

## Sonographic Features of a Tophaceous Nodule

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Subcutaneous nodules with prominent inflammatory features are a diagnostic challenge [1]. The differential diagnosis includes ganglion, cyst, space-occupying lesion, tenosynovitis, rheumatoid nodule, infection, and tophaceous nodule. An imaging technique that could specifically demonstrate monosodium urate deposits within tissues can be extremely helpful, especially in patients presenting with swelling of soft tissues or nodules of unknown causes. On Doppler ultrasonography, the tophi appear as attenuating hypoechoic structures with shadowing and hypervascularity representing inflammation, surrounded by hyperechogenic tissue [2]. These findings cannot be considered specific for gout as they resemble rheumatoid nodules, but are different from those of abscess or fluid collection [2]. We describe a patient who developed a painful, red, warm swelling above the second and third metacarpophalangeal joints without signs of osteomyelitis. The Doppler ultrasound (Sonosite-Titan, Linear transducer L38 with a frequency 5–10 broad band MHz) examination allowed us to differentiate the lesion from an abscess or joint effusion, and to suggest gouty tophi.

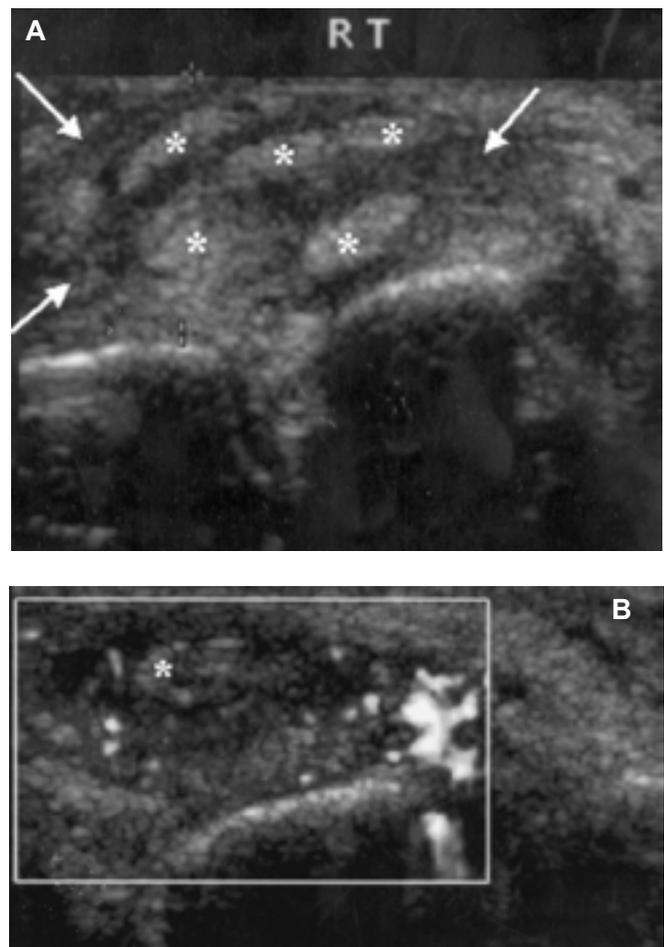
### Patient Description

A 75 year old man was hospitalized with severe pain and swelling on the back of his right hand that appeared several days previously. His medical history was uneventful, except for a mild memory disorder. He denied a history of kidney stones or renal colic, joint pain, and the use of drugs including diuretics. He was afebrile. Vital signs and the general physical examination were unremarkable. Joint examination disclosed deformities of distal and proximal interphalangeal joints, typical of osteoarthritis. The area

above the second and third metacarpophalangeal joints was extremely painful, warm, swollen, and hyperemic. There was a mild fluctuation on palpation.

Laboratory investigation revealed an elevated sedimentation rate of 75 mm/hour, elevated white blood cell count ( $12,000 \times 10^3/\text{ml}$ ) with mild left shift (neutrophils 88%), normal levels of serum creatinine and glucose. Serum levels of uric acid were elevated: 10.2 mg/dl. X-ray of the hand showed typical osteoarthritic changes in distal and proximal interphalangeal joints, and soft tissue swelling above the second and third metacarpophalangeal joints without signs of osteomyelitis. <sup>99m</sup>Tc bone scan showed diffuse hyperemia above the right metacarpus, and increased uptake largely limited to the second and third metacarpophalangeal joints consistent with joint inflammation and/or infection. Doppler ultrasound examination of the dorsal aspect of the hand revealed localized soft tissue swelling and thickened extensor tendons surrounded by bulky hypoechoic hetero-

geneous material [Figure A], which was hyperemic on power Doppler [Figure B]. There was no fluid collection. The differential diagnosis of the sonographic findings included hypertrophied synovia or tophaceous deposits and excluded abscess formation. Ultrasound-guided needle aspiration of the lesion yielded a cream-yellow sterile discharge with a very high count of leukocytes, mostly neutro-



**[A]** Transverse ultrasound scan of dorsal aspect of right hand, demonstrating extensor tendons (asterisk) surrounded by a thick hypoechoic rim (arrows).

**[B]** Power Doppler showing increased vascularization.

phils, and typical intra-leukocyte monosodium urate crystal inclusions. Polarizing microscopy revealed multiple negative birefringence needle-shaped crystals.

Treatment with a short course of indomethacine (75 mg/day) and colchicine (1.5 mg/day) was started and rapid clinical improvement was achieved. A week later, with resolution of inflammatory signs, indomethacine was discontinued and treatment with allopurinol (200 mg/day) was begun. Repeat Doppler ultrasonography 2 months following combined colchicine and allopurinol treatment showed significant resolution of soft tissue swelling and hypoechoic areas.

## Comment

While gout is a common disease, the diagnosis of tophi is sometimes missed, mostly in atypical presentation of gouty arthritis [1]. We describe a case of unusual tophaceous gout arthritis that presented as a very inflamed soft tissue mass on the dorsal surface of the hand without evidence of tophi formation in the typical sites (elbows, first metatarsophalangeal joints, ears). The clinical features suggested infection and pus formation. Doppler ultrasound allowed us

to differentiate the tophaceous inflamed nodule from abscess and may also be performed by mobile ultrasound units at the patient's bedside. Doppler ultrasonography cannot replace the aspiration of the suspected infected lesion, but performance of the aspiration guided by Doppler is much easier and precise [3]. As tophaceous gout and infection may appear simultaneously, aspiration of the lesion is mandatory, both to exclude infection and to demonstrate crystal monosodium urate [4].

Our report emphasizes the possible role of Doppler ultrasonography as a quick and sensitive supplementary diagnostic tool in suspected gouty tophi inflammation. It is a non-invasive bedside imaging tool that is extremely helpful in cases of suspected soft tissue abscess, in detection of articular and periarticular structure involvement (tendons and sheaths, gouty tophi, rheumatoid nodules), in differentiation of synovial proliferation or fluid collection, in assessment of the severity and dynamics of the inflammatory process, and in guided-needle aspiration of suspected lesions in everyday rheumatology practice.

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