Shoulder Impingement and Current concepts in Rehabilitation

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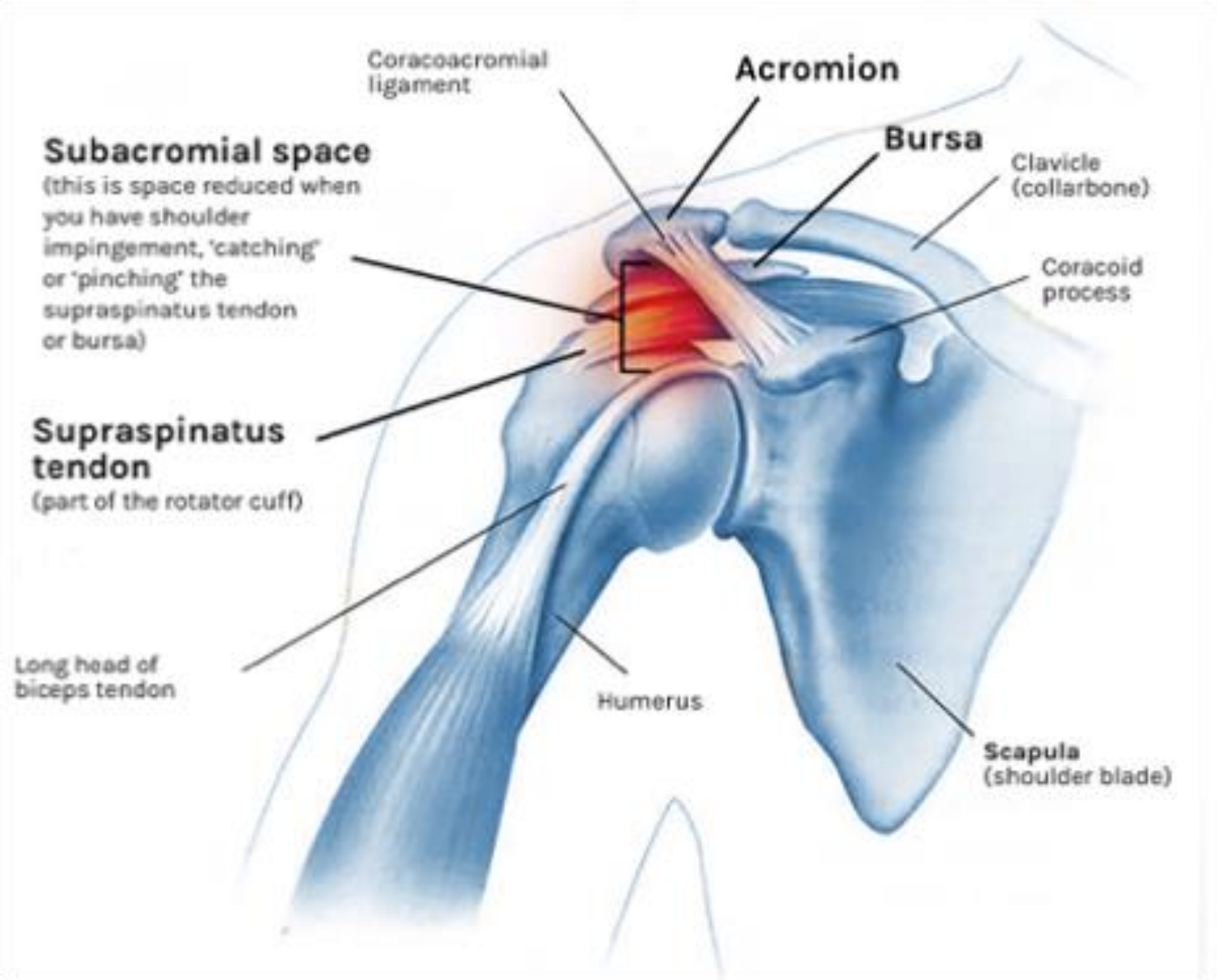
- NO DISCLOSURES

Shoulder Impingement

- Encroachment of the subacromial tissues as a result of narrowing of the subacromial space
- Includes common pathoanatomic labels:
  - Subacromial impingement
  - Bicipital tendinopathy
  - RTC tendinopathy and tears
  - Subacromial bursitis
  - Secondary instability
  - Slap lesions
- SIS is reported to have various underlying pathoanatomical causes:
  - RTC dysfunction
  - internal impingement
  - external impingement
  - scapular dyskinesis
  - decreased muscle length
  - impaired motor control of the shoulder region
- Therefore resulting in large variability in applied therapeutic interventions



Rehabilitation considerations for shoulder impingement: **most commonly related to mechanical compression from the acromion, acromioclavicular joint, and the coracoacromial ligament**

COMMON

- **3rd most common musculoskeletal complaint encountered in clinical practice**
  - The estimated prevalence of shoulder complaints is 7% to 34%, often with shoulder impingement syndrome as the underlying etiology
- **Shoulder impingement is the most common cause of shoulder pain and disability**
  - accounting for 44% to 65% of all shoulder complaints
  - Compressive forces against the acromion in the elevated position are estimated at .42 times the body weight with peak forces occur at 85-136 degrees of elevation
- **Common cause of disability during ADLS and at work**
- **Represents a major socioeconomic problem.**

DX

- **History:**
  - Primary complaint is pain
    - Pain typically with elevation, can be at rest and with sleeping
- **Physical exam:**
  - Ruled in with provocative testing
  - Special tests : Neer, Hawkins, Jobe Test, painful arc, isometric ER resistive testing

  Identify internal or external impingement
- Current literature supports a detailed systematic approach to examining the shoulder and UE to identify underlying causes of impingement

Rehab Considerations

Research is limited in providing a gold standard protocol or CPG in the rehabilitation of shoulder impingement

-Abdulla et al Manual Therapy. Is exercise effective for the management of subacromial impingement syndrome and other soft tissue injuries of the shoulder? A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration October 2015, 20 (5) 646-656

- Evidence on exercise for shoulder soft tissue injuries is limited.
- Rotator cuff strengthening/stretching is effective for subacromial impingement.

-John E Khun Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol . J Shoulder Elbow Surg. 2009 Jan-Feb;18(1):138-60.

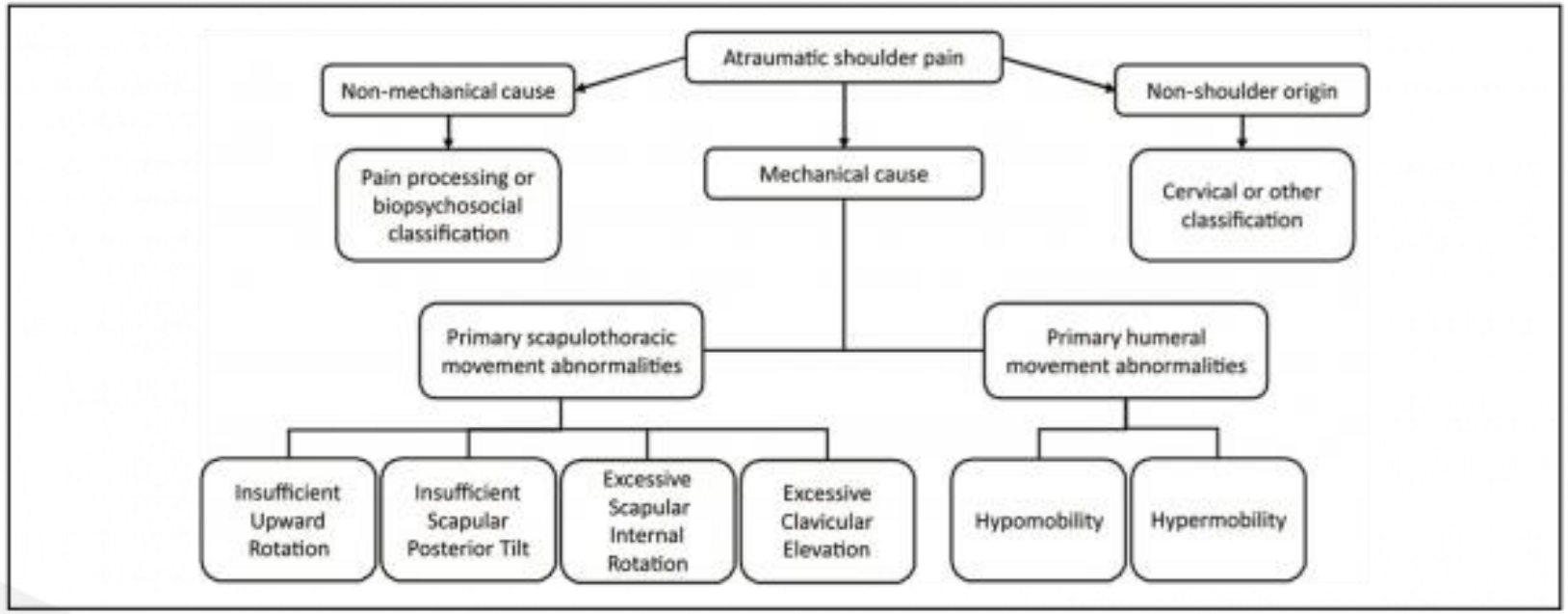
- **Manual Therapy:** manual therapy with the addition of exercises is the best treatment for shoulder impingement early on.
- **Exercise Therapy:** Rotator cuff strengthening and stretching is effective for subacromial impingement.
  - The evidence suggests that supervised and home-based progressive shoulder strengthening and stretching are effective for the management of subacromial impingement syndrome.

Rehab Considerations

-**Pieters et al. An Update of Systematic Reviews Examining the Effectiveness of Conservative Physical Therapy Interventions for Subacromial Shoulder Pain.J Orthop Sports Phys Ther. 2020 Mar;50(3)**

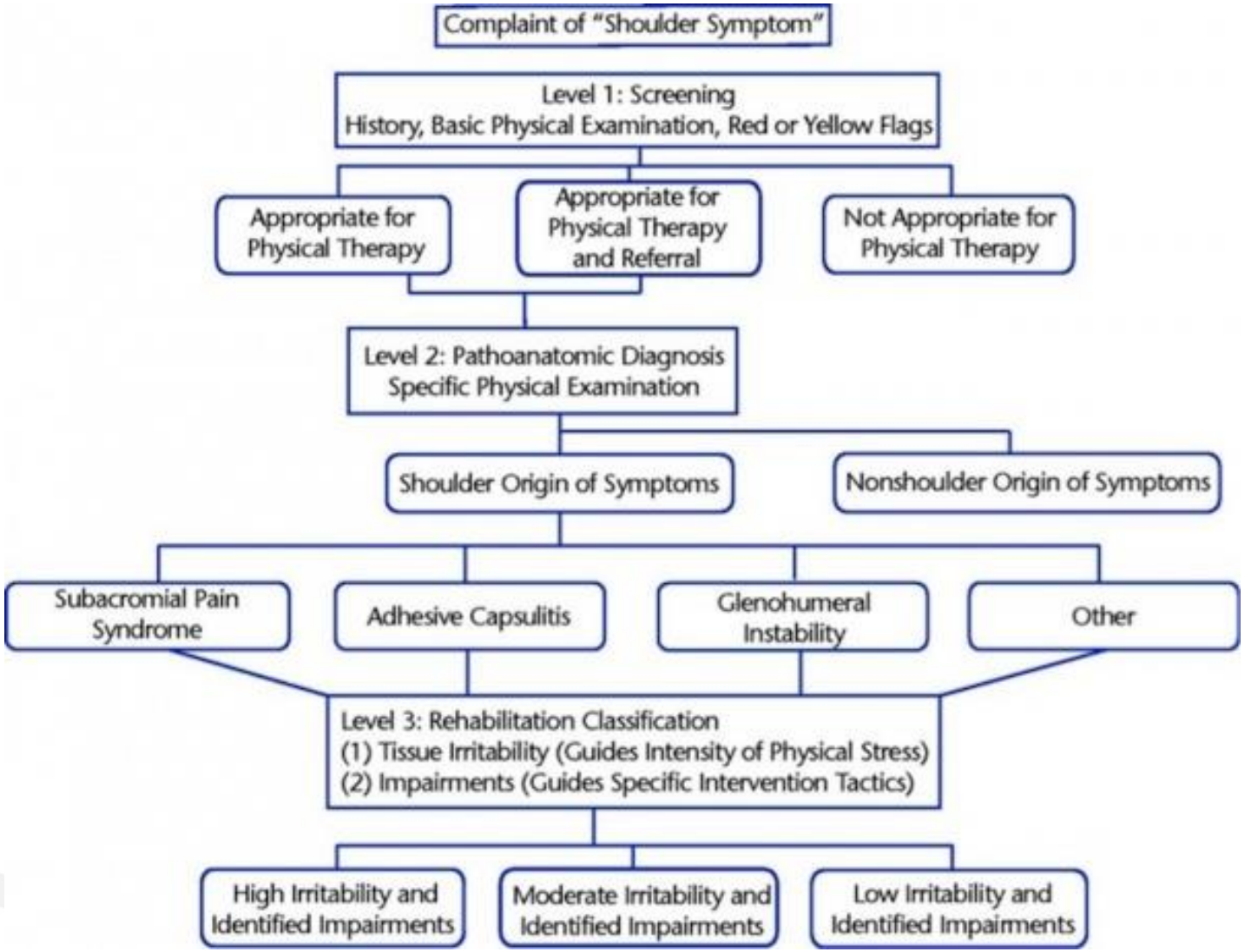
- Evidence for exercises as the most important treatment strategy is increasing and strengthening
- Ongoing research is needed for optimal dose and type of exercises
- It is not possible to state that one exercise program is more appropriate than another
- Manual therapy is strongly recommended in addition to exercise
- Evidence is lacking for the effectiveness of non-surgical interventions such as US, low level laser and shock wave therapy

Proposed classification of primary patterns of movement impairments.



- Ludewig Pm, Kamonseki Dh, Staker Jl, Lawrence RL, Camargo Pr, Braman Jp. Changing Our Diagnostic Paradigm: Movement System Diagnostic Classification. International Journal Of Sports Physical Therapy. 2017 Nov;12(6):884.

Staged Approach for Rehabilitation Classification: Shoulder Disorders (STAR–Shoulder)



McClure PW, Michener LA. Staged Approach for Rehabilitation Classification: Shoulder Disorders (STAR–Shoulder). Physical Therapy. 2015 May 1;95(5):791-800.

Staged Approach for Rehabilitation Classification: Shoulder Disorders (STAR–Shoulder)

- The star classification system groups together diagnoses that have similar presentation and treatment is selected base on integration of diagnosis and tissue irritability as well as identified impairment
- For the rehabilitation classification, 3 levels of irritability (High irritability, Moderate irritability, Low irritability) are proposed and defined, with corresponding strategies guiding intensity of treatment based on the physical stress theory.
- Common impairments are identified and are used to guide specific intervention tactics with varying levels of intensity.
- Stage 3
  - Based on tissue irritability and specific impairments
  - Both guide intervention use

- This is considering that the pathoanatomic model may not provide diagnostic categories that effectively guide treatment decision making in rehabilitation.
- This classification system may be useful clinically for guiding rehabilitation intervention and provides a potential method of identifying relevant subgroups in future research studies.
- The diagnosis tells you expectations about tissue healing which informs you about treatment, but does not tell you the course of treatment
- BEST management blends pathoanatomic diagnosis , impairment and levels of irritability

Reliability and Concurrent Validity of Shoulder Tissue Irritability Classification

- **Objective:** Rating tissue irritability has been recommended to aid decision making in several recent clinical practice guidelines. An explicit method for rating tissue irritability was proposed as part of the Staged Algorithm for Rehabilitation Classification: Shoulder Disorders (STAR-Shoulder), but the reliability and validity of this classification are unknown. The purpose of this study was to examine the reliability and concurrent validity of shoulder tissue irritability ratings as part of a system designed to guide appropriate treatment strategy and intensity.
- **Methods:** A clinical measurement, prospective repeated-measures cross-sectional design was used. The 101 consecutive participants with primary complaints of shoulder pain were assessed by pairs of blinded raters (24 raters in total) and rated for tissue irritability. Patients completed 3 patient-reported outcome (PRO) measures reflecting both pain and disability, and these scores were compared with ratings of tissue irritability. Paired ratings of irritability were analyzed for reliability with prevalence-adjusted, bias-adjusted Kappa for ordinal scales. Analysis of variance was used to compare PRO measures across different levels of irritability. Receiver operating characteristic curve analysis was utilized to derive cut-off scores for 3 PRO instruments.
- **Results:** Interrater reliability was 0.69 (95% CI = 0.59-0.78), with 67% agreement. All PRO measures were significantly different among 3 levels of tissue irritability.
- **Conclusion:** There appears to be acceptable reliability and a strong relationship between PRO measures and therapist-rated tissue irritability, supporting the use of the STAR-Shoulder irritability rating system.
- **Impact:** Several clinical practice guidelines have recommended that clinicians rate tissue irritability as part of their examination. This study provides important new information supporting the reliability and validity of the STAR-Shoulder tissue irritability rating system.

- Stephen M Kareha, Philip W McClure, Alicia Fernandez-Fernandez Reliability and Concurrent Validity of Shoulder Tissue Irritability Classification Phys Ther 2021 Mar 3;101(3)

Rehab Considerations

- Rehab of shoulder impingement should start with a detailed and systematic approach
- Treatment:
  - Initially protect the RTC from stress BUT not function Stressing the RTC from compression of the coracoacromial arch or posterior glenoid with exercise and ADLs
- Scapular dysfunction can be an underlying cause and can exacerbate symptoms

Rehab Considerations

Initial Phase of Rehab

- GOALS:
  - Decreased pain for allowance of sub max RTC /Scapular stabilization exercises
  - Normalization of capsular restriction through the use of specific mobilization/stretching techniques
  - Early sub max RTC and resistance

Rehab Considerations

- **MOBS**
  - Decreased GH joint mobility leads to decreased muscle performance
  - GH joint mobs encourage muscle recruitment normalization
- **SOFT TISSUE INFLEXIBILITY**
  - Tight pec minor (increased tilting and increased rotation)
  - Posterior GH capsule stiffness(increase anterior tilt)
  - Leads to abnormal scapular positioning therefore increasing subacromial impingement
- **STRENGTH**
  - Change in the timing properties of the SA, LT,MT,and increased UT
  - USE rhythmic stab for muscular co-contraction
    - Activation of the serratus anterior and lower trap force couple is imperative to allow scapular upward rotation and stabilization during arm elevation
    - Studies have shown that decreased activation of serratus anterior in patient with GH impingement as well as instability
- **SCAPULA**
  - Stretches address pec minor length
  - Stabilization deficits are addressed by strengthening

Rehab Considerations ROM/Mobs

- ROM/mobilization may be indicated according to the underlying mobility status of the patient
- IR ROM limitations are often seen in OH athletes with RTC dysfunction and impingement
- Use clinical exam to determine tissue involvement for impingement
- Posterior load and shift or posterior draw test
  - if + no Mobs should be performed to increase IR because of hypermobility of the capsule
  - cross arm or sleeper stretch to address posterior capsule restriction and increase IR
  - Current literature notes that the cross arm stretch is superior to the sleeper stretch to increase IR

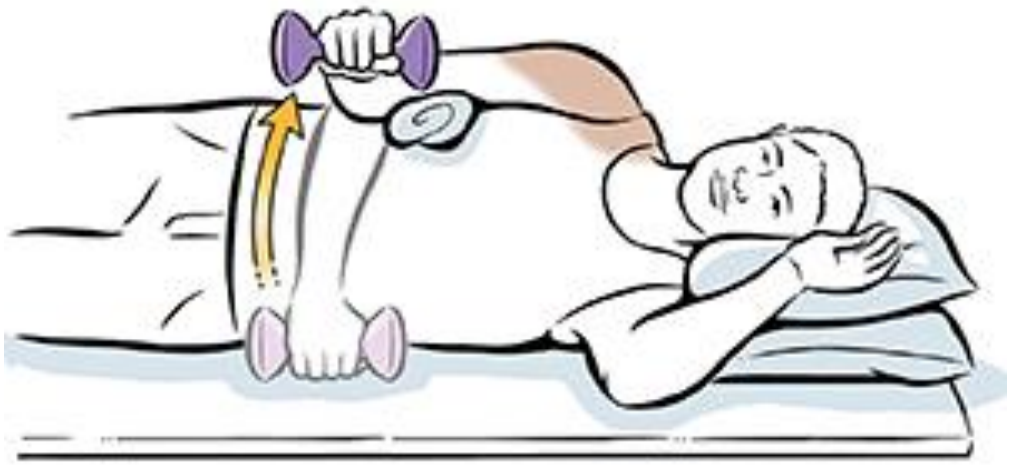
Rehab Considerations
Recommended exercises

- Research DOES support the use of early sub maximal ER and IR isometrics in the scapular plane with low levels of elevation to present subacromial contact
- ANOTHER key component to the EARLY management is SCAP STAB and manual techniques are recommended to ensure proper scapular engagement versus GH joint
- Studies have shown a decrease in subacromial space with the scapula in a protracted position versus retracted position
- Work on the retractor muscles to get the scapula back and increased the subacromial space

Sub Max Contraction in Early stages

- The literature supports early submaximal contraction of the RTC in early stages of rehab
- Increased infraspinatus activity is seen with 40% of max effort
- Sub max RTC work increased cuff activity and de-emphasizes the deltoid and other prime movers

RTC Exercises



- **JOBE ISOTONIC RTC exercise are supported as "better exercises"**
  - Side lying ER
  - Prone shoulder extension
  - Prone HABD
  - Prone 90/90 ER
    - these should be performed 3 sets of 15-20 to promote a fatigue response and improve muscular endurance
    - the efficacy of these have been demonstrated in a 4 week training program

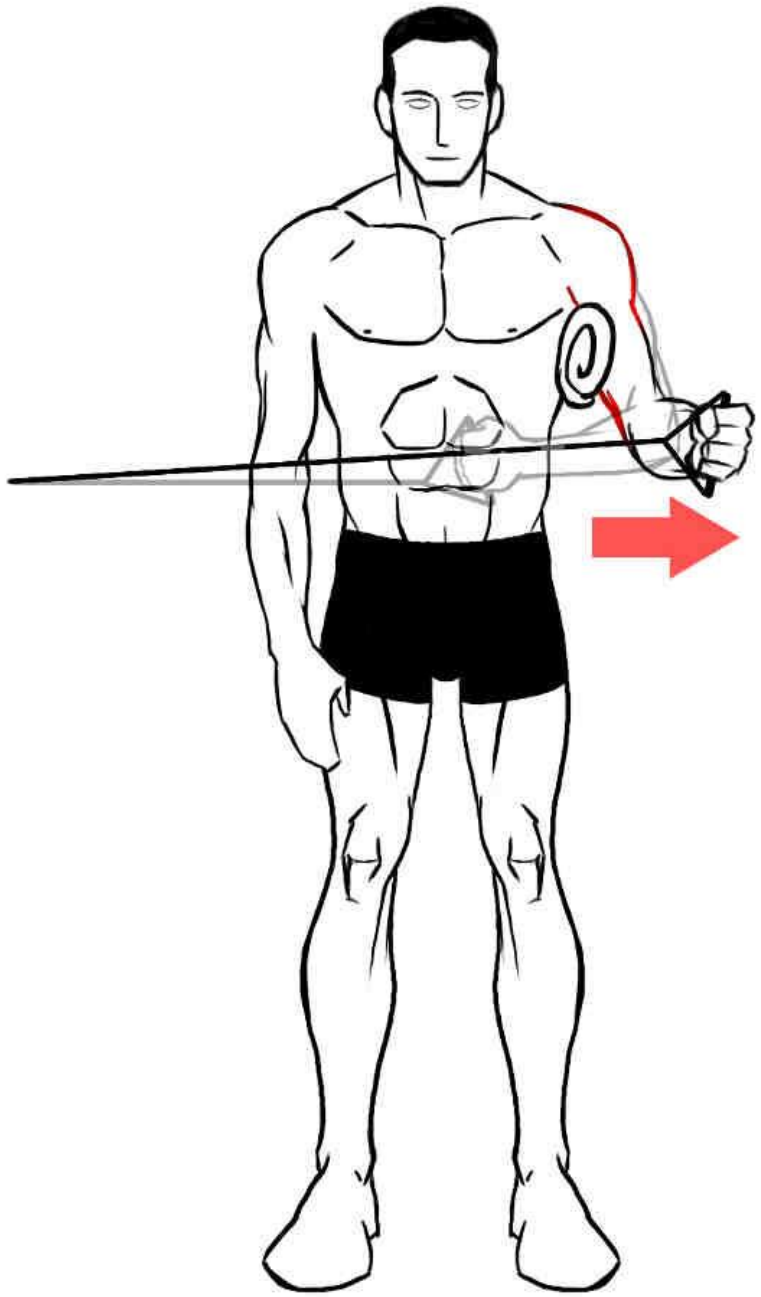
- prone HABD is used at 90 deg of abduction to minimize the effects resulting from subacromial contact

Research shows that this position created high levels of supraspinatus activation

which makes it superior to empty can- which combines IR and elevations therefore increases impingement

-8-10% increase in IR/ER strength measured Isokinetically

- improved IR/ER ratio , improved strength and endurance of RTC and performance enhancement shown in both tennis players and OH athletes



ER exercises in standing

- Should be completed with towel roll under the axilla
  - Assists in isolation of the exercises to control unwanted movements
  - Shown to elevate muscular activity by 10% in the infraspinatus in comparison to no towel
  - Creates an ADDUCTION isometric contraction which increases the subacromial space

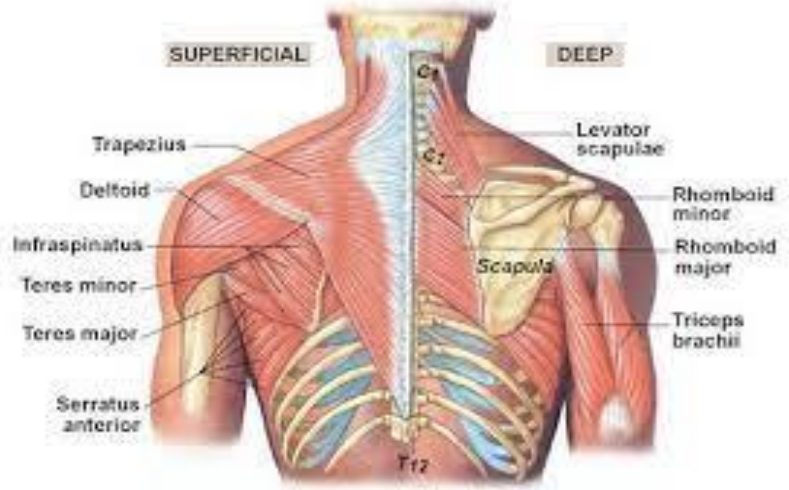
STRENGTH TRAINING

- Total arm strengthening and kinetic chain exercise application is recommended

- Incorporate strength and muscle endurance training to include RTC and scapular stabilizers, but also include the entire kinetic chain

(LE and trunk- especially in the throwing athlete)

Rehab Considerations Scapular Exercises



- **Scapular stabilization exercises progressed to include ER with retraction**
  - Recruits the Lower Trapezius and at a rate which is 3.3x greater than the Upper Trapezius
- **Stretches targeted to increase pectoralis minor length**
  - The unilateral corner stretches been shown to be superior to increase pectoralis minor length
  - Scap setting is recommended as well as retraction in 30 deg of forward flexion
- **Selective serratus anterior training equals temporary effects on motor strategies and upper limb kinematics**
  - conscious muscle control for co-activation of scapular force couple
  - Activate scapular stabilizers without high demands on the shoulder
- **CLOSED CHAIN exercises Plus position gives max scapular protraction which his recommended to recruit SA**
- **GOAL decrease UT, increase SA and LT**
  - Integrate kinetic chain
  - - push up increase serratus anterior with ipsilateral leg extended , increased Lower trap with contralateral leg extended
  - Open chain- low row in unilateral stance on the contralateral leg

PROGRAM PROGRESSION

- When able progress to 90 deg of abduction in scapular plane
  - Research shows the RTC is best able to maintaining GH joint stability in the scapular plane
- Isotonics
  - As isotonics are tolerated with 2-3 lbs and rotational training is performed without pain using elastic resistance, an isokinetic rotational exercise should be initiation in the modified base position
  - Isokinetic dynameter allows you to achieve IR/ER ratio comparable to the non-affected side IR/ER strength
  - By working IR/ER strength you will also have gains in flexion/extension and abduction/adduction
  - If you only train flexion/extension, abduction/adduction you only gain in these directions

Psychological factors

Chester et al Psychological factors are associated with the outcome of physiotherapy for people with shoulder pain: a multicentre longitudinal cohort study Br J Sports Med. 2018 Feb;52(4):269-275

- Besides pain and disability patient expectation and pain self- efficacy were prognostic indicators of patient outcomes
  - if patient expectation and pain self- efficacy are found to be an issue in subjective exam they do need to be addressed
  - Those who believe they will get better and those who believe they have the power to help themselves get better, do better

- Psychological factors were consistently associated with patient-rated outcome, whereas clinical examination findings associated with a specific structural diagnosis were not.
- When assessing people with musculoskeletal shoulder pain and considering referral to physiotherapy services, psychosocial and medical information should be considered.

BERN consensus statement 2022

- The is an absence of high quality evidence to support rehab and rts decisions following shoulder injuries the consensus statement provides guidance with respect to load and risk management supporting athlete shoulder rehabilitation and decision making
- It offers clinicians the flexibility to apply principle based approaches to managing the RTS process
- Developing additional sport specific guidance is recommended for the future

Summary

- BEST EXERCISES – get the most out of your time with your patients and have patients maximize their time rehabbing
- HEP- compliance
- END STAGE REHAB
  - Re-evaluate provocative testing , ROM , strength, functional status and outcome measures

  - OH athletes multifactorial approach, RTS testing

QUESTIONS ???

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