Management of Primary Traumatic Shoulder Instability

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Disclosure

Arthrex – Consultant
AJSM – Principal Reviewer
JBJS – Consultant Reviewer
AAOS – Evaluation Committee

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• Smith & Nephew
• NIH (CT Chen)
• HSS Institute for Sports Medicine Research
• Major League Baseball
Case Example

Treatment Options:

Rationale?
Case Example

Treatment Options:
• **Recurrence common**

• **Strong correlation with age**

  • **Rowe (1980)**

  • **Rates of recurrence**
    - 100% < 10 yo
    - 94% 10-20 yo
    - 79% 20-30 yo

• **Males > Females**
Hovelius (1987) #1 risk factor: age

- <22 y/o: >55% recurrence
- 22-29 y/o: >37% recurrence
- 30-40 y/o: >12% recurrence

Walton (2002) “current concept”: risk at 2 age peaks

- <20 y/o: 70% recurrence
- >60 y/o: 65% recurrence

Kralinger (2002) age 21-30y/o: only risk factor

Hattrup (JSES, 2001) age: one of the 5 factors with a negative influence on results
Shoulder Instability:

Etiology

Pathology
- Bankart (ALPSA)
- IGHL Injury (HAGL)
- Hill-Sachs
  - Engaging, Glenoid Track
  - Itoi (JSES, 2007)

Treatment
- Prior instability treatment
- Cuff & Periscapular mm Fxn

Patient-Specific Factors
- Age
- Hand-Dominance
- Tissue Quality
- Ligamentous Laxity
  - DiBerardino (AJSM, 2001)

Activity
- Activity level
- Overhead athlete?
- Contact/Collision Athlete?
  - Henry (AJSM, 1982): 95%
  - Simonet (AJSM, 1984): 82%
  - Wheeler (Arthrscopy, 1989): 92%
  - Arciero (AJSM, 1994): 80%
  - Miniaci (AAOS, 1999)
What is optimal management for First Time Dislocator?

Controversial
Nonoperative Management for In-Season Athletes With Anterior Shoulder Instability

Daniel D. Buss, MD, Gregory P. Lynch, MD, Christopher P. Meyer, MD, Shane M. Huber, ATC, and Michael Q. Freehill, MD
From 1Sports and Orthopaedic Specialists, Minneapolis, Minnesota, 2Johnson County Orthopaedics, Olathe, Kansas, and the 3University of Minnesota Department of Orthopedics, Minneapolis, Minnesota

N = 30 athletes
- high school & collegiate level

Average age = 16.5 yrs

Type of sport
- Ice Hockey (10)
- Football (9)
- Wrestler (5)
- Basketball (4)
- Downhill skier (1)
- Gymnast (1)
Nonoperative Management for In-Season Athletes With Anterior Shoulder Instability

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Treatment protocol

• No immobilization
• Immediate physical therapy
  – ROM exercises (pendulum)
  – Rotator cuff & Periscapular strengthening

Return to play

– Symmetric strength bilaterally (+) functional ROM

Brace upon return

Duke Wyre Brace
Sully Brace
• **90%** (27/30) return to same or equivalent level of play for that season
  • 1/27 did not complete the season
  • **46%** underwent stabilization at end of season
• **19 athletes wore brace**
  - No wrestlers
• Average missed days: **10.2** [Range = 0-30]
Randomized patients to 2 groups:

- Immobilization in IR (94) vs. ER (104)
- Total time: 3 wks
- Passive ROM initiated after 3 wks
- Return to play: 3 months
Significantly higher recurrence rate \((p = 0.033)\) between pts in IR (42\%) vs. ER (26\%)

No significant difference in return to play between groups

Significant difference in compliance

53\% IR
72\% ER
No Effect of External Rotation Bracing


McCarty EC. Immobilization with an external rotation brace was similar to an internal rotation sling for shoulder dislocation. *JBJS - Am, 2014*

No Effect of External Rotation Bracing

37% redislocation with ER bracing

40% redislocation with sling (IR)
(p=0.41)

No Significant Role in a Young, Active Upper Body Dominant Population
What is rationale behind acute surgical stabilization?

- Better tissue quality
- Avoid pathology of Chronic Instability:
  - Evolution into ALPSA lesion
  - Glenoid erosion
    - Deeper & larger Hill-Sachs lesion
    - Capsular elongation & attenuation
    - Effects of cumulative chondral injury
  - ?  \(\uparrow\) Glenohumeral Arthritis
15 y/o RHD male football goalkeeper & basketball player s/p dislocation & reduction
What is data to support acute surgical stabilization?

Kirkley, et al. (1999)
Prospective RCT w/ 2-yr F/U; 47% recurrence w/ conservative tx & 16% w/ primary stabilization
WOSI QOL Index improved in all categories for stabilized pts

Bottoni, Arciero et al. (2002)
75% recurrence w/ conservative tx group & 11% in surgical group

Kralinger, et al. (2002)
166 pts. @ 3.5 yr f/u
61% recurrence rate for 21-30 y/o pts & recommended surgery for 21-30 y/o pts in high-risk sports

Jakobsen et al. (2007)
Level I Prospective RCT of 76 pts < 40 y/o; 54% recurrence w/ conservative mgmt at 2 yrs & 74% unsatisfactory results @ 10 yrs vs. 3% recurrence with open surgical repair & 72% good-excellent @ 10 yrs
Primary Arthroscopic Stabilization for a First-Time Anterior Dislocation of the Shoulder

A Randomized, Double-Blind Trial

By C. Michael Robinson, BMedSci, FRCSEd(Orth), Paul J. Jenkins, MBChB, MRCS(Ed), Timothy O. White, MD, FRCSEd(Orth), Andrew Ker, BSc(Med Sci), and Elizabeth Will, MSc, MCSP

Investigation performed at The Edinburgh Shoulder Injury Clinic, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom

Single-center, double-blind RCT
88 pts (<35 yrs), 2 yr follow-up (95%)
• Randomized to either arthroscopic exam or Bankart repair
• Rate of recurrent instability, final outcome (DASH, SF-36, WOSI), ROM, pt satisfaction, direct health-service costs, & tx complications for 84 pts (42 in each group)

Strengths:
• thoughtful design
• randomized trial
• well-powered
• Excellent follow-up (95%)
Improved functional outcome appeared to be through prevention of instability.

Risk of further dislocation reduced by 76%
Risk of all recurrent instability reduced by 82%
Functional scores were also better ($p < 0.05$)
Treatment costs were lower ($p = 0.012$)
Pt satisfaction was higher ($p < 0.001$)

Functional outcome in pts with stable shoulders was similar, irrespective of initial treatment.

Pts who had a Bankart repair & played contact sports were also more likely to have returned to sport at 2 yrs (relative risk = 3.4, $p = 0.007$).
Bankart Repair Group

Risk of further dislocation reduced by 76%
Risk of all recurrent instability reduced by 82%
Functional scores were also better ($p < 0.05$)
Treatment costs were lower ($p = 0.012$)
Pt satisfaction was higher ($p < 0.001$) after arthroscopic repair

Conclusions: Following a first-time anterior shoulder dislocation, there is a marked treatment benefit from primary arthroscopic repair of a Bankart lesion

However, primary repair does not appear to confer a functional benefit to pts with a stable shoulder at two years.
West Point as an Injury Laboratory

Indoor Obstacle Course: Low Crawl, Vault, Shelf Climb

Highest rates among Army, junior enlisted soldiers.
Incidence of 1.69 per 1000 person-years second only to West Point population 4.35 per 1000 person-years
The First Time Dislocator: The Conundrum

**Fact:** 1st Time Dislocators in Specific Populations have a High Redislocation Rate

Potential Solution #1: Fix them early to avoid recurrence
2nd Order Effect: You will fix between 10% and 40% of shoulders that wouldn’t have recurrence

Potential Solution #2: Fix them late after recurrence to avoid operating on those who will remain asymptomatic
2nd Order Effect: Greater injury to glenohumeral joint with subsequent episodes leading to late arthropathy

26 yr-old male
• 10 yr history of recurrent instability
Predictive Model of Recurrent Instability after First Time Dislocation

- Markov decision model created for recurrent instability after first time anterior dislocation
  - Variables change over time
  - Analyze Probabilities of each possible outcome
- Externally validated against two previous clinical trials

18 y/o with first time dislocation will have
77% chance of recurrence in one year and
32% chance of a stable shoulder at 10 years

A predictive model of shoulder instability after a first-time anterior shoulder dislocation

Richard C. Mather III, MDa,*, Lori A. Orlando, MD, MHScb, Robert A. Henderson, MSca, J. Todd R. Lawrence, MD, PhDc, Dean C. Taylor, MDa

J Shoulder Elbow Surg (2011) 20, 259-266
Expected-Value Decision Analysis

Based on outcome probabilities and utility values based on data from young, active patients, *arthroscopic management is preferred over non-operative management*

Call for more research on prevention after first time dislocation and predicting the high risk individual

Operative versus nonoperative treatment after primary traumatic anterior glenohumeral dislocation: expected-value decision analysis

Julius A. Bishop, MD,*, Timothy S. Crall, MD, Mininder S. Kocher, MD, MPH

J Shoulder Elbow Surg (2011) 20, 1087-1094
Cost Effectiveness Analysis takes into account the costs not just preferences of surgeon and patient.

Construct Markov model of First Time Dislocator treatment:
- Variables change over time
- Analyze Probabilities of each possible outcome

Compare Cost (to patient, payer, society) to Effectiveness of Procedure (Quality Adjusted Life Years -- QALYs)

- Probabilistic Sensitivity Analysis
  - varies cost, probabilities, utility parameters

Cost-Effectiveness Analysis Results

Over a 15 year period, primary surgery was LESS costly and MORE effective for:
- 15 y/o boys and girls
- 25 y/o men

Primary surgery was MORE costly and LESS effective for:
- 25 y/o women
- 35 y/o men and women

Cost-Effectiveness Analysis of Primary Arthroscopic Stabilization Versus Nonoperative Treatment for First-Time Anterior Glenohumeral Dislocations

Timothy S. Crall, M.D., Julius A. Bishop, M.D., Dan Guttman, M.D., Mininder Kocher, M.D., M.P.H., Kevin Bozic, M.D., M.B.A., and James H. Lubowitz, M.D.

The 25 Yr-Old Woman Conundrum

- Increased sports participation & intensity
- Increased prevalence of ligamentous laxity

Treatment Options / Thoughts?
The 25 Yr-Old Woman Conundrum
Capsulolabral Complex Injury

- **Bankart lesion alone is not sufficient for recurrent instability***
  - Some degree of capsular deformation is a necessary component

- **Anterior & inferior portions of capsule elongated ≥ 19% after dislocation**

*Urayama, Itoi et al., AJSM, 2003
Speer & Warren, et al., JBJS, 1994
Bigliani et al., JOR, 1992

Must address capsular laxity at time of surgery
**Goals of Surgery**

- **Restore Capsulolabral Complex**
  - Vertical & Lateral-to-Medial
  - Peripheral face of glenoid

- **Technical Considerations**
  - Osseous / Articular Arc Deformity
    - Osseous Glenoid Fracture or Erosive Defect
    - Hill-Sachs Lesion
  - Superior Labral Pathology
  - Assess Posterior Capsule / Laxity
Goals of Surgery

**Restore Capsulolabral Complex**
- Vertical & Lateral-to-Medial
- Peripheral face of glenoid

**Technical Considerations**
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**Relative Contraindications**
- Articular-Arc Deficit
  - “Significant” Glenoid Bone Loss
  - “Large” Engaging Hill-Sachs
- Inadequate Capsulolabral Tissue
- HAGL
**Critical Size – Clinical data**

**Small glenoid defect - <15% diameter**
- Glenoid defect does not likely affect outcome

**Moderate glenoid defects – 15-25% diameter**

**Large glenoid defects - >25-30% diameter**
- Burkhart, *Arthroscopy* 2000. N=194 scope repairs. 11% recur. 4% redislocation with no bone loss. 67% (14/21) with instability had bone loss (inverted pear glenoid). 89% instability in contact athletes with bone loss.
42 y/o male firefighter
What to do with the Big Hill Sachs?

Contact between the glenoid and the humeral head in abduction, external rotation, and horizontal extension: A new concept of glenoid track

Nobuyuki Yamamoto, MD, a Eiji Itoi, MD, b Hidekazu Abe, MD, a Hiroshi Minagawa, MD, a Nobutoshi Seki, MD, a Yoichi Shimada, MD, a Kyoji Okada, MD, a Akita and Sendai, Japan

Key Concepts:
- Engaging?
- Articular Arc
- Glenoid Track

JSES, 2007
Critical Steps

- E.U.A.
- Anterior Portal established with Spinal Needle
- Accessory Anterolateral Portal established with Hubless Needle
- View from accessory anterolateral portal
- Mobilization of CLC until fibers of Subscap visualized
- Adequately mobilized Labrum floats back to surface
Critical Steps

- Passing suture shuttle
- Anchor Insertion
- Completed Repair
Rem P’ Lissage

Preparation
Suture Passage
Sutures Tied in Subacromial Space

Anchor Placement
Suture Passage
Completed Procedure
Management of Primary Traumatic Anterior Shoulder Instability

Thank you to: Col. Steve Svoboda, MD & West Point Sports Medicine

Thank You

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Instability Severity Index Score

> 6 Points Equates to Unacceptable Risk of 70% (p<0.001)

<=6 Points has 10% risk of recurrence

- Authors recommend open coracoid transfer in cases where ISIS Score is more than 6.
- We don’t do Latarjets in primary setting

BUT:

A large proportion of cadets are:
<20 years old (2pts)
Competitive athletes (2pts)
Contact or forced overhead (1pt)

ISIS Score 5pts

Table IV. Instability severity index score is based on a pre-operative questionnaire, clinical examination, and radiographs

<table>
<thead>
<tr>
<th>Prognostic factors</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at surgery (yrs)</td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>0</td>
</tr>
<tr>
<td>Degree of sport participation (pre-operative)</td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
<td>2</td>
</tr>
<tr>
<td>Recreational or none</td>
<td>0</td>
</tr>
<tr>
<td>Type of sport (pre-operative)</td>
<td></td>
</tr>
<tr>
<td>Contact or forced overhead</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
<tr>
<td>Shoulder hyperlaxity</td>
<td></td>
</tr>
<tr>
<td>Shoulder hyperlaxity (anterior or inferior)</td>
<td>1</td>
</tr>
<tr>
<td>Normal laxity</td>
<td>0</td>
</tr>
<tr>
<td>Hill-Sachs on AP radiograph</td>
<td></td>
</tr>
<tr>
<td>Visible in external rotation</td>
<td>2</td>
</tr>
<tr>
<td>Not visible in external rotation</td>
<td>0</td>
</tr>
<tr>
<td>Glenoid loss of contour on AP radiograph</td>
<td></td>
</tr>
<tr>
<td>Loss of contour</td>
<td>2</td>
</tr>
<tr>
<td>No lesion</td>
<td>0</td>
</tr>
<tr>
<td>Total (points)</td>
<td>10</td>
</tr>
</tbody>
</table>

* AP anteroposterior

F. Balg, P. Boileau

From University of Nice-Sophia
Antipolis, Nice, France