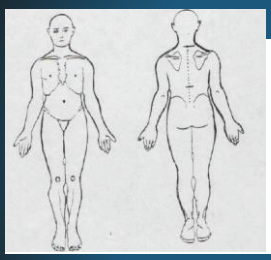
SHOULDER CASE 1

Eric Magrum PT, DPT, OCS, FAAOMPT

Orthopaedic Manual Physical Therapy Series
Charlottesville 2017-2018



Body Chart--**Initial Hypothesis:**

Impingement; RTC Tendonopathy/partial tear; RTC complete tear, C5 radic/referral; AC sprain/arthrosis; Lateral epicondylalgia

SUBJECTIVE EXAM

**** Subjective Asterisks Signs/Symptoms ****

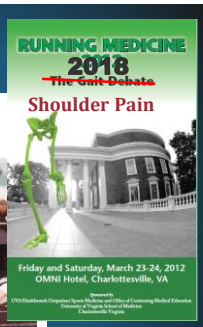
(Aggravating/Easing Factors, Description/Location of symptoms, Behavior, Mechanism of injury)

55 yo male – onset following increased yard work (storm clean up) including overhead chain saw. Aggravated by: Overhead reaching – especially Abduction > 90; Rapid mvts (<90); Sleep disturbed; Pain with bowling, unable to throw, return to gym. Easing factors: Rest/activity modifications, NSAIDS OTC, ice/heat.

Prevalence

- Shoulder pain 2nd to LBP – prevalence MSK
- 44-60% Shoulder = IMP

Less Prevalent



STRUCTURE at Fault:

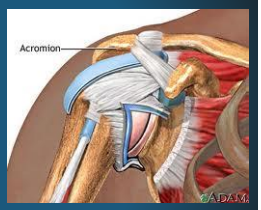
Joints in/refer to the painful region	**Myofascial tissue** in/refer to the painful region	**Non Contractile tissue** in/refer to the painful region	**Neural tissue** in/refer to the painful region	Other structures that must be examined – **non MSK**
GH AC Scapulo Thoracic C5 Elbow	Supraspinatus Biceps UT/Levator Scap Deltoid Wrist Extensors	SA Bursa AC Ligts Labrum Capsule	C5 Nerve root Suprascapular Nerve Axillary nerve	

Primary HYPOTHESIS after Subjective Examination: Primary IMP secondary to RTC tendonopathy

Differential List: (List in ranking order to rule out)
RTC Tear; Biceps pathology; Clear Cervical spine; Instability/Labral pathology; Elbow (lat epicondylalgia)

Impingement Syndrome

- Cluster of signs/symptoms
- Location – Anterior Superior (SA), Posterior Superior (Internal)
- Chronic bursitis
- RC tendinitis
- RTC Partial thickness Tear
- Cause – Compression-Primary vs. Instability-Secondary



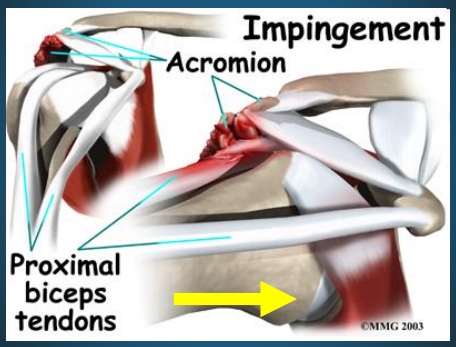
Primary Impingement

- Direct Compression of
  - RTC Tendons, Biceps Tendon, SA bursa
  - Between the Humeral Head and the overlying anterior 1/3 of the Acromion, Coracoacromial ligament, Coracoid or AC joint

Characteristics of Primary Impingement

- > 50 yo
- Age related degenerative changes
- Mechanical compromise of the subacromial space
- DJD - AC joint
- ? Bursal side RTC pathology - controversy
- Subacromial osteophytic changes
- SA Bursitis
- RTC tendinitis/tendinosis - atrophy/weakness
- LH Biceps tendinitis
- Scapular Dyskinesis (poor posture)

Secondary IMP - Sub Acromial



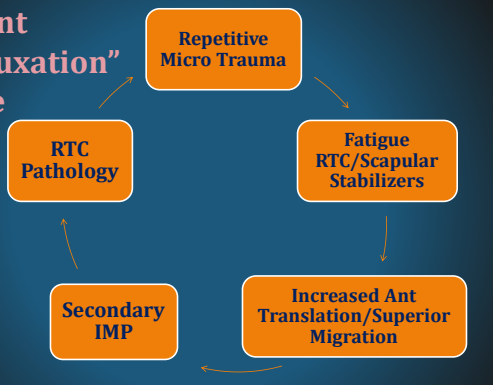
Secondary Impingement

- Underlying instability of the GH joint
- Laxity of capsular ligaments and labrum, in throwing or overhead activities can lead to anterior instability of the GH joint
- Increased humeral head translation, the Biceps/RTC Tendon can become impinged secondary to the ensuing instability
- Dynamic stabilizing functions of the rotator cuff are diminished from fatigue, intrinsic overload and subsequent tendon injury

Characteristics of Secondary Impingement

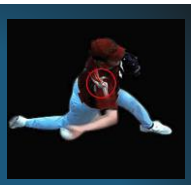
- Patients < 50 yo
- Pain is anterior or anterolateral
- Typically associated with repetitive overhead use
- Rarely night pain, unless chronic
- ? Bursal vs Articular side RTC pathology
- Attenuation of the static stabilizers leads to fatigue of the dynamic stabilizers and subsequent anterior subluxation – "Cycle"

"Silent Subluxation" Cycle



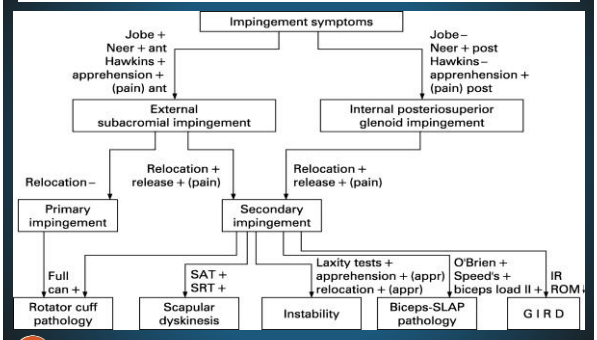
Internal IMP – Posterior

- Post aspect Supraspinatus
- IMP Between Greater Tuberosity & Posterior Superior Labrum
- @ 90 ABD/ER
- Articular RTC tears



Screening the athlete's shoulder for impingement symptoms: a clinical reasoning algorithm for early detection of shoulder pathology

Cools A M et al. Br J Sports Med 2008;42:628-635



**** Physical Exam "Asterisks" Signs/Symptoms ****

(Special Tests, Movement/Joint Dysfunction, Posture, Palpation, etc.)

(-) ULLT, (-) Cervical, (-) AC compression, (-) Sulcus, (-) Load & Shift, (-) Resisted Wrist Ext; (-) Biceps Load II, (+) Neer, (+) HK, (+) Full Can/Jobe, (+) SAT, (+) SRT

- Rate your assessment of Severity & Irritability
  Justify your assessment with examples from the Subjective Exam &/or Objective Exam
  - **Severity** Non Min **Mod** Severe
    Sleep disturbed, Pain < 90 (rapid mvts); Pain > 90; all RTC resisted tests (+)
  - **Irritability** Non Min **Mod** Severe
    Immediate local pain with use, described as sharp
- Stage & Stability?
  - Acute Subacute Chronic Acute on chronic
  - Stable Improving Worsening Fluctuating Red Flags
- Are the relationships between the areas on the body chart, the interview, and physical exam consistent?
  "Do the "Features Fit" a recognizable clinical pattern?" – If "Yes": **RTC primary IMP, Scapular Dyskinesia**

Identify any potential risk factors (Yellow, Red flags, non MSK involvement, biopsychosocial)

None

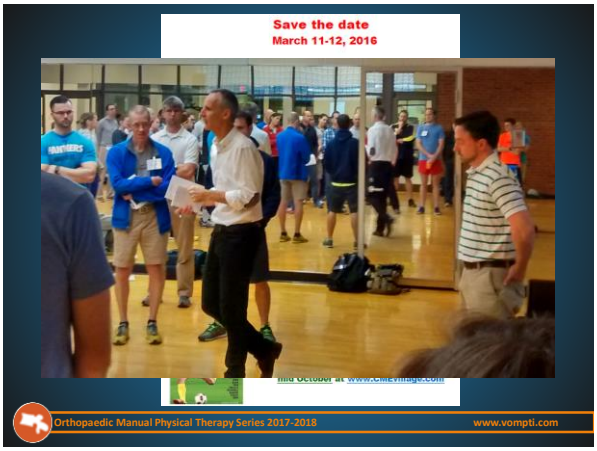
Impingement Lesions → Rotator Cuff Pathology

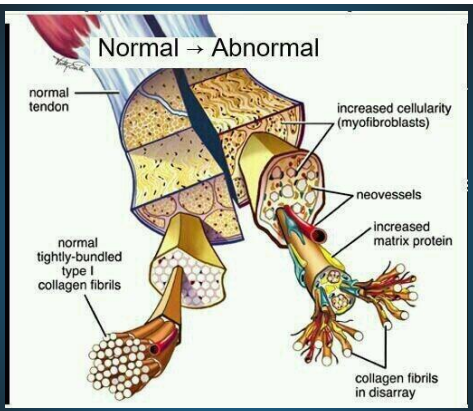
Progressive stages (Neer)

- Stage 1
  - Edema and hemorrhage result from excessive overhead use: Tendinitis
  - < 25 yo
- Stage 2
  - Fibrosis and Tendinosis - Bursa/RTC following repeated episodes of mechanical inflammation: Tendinopathy
  - 25-40 yo
- Stage 3
  - Bone spurs and incomplete and complete RTC/LHB tears : Partial RTC tear
  - > 40 yo

TendinOPATHY NOT Tendonitis

- Absence of inflammatory cell infiltrate and biochemical mediators
- Cellular activation with an increase in cell numbers
- Increase in Ground substance
- Collagen Disorganization
- Neovascularization





Proposed Tendinopathy Etiology

Mechanical

- Inability of the tendon to respond to increasing loads over time may lead to tendon failure and degeneration

Vascular

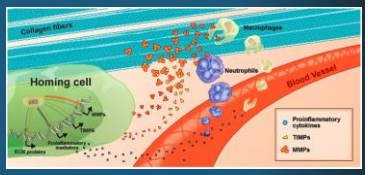
- Decreased vascular supply to certain areas of the tendon causes vascular compromise, pain, inferior healing response progressing to degeneration and tearing

Neural

- Potential of the nervous system, most notably the pro-inflammatory mediator substance P, to contribute to the presence of painful symptoms with tendon degeneration

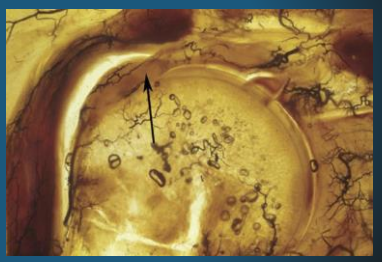
Mechanical - Collagen Degeneration

- Absence normal inflammatory response
- Disordered Healing Response
- Increased Type III
  - Thinner, weaker, disorganized matrix
- Imbalance of MMPs & TIMPs
  - Extra cellular remodeling enzymes



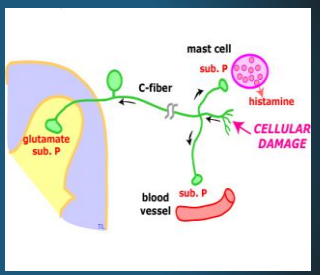
Vascular - Critical Zone

- Watershed area
- Relative Hypovascularity
- Controversy
- Relative to arm position
- Poor Healing Response



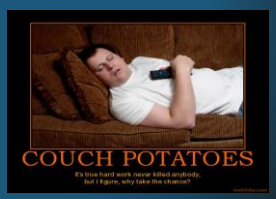
Neurogenic Inflammation = Pain

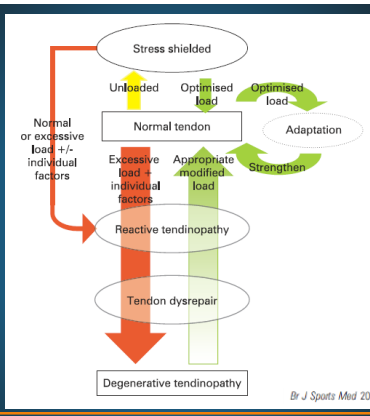
- Chronic painful Tendon– No Inflammation
- Increased neurotransmitters of pain
  - Substance P
  - Glutamate



Intrinsic/Extrinsic Factors

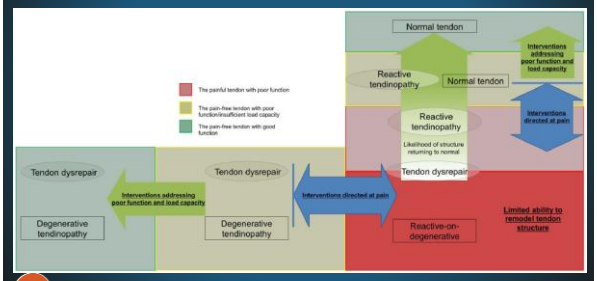
- Extrinsic factors
  - Soft tissue impingement
  - Bony impingement
  - Training errors - Overuse
- Intrinsic Factors
  - Aging
  - Vascular supply
  - Nutrition
  - Genetics
- Tensile load
  - Under stimulation may be as damaging as overstimulation





Revisiting the continuum model of tendon pathology: what is its merit in clinical practice and research?

J L Cook,[1,2] E Rio,[1,2] C R Purdam,[2,3] S I Docking[1,2] *Br J Sports Med* 2016;



Treatment planning

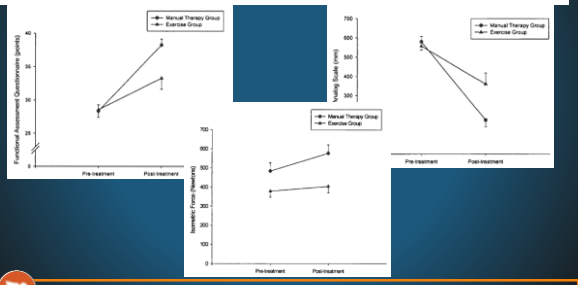
Impairments	Functional limitations	Goals
AROM loss secondary to pain	Pain with active use	Pain free AROM full
Painful resisted tests (RTC)	Pain with overhead use	Pain free recreation - bowling
Scapular dyskinesia	Sleep disturbances	Eliminate sleep disturbances

What is your Primary Treatment Objective after Initial Evaluation?

- **Education:** Relative rest, progressive tendon loading, postural correction, prognosis, Rx plan
- **Manual Therapy** (Specific Technique): STM – RTC, Inf/post GH glides, Scapular assist
- **Exercise Prescription** (Specific):Side lying ER, Side lying Flexion, Prone EXT, Prone Horiz ABD @ 90 – Pain free Scapular NM re education, begin RTC tendon loading
- **Other:** ? Scapular taping for NM re education/proprioceptive cuing

Comparison of Supervised Exercise With and Without Manual Physical Therapy for Patients With Shoulder Impingement Syndrome

J Orthop Sports Phys Ther • Volume 30 • Number 3 • March 2000



Exercise in the treatment of rotator cuff impingement: A systematic review and a synthesized evidence-based rehabilitation protocol

Kuhn JE JSES 2009

- **Findings/Conclusions:**
  - Exercise is effective as treatment for reduction in pain
  - Recommend 2-3 x/week prescribed exercise (RTC strengthening + Scapular stabilization) + Manual Therapy
  - Progress to home program when Manual Therapy no longer indicated

Effect of specific exercise strategy on need for surgery in patients with subacromial impingement syndrome: randomised controled study

BMJ 2012;344:e787

Conclusion

A specific exercise strategy, focusing on strengthening eccentric exercises for the rotator cuff and concentric/eccentric exercises for the scapula stabilisers, is effective in reducing pain and improving shoulder function in patients with persistent subacromial impingement syndrome. By extension, this exercise strategy reduces the need for arthroscopic subacromial decompression within the three month timeframe used in the study.

No evidence of long-term benefits of arthroscopic acromioplasty in the treatment of shoulder impingement syndrome

FIVE-YEAR RESULTS OF A RANDOMISED CONTROLLED TRIAL

Conclusions

Differences in the patient-centred primary and secondary parameters between the two treatment groups were not statistically significant, suggesting that acromioplasty is not cost-effective. Structured exercise treatment seems to be the treatment of choice for shoulder impingement syndrome.

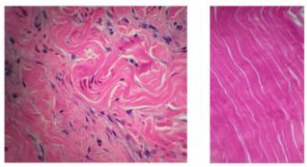
VOL. 2, No. 7, JULY 2013

Treatment- RTC Tendinopathy

- Manual Therapy + Exercise has proved beneficial for RTC tendinopathy
- > Exercise alone
- Manual Therapy addresses Extrinsic factors
- Exercise may address the intrinsic factor of blood flow.

Treatment- RTC Tendinopathy

- Eccentrics help by increasing tenocyte production and normalizing tendon structure
- Lack of quality studies reporting similar benefits in RTC tendinopathy
- Hallmark of Tendonopathy Management → Progressive Tendon Loading



WJO 5th Anniversary Special Issues (7): Shoulder

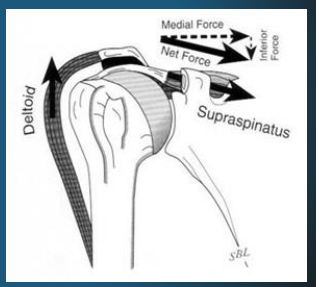
Eccentric training as a new approach for rotator cuff tendinopathy: Review and perspectives

Finally, there is still lack of evidence of the really benefits that the eccentric exercises may bring to subjects with shoulder tendinopathy. In the treatment of shoulder impingement, the approach should not only focus on decreasing the impingement, but should additionally address the tendon degeneration. As such, eccentric training should be used aiming improvement of the tendon degeneration, and usual stretching and strengthening exercises associated with manual therapy techniques to restore kinematics and muscle activity.

World J Orthop 2014 November 18; 5(5): 634-644

IMP

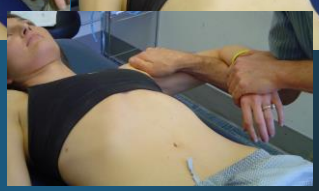
- Initial Goals:
  - Education – Anatomy/pathology
  - Posture (Scapular positioning)
  - NSAIDs/ice
  - Active Rest
  - Manual Therapy
    - Scapular mobs, GH mobs
    - Decrease Superior/Anterior Translation
  - RTC activation
    - Compression
    - Depression
  - Scapular stabilization



Glenohumeral – Inferior Glide

Glenohumeral – Inferior Glide Prone end ROM

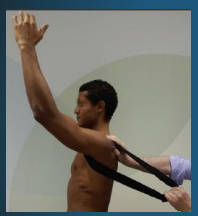
Glenohumeral - Posterior Glide

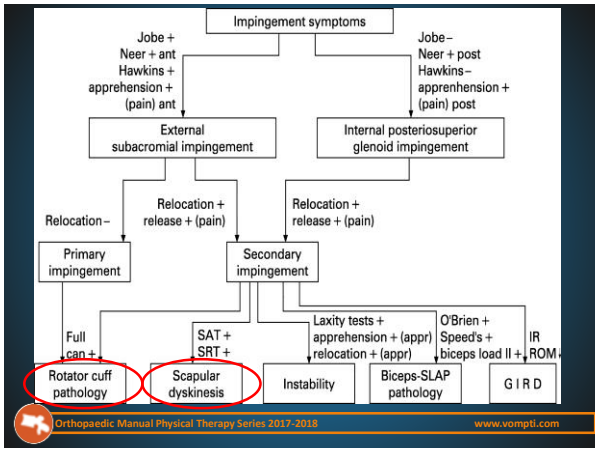


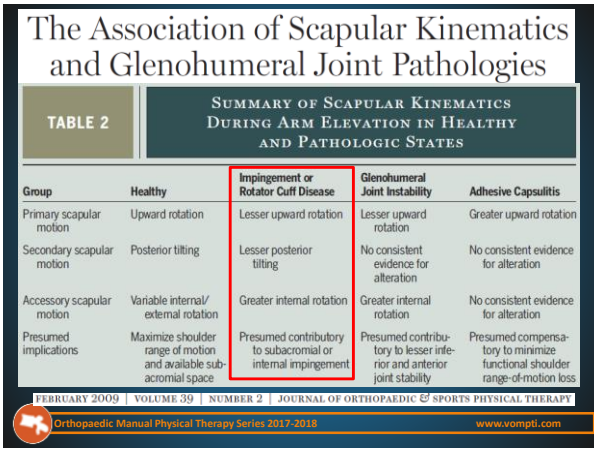
Rotator cuff related shoulder pain: Assessment, management and uncertainties

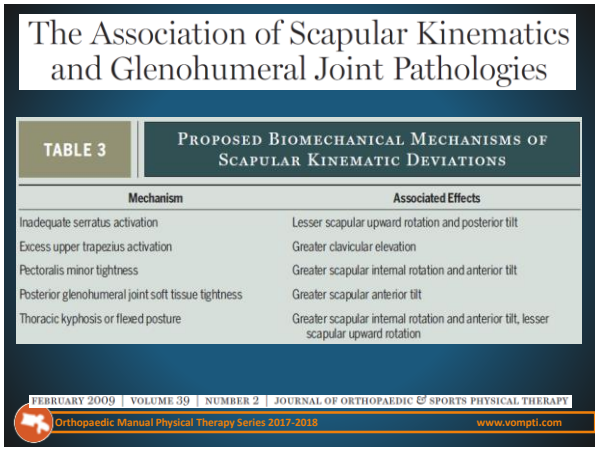
Jeremy Lewis*

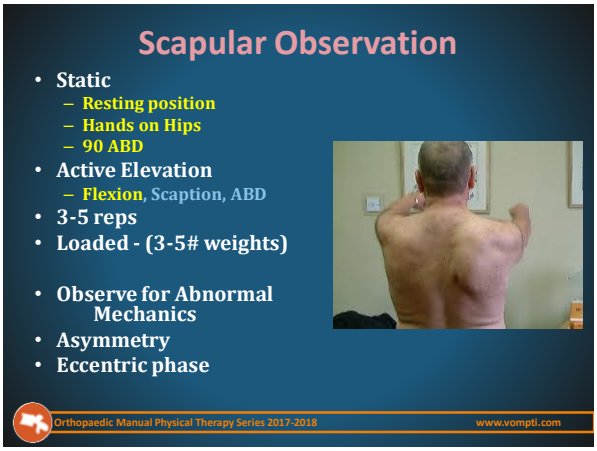
Manual Therapy 23 (2016) 57–68



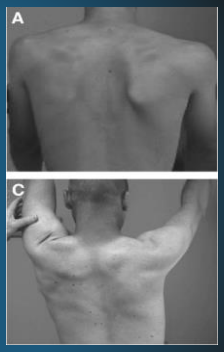




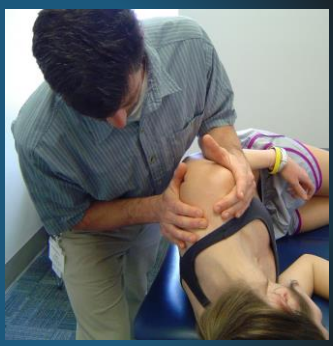




- Type I: Abnormal static scapular position and/or dynamic scapular motion characterized by Medial border prominence
  - Excessive Scapular ER
  - RTC IMP
- Type II: Inferior angle prominence and/or early scapular elevation or shrugging on arm elevation
  - Excessive Ant Tilt
  - GH Instability
  - Change in glenoid position
- Type III: Excessive Upward Rotation
  - Rapid downward rotation during arm lowering
  - RTC weakness
  - Muscle imbalance – force couple



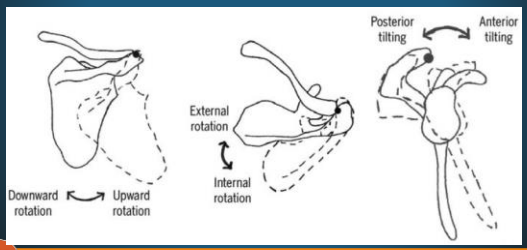
Scapulothoracic Assessment – Physiological Motion : Elevation - Depression



Scapulothoracic Assessment – Physiological Motion : Protraction - Retraction

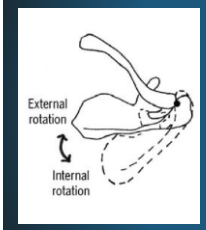
Scapulothoracic Accessory Motion

- Distraction
- Upward/Downward Rotation
- Internal/External Rotation
- Anterior/Posterior Tilt

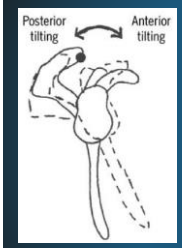


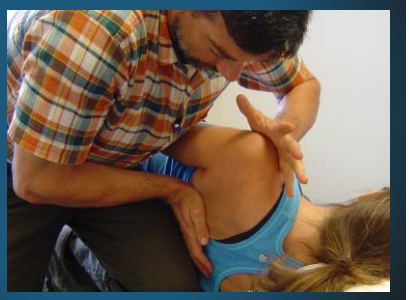
Scapulothoracic Accessory Motion
Distraction

Scapulothoracic Accessory Motion
Internal/External Rotation

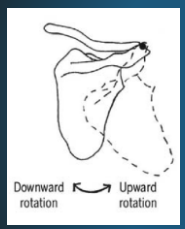


Scapulothoracic Accessory Motion
Anterior/Posterior Tilt





Scapulothoracic Accessory Motion
Upward/Downward Rotation



Scapular Dyskinesis – Scapula Assist Test

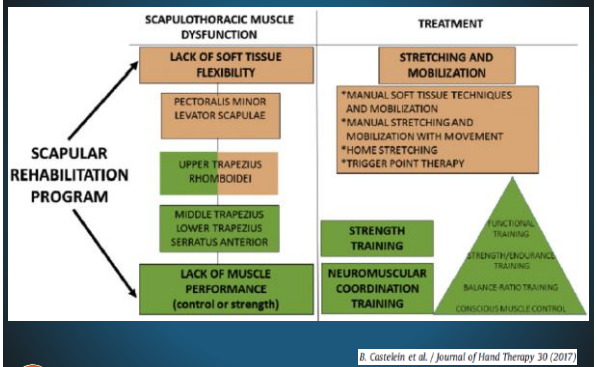
- Pt : Standing – Active Elevation
- PT : Gentle pressure to assist scapular upward rotation and posterior tilt
- (+) Test = Painful arc of impingement symptoms are relieved and the arc of motion is increased.

Scapular Dyskinesis – Scapula Relocation Test

- Pt: Standing – "Full Can" – Supraspinatus test position
- Test: Resist "Full Can"' Stabilize Scapula in retracted position; re test resisted Supraspinatus
- (+): Supraspinatus strength is increased or the symptoms relieved in the retracted position

Scapular Assess: Lab

- Static
  - Neutral, 45, 90 degrees
  - Specific plane of dysfunction
- Dynamic
  - Active Elevation – Flexion
  - Specific plane of dysfunction
- Loaded
- Physiological Motions
  - Retraction/Protraction
  - Depression/Elevation
- Accessory Motions
  - Distraction
  - Upward/Downward Rotation
  - Anterior/Posterior Tilt
  - Internal/External Rotation
- Special Tests
  - Scapular Assist Test
  - Scapular Retraction Test



The Association of Scapular Kinematics and Glenohumeral Joint Pathologies

Summary Intervention Considerations for Subacromial Shoulder Impingement

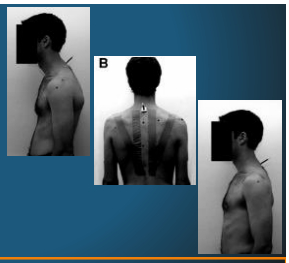
Scientifically Supported Scapular Interventions
Serratus anterior strengthening or retraining
Upper trapezius activation reduction
Posterior shoulder stretching
Pectoralis minor stretching
Thoracic extension posture and exercise

FEBRUARY 2009 | VOLUME 39 | NUMBER 2 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

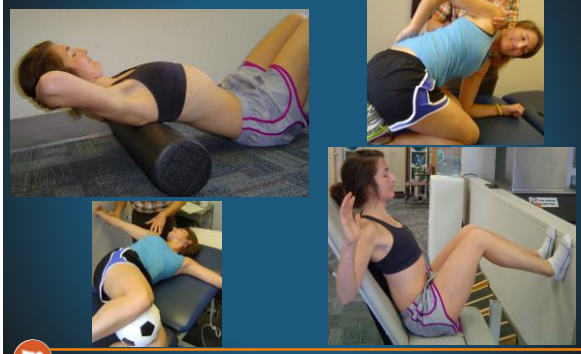
Subacromial Impingement Syndrome: The Effect of Changing Posture on Shoulder Range of Movement

J Orthop Sport Phys Ther 2005;35:72-87.

- Changes in static posture
- Significant Incr flexion, scaption
- Increased elevation ROM prior to onset pain



Thoracic Extension

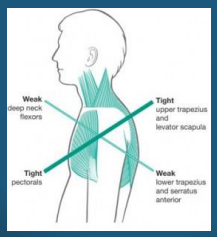


Thoracic Mobilization/Manipulation

Upper Quarter Crossed Syndrome

Facilitated/Short

- Upper Trap/Levator Scapulae
- Pecs



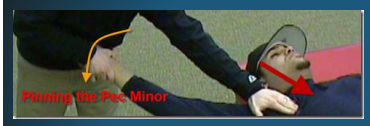
Inhibited/Weak

- Scapular Retractors
  - Mid/Low Trap
  - Rhomboids
  - Serratus Ant
- Deep Neck Flexors

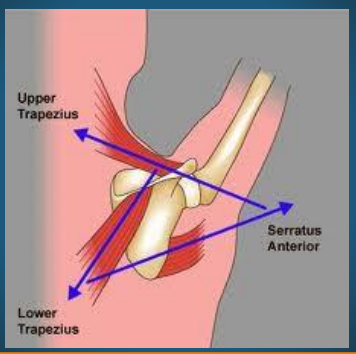
STM:

- Upper Trap, Levator, Scaleni
- Subscapularis

Pec Minor

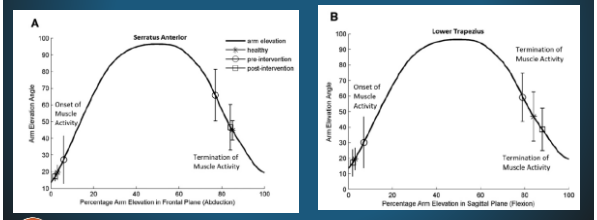


Restore Force Couple - Timing



Motor control retraining exercises for shoulder impingement: effects on function, muscle activation, and biomechanics in young adults J Shoulder Elbow Surg (2012) ■, 1-9

Timing deficits - Improved with feedback/exercise



Conscious Correction of Scapular Orientation in Overhead Athletes Performing Selected Shoulder Rehabilitation Exercises: The Effect on Trapezius Muscle Activation Measured by Surface Electromyography

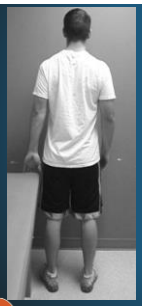
CONCLUSIONS: Conscious correction of scapular orientation during the prone extension and side-lying external rotation exercise can be used to increase the activation level in the 3 sections of the trapezius in overhead athletes with scapular dyskinesis.

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 43 | NUMBER 1 | JANUARY 2013

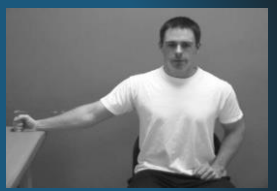
Visual, Auditory, Kinesthetic Cues

- **Anterior-tilted Scapula**
  - "Gently bring the tip of your shoulder blade toward your spine"
- **Downwardly Rotated Scapula**
  - "Gently lift the top of the shoulder"
- **Protracted Scapula**
  - "Gently spread the front of your shoulder apart to draw your shoulder blade toward midline

Electromyographic Analysis of Specific Exercises for Scapular Control in Early Phases of Shoulder Rehabilitation



Low Row



Isometric Inferior Glide

The American Journal of Sports Medicine, Vol. 36, No. 9

Electromyographic Analysis of Specific Exercises for Scapular Control in Early Phases of Shoulder Rehabilitation

"Squat and Reach"

High Low Row

Kinetic Chain Functions

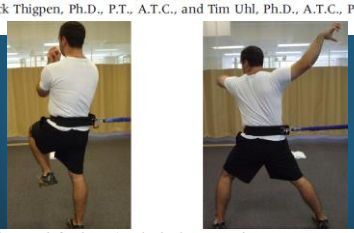
- Using integrated programs of muscle activation to temporarily link multiple body segments into one functional segment to decrease the degrees of freedom in the entire motion
- Providing a stable proximal base for distal arm mobility
- Maximizing force development in the large muscles of the core and transferring it to the hand
- Producing interactive moments at distal joints that develop more force and energy than the joint itself could develop and decrease the magnitude of the applied loads at the distal joint
- Producing torques that decrease deceleration forces

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 29, No 1 (January), 2013

Current Concepts

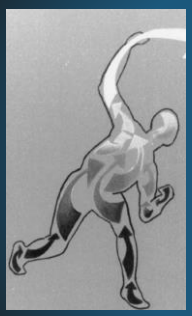
The Disabled Throwing Shoulder: Spectrum of Pathology—10-Year Update

W. Ben Kibler, M.D., John E. Kuhn, M.D., Kevin Wilk, P.T., D.P.T., Aaron Sciascia, M.S., A.T.C., N.A.S.M.-P.E.S., Stephanie Moore, M.S., A.T.C., Kevin Laudner, Ph.D., A.T.C., Todd Ellenbecker, P.T., Chuck Thigpen, Ph.D., P.T., A.T.C., and Tim Uhl, Ph.D., A.T.C., P.T., F.N.A.T.A.



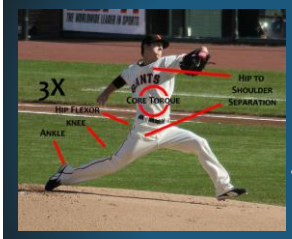
Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 29, No 1 (January), 2013: pp 141-161

Kinetic Chain



- Proximal-to-distal sequencing of velocity, energy, and forces
- 54% of the total force generated in the tennis serve are created by the lower legs, hip, and trunk
- Forces that are generated in the proximal segments have to be transferred efficiently to the shoulder

Kinetic Chain

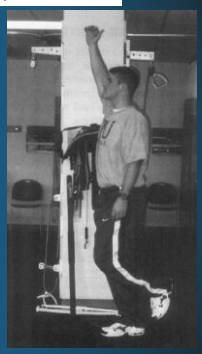


- This can be accomplished most efficiently through the stable and controlled platform of the scapula
- The entire arm rotates as a unit around the stable base of the Glenoid

A Kinetic Chain Approach for Shoulder Rehabilitation

McMullen J Ath Train 2000

- Contralateral step up with Ipsilateral reach
- Hip EXT
- Trunk EXT
- Thoracic EXT
- Scapular upward rotation
- GH Elevation



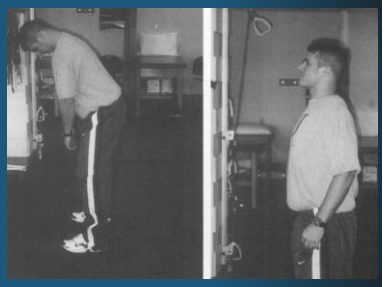
Functional Position with all CKC

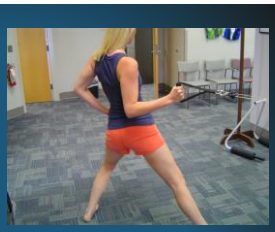
"Shoulder Dump"

- Contralateral Hip/Trunk Flexion – Rotation
- Weight shift to ipsilateral leg; Trunk Extension/Rotation
- Scapular Retraction
- GH ER

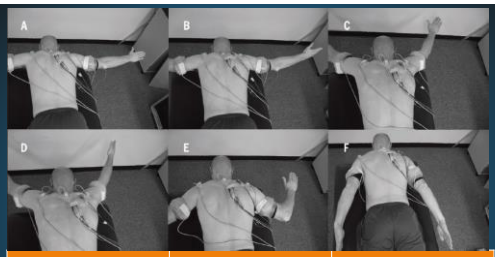
"Sternal Lift"

- Reciprocal Thoracic EXT
- Scapular Retraction-Depression
- Avoid Lumbar Hyper EXT





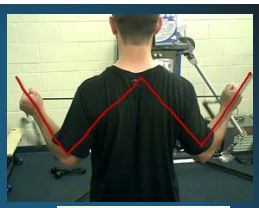
Lateral Lunge
Eccentric Scapular Protraction
Weight shift to outside leg
Scapular Retraction-Depression
"Elbow to Back Hip pocket"

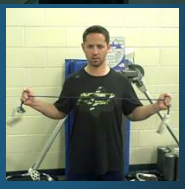


Clavicle retraction, Upward rotation, Post tilt	* Scapular ER, Upward rotation, Retraction, Post tilt *	Greatest Upward Rotation
Upward rotation, Posterior Tilt. High Upper/Mid Trap	* Scapular ER, Upward rotation, Retraction, Post tilt	50% MVIC Lower Trap Best LT/UT ratio

JOSPT 2010

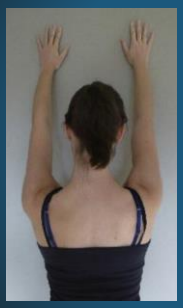
- **Moderate amount**
  - Posterior RTC EMG
  - Lower Trapezius EMG activity
- **Minimal Upper Trapezius activity**
- **Highest ratio of lower Trapezius to Upper Trapezius activity**



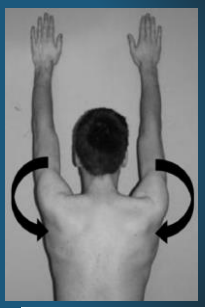


McCabe NAJSPT 2007

Overhead Shrug: High UT/Lower Levator

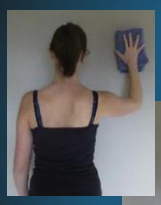


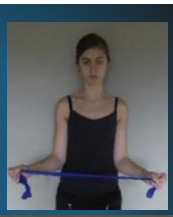
Overhead Retraction/Lift: High Mid/Lower Trap

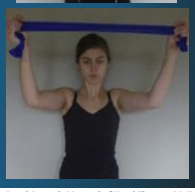


B. Castelein et al. / Journal of Hand Therapy 30 (2017)

High SA, Low UT







B. Castelein et al. / Journal of Hand Therapy 30 (2017)

Identify "gap" in knowledge.

	Patient or Problem	Intervention	Comparison Intervention	Outcomes
Tips for Building	Starting with your patient, ask "How would I describe a group of patients similar to mine?" Balance precision with brevity	Ask "Which main intervention am I considering?" Be specific	Ask "What is the main alternative to compare with the intervention?" Again, be specific	Ask "What can I hope to accomplish? Or What could this exposure effect?"
Example	In patients with lateral epicondylitis....	Would adding manipulation to modalities or injection alone....	When compared to modalities or injection alone	Reduce the number of visits to return to pain free function.
Your Patient	**RTC Tendonopathy with Scapular Dyskinesia**	**Exercises with best MT/UT ratio**	none	**Improve function – overhead reaching, bowling, throwing**

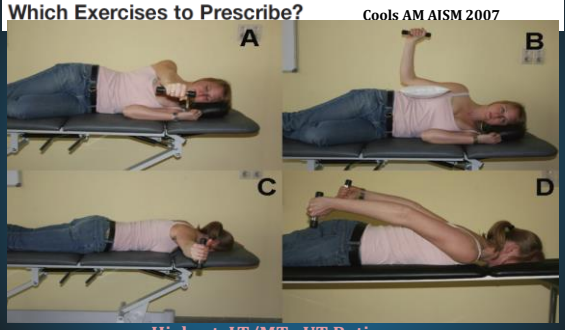
Article Reviewed: **Cools AM AJSM 2007 Rehabilitation of Scapular Muscle Balance: Which Muscles to Prescribe?**

What did you learn from article to apply to clinical case?

Best ratio MT/LT to UT exercises: Side lying ER, Side lying Flexion, Prone EXT, Prone Horiz ABD @ 90

Rehabilitation of Scapular Muscle Balance

Which Exercises to Prescribe? Cools AM AISM 2007



Highest LT/MT : UT Ratio

[CLINICAL COMMENTARY]

MICHAEL M. REINOLD, PT, DPT, ATC, CSCS[1] • RAFAEL ESCAMILLA, PT, PhD, CSCS, FACSM[2] • KEVIN E. WILK, PT, DPT[3]

Current Concepts in the Scientific and Clinical Rationale Behind Exercises for Glenohumeral and Scapulothoracic Musculature

FEBRUARY 2009 | VOLUME 39 | NUMBER 2 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

TABLE Recommended Exercises for Glenohumeral and Scapulothoracic Muscles Based on Anatomical, Biomechanical, and Clinical Implications

Muscle	Exercise	Anatomical Implications	Biomechanical Implications	Clinical Implications
Supraspinatus	1. Full can	1. Enhances scapular position and subacromial space	1. Decreased deltoid involvement compared to empty can	1. Minimizes chance of superior humeral head migration by deltoid overpowering supraspinatus
	2. Prone full can	2. Enhances scapular position and subacromial space	2. High posterior deltoid activity with similar supraspinatus activity	2. High supraspinatus activity and also good exercise for lower trapezius
Infraspinatus and teres minor	1. Side-lying ER	1. Position of shoulder stability, minimal capsular strain	1. Increased moment arm of muscle at 0° abduction. Greatest EMG activity	1. Most effective exercise in recruiting infraspinatus activity. Good when cautious with static stability
	2. Prone ER at 90° abduction	2. Challenging position for stability, higher capsular strain	2. High EMG activity	2. Strengthens in a challenging position for shoulder stability. Also good exercise for lower trapezius
	3. ER with towel roll	3. Allows for proper form without compensation	3. Increased EMG activity with addition of towel, also incorporates adductors	3. Enhances muscle recruitment and synergy with adductors
Subscapularis	1. IR at 0° abduction	1. Position of shoulder stability	1. Similar subscapularis activity between 0° and 90° abduction	1. Effective exercise, good when cautious with static stability
	2. IR at 90° abduction	2. Position of shoulder instability	2. Enhances scapular position and subacromial space. Less pectoralis activity	2. Strengthens in a challenging position for shoulder stability
	3. IR diagonal exercise	3. Replicates more functional activity	3. High EMG activity	3. Effective strengthening in a functional movement pattern

TABLE Recommended Exercises for Glenohumeral and Scapulothoracic Muscles Based on Anatomical, Biomechanical, and Clinical Implications

Muscle	Exercise	Anatomical Implications	Biomechanical Implications	Clinical Implications
Serratus anterior	1. Push-up with plus	1. Easy position to produce resistance against protraction	1. High EMG activity	1. Effective exercise to provide resistance against protraction, also good exercise for subscapularis
	2. Dynamic hug	2. Performed below 90° abduction	2. High EMG activity	2. Easily perform in patients with difficulty elevating arms or performing push-up. Also good exercise for subscapularis
	3. Serratus punch 120°	3. Combines protraction with upward rotation	3. High EMG activity	3. Good dynamic activity to combine upward rotation and protraction function
Lower trapezius	1. Prone full can	1. Can properly align exercise with muscle fibers	1. High EMG activity	1. Effective exercise, also good exercise for supraspinatus
	2. Prone ER at 90° abduction	2. Prone exercise below 90° abduction	2. High EMG activity	2. Effective exercise, also good exercise for infraspinatus and teres minor
	3. Prone horizontal abduction at 90° abduction with ER	3. Prone exercise below 90° abduction	3. Good ratio of lower to upper trapezius activity	3. Effective exercise, also good exercise for middle trapezius
	4. Bilateral ER	4. Scapular control without arm elevation	4. Good ratio of lower to upper trapezius activity	4. Effective exercise, also good for infraspinatus and teres minor

Orthopaedic Manual Physical Therapy Series 2017-2018 www.vompti.com

What are you going to re assess at subsequent visit? **AROM, Scapular dyskinesia (SAT/SRT);**

Resisted test – RTC (? Irritability)

Prognosis/Expectations:

- How do you expect to progress your treatment program over subsequent visits?

Good with compliance – Relative rest, progressive tendon loading, Scapular strengthening

- **Associated Factors for expected outcome**

Favorable	Unfavorable
Sub acute; no prior history	**> 40 yo; irritable (sleep disturbed); pain<90**
(-) Cervical/Neural involvement	

- If referral to other providers is indicated, Identify: Specific Recommendations.

If does not improve in 6 visits: SA injection; Prescription NSAIDs; Advanced imaging

Identify the key subjective and physical features (i.e. **clinical pattern)** that would help you recognize this disorder in the future.

Subjective	Physical
(+) Overhead use mechanism **(+) Pain rapid mvts < 90** **(+) Sleep disturbed** **(+) Pain reaching > 90 esp. ABD**	**(+) Scapular Dyskinesia** **(+) RTC resisted tests – all** **Pain free PROM** **Painful AROM > 90 (ABD)**

Rehab Factors Post RTC Repair

- Surgical Approach
  - Open, Mini-open, Arthroscopic
- Size of Tear
  - Small (<1 cm)
  - Medium (1-3 cm)
  - Large (3-5 cm)
  - Massive (> 5 cm)
- Tissue Quality
  - Good → Poor
- Fixation
  - Single, Double Row
- Tear Location
  - Supra/Infraspinatus
  - Subscapularis
- Type of Tear
  - Crescent, U, L shaped
  - ? retracted
- Mechanism
  - Traumatic; Degenerative
- Surgical Timing
  - Immediate; Delayed
- Surrounding RTC Tissue Quality
- Patient General Health
  - DM, smoker
- Access to care/rehab
- Physician Philosophical approach
  - Conservative vs. Aggressive

Ghodadra JOSPT 2009

Prognostic Factors for Successful Recovery After Arthroscopic Rotator Cuff Repair: A Systematic Literature Review

- Direct factors
  - ROM
  - Obesity
  - Level of sports
  - → Preoperative treatment
- Indirect factors
  - Age
  - Sagittal size of lesion
  - Retraction of the cuff
  - Fatty infiltration
  - Number of tendons
  - → Timing of decision
  - → Decision making on ARCR
- Fixed factors
  - Gender
  - BMD
  - DM
  - Concomitant AC/biceps procedures
  - → Take into account as part of decision-making process

Factors not confirmed by this review because of quality of studies or lack of evidence
- Smoking
- Muscle atrophy
- Upper-limb heavy work
- Long duration of the shoulder complaint
- Preoperative tendon length
- Histopathological aspects of the tendon