Differentiating Anterior Shoulder Pain In The Overhead Athlete

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Objectives

- Identify the possible causes of anterior shoulder pain:
  - Scapular dyskinesis
  - Posture
  - Spinal facilitation
  - Muscular trigger points
  - Lower kinetic chain dysfunction

- Case studies from major league players

- Define regional interdependence as it relates to the overhead athlete
  - Cervical
  - Thoracic
  - Scapula
  - SC joint
  - AC joint

- Evaluation of the kinetic chain in overhead athletes
Dynamic Scapula: Kinematics

- 3 rotations, 2 translations
  - Rotations
  - upward and downward rotation
  - internal and external rotation
  - anterior and posterior tipping

- Translations
  - superior and inferior
  - protraction and retraction
Dynamic Scapula

Stability dependent on 3 major factors

• Muscular and Neural Control Systems

• Muscular Activation System

• Boney and Ligamentous Restraints
Kibler defines scapular dyskinesis as:

- A loss in scapular retraction and ER with altered timing and magnitude of upward scapular rotation. This leads to an anterior tilt of the glenoid and subsequent reduction in RTC force.

**SICK Scapular**

- **Scapular Malposition**
- **Inferior medial border prominence**
- **Coracoid pain and malposition**
- **Dyskinesis of scapular movement**
Scapular Dyskinesis Clinical Features

- Overuse muscular fatigue syndrome
- Pectoralis tightness, LT/SA force couple weakness
- Inferior and or medial border prominence
- Anterior tilting of the scapula
- Decrease in shoulder internal rotation
Kibler Classification of Scapular Dysfunction

- Inferior angle dysfunction
- Medial border dysfunction
- Superior scapular dysfunction
- How do we classify this scapular dysfunction
What Causes Scapular Dyskinesis

- Spine
  - All muscles innervated by cervical nerve roots
  - Thoracic mobility
- Underlying GH pathology
- Muscle imbalance
  - Posture
  - Overuse of sport demands
- Previous injury
  - Instability
  - Loss of proprioception
Trivia: How many muscles attach to the Scapula
Glenoid Labrum

- Functions:
  - Deepen the GH socket to aide in shoulder stability? Or
  - Sensitive proprioception organ for the shoulder girdle providing feedback for movement in all 3 degrees of freedom
  - Described in a clock like fashion
    - Bankart Lesion – 3/6 position
    - SLAP: superior
    - Posterior Reverse Bankart 6/9
Glenoid Labrum

- Signs and symptoms of a glenoid labrum:
  - Pain accompanying overhead arm motion
  - Instability with or without clicking
  - Decreased range of motion
  - Loss of strength
  - Pain Anteriorly or posterior
  - Internal Impingement signs
Posture

Janda’s Upper Crossed Syndrome

- Weakened: Deep Neck Flexors
- Uninhibited Overactive: Pectoral Group
- Uninhibited Overactive: Upper Trapezius, Levator Scapula
- Uninhibited Overactive: Scapular Stabilizers, Retractors & Depressors

- Sway Back
- Lumbar Lordosis
- Thoracic Kyphosis
- Forward Head
- Good Posture
Case Study One

- Olympic potential Swimmer
  - Diagnosis Bicep tendinitis
- Evaluation Findings:
  - Forward head posture
  - Weak scapular force couples: SA LT
  - Scapular dyskinesis
  - Protracted Ant Tilted scapula
  - Weak Core
  - Hypermobile in all planes
- Treatment
  - Scapular stabilization
  - Proprioceptive training
  - Neuro reeducation in the unstable overhead position
- What about the Biceps?
Muscular Trigger points

- What is a Trigger point?

- Symptoms:
  - local tenderness
  - referred pain
  - local twitch response

- Shoulder:
  - Infraspinatus: muscular overload, eccentric forces during follow through
TrP Shoulder Region

- Other muscles that refer to the anterior shoulder
  - Deltoid
  - Pectoralis major/minor
  - Scalenes
Case Study Two

- MLB pitcher complains of pain duration 5 months
  - Improves with rest
  - Aggravated by pitching
  - Points to local spot in anterior shoulder
  - All labral tests negative
  - No signs of impingement
  - Strength: scapular retraction test positive, infraspinatus 4+/5, Serratus 4+/5, Lower trap 4+/5
  - TrP: infraspinatus, deltoid, Teres Major/Minor

- Treatment: TDN to infraspinatus and Deltoid
  - 90% resolution of pain in 1 session
  - Return to painfree Pitching 1 week later
Squirrel
Regional Interdependence

- Cervical facilitation
- C2/3 Hypomobility
- Biceps Tendonitis
- Thoracic/Rib dysfunctions
Cervical Facilitation

- Elevation/Protraction
  - Latissimus Dorsi (C5/6)

- Elevation/Retraction
  - Serratus Anterior (C5/6, C6/7)

- Depression/Protraction
  - Levator Scapulae (C2/3, C3/4, C4/5)
  - Rhomboid

- Depression/Retraction
  - Pectoralis Minor (C6/7, C7/11)
  - Serratus Upper Fibers
C2-3 Hypomobility

- Clinically a very common injury we see is a post-traumatic arthritis of the C2-3 region.
- Following a MVA if the R C2-3 gets “stuck” or becomes hypomobile and the L side becomes hypermobile this can causing increased tone in the Llevator scaplae
- What does this do to the scapula positioning?
Biceps Tendonitis

- Innervated by C6
- When you look at the anatomy the C6 nerve root exits between the C5-6 segment
- The C5-6 segment has the smallest foramen hole and the C5-6 nerve root is the largest
- If stenosis or osteophytes occur then it can affect the innervation of the bicep
Thoracic/Rib dysfunctions

- No agreed upon consensus about the combined movements of the thoracic spine
- Some authors state that if you elevate your R arm you will get extension and ipsilateral rotation/SB of the R side of the thoracic spine
- What would hypomobility of the thoracic spine do to the mechanics/timing of the shoulder girdle movement?
Case Study Three

- MLB Pitcher
- Biceps Pain ongoing
- Evaluation:
  - Scapular Dyskinesis
  - UT/LS hypertonicity
  - Csp/Tsp scan: Right
    - C2/3 hypomobility
    - T1-3 rotation limited
    - C5/6 hypermobile
  - C2/3 hypomobility
  - T1-3 rotation limited
  - C5/6 hypermobile

- Tender Biceps tendon – resisted MMT improves with repetition

- Treatment:
  - 3 sessions
  - Csp manipulation
  - Tsp manipulation
  - TFM to Biceps
  - Scapular/Cervical stabilization program
The thrower's shoulder must be lax enough to allow maximal external rotation but stable enough to prevent symptomatic humeral head subluxations, thus requiring a delicate balance between mobility and stability functionally.
It is important to understand that while these athletes are throwing with their arms, they gain a large amount of momentum and force through the use of their legs and torso.
Kinetic Chain Dysfunction

- Lower Extremity
  - Hip IR/ER ROM
  - Weakness

- Core:
  - TA must be first muscle activated prior to UE movement

- Scapula:
  - Funnels the energy from LE to UE
Evaluation of Kinetic Chain

- No Gold standard
- Difficult to evaluate
- Time constraints
- Evidence limited
Evaluation of Kinetic Chain

- What we do know:
  - All the links in the chain are important
  - Timing is everything
  - Scapula is the key component
  - Core – is the proximal STABILITY to allow for all extremity MOBILITY
Evaluation of Kinetic Chain

- Upper Extremity:
  - Scapular:
    - Kibler scapular retraction test
    - Kibler lateral scapular slide test
    - Flip sign
  - Strength: prone LT seated SA
  - Length tests
- Shoulder
  - ROM: IR/ER supine at 90 degrees abduction – 2 person measurement
- Posture
- Lower Extremity:
  - SFMA – general screen used to identify areas of dysfunction
  - Hip
    - ROM prone with knee at 90 degrees IR/ER – 2 person measurement
  - Strength: Hip Abd, ER, Extension
- Core
  - Strength: DKLTo abdominal brace test
What can lead to Anterior Shoulder Pain in the Overhead Athlete?

- Scapular dyskinesis
- Glenoid Labrum
- Postural adaptations
- Muscular Trigger points
- Regional interdependence from spinal segments
- Biceps Tendonitis
- Kinetic Chain Breakdown
Differential Diagnosis of the Overhead Athlete

**Labrum vs TrP**
- Weakness
- Use of TDN to reproduce pain
- Treatment at same time
- Stability Tests
  - O’Brien
  - Sulcus
  - Relocation
  - Clunk

**Regional Interdependence vs Biceps tendonitis**
- Any history of cervical dysfunction
- Referred pain vs local pain
- Histological changes from changes in axonal transport
Differential Diagnosis of the Overhead Athlete

- Use of dry needling for differential diagnosis?
- What leads to TrP in the shoulder girdle?
- Proper use of special tests clusters for better specificity?
- Evaluating the kinetic chain?
- Identify breakdown point
- Throwing all arm?
- Previous history of injury anywhere in kinetic chain
Principles of Integrated Functional Kinetic Chain Rehab

- Establish proper postural alignment
- Achieve motion in all involved segments
  - Total arc of motion
- Facilitate scapular motion
- Achieve proper scapular stabilization
  - Endurance strength vs power strength
- Utilize closed kinetic chain exercises
  - Integrate core into upper extremity dynamic exercises
- Work in multiple planes
References


References


