Chronic Tophaceous Gout of the Third Flexor Digitorum Profundus Tendon in the Hand: An Unusual Sonography Diagnosis

Peter R. Coombs[1]
Nicholas Houseman[2]
Rohan White[3]

Keywords: dynamic sonography, gout, hand, musculoskeletal imaging, tophaceous gout

DOI:10.2214/AJR.05.0336

Received February 26, 2005; accepted after revision April 11, 2005.

[1]Department of Medical Imaging and Radiation Sciences, Clayton Campus, Monash University, Blackburn Rd, Clayton, Australia 3800. Address correspondence to P. R. Coombs (Peter.Coombs@med.monash.edu.au).

[2]Department of Plastic and Reconstructive Surgery, The Northern Hospital, Melbourne, Australia

[3]Department of Medical Imaging, The Epworth Hospital, Melbourne, Australia.

WEB
This is a Web exclusive article.

AJR 2006; 187:W313–W315

0361–803X/06/1873–W313

Tophaceous gout in a flexor tendon of the hand is a rare form of tenosynovitis. We report on a patient who presented with chronic swelling and restricted movement of his left middle finger. Sonography displayed features atypical of tenosynovitis. The enlarged tendon's normal fibrillar pattern was replaced by increased echogenicity and heterogeneity. The tendon was highly attenuative to transmitted sound. Subsequent surgery and histology confirmed the diagnosis of tophaceous gout.

Case Report

A 63-year-old man presented after having developed a gradual inability to flex his left middle finger during the previous 12 months. He had no known history of gout. Physical examination revealed mild soft-tissue swelling of the distal half of the finger. No associated soft-tissue erythema or crepitus was seen. Posteroanterior, oblique, and lateral radiographs showed mild osteopenia and soft-tissue swelling over the volar aspect of the finger (Fig. 1A). No soft-tissue calcification was shown.

The patient was referred for sonography to establish the integrity of the tendon and to assess tendon movement. Dynamic sonography was performed with the Antares imaging system (Siemens Medical Solutions) with a 12.5-MHz transducer. A large amount of gel was used to obviate a standoff. Sagittal and transverse planes were used to show the key features of the pathology. Adjacent digits and the contralateral side were used for a normal comparison. A SieScape imaging system (Siemens Medical Solutions) was used to show a long length of tendon to clearly document the normal and abnormal parts of the tendon in the same image.

Sonography showed abnormalities in the flexor digitorum profundus and the flexor digitorum superficialis from their insertions to 4-mm proximal to the proximal interphalangeal (PIP) joint. The distinctive features were markedly increased echogenicity and heterogeneity in the tendon (Figs. 1B–1D). Posterior to the increased echogenicity was loss of detail and shadowing indicating the tendon was highly attenuating. The tendon was also slightly increased in size. Color Doppler sonography showed no vascular pat-

A

Fig. 1—63-year-old man with gout.
A, Lateral radiograph of third digit showing mild soft-tissue swelling (*arrow*).
(Fig. 1 continues on next page)

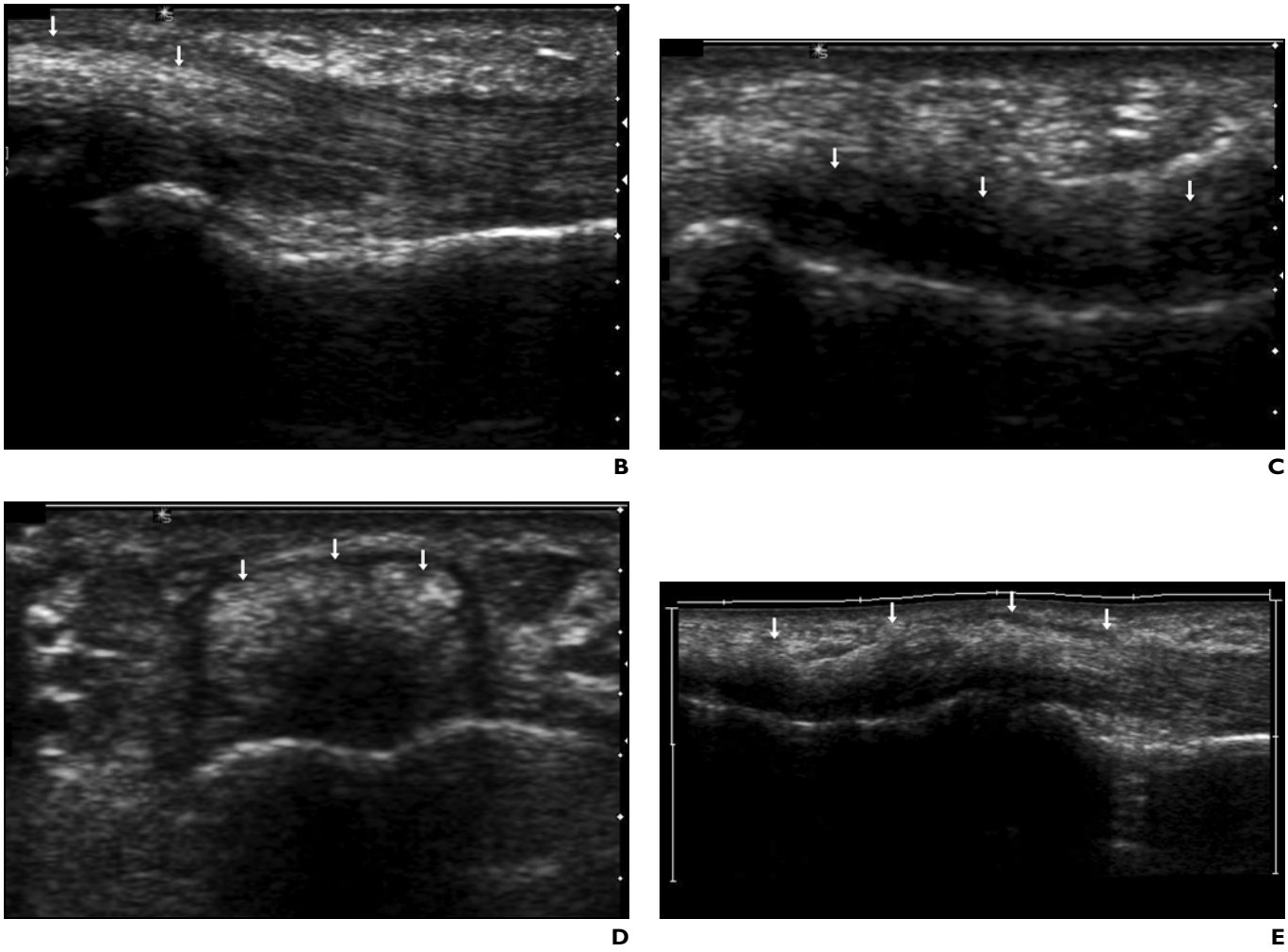

Fig. 1 (continued)—63-year-old man with gout.
B, Sagittal sonogram showing tophaceous gout (*arrows*) and healthy proximal tendon.
C, Sagittal sonogram showing marked heterogeneity and attenuation of tophaceous gout (*arrows*).
D, Transverse sonogram showing tophaceous gout (*arrows*).
E, SieScape imaging system (Siemens Medical Solutions) shows extent of tophaceous gout in distal third flexor tendon of hand (*arrows*).

tern in the tendon. There was no fluid in the synovial sheath apart from a small, unrelated 4-mm synovial cyst at the level of the PIP joint. Visualization of the volar aspect of the distal and proximal interphalangeal joints with sonography was significantly limited due to the attenuating tendon. A 3-mm soft-tissue nodule was noted on the lateral aspect of the finger, which was slightly hypoechoic when compared with the adjacent soft-tissue (Fig. 1E). The sonography diagnosis at the time of the examination was an atypical presentation of tenosynovitis.

The patient was treated with oral nonsteroidal antiinflammatory medication. This conservative management did not provide clinical improvement. Seven months after the sonography examination, the patient underwent an exploration, tenosynovectomy, and release of the A1 pulley. Observation at surgery showed chalky, crystalline deposits on the surface tendon. Biopsy was performed. Histopathology showed fragmented nodules with amorphous basophilic material resembling sodium urate deposits surrounded by palisaded layers of histiocytes and occasional multinucleate giant cells. These appearances are typical of gouty tophus. Microscopy examination and subsequent culture did not reveal any bacterial infection. Consistent with gout, uric acid crystals were detected by polarizing microscopy, and an elevated serum uric acid of 0.60 mmol/L (normal range is 0.12–0.45) was found on blood analysis.

Three months later, the patient returned to the operating theater because of continued pain and active tenosynovitis. He then had further release of the scarred A1 pulley and tenosynovectomy. The articular symptoms improved after the surgery to his tendon and he is receiving aggressive physical therapy.

Discussion

Gout presents as the deposition of sodium urate crystals in joints, tendons, nerves, or kidneys when production exceeds the excretion [1]. Typically this is seen as a peripheral arthritis. Extraarticular gout is less common, presenting as nerve entrapment dermatitis, skin ulceration, sinus, or peritendinous nodular change [2].

Sonography is a useful tool to evaluate gout in an equivocal clinical setting to exclude alternative differential diagnoses. In an affected joint, sonography may show joint widening, thickened periarticular tissues, and power Doppler signal [3]. Effusions and synovial thickening that are present in the other forms of arthritis may be seen. Gouty synovial fluid tends to have a "snowstorm" appearance with multiple heterogeneous foci [4]. Tophi may be echogenic, hypoechoic, or calcific. Cortical bony erosions may be seen adjacent to these tophi [5].

Tenosynovitis is a highly unusual form of extraarticular gout. Eight cases have been reported in the literature involving the distal flexor tendons of the hand [1, 2, 6, 7]. Weniger et al. [1] report three cases imaged on MRI. Aslam et al. [8] describe the only case that used sonography. In contrast, their case was an acute presentation in which the tendon was normal but there was a loculated collection of synovial fluid in the tendon sheath at the level of the A1 pulley [8].

The differential diagnosis in this case was synovitis, tenosynovitis, or a partial-thickness tear of the tendon, although there had been no trauma. Synovitis is seen on sonography as hypoechoic thickening of the synovial sheath. Anechoic fluid may also be identified [9]. Inflammatory changes to the tendon produce areas of hypoechogenicity, loss of the fibrillary pattern, and tendon enlargement [9, 10]. Power Doppler sonography may show increased flow depicting inflamed synovium [9]. In cases where there has been a definite injury or repetitive movement, anechoic change and the separation of fibers may reflect a tear to the tendon.

In this chronic case of gouty tenosynovitis, the tendon changes on sonography were distinctly different from typical presentations. The flexor digitorum tendons were slightly enlarged with a loss of normal fibrillar pattern; however, increased echogenicity, marked heterogeneity, and attenuation of the transmitted sound were seen. No other forms of tenosynovitis have been reported in the literature with this distinctive appearance. This case affirms the value of sonography in tendon imaging and provides a primary differential diagnosis when these very distinctive sonographic appearances are present.

References

1. Weniger FG, Davison SP, Risin M, Salyapongse AN, Manders EK. Gouty flexor tenosynovitis of the digits: report of three cases. *J Hand Surg [Am]* 2003; 28:669–672
2. Moore JR, Weiland AJ. Gouty tenosynovitis in the hand. *J Hand Surg [Am]* 1985; 10:291–295
3. Filippucci E, Ciapetti A, Grassi W. Sonographic monitoring of gout [in Italian]. *Reumatismo* 2003; 55:184–186
4. Farina A, Filippucci E, Grassi W. Sonographic findings for synovial fluid [in Italian]. *Reumatismo* 2002; 54:261–265
5. Nalbant S, Corominas H, Hsu B, Chen LX, Schumacher HR, Kitumnuaypong T. Ultrasonography for assessment of subcutaneous nodules. *J Rheumatol* 2003; 30:1191–1195
6. Weinzweig J, Fletcher JW, Linburg RM. Flexor tendinitis and median nerve compression caused by gout in a patient with rheumatoid arthritis. *Plast Reconstr Surg* 2000; 106:1570–1572
7. Abrahamsson SO. Gouty tenosynovitis simulating an infection: a case report. *Acta Orthop Scand* 1987; 58:282–283
8. Aslam N, Lo S, McNab I. Gouty flexor tenosynovitis mimicking infection: a case report emphasising the value of sonography in diagnosis. *Acta Orthop Belg* 2004; 70:368–370
9. Moschilla G, Breidahl W. Sonography of the finger. *AJR* 2002; 178:1451–1457
10. Serafini G, Derchi LE, Quadri P, et al. High resolution sonography of the flexor tendons in trigger fingers. *J Ultrasound Med* 1996; 15:213–219