Anterior Shoulder Instability
Midseason Management
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CME Accreditation

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Dr. John Hinchey has no relevant financial relationships with commercial interests to disclose.

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Learning Objectives

- Review history of shoulder dislocations
- Understand the anatomy responsible for shoulder stability
- Understand the incidence & pathophysiology of shoulder dislocation & instability
- Review the physical exam & radiographs of shoulder dislocation
- Understand the treatment options & rational for midseason shoulder instability

History

- Shoulder Dislocations have been described and recorded from the beginning of recorded history.
- 3000 BC: Egyptians recorded and depicted a reduction maneuver as early as 1200 BC.
History

- 400 BC: Hippocrates described numerous reduction techniques.
- He also described the first surgical treatment: inserting a red-hot rod through the axilla to create scarring in the inferior shoulder.

History

- 1895: Wilhelm Roentgen developed medical x-ray.
- 1898: Francke - first series of shoulder dislocations radiographically characterized.

History

- 1939: Bankart described the problem with anterior shoulder dislocations as "detachment of the glenoid ligament from the anterior margin of the glenoid cavity."
- In 1940, two radiologists, Harold Hill and Maurice Sachs, published a review of the humeral head compression fractures.
The glenoid covers only 25-30% of the humeral head and is an inherently unstable construct.

5 degree superior tilt of the glenoid helps with inferior stability.

Variations from the 7 degree average retroversion has not clinically been shown to affect anterior stability.

- **Increases the contact area** with the humeral head articulat surface from 1/4 with the glenoid alone to 1/3 with the labrum.
- **Stability Ratio** (force to dislocate humerus against compressive forces pressing the humerus against the glenoid) decreases by 20% without the labrum.
- **Labrum assists with stability** especially inferiorly.

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Ligament Anatomy - Origins

- **SGHL** - 3 variations in origin:
  - Biceps Tendon
  - Labrum
  - MGHL
- **MGHL** - Arises from the anterior Labrum or glenoid neck
- **IGHL**
  - Arises from glenoid between 2-4 o’clock anteriorly and 7-9 o’clock posteriorly.
  - Two Bands: *Anterior* and *Posterior*

Ligament Anatomy - Attachments

- **SGHL** - Attaches just superior to the lesser tuberosity
- **MGHL** - Attaches medial to the lesser tuberosity deep to the subscapularis tendon
- **IGHL** - Inserts on about a 90 degree arc just off the articular surface

Superior Glenohumeral Ligament

- **Assists as an inferior stabilizer**
- With the MGHL assists with anterior stability in an abducted and neutral position.

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Middle Glenohumeral Ligament

- Helps provide anterior stability in lower degrees of abduction. (Also with the SGHL provides stability with the arm abducted and in neutral rotation)
- Stress on the ligament reduces with increased abduction & external rotation

Inferior Glenohumeral Ligament

- With abduction and external rotation of the arm, the Anterior Band becomes the primary static stabilizer of the shoulder.

Passive Muscle Stabilization

- **Subscapularis** provides primary anterior stability passively with the shoulder at 0 and 45 degrees of abduction.
- At 90 degrees of abduction the IGHL is the primary stabilizer.
Dynamic Muscle Stabilization

- **Rotator cuff musculature** provides important assistance to **dynamic anterior stability**.
- Creating the **compressive forces** on the humeral head.

Shoulder Dislocation Incidence

- Extremely Common Problem
- US Incidence: 23.9 per 100,000 person-years.
- **Males are 2.5 times more likely** to sustain a dislocation.
- **Nearly half** of dislocations occur in individuals between the **ages of 15-29 years**.
- Much higher in military and **athletic groups** of individuals.

Pathoanatomy of Anterior Dislocations

Bankart Lesion

- **Bankart Lesion**: Avulsion of the labrum from the glenoid.
- Typically occurs in the **anterior-inferior aspect of the glenoid** → insertion of the IGHL.
Bankart Lesion creates a reduction in the stability angle, which reduces the force needed to dislocate the shoulder. Studies report the incidence of a bankart lesion is >90% with first-time dislocation.

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Incidence: 32-51% with initial dislocations increases with recurrent dislocations.

If H-S & Bankart are engaging lesions, increasing instability and failure if Bankart repaired & H-S not addressed.

Engagement: Hill-Sachs lesion contacts the anterior glenoid.

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Nonoperative treatment has been the gold standard for treating primary anterior dislocations. Recently, Nonoperative management has been questioned as the best treatment.
**Treatment - Immediate**

- On the field –
  - If recognized, attempt a closed reduction
  - If unsuccessful, send to ER for sedation and closed reduction
- Place in sling once reduced and refer to team MD

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**Treatment Algorithm**

[Diagram of treatment algorithm]

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**Nonoperative Treatment**

- Initial period of **immobilization** → Sling
  - ER no different than IR slings
    - Liavaag 2011 JBJS
    - Patterson 2010
    - Hovelius 2008
### Indications for Nonop Trial during Midseason

- **Injury Characteristics**
  - *INITIAL* d/l
  - Glenoid defect <25%
  - Humeral head defect <25%
  - Absc of fx or soft tissue injury requiring surgery

- **Player & Sport Specific Characteristics**
  - Desires return to sport
  - Non-overhead or throwing athlete
  - Noncontact sport
  - Can complete sport specific skills w/o instability

### Nonsurgical Management Protocol

- Sling immobilization & Cryotherapy (week 0)
- Begin early motion (week 1)
  - Goal – pain-free symmetric motion
- Strengthening: Cuff and Scapular Stabilizers (week 2)
  - Goal – equal strength bilaterally
  - +/- bracing
  - Timeline: Return to sport approx 3-4 weeks (variable)

### Nonoperative Treatment

- **Cuff & Scapular Stabilizers exercises:**
  - strengthen cuff ➔
  - create a balanced net force increasing stability of the shoulder
Nonoperative Treatment

- Relying on dynamic stability to help stabilize the shoulder and create a balanced compressive force that offsets the applied force.

Return to Play

- Criteria:
  - Symmetric pain-free ROM
  - Symmetric strength
  - Ability to perform sports specific skills
  - Absence of subjective & objective instability

Risks w/ Return to play

**Main problem: Redislocation**

- Up to 90% risk in young athletes in contact sports
- Risk for larger Hill-Sachs lesions and increased anterior glenoid bone loss with recurrent dislocations
- Risk for arthritis with recurrent dislocations
Various Studies for recurrent dislocations have been cited ranging from <25% to near 100%.

- Hovelius et al.
  - 229 primary anterior dislocations in pts 12-40 yrs
- 57% of shoulders re-dislocated at least once. (25 year f/u)

- Robinson et al.
  - 252 pts aged 15-35 yrs
- 59.5% repeat dislocation (average follow-up of 46.7 mos)

Indications for Midseason Surgical Management

- **Absolute**
  - Failed rehab trial
  - Inability to tolerate restrictions
  - Inability to perform sport specific tasks with instability
  - >50% RCT
  - Glenoid defect >25%
  - Humeral head defect >25%
  - Prox Hum fx
  - Irreducible d/l
  - Intersposed tissue or nonconcentric

- **Relative**
  - RECURRANT d/l
  - Overhead/throwing athlete
  - Contact sport
  - d/l near end of season
  - Age <20 y/o
  - Axillary nerve injury

Surgical Fixation - Tips

- Important to properly repair the Bankart lesion and capsular laxity.
- Rotator interval closure as needed.
- Compensate for engaging Hill-Sachs lesions, if needed.
- If there is significant glenoid bone loss or a large fracture, these need to be addressed.

**MUST ADDRESS ALL PATHOLOGY!!!!**
Surgical Points: Labral Repair Position

Labrum should be repaired to the glenoid rim, not the glenoid neck.

Reasons for Arthroscopic Repair Failure

- Younger Age
- Glenoid Bone Loss
- Large Hill-Sachs Lesion
- Hyperlaxity
- Use of fewer than 4 suture anchors
- High Activity Level/Contact Sports

(Note: Many of these are reasons for failure of open repairs as well.)

Recurrence after arthroscopic stabilization

- Randelli 2012 – systematic review
  - 3.4-35% rate of recurrence
  - Risk Factors for recurrence after repair
  - Epidemiological parameters
    - Age < 23
    - Male gender
    - Number of preoperative dislocations
    - Participation in competitive sports
Arthroscopic vs. Open Repair

- Open Repair has been the Gold Standard
- Arthroscopic repairs have been increasing in popularity and reported success in the literature
- Arthroscopic approaches:
  - Improved Shoulder ROM esp. external rotation
  - Historically higher risk for repeat dislocations
- **Recent Studies**
  - ~10% risk of re-dislocation
  - Comparable to open technique
  - High return to play to contact/throwing sports

Management of Failed Surgical Stabilization

- **Rerupture of the Bankart lesion was the most common finding**, creating instability in revision cases.
- Engaging Hill-Sachs lesions can contribute to instability.
- **Anterior Glenoid bone loss** must be addressed.
- **Hyperlaxity** must be addressed.
- Redislocation rates after revision stabilization procedures range from 8-27% in the literature.
- Arthroscopic Revisions have a higher failure rate.

Management of Anterior Glenoid Bone Loss

- Greater than 25% of anterior glenoid bone loss creates significant instability in the shoulder.
  - This amount of bone loss needs to be replaced.
  - Several options exist for grafting:
    - Laterjet, Iliac Crest Grafting, Osteocarticular allografts
    - Normal
    - Inverted Pear

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### Management of Anterior Glenoid Bone Loss -- Laterjet

- **Laterjet**: Transfer of the coracoid to the face of the glenoid to reconstitute the anterior glenoid.
- Can serve as an extra-articular bone graft.
- Non-anatomic repair

### Management of Hill-Sachs Lesions

- Large (>25% of the humeral articular surface) and engaging Hill-Sachs lesions have been shown to increase the rate of dislocation after Bankart Repair
- Options: No treatment, Remplissage, rotational humeral osteotomies, Allograft placement, Arthroplasty

### Management of Hill-Sachs Lesions -- Remplissage

- Involves tacking the posterior capsule & Infraspinatus down to defect
- Makes the lesion extraarticular
- Assoc w/ 10 deg loss of ER
- Has shown early promising results
  - High return to activity – up to 90%
  - Low recurrence rate

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Management of Hill-Sachs Lesions–Allograft

- Hill-Sachs lesion is prepared
- Allograft from humeral head is prepared and contoured
- Fixed w/ screws countersunk below articular surface
- Concerns: allograft resorption, viability of cartilage

Conclusion

- Shoulder dislocations are common in the young athlete
- Trial of nonoperative therapy w/ return to play warranted after informed discussion w/ player & parents and criteria met
- Surgical management warranted if recurrent or failure of nonop therapy
- Surgical management is very technical and all pathology needs to be addressed for good outcome

References

- “Glenoid Bone Deficiency in Recurrent Anterior Shoulder Instability: Diagnosis and Management.” – Piasecki, D, et al. JAAOS 2009; 17: 482–493

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GO MUSTANGS!