



University
of Antwerp



The spectrum of rotator cuff related shoulder pain

Applying an evidence-based approach to inform what we do in clinic


Eoin Ó Conaire PhD candidate, MSc, BSc (Hons), BA, MMACP, MISCP

Specialist Shoulder Physiotherapist

ISERS conference 21st January 2023



IRISH SHOULDER & ELBOW
REHABILITATION SOCIETY



What can we do to get
people better, pain-free and
confident in their shoulders?

Background & experience



UNIVERSITY OF BIRMINGHAM



Learning Outcomes

**WHAT ARE YOU GOING TO DO DIFFERENTLY
IN CLINIC ON MONDAY?**



@EBTC_Eoin



eoin.oconaire@ebtc.ie



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The Shoulder
Masterclass

Next course: 25th & 26th February, EBTC Galway

The Psychologically
Informed
Physiotherapist[™]

Next course: tbc



Step 1: Create the foundations for a
good therapeutic relationship

You are treating a person, not a rotator cuff tendon!

Positive association between better therapeutic relationships and:

- Patient satisfaction (Husk et al, 2011)
- Adherence with treatment (Schönberger et al 2006)
- Clinical outcomes (Fuentes et al 2014; Hall et al 2010; Fereira et al 2013)


Patients value patient-therapist relationships more than the amount or content of therapy (Casey et al 2012)

RESEARCH ARTICLE

Open Access



The necessary conditions of engagement for the therapeutic relationship in physiotherapy: an interpretive description study

Maxi Miciak^{1*} , Maria Mayan², Cary Brown³, Anthony S. Joyce⁴ and Douglas P. Gross⁵

- Qualitative study of 11 physiotherapists and 7 patients
- 4 conditions found to foster engagement between the physiotherapist and the patient

PRESENT

RECEPTIVE

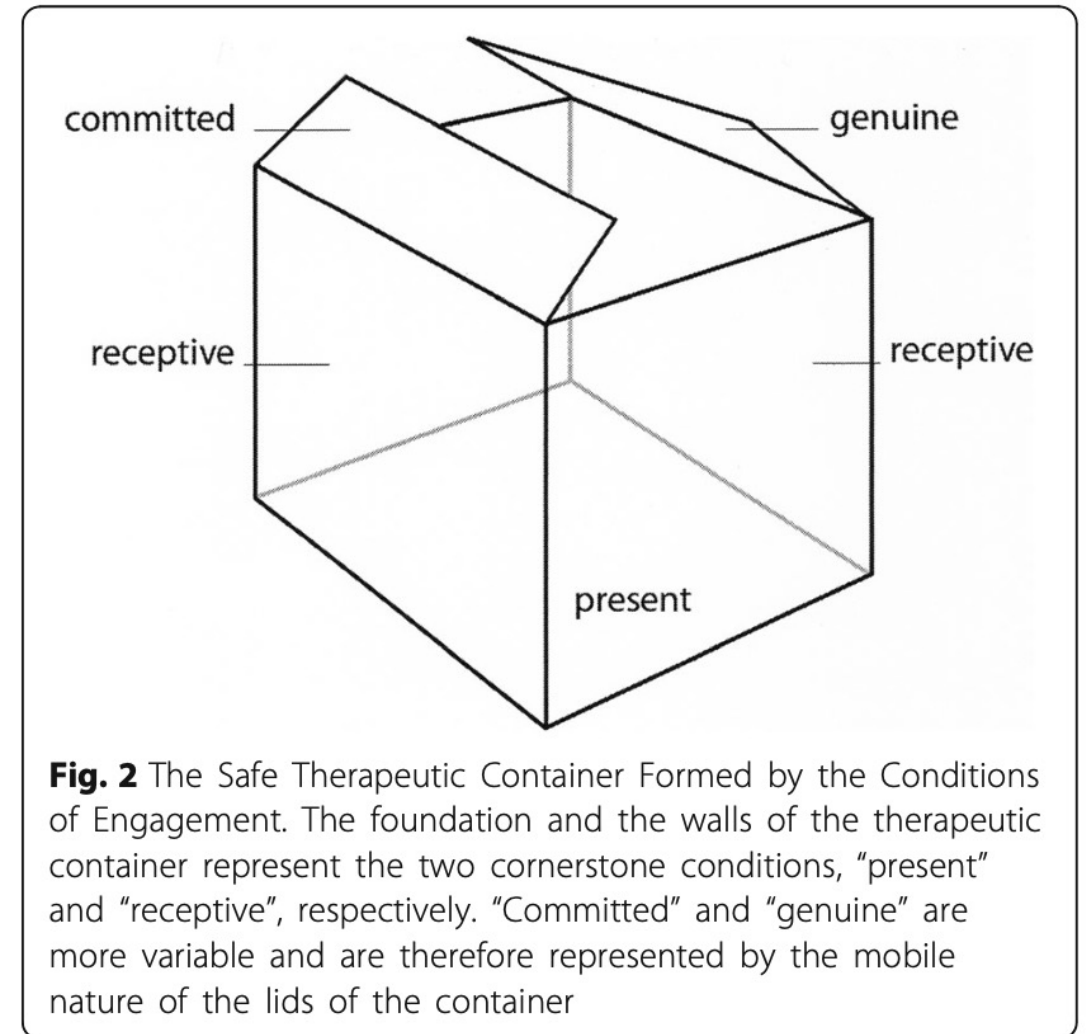
GENUINE

COMMITTED

The safe therapeutic container

“The conditions of engagement work in concert to form a safe therapeutic container for the therapeutic relationship to manifest”

Miciak et al, 2018



REPORT



A framework for establishing connections in physiotherapy practice

Maxi Miciak, PhD ^a, Maria Mayan, PhD^b, Cary Brown, PhD^c, Anthony S Joyce, PhD^d, and Douglas P. Gross, PhD^e

^aFaculty of Rehabilitation Medicine, University of Alberta, Edmonton, AB, Canada; ^bFaculty of Extension, University of Alberta, Edmonton, AB, Canada; ^cDepartment of Occupational Therapy, University of Alberta, Edmonton, AB, Canada; ^dDepartment of Psychiatry, University of Alberta, Edmonton, AB, Canada; ^eDepartment of Physical Therapy, University of Alberta, Edmonton, AB, Canada

ACKNOWLEDGING THE INDIVIDUAL

GIVING OF SELF

USING THE BODY AS A PIVOT
POINT (means of connection)

- Miciak et al 2018
- Qualitative study
- 11 physiotherapists, 7 patients
- Semi-structured interviews
- Identified ways that physiotherapists establish meaningful connections with their patients

Before we see each patient

- Take a breath and calm your mind
- Be present in the moment
- Think about what that person needs from you
- Think about how you want to *be* in the session



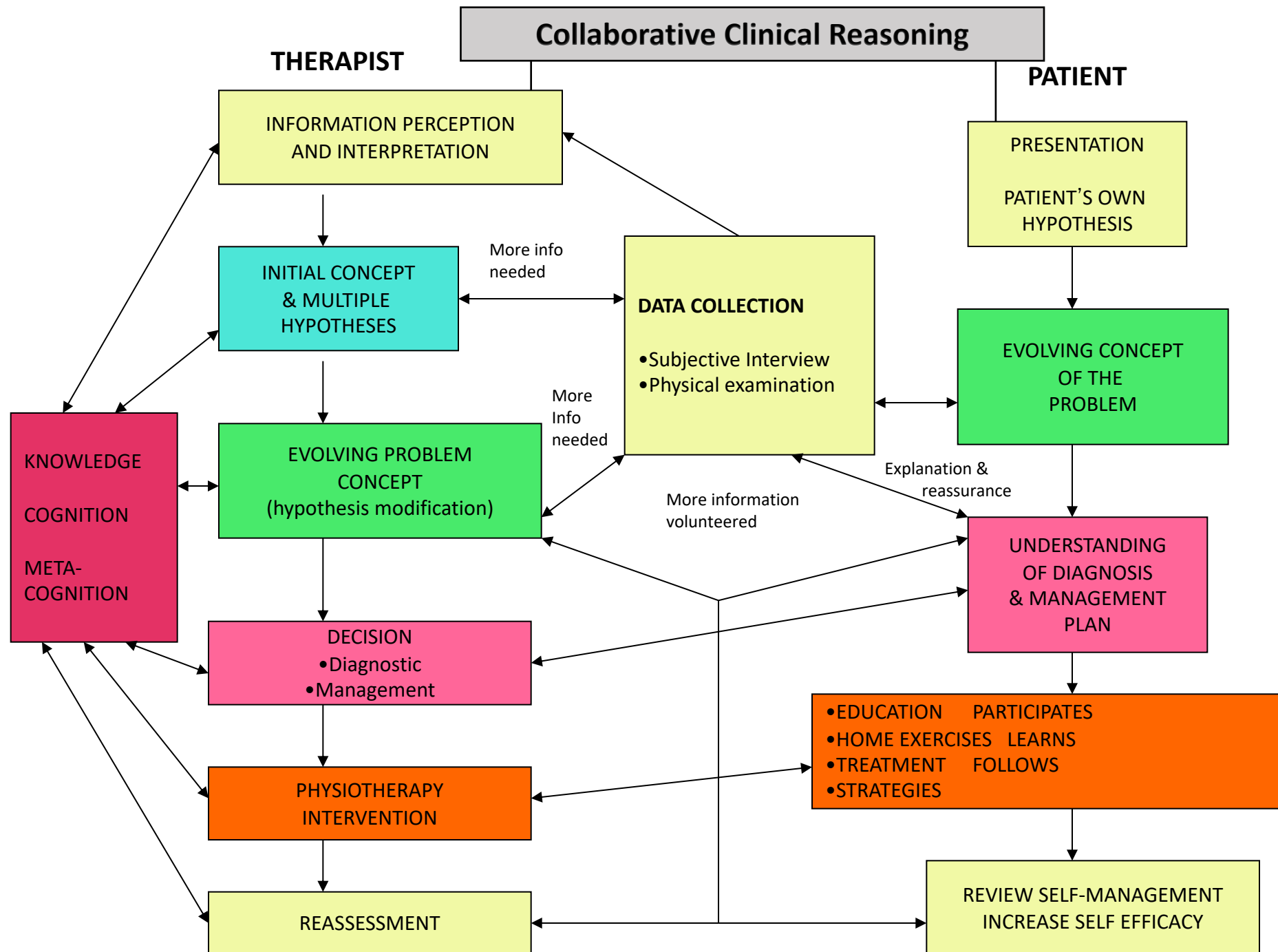
Narrative / collaborative clinical reasoning

- Gain an understanding of the patient's
 - Illness experience / perception
 - “Stories”
 - Meaning perspectives
 - Context
 - Beliefs
 - Culture
 - ABCDEFW
 - Actively seek out the patient's opinion



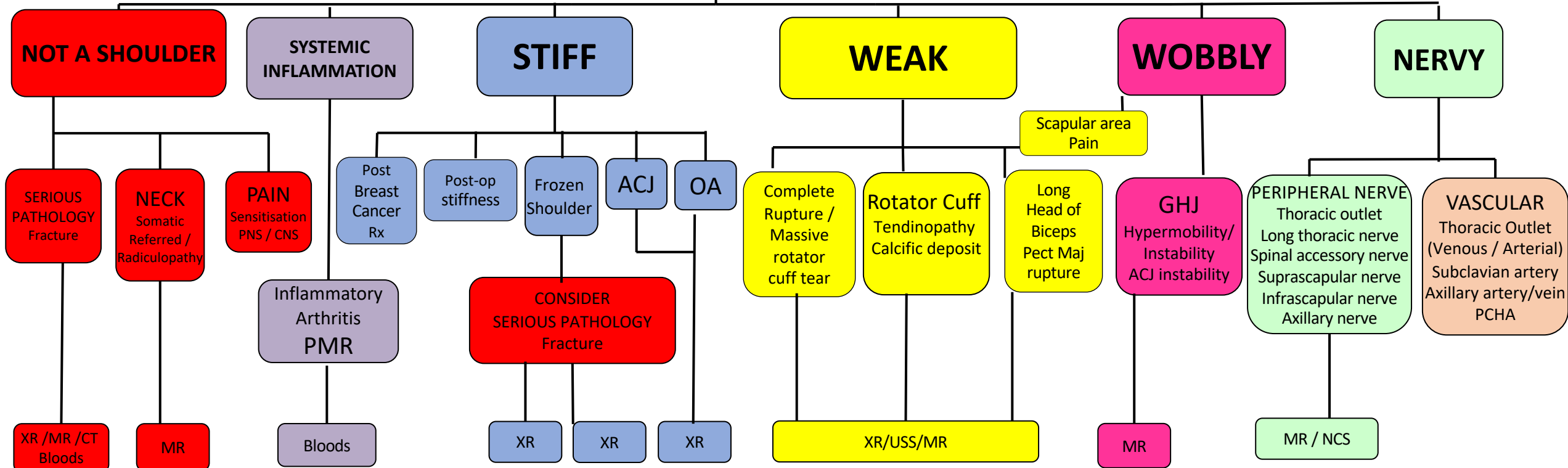
**Every good
conversation
starts with
good listening.**

Listen to your patient – he / she is telling you the diagnosis (William Osler)



(Adapted from
Edwards &
Jones, 1995)

SHOULDER ASSESSMENT FRAMEWORK



LISTENING TO THE PATIENT'S STORY

ASSESSMENT OF NERVOUS SYSTEM INVOLVEMENT

Reflexes	Unusual Patterns	Motor testing
Hyperalgesia	Altered sensory thresholds: vibration, thermal	Skin condition
Allodynia	Neurodynamic sensitivity	CNS / UMN testing

ASSESSMENT OF PSYOSOCIAL IMPACT

Attitudes	Compensation	Family	Catastrophising	Impact of events / PTSD
Beliefs	Expectations	Diagnosis	Work	Fear-avoidance
Behaviours	Emotions	Self efficacy	Sleep	Social support
				Culture

PAIN (as an expression of what is happening in the nervous system)

Step 2: Accurate and careful assessment

About 50% of patients with shoulder pain have pain or problems related to the rotator cuff.

Watch out for laziness in our clinical reasoning

Proactively try to disprove the assumed diagnosis of rotator cuff related shoulder pain

Make sure you are treating what you think you are treating!



A man with dark, curly hair, wearing a light-colored suit jacket, a white shirt, and a patterned tie, is seated at a chessboard. He has a stressed or overwhelmed expression, with his hands pressed against his temples. In the foreground, several chess pieces, including a king and a queen, are visible on the board. The background is blurred, showing other people and what appears to be a large chess set on a wall.

Pattern recognition

Pattern Recognition: Neck V Shoulder

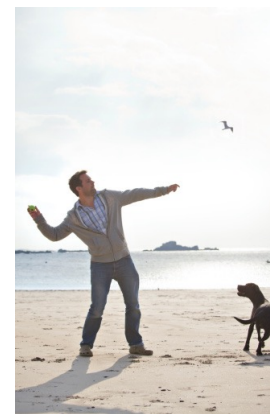
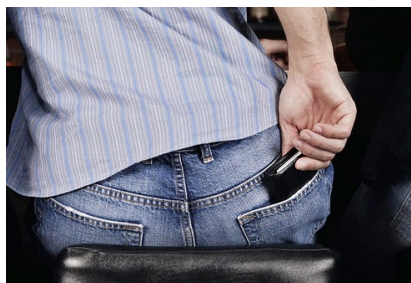
Neck



Shoulder



A unique and complicated joint



Ruling out the neck

- Pattern recognition
- AROM / PROM
- PAIVMs
- Neurological examination (Consider Vibration Disappearance Threshold testing / hot / cold)
- Neurodynamic testing – particularly median & radial nerves / improvement testing
- Spurling's test: Lateral flexion to symptomatic side +/- overpressure +/- compression



Shoulder Abduction test Malanga et al 2002



Carracci's Sleeping Venus

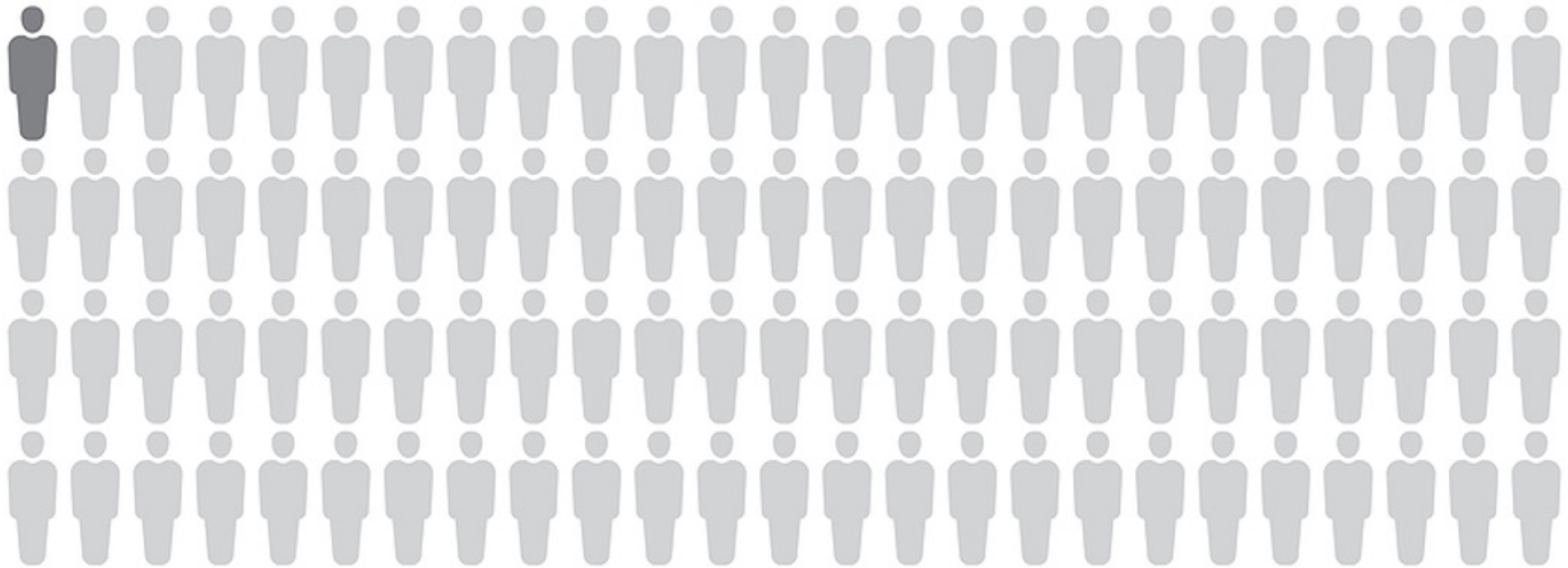
Positive: relief or reduction of ipsilateral radicular symptoms

Discussion:– quick clinical reasoning

- Kate - 42 year-old Musculoskeletal Physiotherapist
- Fell over skiing the week before – shoulder still painful wants you to “have a look”
- “Quick clinical reasoning”



Red Flags



(Rud Butz et al 2021)

Your scary reading list

- **Lessons learnt from the painful shoulder: a case series of malignant tumours misdiagnosed as frozen shoulder** Quan et al 2005 (5 cases presented)
- **Tumours masked as frozen Shoulders. A retrospective analysis** Sano et al 2009
 - 4/505 patients (0.8%) with pain and stiffness went on to be diagnosed with malignant tumours
 - Among 34 tumour patients, 9 (26%) had been initially misdiagnosed with frozen shoulder syndrome
- **Shoulder girdle neoplasms mimicking frozen Shoulder syndrome** Robinson et al 2003
 - Among 7/67 bone tumour patients presented with stiffness as initial feature
 - Younger in age than is typical for Frozen Shoulder
 - Discrete area of bony tenderness common
- **Primary chest wall tumour appearing as frozen shoulder. Review and case presentation** Demziere & Wiley 1991
 - 2% of patients referred for manipulation for frozen shoulder had primary chest wall tumours
- **Common Tumors and tumor-like Lesions of the Shoulder** Lee et al 2018
 - Shoulder accounts for approximately 15% of primary sarcomas and is the third most common site. Patients with MSK malignancy experience up to 6 months delay before diagnosis

Tumour masked as Frozen Shoulder

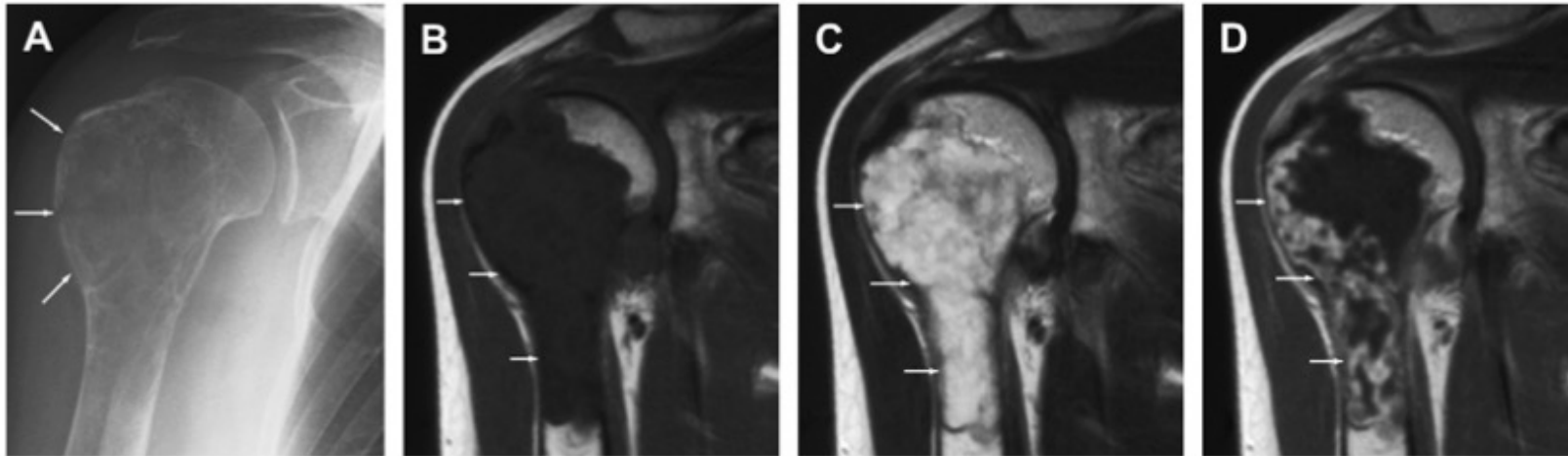


Figure 1 A 61-year-old female suffering from chondrosarcoma. The ballooning of the lateral cortex with destruction of the bony trabeculae due to chondrosarcoma were seen in the proximal part of the humerus (**A**). However, because the tumor was localized inside the humerus (*arrows*), it was overlooked and misdiagnosed with frozen shoulder syndrome by the primary physician. She underwent a conservative therapy for 7 months as frozen shoulder syndrome, then underwent surgical resection with a wide-margin (**A**, plain x-ray; **B**, T1-weighted image in the oblique coronal plane; **C**, T2- weighted image in the oblique coronal plane; **D**, T1-weighted image with gadolinium enhancement in the oblique coronal plane).

Pattern recognition of tumour around the shoulder

- Bone & soft tissue tumours are rare – 1% of all malignancies
- Challenging because of this rarity and heterogeneity of presentation
- Most common in teens and young adults & then elderly
- Commonest symptom of malignant tumour is constant, dull, aching pain
- Swelling and tenderness with persistent non-mechanical pain that increases at night requires urgent investigation
- Soft tissue mass >5cm associated with non-mechanical pain: investigate
- Malignant tumours commonly present with restriction

Red Flag indicators

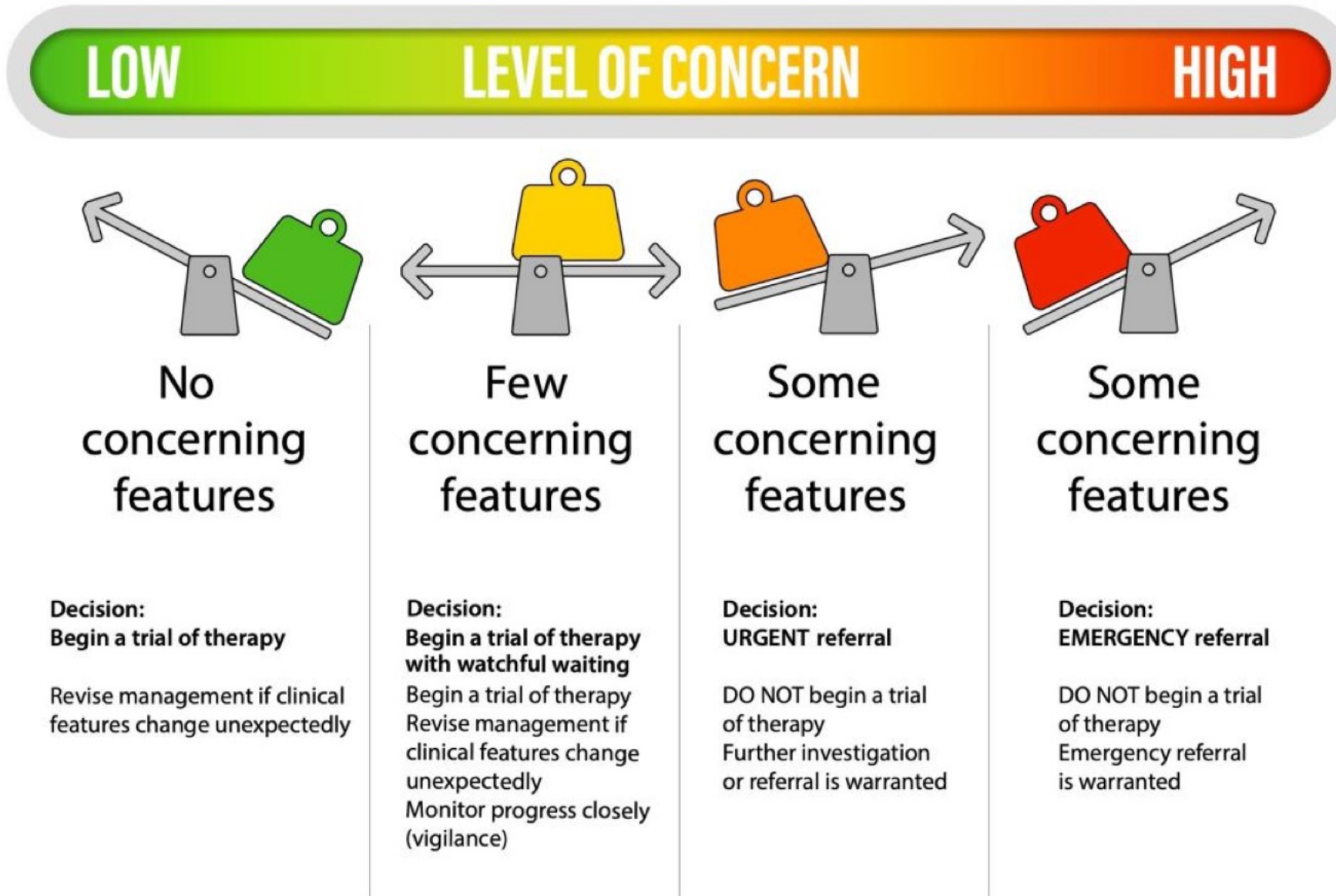
History of cancer: symptoms and signs of cancer;
unexplained deformity, mass, or swelling: tumour?

Red skin, fever, systemically unwell: infection?
Alcohol / steroids / OA / complex #: consider avascular necrosis

Trauma, epileptic fit, electric shock; loss of rotation and normal shape: unreduced dislocation / locked posterior dislocation?

Unexplained significant sensory or motor deficit: neurological lesion?

Decision model



(Finucane et al 2020)

Rheumatological presentation



2012 provisional classification criteria for polymyalgia rheumatica: a European League Against Rheumatism/American College of Rheumatology collaborative initiative

Bhaskar Dasgupta,¹ Marco A Cimmino,² Hilal Maradit-Kremers,³ Wolfgang A Schmidt,⁴ Michael Schirmer,⁵ Carlo Salvarani,⁶ Artur Bachtá,⁷ Christian Dejaco,⁸ Christina Duftner,^{5,9} Hanne Slott Jensen,¹⁰ Pierre Duhaut,¹¹ Gyula Poór,¹² Novák Pál Kaposi,¹³ Peter Mandl,¹⁴ Peter V Balint,¹⁴ Zsuzsa Schmidt,¹² Annamaria Iagnocco,¹⁵ Carlotta Nannini,¹⁶ Fabrizio Cantini,¹⁶ Pierluigi Macchioni,⁶ Nicolò Pipitone,⁶ Montserrat Del Amo,¹⁷ Georgina Espígol-Frigolé,¹⁸ Maria C Cid,¹⁸ Víctor M Martínez-Taboada,¹⁹ Elisabeth Nordborg,²⁰ Haner Direskeneli,²¹ Sibel Zehra Aydin,²¹ Khalid Ahmed,²² Brian Hazleman,²³ Barbara Silverman,²³ Colin Pease,²⁴ Richard J Wakefield,²⁴ Raashid Luqmani,²⁵ Andy Abril,²⁶ Clement J Michet,²⁷ Ralph Marcus,²⁸ Neil J Goner,²⁸ Mehrdad Maz,²⁹ Rickey E Carter,³ Cynthia S Crowson,^{3,27} Eric L Matteson^{3,27}

- Patients > 50 years
- Bilateral shoulder pain
- Not explained by other pathology
- Morning stiffness > 45mins
- New hip pain
- Elevated CRP and / or ESR

SCREEND'EM

BEFORE YOU TREAT'EM

A clinical tool to help identify spondyloarthritis (SpA) in patients with tendinopathy.

SKIN

6-42% of patients with psoriasis develop psoriatic arthritis.

COLITIS OR CHROHN'S

Arthritis is one of the most common extra-intestinal manifestations of inflammatory bowel disease. The prevalence of SpA in patients with Crohn's is estimated to be 26% at 6 year follow up.

RELATIVES

There is a strong relationship between SpA and HLA-B27 positive patients.

Family members of patients with SpA who are HLA-B27 positive have a 16-fold increase chance of developing ankylosing spondylitis if they are also HLA-B27 positive.

EYES

Acute anterior uveitis (AAU) can cause a painful, red eye with photophobia and blurred vision. 40% of patients presenting with idiopathic AAU have undiagnosed SpA. 50% of patients with AAU are HLA-B27 positive and >50% of these have SpA.

EARLY MORNING STIFFNESS

Inactivity related stiffness that lasts for more than 30 minutes is suggestive of inflammatory disease.

NAILS

Nail lesions occur in 87% of SpA patients and include:

- small depressions in the nail (pitting)
- thickening of the nails
- painless detachment from the nail bed (onycholysis).

DACTYLITIS

Sausage like swelling of the digits is a hallmark sign of psoriatic arthritis, occurring in 50% of cases.

ENTHESITIS

98% of SpA patients have at least one abnormal enthesitis. The most common sites are the Achilles tendon, plantar fascia and patellar tendon.

MOVEMENT & MEDICATION EFFECT

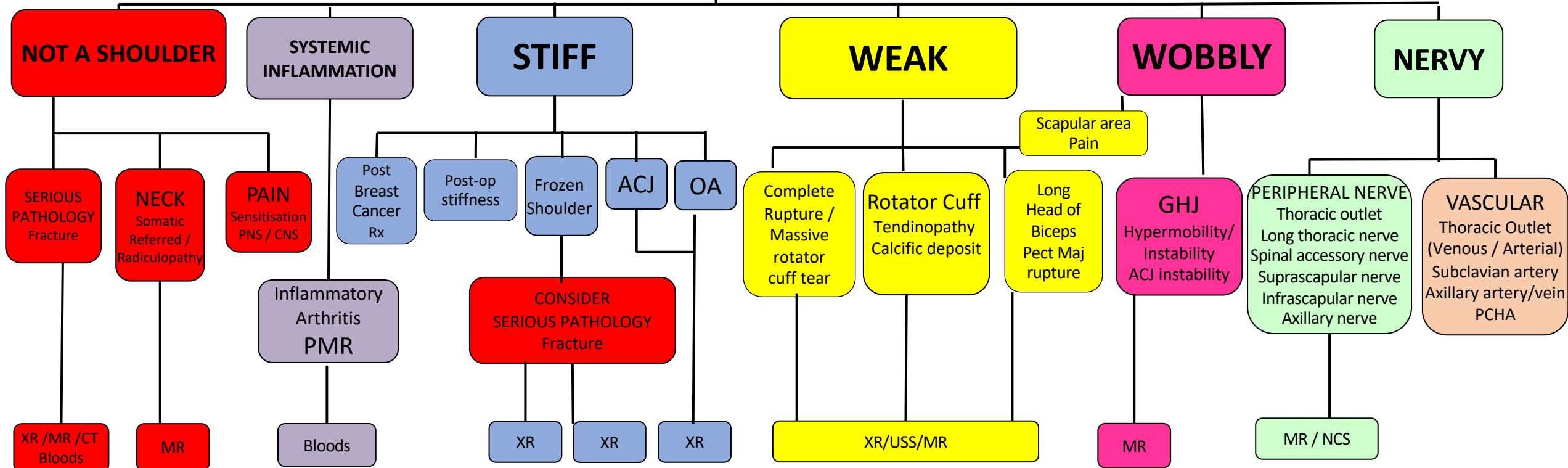
SpA patients report improvement with activity but not with rest, and a favourable response to NSAIDs.

Created by Paul Kirwan

@pdkirwan

THE KNEE RESOURCE

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Behaviours	Emotions	Self efficacy	Sleep	Social support
				Culture

PAIN (as an expression of what is happening in the nervous system)

Let's not miss any Frozen Shoulders!



- Important factors in identifying Frozen Shoulder
- History
- Past Medical History
- Red Flag questions
- Accurate and effective Active and Passive ROM assessment
- Imaging

PATTERN RECOGNITION

WEAK

SCAPULAR
AREA PAIN

COMPLETE RUPTURE / MASSIVE
ROTATOR CUFF TEAR

ROTATOR CUFF TENDINOPATHY
/ CALCIFIC DEPOSIT

LONG HEAD OF BICEPS
TENDINOPATHY

PECTORALIS MAJOR
RUPTURE

Assessment of the rotator cuff: Can we test distinct structures?

- Clark & Harryman (1992): layered structure of the cuff and capsule – all 4 tendons fuse to form a common insertion into the humeral tuberosities
- Muscle testing procedures have been proposed to selectively challenge different aspects of the cuff
- Is this realistic / likely?
- “No single test or combination of tests is both reliable and valid for the diagnosis of a partial or complete RC tear. A clinical examination...may be able to rule out a tear, but is less effective at detecting tears” (NZ Guideline Group, 2004)

THE KEY ASPECT IS TO BE SURE THAT YOU ARE DETECTING TRUE WEAKNESS NOT MERELY PAIN INHIBITION

Physical Examination Evidence: Observation

- Muscle wasting in the supra / infrascapular fossa are statistically associated with the presence of a RC tear. Sensitivity (55.6%) and Specificity (72.9%) lack sufficient power to accurately predict a tear (Litaker et al, 2000)
- Posture & Muscle imbalance – scapular position: problematic as no reliability in assessing scapular position (Lewis et al, 2004)



Physical Examination: Strength

- Strong evidence for inter and intra-rater reliability in assessing shoulder strength with hand held dynamometer or spring scale dynamometer (Brox et al, 1997) (Ben-Yishay et al, 1994)
- Manual muscle testing less reliable but adequate
- Weakness greater than 50% relative to the asymptomatic side was associated with a large or massive RC tear when tested at 10° shoulder abduction (McCabe et al, 2005)
- Pain inhibition is important!
- Immediate and significant increases in maximal isometric abduction strength was reported following subacromial injection with local anaesthetic in 10 subjects with RC tendinosis (Brox et al, 1997)

Consider flexion & extension testing!

- Boetcher et al 2010 used EMG to demonstrate increased activation of posterior rotator cuff muscles on shoulder flexion and increased anterior rotator cuff activation in shoulder extension
- Emerging EMG evidence that rotator cuff function is direction-specific – flexion activating external rotators (Ginn et al 2011)
- Emerging EMG evidence that rotator cuff activity is relatively increased in supported positions rather than unsupported (Dark et al 2007)
- How many of us include resisted flexion & extension in our rotator cuff assessment?

Physical Examination: Clinical Tests

- Research evidence is unwieldy and confusing
- No single test or combination of tests have stood up to independent scrutiny as having sufficient sensitivity or specificity to diagnose RC pathology
- Manual muscle tests do not test specific muscles
- Empty-Can test does not specifically test Supraspinatus (Boettcher et al 2009)
- The strength of lag signs to diagnose full thickness tears is superior to partial thickness tears (Ahern & Forrester, 2005)

Original paper

The ‘empty can’ and ‘full can’ tests do not selectively activate supraspinatus

Craig E. Boettcher^{a,*}, Karen A. Ginn^a, Ian Cathers^b

^a Discipline of Biomedical Science, Faculty of Medicine, The University of Sydney, Australia

^b Faculty of Health Sciences, The University of Sydney, Australia

Received 26 June 2008; received in revised form 28 August 2008; accepted 1 September 2008

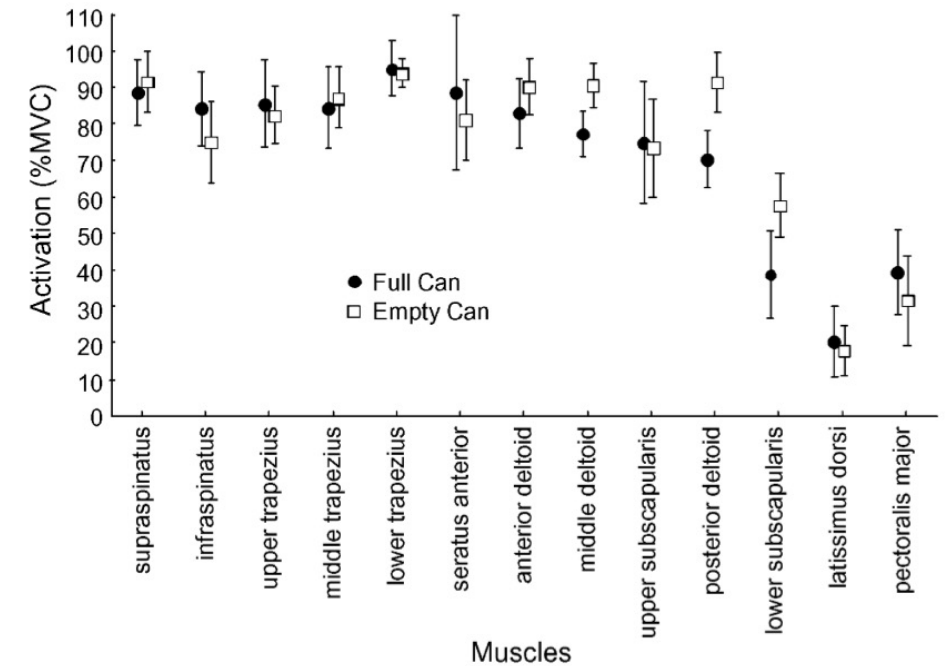


Fig. 2. Activation levels for the 13 muscles in the “empty can” and “full can” tests. Bars indicate 95% confidence intervals.

We cannot isolate activity to a single muscle!
Move away from implying this and change your thinking & language around this

Key physical tests – do simple tests really well!

- AROM
- PROM
- Mid-range isometric resisted testing
 - Internal rotation
 - External rotation
 - Flexion
 - Extension
- Through-range testing
 - Supine external rotation
 - Prone external rotation
- Scapular muscle tests
 - Observation of movement
 - Observation on weight-bearing
 - Upper, middle and lower trapezius
 - Serratus anterior
- Functional tests tailored to your patient
- Improvement tests / symptom-modification



Keep the less common causes of shoulder dysfunction on your radar!







Facioscapulohumeral muscular dystrophy

- Facial muscles
- Serratus anterior, middle and lower trapezius most often affected
- Upper trapezius, deltoid and posterior rotator cuff often spared
- Can also affect abdominals, paraspinal muscles & tibialis anterior







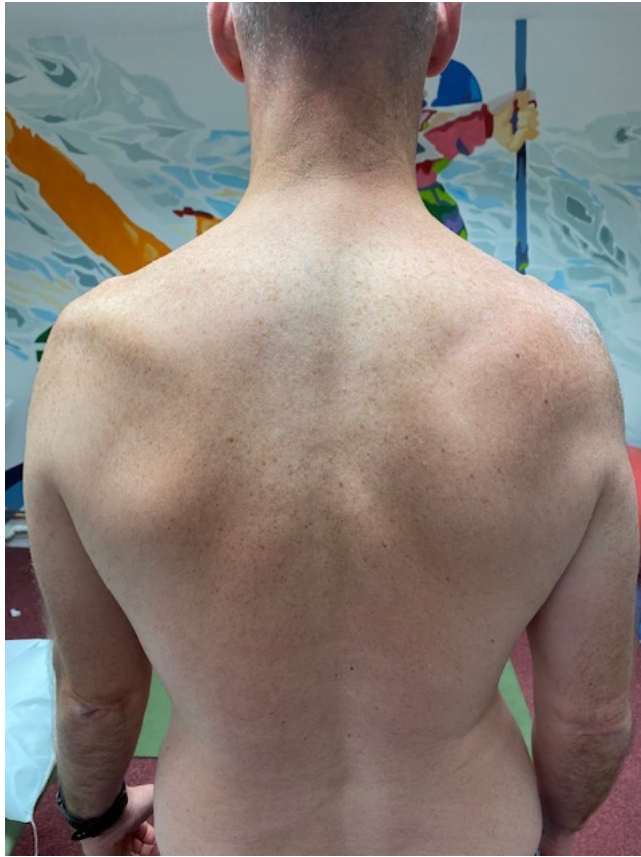
April, 2022



May, 2022



June, 2022



July, 2022



July, 2022



August, 2022







MANAGEMENT

NERVY

THORACIC OUTLET

LONG THORACIC NERVE

SUPRASCAPULAR /
INFRASCAPULAR

AXILLARY NERVE

SPINAL ACCESSORY
NERVE

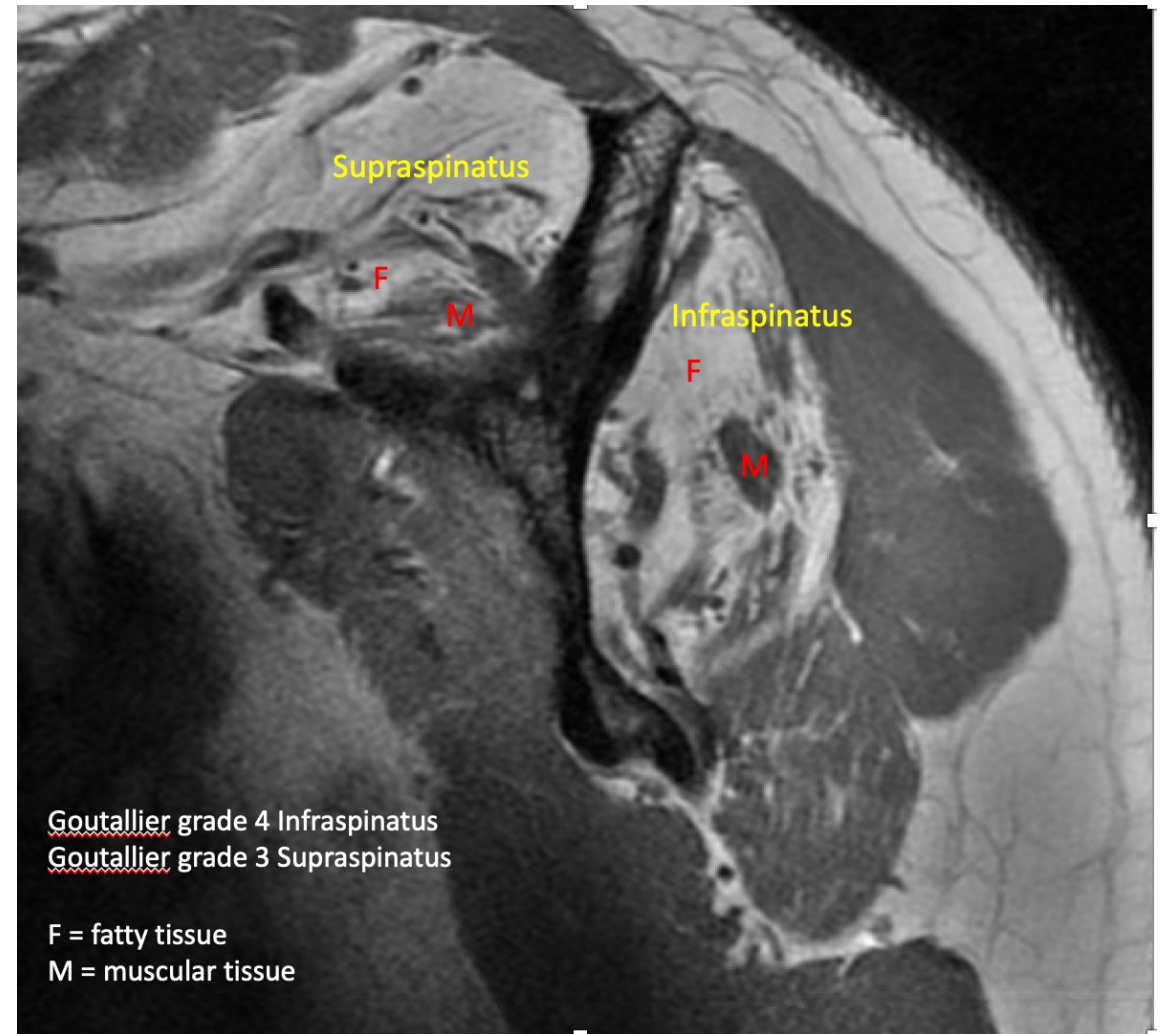
Massive irreparable rotator cuff tears: learning to speak the language of orthopaedics

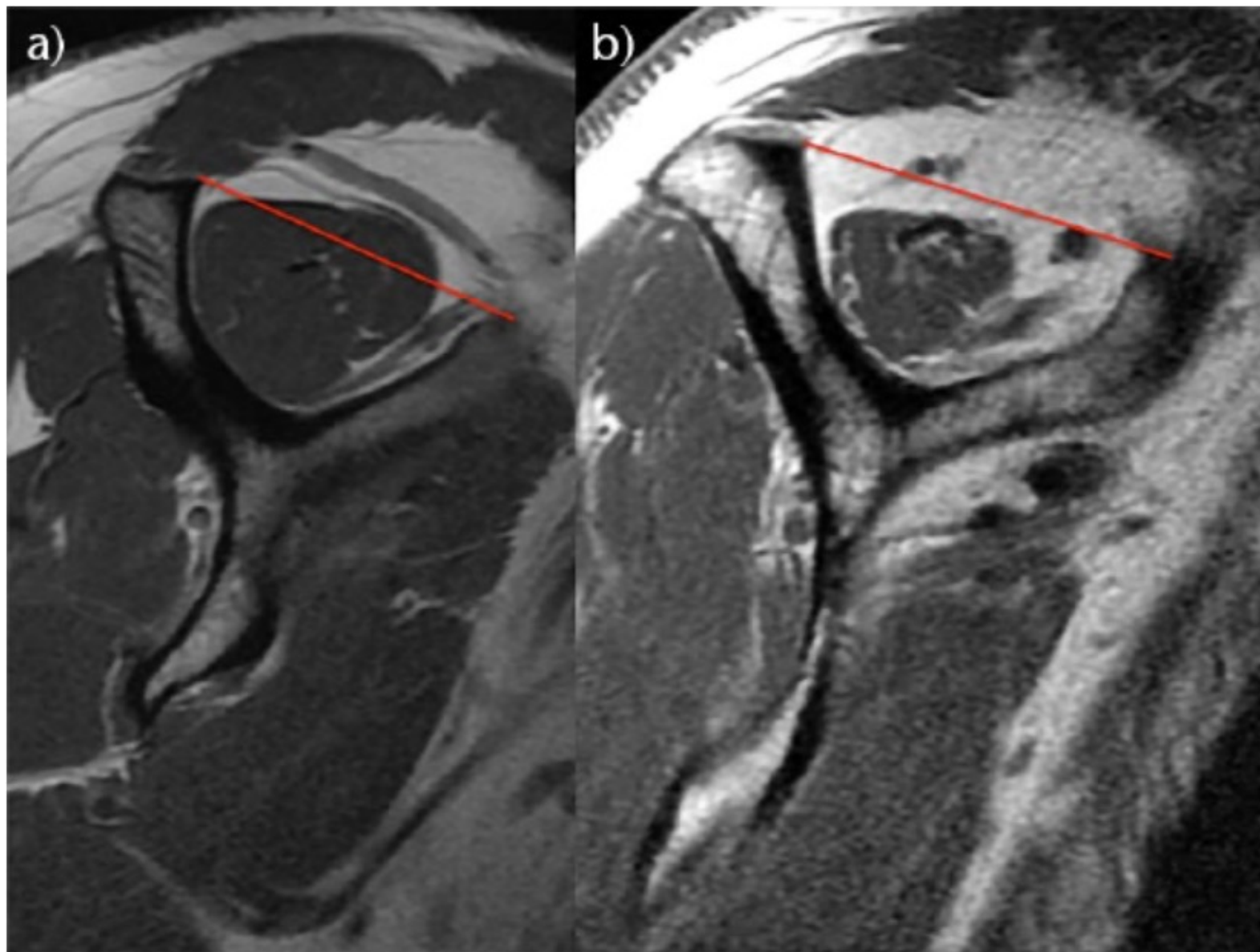
- X-Ray: superior migration of humeral head: acromiohumeral distance $< 7\text{mm}$
- MRI: Fatty infiltration of muscle: Goutallier grade 3 or 4
- MRI: Tendon retraction: Patte grade 3 (retracted to the level of the glenoid)
- MRI: more than one tendon torn
- MRI: “tangent sign” (supraspinatus atrophy)
- Pattern of tear: Involvement of subscapularis





Patte grade 3





Tangent sign

Ainsworth programme / Torbay programme / “anterior deltoid” programmes

- Levy et al 2008: n=17 prospective case series: (12 weeks exercise) 82% success rate at 9/12
- Yian et al 2017: n=30 prospective case series: (12 weeks exercise) 40% success rate at 2 yrs
- Christensen et al 2016: n=24 prospective case series (5 months of exercise) significant improvements in pain, function & quality of life
- Ainsworth et al 2009: prospective randomised placebo controlled clinical trial: (3 months exercise) significant improvements in pain and function at 3 and 6 months but by 12 months, although the improvements were sustained, they were no longer statistically significant compared to the control group

Nuances of assessment of patients with massive irreparable rotator cuff tears

- AROM V PROM
- Any remaining cuff function?
- Supine shoulder flexion
- Improvement tests



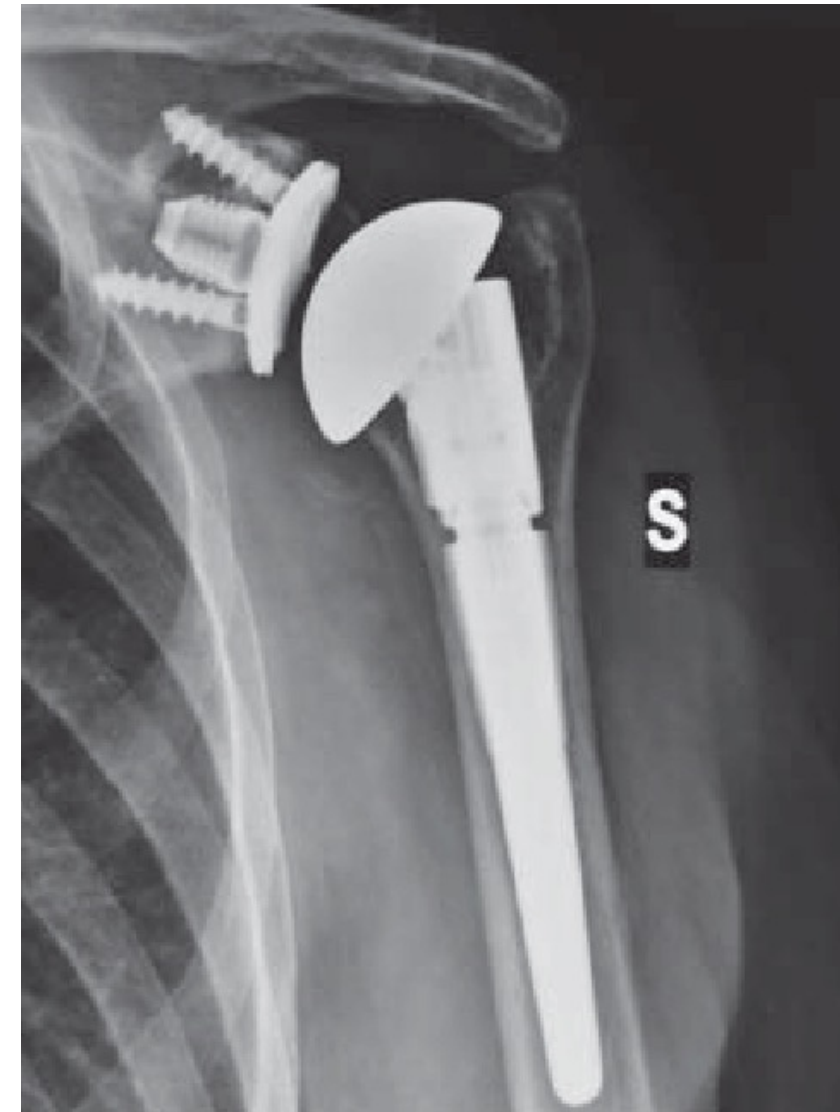
Predictors of good response to physiotherapy for massive inoperable rotator cuff tears

- Patients who construct their own recliner platform to carry out their Ainsworth programme do very well (n=1)



Surgical options

- Superior capsular reconstruction
- Latissimus Dorsi tendon transfer
- Reverse anatomy shoulder arthroplasty
- Total Shoulder Replacement
- Partial rotator cuff repair



How do we decide / advise - rehab versus surgery?

Can we predict which patients with MIRCT will do well with physiotherapy?

- SR of physiotherapy for MIRCT: highly variable outcomes: 32-96% success
- No prospective prognostic studies to evaluate whether certain factors may predict a successful outcome
- No RCTs comparing different physiotherapy programmes or comparing physiotherapy to surgery
- Single arm cohort studies (weak evidence) suggest the following may be important factors
 - range of motion of less than 50° flexion (Yian et al., 2017)
 - tear of subscapularis (Collin et al., 2015)
 - lack of teres minor hypertrophy (Yoon et al., 2019)
 - glenohumeral arthritis, passive restriction of movement and weakness of external rotation or abduction strength (Vad et al 2002)
- Focus on purely biomechanical factors

78 year old patient with complete rupture of Supraspinatus and Infrapinatus



Step 3: Help the person to choose their pathway



- Develop your pattern
- Practise!
- Mix it up and customise it to your patient's needs
- Quote back to them
- Check-in that they are taking it on board
- Manage expectations
- Have fun with it

Empowering the patient with knowledge



Case example: Ann: 48 year old training for the Galway Bay swim (11 K)

- Long history of grumbling shoulder pain related to swimming
- Sharp increase in training volume in April and May: daily sea swims from 2K – 4K depending on conditions
- Increasing pain painful when first starts swimming, eases off and then comes back at about 1K. Very painful about an hour after swimming. Settles down after a day or so but now not able to swim > 1K without severe pain
- Tried “band exercises”: no help
- MRI: reported small PTT Supraspinatus, tendiopathic changes Infraspinatus & Subscapularis
- Main findings:
 - Hypermobile shoulders: Abduction 90° + lateral rotation: 120°
 - Supine lateral rotation 3Kg: very weak and painful 75% ROM
 - Prone lateral rotation 1 Kg 75% ROM, painful and weak
 - Weakness scapular muscles: Is, Ts, Ys & simulated crawl position
 - Weakness on all trunk stability tests: plank / side plank (very painful)

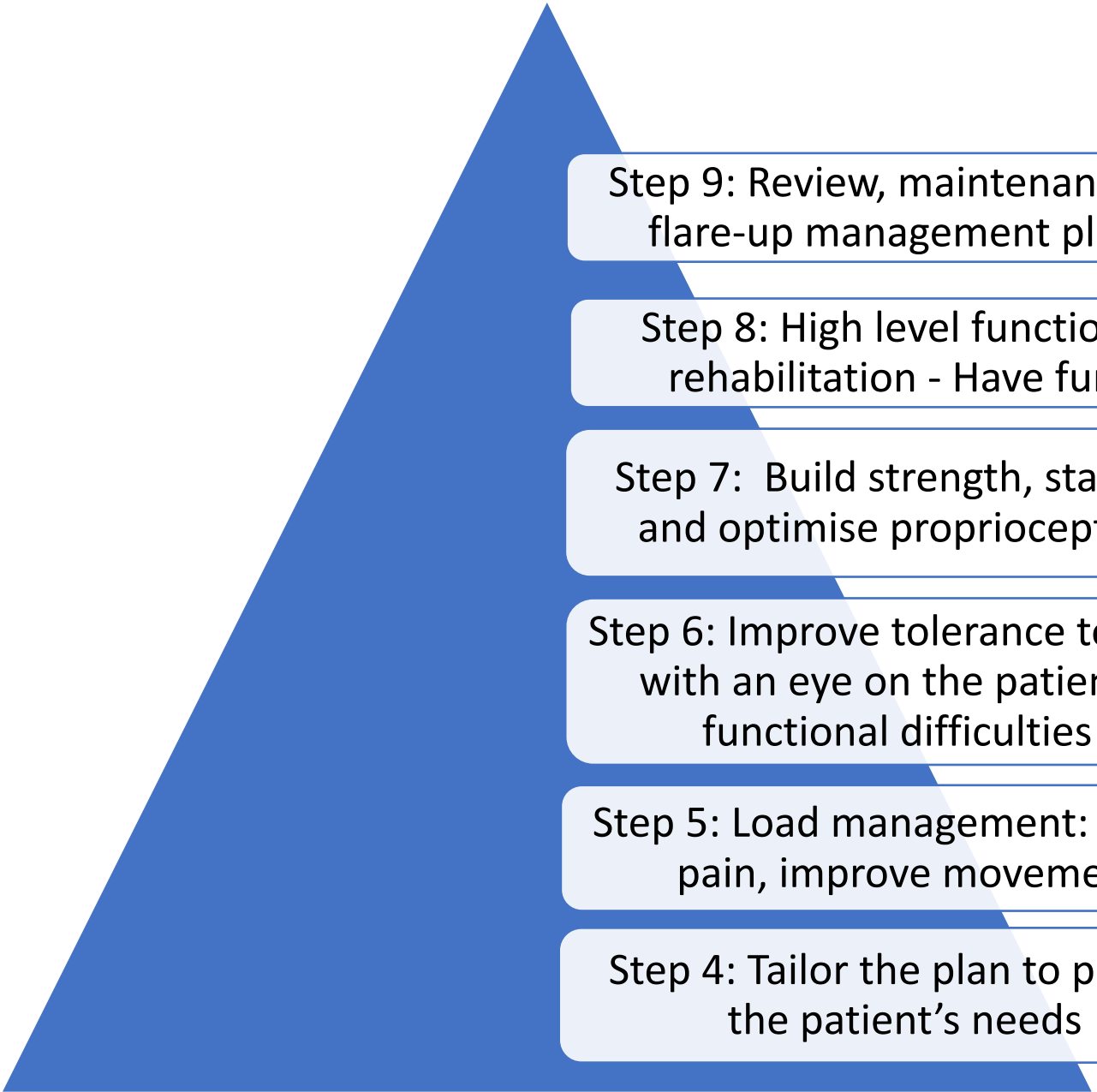
Case example: John: 78 year old, entrepreneur, business-owner, keen golfer, fit and well

- Knocked down by a reversing car – MRI diagnosis of complete rupture of Supraspinatus & Infraspinatus, fatty infiltration and significant tendon retraction
- Marked functional limitations: personal care, golf
- 6 weeks of “intensive” physiotherapy – no improvement
- AROM: 50° flexion & abduction, 50% ROM lateral rotation & HBB
- PROM: 150° flexion & abduction, 75% ROM lateral rotation & HBB
- Resisted testing: Unable to resist lateral rotation / positive lag sign

Questions

- How would we explain Ann's shoulder pain to her? What are the key points to mention?
- What would a management plan look like for her?
- How would we explain John's shoulder problem to him? What are the key points to mention?
- What would a management plan look like for him?





Step 9: Review, maintenance & flare-up management plan

Step 8: High level functional rehabilitation - Have fun!

Step 7: Build strength, stability and optimise proprioception

Step 6: Improve tolerance to load with an eye on the patient's functional difficulties

Step 5: Load management: reduce pain, improve movement

Step 4: Tailor the plan to plan to the patient's needs



Let's get practical!

Summary

- Step 1: Take a breath & be present
- Step 2: Accurate & careful assessment – consider red flags, inflammatory presentations, rarer sources of shoulder problems
- Step 3: Help the person to choose their pathway
- Step 4: Tailor the plan to the patient's needs
- Step 5: Load management: reduce pain, improve movement
- Step 6: Improve tolerance to load with an eye on the patient's functional difficulties
- Step 7: Build strength, stability and optimise proprioception
- Step 8: High level functional rehabilitation - Have fun!
- Step 9: Review, maintenance & flare-up management plan



Learning Outcomes

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