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head and neck radiology

Foreign bodies in the head and neck

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

Systematic approach to imaging foreign bodies

Mechanism

- Inhalation
- Ingestion – migration
- Insertion
- Penetrating trauma (accidental/self-inflicted)

Material

- Wood
- Metal
- Bone
- Glass, plastic
- Sand/gravel/stone

Method

- X-ray
- US
- CT
- MRI

Complications

- Infection / abscess
- Vascular injury / bleeding
- Airway compromise
- Organ injury
- Hematoma

Talk will not include

- Tracheobronchial
- Esophageal
- Implants
- Medical devices

What the clinician wants to know?

- Confirm presence or absence of foreign body
  - Unknown (*e.g.*, unclear trauma or ingestion)
  - Known (*e.g.*, penetrating trauma by a large object)
- Confirm material composition
- Describe exact anatomical compartment
  - Especially important in migrating foreign bodies
- Describe potential complications:
  - Airway compromise
  - Hematoma, bleeding
  - Vascular injury
  - Organ injury
  - Emphysema
  - Infection / abscess formation
- Describe concomitant injuries in traumatic foreign bodies

Voss *et al. Insights Imaging (2021) 12:20* https://doi.org/10.1186/s13244-021-00969-9

Material composition and imaging

Wood
- Not seen on x-ray
- Hyperechoic on US
- Hypodense on CT
- Variable on MRI

Metal
- Radiopaque on x-ray/CT
- Hyperechoic on US
- Beware when considering MRI!

Bone
- Trauma fragments or ingested (fish)
- Hyperechoic on US
- May be seen on x-ray
- Hyperdense on CT

Plastic
- Wide variety of materials
- Visibility dependent on: material composition, sample size, study design…

Stone/Gravel
- Penetrating trauma
- Hyperechoic on US
- Radiopaque on x-ray/CT

Glass
- Penetrating trauma
- Hyperechoic on US
- Radiopaque on x-ray/CT

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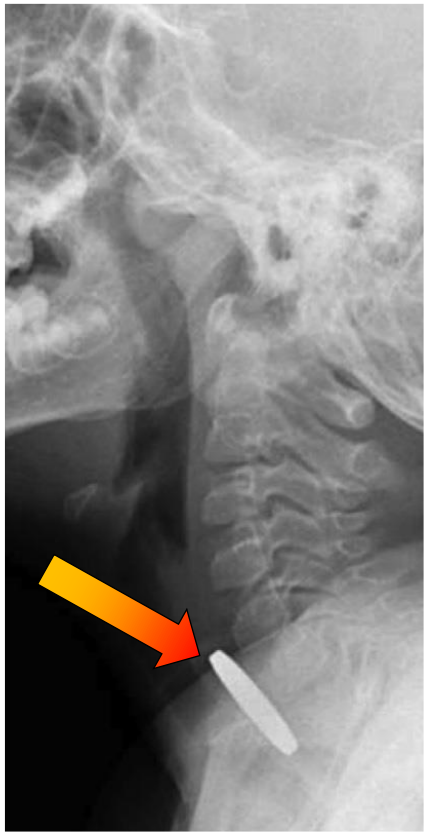
Comparison of imaging methods

- X-ray
  - Low sensitivity for wood and fish bone
  - Good sensitivity for: metal, glass, stone, gravel, *etc.*
- Ultrasound
  - For superficial imaging only; most are hyperechoic
- Computed tomography
  - Best overall performance in diagnostic accuracy
  - Especially for radiopaque foreign bodies, but also radiolucent
  - Consider low-dose in young people
- MRI
  - Diagnostic accuracy is variable
  - Higher sensitivity for abscesses than CT (complications)
  - Beware of unknown metallic foreign bodies

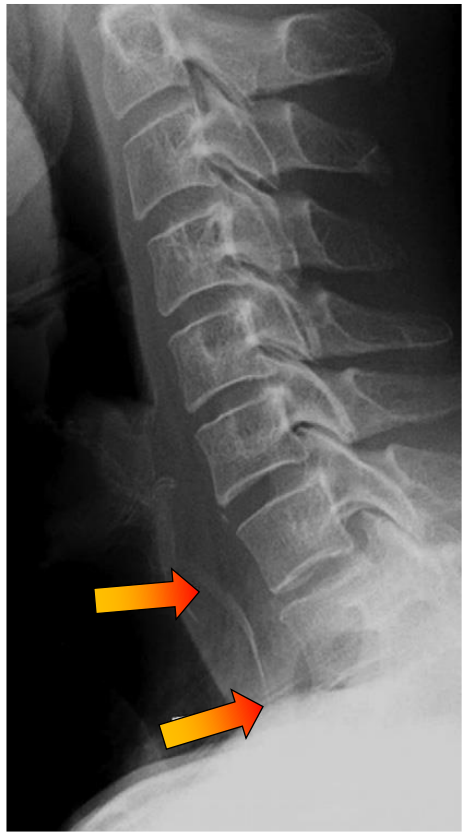
Mechanisms: Ingestion – where & what to look?



Coin

Dentures

Apricot stone



Fish bone

Food bolus

Pinto et al. *Seminars in Ultrasound, CT and MRI* 2012;33(5):463–70.

Materials: Wood

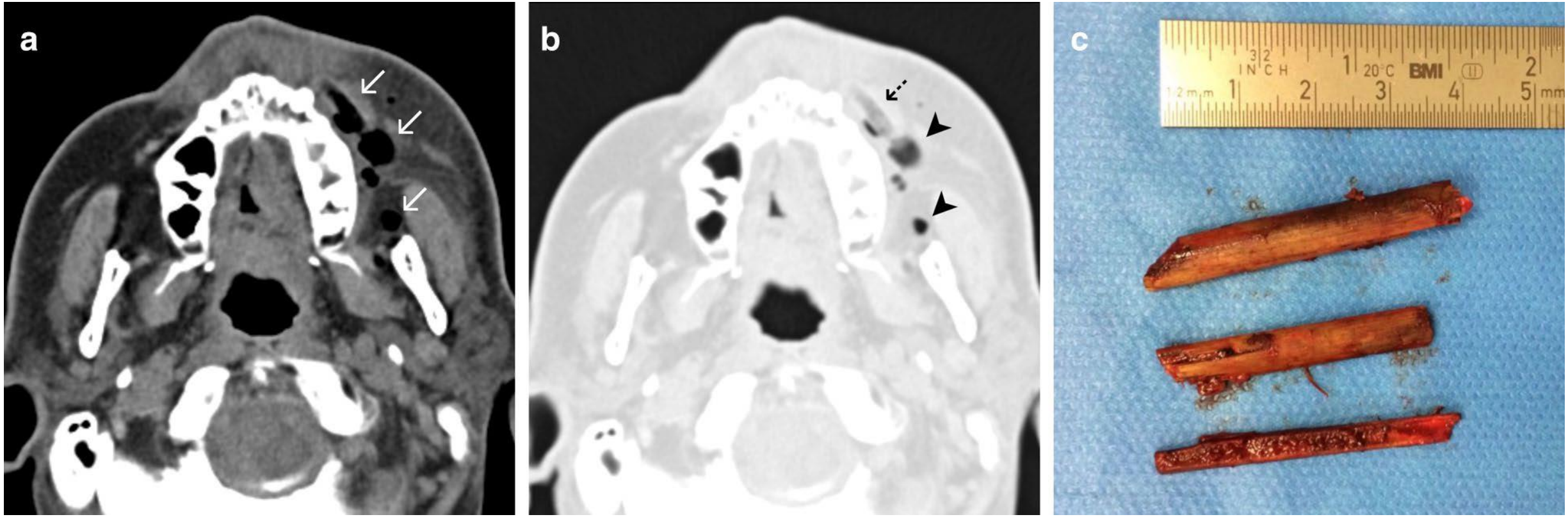
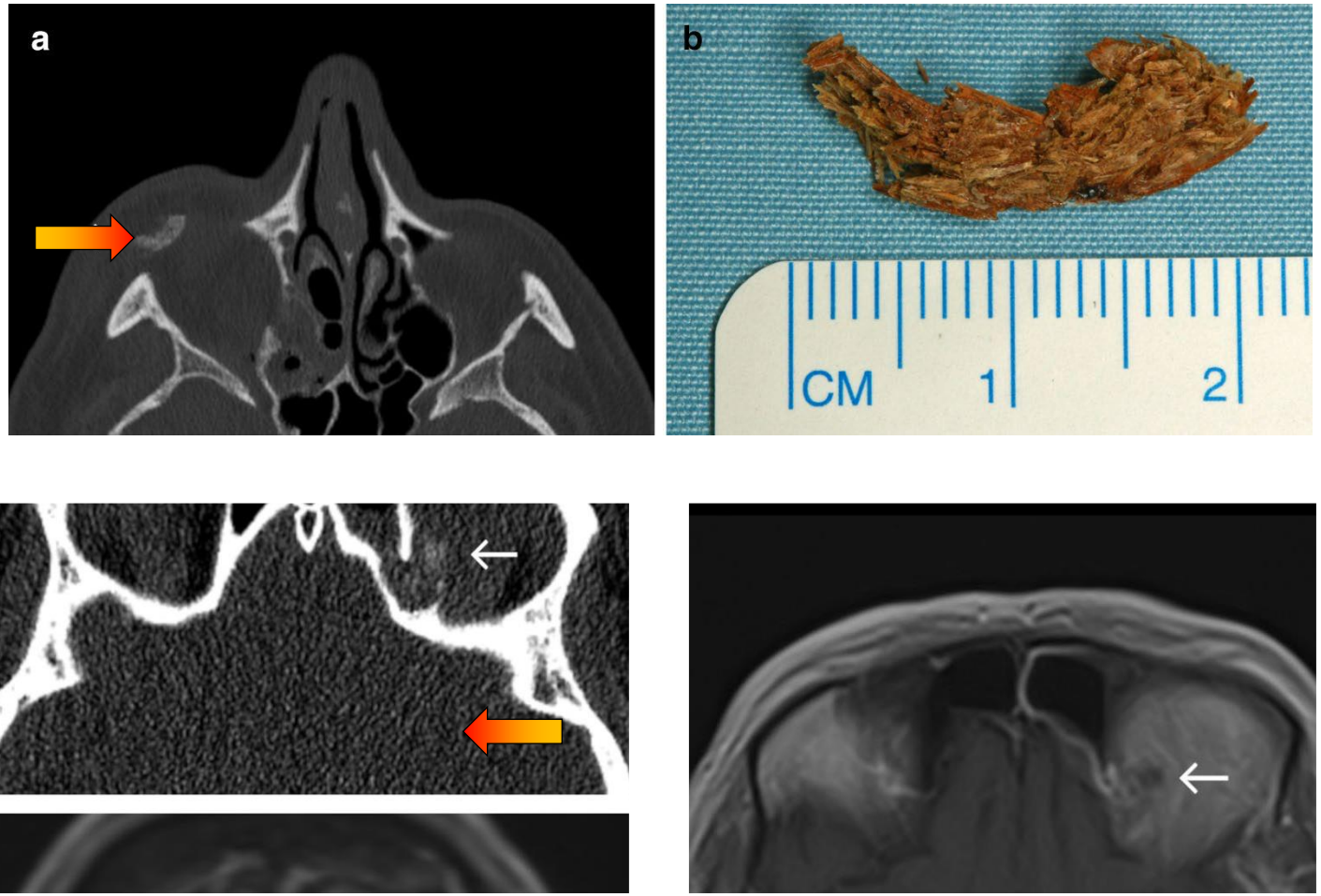


Fig. 1 Wooden stick. Axial CT image in soft tissue window (**a**) shows phlegmonous fat stranding in the left buccal region, surrounding multiple hypodense features (arrows), giving the impression of emphysema. Closer inspection of the lung windows (**b**) reveals that one of the hypodense structures has a discernible internal structure (dashed arrow), distinguishing it from the homogenously hypodense gas locules (arrowheads). Three pieces of a wooden stick were surgically removed (**c**)

Voss *et al. Insights Imaging (2021) 12:20* https://doi.org/10.1186/s13244-021-00969-9

Materials: Wood



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Materials: Metal

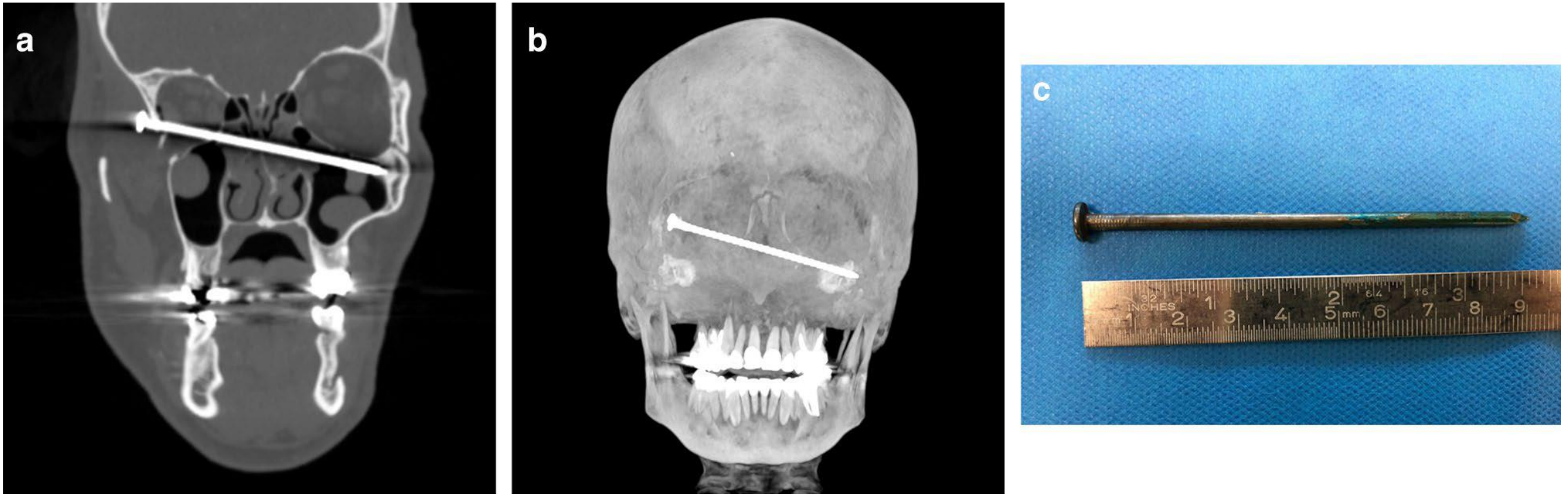
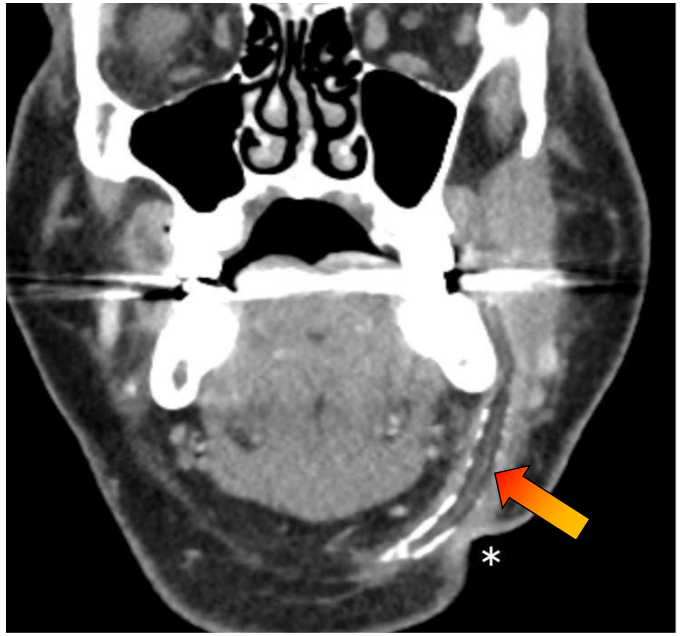


Fig. 8 Nail gun. Para-coronal CT image (**a**) and a 3-dimensional maximum intensity projection (**b**) showing a hyperdense straight foreign object entering the right lateral wall of the orbit, penetrating the left ethmoidal cells and the left maxillary sinus. A photograph of a metal nail after removal from the midface (**c**)

MRI may be contraindicated!

Voss *et al. Insights Imaging (2021) 12:20* https://doi.org/10.1186/s13244-021-00969-8

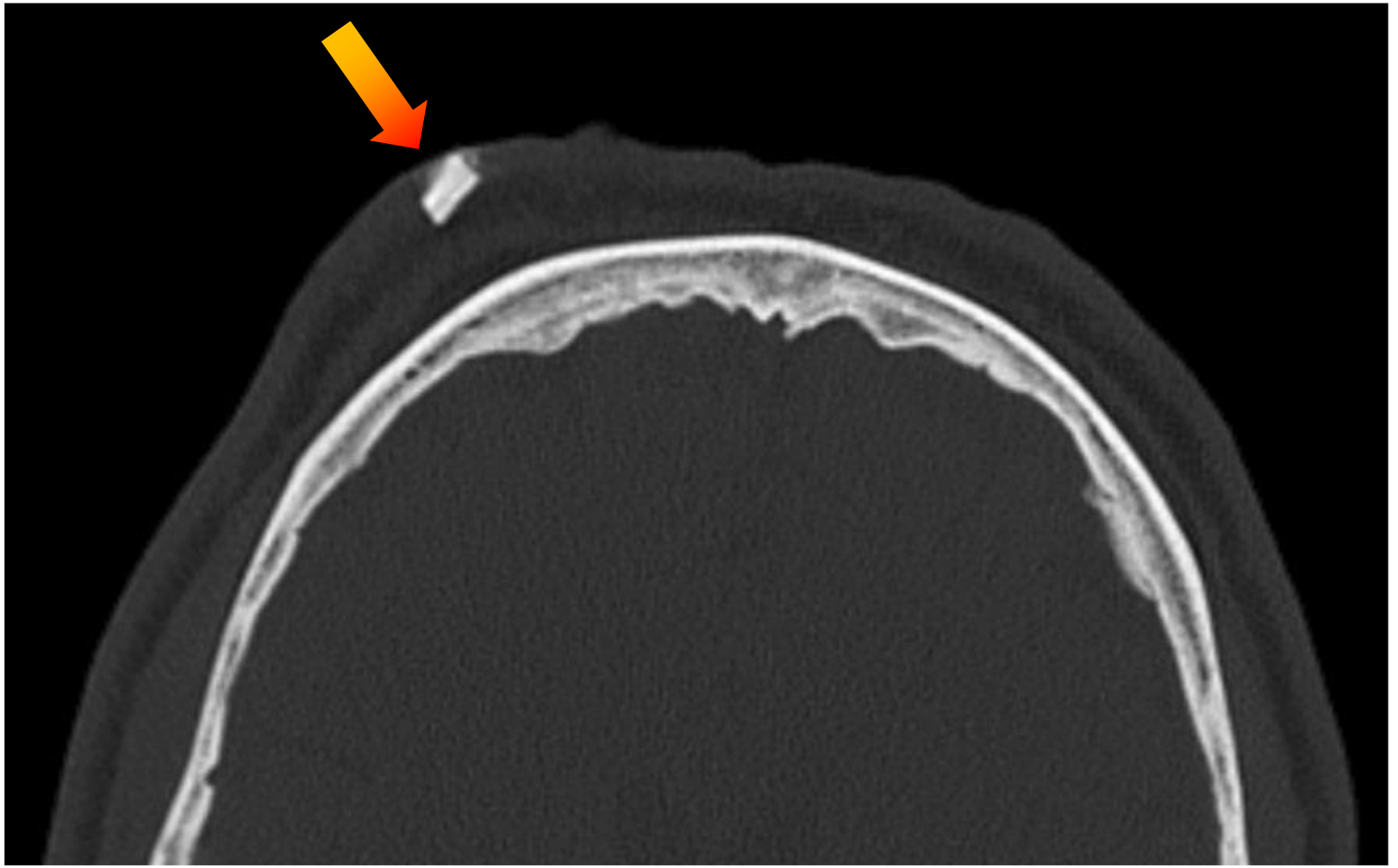
Materials: Plastic



Voss *et al. Insights Imaging (2021) 12:20*
https://doi.org/10.1186/s13244-021-00969-9

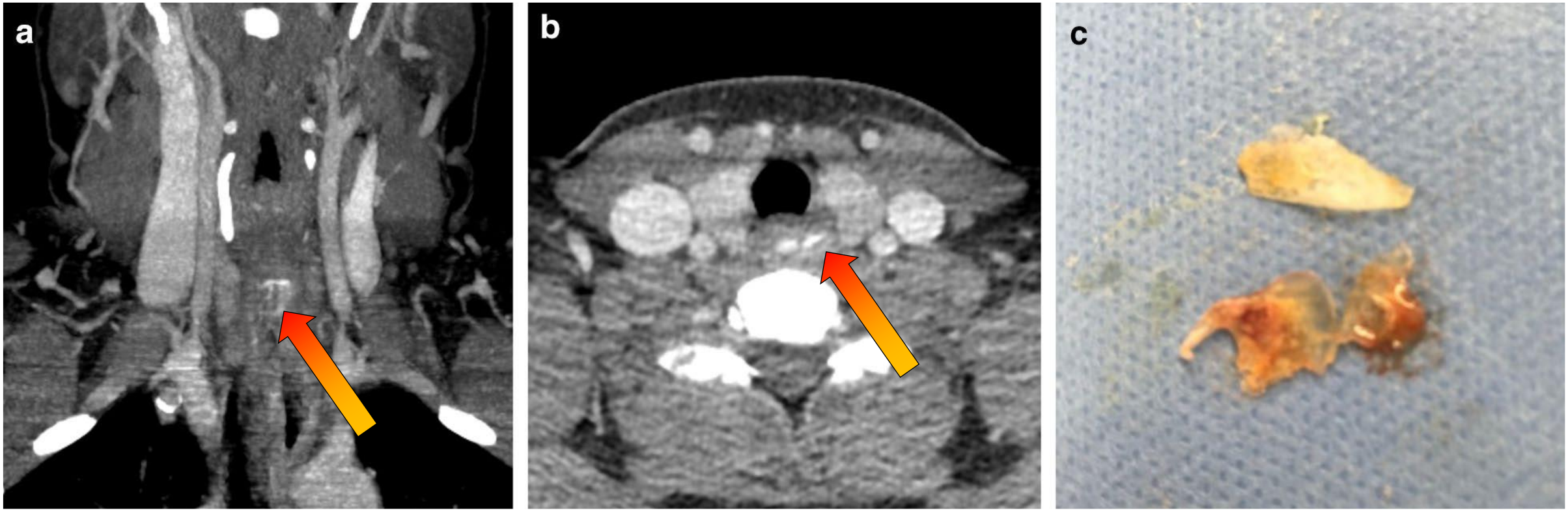
Ginat DT: Neuroimaging Clin N Am 2022 May;32(2):315-326.

Materials: Stone



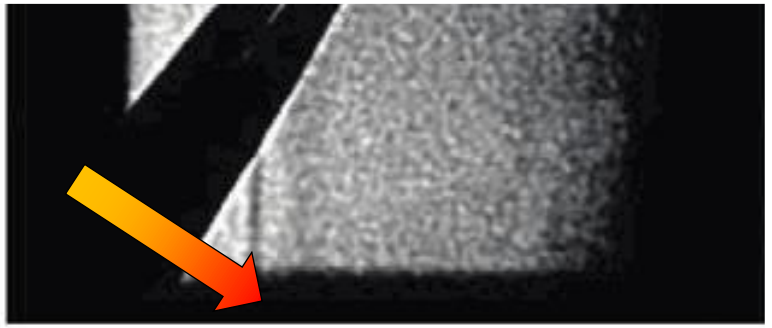
Voss *et al. Insights Imaging (2021) 12:20* https://doi.org/10.1186/s13244-021-00969-9

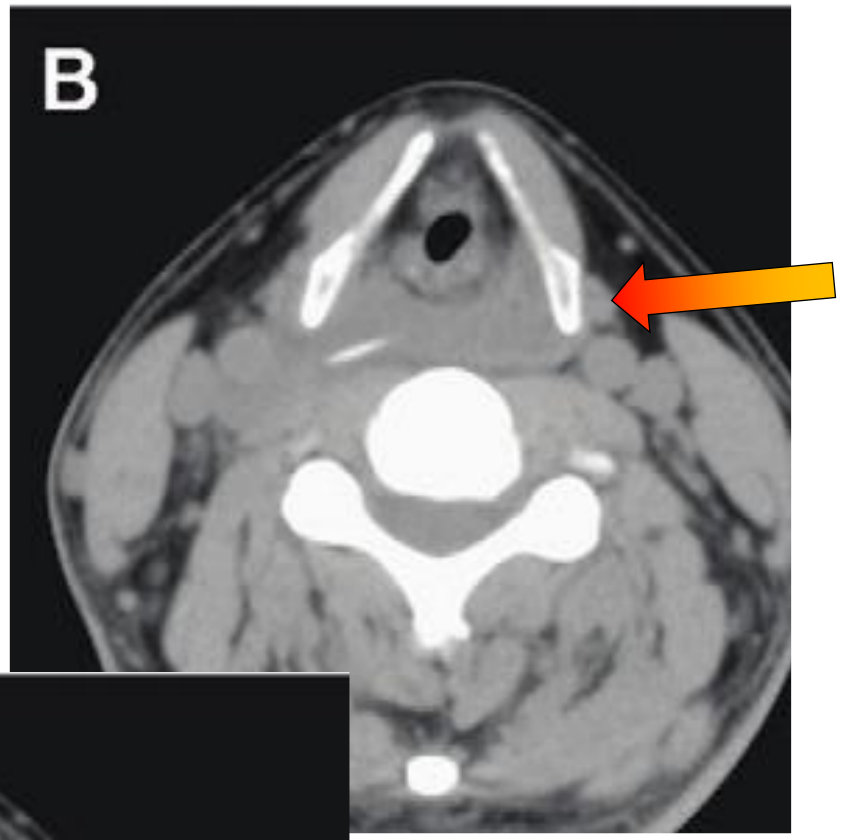
Mechanism: Ingestion (fish scales)

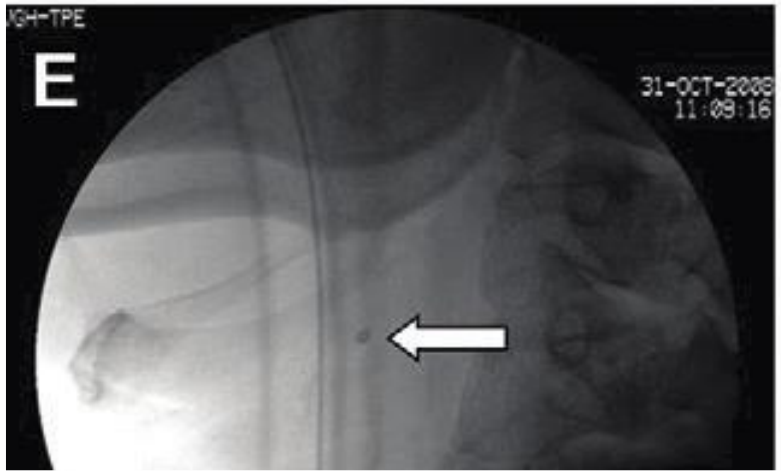


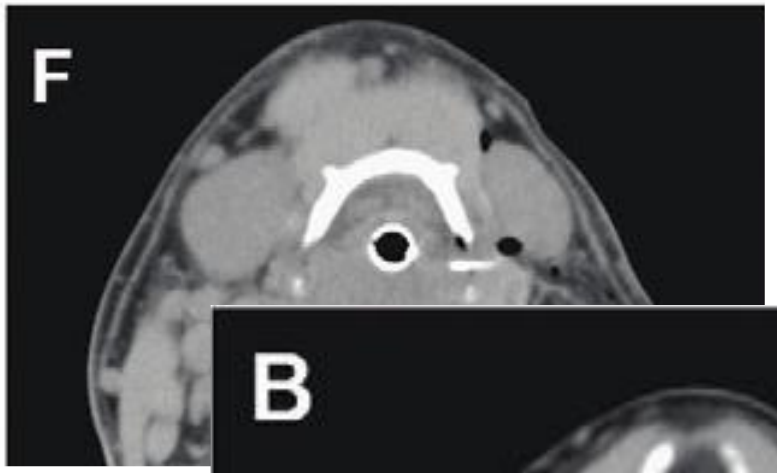
Voss *et al. Insights Imaging (2021) 12:20* https://doi.org/10.1186/s13244-021-00969-9

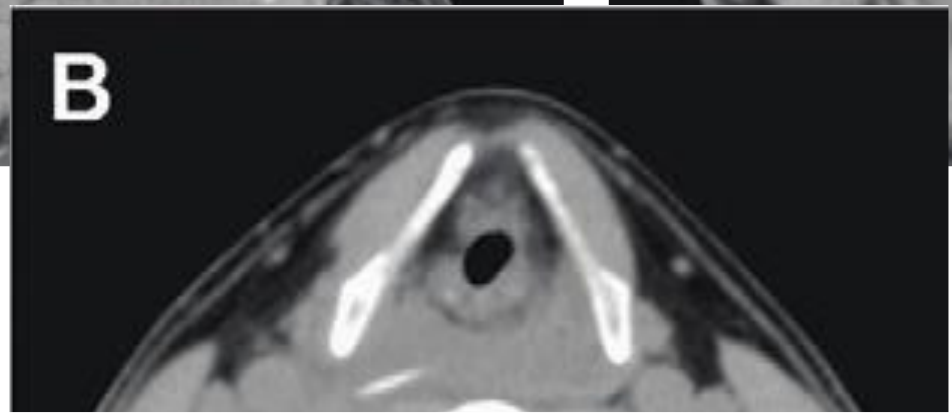
Mechanism: Ingestion – migration (fish bone)





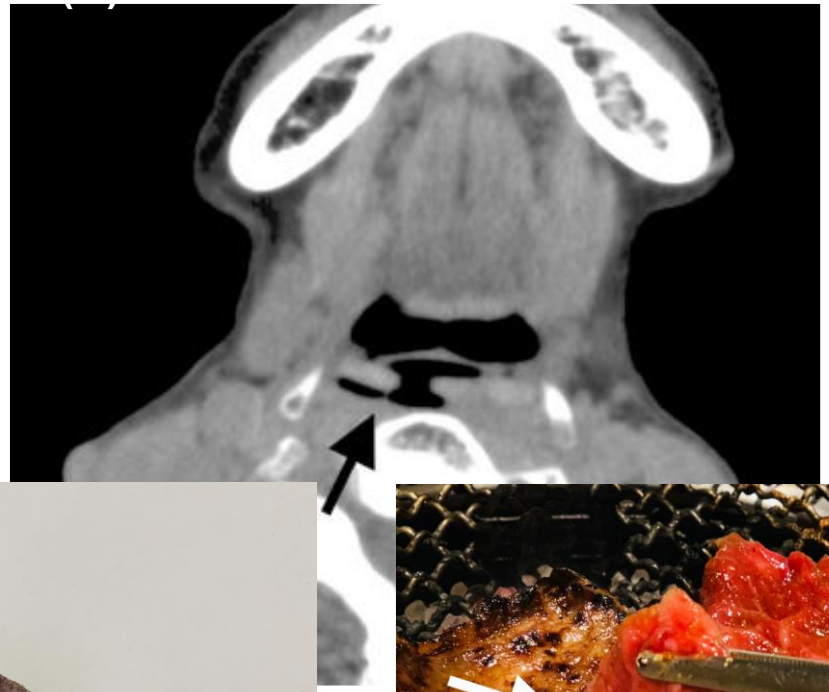


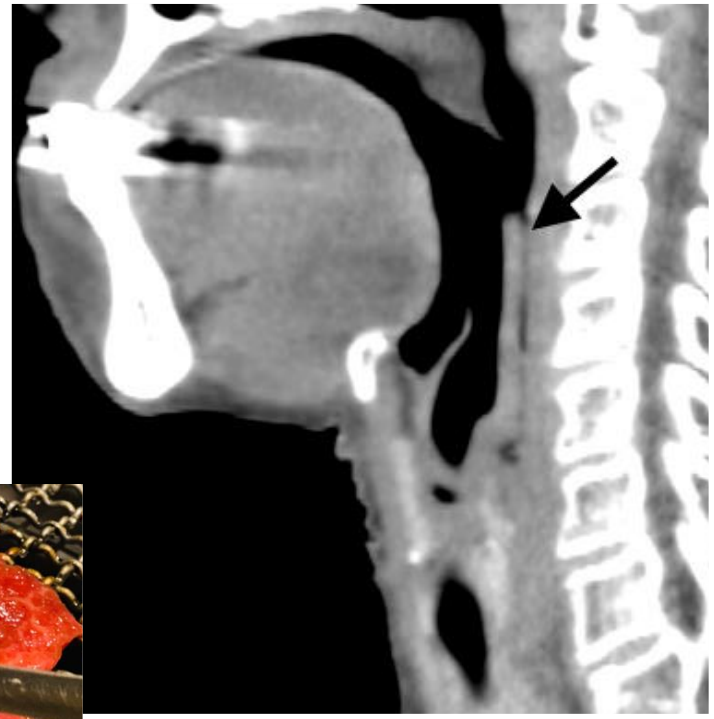


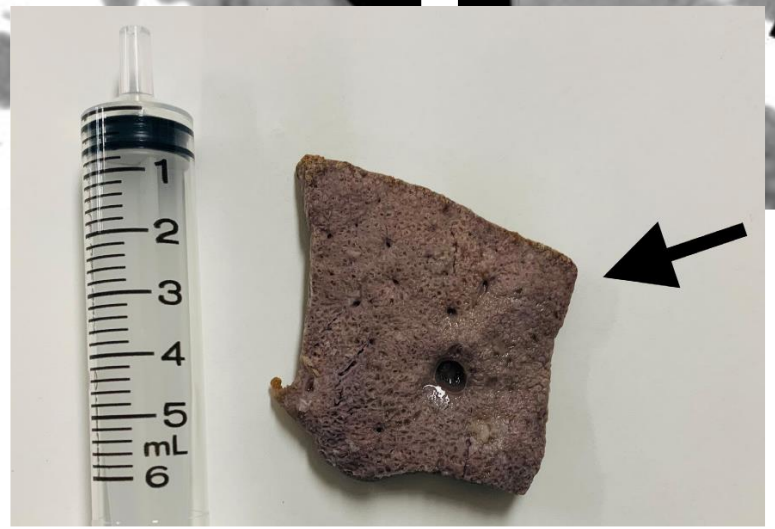


Ho *et al.* Ear, Nose & Throat Journal 2022, Vol. 101(3) 181–185

Mechanism: Ingestion – material unclear…

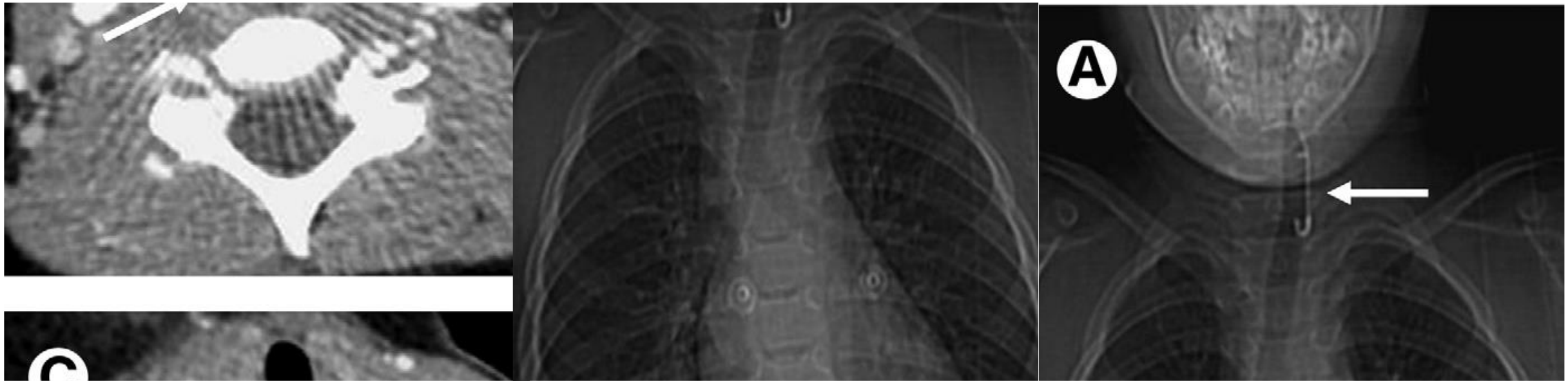






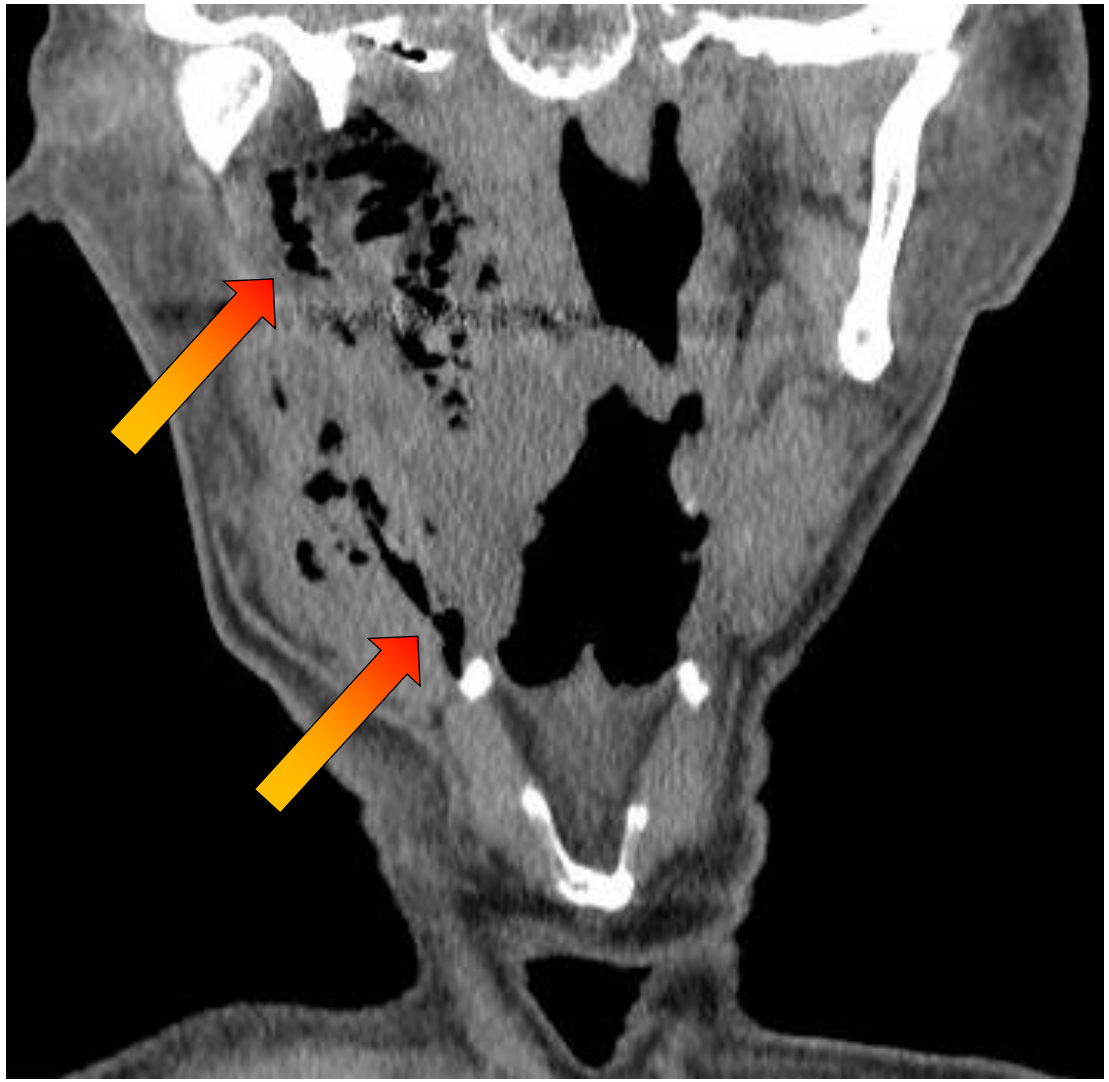
Nishiori et al. Clin Case Rep. 2022;10:e06180 https://doi.org/10.1002/ccr3.6180

Complication: Abscess formation



Pinto et al. *Seminars in Ultrasound, CT and MRI* 2012;33(5):463–70.

Case 1: “I fell and something got into my mouth”

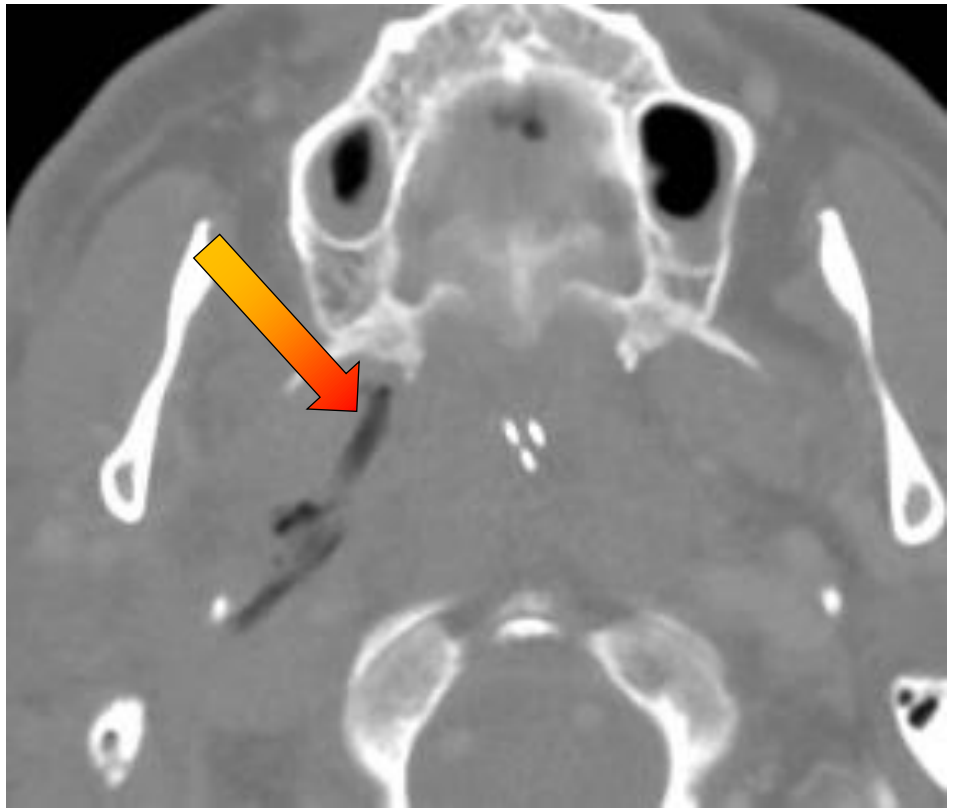


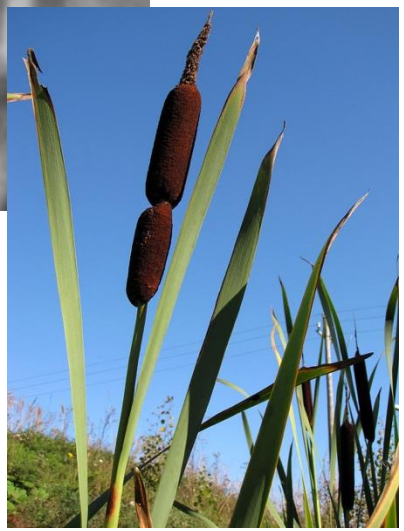
Case provided by Dr. Antti Markkola (FI)

Case 1: Two days later: are there abscesses?

Case provided by Dr. Antti Markkola (FI)

Case 1: 11 days later: condition worsening

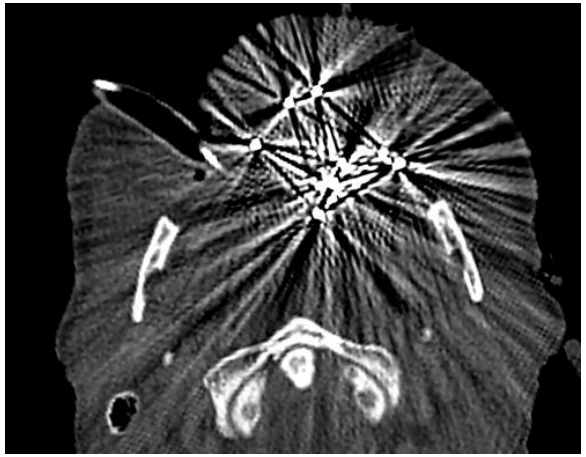


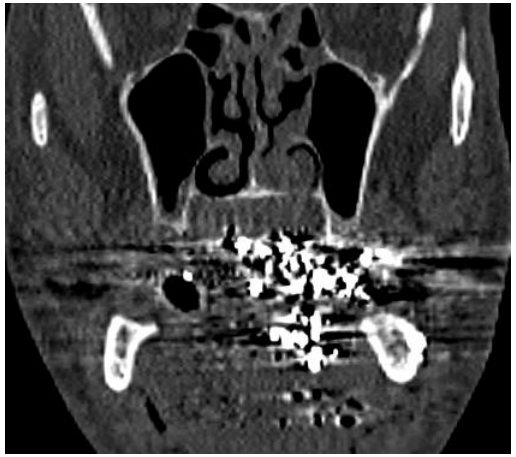


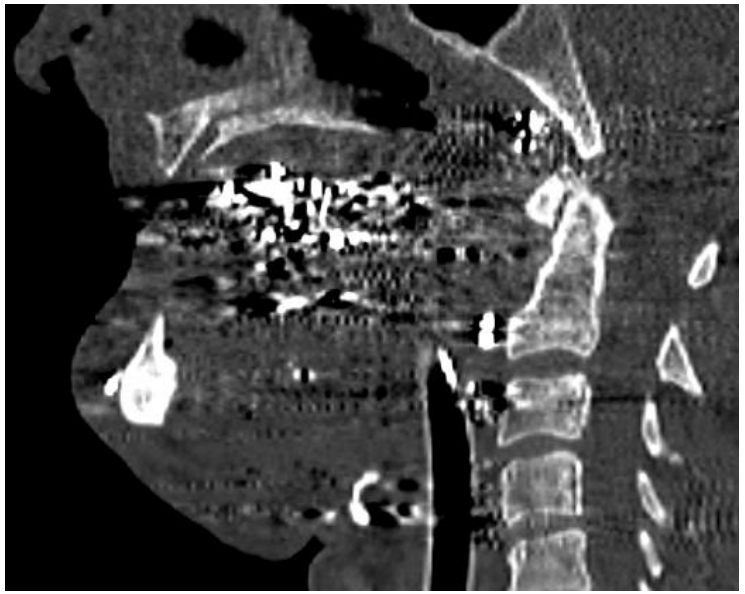
Typha latifolia (common cattail)

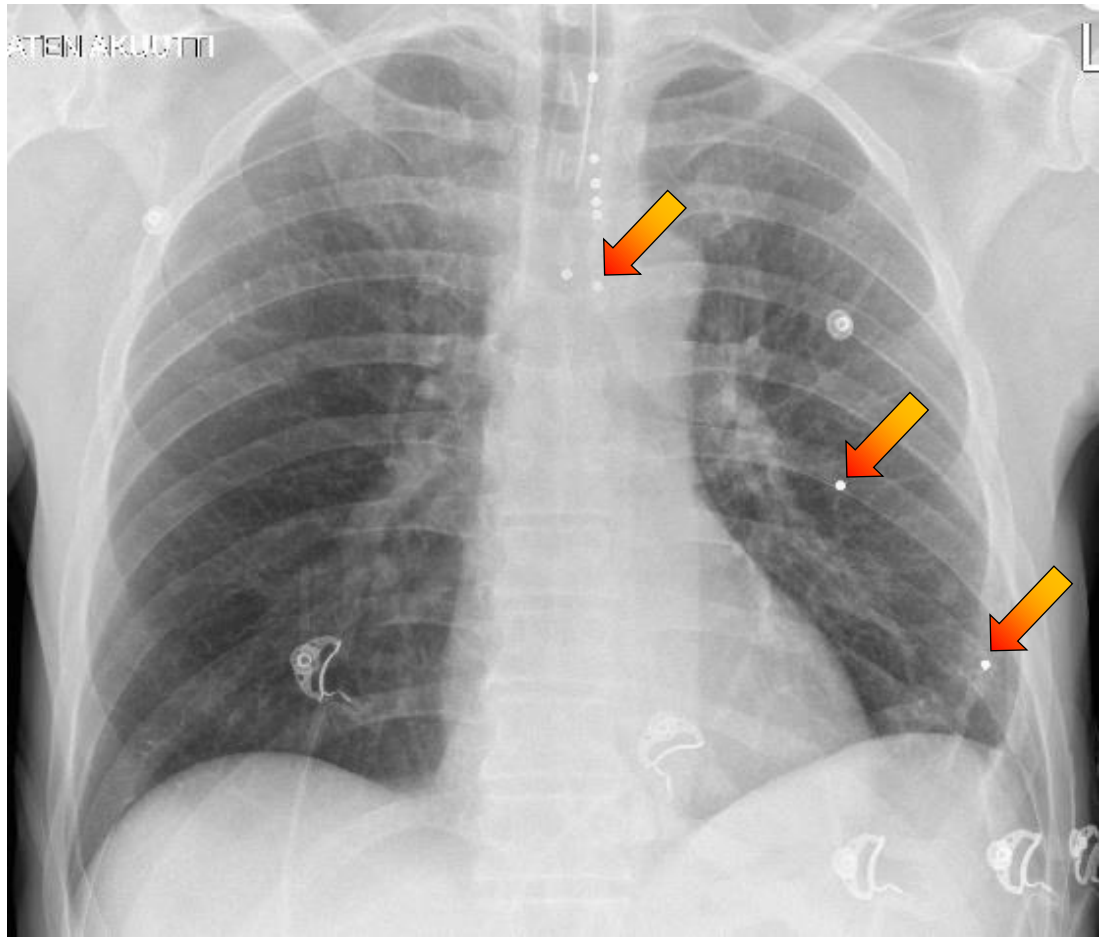
Case provided by Dr. Antti Markkola (FI)

Case 2: Self-inflicted shotgun injury

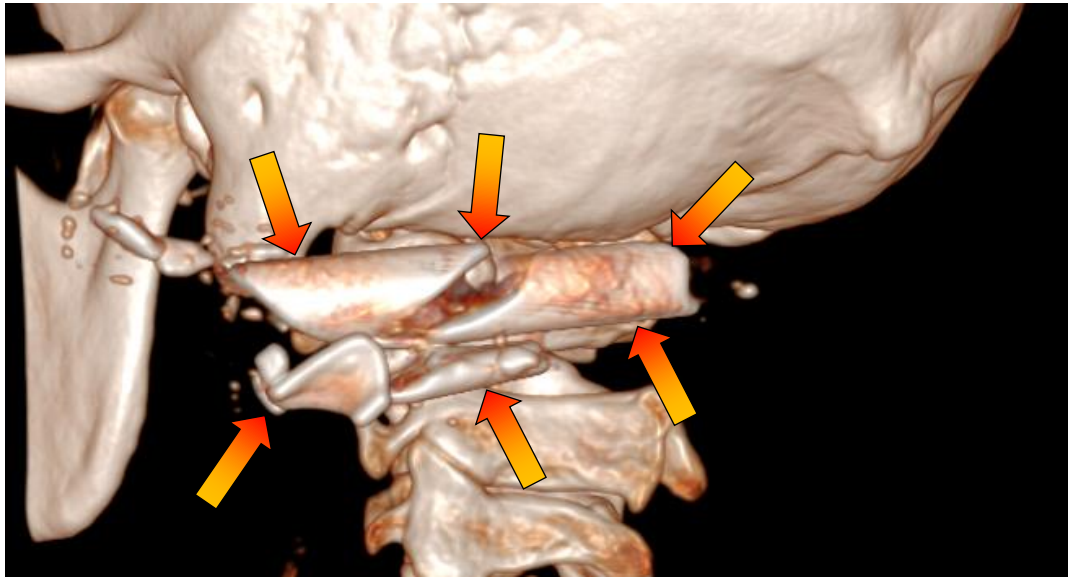


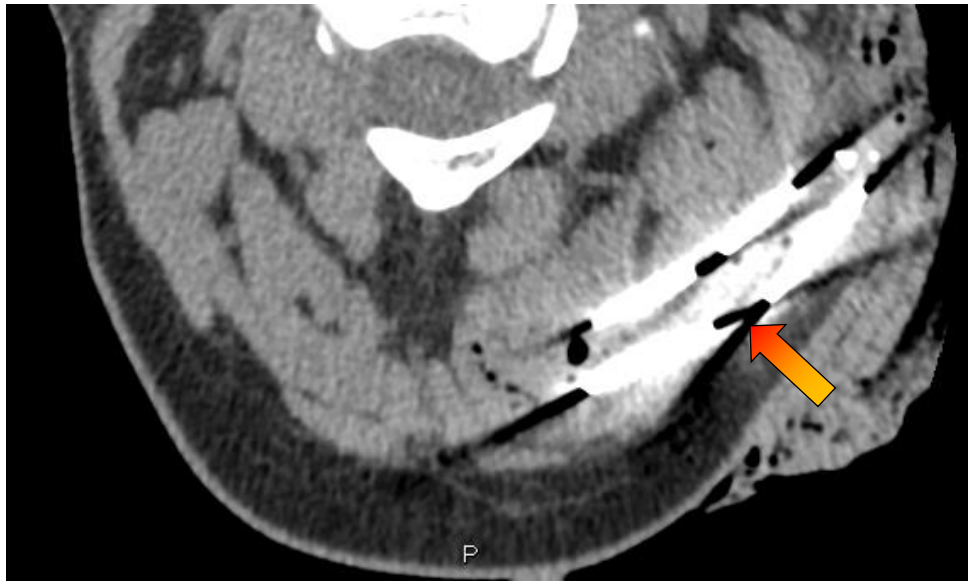


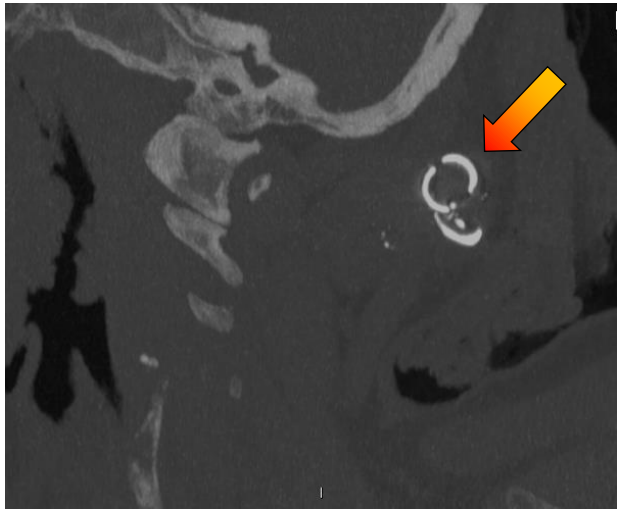


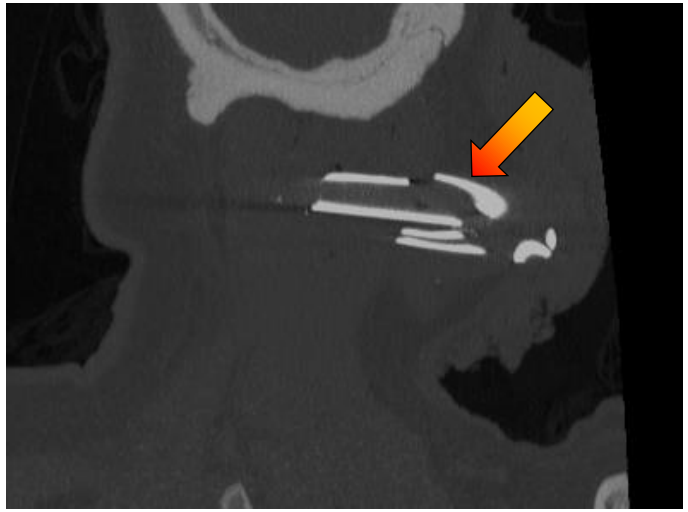


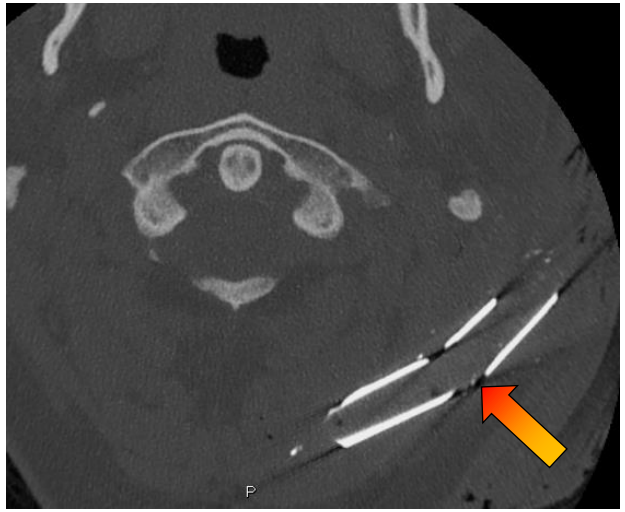
Case 3: Patient assaulted with a glass object



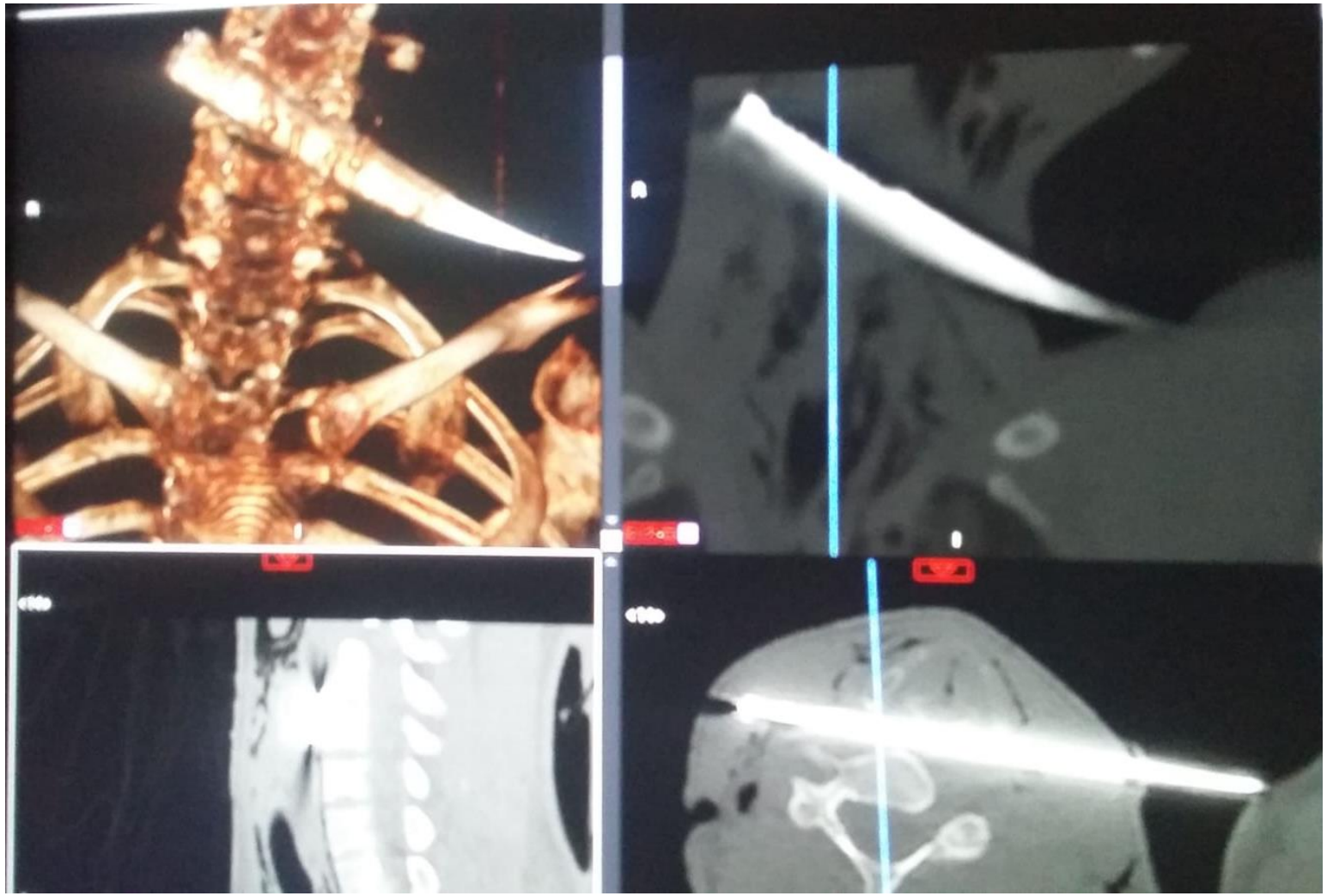








Case 4: Surprise in a body bag: From burn victim to homicide victim



Cases provided by
Dr. Ville Jussila (FI)

Suggested reading

Voss JO, Maier C, Wüster J, Beck-Broichsitter B, Ebker T, Vater J, et al. Imaging foreign bodies in head and neck trauma: a pictorial review. *Insights into Imaging* 2021;12(1):20.

Ginat DT. Implants and Foreign Bodies on Head and Neck Imaging. *Neuroimaging Clinics of North America* 2022;32(2):315–26.

Pinto A, Muzj C, Gagliardi N, Pinto F, Setola FR, Scaglione M, et al. Role of Imaging in the Assessment of Impacted Foreign Bodies in the Hypopharynx and Cervical Esophagus. *Seminars in Ultrasound, CT and MRI* 2012;33(5):463–70.

Oh GM, Jung K, Kim JH, Kim SE, Moon W, Park MI, et al. Can the patient pinpoint where the ingested fish bone is impacted?: A single-center, retrospective study. Medicine 2022;101(30):e29399.

Summary

- Choose imaging method best suited for clinical scenario and assumed material composition
  - Usually CT has best accuracy, US may be good in superficial foreign bodies
  - Beware of metallic foreign bodies when considering MRI
- Reporting should include
  - Presence, material composition and anatomical location of foreign body
  - Potential complications and concomitant injuries
- Look carefully outside the aerodigestive tract for migrating ingested foreign bodies