

Case 15

Diagnosis of Gout using Dual Spiral Dual Energy CT

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History

A 56-year-old male patient, with history of podagra, was complaining of intense pain in the first left metatarsophalangeal joint for the past three days. The serum uric acid test results were normal. Dual Energy (DE) CT was requested for further evaluation.

Diagnosis

DECT, using material decomposition, revealed multiple major uric acid gouty tophi formations in the first left metatarsophalangeal joint, around the right medial cuneiform and in front of the right tibia. Smaller lesions were also seen in the rest of the left metatarsophalangeal joints and in the 1st and the 4th metatarsophalangeal joints.

Examination Protocol

Scanner	SOMATOM Perspective
Scan area	Ankles and feet
Scan length	169 mm
Scan direction	Cranio-caudal, Caudo-cranial
Scan time	5.7/5.7 s
Tube voltage	80/Sn130 kV
Tube current	114/40 mAs
Dose modulation	CARE Dose4D
CTDI _{vol}	3.2/4.4 mGy
DLP	69.93/95.83 mGy cm
Effective dose	0.06/0.08 mSv
Rotation time	1 s
Pitch	0.75
Slice collimation	64 × 0.6 mm
Slice width	0.75 mm
Reconstruction increment	0.5 mm
Reconstruction kernel	D30s

Comments

The incidence of gout has tripled over recent decades and now represents the most common form of inflammatory arthritis in men and women. The only certain way to diagnose gout is through the identification of monosodium urate (MSU) crystals in synovial fluid (SF). Unfortunately, the high dependency on microscopic analysis of bio specimens involves problems such as obtaining adequate specimens from small joints or periarticular structures. This can be difficult especially within primary care setting. The reliability of polarising microscopy is also wanting.

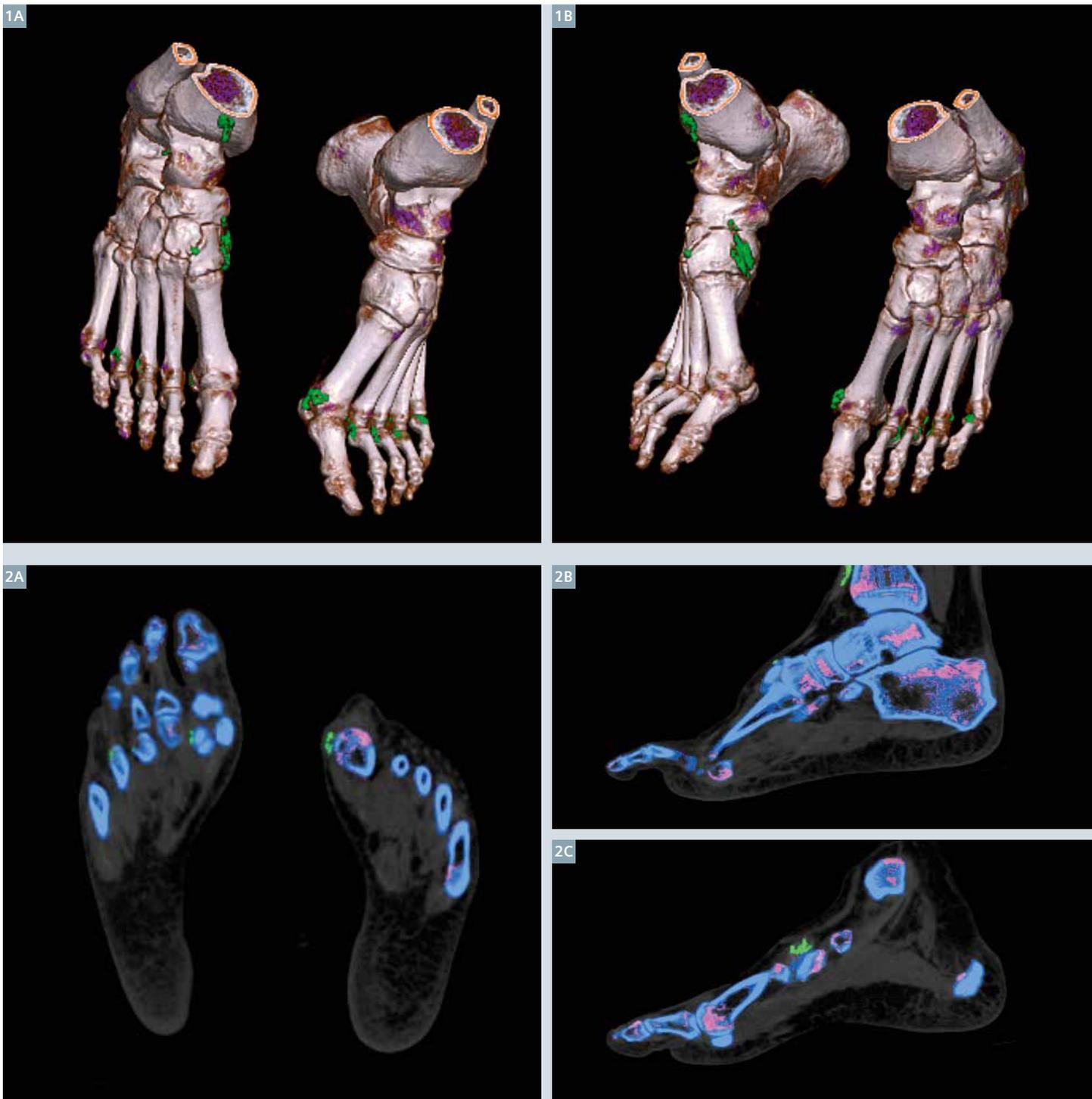
Since a diagnosis of gout arthritis typically results in therapeutic steps that are distinctly different from

those used to address other types of inflammatory arthritis, the failure to detect MSU deposition can result in exposure to unnecessary and ineffective treatment strategies.

There are studies that confirm the good overall accuracy of DECT in diagnosing patients with gout. Moreover, DECT can provide important diagnostic information when the current routine diagnosis approach has failed to confirm the presence of MSU crystals. DECT also enables the detection of MSU deposition in anatomic structures that cannot be easily aspirated. The DECT sensitivity and sensibility is approximately 95%. [1,2,3]

DECT may be used to correlate crystal deposition with osseous changes. Classic osseous radiographic findings include well-defined “punched out” periarticular erosions with overhanging edges, normal mineralization, relative preservation of the joint spaces and asymmetric distribution that eventually becomes polyarticular. After an acute attack, classic osseous findings take several years to manifest, so if these findings are seen with no urate crystal deposition they may be due to remote, currently inactive gout and alternative causes for an acute-onset of arthropathy may be pursued. ■

The outcomes by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no “typical” hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.



1,2 DECT VRT (Fig. 1) and MPR (Fig. 2) images reveal multiple major uric acid gouty tophi formations (in green) in the first left metatarsophalangeal joint, around the right medial cuneiform and in front of the right tibia. Smaller lesions are also seen in the rest of the left metatarsophalangeal joints and in the 1st and the 4th metatarsophalangeal joints.

References

- [1] Dual-energy CT for the diagnosis of gout: an accuracy and diagnostic yield study. Bongartz T, et al. *Ann Rheum Dis* 2014; 0:1–6. doi:10.1136/annrheumdis-2013-205095
- [2] Dual- and Multi-Energy CT: Principles, Technical Approaches, and Clinical Applications. McCollough et al. *Radiology: Volume 276: Number 3-September 2015* radiology.rsna.org
- [3] Dual-Energy CT with Single- and Dual-Source Scanners: Current Applications in Evaluating the Genitourinary Tract. Kaza et al. *RadioGraphics: RG, Volume 32 Number 2, March-April 2012*, radiographics.rsna.org