CSM 2018 Outline

Educational Session Title:

Shoulder Pathomechanics in the Throwing Athlete - Causes, Surgery, Outcomes, & Rehab

Speakers:
Dr. Rafael F Escamilla, Department of Physical Therapy, California State University, Sacramento, Sacramento, CA, USA

Dr James R Andrews, Andrews Institute, Gulf Breeze, FL, USA

Dr Kevin E Wilk, Champion Sports Medicine, Birmingham, Alabama, USA

Dr Kyle Yamashiro, Results Physical Therapy and Training Center, Sacramento, CA, USA

Dr Mike Reinold, Champion Physical Therapy and Performance, Waltham, MA
Shoulder Biomechanics, Pathomechanics, & Pathology
Rafael Escamilla, Ph.D., P.T., C.S.C.S.
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Purpose of Studying Throwing
Shoulder Biomechanics

ASMI Throwing Tests: 1989-present

Qualitative Analysis of Pitching Mechanics

Quantitative Analysis of Pitching Mechanics

• Kinematics - Describes How Motion Occurs
  – Quantifies Shoulder Angles, Velocities, & Accelerations
• Kinetics – Explains Why Motion Occurs
  – Quantifies Shoulder Forces & Torques
• Electromyography
  – Quantifies Shoulder Muscle Activity

Phases of Pitching

Kinematics at Lead Foot Contact
(Escamilla et al., 1998; Fleisig et al., 1999)

Kinematics at Lead Foot Contact (FC)
(Escamilla et al., 1998; Fleisig et al., 1999)

Arm Cocking
(Lead Foot Contact to Max Shoulder External Rotation)

Kinematics During Arm Cocking
(Escamilla et al.,1998; Fleisig et al,1999; Matsuo et al,2001)

Kinematic Changes During 8 Minutes of Pitching

Arm Cocking Shoulder Girdle EMG

Arm Cocking Shoulder Kinetics
(Escamilla et al., 2002; Fleisig et al., 1996)
  • Shoulder Compressive Force 660 N (70-80% BW)

Arm Cocking Shoulder EMG
Arm Cocking Shoulder Kinetics and EMG  
(Escamilla et al., 2002; Fleisig et al., 1996)

Arm Cocking Shoulder Pathomechanics
• Pathology in the Thrower’s Shoulder is Often Complex and Multifaceted
  • Rotator cuff articular surface partial thickness tears (full thickness tears uncommon)
  • Labral/biceps pathology (SLAP lesions)
  • Internal/external impingement
  • Capsule injuries
  • Microinstability
    • Anteroposterior

Internal Impingement  
(Walsch et al, JSES, 1992)

Internal Impingement Contributing Factors  
(Myers et al, AJSM, 2006)

SLAP Lesions in Throwers  
(Andrews et al, AJSM, 1985)

Arm Acceleration  
(Max Shoulder External Rotation to Ball Release)

Kinematics During Arm Acceleration  
(Escamilla et al., 1998; Fleisig et al., 1999)

Kinematics at Ball Release  
(Escamilla et al., 1998; Fleisig et al., 1999)

Arm Deceleration & Follow-Through  
(Ball Release to End of Throwing Motion)

Arm Deceleration Shoulder Kinetics  
(Escamilla et al., 2002; Fleisig et al., 1996)  
(Body Weight = 900 N, or approx 200 lbs)
  • Shoulder
    – Compressive Force = 1100 N
    – Posterior Shear Force = 400 N
    – Hor Abd Torque = 100 Nm

Arm Deceleration Shoulder Pathomechanics
Tensile Overload Articular Surface (Undersurface) Rotator Cuff Tears

Arm Deceleration Shoulder EMG
Arm Deceleration Shoulder Pathomechanics
SLAP Lesion (Andrews et al, AJSM, 1985)

Arm Deceleration Shoulder Pathomechanics
What is the Role of the Long Biceps at the Shoulder?

Biomechanical Pitching Research to Better Understand the Role of the Long Biceps
• Testing Ongoing
  – Motions
  – Muscle Activity
  – Joint Force

Pitching Research May Help Determine Which SLAP Surgical Treatment Option is Best for Pitchers
  Biceps Tenodesis
  (cut & re-attach lower)

Conclusion
• Poor pitching mechanics or muscle weakness or fatigue can result in increased shoulder force and torque, with a subsequent increase in shoulder injury risk.
• Both excessive shoulder ER and deficits in shoulder IR can lead to pathologies such as SLAP lesions and anterior instability
• The Role of the long biceps brachii in pitching is becoming a bigger issue

Sample of Throwing Biomechanics Publications
The Throwing Shoulder “Putting it All Together”
James R. Andrews, MD

- **Clinical Diagnosis**
  - The history is still more important than the physical exam
  - MRIs have revolutionized the diagnosis of shoulder injuries
    - “Good or Bad”

- **How about MRIs?**
  - MRIs continue to get better and better
  - We prefer Arthro MRIs

- **The Thrower’s Shoulder**
  - How have our surgical procedures advanced?
    - In a nutshell we are now repairing lesions that formerly were debrided only. I.E. the cuff and the labrum

- **“Interal impingement” 4 critical components**
  - Internal rotation deficit

- **Surgical treatment of internal impingement**
  - An “over-rotation” phenomenon

- **Internal Impingement “Over-rotation phenomenon”**

- **Undersurface Partial Tears Potential for Healing**
  - The articular surface is slow in healing!
  - There is little potential for any true healing response

- **Pathophysiology of Partial Undersurface RCT**
  - Often associated with anterior microinstability and a SLAP lesion
  - Compounded by a tight posterior and inferior capsule and an IR deficit
  - Continued internal impingement leads to deepening of the tear and extension of delamination
  - Further microtrauma or superimposed macrotrauma produces full thickness tear

- **Pathophysiology**
  - With throwing, the articular surface experiences high eccentric and shear forces
    - The tear usually begins on the articular surface with fraying
    - Associated with intratendinous degeneration and tendinosis
  - Less often it can be associated with acute trauma
  - Most often it is found in throwers with “internal impingement” and the peel-back phenomenon

- **Surgical techniques future directions**
  - Continued improvement in arthroscopic fixation methods with outcomes-based studies confirming such improvements
  - Double row fixation technique with suture bridge technique – Neal ElAttrache, M.D.
  - Addition of biological agents/genetic alterations to improve healing and/or decrease tissue destruction
  - Prevention of development of FTRCTS...
• SLAP Lesions
  o In throwers, superior labral pathology is usually associated with shoulder instability
  o Some experts believe that superior labral pathology produces instability???
  o Often the capsular laxity associated with instability must be addressed: capsular plication
• 6 points that help guide you in the treatment of pathologic SLAP lesions
  o Identify normal vs pathologic anatomy
  o Treat only symptomatic labral tears. Be sure to establish an aggressive bleeding bone bed
  o Use proper multiple anchor replacement and tie on tissue side
  o Stay organized
  o The surgical team
  o Know and communicate with your physical therapist. Appropriate therapy is more important than the surgical procedure.
• Knotless technique of ElAttrache
• Anterior instability in a major league baseball pitcher
  o 30 year old male
    ▪ 9 years in the league
    ▪ Reported history of injury 5 years ago
    ▪ Modified mechanics to continue
    ▪ No longer able to perform at major league level due to fatigue and pain
  o Chronic anterior inferior capsular disruption, “midcapsular tear”
• “OCD of the Shoulder” Osteochondritis Dissecans of the Glenoid
• Operative technique
  o Excision
  o Abrasion
  o 2nd look arthroscopy 12 mo.
• The Throwing Shoulder – What have we learned?
  o It’s amazing that the shoulder can survive even a short course of baseball throwing
  o Surgical options for injuries of the throwing shoulder continue to be refined and more sophisticated
  o There’s always a role for extensive conservative treatment
  o Rehabilitation is frequently more important than the surgical procedure
  o Follow up results are needed now more than ever
Rehabilitation Following Selected Shoulder Surgery
Kevin E Wilk, PT, DPT, FAPTA
Champion Sports Medicine
Birmingham, AL

I. Introduction:
A. Injuries to the Thrower’s Shoulder are Common
   1. Pitchers are the most frequently injured
   2. Pathology seen is frequently a partial thickness rotator cuff tear & a SLAP peel back lesion
   3. Common finding in the normal pitchers’ shoulder
      * Wilk, Andrews, Reed: Spring Training ‘00
         a. Approximately 92% asymptomatic pitchers had SLAP tear
         b. Approximately 87% asymptomatic pitchers had undersurface cuff tear
   4. Normal finding or pathology finding
      * Normal Adaptation or Injury/Lesion

B. Treatment Options:
   1. Skillful neglect
   2. Injections
      a. Corticosteroid injections
   3. Orthobiologics
      a. PRP
      b. Stem Cell
      c. Amino
   4. Non-Operative rehabilitation without injection
      a. Rest from throwing
      b. Rehab program
   5. Surgery
      a. Debridement of rotator cuff
      b. Repair rotator cuff tear
      c. SLAP lesion (debridement or repair)
      * First Line of Treatment is Often Non-Operative Rehabilitation
         Fedorew, Lintner: AJSM ‘14

II. Rehabilitation Programs
A. Rehab Must Match the Surgery
   1. Different types of surgery
   2. Specific time frames based on surgery & healing constraints
   3. Team approach to Treatment
      * Surgeon --------- Physical Therapist
   5. Need to know exactly what was degree of lesion (partial thickness?)
   6. Surgery technique
   7. Timeframes –
      a. Aggressive strengthening
      b. Plyometrics
B. Rehab Must Match the Patient
   1. Functional goals & timeframes
   2. Status of the shoulder
   3. Patient’s response to surgery
   4. Concomitant lesions
   5. Type of pitcher (types of pitches, etc.)
   6. Position(s) of the player/patient

III. Specific Rehabilitation Programs/Guidelines:

A. Rotator Cuff Debridement:
   *Levitz et al* Arthroscopy '01
   i. Precautions: excessive loading & further injury
   ii. Goals: stimulate healing response – collagen synthesis & increase strength
   iii. Immediate motion, light stretching
   iv. Normalize motion, & tissue extensibility
   v. Gradual strengthening program
   vi. Condition the tissue – stimulate healing response
      1. Laser therapy
      2. Eccentrics
      3. Higher repetition
      4. Blood Flow Restriction (BFR) programs
   vii. Slow return to throwing activities
   viii. Rate of return depends on degree of lesion
      1. Can be as slow as 5-6 months to initiate throwing

b. Rotator Cuff Repair:
   *Mazoue & Andrews: AJSM '06*
   i. Precautions: allow cuff to heal, protection
   ii. Goals: stimulate healing response while protecting repair
   iii. Precautions: over stressing cuff repair, loads, excessive ROM/stretching
   iv. Gradual motion/stretching program
      1. Full PROM 8-10 weeks
      2. Full throwers PROM: 12-14 weeks
   v. Gradual progressive strengthening program
   vi. Plyometrics at 5-6 months
   vii. Throwing at 6-7 months
   viii. RTP: 9 months to 1 year

Rehab Program Dependent on Size of Tear

c. SLAP Repair:
   i. Immediate limited motion, no motion above 90 deg of elevation
   ii. Week 5 initiate PROM above 90 deg & ER/IR at 90 deg abduction
   iii. Ensure TROM is restored & proper
   iv. Gradual strengthening program
   v. Correct biomechanics, postural faults etc…
   vi. ITP 4-5 months
   vii. Return to Sports (depends on position) Pitchers 9.6 mos
   viii. *Concern with SLAP repairs: Throwers being too TIGHT*
      *Laughlin, Fleisig, et al: AJSM ‘14*
Rehabilitation Following Shoulder Stabilization Surgery
Kevin E Wilk, PT, DPT, FAPTA
Champion Sports Medicine
Birmingham, AL

I. Introduction:
A. Most Commonly Dislocated Joint Human Body
   1. General population
   2. In Sports
      a. Football players
      b. Hockey players
      c. Other sports
      d. Work environment
   3. Injuries appear to be increasing
      a. Shoulder joint

B. Glenohumeral Joint Dislocations
   1. Numerous types of injuries
      a. Capsule
      b. Osseous
      c. Muscle
      d. Neurologic

   Different Structures Injured Require Different Management

II. Rehabilitation Programs
A. Rehab Must Match the Surgery
   1. Different types of surgery
   2. Specific time frames based on surgery & healing constraints
B. Rehab Must Match the Patient
   1. Functional goals
   2. Status of the shoulder
   3. Patient’s response to surgery

III. Specific Rehabilitation Programs/Guidelines:
   a. Laterjet Procedure:
      An et al: J Shoulder Elbow Surg ‘16

      i. Shoulder in sling for 4-6 weeks
      ii. Sleep in shoulder sling 4-6 weeks
      iii. Promote osseous healing
      iv. Immediate limited restricted PROM
         1. Flexion to 90 deg 2-4 weeks
         2. ER/IR at 45 deg abduction: easy light motion (do not ER)
3. Progress PROM
4. Full PROM 6-8 weeks post-op
5. Loss of ER
   v. Scapular muscle training immediate in sling (NM control drills manual)
   vi. Isometrics initiated at 2 weeks
   vii. Isotonics limited ROM & light at 3-4 weeks
   viii. Isotonic lifting program 12 weeks
   ix. Return to sports (collision sports) (4 months)

b. Remplissage Procedure:
   Buza et al: JBJS ‘14
   Boileau et al: JBJS ‘12
   Garcia et al: AJSM ‘16

   i. Usually performed with another surgery (anterior stabilization Bankart)
   ii. Performed for Hills Sachs Lesion
   iii. Precautions: over stressing posterior capsular stretching & anterior surgery precautions
   iv. Motion Precautions: Horizontal adduction, IR, pushing motions
   v. Immediate PROM – very restricted & limited
   vi. Initiate IR at 6 weeks
   vii. Full PROM 8-12 weeks (limited IR & Horz adduction)

IV. Summary & Key Points:
   a. Shoulder instability – common lesion
   b. Surgery is often indicated to restore functional stability
   c. Rehab Must Match the Surgery
   d. Rehab Must Match the Patient
   e. Team Approach to Treat
      Physician --------- Rehab Team
      Communications is the Key

KEW: 11/17
Exercise Progressions for the Thrower’s Shoulder

Mike Reinold, DPT, SCS, CSCS

The Thrower’s Shoulder

Introduction

• To treat the athlete you must understand:
  – The shoulder
  – The unique characteristics of the overhead athlete
  – The specific pathology

The Thrower’s Shoulder

Introduction

• Inherently poor static stability
• Emphasis on dynamic stability

Dynamic Stabilization

• How do you achieve?
  – Strength?
  – Endurance?
  – Scapula?
  – Posture?
  – Core?

How to Enhance Dynamic Stability?

Is Strength Important for Dynamic Stabilization?

Muscle Strength

Is “functional training” enough?

Muscle Strength

A weak muscle can’t stabilize
14 Effect of Throwing on Strength
Mullany: AJSM ‘05

15 Effect of Throwing on Strength
Reinold: Sports Health ‘10

Just a 3-4% decrease in rotator cuff strength results in potential loss of dynamic stability

17 Muscle Strength
• What is needed while pitching?
• Emphasis on muscle groups that have to decelerate arm and maintain stability
  – Rotator cuff
  – Scapular stabilizers
  – Lower trap
  – Serratus anterior

18 Reinold, Fleisig, Wilk: ASMI 2001
• EMG of Rotator Cuff
• Goal to find most effective exercise for ER

19 Results
• Sidelying ER = greatest ER EMG
• Sidelying ER showed greater activity of all muscles than ER@ 0
• Possible due to gravitational effect

20 Results
• Moderate activity of all muscles was observer during ER@90
  – Infraspinatus 59% MVIC
  – Teres minor 54% MVIC
  – Supraspinatus 57% MVIC
  – Deltoid 58% MVIC

• Similar muscle patterns between prone ER and standing ER@90

21 Results
• Sidelying ER
Exercises and Dynamic Stabilization
Progressions for the Thrower’s Shoulder

- Infraspinatus 62%
- Teres minor 67%
- Supra 51%
- Deltoid 44%

Results

2. ER@ 0
- Infraspinatus 40%
- Teres minor 34%
- Supra 40%
- Deltoid 18%

Results

22 □ Results
1. ER@ 90
- Infraspinatus 59%
- Teres minor 54%
- Supra 57%
- Deltoid 58%

2. ER@ 0
- Infraspinatus 40%
- Teres minor 34%
- Supra 40%
- Deltoid 18%

Results

23 □ Results
- Placing a towel between the arm and the body increases muscular activity
- Balance between the superior shoulder muscles that ER the arm and the inferior shoulder muscles that adduct the arm to hold the towel

24 □ Results
1. ER@ 0
- Infraspinatus 40%
- Teres minor 34%
- Supra 40%
Exercises and Dynamic Stabilization
Progressions for the Thrower’s Shoulder

Mike Reinold - MikeReinold.com

Results

- Infraspinatus 40%
- Teres minor 34%
- Supra 40%
- Deltoid 18%

Towel

- Infraspinatus 50%
- Teres minor 46%
- Supra 41%
- Deltoid 21%

Results

- ER in the scapular plane offers a compromise between muscular activity and capsular strain
  - Infraspinatus 53%
  - Teres minor 70%
  - Supra 32%
  - Deltoid 41%

- Highest activity of teres minor

Reinold, Fleisig, Wilk: ASMI 2001 Clinical Implications

- Prone ER and ER@90 have functional advantages as several activities are performed in similar position
- While ER@90 does have a functional advantage, the combination of abduction and ER place high strain on the shoulder capsule

Is Endurance Important for Dynamic Stabilization?

Influence on Dynamic Stabilization

- Muscular weakness & fatigue
  - Voight: JOSPT ‘96
  - Myers: JAT ‘99
  - Carpenter: AJSM ‘98
Is Posture Important for Dynamic Stabilization?

Influence on Dynamic Stabilization
- Posture
  - Scapula
  - Thoracic Spine
  - Lumbopelvic

Local and Global Dynamic Stability

Scapular Position
Thigpen / Reinold: APTA ‘06, ‘08, ‘09, ‘10
- Static resting position of scapula is protracted and anterior tilted
  - Reinold, Wilk, Bastan: APTA ‘06
  - 71 Professional baseball pitchers
- These positions have strong correlation with decreased serratus and lower trapezius strength
  - Thigpen, Reinold, Gill: APTA ‘08
  - 50 Professional baseball pitchers

Effect of Scapula Posture on Strength
Thigpen, Reinold, Gill: APTA ‘08
- Electromagnetic tracking of scapula
- 78 professional baseball pitchers
- Correlation between scapula posture & strength
- Protracted/anterior tilt
- Lower trap inhibition

Decker et al: AJSM 1999
- Ranked the most effective serratus anterior exercises
- 20 subjects performed 8 exercises
  - Push-up with a plus
Exercises and Dynamic Stabilization
Progressions for the Thrower’s Shoulder

Mike Reinold - MikeReinold.com

Decker et al: AJSM 1999
• Ranked the most effective serratus anterior exercises
  • 20 subjects performed 8 exercises
    – Push-up with a plus
    – Dynamic hug
    – Serratus punch

Ekstrom: JOSPT ‘03
• EMG for Serratus Anterior
  – Diagonal exercise
  – Scapular elevation > 120 degrees
  – Scapular upward rotation
  – Force couple with lower trap

Ekstrom: JOSPT ‘03
• EMG for lower trapezius
  – Prone H. add with ER at 120 – 97% MVIC
  – Prone ER@90 – 79% MVIC
  – Prone H add with ER at 90

Techniques to Enhance Dynamic Stabilization

Dynamic Stability
•
  • Strength
  • Endurance
  • Posture
  • Dynamic stability

Dynamic Stability
•
  • Strength
  • Endurance
  • Posture
  • Dynamic stability

Dynamic Stability
Exercises and Dynamic Stabilization
Progressions for the Thrower’s Shoulder

• Strength
• Endurance
• Posture
• Dynamic stability

52  Dynamic Stability
•
  • Strength
  • Endurance
  • Posture
  • Dynamic stability

53  Dynamic Stability

• Joint compression
  – compression of humeral head
  – Center within glenoid fossa
• Dynamic ligament tension
  – cuff blends with capsule
  – muscular contraction - capsular tension
  – ER reduces anterior capsule strain
• Neuromuscular control
  – proprioception & kinesthesia
  – efferent response / afferent info
  – reflexes, stereotypic & learned skills

54  
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Mike Reinold - MikeReinold.com
Key Points

- Dynamic Stabilization
  - Strength
  - Endurance
  - Posture
- Local Stabilization
  - Glenohumeral
  - Scapulothoracic
- Global Stabilization
  - Thoracic spine
  - Lumbopelvic

Thank You!
Orthobiologics for the Overhead Athlete
CSM New Orleans 2018
Kyle Yamashiro, PT, DPT, CSCS

No Disclosures

Sacramento State Athletics

SACRAMENTO RIVER CATS

Oakland A’s

SACRAMENTO REPUBLIC FC

REHABILITATION FOLLOWING INJECTION

Types of Injections
• Cortisone
• PRP
• Stem Cell

ADVANTAGES and DISADVANTAGES
• Cortisone
• Prolotherapy
• PRP
• Stem Cell

Overhead Athlete
• Muscle, Tendon, Ligament, Bone, Inflammation

OVERHEAD ATHLETE
• Shoulder: rotator cuff, labrum, G-H Chondral lesions and arthritis
• Elbow: UCL, epicondylitis, arthritis
• Patellar tendon

REHABILITATION CONSIDERATIONS
• Educate the patient
  – Relatively new intervention
  – Understand expectations
• Timing of the athlete

INDICATIONS FOR INJECTION
• INTRA-ARTICULAR
• INTRACAPSULAR AND TENDON SHEATH
• INTRAMUSCULAR AND INTRATENDINOUS

INTRA-ARTICULAR
• INDICATIONS:
  – DECREASE PAIN IN THE JOINT
  – DECREASE INFLAMMATION
  – DECREASE POST-OPERATIVE STIFFNESS
  – REHABILITATION:
    – BEGIN ROM IMMEDIATELY
    – WBAT, MINIMIZE EXCESSIVE AMBULATION

TENDON SHEATH / INTRACAPSULAR
• INDICATIONS
  – NON-INVASIVE TO TENDONS AND LIGAMENTS
  – FUSIFORM SWELLING
  – IN-SEASON ATHLETE
  – REHABILITATION:
    – REST FOR 2-3 DAYS
    – MAY BEGIN FULL ACTIVITY BY DAY 3
    – AVOID STRETCH BEYOND LIMITS
    – BEGIN RTP WHEN PAIN HAS SIGNIFICANTLY IMPROVED

INTRA-MUSCULAR / TENDINOUS
• INDICATIONS
  – REPAIR THE DEFECT
  – INVASIVE
  – SCARRING WILL OCCUR
  – REHABILITATION:
    – REST AND POSSIBLY IMMOBILIZE FOR 7 DAYS
    – WEEK 1: BEGIN GENTLE ROM IN LINES OF STRESS
    – WEEK 2-3: PROGRESS LOW LEVEL ACTIVITY AND WBAT
    – WEEK 3-4: PROGRESS ROM BEGIN LOW INTENSITY STRENGTH
    – WEEK 5+: TREAT AS THE AFFECTED STRAIN / SPRAIN

6 Week Critical Stage
• At this point, the player should have improved significantly with symptoms and function
• BEGIN TO RETURN TO SPORT SPECIFIC DRILLS
• IF THE PLAYER IS RESPONDING WELL, THEN CONTINUE AND ADVANCE REHAB
• IF THE PLAYER IS NOT RESPONDING, THEN RETURN THE PLAYER BACK TO THE M.D. FOR FURTHER EVALUATION

4 stages
Stage I: Post Injection Stage
Stage II: Protection
Stage III: Light Activity
Stage IV: Return to Sport Activity

TIME LINE
Return to Activity Time line
Weeks

<1

<4            <6

<8

<12+
inflammatory     Grade I       Grade II

Grade III

Partial

Tears

bursitis

Sprains

Sprains

Sprains

Sprains

Bone

tendinitis

Strains

Strains

Strains

External

Tendinosis

Tendinosis

Impingement       (mild)                       (mod-severe)

THANK YOU

KYLE YAMASHIRO, PT, DPT, CSCS

www.resultstherapy.com
• In season or off season
• Attempt conservative rehabilitation vs surgery
• Therapist MUST understand the purpose and indication of the injection

12 REHABILITATION PRINCIPLES
Immediate Post Injection
– The healing process commences
– Allow for homeostasis to occur
– DO NOT use modalities ultrasound, e-stim, vasocompression
– Minimize activity

13 REHABILITATION PRINCIPLES
Sub-Acute Protection Phase
– Begin Gentle ROM, DO NOT OVERSTRETCH
– Maintain integrity of cross link
– Progressive strength, allow for cross-link and tensile strength

14 REHABILITATION PRINCIPLES
LIGHT ACTIVITY PHASE
• Increasing tensile force of the selected tissue
• Begin to withstand load and stress
• Pain has significantly decreased in this phase

15 REHABILITATION PRINCIPLES
RETURN TO PLAY
• Improving the tensile load and elasticity of the tissue.
• Ability to generate force and stretch
• Must implement a return to sports program
• Sport specific drills, practice, and competition

16 INDICATIONS FOR INJECTION
• INTRA-ARTICULAR
• INTRACAPSULAR AND TENDON SHEATH
• INTRAMUSCULAR AND INTRATENDINOUS
INTRA-ARTICULAR

• INDICATIONS:
  – DECREASE PAIN IN THE JOINT
  – DECREASE INFLAMMATION
  – DECREASE POST-OPERATIVE STIFFNESS

• REHABILITATION
  – BEGIN ROM IMMEDIATELY
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TENDON SHEATH / INTRACAPSULAR

• INDICATIONS
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INTRA-MUSCULAR / TENDINOUS

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  – INVASIVE
  – SCARRING WILL OCCUR

REHABILITATION:
  – REST AND POSSIBLY IMMOBILIZE FOR 7 DAYS
    WEEK 1: BEGIN GENTLE ROM IN LINES OF STRESS
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    WEEK 3-4: PROGRESS ROM BEGIN LOW INTENSITY
STRENGTH
WEEK 5+: TREAT AS THE AFFECTED STRAIN / SPRAIN

6 Week Critical Stage
• At this point, the player should have improved significantly with symptoms and function
• Begin to return to sport specific drills
• If the player is responding well, then continue and advance rehab
• If the player is not responding, then return the player back to the M.D. for further evaluation

4 stages
Stage I: Post Injection Stage
Stage II: Protection
Stage III: Light Activity
Stage IV: Return to Sport Activity

TIME LINE
Return to Activity Time line

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THANK YOU
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