بسم الله الرحمن الرحيم

Frozen shoulder
Adhesive Capsulitis

by

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Frozen shoulder was first described in the literature by French Pathologist Duplay (1896)

Codman (1934) suggested the term Frozen Shoulder (FS) and argued the condition represented a non-calcifying tendonitis of the rotator cuff and was associated with slow onset of symptoms, pain near the insertion of the deltoid, inability to sleep on the affected side, restriction of external rotation and elevation and normal radiological appearance

Neviaser (1945) then suggested the term adhesive capsulitis due to the observations of adhesions between the shoulder capsule and the humeral head

Classification of frozen shoulder

Primary/idiopathic frozen shoulder

An underlying etiology or associated condition cannot be identified

Secondary frozen shoulder

An underlying etiology or associated condition can be identified

- Intrinsic

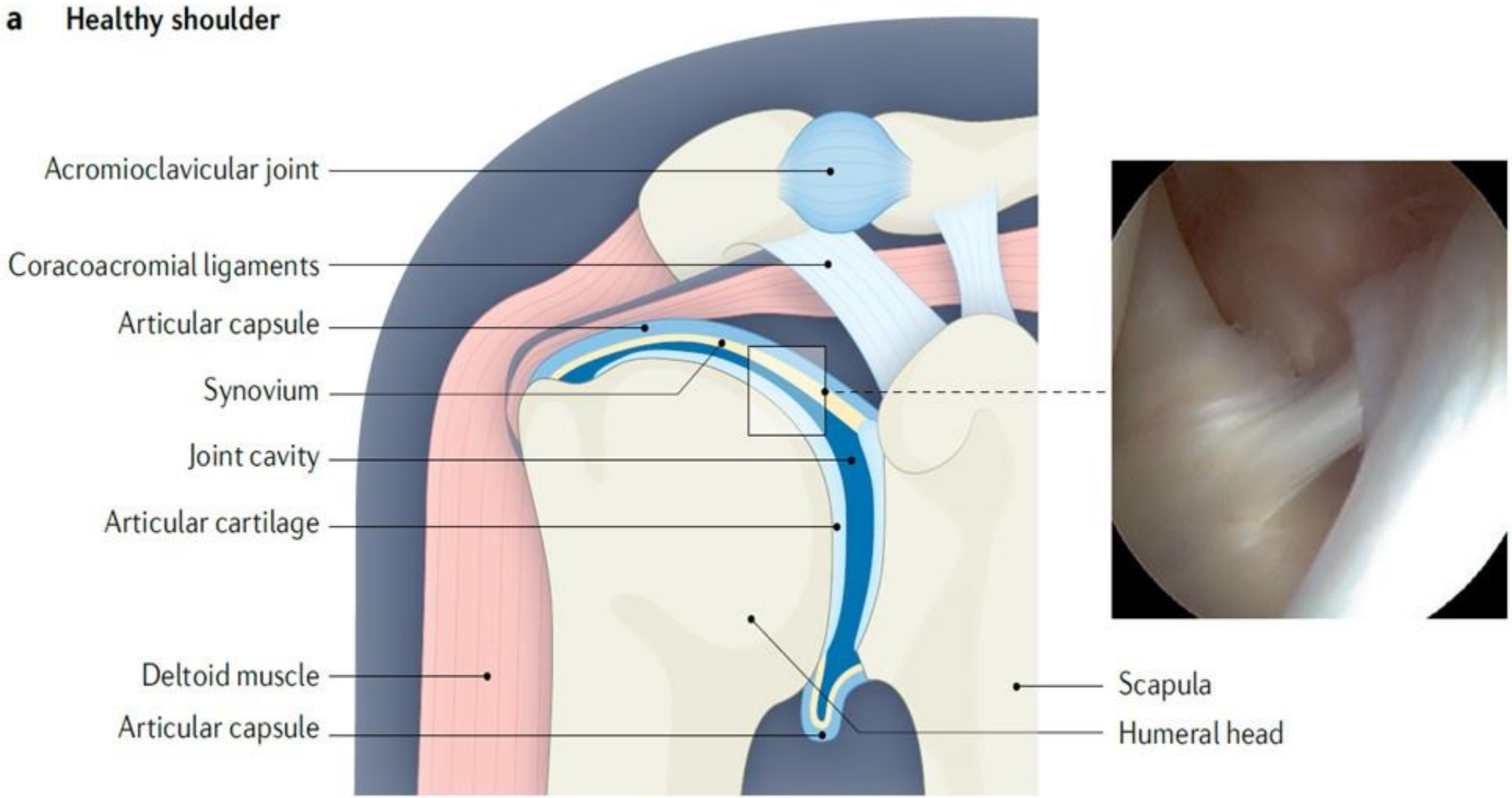
In association with rotator cuff disorders (tendinitis and partial-thickness or full-thickness tears), biceps tendinitis, or calcific tendinitis

- Extrinsic

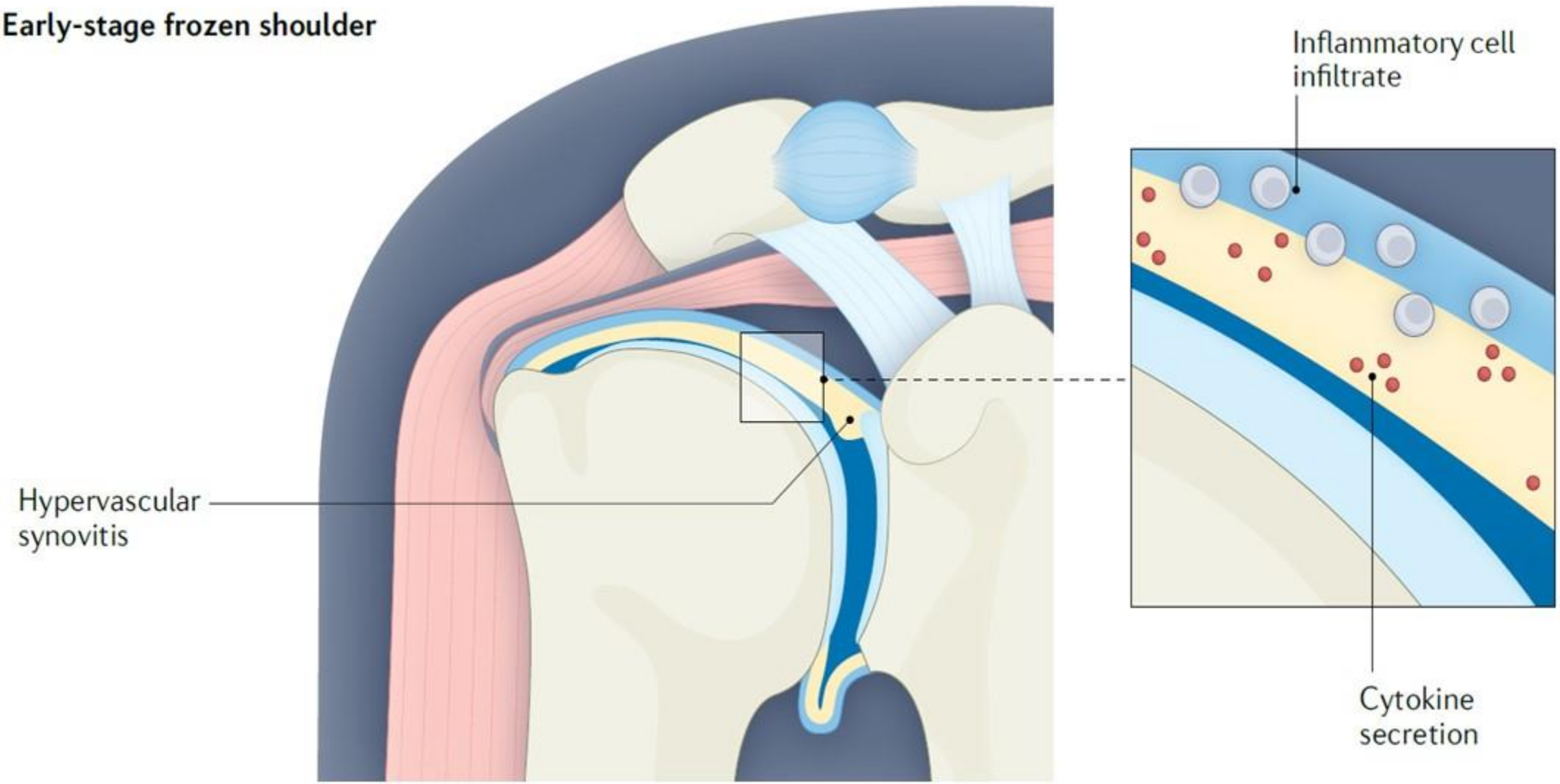
In association with previous ipsilateral breast surgery, cervical radiculopathy, chest wall tumor, previous cerebrovascular accident, or more local extrinsic problems, including previous humeral shaft fracture, scapulothoracic abnormalities, acromioclavicular arthritis, or clavicle fracture

- Systemic

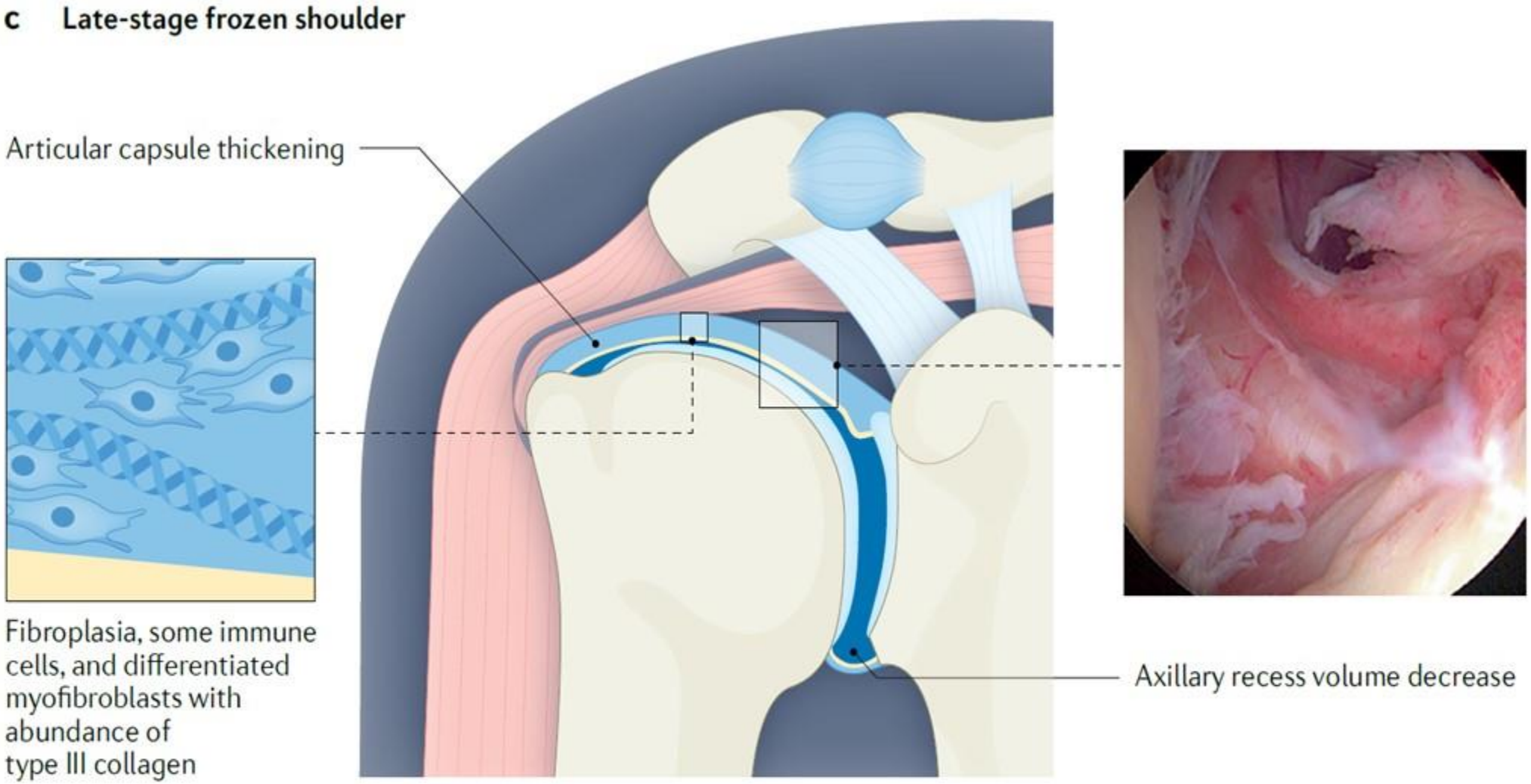
Diabetes mellitus, hyperthyroidism, hypothyroidism, hypoadrenalism, etc.



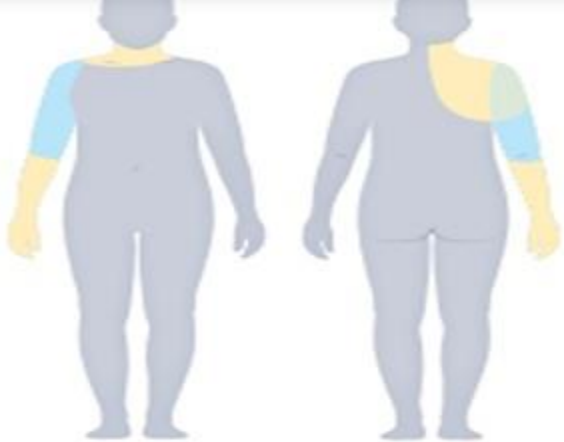
a | The healthy capsule is collagenous in structure, composed primarily of dense type I collagen and elastic fiber bundles with limited blood vessels and nerve fibers. The main cell type within this membrane is the fibroblast, which maintains capsule health by producing extracellular matrix (ECM) proteins that provide a supportive yet flexible structure.



b | In frozen shoulder, there is fibrosis and thickening of the connective tissue membrane as well as the adjacent synovial membrane.



c | Fibroproliferation results in an increased number of fibroblasts producing more ECM proteins, resulting in a dense and poorly organized fibrillar structure. These fibrotic changes are accompanied by inflammation, neoangiogenesis and neoinnervation. The consequence is a reduced joint volume and increased stiffness of the capsule, causing restricted movement and pain.



Red flags
- Mass, lump, constant pain?
  - Possible tumour
- Red skin, fever, unwell?
  - Possible infection
- Trauma and pain and gross weakness?
  - Possible fracture or cuff tear
- Trauma or seizure and pain and loss of movement?
  - Possible dislocation

Does it hurt to move the neck or shoulder?

Neck → **Manage accordingly**

Shoulder → Any reports of instability?
- Dislocations or subluxations
- Feelings of apprehension

Yes → **GHJ instability**
- Traumatic
- Atraumatic

No → Is there a substantial loss of passive external rotation compared with the other arm?

Yes → **Frozen shoulder**
- Common age 35–65 years

or **GHJ osteoarthritis**
- Common age >60 years

No → Is there a painful arc of movement through elevation or pain on resistance testing?

Yes → **Subacromial pain**
- Rotator cuff pathology
  - Tendinopathy
  - Calcific deposit
  - Degenerative tear
- Bursitis
- Long head of biceps
- SLAP lesions

No → Is there localized pain over the ACJ and on movements above shoulder height and/or horizontal abduction?

Yes → **ACJ pathology**
- Common age >30 years

how do we diagnose a primary frozen shoulder?

There is an old expression “if it looks like a duck and quacks like a duck and walks like a duck, it must be a duck”.

So, we therefore rely on typical clinical features to suggest the diagnosis of a frozen shoulder.

- If, however, features are not typical, we call these red flags.

Examples include occurring in both shoulders at once or occurring less than 45 years old or greater than 65 years old. In this situation, further investigations are warranted.

A popular description of FS states that both an active and passive range of motion (ROM) loss of more than 25% in at least 2 planes and an external rotation loss that is greater than 50% of the uninvolved shoulder is indicative of FS

if the patient facing us demonstrates profound loss of passive external rotation and generally decreased ROM in multiple planes of movement for roughly 1 month, we can hypothesize that this person may possibly be affected by a FS

While this may seem simple, individuals with FS often experience a delay in receiving an accurate diagnosis

Why?

1. Some people who display signs and symptoms of FS can actually lack any identifiable capsular pathology and psychosocial factors such as depression and anxiety can amplify an individual's pain experience and shoulder dysfunction, leading to an uncertain clinical picture.
2. many patients with shoulder pain will be referred for radiological imaging that will often detect apparent "pathological" changes in the soft tissues of the shoulder. These pathoanatomical changes may or may not be related to their clinical presentation. Thus, a patient can be incorrectly given a diagnosis of rotator cuff tear or subacromial bursitis to explain their stiff and painful shoulder
3. the wide spectrum of pain and disability experienced by those with FS and the lack of a "magic bullet' clinical test, blood test, or imaging modality that definitively points to a diagnosis of frozen shoulder.

Clinical features of frozen shoulder

Pattern recognition

a FS goes through some typical phases: the freezing phase, the frozen phase, and the thawing phase

the freezing phase

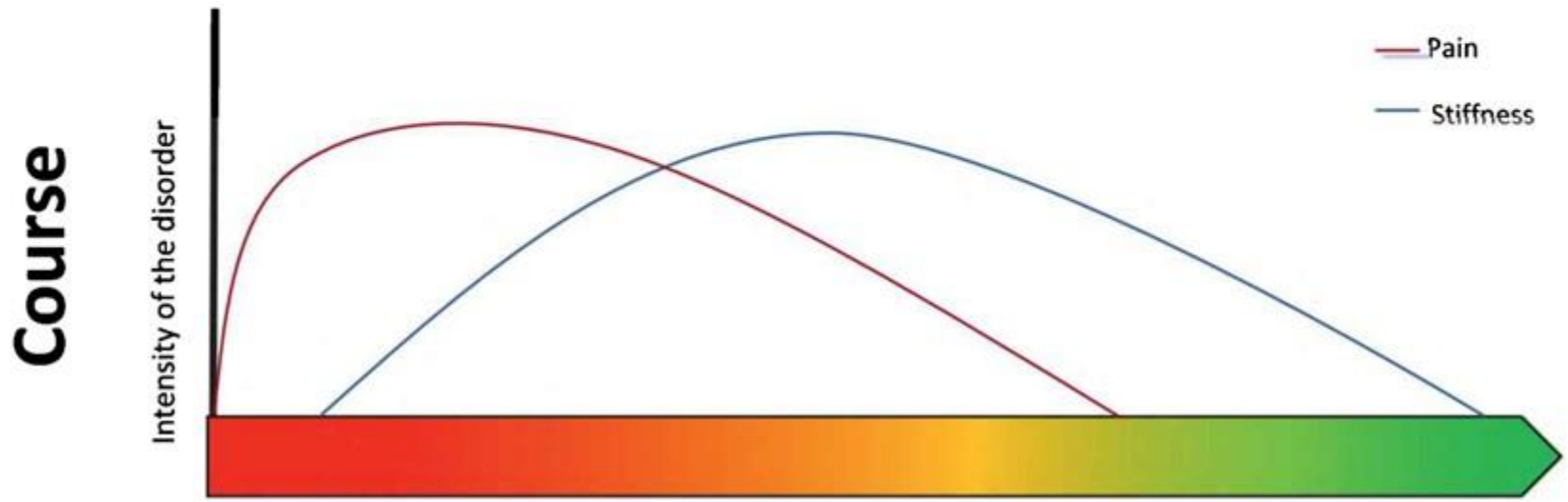
- patients will frequently report high levels of pain, both at rest and during movements of the shoulder.
- As a result of that pain, the ROM of the shoulder can rapidly decrease.
- The freezing phase can vary from several weeks to an average of 9 months.
- This phase is characterized by an inflammatory response, fibroproliferation, and hyper-vascular synovitis.

the frozen phase

- pain usually diminishes and stiffness becomes increasingly prominent.
- The connective tissue structures will become very rigid and the ROM will decrease even more.
- This phase can again last up to 9 months.

the thawing phase

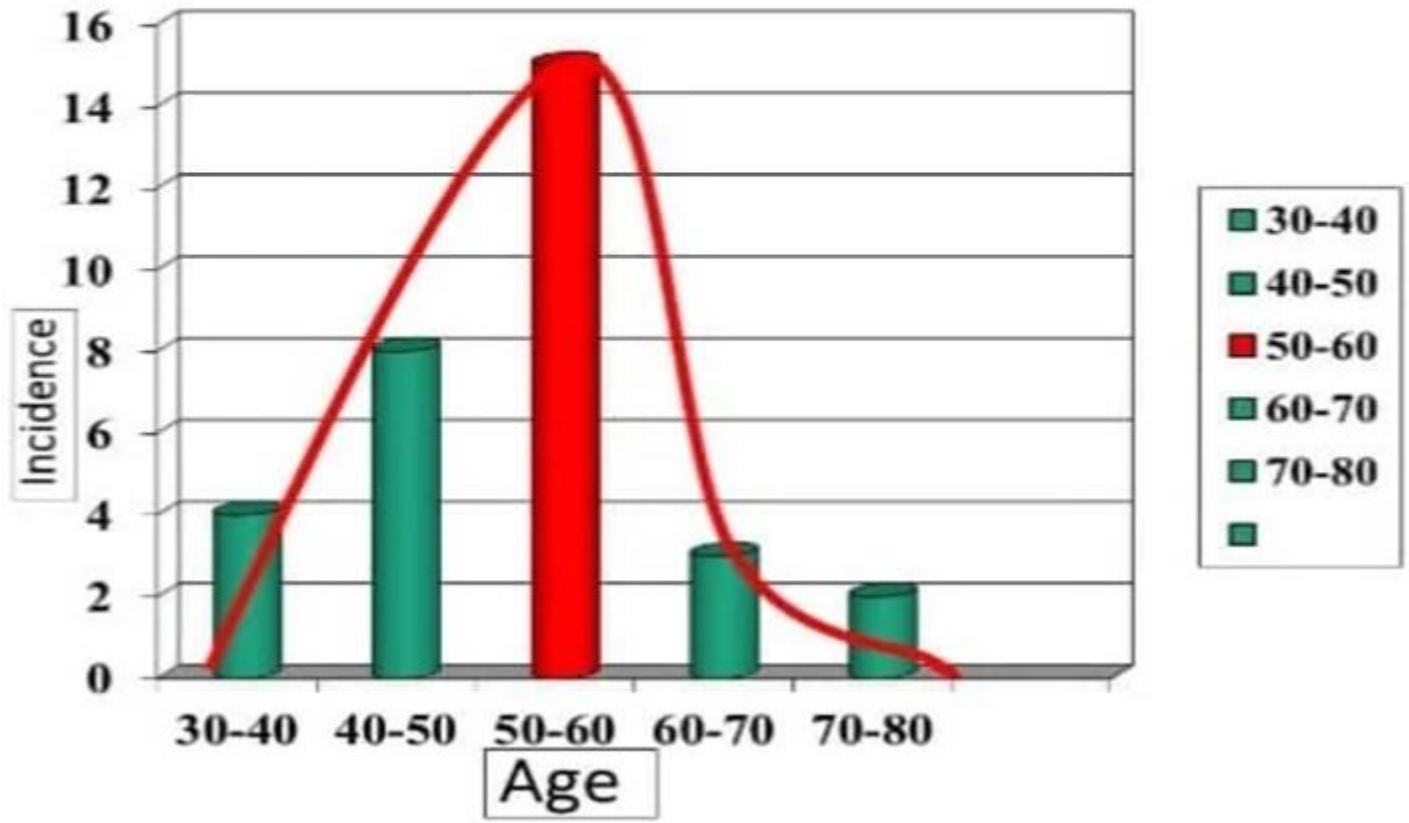
- This starts a gradual improvement in stiffness over a timespan of several months.



Individual factors

Epidemiology

- Primary adhesive capsulitis affects 2% to 5% of the general population
- Patient age, 40 to 65 years old. it is rare for people below the age of 40 to develop a true FS.
- Incidence, higher in females than in males
- Nondominant arm is more frequently involved



Pain type and location

- The pain location unfortunately does not accurately indicate whether a person has FS or not
- The epicenter of pain is the deltoid tuberosity, anterolateral shoulder, and general upper arm, however recent evidence suggests that pain is commonly felt distally down the arm, even beyond the elbow.
- the greater the distribution of pain the greater the pain intensity.
- The pain type and quality are usually dull, throbbing, and nagging (especially in the early phases) but can become sharp and “severe” with unguarded or unplanned movements. However, there is still a whole range of shoulder conditions that can present with a similar clinical picture. In the absence of motion restriction, this would be difficult to distinguish with the rotator cuff-related shoulder pain patient.
- the harrowing and disabling nature of the pain associated with FS leading some patients to think that they might have a serious and sinister shoulder disorder:

“The amount of pain that I was in, I didn’t believe that it was just a frozen shoulder”

Sleep

A particularly telling sign of FS is an inability to find any position of comfort in bed, which may differentiate an FS from another painful shoulder condition, such as rotator cuff-related shoulder pain, where often laying on the unaffected shoulder can provide relief.

Range of motion and movement quality

- ROM will be profoundly affected in a presentation of FS
- should affect multiple planes of movement, most notably external rotation.
- A significant passive restriction of shoulder external rotation is highly indicative of a FS
- FS does tend to affect movement in a capsular pattern (ext. rotation, abduction, internal rotation)
- Combining glenohumeral abduction to external rotation will often reduce external rotation mobility, suggestive for a true frozen shoulder.

Combined abduction and external rotation assessment

- The appearance of a shrug sign is common in those with FS due to compensation by the scapula for a lack of movability of the glenohumeral joint
- it is recommended that movement be assessed in different postures with different levels of support. For example, the main movement of external rotation, which appears reduced in a standing position, should also be assessed in supine with arm and trunk support. A noticeable difference in ROM then represents Kinesio-phobia and movement inhibition rather than true capsular restriction.

Shoulder shrug sign. Patient showing scapular compensation on the right shoulder for reduced glenohumeral mobility.

Strength and functional movement testing

- Shoulder strength, specifically external rotation, does appear to be affected in those with FS. Most likely, this is secondary to a combination of general disuse, pain inhibition
- a reduction in shoulder strength can be treated as a symptom and not a cause of FS.
- functional tasks assessment will provide reference point to monitor change over time. However, the information elicited will probably not meaningfully alter your diagnosis or treatment.
- Exploring various reaching tasks (overhead, behind back, to the side) can also provide rich information about how their FS is affecting their daily life.

What about special orthopedic tests?

- Due to the profound restriction of ROM, the utility of special orthopedic tests is limited.
- There does not appear to be a single, or cluster, of special tests that can help with differential diagnosis of FS.

Tissue irritability the ability of this tissue to deal with physical stress

The concept of classifying pathology by tissue irritability is not only beneficial for evaluation and prognosis purposes but can also direct intervention strategies

High tissue irritability

- the patient has a lot of pain with arm movements in different directions, more than 7/10 on a Visual Analogue Scale (VAS).
- The patient has also frequent pain at rest and night.
- Full passive ROM cannot be tested because of the pain.
- Active ROM is often larger than passive ROM.

Moderate tissue irritability

- the patient has moderate pain with arm movements, between 4 and 6/10 on a VAS.
- The patient has only occasional pain at rest and night.
- The active and passive ROMs are almost the same.

Low tissue irritability:

- the patient has low to no pain with arm movements, less than 3/10 on a VAS.
- The patient has no pain at rest or night.
- The patient's active and passive ROMs are equal.

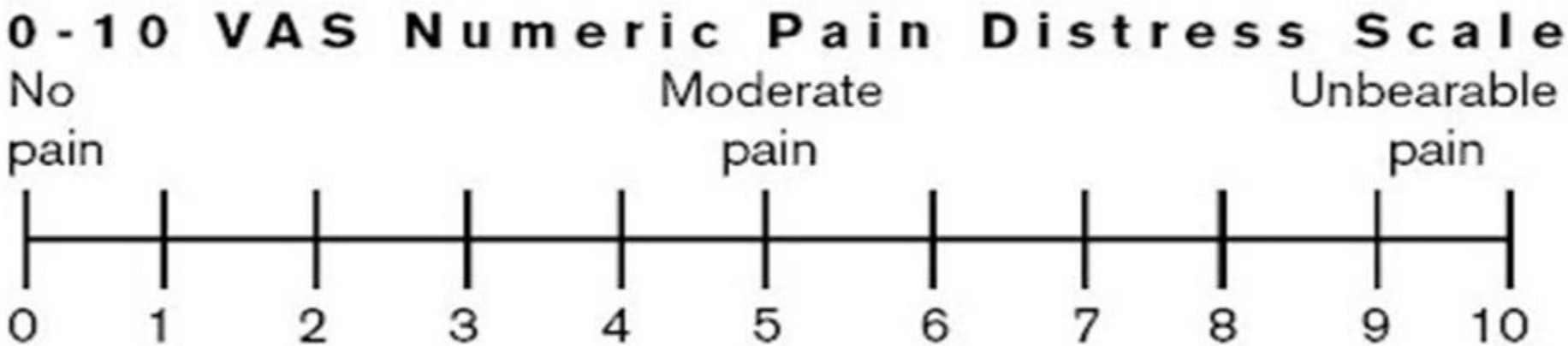
Questionnaires

To monitor progress or to assess a patient's shoulder condition

VAS for pain

Shoulder Pain and Disability Questionnaire (SPADI)

Disabilities of the Arm, Shoulder and Hand (DASH)


0-10 VAS Numeric Pain Distress Scale
No pain
Moderate pain
Unbearable pain
0 1 2 3 4 5 6 7 8 9 10

SPADI (SHOULDER)

Name _____ Date_____

PAIN SCALE												
How severe is your pain:												
1. At its worst.	No pain	0	1	2	3	4	5	6	7	8	9	10 Worst Pain Imaginable
2. When lying on involved side.	No pain	0	1	2	3	4	5	6	7	8	9	10 Worst Pain Imaginable
3. Reaching for something on a high shelf.	No pain	0	1	2	3	4	5	6	7	8	9	10 Worst Pain Imaginable
4. Touching the back of your neck.	No pain	0	1	2	3	4	5	6	7	8	9	10 Worst Pain Imaginable
5. Pushing with the involved arm.	No pain	0	1	2	3	4	5	6	7	8	9	10 Worst Pain Imaginable
DISABILITY SCALE												
How much difficulty did you have:												
1. Washing your hair.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
2. Washing your back.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
3. Putting on an undershirt or pullover sweater.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
4. Putting on a shirt that buttons down the front.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
5. Putting on your pants.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
6. Placing an object on a high shelf.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
7. Carrying a heavy object of 10 pounds.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help
8. Removing something from your back pocket.	No difficulty	0	1	2	3	4	5	6	7	8	9	10 So difficult required help

DEVELOPED BY Roach 1991 [1];

Reference List

1. Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder pain and disability index. Arthritis Care Res. 4[4], 143-149. 1991.

Disabilities of the Arm, Shoulder, and Hand (DASH)

Name:_____ Date:_____

This questionnaire asks about your symptoms as well as your ability to perform certain activities. Please answer every question, based on your condition in the last week, by circling the appropriate number. If you did not have the opportunity to perform an activity in the past week, please make your best estimate on which response would be the most accurate. It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.

Please rate your difficulty.	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	UNABLE
Open a tight or new jar	1	2	3	4	5
Write	1	2	3	4	5
Turn a key	1	2	3	4	5
Prepare a meal	1	2	3	4	5
Push open a heavy door	1	2	3	4	5
Place an object on a shelf above your head	1	2	3	4	5
Do heavy household chores (vacuum, scrub)	1	2	3	4	5
Garden or do yard work	1	2	3	4	5
Make a bed	1	2	3	4	5
Carry a shopping bag or briefcase	1	2	3	4	5
Carry a heavy object (over 10 lbs.)	1	2	3	4	5
Change a light bulb overhead	1	2	3	4	5
Wash or blow dry your hair	1	2	3	4	5
Wash your back	1	2	3	4	5
Put on a pullover shirt or sweater	1	2	3	4	5
Use a knife to cut food	1	2	3	4	5
Recreational activities which require little effort (card playing, knitting, etc.)	1	2	3	4	5
Recreational activities in which you take some force or impact (golf, hammering, tennis, etc.)	1	2	3	4	5
Recreational activities in which you move your arm freely (throwing, frisbee, etc.)	1	2	3	4	5
Manage transportation needs (getting from one place to another)	1	2	3	4	5
Work or regular daily activities due to arm, shoulder, or hand problems	1	2	3	4	5
Social activities	1	2	3	4	5
Sleep	1	2	3	4	5

Please rate your symptoms.	NONE	MILD	MODERATE	SEVERE	EXTREME
Arm, shoulder, or hand pain	1	2	3	4	5
Arm, shoulder, or hand pain when you performed any specific activity	1	2	3	4	5
Tingling (pins & needles) in your arm, shoulder, or	1	2	3	4	5
Weakness in your arm, shoulder, or hand	1	2	3	4	5
Stiffness in your arm, shoulder, or hand	1	2	3	4	5

Please rate your confidence.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel less capable, less confident or less useful because of my arm	1	2	3	4	5

Please rate the severity of your pain at its worst and at its best by circling a number between 0 and 10.

0	1	2	3	4	5	6	7	8	9	10
no pain		mild, annoying		nagging, uncomfortable		increasing, miserable		intense, dreadful		worst possible

Score:_____ Difficult total _____ + Symptom total _____ + Confidence total _____ = _____ DASH Score = [(_____ (total) / # of responses) -1] x 25 =_____

summary

rule-in criteria of FS

1. patients are typically around the age of 40—65 years.
2. a FS is characterized by a slow onset of complaints.
3. pain and stiffness will restrict sleep, daily activities, and overhead reaching.
4. a FS affects the whole joint and will therefore show movement restrictions in all directions, with external rotation being the most restricted.
5. moving the arm toward their end-range mobility will produce their typical pain.
6. rotational ROM will reduce when the arm is elevated or abducted. This typical decrease in internal or external rotation is indeed often seen when the glenohumeral capsule is stretched to its limits.

rule-out criteria of FS

1. Patients with a painful and restricted abduction but no external rotation restriction are not likely your FS patient.
2. patients that have increased rotational mobility when raising their arm does not fit well with FS.
3. the feeling of a bone to bone contact when testing can be considered a rule-out criterium.
4. FS should not report significant trauma as the onset of their shoulder complaints.

Differential diagnosis

The common presentation is a painful global loss of both active and passive range of motion (ROM) but the hallmark sign of FS is

a significant loss of passive external rotation when assessed with the arm near the side

The common differential diagnosis for pathologies that cause the significant loss (typically 50% or greater) of external rotation at the side.

- advanced glenohumeral arthritis
- locked posterior glenohumeral dislocation
- highly irritable rotator cuff tendinopathy
- highly irritable calcific tendinitis/bursitis.

condition	Typical patient characteristics	Overlapping clinical features	"Unique" clinical features	Diagnostic tests
Frozen shoulder	• 40-60 y/o • Female	• Limited, painful shoulder mobility	• ER PROM limited at side of body	
GH arthritis	• >60 y/o • History of manual labor or physical activity	• Limited, painful shoulder mobility • Intact RTC strength	• Crepitus • SS/IS atrophy	• Radiographs of shoulder
RTC tendinopathy	• Ranges from traumatic in cuff tears, overuse injuries in tendinitis, to chronic or insidious onset with sedentary to active individuals	• Limited, painful shoulder AROM > PROM	• Pain/weakness on isolated muscle testing specific to lesion with minimal glenohumeral/capsular restrictions	• MRI • Diagnostic ultrasound • MRI with contrast
Calcific tendinopathy	• 30-60 y/o • Metabolic disorders, diabetes, thyroid disorders, hyperlipidemia • Insidious onset	• Limited, painful active > passive shoulder mobility • Night pain	• Warmth, palpable swelling if bursitis present • Elevated pain reports on resisted testing	• Radiographs • Diagnostic ultrasound
Locked posterior dislocation	• History of fall/syncope/ seizure or electrocution • Arm at the side and in complete IR	• Limited painful shoulder AROM & PROM	• Active/passive ER to less than neutral at the side	• Radiographs but must include axillary or Velpeau view • CT scan

Imaging in frozen shoulder

FS is mainly a clinical diagnosis, not an imaging diagnosis.

Uncovering underlying pathologies

- FS can be accompanied by various underlying pathologies, such as rotator cuff tears, biceps tendinitis, or shoulder impingement. Without medical imaging, these concomitant conditions may go undetected, leading to misdiagnosis or delayed treatment

Indirect imaging signs of a frozen shoulder

These indirect ultrasound signs might help to support the FS diagnosis if at the same time ultrasound has excluded some other diseases (large rotator cuff tear, glenohumeral joint dislocation, and a massive bursitis (subacromial/subdeltoid and/or subcoracoidal)), and if passive external rotation ROM is restricted.

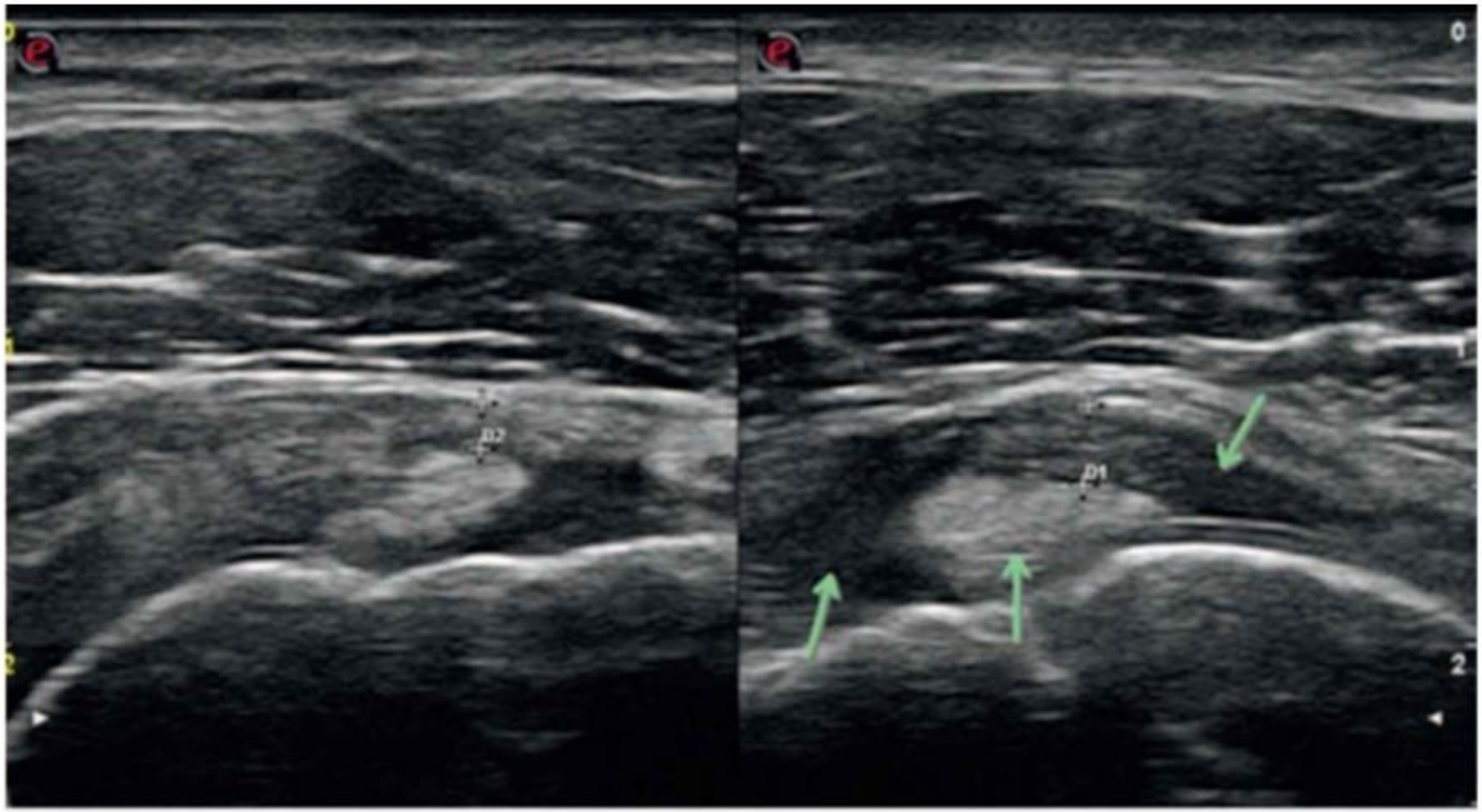
Effusion biceps tendon sheath

- Biceps sheath effusion is a common finding in patients with FS.
- The effusion may coexist with many shoulder pathologies such as long head of the biceps tendon pathology, bicipital tenosynovitis and rotator cuff tendon problems.
- Stella et al. described the effusion of the biceps sheath in 75 out of 106 patients with FS
- An MRI study reported that effusion of the biceps sheath was more frequently observed in early stages of FS

Figure 10:

A coronal fat-suppressed T2-weighted image from an MR arthrogram performed on a 40 year-old female with chronic shoulder pain and decreased range of motion demonstrates low signal thickening of the axillary capsule (arrow) suggestive of later stage adhesive capsulitis. Also note extension of fluid along the tendon sheath of the long head of the biceps (arrowhead) resulting from overdistension of the contracted glenohumeral joint.

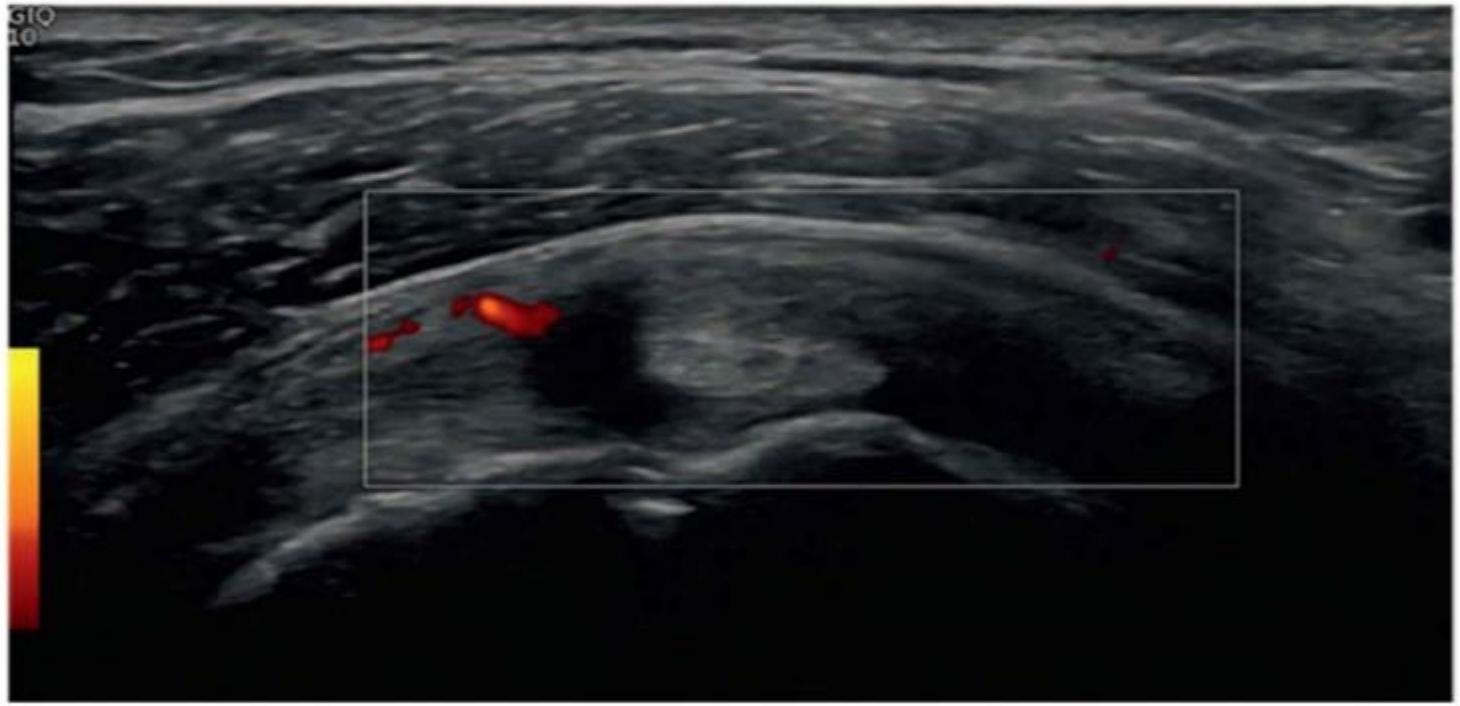
Hypoechoic appearance and thickening of rotator interval ligaments



Ultrasound image of rotator interval SAX: hypoechoic/thickened ligaments >> left/right comparison. Left is healthy, right affected.

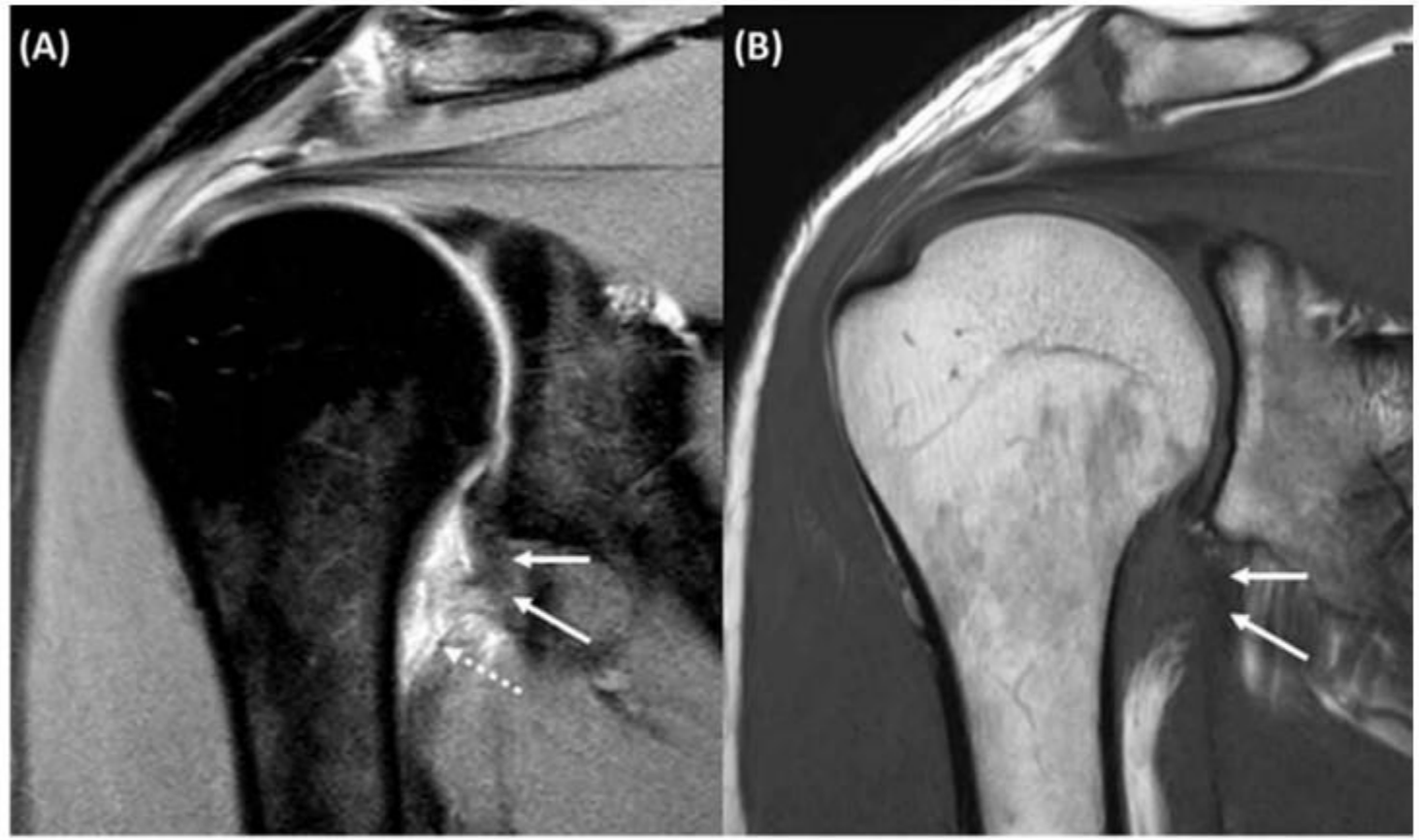
Neovascularization in the rotator interval

- Neovascularization and accompanying newly formed nerves, known as neurovascular ingrowth or neoinnervation, are a potential source of pain in FS.
- Cheng et al. reported neovascularization in the RI in 71.1% of FSs
- Neovascularization may be detected by using color Doppler ultrasound.



Ultrasound image of rotator interval SAX: positive Doppler. Potential changes around the coracoid process.

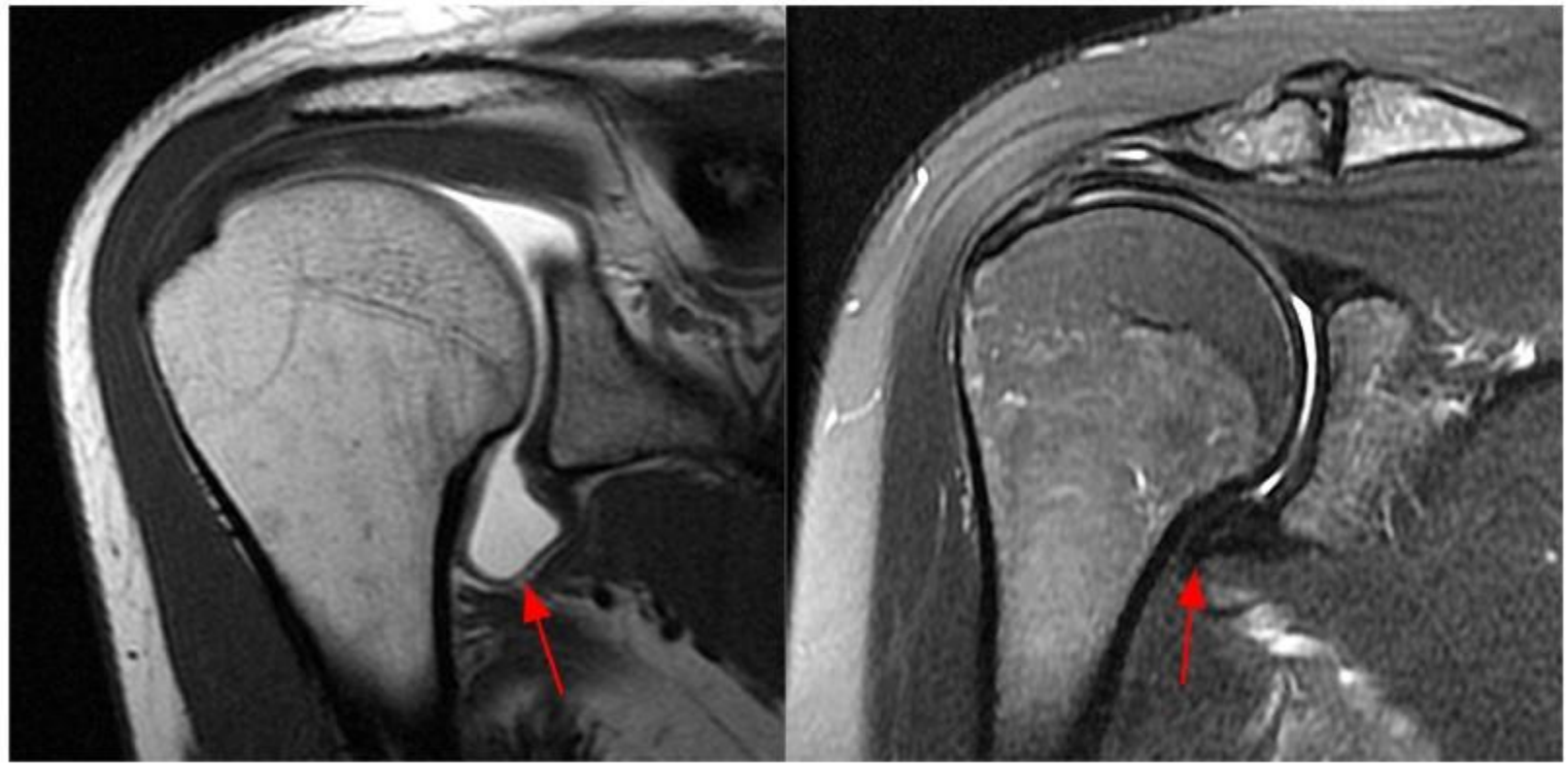
Thickening and T2 hyperintensity of the inferior glenohumeral ligament



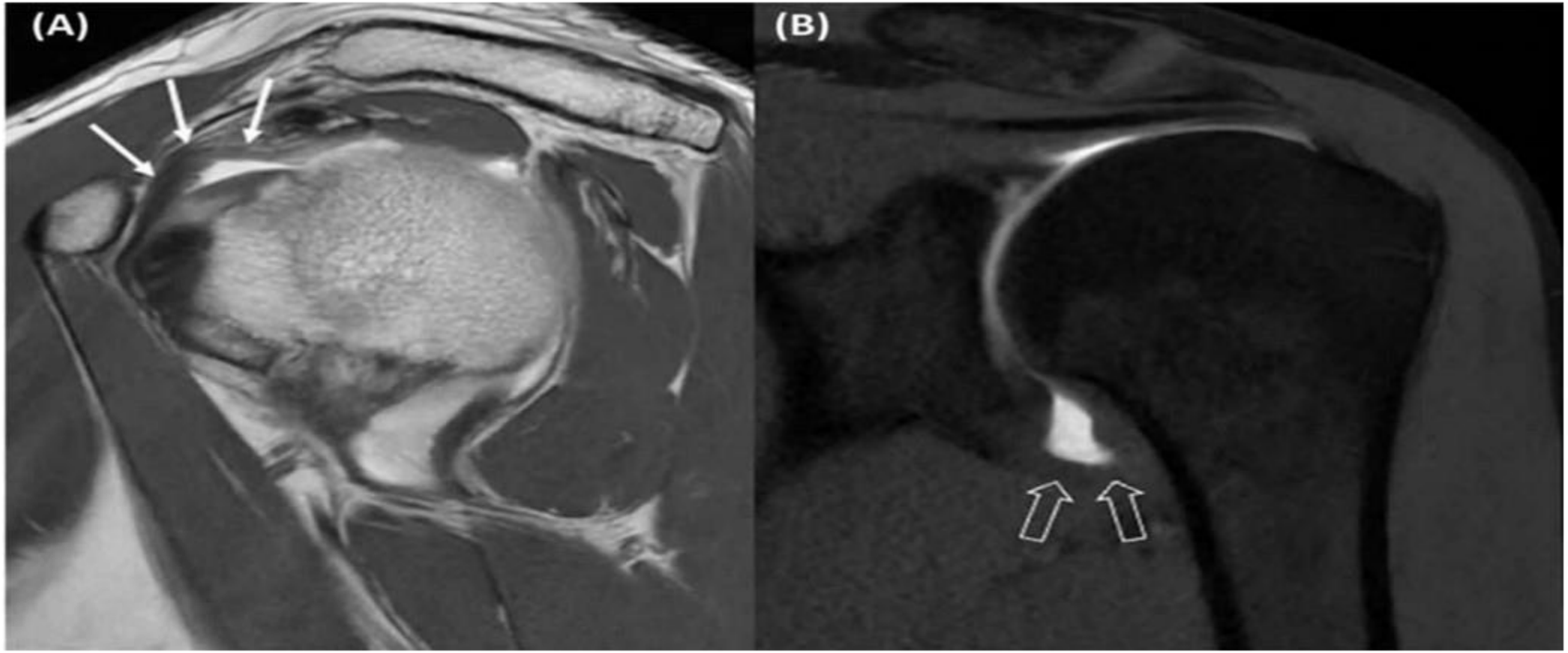
Coronal fat-saturated proton density weighted (A) and coronal T1-weighted (B) unenhanced MRI images show thickening and T2 hyperintensity of the inferior glenohumeral ligament (arrows) and pericapsular edema (dotted arrow). MRI, Magnetic resonance imaging.

Axillary recess

The axillary recess of the joint can become thickened in cases of FS.



Thickening of the coracohumeral ligament and joint capsule



Sagittal Tl-weighted (A) and coronal fat-saturated T1-weighted (B) MRI arthrography images underline thickening of the CHL (white arrows in A) and reduced axillary pouch distension (void arrows). MRI, Magnetic resonance imaging

Management of frozen shoulder

it is commonly believed that a FS is a “self-limiting” resolve spontaneously without treatment or intervention.

There is no strong evidence of a full recovery without supervised treatment

Indeed, it is uncertain whether we can influence the duration of the disease with any type of treatment, with the efficacy of most interventions remaining unclear **(Neviaser & Hannafin 2010)**

Based on this lack of certainty, the probability of over or undertreating this condition is high.

Pharmacotherapeutic options

Oral analgesic NSAIDS

Corticosteroids: oral or Local injection

Collagenase clostridium histolyticum CCH

It works by breaking down excess collagen in the tissue, which reduces stiffness and tightness.

Tissue irritability as a factor to guide treatment

Treatment

High irritability

- Pain free active assisted low intensive mobilizations
- Exercise therapy
  - Active range of motion exercises
  - Proprioceptive Neuromuscular Facilitation
  - General (aerobic) exercises
- Corticosteroid injection (strong evidence), paracetamol and NSAIDs (both limited evidence)

Moderate irritability

- Low intensive mobilizations with increasing duration towards the end range
- Exercise therapy
  - Active exercises in all directions with gradual progression
  - Neuromuscular re-education
  - Proprioceptive Neuromuscular Facilitation
  - General (aerobic) exercises

Low irritability

- End range mobilizations with increasing duration
- Exercise therapy
  - Optimizing movement chain of the shoulder girdle
  - Very frequent stretches towards the end range
  - Neuromuscular re-education
  - Proprioceptive Neuromuscular Facilitation

Physiotherapeutic management

The aim of a physiotherapeutic treatment of FS patients is mainly to provide information, relief symptoms, and restore mobility and daily functions

Patient education

- Patient education is recommended as one of the most important interventions.
- Informing patients about the course of an FS seems to afford relief to patients and contributes to a gradual improvement in their symptoms

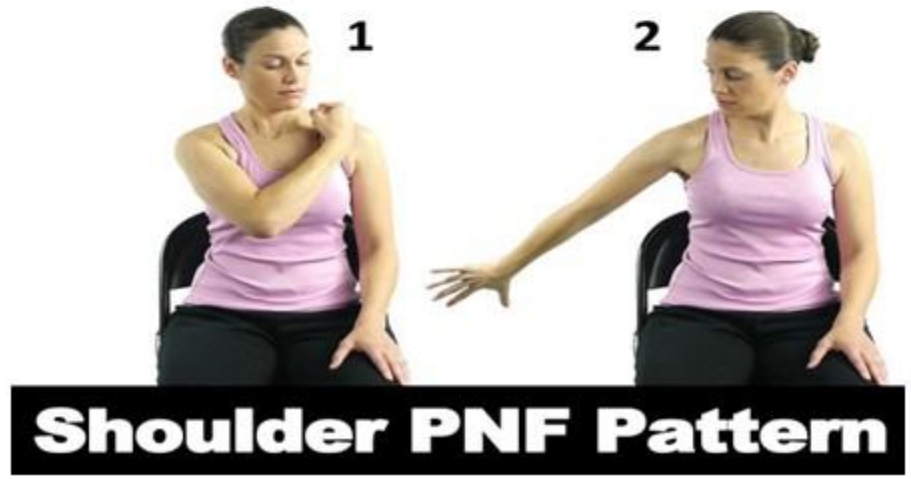
General physical activity

- General physical activity, such as walking or cycling, is recommended as a first-line treatment.
- General physical activity has a positive effect on general health and well-being, improves mood and sleep, and prevents depression
- general physical activity can activate central pain inhibitory mechanisms (exercise-induced hypoalgesia EIH)

Active shoulder exercises

The addition of strengthening exercises to a multimodal program with mobilization and electrostimulation appears to have a substantial effect on pain, ROM, function, and muscle strength **(Rawat et al., 2017)**

Proprioceptive neuromuscular facilitation (PNF) is a specific form of through range strengthening that has been shown to be effective for patients with an FS



Other physical therapy applications

cold, heat, or TENS are hypothesized to have positive effects on pain in FS patients.

beneficial effects having been reported for both focused and radial ESWT for FS patients (**Chen et al., 2014)**

Contemporary approaches that potentially may help in the management of frozen shoulder

During the last decade, some researchers and clinicians have focused their efforts on the study of central pain mechanisms to understand and address different musculoskeletal pain conditions.

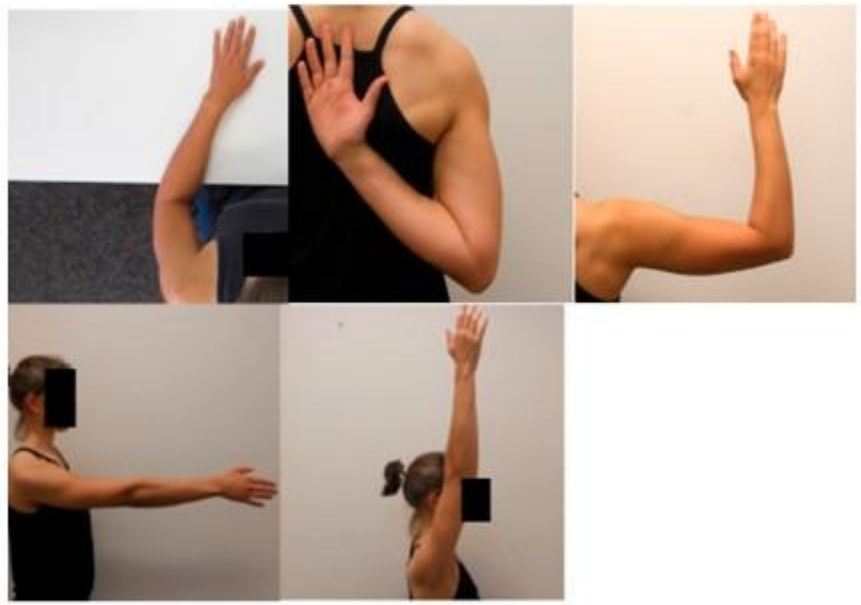
Mena et al. 2020 found that people with FS had a reduced tactile acuity and impaired laterality judgment in their affected shoulder when compared to their unaffected shoulder and controls.

Breckenridge et al. 2020 showed that patients with FS had significantly slower response times than healthy controls when testing a left/right judgment task. In addition, they found that the two-point discrimination threshold of the affected shoulder was significantly larger than the contralateral healthy shoulder

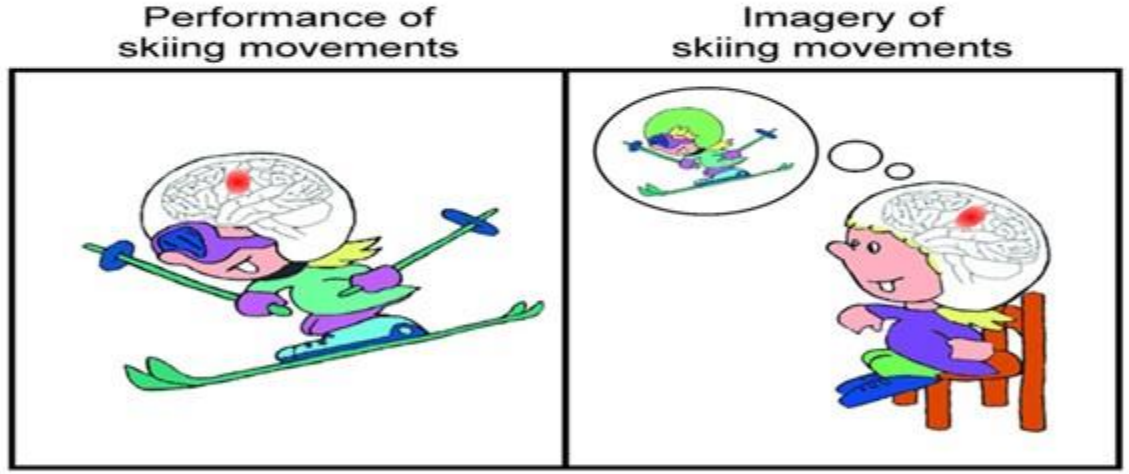
CNS-focused treatment in FS seeks to sharpen the cortical map of the shoulder in the brain and thus improve pain and movement. This can be potentially achieved by the combination of

- graded sensory discrimination techniques (tactile acuity) such as graphesthesia and two-point discrimination
- motor imagery such as laterality recognition and imagined movement

shoulder muscle isometric contractions are part of motor imagery as a transition between imagined and real movements



Examples of shoulder images displayed during Shoulder Left/Right Judgement Task.



Performing a movement such as skiing (left picture) activates the primary motor cortex (red circle marked in the brain) in a similar way as imagery of the movement (right picture).

Musculoskeletal Science and Practice 47 (2020) 102136

Contents lists available at ScienceDirect

Musculoskeletal Science and Practice

journal homepage: www.elsevier.com/locate/msksp

Original article

Laterality judgement and tactile acuity in patients with frozen shoulder: A cross-sectional study

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International Journal of
Environmental Research and Public Health

MDPI

Article

Motor Imagery Performance and Tactile Spatial Acuity: Are They Altered in People with Frozen Shoulder?

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Received: 7 August 2020; Accepted: 11 October 2020; Published: 14 October 2020

check for updates

In line with the CNS-focused treatment approach, virtual reality is gaining more attention during the last decade with its role in the management of MSK pain

JMIR Serious Games. 2022 Apr-Jun; 10(2): e34402.
Published online 2022 May 10. doi: 10.2196/34402

PMCID: PMC9131143
PMID: 35536641

Journal Article

Virtual Reality Applications in Chronic Pain Management: Systematic Review and Meta-analysis

Monitoring Editor: Nabil Zary

Reviewed by Jeffrey Gold and Ruben Nieto

Lisa Goudman, PhD,[✉#1,2,3,4,5] Julie Jansen, MSc,[#1,2] Maxime Billot, PhD,[6] Nieke Vets, MSc,[1,2] Ann De Smedt, MD, PhD,[2,3,7] Manuel Roulaud, PhD,[6] Philippe Rigoard, MD, PhD,[6,8,9] and Maarten Moens, MD, PhD[1,2,3,4,10]

Surgical treatment

Surgical indications

when considering surgical treatment of a frozen shoulder. We should know that FS is often self-limiting and conservative treatment proves successful in up to 90% of cases

“aggressive treatment” such as manipulations or capsular releases are rarely necessary

Unfortunately, to date, there are no clear guidelines based on high-level evidence that establish strict surgical indications or indicate the best time to intervene. Therefore , many decisions are made based on the surgeon’s experience and personal preference.

operative treatment is rare and should only be considered after the absence of symptom relief and failure of nonsurgical management for at least 9-12 months.

Patients with more severe initial symptoms seem more resistant to conservative measures and are more likely to undergo surgery

those with secondary forms of frozen shoulder may warrant more rapid surgical intervention to treat the underlying structural lesions or abnormalities.

The optimal timing of performing an intervention is still a matter of controversy. Some authors claim that a too-early MUA or release (within 6 months after symptom onset) is associated with a high risk of recurrence due to the frozen shoulder still being in the inflammatory phase **Vastamaék et al., 2015**

Options and surgical techniques

Hydrodistension

HD or hydrodilatation in treating adhesive capsulitis a large volume of fluid (e.g., sterile saline, local anesthetic, and corticosteroid) is injected into the glenohumeral joint under imaging guidance

Postoperative physiotherapy management: rehabilitation following release procedures

Flexion—sitting or standing

With the patient's arms supported (e.g., on table, kitchen counter, or the back of a chair), step back, incorporating trunk flexion to maximize shoulder flexion.

Scapular plane

- If the patient cannot tolerate a pure flexion movement, scapular plane flexion can be a good alternative.
- slide a cloth along a table in the scapular plane.

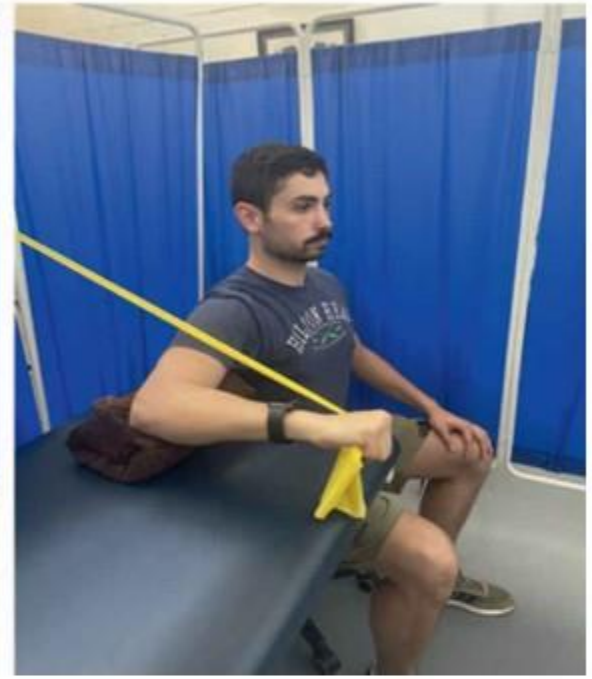
Abduction

External rotation

the combined abduction/ external rotation

Internal rotation

Early strengthening



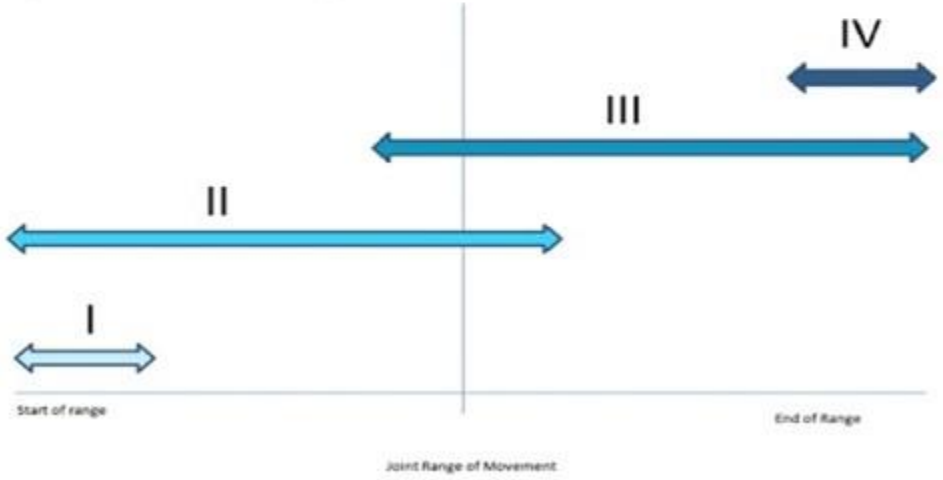
Techniques for Progressive Increase in Range of Motion

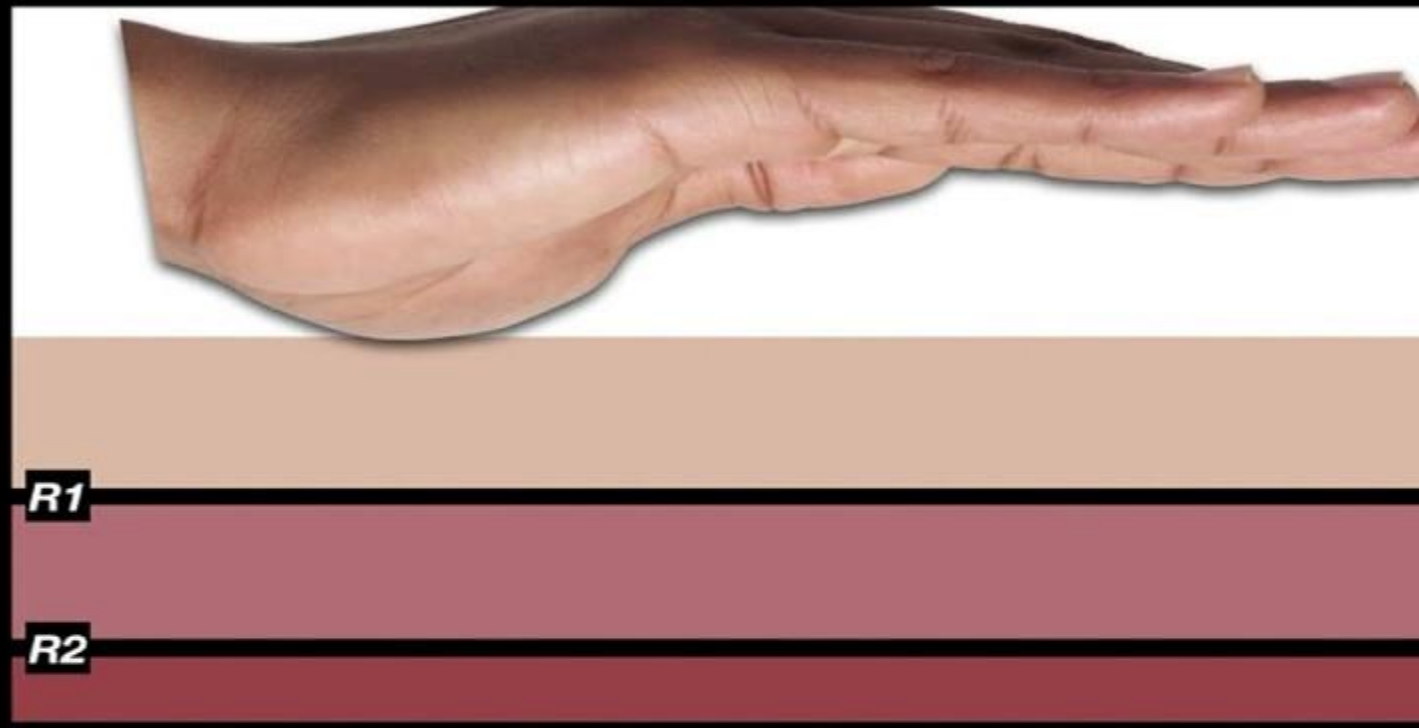
Joint mobilizations

- in the posterior/dorsal direction, inferior, and caudal, lateral distraction direction. The glenohumeral joint is mobilized using Grade I mobilizations to help modulate pain, progressing to GradeII mobilization.
- Distraction/traction can be performed in combination with the glides.

Grade I Mobilizations

- **Grade I** – small amplitude movement at the beginning of the available range of movement [beginning ↔ before R1]
- **Grade II** – large amplitude movement at within the available range of movement [beginning ↔ R1]
- **Grade III** – large amplitude movement that moves into stiffness or muscle spasm [R1 ↔ R2]
- **Grade IV** – small amplitude movement stretching into stiffness or muscle spasm [after R1 ↔ R2]





- **Rate** | Oscillations @ 2Hz OR 120 movements per minute
  - *Or slightly slower*
- **Duration** | 30 seconds - 1 minute

↓ **PAIN** → **NPRS [X/10]**

Severity
Irritability

(Posterior Capsule in General)
General Internal Rotation

With the patient in the side-lying position, the arm is placed in 90 of flexion in the sagittal plane with the elbow bent at 90. The PT rotates the patient's arm toward the patient's hips

(Lower Fibers of the Posterior Capsule)
30 of Extension and Internal Rotation

With the patient prone, the PT moves the patients arm back into 30 of shoulder extension. While the hand is resting on the patient's waist, the PT pushes the patient's scapula
against the patient's rib cage. The distance from the patient's elbow to the plinth is noted and compared with the contralateral arm

(Superior and Middle Fibers of the Posterior Capsule) Internal Rotation in 30 of Abduction in the Plane of the Scapula (30 Anterior to the Frontal Plane)

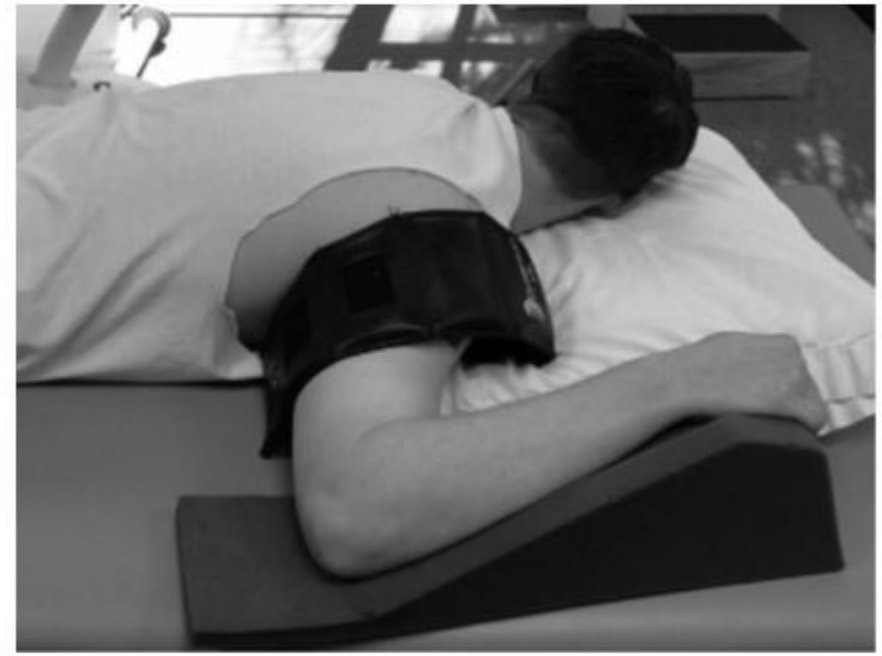
With the patient in the supine-lying position, enough to place the patient's shoulder in the scapular plane, the PT moves the arm into 30 of abduction. The PT then internally rotates the patient's arm

(Posterior Capsule)
60 of Abduction in the Frontal Plane and Internal Rotation

With the patient supine, the PT brings the patient's out to 60 of abduction. The PT then rotates the arm internally while making sure not to allow the scapula to come off the plinth.

Joint Position and End-Range Mobilization Combined with Low-Load Stretch

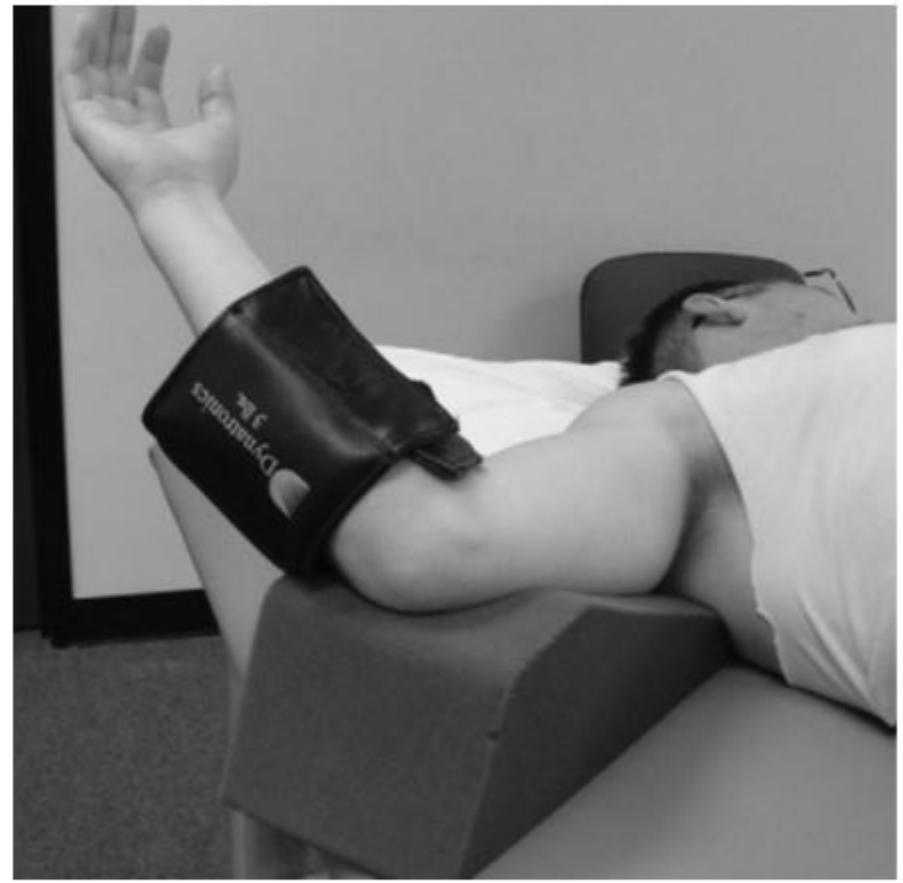
at 90 of passive abduction and external rotation, the inferior glenohumeral ligament is the most stabilizing.



Prone left shoulder at 90abduction with external rotation on a wedge.

positioning the patient at 0 of abduction with external rotation is a specific stretch to the subscapularis tendon and muscle

At 45 of abduction and external rotation, the subscapularis, middle glenohumeral ligament, and anterior superior fibers of the inferior glenohumeral ligament are the most stabilizing to the joint. Therefore, positioning the patient at 45 Of abduction with passive external rotation is specific to stretching the anterior middle and inferior capsule



45 of abduction with passive external rotation would be specific to stretching to the anterior middle and inferior capsule.


THANK
YOU