Top 5 tips: Gout

Arthritis Subcommittee

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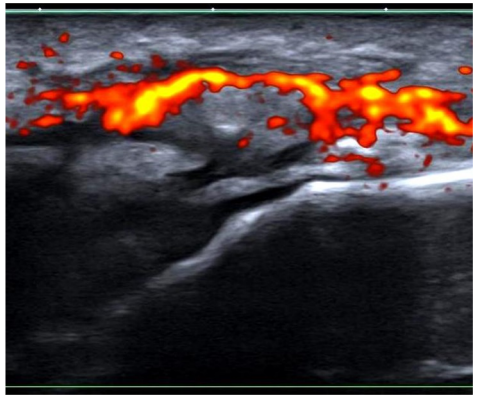
Tip#1: Use ultrasound or DECT to prove MSU

Joint aspiration is the gold standard for demonstrating monosodium urate (MSU) crystals in patients with suspected gouty arthritis. In many cases, clinical presentation and lab findings can be sufficient for the diagnosis. Nonetheless, imaging such as **US and DECT** can detect MSU deposits in various tissues, hence being an alternative to synovial fluid microscopy.

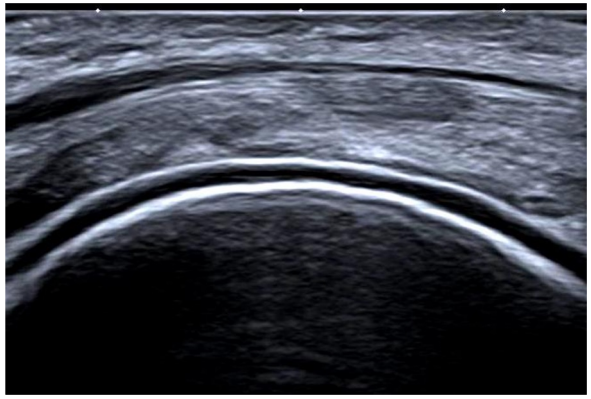
MSU on the cartilage presents by the typical double contour sign at US, which is included in the guidelines.
Tophi are generally hyperechoic, heterogeneous, poorly defined, multiple grouped, and surrounded by an anechoic halo.

radiographs with tophus

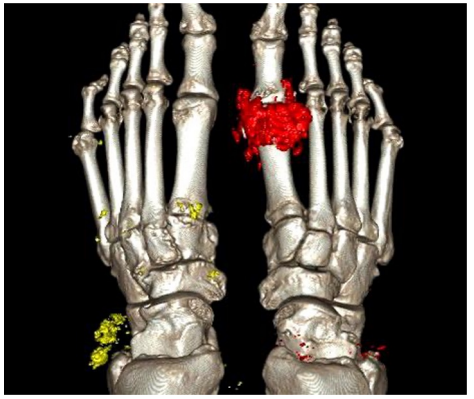
tophus and inflammation at US



double contour sign in US



tophi in DECT



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Tip#2: Morphology and location of erosions is important

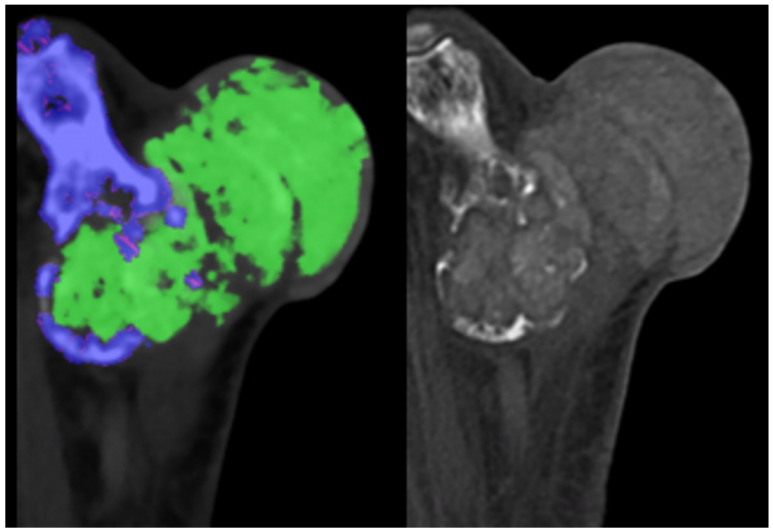
The morphology of bone erosion is sometimes specific and might point towards gouty arthritis in unclear cases. Erosions are (i) well defined (so-called punched out lesions) with (ii) overhanging edges and often (iii) farther away from the joint than for example in rheumatoid arthritis. They often represent direct growth of tophus into the bone.

punched out lesions

overhanging edges

long-standing RA with new DIP erosion in secondary gout

tophus causing bone erosion



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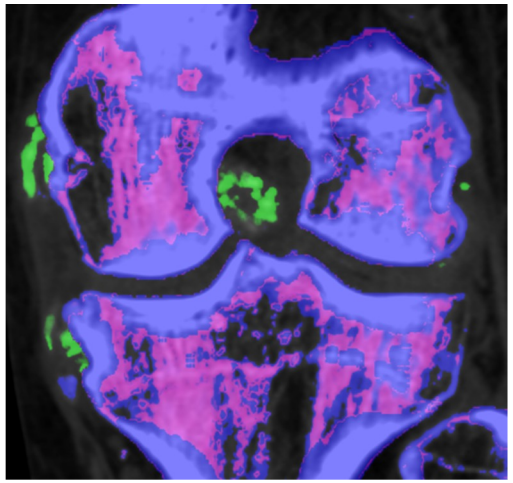
Tip#3: Gout can affect every joint

MUS crystal deposition might be present in every bradytrophic tissue inside and outside the joint and might affect every joint and location. Advanced imaging can detect tophi even before occurrence of the first symptoms. However, the axial skeleton is less likely to be affected for various reasons, such as pH and temperature. Thus, when in doubt think of gout!

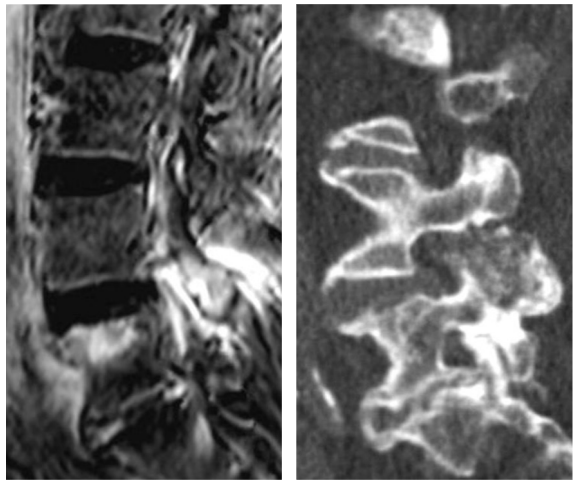
subcutaneous tophus

tophus in bursa

gouty arthritis of the knee



gouty arthritis of the facet joints



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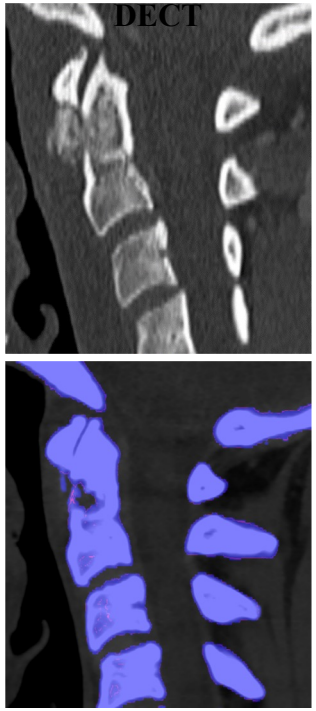
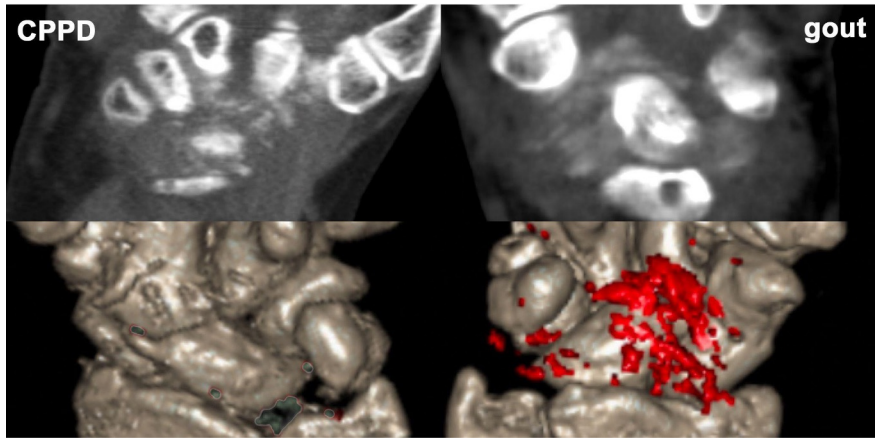
Tip#4: Role of DECT

DECT can distinguish gouty tophi and calcium-based crystal deposition in HADD and CPPD or demonstrate the coexistence of MSU and CPP crystal deposition. It can also quantify the tophus burden and this information can be used for therapy monitoring. It may also be useful before surgery with tophus resection.

HADD of longus colli muscle: MSU-negative DECT



DECT for differentiating CPPD and gout



before therapy

9 months after therapy onset

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Tip#5: DECT pitfalls and additional information

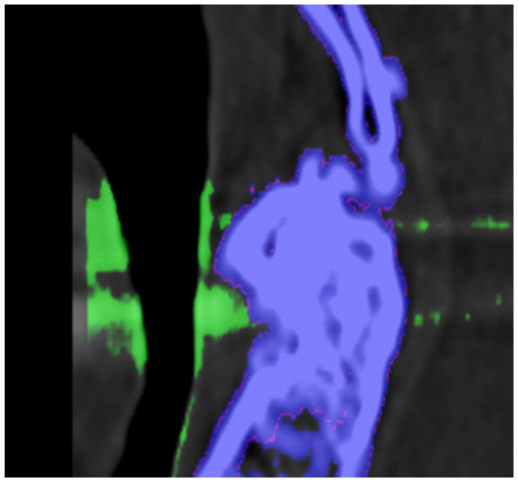
Dual-energy CT is often requested to prove or rule out gouty arthritis. However, while DECT is probably less sensitive to very small deposits or tophi with low MSU concentration demonstrated by US, it can provide additional information, e.g. on osteitis. The source images can show deposits not highlighted by the algorithm. There are several types of artefacts to be distinguished from tophi. Current research suggests that some of those detections, e.g. in vessel walls, may represent MSU depositions but this is still debated.

Pitfalls:

False positive lesions

- Beam hardening artifacts
- Nail bed & skin artifacts
- Calcified vessels
- Areas smaller than 1 mm
- Clumpy artifacts in tendons

beam hardening artifact



tophus negative case with osteitis

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