Clinical Practice Guidelines for Subacromial Impingement Syndrome (SAIS)

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SAIS: Objectives

• What is SAIS & how do we diagnose it?
• How does it happen?
  • Glenohumeral/scapulothoracic kinematics
  • Posterior capsule tightness
  • Upper quarter posture
  • Acromial morphology
  • Shoulder girdle musculature
• Conservative vs. surgical intervention
• PT for SAIS
• Appropriate rehabilitation exercises for specific muscles
SAIS

- Most common shoulder disorder
- Multifactorial problem
- Neer proposed that 95% of all RTC tears are caused by impingement
- Symptoms: painful arc, crepitus & weakness
  - Occupational demands
  - Athletic activity
  - No precipitating factor
Subacromial Space

• 1.0-1.5 cm on radiograph
  • A ↓ of 3 mm was seen in pts with SAIS compared to healthy subjects
• Inferior: humeral head
• Superior: acromion, coracoacromial ligament & AC joint
• Tissues in space: supraspinatus tendon, subacromial bursa, long head of biceps tendon & capsule

...Any or all may be affected!
Diagnosing SAIS

PT Examination

• AROM & painful
• Special Tests
  • Neer’s impingement sign
  • Hawkins-Kennedy
  • Painful Arc (60-120°)
  • Jobe’s Test (empty can)
  • External rotation resistance stress test
• Nocturnal p! & are unable to lay on the involved side
• Acutely, they may have discomfort at rest

Differential Diagnoses

• GH instability
• Arthritis of the AC jt
• Adhesive capsulitis
• RED FLAGS
  • Systemic conditions in the neck, C/T-spine, axilla, thorax, & diseased viscera in the chest and upper abdomen can refer pain to the shoulder
How Does SAIS Happen?

**Intrinsic impingement**
- Partial or full thickness tendon tears
  - Overuse
    - Inflammation of tendon’s/subacromial bursa
  - Degeneration of tendons
- Tension overload
- Trauma to tendons

**Extrinsic Impingement**
- Mechanical compression by some structure external to the tendon
  - Altered GH or scapular kinematics
    - Weak or dysfunctional RTC & scapular muscles
  - Posterior GH capsule tightness
  - Posture dysfunctions of spinal column & scapula
  - Acromial or coracoacromial arch pathology
  - ST abnormalities around subacromial outlet
Glenohumeral Joint Kinematics

- GH jt allows the greatest motion potential of any jt
- Mobility is afforded at the expense of stability
  - Shoulder complex relies on muscles & ligament structures to provide static & dynamic stabilization
- Muscular coordination is necessary for the smooth passage of ST structures under the coracoacromial arch
Glenohumeral Joint Kinematics

- With scapular plane ABD, the humerus ER’s to allow clearance for the greater tuberosity & the associated tissues
  - Limited ER could cause SAIS
- The greatest subacromial contact force between the RTC & biceps tendon with the subacromial arch is at **mid-range of GH ABD**
  - Painful arc
Scapulothoracic Kinematics

- **Normal w/ GH elevation**
  - Upward rotation \(\sim 50^\circ\)
  - ER \(\sim 24^\circ\)
  - Posterior tilt \(\sim 30^\circ\)

- **Abnormal w/ GH elevation**
  - Upward rotation
  - Anterior tilt
  - Scapular IR or “winging”

- **Scapular kinematics can be altered by:**
  - Weak or dysfunctional scapular/RTC musculature
  - Poor cervical & thoracic spine posture
  - ST tightness
Posterior Capsule Tightness

- Increases superior & anterior humeral head translation
  - Altered accessory motion of the humeral head leads to impingement of subacromial structures against the anterior inferior acromion
- Tested via GH horizontal ADD w/ manual stabilization of the scapula
Upper Quarter Posture

- **Slouched posture:** forward head & shoulders with T-spine flexion
- **Position & mobility of the C/T-spine can influence scapulothoracic & GH kinematics**
  - A relatively small increase in T-spine flexion results in a more elevated and anteriorly tilted scapula at rest
  - During GH elevation there is less upward upward rotation and posterior tilt & a decrease in the amount of available GH elevation
    - **Poor posture = decrease in subacromial space**
Acromial Morphology/Shape: Structural

- A majority of the population has a type II or III acromion
  - Type III has a correlation with SAIS
  - 70% of pts with RTC tears have a type III acromion
- Does NOT account for all change in pts shoulder fx
- A thick coracoacromial ligament can directly decrease the subacromial space
  - Significant relationship between this & the incidence of RTC tears
Shoulder Girdle Musculature

RTC Musculature

- RTC muscles compress & stabilize the humerus
  - Torn or degenerating tissues cause superior humeral head translation
  - Encroachment of the “critical zone” or hypovascular zone of the supraspinatus tendon is a precursor to impingement
- Fatigue of the infraspinatus & teres minor leads to less scapular posterior tilt

Scapular Musculature

- In the initial phase of GH elevation, scapular upward rotation is produced by the upper trapezius & serratus anterior
- In the middle, the lower trapezius increases its contribution until they are all equally active
- Without proper stabilization of the scapula, the scapular position can change the length-tension relationship of the attached muscles, specifically the RTC
Conservative vs. Surgical Intervention

**Conservative**
- Trial of conservative tx first
  - NSAIDs
  - Relative rest
  - Corticosteroid injections
  - PT
- **Goal**: break the cycle of impingement & prevent further ST trauma
- Duration of conservative tx: 3 → 18 months
- SAIS responds to conservative tx 80% of the time

**Surgical**
- Subacromial decompression & repair in cases of RTC tears
  - Surgeon removes the structure(s) responsible for impingement
    - Subacromial bursa, undersurface of the anterior acromion, coracoacromial ligament, distal clavicle & AC jt
- Conservative tx has comparable success
PT for SAIS

- **Pt education**
  - Avoidance of aggravating activities
  - Independence with HEP

- **Modalities**
  - Ice, moist heat, ultrasound & estim

- **Exercise**
  - PROM → AAROM → AROM
  - Stretching, ROM, PRE’s

- **Scapular Taping??**
PT for SAIS: Acute Stage

- **Decrease p! & inflammation**
  - Rest, modalities (ultrasound, TENS, cryotherapy, iontophoresis), & NSAIDS

- **Maintain ROM**
  - Prevent jt capsule contracture
  - Static stretching for 30-60 sec (Bandi & Irion)
  - Maitland’s Grade I-II GH jt mobilizations
  - AAROM exercises (supine → sitting)
  - **Exercises**: Pendulums, cane AAROM, pulleys

- **Retard muscle atrophy**
  - Submaximal isometric exercises
  - Estim

- **Patient Education**
  - MOI & activities to avoid
  - Posture correction
  - HEP
PT for SAIS: Subacute Stage

- **Promote tissue healing**
  - Modalities
    - Pre-treatment heat
    - Post-treatment ice

- **Progress exercise program**
  - Pulleys & cane AAROM exercises in scapular plane → increasing elevation & ER
  - Static stretching
  - Maitland’s grade III/IV GH jt mobilizations for increasing ROM
  - Isotonic dumbbell exercises
  - PNF

- **Moseley et al used EMG to identify 4 exercises that consistently fired all 8 of the scapular rotator muscles**
  - Scaption; rowing; push-up +; press-up
PT for SAIS: PRE Stage → Return to Activity

**PRE Stage**
- Increase proprioceptive awareness
- Static stretching
- Maitland’s grade III/IV GH jt mobilizations for increasing ROM
- Muscular endurance is emphasized
- Incorporate functional exercises specific to the pt → duplicate stresses the pt will experience during return to normal UE activity

**Return to Activity**
- Overhead arm movements desired
- Static stretching
- Strengthening of RTC & scapular muscles
- Reinforce postural awareness
- Modification of repetitive overhead activities
- Teaching the pt self-care
Addressing the Mechanical Problem Via Strengthening

The following exercises have been selected based on the results of numerous cited studies
Supraspinatus

- Compresses, ABD & generates a small ER torque
  - Strongest at 30-60° elevation
  - Deltoid is strongest at 60-90°

- **Scapular plane exercises specifically strengthen the supraspinatus**

- **Exercises**
  - Scapular punches
  - Rowing
  - Push-ups
  - Prone horizontal ABD @ 100° w/ ER
  - 2 hand overhead medicine ball throws

- **Scapular retraction puts the supraspinatus at a better length for strengthening**

- AVOID empty can
Infraspinatus & Teres Minor

- ER of humerus
  - Infraspinatus more effective at 0° ABD
- **Exercises:**
  - Prone horizontal ABD w/ ER
    - = activity of infraspinatus & teres minor
  - Sidelying ER
    - Most combined EMG signal
  - Avoid ER at 90° ABD w/ pts that have capsulolabral pathology
- **Placing a towel roll under the arm increases posterior cuff activity by 20-25%**
Subscapularis

- IR & anterior stability
- IR @ 0° produces = upper & lower subscapularis activity
- IR @ 90° is better for isolating subscapularis
- Exercises:
  - Push-up +
  - Dynamic hug
  - Diagonal exercise
  - Sidelying shoulder ABD
  - Shoulder extension
  - Military press
  - PNF D2 & scapular pattern
Serratus Anterior

- Stabilizes the medial border & inferior angle of the scapula
- Works with pectoralis minor to protract the scapula & with the UT/LT to upwardly rotate the scapula

**Exercises:**
- Push-up +
- Dynamic hug
- Scapular punch (120° ABD)
- Wall slides
  - Safe early on
- Scapular punches
- Military press
- GH IR/ER @ 90° ABD
- Shoulder flexion, ABD & scaption w/ ER > 120°
- D1/D2 PNF flexion, & D2 extension

- Serratus anterior activity increases as the gravitational challenge increases
Trapezius

- Lower trapezius assists with scapular posterior tilt & ER

**Exercises for UT:**
- Shoulder shrugs
- Prone rowing
- Prone horizontal ABD
- Dynamic hug
- Military press
- Scaption
- PNF scapular clock
- 2 handed overhead medicine ball throws

**Exercises for MT:**
- Shoulder shrugs
- Prone rowing
- Prone horizontal ABD

**Exercises for LT:**
- Prone rowing
- **Prone horizontal ABD**
- **Prone/standing ER at 90° ABD**
- High scapular rows
- Scaption
- D2 PNF pattern: scapular clock

**Poor posture → UT/LT muscle imbalance**
- Bilateral ER at 0° = greatest LT/UT ratio
- Sidelying ER & prone horizontal ABD are also beneficial in enhancing the ratio
Rhomboids & Levator Scapulae

**Exercises:**
- ER @ 0 & 90° ABD
- IR @ 90° ABD
- Shoulder ext
- Prone horizontal ABD @ 90°
- Scapular ABD
- ABD
- Standing/prone rows
- Prone extension
- PNF D@ flex/ext
Summary

• SAIS can be caused by many factors
• Many of these exercises target multiple muscles
  • Emphasize posture & scapular retraction
  • Whole body kinetic chain approach
  • Alter bases of support to recruit whole body muscle patterns
Questions/Comments?
Resources


