

SHOULDER IMAGING

Catch of the Day or Red Herring?



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Diagnostic imaging investigations including x-ray, diagnostic ultrasound scans and magnetic resonance imaging (MRI) are now widely available in many countries. Referral rights for physiotherapists vary. In New Zealand and some other countries, physiotherapists working in private practice can order x-ray and ultrasound scans. Advanced practitioners also have imaging referral rights in countries where these roles are established.



With imaging referral rights comes the responsibility to refer for, and to interpret the results appropriately to avoid unnecessary investigations that may lead to overdiagnosis, overdiagnosis and overtreatment of asymptomatic findings and associated harm.

Purpose of Imaging

Imaging is used to help discriminate between competing differential diagnoses in order to inform treatment decisions and prognosis. Imaging is therefore used to help:

- Exclude serious pathologies
- Confirm a diagnosis (where this will alter management)
- Differentiate between conditions for which management and/or prognosis differs

Shoulder Imaging

The decision to use imaging in the differential diagnosis of shoulder conditions should always begin with a clinical question derived from the clinical examination. For example: a patient presents with severe pain in the lateral shoulder region, no history of trauma and a global loss of passive range of motion and a history of cancer. What is the cause of the pain and stiffness, and would finding out make any difference to treatment or prognosis? Let's take a closer look at this scenario.

Differential diagnoses for this patient could include:

- Bony metastases
- Frozen shoulder
- Glenohumeral osteoarthritis

Clearly the treatment and prognosis is very different for all three conditions, hence differentiating between these conditions is critical in helping make decisions about management and prognostic planning. In this situation a plain film x-ray is indicated to:

- Exclude pathologies of significance (bony metastases)
- Exclude other causes of shoulder stiffness (a normal x-ray helps confirm the diagnosis of frozen shoulder)
- Confirm the presence of arthritic changes (confirming the diagnosis of glenohumeral osteoarthritis)

Normal Shoulder X-ray



Glenohumeral Osteoarthritis



Osteosarcoma of the Proximal Humerus



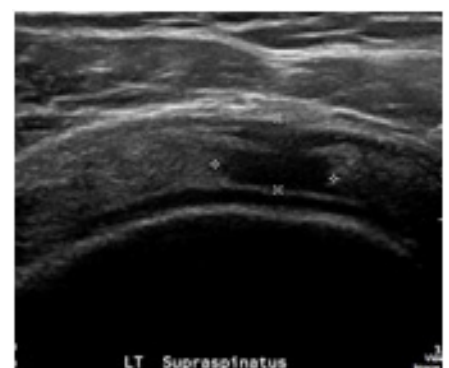
Asymptomatic Findings

Much is written and discussed on social media about the high prevalence of abnormal imaging findings in asymptomatic populations. Are the people who present to physiotherapy or medical clinics asymptomatic? No. This is not the population we see. All this research tells us is that it is possible for people who do not have shoulder pain to have abnormal findings on imaging. What should be of more interest to us is the prevalence of abnormal imaging findings in symptomatic populations, and what the likelihood is of these findings being symptomatic.

Rotator cuff tears

Rotator cuff tears are often touted to be normal findings in asymptomatic populations. This is true. However, it is not the asymptomatic population who seek our help. In people with shoulder pain, evidence from my own research suggests that in people over the age of 50 years with injection-confirmed subacromial pain, full thickness supraspinatus tears were almost 6x more likely to be symptomatic than in those who do not have subacromial pain. ¹ This suggests that in people over the age of 50 years who present with subacromial shoulder pain (full passive range of motion and pain with variable weakness on resisted muscle tests*) many of these tears are, in fact, symptomatic and are not simply imaging 'red herrings'

Full thickness supraspinatus tear on ultrasound



*This is covered in more detail in the [Rotator Cuff](#) online module.

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How To Tell if Imaging Findings Are Symptomatic?

Imaging begins with a clinical question. While our clinical tests lack specificity for specific shoulder pathologies, by the end of the clinical examination you should have a list of possible differential diagnoses for various shoulder presentations; stiff shoulder, unstable shoulder, subacromial pain/weakness, or acromioclavicular joint pain. *

*This is covered in more detail in the “**Diagnostic Classification**” lesson in the Shoulder Screening online module.*

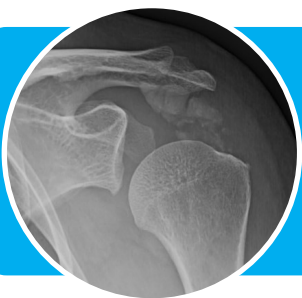
From the start point of the clinical question, imaging can then be used to fine-tune the diagnosis if needed to guide further management decisions that may include:

- Medical referral if there are red flag indicators of serious pathology.
- Orthopaedic referral if there is traumatic, structural pathology (fracture, dislocation, tissue rupture)
- Non-surgical management:
 - Interventional procedures E.g fenestration of calcific deposits in resorptive calcific tendinopat
 - Physiotherapy treatment and rehabilitation

Occasionally, where clinical differentiation is difficult, and where management decisions rely upon definitive identification of the pain source (e.g surgical decisions), diagnostic injections of local anaesthetic can be used to assist in confirming the source of pain.

Who Should be Referred for Imaging?

There are no universally accepted imaging guidelines. Guidelines vary by region, country and health system. However, after completing a comprehensive clinical examination to establish a list of possible differential diagnoses the following guidelines may help in making decisions about the use of imaging to exclude, confirm or differentiate specific pathologies that alter management or prognosis:



GENERAL IMAGING INDICATIONS:

- Red Flags
- Severe Pain
- Undiagnosed Pain
- Significant Trauma
- Pain in previous arthroplasty
- Failure to respond to current treatment

There are some certain considerations around each of these indications that we discuss further in the online learning module. There are also indications for imaging relating to specific shoulder conditions that are covered in the online module including shoulder dislocations, rotator cuff tears and prior to certain shoulder procedures.

References: 1. Cadogan A, McNair P, Laslett M, Hing W. Diagnostic accuracy of clinical examination and imaging findings for identifying subacromial pain. PLoS ONE. 2016;11(12):e0167738.

Download this article for free: <https://pubmed.ncbi.nlm.nih.gov/27936246/>

Also Covered in the **Shoulder Imaging Module**:

- How to write a radiology referral
- Which investigations to order (e.g x-ray, ultrasound, MRI)
- Strengths and limitations of various imaging investigations
- Radiation exposure in x-ray investigations
- Prevalence of pathology in various populations
- How to read and interpret basic shoulder x-ray views
- The use of MRI in shoulder pathology

If you would like to learn more about shoulder imaging we'd love to have you join the Shoulder Imaging lesson in our **Shoulder Screening** online module. You might also like to check out **Shoulder Academy** for ongoing learning after you finish the module.



Other topics covered in the **Shoulder Screening** online module include:

- **Red Flags**
- **Health Screening**
- **Pain and Psychosocial Modifiers**
- **Cervical Spine & Neurological Examination**
- **Shoulder Imaging**
- **Diagnostic Classification of Shoulder Conditions**

Lessons can be purchased individually or as a full module (package discount applies).

MEET YOUR INSTRUCTOR

Dr Angela Cadogan, *PhD, NZRPS*



Angela is a NZ registered Physiotherapy Specialist (Musculoskeletal). Angela has a Ph.D in Musculoskeletal Diagnostics from AUT University, Auckland, New Zealand (2012) with a sub-specialty in the diagnosis and management of shoulder pain. She is based in Christchurch, New Zealand where she works part-time in her own physiotherapy practice, in a diagnostic Orthopaedic Triage role (Shoulder) with the Canterbury District Health Board and in private practice with an orthopaedic shoulder specialist. She has an ongoing research interest in shoulder diagnostics and clinical management of shoulder conditions.

Angela graduated from AUT University in 1990 with a Diploma in Physiotherapy. In 2000 she completed her Masters Degree in Sports Physiotherapy at Curtin University (Perth, Australia) then returned to New Zealand to take on a position with NZ Cricket as the team physiotherapist for the White Ferns in 2001. This role expanded and she worked as the Sports Medicine and Science Coordinator for women's cricket, and the touring physiotherapist for the NZ Men's "A" team for several years, and for the World XI Cricket team in 2007. She left NZ Cricket in 2009 to begin her PhD research into the diagnosis of shoulder pain. She was awarded a Clinical Research Training Fellowship through the Health Research Council of NZ and completed her PhD in 2012. She has published several papers from her thesis in the area of shoulder diagnostics and sports physiotherapy.



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