

Message of the Month for GPs

June 2013

Dr Winn : Consultant Musculoskeletal Radiologist, Manchester Royal Infirmary

Imaging of the musculoskeletal system

Musculoskeletal pain is a common problem in the general population and most people will experience some kind of musculoskeletal pain in their lifetime. Most problems are likely to be self limiting and will not require further investigation. Some may not settle with conservative management and will require further investigation. The following information is intended as an aid to deciding on the most appropriate further investigation and management.

The Royal College of Radiologists website hosts a useful resource known as “iRefer,” previously available in hard-copy booklet form as “Making Best use of a Department of Clinical Radiology.” iRefer is available free of charge to all NHS staff through the e-learning for healthcare portal and provides a comprehensive list of appropriate imaging tests for a wide variety of clinical indications.

iRefer access: <http://www.irefer.org.uk/>

E learning for healthcare: <http://portal.e-lfh.org.uk/>

The following is a summary of the information available on iRefer, tailored for the needs of local GP referrers:

Trauma

Investigation	Radiation Dose	Comment
X-ray	*	First line investigation. In most cases, a normal x-ray should be re-assuring that there is no significant pathology. Notable exceptions to this are the scaphoid and the knee. X-rays are relatively insensitive to scaphoid injuries and persistent pain should be followed up with orthopaedic assessment +/- MRI. In the knee, x-rays are insensitive to soft tissue pathologies, so any persistent knee pain following trauma, should be further investigated, usually with MRI
MRI	none	See above. Second line investigation of injury
CT	*****	Specialist referral only.

Neck Pain

Investigation	Radiation Dose	Comment
X-ray	*	Neck pain generally improves or resolves with conservative treatment, without requirement for any imaging. Degenerative changes begin in early middle age and are often unrelated to symptoms. X-ray can be helpful as a low cost, first line investigation, however, often the imaging findings do not correlate with the symptoms.
MRI	none	Consider MRI and specialist referral when pain affects lifestyle or when there are neurological signs or red flag features (including vascular insufficiency, trauma, malignancy, infection, inflammation, and myelopathy)

Back pain without red-flag symptoms

Investigation	Radiation Dose	Comment
X-ray	*	<p>Lumbar imaging for low-back pain without suggestion of serious underlying conditions does not improve clinical outcomes. X-ray is not indicated</p> <p>X-ray is only indicated where there is a suspicion of metastatic disease, osteoporotic crush fracture, bone tumour, spondylolysis or spondyloarthropathy. Most patients do not fall into this category and an x-ray does not add any useful information but carries a radiation burden.</p> <p>The Manchester Royal Infirmary will only accept requests for lumbar spine x-ray for the above indications. If this is not provided (i.e. the examination is not justified), the patient will not be imaged and will be advised to return to their GP.</p>
MRI	none	MRI is the preferred investigation for the diagnosis of most spinal diseases and is helpful in identifying those patients who may benefit when planning surgical intervention
CT	*****	Referral for CT of the lumbar spine has specific referral criteria (eg surgical planning, if MRI is contraindicated), not indicated for GP referral.

Back pain with red-flag symptoms

Investigation	Radiation Dose	Comment
X-ray	*	Not a first line investigation
MRI	none	MRI is the test of choice, but red-flag symptoms should necessitate urgent specialist referral without delay for imaging

Shoulder Pain

Investigation	Radiation Dose	Comment
X-ray	*	XR is used as a preoperative assessment. Impingement is clinically diagnosed. XR is indicated for persistent shoulder pain that is unresponsive to conservative treatment to exclude calcific tendinitis and diagnoses unrelated to the rotator cuff
MRI	none	MRI provides a good assessment of the intra-articular structures, such as cartilage and ligaments, not visible on ultrasound. MRI arthrography (following intra-articular injection of contrast) is a specialised test only available to orthopaedic surgeons. MRI is an alternative to US and is useful after major trauma to assess complex injury and bony abnormality
Ultrasound	none	Ultrasound is the investigation of choice in the assessment of rotator cuff and surrounding soft tissues. It may be used to guide injection. It is reserved for cases unresponsive to firstline treatment and clinically guided injection. It is indicated preoperatively if the surgeon requires assessment of rotator cuff integrity. Ultrasound does not provide adequate assessment of intra-articular pathology, MRI is required for this.
CT	*****	CT of the shoulder is a specialist test, available only to orthopaedic surgeons

Elbow pain

Investigation	Radiation Dose	Comment
X-ray	*	XR is a first line investigation to assess the joint
MRI	none	Good assessment of the bone, joint and tendons
Ultrasound	none	Ultrasound is useful for assessment of the common extensor and flexor tendons, however, tennis elbow / golfers elbow is usually a clinical assessment that doesn't require imaging confirmation. Ultrasound may be used for assessment of the distal biceps tendon, for example, in suspected acute rupture
CT	*****	CT of the elbow is a specialist test, available only to orthopaedic surgeons

Hand pain

Investigation	Radiation Dose	Comment
X-ray	*	First line investigation. Good assessment for osteoarthritis (commonest) and inflammatory arthropathies. Suspected scaphoid fracture with a normal x-ray requires further follow-up, preferably with MRI. Orthopaedic referral is indicated for follow-up and further imaging.
MRI	none	Good assessment of the bones and tendons, specialist referral from rheumatologists and orthopaedic surgeons only
Ultrasound	none	Good assessment of the synovium (?inflammatory arthritis) and the tendons. Specialist referral only
CT	*****	Dual energy CT can be used to assess for gout, limited availability (not available at Manchester Royal Infirmary), specialist referral only.

Hip pain

Investigation	Radiation Dose	Comment
X-ray	*	XR of the pelvis is indicated for persistent pain. It may demonstrate focal bony pathology, erosive joint changes, dysplasia and anatomical features associated with femoroacetabular impingement. XR is abnormal in established avascular necrosis but is frequently normal within first 6-9 months, hence if there is a high suspicion of avascular necrosis with a normal x-ray, MRI is indicated
MRI	none	MRI is widely accepted as the best investigation for further evaluation of XR negative hip pain, including avascular necrosis. MR arthrography may be helpful to diagnose labral tears, specialist referral only.
Ultrasound	none	Ultrasound has limited use in the hip, owing to the depth of the structures. Specialist referral only.
CT	*****	CT can be useful for some specific indications (for example, ?fracture occult on x-ray) but should be specialist referral only.
Nuclear Medicine bone scan	****	Bone scan is less specific than MRI for avascular necrosis and other focal lesions but is an alternative when MRI is not possible. A three-phase bone scan or labelled white-cell scan may be helpful to assess suspected infected hip prostheses.

Knee pain

Investigation	Radiation Dose	Comment
X-ray	*	Symptoms frequently arise from soft tissues, which will not show on XR. Osteoarthritic changes are common. XR is needed when considering surgery (MRI is not!). Sudden onset or exacerbation of pain is a good indication for imaging, as is pain persisting for more than 6 weeks in children and young adults. If locking is a symptom, x-ray is useful to assess for any ossified loose bodies.
MRI	none	Undiagnosed knee pain in a young adult warrants further investigation with MRI for assessment of the intra-articular structures, eg menisci, cruciate ligaments, articular cartilage. MRI can also detect suspected avascular necrosis and sepsis and other less common causes of knee pain.
Ultrasound	none	Limited use in the knee, specialist referral only
CT	*****	Can be useful for fracture assessment, specialist referral only

Ankle + foot pain

Investigation	Radiation Dose	Comment
X-ray	*	Good first line investigation
MRI	none	Gold standard test in imaging the ankle and foot and can show pathology of the bone, joint and tendons. The small joints of the feet / phalanges are not well assessed on a body MRI scanner and ultrasound may be more appropriate. With the advent of extremity scanners, MRI will have more utility in the small structures, however, this is not yet available locally.
Ultrasound	none	Ultrasound is very useful for soft tissue assessment, eg the tendons, plantar fascia, Achilles tendon. Ultrasound is superior to MRI in assessment of the Achilles tendon as it has better spatial resolution. Ultrasound is complementary to MRI in assessment for inter-metatarsal pain, eg? Morton's neuroma.
CT	*****	Specialist referral only

Soft tissue mass

Investigation	Radiation Dose	Comment
X-ray	*	Not usually indicated
MRI	none	Second line investigation, usually specialist referral
Ultrasound	none	First line investigation. Anything that is not clearly a small, simple lipoma should be referred onward to the sarcoma team at the Manchester Royal Infirmary – see the message of the month for October 2012
CT	*****	Not usually indicated, specialist referral only

Suspected primary or secondary bone tumour

Investigation	Radiation Dose	Comment
X-ray	*	Good first line investigation. A “negative” x-ray does not definitively exclude disease. If the suspicion is high, MRI is the test of choice, however, specialist referral is usually indicated prior to more extensive imaging.
MRI	none	Gold standard test for suspected bone malignancy
Ultrasound	none	Not usually indicated.
CT	*****	Indicated, specialist referral only

It is worth reminding that MRI has some absolute contra-indications, owing to the strong magnetic fields required to generate the images. Some of the common contra-indications are intra-orbital metal fragments (if in doubt, we will x-ray the patient's orbits at the time of examination), pacemaker, neuro-stimulaor and intra-cranial aneurysm clips. Some of the most recently implanted pace-makers can be compatible with the MRI scanner, however, currently these are uncommon and we will require written documentation confirming that the device is MR conditional / compatible. Orthopaedic implants (such as total knee replacement, intra-medullary rod) are not an absolute contra-indication and if were placed greater than 6 weeks ago, should not preclude an MRI scan. Similarly, any surgery within 6 weeks is usually a contra-indication to an MRI scan as metal clips placed at the time of surgery may move in the strong magnetic field. Cochlear implants are a relative contra-indication. If in doubt, please call the department (0161 2768596 / 0161 2764588 / 0161 2764702).

I hope the above is helpful when faced with a patient with musculoskeletal pain.

Dr Naomi Winn

Naomi.winn@cmft.nhs.uk

Consultant Musculoskeletal Radiologist

Manchester Royal Infirmary (9/5/13)