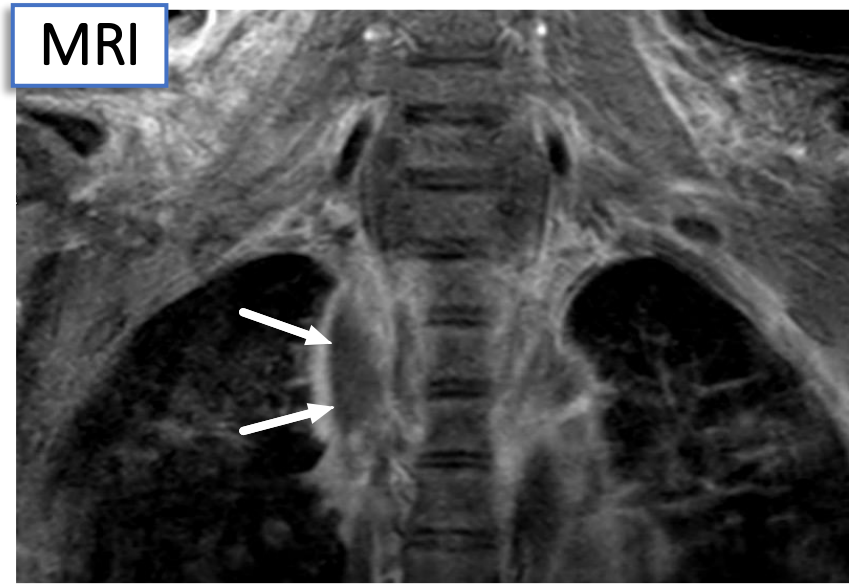
Gavid *et al*. Anatomical and histological study of the deep neck fasciae: does the alar fascia exist? Surg Radiol Anat 2018;40:917–922.

Snosek *et al*. Anatomical and histological study of the alar fascia. *Clinical Anatomy*. 2021; 34: 609– 616.

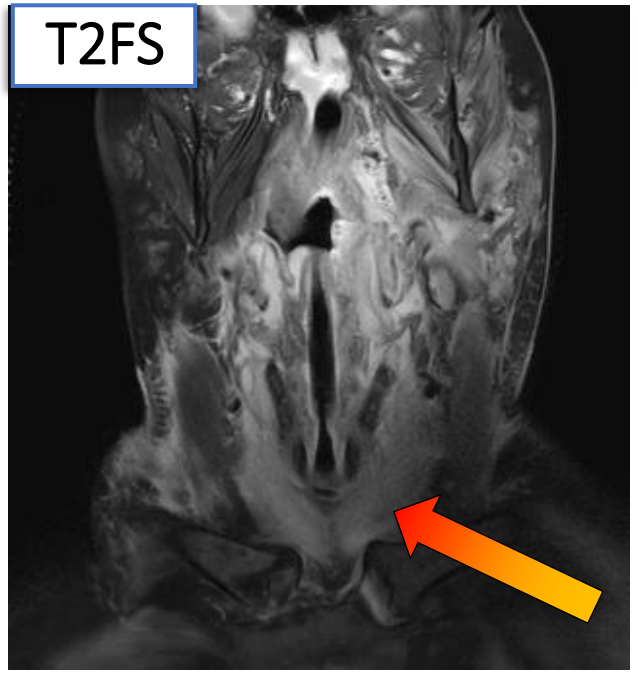
Descending mediastinitis

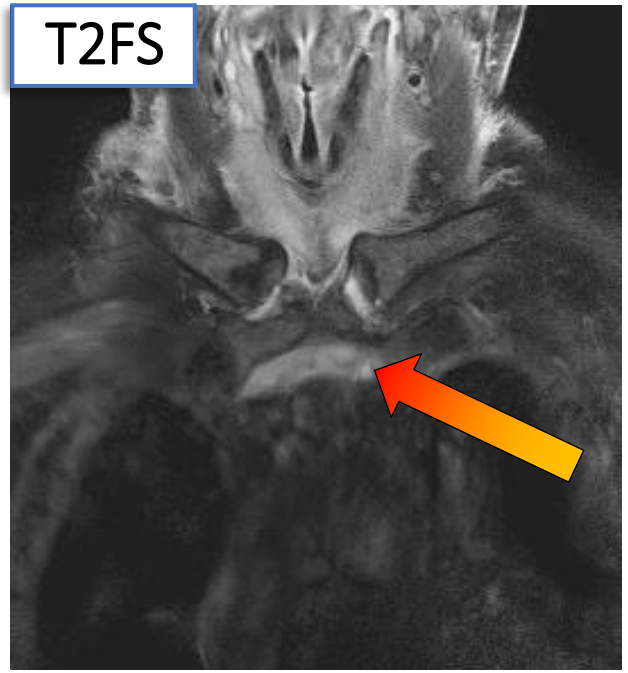
Posterior route



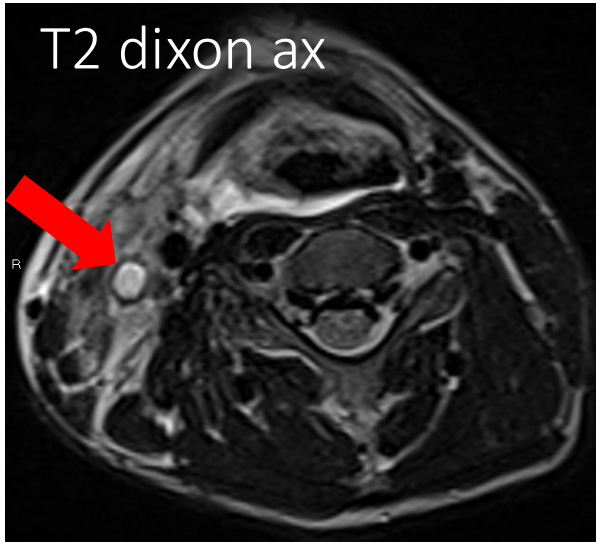


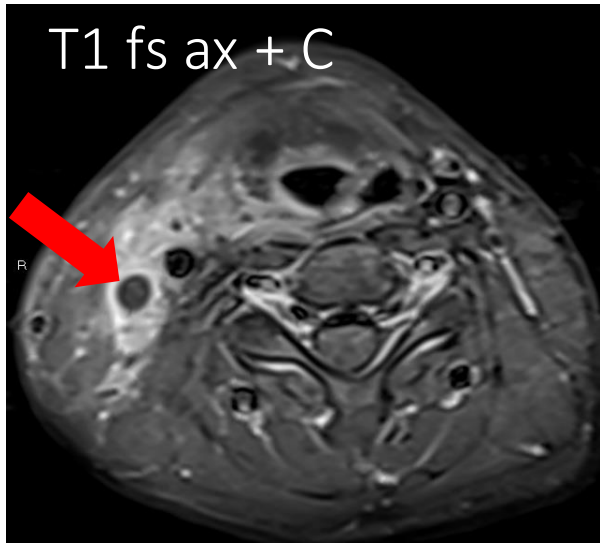
Anterior route





Complication: venous thrombosis



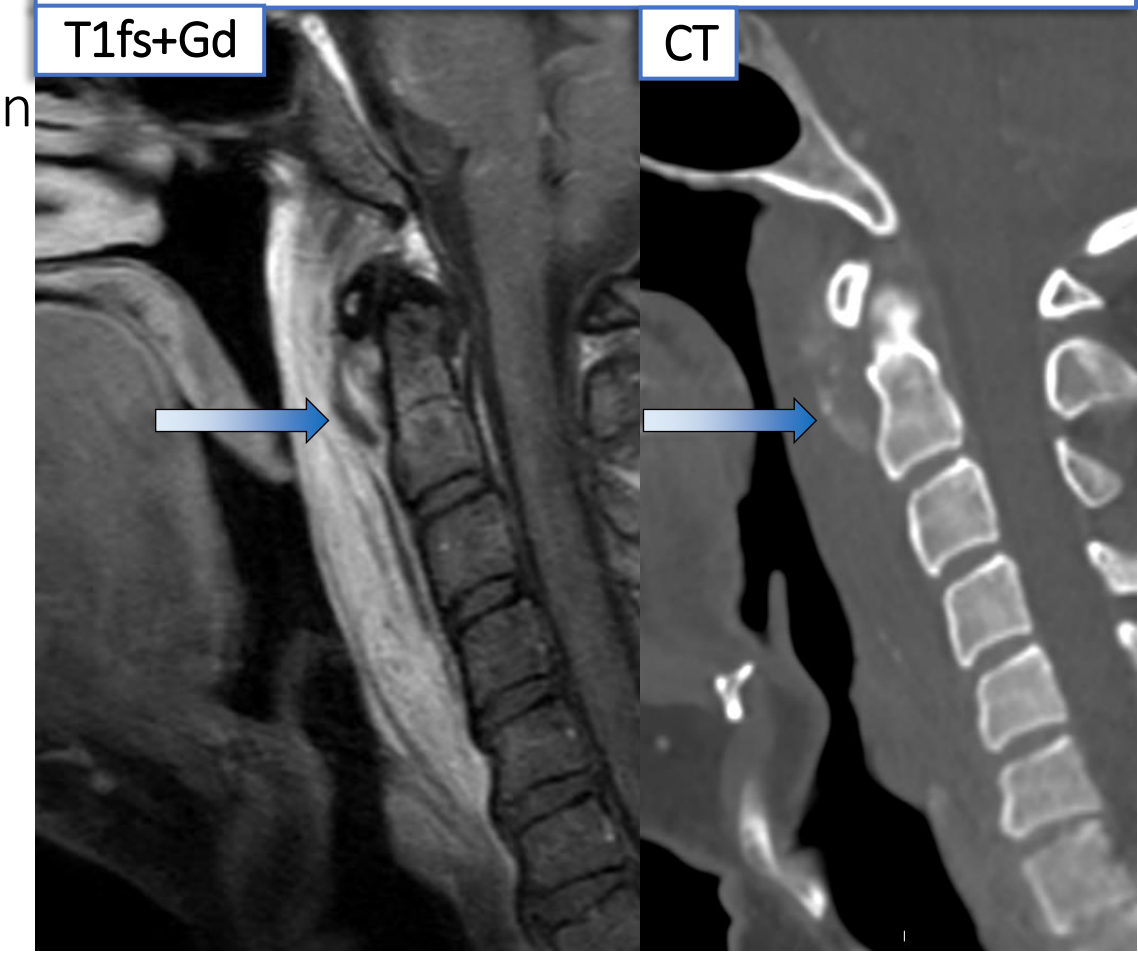


Dx: Lemierre syndrome (*F. necrophorum*)

Infection mimic: longus colli calcific tendinitis

- A rare inflammatory disease with unknown origin[1,2]
- Incidence 1/1000 acute neck CT
- Calcium hydroxyapatite crystal deposits, inflammation in the longus colli muscle tendons
- Clinical: neck pain and stiffness, odynofagia, fever, headache, elevated CRP & WBC
- Imaging findings:
  - Swollen and edematous longus colli muscles
  - May have retropharyngeal edema (no abscesses)
  - Amorphous calcifications (best seen on CT)
- Differential diagnosis:
  - Deep neck infection, retropharyngeal abscess, spondylodiscitis
- Treatment: NSAIDs

Case example: CRP 156, WBC 10.8



[1]Paik et al. J Comput Assist Tomogr. 2012;36(6):755-61. [2]Boardman et al. Emerg Radiol 2017;24(6):645-651.

Take home: Five critical findings

1. **Complicated sinusitis**
   MRI when orbital or intracranial extension is suspected
2. **Deep neck abscess**
   CT/MRI; irregular shape predicts worse outcome
3. **Airway compromise**
   narrowed or displaced lumen drives intubation planning
4. **Descending mediastinitis**
   always look below the clavicles on a neck CT/MRI
5. **Vascular thrombosis**
   check the internal jugular vein — think Lemierre

Hirvonen J, Lingam RK, Connor SEJ. ESR Essentials: Acute infections of the head and neck – Practice Recommendations by European Society of Head and Neck Radiology. *European Radiology* 2026;36:334-343

eshnr

european society of
head and neck radiology

Save the date!

ESHNR 2026

38th Annual Meeting and Refresher Course

September 10–12 | Budapest, Hungary