Rehabilitation for the Overhead Athlete

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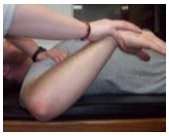
Common Shoulder Deficiencies

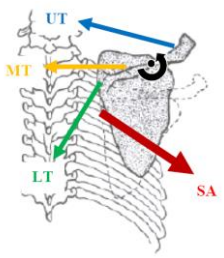
- ✓ Lack of scapular upward rotation
- Glenohumeral internal rotation deficit (GIRD)
- Postural deviations


Scapular Dyskinesis

- Scapular dyskinesis: abnormal movement of the scapula
- Scapular dysfunction is found in approximately 70% of rotator cuff injuries and 100% of glenohumeral instability cases (Warner, et al. 1992).

Normal Upward Rotation



- Upward Rotation:
  - Upper trapezius
  - Lower trapezius
  - Serratus anterior
- An appropriate amount of upward rotation allows the shoulder to be elevated above 90˚

Serratus Anterior During Throwing

- SA: >100%MVC during late cocking and acceleration phases
  vs.
- UT: activation was minimal throughout all phases
  (Gowan, et al. 1987)

- Similar SA findings for swimming and tennis serve (Moynes, et al. 1986)

Scapular Dyskinesis

- A muscle force imbalance between the serratus anterior and upper trapezius causes the scapula to abnormally translate, causing decreased upward rotation
  (Ludewig and Cook, 2000).

Scapular Dyskinesis

- This form of scapular dyskinesis has been associated with instability, impingement, SLAP lesions and rotator cuff tears (Kibler, 1991; Burkhart and Morgan, 1998; Burkhart, et al. 2000).

Overhead Injury Prevention

- Proposed prevention of overhead injuries:
  - Adherence to pitch counts
  - Modification of incorrect biomechanics
  - Maintenance of mobility
  - Implementation of strength and conditioning programs
  - Adequate warm-up
  - Allowance of adequate recovery time

(Tripp, et al. 2007)

- "The legs feed the wolf."
  - Herb Brooks

- During overhead throwing 54% of force & 51% of kinetic energy from the shoulder is generated by the legs, hip & trunk (Kibler, 1995).

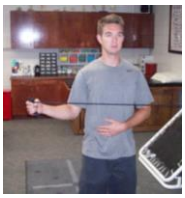
Overhead Athlete Rehab

- Overhead athletes perform high-velocity movements
- Velocity depends on the interaction of the distal to proximal segments
- Rehab should involve a distal to proximal sequence of the hips, trunk and shoulders

Open Kinetic Chain

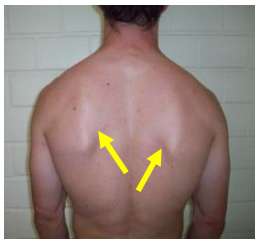
- Benefits of OKC
  - Increases ROM
  - Strengthens isolated muscles
  - Replicates functional activities

Open Kinetic Chain



- Myers, et al. 2005, evaluated 10 common rubber tubing exercises.
- ER & IR at 0° abduction: serratus anterior activation was 18.0% & 20.5% MVIC.
- Exercises in which the GH joint was elevated at or above 90° elicited higher activation levels (≈66%).

Clinical Evidence



- Strength & Conditioning Coach
  - Gradual on-set of s/s
  - Regular upper extremity resistance training, all OKC
  - Weak SA
  - Dx: shoulder impingement syndrome

Open Kinetic Chain

- Negatives of OKC
  - Don't always activate the scapular stabilizers
  - Functional?...overuse?

Are OKC exercises functional?

OKC vs. CKC

- Patients with shoulder impingement: overactive upper trapezius and suppressed serratus anterior (Ludewig and Cook, 2000)

  …during OKC activities.

- We don't see the same muscle activation imbalance during CKC exercises (Tucker, et al. 2010).

Closed Kinetic Chain

n = 15 overhead athletes w/ shoulder impingement (SI)

n = 15 overhead athletes w/o shoulder impingement (NP)

Performed 3 CKC exercises

Muscle	SI	NP
Middle trapezius	23.02±19.97	15.14±8.29
Serratus anterior	66.79±34.32	56.66±25.94
Upper trapezius	30.84±33.31	38.78±38.59
Lower trapezius	21.92±12.49	21.94±13.22

Units = %MVIC

(Tucker, et al. 2010)

Closed Kinetic Chain

- Compared to the UT, MT and LT, the serratus anterior consistently elicits the greatest level of activation during CKC exercises (Moseley, et al. 1992; Decker, et al, 1999; Ludewig, et al. 2004; Tucker, et al. 2005, 2008, 2009, 2010; Maenhout, et al. 2010)
  - Reached >80% of MVC in some cases

Closed Kinetic Chain

- Benefits of CKC
  - Co-contractions of the joint stabilizing muscles
  - Activation of the scapular stabilizers
  - Activation of the entire kinetic chain
- Negatives of CKC
  - Not functional

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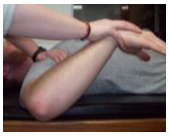

After that?...Start looking down

Standing Shoulder Mobilization