

The Various Modalities for Imaging of the Wrist

The wrist joint is probably the most complicated joint in the body owing to its unique arrangement and articulation of the radio-carpal and intercarpal joints as well as the distal radio-ulnar joint. Through a linkage of 8 bones, 45 articular surfaces and a myriad of ligaments, the wrist allows motion in six directions around three independent axes. The motions involve a single articulation and for most movements a co-ordinated sequence of gliding and rolling must occur.

It is also a very commonly injured joint due to the propensity to fall on an outstretched hand which can result in fracture or unrecognised ligamentous damage, pain and instability.

The complexity of this joint is underlined by the growing subspeciality of hand surgery with a number of dedicated upper limb/hand surgeons practicing in Brisbane. This is paralleled by the increased complexity of radiology with all types of imaging being applicable to disorders of the wrist and hand. It may be difficult at times to know which examination to use for which problem. With this update, we hope to provide straightforward guidelines for commonly presenting clinical problems. Also, the Radiologists of Queensland X-Ray are always available for direct telephone consultation if you wish to discuss the most appropriate method of investigation.



Figure 1: Coronal MRI showing widened gap between the torn edge of the scapho-lunate ligament readily visible.

Figure 2a



Figure 2b



Isotope bone scan showing a right scaphoid fracture, with increased uptake on blood pool image (Figure 2a) and delayed static image (Figure 2b).

Trauma

For simple trauma, conventional radiographs usually suffice. If strong clinical suspicion of fracture persists despite a normal x-ray then an isotope bone scan will help to rule out a scaphoid or other occult fracture (Figure 2). In the wrist and particularly in younger patients a bone scan should be positive within 24 hours of injury and always within 48 hours.

For more complex and particularly intra-articular radial fractures, CT scanning with 3D reconstruction is occasionally required by the managing Orthopaedic/Hand Surgeon. Morbidity and poor result may be related to the size of the gaps and steps in the articular surface which may be difficult to appreciate fully on plain films.

Foreign Bodies

Although glass and metal are readily appreciated on conventional radiographs, vegetable foreign bodies do not show up on plain films or CT. Ultrasound shows all form of vegetable foreign body clearly (Figure 3). Also if the nature of a foreign body is uncertain then ultrasound is the method of choice.

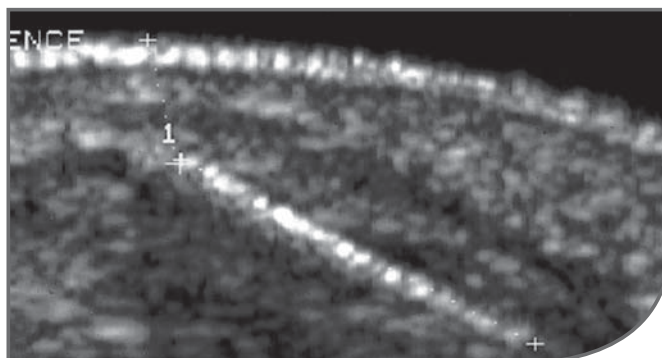
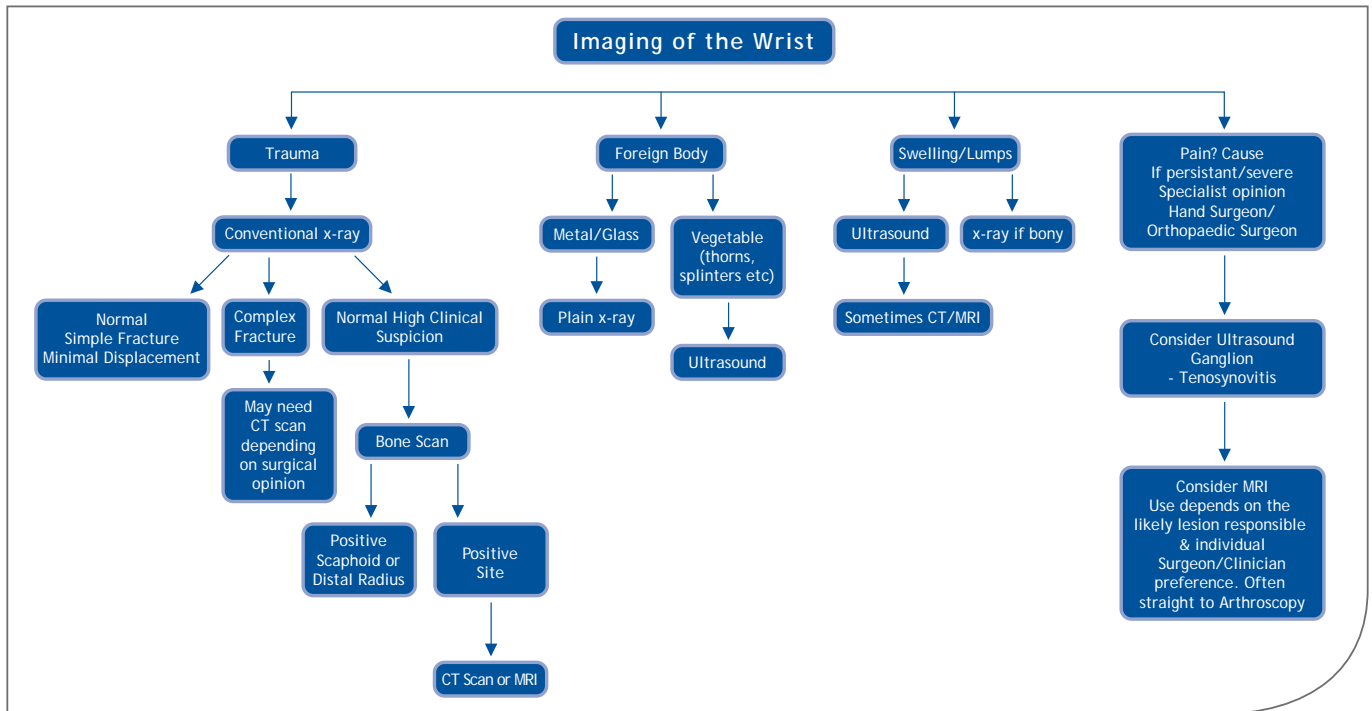


Figure 3: Ultrasound of the thenar eminence showing a 1cm thorn lying 3mm deep to the skin surface. Thorns, splinters etc show up very clearly as echogenic foci, often with acoustic shadowing.



Lumps and Bumps

Soft Tissue - Superficial and deep lumps and bumps are also best assessed initially by ultrasound. Ultrasound differentiates solid from cystic or complex masses. Most cystic masses are ganglia. Complex or solid masses usually require specialist assessment and may need an MRI to further analyse.

Bony - Plain film assessment often clarifies the nature of an apparent bony mass, occasionally CT or MRI will be necessary to further analyse.

The Painful Wrist

The cause of persisting wrist pain can be hard to diagnose. Conventional radiographs may show evidence of osteoarthritis, scapho-lunate or rarely luno-triquetral ligament abnormality with or without instability. It can also show signs of triangular fibro-cartilage complex (TFCC) damage and ulnar carpal impaction.

Occasionally an instability x-ray series may be necessary to further analyse. Ultrasound may help to rule out a deep-seated ganglion as a cause of pain and will also readily show tenosynovitis (Figure 4). A bone scan is also often of value to rule out an unexpected focal bony cause of pain or to clarify possible plain film abnormality.

As within internal derangements in the shoulder and knee, MRI is also proving useful in the wrist. It is however technically more challenging to obtain high quality examinations. MRI reliably demonstrates deep ganglia and bony abnormalities, particularly unexpected bony trauma as well as synovitis and tenosynovitis. It is also proving useful in ligamentous

disruptions (Figure 1) as well as disruptions and disorders of the ulno-carpal articulation and TFCC. The complex anatomy and common occurrence of asymptomatic abnormalities in the general population however underlines that interpretation must be made with care and fully correlated with clinical history and examination.

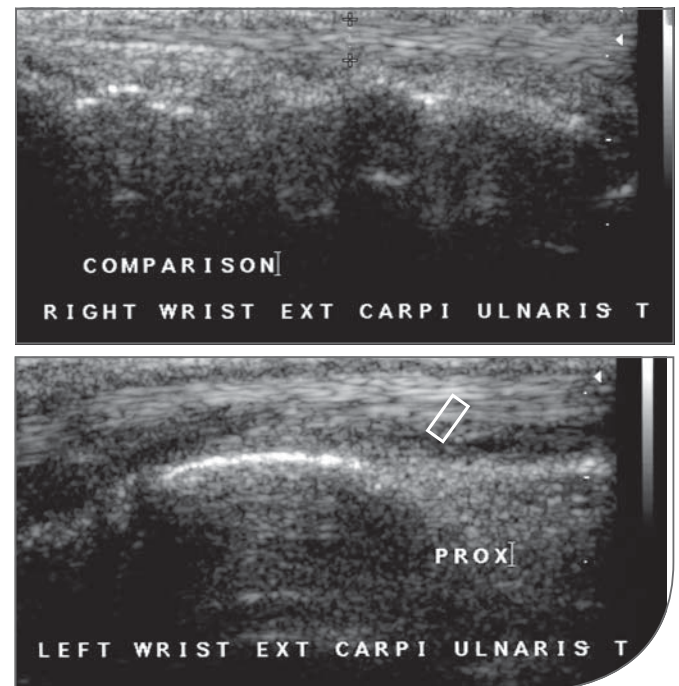


Figure 4: Left extensor carpi ulnaris tenosynovitis with thickening of the tendon (arrow) and its sheath as compared to the normal right side.

For further information please phone 07 3343 9466 or visit our website www.qldxray.com.au.