Shoulder Stabilization in Athletes

When Can I Play

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Faculty Disclosure:

- Theradose Laser – Medical Advisory Board
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- Zetor Medical – Medical Advisory Board
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- Educational Grants:
  » Empi Medical
  » Joint Active System
  » ERMI
- Bauerfeind Brace

Book Royalties:

> CV Mosby, Lippincott, Human Kinetics
Shoulder Instability

Introduction

- Most commonly dislocated major joint in body (1.7%) general population
- Higher incidence in athletes/sports
- NCAA injury surveillance ‘89-’04: 4,080 instability events
- 0.12 per 1000 athletic exposures
- Greater rates in collision sports

Collision Sports Active Sports
Shoulder Instability
Goals of Presentation
- When can an athlete return to play following shoulder instability episode?
  - non-operative treatment
  - post-operative treatment
  - specific sports
  - anterior vs. posterior stabilization
- Discuss return to play criteria & time following shoulder stabilization

Shoulder Instability
Return to Play
- What is return to play?
- What does that mean?
- Is play – practice or competition?
- Need to be clearly defined
  - Often open to interpretation
  - Coaches
  - Athletic trainers
  - Player & parents

No Association of Time From Surgery With Functional Deficits in Athletes After Anterior Cruciate Ligament Reconstruction

Evidence for Objective Return-to-Sport Criteria

*AJSM '12*
Shoulder Instability

*Return to Play*

- Risk
  - Early return to sports
  - What’s the level of the risk

- Benefit
  - Return to sports
  - Scholarship, last season, or dream

*Return to Play*
Return to Throwing Criteria
Rehab Overhead Athlete

Return to Play Criteria

- Full sport specific non-painful ROM
- Strength which meets the criteria
- Excellent stability and no painful special tests
- Demonstrates proper throwing mechanics
- Successfully has completed rehab program, ITP
- Appropriate rehab progression completed
- Satisfactory functional scoring

An Objective Criteria is Important

Return to Play Criteria

Assess Shoulder PROM

- PROM Shoulder Joint
  - Supine 90/90 Position
  - ER: 115-125°
  - IR: 55-60°
  - TROM: 180-185°
  - Horz Add: 40-45°
  - No apprehension
  - No pain at end range
  
  Wilk et al: CORR ‘12
  Wilk et al: AJSM ‘14, ’02, ‘11

Assess Muscular Strength

Biodex - Isokinetics

- ER / IR ratios
  - 72 - 76%
- ER / ABD ratios
  - 68 - 73%
- Torque / BW ratios
  - ER 18 - 23%
  - IR 26 - 32%
- Bilateral comparison
  - ER 95-100%, IR 115%
  
  Wilk et al: AJSM ’93
  Wilk et al: AJSM ’95
Return to Play Criteria

**Appropriate Rehab Progression**

- ✔ Plyometrics
  - pain free 2 hand throwing
  - pain free 1 hand throwing
  - pain free throws with 1 lb
- ✔ Dynamic stabilization drills
  - RS drills at 90/90
  - prone ball drop test

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Return to Play Criteria

**Ball Drop Test**

- ✔ Dynamic stabilization tests
  - Prone ball drops
    - 30 sec test
    - prone on plinth
    - number of releases/catches
    - compare Dom to Non Dom
    - score: %
    - Goal: 90%>
    - Expectation; 110%>

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Return to Play Criteria

**Single Leg Squat**

- ✔ Single leg squat test
  - Floor or 8 in step
    - 10 reps on each leg
    - assess depth
    - assess valgus/varus
    - assess lateral trunk movt.
    - assess trunk flexion
    - looking for symmetrical motion with no pain &/or dysfunction
Return to Play Criteria

Appropriate Rehab Progression

✓ Subjective Shoulder Questionnaire & Scoring System
✓ KJOC

AJSM '11
Clin Spts Med '13
Case Presentation #282011

- 24 yr old star running back (best player on team)
- Dislocation of ND shoulder during the second pre-season game while making a tackle
- MRI indicates Bankart lesion from ~7:00 to 9:00
- No Hill Sachs, no GLAD lesion
- 2+ laxity anterior, posterior normal
- Treatment: Surgery or Non-Op Rehab?

Non-Operative Rehab Shoulder Instability

- Initial period to calm tissue down
- Early light & gradually motion
- No aggressive stretching (ER & elev)
- Dynamic stabilization drills
- More than strengthening
- Proprioception drills
- Perturbations drills
- Sport specific movements
- Plyometrics
- Brace return to play in 12 days
Non-Operative Rehab Shoulder Instability

The Weekend Warrior

- Immobilization 2-4 wks
- Reduce pain & inflammation
- Conservative rehabilitation
- Easy motion at 2-4 wks
- Gradual strengthening program
- Emphasize scapular control
- Proprioception drills
- What are they going back to?
- Lower expectations levels

Case Presentation #7182016

- 16 yr old high school QB
- Non dominant shoulder Bankart repair performed 8 weeks post-op
- 3 anchors utilized - (9:00, 7:30 & 6:00)
- Normal ROM, good strength, excellent stability
- Wants to be back to participant in spring practice and summer camps
- “it’s my non throwing shoulder & I just want to do hand offs to the left only”
Case Presentation #7182016

- 20 yr old college D1 linebacker
- Dominant shoulder Bankart repair performed 5 months post-operative
- 5 anchors utilized: (3:00, 4:30, 6:00, 7:30 & 9:00)
- ROM: ER: 95°, Flex.: 165°, IR: 58°
- Strength: ER: 4+/5, IR: 5/5, Abd: 5/5
- Stability testing: excellent with no apprehension sign
- “when can he lift with other players? When can he return to practice?”

Shoulder Instability

Introduction

✓ ~10% of all players at NFL Combine had shoulder instability
  Brophy et al: MSSE ’07
✓ 4th most common procedure seen on FB players at NFL Combine
  Brophy et al: MSSE ’07
✓ College players- 2nd most common shoulder injury in FB players (overall 4th most common procedure performed)
  Kaplan et al: AJSM ’05

Rehabilitation Shoulder Instability

Return to Play Criteria

✓ 3 P Program:
  ✓ Performance
  ✓ Practice
  ✓ Play
Rehabilitation Shoulder Instability

Return to Play Criteria

3 P Program:

Performance Training:

- performance training – sport specific drills
- plyometrics
- agility drills
- speed drills
- sport specific drills (throwing, catching, hitting)
  (contact sports: hitting a bag, wall pushes, shadow)

Practice situations:

- control practice
- gradual increase time, intensity, reps
- lower intensity to begin gradually increase intensity
  50-60% → 75% → 80-90% → 100%
- return to practice game (game simulation)

Play:

- return to competition
- game situation
- 100% effort
Rehabilitation Shoulder Instability

Return to Play Criteria – (Non-Op)

- Appropriate time from injury
- Full sport specific non painful ROM
- Strength which meets the criteria (objective tests)
- Excellent stability
- No painful special tests
- Successfully has completed rehab program
- Appropriate rehab progression completed
- Satisfactory functional scoring

An Objective Criteria is Important

Reactive Neuromuscular Shoulder Testing
Can An Athlete Perform Effectively Following An Episode of Shoulder Instability???
Shoulder Instability

In–Season Injuries

*Buss et al: AJSM 2004*

- 30 athletes dislocation/subluxation
- Rehab & Brace
- 27/30 players returned avg 10.2 days
- 3 required surgery (in-season)
- 37% experienced recurrence in season
- 16 surgery @ end of season
- 20/30 (66%) required season within 6 mos
Dickens et al: AJSM ‘14

• NCAA athlete study (2 yr study, 45 contact athletes – prospective study
• 73% of the athletes able to return to sports at a median of 5 days following injury
• 36% did not experience episodes of recurrence
• 30% had recurrences but completed season
• 33% had recurrence & couldn’t complete season
• Subluxation players were 5.3 x more likely to return to sports than those that dislocated
• Return to play criteria -
Taylor, Arciero: AJSM ’97

• 116 first time anterior shoulder dislocations in 112 men & 4 women (mean age 19.6 yrs)
  • 53 chose non-op treatment
  • 63 elected to have surgery
• 97% patients surgery complete
  detachment capsulolabral complex
  » 1 patient HAGL & 1 interstitial tear
  capsule intact labrum
✓ 53 patients treated non-operatively –
  90% developed recurrent instability
✓ 4 weeks immobilization
✓ Supervised rehab & no athletic participation 4 months

Non-Operative Treatment
for First Time Shoulder Dislocation
In the Elite Athlete


Non-Op Traumatic Instability
Anterior Dislocation

• Four Phased Approach:
  ✓ Acute Phase
  ✓ Stabilization Phase
  ✓ Dynamic Stabilization Phase
  ✓ Return to Activity Phase
Non-Op Treatment Instability
4 Phase Programs

• Acute Phase:
  ✓ Sling for comfort
  ✓ Gradually restore non painful ROM
  ✓ Reduce pain & muscle spasms
  ✓ Prevent muscular atrophy & initiate activation ex

• Subacute Phase:
  ✓ Enhance dynamic stabilization
  ✓ Improve GH & ST joint strength & proprioception abilities/skills
  ✓ Gradually restore non painful functional ROM

• Advanced Strengthening Phase:
  ✓ Improve strength, power & endurance
  ✓ Enhance neuromuscular control
  ✓ Enhance dynamic stabilization & reaction stability (perturbation drills)
  ✓ Prepare athlete for gradual return to sports

• Return to Play Phase:
  ✓ Maintain optimal level of strength, power & endurance
  ✓ Progress to full level of sport participation

Non-Operative Rehabilitation
Shoulder Instability

6. Perturbation training
  ✓ End range stability
  ✓ Postural/positional disturbance
  ✓ Critical rehab goal
  ✓ Necessary component allowing athletes to return to overhead sports

Critical Skill to Return to Sports
Non-Operative Rehabilitation
Shoulder Instability

8. Functional Sport Specific Drills
   » Plyometrics
   » Sport specific drills
   » Gradual progression
   » Two hand drills
     one hand drills
     • mid-range drills – full/end range drills

Rehabilitation Following Shoulder Stabilization Surgery

Milchteim, Tucker, Darin, Andrews: Arthroscopy ’16

• 94 shoulders arthroscopic Bankart in Athletes
• Mean 5 yr. follow up. (3-8.8 yrs)
• 71% multiple dislocations, 93% sports related
• 82.5% returned to same level of sports
• ASES 91.5/100, VAS 8/10, satisfaction 8.8/10
• 6.4% recurrence rate
  » Professional athletes 23%
  » College athletes: 30%
  » High school athletes: 31%

Goal: Return to Sports 7-9 mos
Brophy et al: AJSM ’11

- 42 players with shoulder stabilization
- 91% anterior stabilization & 90% open procedures

✓ Shoulder stabilization significantly decreased length of career & games played
  » 5.2 yrs vs 6.9 yrs
  » 56 games vs. 77 games

✓ Position dependent: linemen & LB with history shldr stab shorten career most…other positions no significant findings

Rehabilitation Shoulder Instability

Return to Play Criteria (Post-Op)

✓ Appropriate time from surgery (post-op timeframe
✓ Full sport specific non painful ROM
✓ Strength which meets the criteria (objective tests)
✓ Excellent stability
✓ No painful special tests
✓ Successfully has completed rehab program
✓ Appropriate rehab progression completed
✓ Satisfactory functional scoring (ASES, Rowe)

An Objective Criteria is Important
Rehabilitation Following Shoulder Stabilization

Rehab Philosophy

- Understand type & nature of lesion (traumatic, congenital)
- Understand type of surgical procedure
- Rehab must match the surgery & patient
  - Isolated lesion
  - Concomitant lesion
- Evaluate/grade patients' tissue status
- Never overstress healing tissue
- Avoid effects of immobilization
- Gradual increase applied forces/loads
- Recognize fixation strength & healing rates

Rehabilitation Following Shoulder Stabilization

Rules of the Road

- Rehab program must match the surgery
- Rehab program must be based on patient's unique tissue qualities
- Rehab program must be adaptable to host tissue's response
- Gradual progression is key
- Ultimate goal is dynamic/static stability
  - Restore Normal Full Pain-free Function

SHOULDER INSTABILITY

Numerous Surgical Procedures

- Bankart procedure (open or arthroscopic)
- Capsular shift procedure
- Plication procedure
- Capsulolabral reconstruction
- Laterjet procedure
- Remplissage
- Concomitant posterior capsule repair?
REHABILITATION FOLLOWING ARTHROSCOPIC BANKART

Precautions

• No overhead motions for 4-6 weeks
• Sling for 4 weeks
• Sometimes longer for specific patients
• Sleep in brace for 4 weeks
• No excessive ER or extension or horizontal abduction

Precautions dependent on extent of lesion & surgical technique

REHABILITATION FOLLOWING ARTHROSCOPIC BANKART

Range of Motion

 ✓ Immediate motion in scapular plane
 ✓ ER / IR @ 30 deg abduction
 ✓ Flexion to 90 degrees only (for first 4 weeks)
 ✓ At week 5, gradually progress ROM
 ✓ ER / IR at 90 degrees ABD
 ✓ Flexion > 90 degrees – gradual†
 ✓ At week 7 – 8: full ROM

What Does Full ROM Mean?

REHABILITATION FOLLOWING ARTHROSCOPIC BANKART

Range of Motion

• Gradually increase ROM based on patient’s healing response, tissue quality & end feel.
• Also based on patient’s desired activities

Football ↔ Overhead Athlete
• 90 degrees of ER ?
• Week 8-12: push throwers ROM
**REHABILITATION FOLLOWING ARTHROSCOPIC BANKART**

*Strengthening Exercises*

- Isometrics and rhythmic stabilization drills 2 weeks
- Progress to tubing ER / IR week 3
- Isotonic strengthening week 4 - 5
- Aggressive strengthening week 12 - 14
- Plyometric training week 14-16

**REHABILITATION FOLLOWING ARTHROSCOPIC BANKART**

*Functional Activities*

- Sport-specific training: initiated week 18 - 21
- Interval throwing program: initiate at week 16
- Return to contact sports: gradual at 6-7 months
- Return to overhead sports: 6 - 9 months

**REHABILITATION FOLLOWING OPEN BANKART**

*Motion*

- Immediate easy motion to tolerance with restrictions
  - ER / IR in scapular plane at 30 deg abd.
  - ER usually painful
  - IR not painful or tight
  - Flexion to tolerance (90)
  - Progress ER/IR motion to 45 deg abd. at 2-3 weeks
REHABILITATION FOLLOWING OPEN BANKART

Motion

- Gradually ER/IR ROM to 90 deg abduction
- Gradually applying stretch on inferior capsule
  » ER at 90 deg progression:
  » At week 4-5: 45-50 deg
  » At week 6: 65 deg
  » At week 8: 80 to 90 deg
  » At week 10/12: 85–95 degrees

REHABILITATION FOLLOWING OPEN BANKART

Strengthening Program

- Immediate isometrics, RS, RI, co-contractions
  » No IR for 2 weeks
- Initiate isotonics week 3
- Aggressive strengthening week 8 – 10
- Caution against high loads at excessive points of ROM
- Plyometric drills week 12

REHABILITATION FOLLOWING OPEN BANKART

Functional Activities

- Weight training 14 – 16 weeks
- Sport-specific training 3 - 4 months
- Contact sports: 6 months
- Collision sports: 6+ mos
- Return to overhead sports (when able)
  » Interval throwing program week 16
Rehabilitation Following Anterior Laterjet

- Shoulder sling for 4 weeks
- Sleep in shoulder brace for 4 weeks
- Immediate restricted motion:
  - Flexion to 90 deg for 4 weeks
  - ER/IR @ 30 abd: ER to 20 deg for 2-4 wks; IR to 20-30 for 4 weeks
  - ER/IR @ 45 abd: ER to 25 deg; IR to 45 deg
- Submaximal isometrics, scapular strengthening

Rehabilitation Following Anterior Laterjet

- Week 6:
  - Flexion to 145 deg
  - ER @ 45 deg abd: 45-50 deg
  - IR @ 45 deg abd: 55-60 deg
  - Isometrics, light isotonics, scapular strengthening
- Week 8: Gradually increase ROM
- Week 10-12: approximately full ROM
- Progress to isotonics week 12
- Sports specific training (restricted) week 16
- Return to sports: depends on type of sport 5-6 mos.

Rehabilitation Following Arthroscopic Plication

- Control forces for at least 6-8 weeks
- Gradually increase applied loads
- Immediate controlled restricted motion
  - Flexion to 70 deg week 1; 90 deg week 2
  - ER/IR @ 30 deg abd (15/30 deg) week 2
- Motion below 90 degrees for first 4 weeks
- Shoulder immobilizer (sleep) 4 weeks
- Isometrics, RS, scapular trn., & proprioception
Rehabilitation Following Arthroscopic Plication

- Gradually increase ROM
  - Week 4: motion above 90 degrees
  - Flexion to 125 degrees (wk 4), then gradually increase
  - ER/IR @ 90 deg abd. (ER to 30-40) week 5
- Week 6:
  - Flexion to 145 deg
  - ER @ 90 deg abd. 70 deg*
- Week 8: Full flexion motion
  - ER @ 90 deg abd to 90
- Weeks 8-12: gradually increase to thrower’s motion 115 deg. of ER

Rehabilitation Following Arthroscopic Plication

- Isometrics, dynamic stabilization drills wk1&2
- Active limited ROM week 3
- Light isotonic exercises week 4
  - Use 1 lb.
  - Increase 1 lb/week
- Initiate weight training (gradually) week 10-12
- Plyometrics (2 hand drills) week 12
- Interval throwing program: week 16
- Interval hitting program: week 13-14
- Return to sports; contact 6-7 mos. Overhead 7-9 mos
Rehab Following Remplissage

Rehab Overview

- Procedure usually performed with another procedure (Bankart, etc…)
- Precautions from other procedure
- Precautions: restrict IR, Horz adduction, pushing movements, bench press etc…
- Immediate motion for ER at 45 deg abd & flexion PROM to 90 deg for 4 weeks
- Initiate IR ROM at 6-8 weeks post-op
- ~Full ROM: 8 to 12 weeks

RTP Following Shoulder Stabilization

Conclusions

- Shoulder instability is a common shoulder lesion
- Often surgery is required to restore functional stability
- RTP should be based on several factors:
  - Time (healing constraints)
  - Objective criteria (ROM, strength)
  - Subjective criteria
  - Rehab progression & NM control is critical factor

Rehab Following Shoulder Stabilization

Conclusions

- Shoulder instability is a common shoulder lesion
- Often surgery is required to restore functional stability
- Rehab program must match the surgical technique & patient variables
- Stiffness in active people can lead to poor results & OA
Non-Operative Rehab Shoulder Instability

The Weekend Warrior

“Okay, folks! It’s a wrap!”

Thank You !!!