If you are viewing this course as a recorded course after the live webinar, you can use the scroll bar at the bottom of the player window to pause and navigate the course.

This handout is for reference only. It may not include content identical to the powerpoint. Any links included in the handout are current at the time of the live webinar, but are subject to change and may not be current at a later date.
Post-Operative Management of Selected Shoulder Conditions

David Nolan, PT, DPT, MS, OCS, SCS, CSCS

Learning Objectives

After this course, participants will be able to:

- Identify the biomechanics and force couples associated with shoulder function.
- List the factors associated with rotator cuff and shoulder instability pathology that impacts rehabilitation.
- Describe the mechanism of injury associated with Superior Labrum Anterior Posterior (SLAP) Lesions.
- Recognize an effective and appropriate post-operative rehabilitation program for patients following common surgical procedures of the shoulder.
- Compare and contrast traditional and inverse total shoulder replacement.
Anatomy

- Most mobile joint in body
- Posterior portion of the capsule is quite thin
- Sternoclavicular joint is only skeletal articulation to axial region

Biomechanics

- Scapulohumeral rhythm
  - 2° of GH motion for every 1° of ST motion
  - 180° shoulder elevation
    - 120° humeral elevation
    - 60° scapular rotation

continued
Force Couples

- Deltoid – Rotator Cuff Force Couple
  - Unopposed deltoid = superior migration

Force Couples

- Anterior-Posterior Rotator Cuff Force Couple
  - Anterior: Subscapularis
  - Posterior: Infraspinatus & Teres Minor
Force Couples

- Upper Trapezius-Serratus Anterior Force Couple
  - Shoulder elevation
  - Upward rotation of scapula
  - Functions
    1. Optimal position of glenoid
    2. Deltoid length-tension
    3. Prevents impingement
    4. Stable base to recruit scapular musculature

Radiograph
ROTATOR CUFF LESIONS

Surgical Interventions & Rehabilitation

Influencing Factors

- Bishop J et al. JSES 2006
  - Age (healing)
  - Activity level
  - Type of repair
    - Open (deltoid taken down)
    - Mini-Open (deltoid split)
    - Arthroscopic
  - Tissue quality
    - Soft tissue integrity
      - Repair and surrounding tissue
    - Osseous integrity
      - Fixation strength
Influencing Factors

• Size of tear
  – Bishop J et al. JSES 2006
    – Small: <1cm
    – Medium: 1-3cm
    – Large: 3-5cm
    – Massive: >5cm

Influencing Factors

• Location of tear
  – Isolated supraspinatus
  – Supraspinatus and Infraspinatus
  – Subscapularis
Positive Outcome

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

  - Demographic Factors
    - Younger age, male gender
  - Clinical Factors
    - Higher BMD, (-) DM, (-) obesity, ↑ pre-op ROM, ↑ sports activity

  - Cuff Integrity
    - Smaller sagittal size, less retraction, less fatty infiltrate, (-) multiple tendon involvement
  - Surgical Procedure
    - (-) concomitant biceps or AC procedures

CONTINUED
Surgical Interventions

- Impinging Lesions
  - Arthroscopic Acromioplasty
    - Acromial spur removed
    - Coracoacromial ligament released
    - AC joint osteophytes excised

Rehab Considerations

- Bone pain from shaving, bursectomy

- AC Jt. Capsule may be compromised, beware too much overhead activity early on while healing

- Generally can commence AROM as tolerated
Surgical Interventions

• Partial Thickness Rotator Cuff Tears
  – Type of tear
    • Bursal sided
    • Articular sided
    • Intratendinous
  – Multiple surgical options:
    • Open decompression & tendon repair
    • Arthroscopic tendon debridement
    • Arthroscopic decompression & tendon debridement
    • Arthroscopic decompression & mini-open cuff repair
    • Arthroscopic decompression & arthroscopic cuff repair

Surgical Interventions

• Full Thickness Rotator Cuff Tear
  – Open repair
    • Pros
      – Exposes all involved anatomy
      – Allows for mobilization of tendons
    • Cons
      – Release of deltoid
      – Hospital stay
      – Longer rehab
      – Unable to examine GH joint and subacromial space
      – Decreases cosmesis
Surgical Interventions

- Full Thickness Rotator Cuff Tear
  - Arthroscopically Assisted Mini-Open Repair
  - Pros
    - Visualization of cuff tear (open)
    - No deltoid release (arthroscopy)
    - Possibly better fixation

Mini-Open Surgical Technique

- Visualization of Supraspinatus tear
- Retraction from footprint
Mini-Open Surgical Technique

- Sutures through bone tunnel
- Suture Anchors

Mini-Open Surgical Technique

- Tear is brought back to footprint
- Bony notch to improve healing
Surgical Interventions

• Full Thickness Rotator Cuff Tear
  – Arthroscopic Rotator Cuff Repair
    • Pros
      – No deltoid release
      – Limited morbidity
      – Accelerated rehab
      – Improved cosmesis
    • Cons
      – Technically demanding

Surgical Video
Failure

- Integrity of Repair
  - 22% had recurrent tears on MRI at 2 Yr F/U
    • Cole BJ et al JSES 2007
  - 40% of tendons not healed
    • DeFranco MJ et al. JSES 2007
  - 88% (15/17) showed leakage with MR Arthrography
    • Meyer M et al. JSES 2012
  - Anatomic Integrity does not correlate with functional outcomes or patient satisfaction

Delayed Mobility?

Does slower rehabilitation after arthroscopic rotator cuff repair lead to long-term stiffness?
Bradford O. Parsons, MD*, Konrad I. Gruson, MD*, Darwin D. Chen, MD*, Alicia K. Harrison, MD*, James Gladstone, MD*, Evan L. Flatew, MD*

- Parsons BO. et al. JSES. 2010
  - Sling immobilization for 6 weeks post-op
    • Did not result in long term stiffness (1 yr)
    • May improve rate of tendon healing (less re-tears)
Rehabilitation

A Comparison of Rehabilitation Methods After Arthroscopic Rotator Cuff Repair: A Systematic Review
Anthony Yi, BS,1 Diego Villicana, MD,1 Raj Yalameruili, BS,1 and George F. Rick Hetch III, MD1

• Yi A et al. Sports Health, 2015
  – No significant difference between early versus late mobilization approaches

Post-Operative Rehabilitation

• Phase I (0-6 weeks)
  – Passive exercises
  – Minimize load across repair
• Phase II (6-10 weeks)
  – Active exercises
  – Gradual load repair
• Phase III (10-12 weeks)
  – Resistive exercises
  – Restore force production of cuff
• Phase IV (16-24 weeks)
  – Restore maximum strength, power, endurance
Range of Motion Goals

<table>
<thead>
<tr>
<th></th>
<th>Passive Scaption</th>
<th>Passive ER 20° Abd</th>
<th>Passive ER 90° Abd</th>
<th>Active Scaption</th>
</tr>
</thead>
<tbody>
<tr>
<td>POD 1</td>
<td>60° - 90°</td>
<td>0° - 15°</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>POD 1</td>
<td>60° - 90°</td>
<td>0° - 20°</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>POW 3</td>
<td>90° - 100°</td>
<td>15° - 30°</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>POW 6</td>
<td>90° - 120°</td>
<td>20° - 45°</td>
<td>40° - 60°</td>
<td>NA</td>
</tr>
<tr>
<td>POW 9</td>
<td>130° - 155°</td>
<td>30° - 60°</td>
<td>50° - 75°</td>
<td>80° - 120°</td>
</tr>
</tbody>
</table>

Rehabilitation

- Phase I (0-6 weeks): Protect Repair
  - Immobilization in Abduction sling
    - Prevent “wringing out”
    - ↓ tension on repair
  - PROM
    - May assist with proper orientation of type 1 collagen
    - Assist with proper tendon gliding
  - “Stretching” should be avoided
  - Establish voluntary muscle control
Rehabilitation

- Phase I interventions
  - Patient education key
  - Sling 4-6 weeks (per MD)
  - Immediate PROM
    - Elbow wrist and hand (modify with biceps involvement)
    - Achieve staged ROM goals
    - Scapular plane
    - Caution excessive Abd & IR
    - Avoid pulleys
      - EMG shows RC is active (Burkhart SS et al. Arthroscopy. 1997)
  - Manual scapular strength
  - Cryotherapy
    - Control post-op pain
    - ↓ swelling & muscle spasm

Rehabilitation

- Milestones to Progress to Phase II
  - Appropriate healing
    - Compliant with immobilization
    - Compliant with precautions
  - Staged ROM goals on target
    - Scaption (90° – 120°)
    - ER 20° Abd (20° – 45°)
    - ER 45° Abd (40° – 60°)
  - Minimal pain with ROM
    - ≈ 2/10
Rehabilitation

- Phase II (6-12 weeks)
  - D/C Sling
    - Consider pain and compliance
  - Progress to full PROM
  - Initiate self-assisted & AAROM → AROM
    - Focus on good mechanics
  - Strengthening
    - No resisted RC exercise
  - Scapulothoracic focus
    - Dynamic stability
  - Independent with ADLs (Week 12)

Rehabilitation

- Phase II interventions
  - Continue P-A-AAROM
    - Pec minor
  - Continue rhythmic stabilization
    - Middle and lower trapezius
  - Strength (10-12 weeks)
    - Isometrics
    - Scaption with ER (Full Can)
    - Sidelying Abduction to 45°
      - ↑ Supraspinatus with ↓ risk of impingement
    - Avoid painful exercises
  - Initiate low level functional activities
Rehabilitation

- Milestones to Progress to Phase III
  - Staged AROM achieved
    - 0-2/10 pain
    - Without compensation
  - Strengthening Activities progressing
    - 0-2/10 pain
  - Normal scapular position
    - Static and dynamic

Rehabilitation

- Phase III (12 - 24 weeks)
  - Goals
    - Full P / AROM
    - Dynamic shoulder stability
    - Shoulder strength & endurance
    - CKC activities
    - Neuromuscular Re-Ed
      - Joint reposition
    - Return to work activities
    - Initiate modified recreational activities
Rehabilitation

- Phase III Interventions
  - Scapular plane initially
  - No compensatory patterns
  - High repetition focus

Rehabilitation

- De Mey K. et al. AJSM 2012
  - **47 Overhead Athletes**
    - 25 men; 22 women
    - Mean age = 24.6 ± 7.81
    - Mild impingement symptoms
  - **6-Week exercise program**
    - Prone H-Abd with ER
    - Sidelying Flexion
    - Sidelying ER
    - Prone Extension
  - **Outcomes**
    - SPADI
    - Muscle activation & timing
Rehabilitation

• De Mey K. et al. AJSM 2012
  – Results
    • SPADI scores improved
      – 29.86 ± 17.03 to 11.7 ± 13.78 (P<.001)
      – Improved pain and function
    • Increased MVIC of trapezius muscles
    • Earlier activation of LT compared to UT and MT (P<.001)
    • Earlier activation of SA compared to UT & MT (P<.001) and LT (P<.046)

Rehabilitation

• Milestones to Progress to Phase IV
  – Adequate strength & dynamic stability for progression to work / sport activity
  – Normal scapular position
    • Static and dynamic
Rehabilitation

- Phase IV
  - Replicate demands of ADL and work activity
  - Plyometric program
  - Initiate interval sport program

Keys to Success

- Establish PROM
- Restore ER strength
- Establish shoulder balance
- Improve scapular position & movement
- Gradually increase loads
- Avoid aggressive activities early on
- Gradual return to functional activities
SLAP Lesions

• Andrews JR. et al. AJSM 1985
  – First Identified in throwers

• Snyder et al. Arthroscopy 1990
  – Coined term “SLAP”
  – Disruption of superior labral-biceps complex
    involving tearing, separation or both of the superior
    labrum beginning posterior to the biceps tendon
    insertion and extending anteriorly
SLAP Lesions

- Mechanism of Injury
  - Macrotrauma
    - Forceful Abd, Ext, ER
    - Fall on outstretched arm
    - Traction force
    - Weight lifting
    - Blow to shoulder
  - Microtrauma
    - Overhead athletes
    - Symptoms
      - Clicking, Catching, Popping, Grinding,
      - Pain with overhead activity

SLAP Lesions: Mechanism

- Andrews JR. et al. AJSM 1985
  - First Identified in throwers

  - Biceps contract eccentrically to decelerate the extending elbow during deceleration & follow-through phase of throwing

  - MOI thought to be tensile failure of biceps
SLAP Lesions: Mechanism

- Burkhart SS. & Morgan CD. *Arthroscopy* 1998
  - “Peel-Back” mechanism
  - Abduction & ER in Late Cocking phase of throwing
  - Twisting at base of biceps
  - Transmits torsional force to anchor

---

SLAP Lesions: Mechanism

- Tensile Loading vs. Peel-Back?......Yes
  - Shepard MF. et. al. *AJSM*. 2004
    - In-line (tensile) loading / deceleration phase
      - Load to failure = 508 N
      - 7/8 failed in midsubstance of biceps tendon
      - 1/8 fractured at supraglenoid tubercle
  - Peel-Back / cocking phase
    - Load to failure = 202 N
    - 8/8 resulted in type II SLAP lesion

CONTINUED
SLAP Lesions: Mechanism

- Wilk KE. et al. JOSPT 2005
- Wilk KE. et al. IJSPT 2013
  - “Eccentric biceps activity during deceleration may serve to weaken the biceps-labrum complex, while the torsional peel-back force may result in the posteroinferior detachment of the labral anchor.”

SLAP Lesions

- Concomitant Pathology
  - Partial thickness supraspinatus tears in 45% of patients & 73% baseball pitchers
    - Andrews JR et al. AJSM 1985
    - 29% partial thickness tears
    - 11% complete cuff tears
    - 22% Bankart lesions
SLAP Lesions

- Type I (11%)
  - Periphery of labrum attached
  - Biceps attached
  - Significant degeneration and fraying of tissue
  - Associated with RC pathology
    - Kim et al. JBJS 2003

SLAP Lesions

- Type II (41%)
  - Superior labrum and biceps detached from underlying glenoid
  - Resultant instability
  - Most common in overhead athletes
  - RC pathology in older patients
    - Kim et al. JBJS 2003
  - Instability in younger patients
    - Kim et al. JBJS 2003
Type II SLAP Subtypes

- Morgan CD. et al. *Arthroscopy* 1998

Anterosuperior  Posterosuperior  Combined

<table>
<thead>
<tr>
<th></th>
<th>Anterior</th>
<th>Posterior</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquired</td>
<td>10 (19%)</td>
<td>25 (47%)</td>
<td>18 (34%)</td>
</tr>
<tr>
<td>Overhead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traumatic</td>
<td>28 (57%)</td>
<td>7 (14%)</td>
<td>14 (29%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SLAP Lesions

- **Type III (33%)**
  - Displaced “Bucket Handle” tear
  - Central portion displaced into joint
  - Periphery is still attached to glenoid
  - Associated with traumatic instability
    - Kim et al. JBJS 2003

SLAP Lesions

- **Type IV (15%)**
  - “Bucket Handle” tear extending into biceps
  - Labral tear flaps into joint
  - Associated with traumatic instability
    - Kim et al. JBJS 2003
Conservative Treatment for Labral Lesions

Nonoperative Treatment of Superior Labrum Anterior Posterior Tears
Improvements in Pain, Function, and Quality of Life

- Edwards SL. et al. AJSM 2010
  - 371 patients mailed questionnaires
  - 50 returned (16.4%)
  - Average F/U 3.1 years
  - 20 patients required surgery (51%)
Conservative Treatment for Labral Lesions

Nonoperative Treatment of Superior Labrum Anterior Posterior Tears
Improvements in Pain, Function, and Quality of Life

- Edwards SL. et al. AJSM 2010
  - 71% of athletes returned to sports
  - 66% of overhead athletes returned to sports

Treatment Interventions

- Keys to successful treatment
  - Improve static & dynamic stabilization
  - Activate RC for adequate compressive forces
  - Improve proprioception & neuromuscular control
  - Increase scapular strength / control
  - Improve muscular endurance
SHOULDER INSTABILITY
Surgical Interventions & Rehabilitation

Patient Presentation

- Anterior Dislocation / Subluxation
  - Position is generally overhead and abducted with ER
  - Impingement type pain is common
  - Loss of IR
  - Pain during late cocking phase of throwing
  - Bankart lesion / Hill-Sachs lesion
  - Recurrent injury
    - <20 yo: 60-95%
    - 20-25 yo: 50-75%
    - 25-40yo: <50%
Patient Presentation

- Posterior Dislocation / Subluxation
  - <5% of all shoulder dislocations
  - Position is adducted, flexed, and in IR with a posterior force
  - Loss of elevation and ER
  - Pain with pushing
  - Pain in follow-through phase of throwing

Recurrence Rates

- Rowe, JBJS 1956  < 20 yo  94%
- Henry, AJSM 1982  17-23 yo  90%
- Simonet, AJSM 1984 <30 yo  82%
- Marans, JBJS 1992 Open Physes 100%
- Arciero, AJSM 1994 17-24 yo  85%
Recurrence Rates
Collision Sports

- Larrin, *Arthroscopy* 2001
  - 17 – 27 yo: 94%
- West Point Studies, *AJSM* 1994
  - 17 – 23 yo: 86%
- Hovelius, *JBJS* 1978
  - <20 yo: 90%
- Henry, *AJSM* 1982
  - 17 – 23 yo: 90%

Anterior Instability

- Non-Anatomic
  - **Putti-Platt / Magnuson-Stack**
    - Shorten / Advances subscapularis
  - **Modified Bristow / Latarjet**
    - Transfer coracoid tip to anteroinferior glenoid neck
- **Pros**
  - Prevents dislocation
- **Cons**
  - Does not restore normal motion
  - Loss of ER
  - Inability to return to throwing sports
Bankart Lesion

- Labral tear
- Stretching of anterior-inferior capsule & IGHL
- Periosteal stripping of subscapularis from neck of glenoid fossa

Anterior Instability

- Anatomic
  - **Bankart Repair**
  - Reattachment of avulsed anterior capsule to glenoid rim
  
  - **Indications**
    - Symptomatic recurrent anterior shoulder dislocations
    - Failed conservative therapy
    - Unidirectional anterior instability

  - **Contraindications**
    - Voluntary instability with emotional/psychological problems
    - Seizure disorder
    - Multidirectional instability
Bankart Repair

- Technique
  - Vertical skin incision along anterior axillary fold
  - Subscapularis tendon is divided

Bankart Repair

- Factors Impacting Rehabilitation
  - Open procedure or arthroscopy

  - Method of fixation
    - Sutures
    - Anchors

  - Concomitant procedures
    - Capsular shift
    - Thermal shrinkage
Open Bankart Repair

• Rehabilitation
  – Precautions
    • Avoid early aggressive motion & activities
    • Avoid excessive ER and extension
    • Avoid resisted or forceful IR
    • Lengthy immobilization

Open Bankart Repair

• Rehabilitation
  – Motion
    • Immediate to tolerance

  • ER / IR in scapular plane
    – 45° Abd initially → 90° Abd at week 5

  • Gradual increase in shoulder elevation
    – Week 2: 0-100°
    – Week 4: 0-155°
    – Week 6: 0-180°
Open Bankart Repair

• Rehabilitation
  – **Strength**
    • Submaximal isometrics immediately
      – Rhythmic initiation
      – Rhythmic stabilization
    • Isotonics week 3
    • Plyometrics week 10

Open Bankart Repair

• Rehabilitation
  – **Functional Activities**
    • Sport Specific Training at week 12-14
    • Contact Sports at 5 months
    • Overhead sports after 6-7 months
Open Repair Recurrence Rate

- Magnusson, 2002 17%
- Pagnani, 2002 10% unable to return
- Kim, 2002 10%
- Sperber, 2001 12%
- Uhorchak, 2000 23%
- Chapnikoff, 2000 9.5%
- Cole, 2000 24%

10% – 24% Recurrence Rate

Arthroscopic Bankart Repair

- Rehabilitation
  - Precautions
    - Sling for 6 weeks
      - Out for ROM
      - Sling continues for comfort >6 weeks
    - No overhead motion for 4 weeks
    - Sleep in immobilizer for 4 weeks
    - No excessive ER or extension for 4 weeks
  - Slower rehab compared to open procedure
Arthroscopic Bankart Repair

- Rehabilitation
  - Motion
    - Immediate in scapular plane
    - ER / IR @ 30° Abd
      – Subscapularis intact
    - Elevation to 90° for 3 weeks
      – Stress to inferior capsule
      – Progress to 135° POW 6
    - Full Rom by week 12

[ CLINICAL COMMENTARY ]

The American Society of Shoulder and Elbow Therapists’ Consensus Rehabilitation Guideline for Arthroscopic Anterior Capsulolabral Repair of the Shoulder

continued™
Arthroscopic Bankart Repair

- Phase 1 Rehabilitation (0–6 weeks)
  - Maximal protection
    - Absolute immobilization (0-4 weeks)
    - Achieve staged ROM goals

**Table 2: Staged Range-of-Motion Goals Following Arthroscopic Anterior Capsulolabral Repair**

<table>
<thead>
<tr>
<th>POW 3</th>
<th>POW 6</th>
<th>POW 9</th>
<th>POW 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>135°</td>
<td>155°</td>
<td>WNL</td>
</tr>
<tr>
<td>10°–30°</td>
<td>35°–50°</td>
<td>50°–65°</td>
<td>WNL</td>
</tr>
<tr>
<td>Contained</td>
<td>45°</td>
<td>75°</td>
<td>WNL</td>
</tr>
<tr>
<td>NA</td>
<td>115°</td>
<td>145°</td>
<td>WNL</td>
</tr>
</tbody>
</table>

**Abbreviations:**
- Abd: abduction
- AFE: active forward elevation in the scapular plane
- NA: not applicable
- PER: passive external rotation
- PFE: passive forward elevation
- POW: postoperative week
- WNL: within normal limits

**continued**
Arthroscopic Bankart Repair

• Phase 2 Rehabilitation (6-12 weeks)
  – **Milestones**
    • Appropriate healing
      – Compliant with immobilization guidelines
    • Staged ROM goals achieved
      – No exceeded
    • Minimal – no pain with ROM
      – 0-2/10 (NPRS)

    ![Table 2: Staged Range-of-Motion Goals Following Arthroscopic Anterior Capsulolabral Repair](image)

    **Abbreviations**: Abd, abduction; AFE, active forward elevation in the scapular plane; NA, not applicable; PER, passive external rotation; PFE, passive forward elevation. POW, postoperative week; WNL, within normal limits.
Arthroscopic Bankart Repair

• Phase 2 Rehabilitation (6-12 weeks)
  – **Cross-Body stretching for IR**
    • McClure P et al. *JOSPT* 2007
  
  – **Scapular stability**

  – **Elevation in scapular plane (full can)**
    • Minimal capsular tightness
    • Subacromial clearance
    • Optimal length-tension RC/Scap

Arthroscopic Bankart Repair

• Phase 3 Rehabilitation (12-24 weeks)
  
  – **Milestones**
    • Full ROM without substitution
    • Good dynamic scapular control
    • Strengthening with 0-2/10 pain (NPRS)

  – **Goals**
    • Normal strength, endurance, neuromuscular control & power
    • Gradual stress to anterior capsulolabral structures
    • Gradual return to full ADLs, work duties, recreational activities

**continued**
Arthroscopic Bankart Repair

- Phase 3 Rehabilitation (12-24 weeks)
  - Progressive strength / endurance
    - High-speed / multi-planar
  - Neuromuscular control
  - Activity specific interventions
    - Work, sport, hobbies
  - Core & scapular stability
  - Plyometrics
    - Overhead athletes

Arthroscopic Bankart Repair

- Return to Full Activity
  - Milestones
    - MD clearance
  - No pain / Full ROM
  - No sensation of instability
  - Adequate RC/Scap strength without pain
Arthroscopic Repair
Reurrence Rates

- Mazzocca, 2005  15%
- Abrams, 2002  6.6%
- Kim, 2002  10.2%
- Mishra, 2001  7%
- Kandziora, 2000  16.4%
- Tauro, 2000  6.9%
- Gartsman, 2000  7.5%

6% – 16% Recurrence Rate

Arthroscopic Compared with
Open Repairs for Recurrent
Anterior Shoulder Instability
A Systematic Review and Meta-Analysis of the Literature
By Tim R. Lenters, MD, Amy K. Frantz, MD,
Frederic M. Wolf, PhD, Seth S. Leopold, MD, and Frederick A. Matzen III, MD

- Lenters TR et al. JBJS. 2007
  - Arthroscopic approaches not as effective as open approaches in preventing recurrent instability
    - Arthroscopic suture anchor techniques associated with higher risk of recurrent instability (p=0.01)

    - Arthroscopic approaches less effective with return to work/sport (p=0.03)

    - Arthroscopic repairs associated with higher Rowe scores

continued™
Long-term outcomes after repair of recurrent post-traumatic anterior shoulder instability: comparison of arthroscopic transglenoid suture and open Bankart reconstruction

  - No significant differences between arthroscopic and open repair groups
    - Failure rate
      - Arthroscopic: 12.5% re-dislocation rate
      - Open: 9% re-dislocation rate
    - Rowe score
    - UCLA score
    - Constant score

Summary

- Key Factors to Optimize Outcomes
  - Understanding of MOI
    - Education; positions / activities to avoid
  - Control forces on healing tissues
    - Anterior-inferior capsule/labrum & Biceps
  - Concomitant injury / surgery
    - Impact to rehab progression
  - Activity demands of patient
    - ? Overhead athlete
Anterior Instability

• Anatomic
  – Capsular Shift / Capsular Plication
    • Corrects anteroinferior glenohumeral joint instability
    • Labrum is intact
    • Indications
      – Atraumatic instability
    • Pros
      – Addresses lax structures without compromising ROM
    • Cons
      – Posterior translation

Arthroscopic Capsular Plication

• Most common procedure for anterior-inferior instability

• Capsule shifted superiorly

• Capsule repaired to intact labrum
Arthroscopic Capsular Plication

- Rehabilitation
  - ABD sling for 2 weeks
  - PROM in “safe zone” immediately
  - Isometrics once sling D/C
  - Isotonics after 3 weeks as tolerated
  - Full ROM by 12 weeks
  - Progressive strength and sport/work activities
  - Throwing full speed at 1 year

Anterior Instability

- Thermal Capsular Shrinkage
  - Rarely done anymore
  - Probe used to heat capsule and ligaments
  - Unidirectional only
  - Poor long term outcome due to failure
**SLAP Surgical Interventions**

- **Type I**
  - Arthroscopic debridement to labrum
  - Biceps attachment is preserved

**SLAP Surgical Interventions**

- **Type I Rehabilitation**
  - Immediate PROM-AAROM
  - Full PROM by 2 weeks
  - Begin AROM at week 2
  - Isotonics at week 2
  - Dynamic stabilization
  - Progress strengthening at week 4-6
  - Return to Activity week 7+
SLAP Surgical Interventions

- Type II
  - Arthroscopic debridement and re-attachment of labrum to glenoid

SLAP Surgical Interventions

- Type II
  - Precautions
    - Control forces 8 weeks
    - No overhead motions 4 weeks
    - No isolated biceps 8 weeks
    - No resisted biceps 12 weeks
SLAP Surgical Interventions

- **Type II Rehabilitation**
  - **Weeks 0-4**
    - Sling for 4 weeks
    - Immediate “controlled motion”
      - Weeks 1-2
        - Elevation: 75°
        - ER @ 30°: 15°
        - IR: 45°
      - Weeks 3-4
        - Elevation: 90°
        - ER @ 30°: 30°
        - IR: 60°
    - Isometric strength
    - Rhythmic stabilization week 3

---

SLAP Surgical Interventions

- **Type II Rehabilitation**
  - **Weeks 5-6**
    - Progress mobility
      - Elevation to 145°
      - ER @ 45° Abd: 50°
      - IR @ 45° Abd: 60°
    - Full Can scaption
    - Prone row, Prone H-Abd
    - PNF manual resistance
    - IR/ER tubing at 0° Abd
    - **NO** Biceps strengthening
SLAP Surgical Interventions

- Type II Rehabilitation
  - **Weeks 7-9**
    
    - Progress mobility
      - Elevation to 180°
      - ER @ 90° Abd: 90°
      - IR @ 90° Abd: 75°
    
    - Progress isotonics
    
    - Continue PNF
    
    - Initiate “Thrower’s Ten Program”
    
    - Begin AROM of biceps

---

SLAP Surgical Interventions

- Type II Rehabilitation
  - **Weeks 10-12**
    
    - Thrower’s motion
      - ER @ 90° Abd to 115°–120°
    
    - Continue strengthening / Stretching
    
    - Progress isotonics
SLAP Surgical Interventions

- Type II Rehabilitation
  - **Weeks 12-20** *(Minimal Protection)*
    - Milestone Criteria
      - Full – painless AROM
      - Good stability
      - 4/5 or greater strength
      - No pain/tenderness
  - Week 12-16
    - Light plyometrics
  - Week 16-20
    - Interval Sport Program initiated

- Type II Rehabilitation
  - **Advanced Strengthening Phase**
    - Week 20-26
    - Milestones
      - Full pain-free AROM
      - Strength 75-80% of uninvolved
      - No pain / tenderness
  - **Return to Activity Phase**
    - Month 6-9
    - Milestones
      - Full functional ROM
      - Satisfactory shoulder stability
      - No pain / tenderness
SLAP Surgical Interventions

- Type III
  - Excision of “bucket handle” tear of labrum

SLAP Surgical Interventions

- Type III Rehabilitation
  - Immediate PROM-AAROM
  - Full PROM by 2 weeks
  - Begin AROM at week 2
  - Isotonics at week 2
  - Dynamic stabilization
  - Progress strengthening at week 4-6
  - Return to Activity week 7+
SLAP Surgical Interventions

- Type IV
  - Excision of “bucket handle” tear of labrum
  - Possible biceps tenodesis

---

SLAP Surgical Interventions

- Type IV Rehabilitation
  - Sleep in immobilizer for 4 weeks
  - Elevation to 90° only for 4 weeks
  - Full ROM by week 10
  - No isolated biceps for 4 months
  - Isotonics at week 4-6
  - Progressive strengthening at week 10-12
  - Light Plyometrics at week 12-16
  - Interval throwing at week 16-20
  - Full activity at 6-9 months
Biceps Tenodesis

- Removal of long head of biceps from glenoid
- Reattachment to proximal humerus
- “Keyhole” technique uses pre-drilled hole in humerus, insert knotted end of tendon
- Screw fixation- most common

Biceps Tenodesis

- Indications:
  - Anticipated irreversible changes to biceps tendon
  - >25% tearing or atrophy
  - Any luxation of tendon from bicipital groove
  - Biceps pathology in context of SLAP lesion
Rehab Considerations

- No bicep loading x 6 weeks
- Additional precautions in context of surgical procedures performed

Summary

- Key Factors to Optimize Outcomes
  - **Understanding of MOI**
    - Education; positions / activities to avoid
  - **Control forces on healing tissues**
    - Anterior-inferior capsule/labrum & Biceps
  - **Concomitant injury / surgery**
    - Impact to rehab progression
  - **Activity demands of patient**
    - ? Overhead athlete
Clavicular Fractures

- Common in children
- Fall on outstretched hand or direct impact
- Midshaft fracture common
  - Medial (SC) & lateral (AC) ligaments

Clavicular Fractures

- Treatment
  - Conservative
    - Figure-8 brace for 3-6 weeks
    - ROM <90° initially
    - Callus creates palpable “bump”
  - Surgical Stabilization
    - Open fracture
    - Neurovascular compromise
Acromioclavicular Joint Injury

• **Grade 1-2**
  • Partial tears
  • Recovery depends on degree of lifting and overhead activity

• **Grade 3-6**
  • Complete tears to A/C, Conoid & Trapezoid
  • Candidates for surgical repair

![Diagram of acromioclavicular joint with labels for coracoclavicular ligaments, trapezoid ligament, conoid ligament, coracacromial ligament, lesser tuberosity, and bicipital groove.](image)
**Acromioclavicular Joint Repair**

- “Tightrope” #5 fiber wire threaded clavicle to coracoid
- Minimally invasive
- Allograft w/screw fixation
- Invasive to clavicle, danger of fracture

---

**Acromioclavicular Joint Repair**

- Anatomic CC lig reconstruction, +/- AC lig
- Gracilis graft or dacron sutures
- Optimally only one drill hole in clavicle
- Loop around/under coracoid
- Procedure of choice
Rehab Considerations

• Non-op I-II:
  – limit IR, H-Add initially
  – sling up to 2-3 weeks
  – Gradual motion & strength

• Post-op: Sling 6-8 wks
  – Limit elevation < 90 degrees, avoid full IR, H-Add 3-6 wks.
  – Progress scaption to full ROM >6 wks.

Osteoarthritis

• Epidemiology
  – Primary
  – Secondary
    • Prior trauma

• Presentation
  – Pain
  – ↓ Function
  – ↓ Motion
Osteoarthritis

- Treatment
  - Pain management
- Capsular mobility
  - Capsular pattern
  - ER, Abd, IR
- Strength/Endurance
  - RC & scapular musculature

Shoulder OA Surgical Options

- Focal Humeral Lesions in articular cartilage, osteophytes
- Debridement
- Microfracture or abrasion
- Osteochondral Autograft Transfer (OATS)
Total Shoulder Arthroplasty

- When all else fails...
- Not suggested for
  - Laborers or high impact/load demands
  - Large inoperable RTC tears
  - Isolated humeral OA with intact scapular surface
    - Hemiarthroplasty

Traditional TSA

- Humeral component (Hemiarthroplasty)
- Glenoid component (TSA)
Traditional TSA

- **Rehabilitation Considerations**
  - Week 1-6 Subscapularis Precautions
    - Detached during procedure
  - Limit ER ROM <30 degrees
  - No IR resistive exercise
  - Scapular ROM and exercises
  - Wk 4 isometrics (no IR)

Traditional TSA

- **Rehabilitation Considerations**
  - Sling x 3-4 weeks
  - Scapular plane IR/ER/Scaption P/AAROM
  - Early strengthening 4-6 weeks
  - Flexion 100/140
  - ER 30- 60+
  - All values based on surgeon’s guidelines, pt’s response
Reverse TSA

- Grammont Delta prosthesis
- Europe initially
- Advantage in absence of functional RC
- Medializes center of rotation
- ↑ Deltoid lever arm
- More powerful abduction

Reverse TSA

- Technically even more difficult, especially determining correct deltoid tensioning
- Inferior scapular notching 50-96% of cases
- ER strength/AROM reduced
Reverse TSA

• **Indications**
  – Massive RC tear
  – Failed TSA with deficient RC

• **Contraindications**
  – Active infection
  – Impaired deltoid function
  – Need for high level shoulder function

---

Reverse TSA

• **Rehab Considerations**
  – Immobilizer-sling first 4-6 weeks
  – Dislocation: Combined IR/Add/Ext
    • Subscapularis status following deltopectoral approach
  – PT started between 2-4 weeks, per MD
  – AAROM weeks 5-7
  – AROM at 8-10 weeks
  – PRE’s week ~12, allowing for subscapularis healing
Reverse TSA vs. Traditional TSA

Thank You!

Email: d.nolan@northeastern.edu