NEWSPAPER POST

TheSynapse

The Medical Professionals' Network

MEDICAL IMAGING

Ultrasound of Musculoskeletal Trauma

by **Pierre Vassallo**
MD PhD FACA Artz für Radiologie
Consultant Radiologist

Sport is the best thing that ever happened to orthopaedic surgeons. Our colleagues in this field readily admit to this. But it has certainly not harmed radiologists. As far back as 1895, with the discovery of X-rays by Wilhem Conrad Roentgen, trauma was the first indication for a radiological examination.

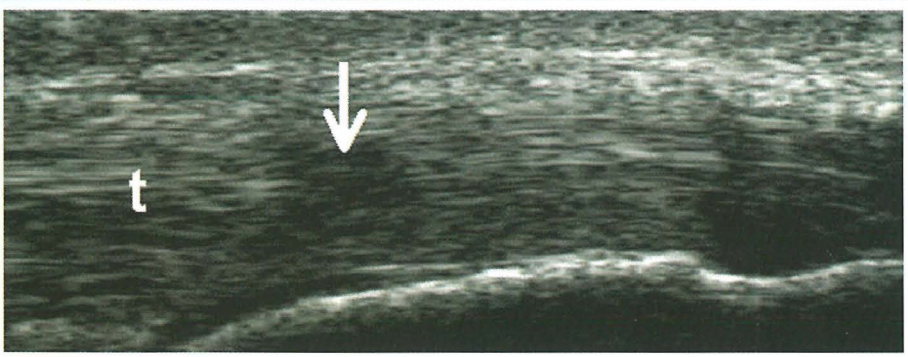

Figure 1. Longitudinal scan of the Achilles tendon showing a tear in its anterior fibres (arrow).

Since that time, we have come along way. The quality of radiographic examinations has excelled primarily through the use of conventional technologies and recently with the implementation of digital techniques. The introduction of radiographic contrast agents extended the use of X-rays in trauma beyond bones and joints to soft tissues such as articular cartilage (ie arthrography) and blood vessels (angiography).

The next major breakthrough in imaging of trauma paralleled that of computer technology. Cross-sectional imaging techniques including ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI) were only made possible with the development of fast computers. These technologies have extended the value of trauma radiology from detection of fractures and subluxations to exquisitely detailed imaging of soft tissue injuries.

The roles of CT and MRI are now well established in the evaluation of trauma.

Ultrasound has until relatively recently been neglected in this field. The introduction of high-resolution probes however, opened the new field of musculoskeletal ultrasound. In contrast to CT and MRI, musculoskeletal ultrasound has the advantages of being fast, widely available and inexpensive. It also allows dynamic imaging (imaging during motion), which is very difficult with CT or MRI.

The first reports on the use of ultrasound in musculoskeletal imaging appeared in 1986 and dealt with tears of the Achilles tendon. Ultrasound is now the primary imaging method for assessing tears of the Achilles tendon as it allows accurate visualisation of the extent of the tear and of secondary muscular and tendonous atrophy that may influence surgical technique. Achilles tendon tears typically occur at a zone of relative avascularity 2–6 cm from the calcaneal insertion. Tears may be partial (Figure 1) or full

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Editor's Word

Dear Colleagues,

It is with great sense of satisfaction that on the eve of the eleventh anniversary of TheSYNAPSE, we give you, members of the medical professions, two other firsts. You will note a thicker magazine – from a humble, four page newsletter-type black and white magazine in 2001, we have come up all the way to a thirty two page magazine full of interesting articles.

The other first is the launch of our new tool for medical professionals – **SMS4Health®**. This innovative piece of technology is intended to help all medical professionals improve the health of their patients using the ubiquitous mobile phone. This project, which has been developed by our team of dedicated staff over the past two years of continuous research and development, is yet another proof of our dedication to the health of our patients.

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Editor: Wilfred Galea
Scientific Editor: Ian C. Ellul
Designer: Conrad Bondin
Administration Manager: Carmen Cachia

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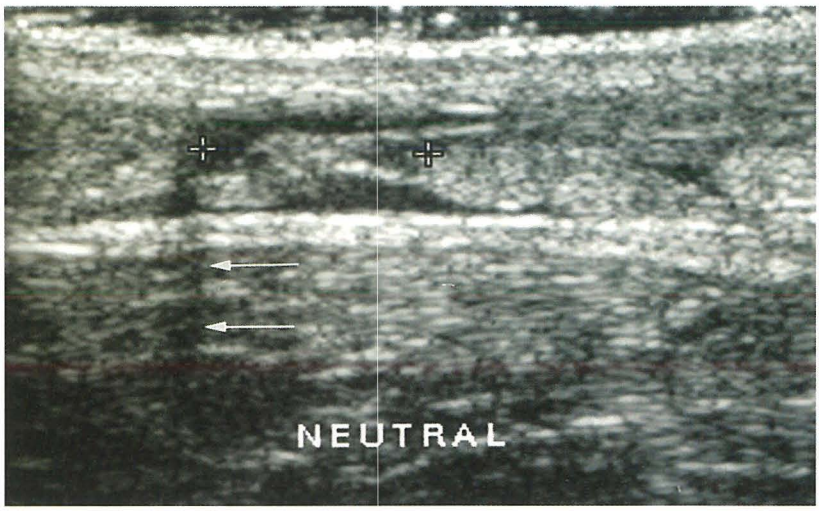

Figure 2. Longitudinal scan of the Achilles tendon (in neutral position) showing a full thickness tear with fluid filling the synovial sheath and surrounding the torn end of the tendon and intervening tissue debris (callipers). Some acoustic shadowing is seen at the torn end of the tendon (arrows).

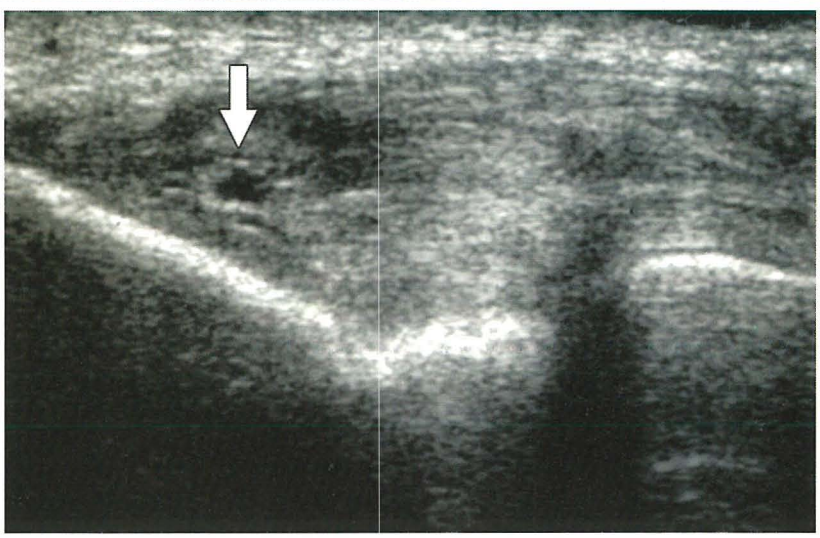

Figure 3. Longitudinal scan of the common extensor **tendon.** The **tendon** is markedly thickened and heterogeneous, and has hypoechoic foci consistent with intrasubstance **tear**s (arrow).

(Figure 2) thickness and acute or chronic. Accuracy of ultrasound for the detection of Achilles tendon tears is around 95%, while 20% of tears are missed on clinical examination because the flexor digitorum, peroneal, and plantaris **tendon**s also contribute to plantar flexion and can compensate, to some degree, for an injured Achilles **tendon**. In addition, oedema caused by an acute **tear** can obliterate a **tendon** defect and render palpation ineffective. Distinction between partial and full thickness tears is important as partial thickness tears usually respond to conservative treatment, while full thickness tears require surgery.

Over the years, high-resolution ultrasound has been used to effectively assess lesions of the common flexor and extensor origins of the elbow, the biceps and triceps tendons, the rotator cuff tendons, the carpal tunnel tendons and median nerve, the ulnar collateral ligament, the ilio-psoas tendons and bursa, the quadriceps and hamstring tendons, the peroneal and tibialis anterior and posterior tendons, the digital tendons of the hands and feet as well as muscle tears and masses in all limb compartments.

Lateral epicondylitis, also known as "tennis elbow," is an overuse syndrome of the common extensor **tendon**, predominantly affecting the extensor carpi radialis brevis. The clinical diagnosis is often relatively clear, however cases refractory to conservative treatment further evaluation with ultrasound can confirm the abnormality and guide further treatment planning. High-resolution ultrasound shows thickening of the tendon, small fluid collections within it ("cysts") (Figure 3) and calcifications (Figure 4).

Avulsion of the distal biceps tendon occurs due to sudden elbow flexion against resistance as may occur in weight lifting,

Musculoskeletal Trauma

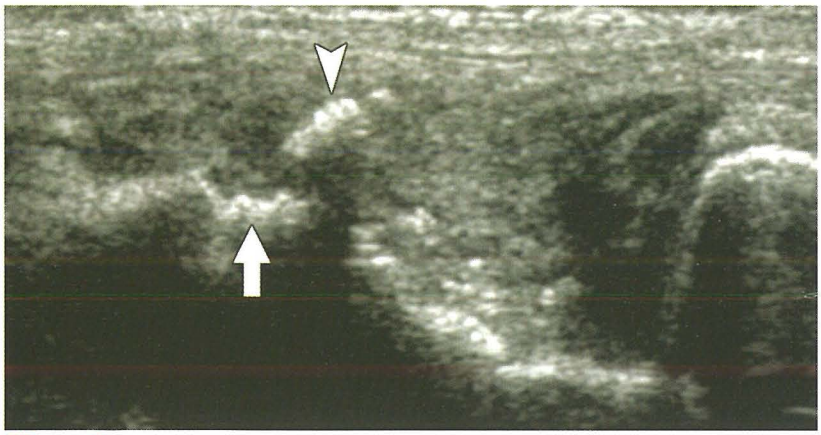

Figure 4. Longitudinal scan of the common extensor **tendon showing a** thickened and heterogeneous tendon with calcification.

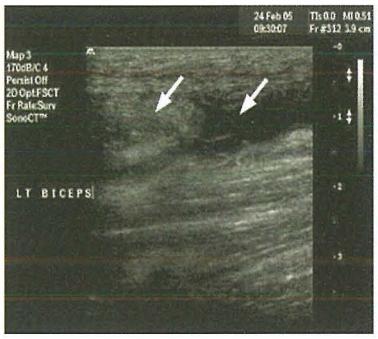

Figure 5. Longitudinal scan of distal biceps tendon confirming rupture. Left arrow shows avulsed proximal tendon and right arrow shows 'gap' with haematoma.

'spotting' gymnasts, carrying and catching heavy loads and ten pin bowling. This may present clinically as a retracting bulge in the biceps muscle on attempted elbow flexion. Flexion will still occur due to action of the brachialis muscle. Ultrasound may be used to confirm and assess the extent of the tendon tear (Figure 5). The value of ultrasound in the assessment of the rotator cuff tendons has been discussed in a previous article.

Injuries of carpal tunnel structures and compression of the median nerve are frequently best detected by ultrasound. Median nerve thickening and fluid in the tendon sheaths (Figure 6) are both features of trauma. Rheumatoid arthritis may however present similar findings, but the clinical history should allow distinction.

Injuries to the ulnar collateral ligament can be either acute or chronic and typically result from sudden forced flexion that occurs in baseball pitchers. The UCL is located along the medial aspect of the elbow and extends from the medial epicondyle of the humerus to the coronoid process of the ulna. Acute tears produce pain in the medial elbow, and the pitcher may hear or feel a "pop" accompanied by swelling and laxity of the ulnohumeral joint at physical examination. Ultrasound shows torn fibres of the UCL and frequently a small fluid collection adjacent to it (Figure 7).

In the next article, we will continue to discuss further uses of high resolution ultrasound for the detection of musculoskeletal trauma.

Dr Pierre Vassallo can be reached at the DaVinci Hospital on 21 491 200 or by email on pvassallo@davincihospital.com.mt

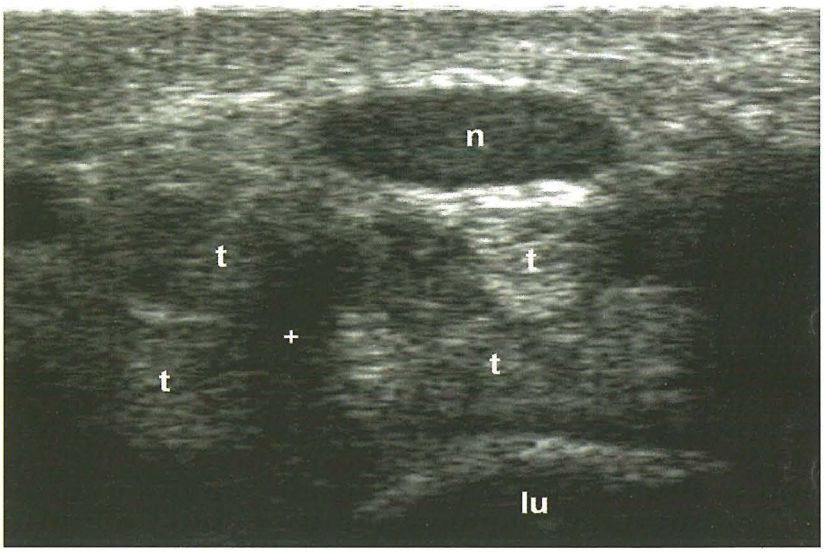

Figure 6. Transverse scan through the carpal tunnel showing a thickened median nerve (n) and fluid in the tendon sheaths (+). Tendons (t) and lunate bone (l).

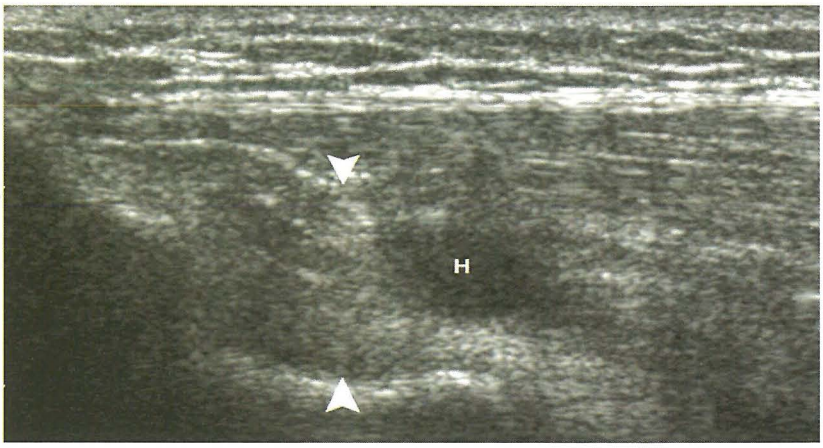

Figure 7. Longitudinal scan through the ulnar collateral ligament of the elbow showing a thickened (arrowheads) that is 8.9 mm and a fluid collection or haematoma (*H*).