Tophaceous podagra: ultrasound diagnosis

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Ultrasound is not routinely used in the evaluation of tophaceous gout. Gout may, however, present with an atypical clinical picture mimicking a neoplastic or infectious process. This article presents the sonographic findings of a middle-aged man referred for evaluation of a lump adjacent to the metatarsophalangeal joint of the great toe in which the final diagnosis was podagra (gout of the great toe metatarsophalangeal joint).

INTRODUCTION

Gout results from the tissue deposition of crystals of monosodium urate monohydrate (MSU) from supersaturated hyperuricaemic body fluids. Not all hyperuricaemic persons develop gout – the greater the degree and duration of hyperuricaemia, the greater the chance of crystal deposition and of acute attacks of gout.

At pH 7.4, normal sodium concentration and 37ºC, plasma is saturated with uric acid above 7.0 mg/dl. Urate solubility at 30ºC is 4.0 mg/dl, thus MSU crystals are deposited in relatively avascular tissues such as cartilage and tendons around peripheral joints and within subcutaneous tissues (Nuki, 1996). Deposition may be nodular (tophaceous). Presenting symptoms usually include acute inflammatory arthritis, tenosynovitis, bursitis or cellulitis. In the absence of earlier episodes of acute attacks of gout the development of a tophus is unusual (Wernick et al, 1992).

DISCUSSION

Tophi, a mass of urates surrounded intense inflammatory tissue, are pathognomonic of gout. Patients usually have had gout for more than 10 years before tophi become apparent on clinical examination or visible radiographically (Nakayama et al, 1984). The presentation of a tophus may be atypical. A solitary tophus presenting as a soft tissue mass in the absence of articular disease may be confused with a neoplastic process. Tophi causing acute inflammation may be misdiagnosed as infection.

In this patient, although a biopsy of the soft tissue mass was not performed and thus MSU crystals were not obtained, the presence of seven clinical, radiological and laboratory criteria (more than one attack, monoarticular arthritis, redness, first metatarsophalangeal joint pain/swelling, unilateral first metatarsophalangeal joint involvement, suspected tophus and hyperuricaemia) enable the diagnosis of gout to be established as defined by criteria of the American College of Rheumatology (Wallace et al, 1977).

CASE REPORT

A 40-year-old male patient had a 6-week history of intermittent pain and swelling of the metatarsophalangeal joint of the left great toe. There was no history of trauma. Past medical history was unremarkable and the patient was not taking any regular medication. Physical examination of the joint demonstrated swelling and warmth with the overlying skin tense and erythematous. Full blood count was normal.

He was referred for ultrasound examination. This demonstrated a mass, adjacent to the medial aspect of the metatarsophalangeal joint of the great toe, predominantly of intermediate echogenicity blending with the soft tissues with smaller non-sonotransmitting areas (*Figure 1*). The cortical surface of the metatarsal head was irregular. A tentative diagnosis of tophaceous gout was made. A plain radiograph acquired just after performing the ultrasound confirmed the irregularity of the cortex and demonstrated subchondral lucencies within the medial aspect of the great toe metatarsal head in addition to a moderately radiodense mass within the adjacent soft tissues (*Figure 2*).

Subsequently the serum uric acid level was found to be elevated at 10.2 mg/dl (normal range < 7.0 mg/dl) and the patient's symptoms settled shortly following the administration of oral colchicine in keeping with a diagnosis of gout.

The great toe metatarsophalangeal joint is the most common site of gouty arthritis. Classical plain radiograph appearances include well-defined erosions with overhanging edges and sclerotic borders, preservation of the joint space until late in the course of the disease, normal mineralization and soft tissue swelling in which tophi may develop (Buckley, 1996). Calcification may occur in tophi.

A variety of appearances of tophi on ultrasound have been reported: non-

Figure 1. Ultrasound in the coronal plane of the medial aspect of the great toe metatarsophalangeal joint showing mass of intermediate echogenicity within the adjacent soft tissues (closed arrows). The cortex of the first metatarsal head is irregular (open arrows).

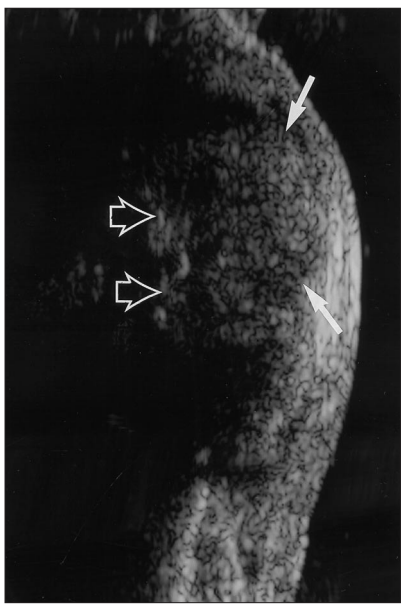

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Figure 2. Dorso-plantar radiograph of corresponding region showing soft tissue mass (closed arrows) and irregularity of the cortex with subchondral lucencies within the medial aspect of the great toe metatarsal head (open arrow head).

sonotransmitting similar to bone (Tiliakos et al, 1982); intermediate heterogeneous echogenicity, blending with surrounding tissues (Benson et al, 1983) and echogenic with posterior acoustic shadowing (De Pra et al, 1995). In the case described here the appearance was mixed, with a mass of intermediate heterogeneous echogenicity and non-sonotransmitting areas. An explanation for the ranges in reported appearance is that it is dependent on the degree of developmental state and calcification within the tophus (Benson et al, 1983). In this case abnormality of the adjacent bony cortex was identified in addition to the soft tissue mass. The irregularity likely reflected early erosion. Classical 'punched-out' erosions were not apparent on the plain radiograph, but irregularity of the cortex with subchondral lucencies were identified.

The sonographic appearance of tophi is non-specific and routine use of ultrasound in the diagnostic evaluation of gout is not advocated, particularly if the classical plain radiographical features are present. As presentation of tophaceous gout may be atypical, however, the diagnosis should be considered when a mass is demonstrated in peri-articular soft tissues, especially if there is irregularly of the adjacent bony cortex. HM

Benson CH, Gibson JY, Harisdangkul V (1983) Ultrasound diagnosis of tophaceous and rheumatoid nodules. *Arthritis Rheum* **26:** 696

Buckley TJ (1996) Radiologic features of gout. *Am Fam Phys* **54:** 1232–8

De Pra L, Monetti G, Derdin LE (1995) Tendons. In: Solbiati L, Rizzatto G, eds. *Ultrasound of Superficial Structures.* Churchill Livingstone, Edinburgh: 337–46

Nakayama DA, Barthelemy C, Carrera G, Lightfoot RW Jr, Wortmann RL (1984) Tophaceous gout: a clinical and radiographic assessment. *Arthritis Rheum* **27:** 468–71

Nuki G (1996) Disorders of purine and pyrimidine metabolism. In: Weatherall DJ, Ledingham JGG, Warrell DA, eds. *Oxford Textbook of Medicine.* 3rd edn. Oxford University Press, Oxford: 1376–81

Tiliakos N, Morales AR, Wilson CH Jr (1982) Use of ultrasound in identifying tophaceous *vs* rheumatoid nodules. *Arthritis Rheum* **25:** 478–9

Wallace SL, Robinson H, Masi AT, Decker JL, McCarty DJ, Yu T-F (1977) Preliminary criteria for the classification of the acute arthritis of primary gout. *Arthritis Rheum* **20:** 895–900

Wernick R, Winker C, Campbell S (1992) Tophi as the initial manifestation of gout. *Arch Intern Med* **152:** 873–6

In the Public's View...

Cloning cells: it's big business (but is it right?)

You can always trust the *Daily Mail*. While the *Guardian* headlined, 'Human Embryo Cloned', the *Mail* screamed, 'Human Baby Cloned'. No doubt the inside seethed with moral indignation, but I chose not to look. As ever, the real story was somewhat less dramatic. There was no screaming 8 pound bonnie bouncing baby; there was a glob of six cells that refused to divide further. Nothing useful will come of cloning until the cells at least reach the blastocyst stage, which is a good deal further than six fairly manky cells.

Ignoring reality, the media dragged out all the tired old stories about cloning Hitlers, or providing freshly grown kidneys for transplant. The same old talking heads from both sides of the religious and ethical fences said their pieces and were put back in their boxes for next time. As time wore on, the original announcement – made by a biotechnology company in an online journal – became less significant for the future of humankind and more interesting as insight into the behaviour of big business. Scientists working in cell stem research started pouring very cold water on the claim. For a start, if you really have cloned human cells, why not publish in *Nature*? The whole affair began to look like a publicity stunt aimed, in the words of one bioethicist, 'at investors and the public, but not scientists'.

To the informed outsider, the therapeutic possibilities of stem cells seem more likely than the promise of genetics. Getting undifferentiated cells to replace cell mass – heart muscle, liver cells, pancreatic beta-cells – sounds worth trying. Whether it is sensible to heal the ravages of smoking and poor diet on the coronary arteries with expensively harvested stem cells is another matter, but you can be sure that the *Daily Mail* will laud the first cardiologist successfully to do so as a hero.

But somebody should point out to the media that it is different for highly structured organs such as kidneys. Stem cells are a long way from kidneys, which need a functioning, complicated blood supply to keep their cells alive even when they are in an intact human being. Stem cells might be persuaded to turn into renal tubular cells or endothelial cells, but no one has a clue how to arrange those into a functioning organ.

A disquieting part of this story was the claim that cloning experiments were being done by biotechnology companies without ethics committee approval. This is the inevitable result of big money playing on human hopes, and it is difficult to know how to stop it. 'Anything that relieves human suffering is good' is not ethics at all. I have no ethical problem as long as dividing cells are not allowed beyond the stage at which embryonic stem cells can be harvested. I suspect this is the most widely held view and that most people are against so-called reproductive cloning. But ethicists' views differ, and money will always talk. HM

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