Traumatic Shoulder Instability: Treatment Options for Physicians

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OSU Department of Orthopaedics
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Goals

- Define traumatic anterior shoulder instability
- Review the pathology involved with instability
- Review the pathology of recurrent instability
- Review the long-term outcomes of instability
- Discuss treatment options based on patient demographics

Shoulder Instability: Many Types

Must be clear always what we are referring to...

- Atraumatic Instability
  - Subluxations
  - Ligamentously lax patient
  - Typically no structural lesion
  - Multidirectional
  - Surgery rare
- Traumatic Instability
  - Locked dislocation
  - Requires reduction
  - Structural damage
  - Surgery common
  - Unidirectional
    - Anterior
    - Posterior

Most Common:

Traumatic, Locked, Anterior Shoulder Dislocation

- Common problem that is sports specific
  - Football
  - Basketball
  - Hockey
  - Wrestling
  - Traumatic fall

20% of shoulder injuries
The Concern for our Patients

Recurrent Instability

Recurrent vs. Age Natural History

<table>
<thead>
<tr>
<th>Author</th>
<th>Published</th>
<th>Age</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>McLaughlin (1950)</td>
<td>1950</td>
<td>&lt;20</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;40</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;40</td>
<td>10%</td>
</tr>
<tr>
<td>Rowe</td>
<td>1980</td>
<td>&lt;20</td>
<td>94%</td>
</tr>
<tr>
<td>Simonet/Cofield</td>
<td>1984</td>
<td>&lt;30</td>
<td>82%</td>
</tr>
<tr>
<td>Arciero</td>
<td>1994</td>
<td>&lt;20</td>
<td>80%</td>
</tr>
</tbody>
</table>

More Recent Studies Confirm These Results

Pathology of an Anterior Dislocation

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Bankart lesion</td>
</tr>
<tr>
<td>Ant/inf labrum Torn</td>
</tr>
<tr>
<td>Hill-Sachs lesion</td>
</tr>
<tr>
<td>Impaction of Humeral head</td>
</tr>
<tr>
<td>Capsular deformation</td>
</tr>
<tr>
<td>Capsule stretches 4-7%</td>
</tr>
</tbody>
</table>
**Labrum**

- Increase contact surface area
- Anchor for Capsule/Ligaments

**Humeral Pathology**

*Initial Dislocation*

- **Hill-Sachs**
  - 90% Arciero 1997
  - 100% Kirkley 1999
  - 56% Larrain 2001

**Bankart: Capsulolabral Avulsion**

*Initial Dislocation*

<table>
<thead>
<tr>
<th>Author</th>
<th>Published</th>
<th>Bankart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker</td>
<td>1990</td>
<td>87%</td>
</tr>
<tr>
<td>Norlin</td>
<td>1993</td>
<td>100%</td>
</tr>
<tr>
<td>West Point</td>
<td>2001</td>
<td>97%</td>
</tr>
</tbody>
</table>

**Recurrent Dislocations**

- The more dislocations, the worse the pathology
  - Increase ligament/labral damage
  - More capsular stretch
  - Increased Hill-Sachs lesions
  - Glenoid bone loss – erodes glenoid
  - Cartilage damage

References:
- Burkhart and De Beer, Arthroscopy, 2000
## Ramifications?

<table>
<thead>
<tr>
<th>Short Term</th>
<th>Long Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easier to dislocate</td>
<td>Higher risk for arthritis</td>
</tr>
<tr>
<td>Fail arthroscopy</td>
<td>More severe arthritis</td>
</tr>
<tr>
<td>Require open surgery</td>
<td></td>
</tr>
<tr>
<td>Bone grafting</td>
<td>Seen at earlier age</td>
</tr>
<tr>
<td>Uncertain outcomes</td>
<td></td>
</tr>
</tbody>
</table>

## Glenoid Bone Loss

- Anterior
- Posterior

## Glenoid Bone Loss

- N/S glenoid
- Glenoid bone loss

## Cartilage Damage

- [Image of cartilage damage]
### Treatment Options

<table>
<thead>
<tr>
<th>Patient Age &gt; 40 @ 1st dislocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Check x-rays: make sure no fractures</td>
</tr>
<tr>
<td>✓ Sling for comfort (typically 1-2 weeks)</td>
</tr>
<tr>
<td>✓ Check rotator cuff exam!</td>
</tr>
<tr>
<td>✓ Start physical therapy soon</td>
</tr>
<tr>
<td>• Higher risk for post-dislocation stiffness</td>
</tr>
<tr>
<td>✓ Progress all activities to tolerance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Age &gt; 20 yo; &lt;40 yo</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Follow same principles just outlined</td>
</tr>
<tr>
<td>✓ Unlikely to have any rotator cuff pathology</td>
</tr>
<tr>
<td>✓ Sedentary lifestyle – unlikely to recur</td>
</tr>
<tr>
<td>✓ Athletes:</td>
</tr>
<tr>
<td>• return to sports when full motion/strength and no pain</td>
</tr>
<tr>
<td>✓ Counsel patients accordingly:</td>
</tr>
<tr>
<td>• Age – closer to 20?</td>
</tr>
<tr>
<td>• Gender – male higher risk</td>
</tr>
<tr>
<td>• Activity level – contact sports/martial arts/etc</td>
</tr>
<tr>
<td>✓ MORE LIKELY TO HAVE A RECURRENT DISLOCATION</td>
</tr>
</tbody>
</table>

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### What if They Fail Conservative Tx?

<table>
<thead>
<tr>
<th>c/o Recurrent anterior dislocation –</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Halt contact sports</td>
</tr>
<tr>
<td>✓ MRI/gadolineum</td>
</tr>
<tr>
<td>✓ Refer for surgical evaluation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c/o Subluxations –</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Determine if it c/o is true instability</td>
</tr>
<tr>
<td>✓ MRI</td>
</tr>
<tr>
<td>✓ When do they occur – Sports versus ADL’s</td>
</tr>
<tr>
<td>✓ May be willing to give up sport – but need to shower!</td>
</tr>
</tbody>
</table>

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### PE Findings with Anterior Instability

| Many of the exam techniques are difficult |
| Often the patient is guarding during exam |
| Apprehension test very reliable: |

**ABD/ER: FEAR**

**POSTERIOR PRESSURE: RELIEVES FEAR**
**Treatment Options**

- Age < 20 yo @ 1st dislocation
  - High chance of recurrence
  - Still controversial
  - Rehab/finish season
    - Surgery if sustain a recurrence
    - Surgery at end of season
  - OR: Stop season – proceed with surgery
- Surgery?
  - Confirm pathology with an MRI

**Evaluation and Treatment of Rotator Cuff Tears**

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**Should the Bankart Lesion be Viewed as the ACL of the Shoulder??**

**Rotator Cuff Tendons**

- Supraspinatus
- Infraspinatus
- Teres minor
- Subscapularis
Function of the Rotator Cuff

- Maintenance of humeral head position in the glenoid
  - Compresses humeral head into fossa, stabilizing against superior migration and providing stable fulcrum against which rotational forces can be applied.
- Rotational power of the shoulder
- Anterior and posterior aspects of the cuff work in concert
- Loss of one or the other creates translation movement and reduces the effect of compression

Etiology of Rotator Cuff Tears

Intrinsic Factors

- Degenerative or tendinosis problem, rather than true tendinitis
- Vascular factors
  - Watershed or critical zone 1 cm medial to insertion of supraspinatus tendon
  - Differential vascularity between bursal and articular surfaces
- 5 layer structure predisposes to internal shear forces resulting in intra-substance tears
### Extrinsic (Impingement) Factors

- Acromial morphology
- Anterior acromial enthesophytes
- Unstable os acromiale
- Degenerative acromioclavicular joint
- Internal impingement in overhead athletes

### History

- Age- tears more common in older patients
- Trauma- dislocation in patients over 35, high incidence of rotator cuff tear
- Overhead activities cause pain
- Night Pain
- Pain over deltoid/ lateral shoulder
- Weakness/ loss of endurance
- Crepitation

### Evaluation of Rotator Cuff Disorders

### Physical Examination

- Inspection- atrophy, asymmetry, deformity (long head biceps rupture)
- Palpation- AC joint, bicipital groove, greater tuberosity, crepitation
- Active and passive range of motion
- Strength testing
- Neck exam- Spurling's maneuver
<table>
<thead>
<tr>
<th>Impingement Examination</th>
<th>Plain Radiographs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hawkins’ sign</td>
<td><img src="image1.png" alt="X-ray images" /></td>
</tr>
<tr>
<td>• Neer impingement sign/test</td>
<td><img src="image2.png" alt="X-ray images" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imaging</th>
<th>MRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plain radiographs- AP, low-voltage AP joint view, outlet view, axillary view, internal rotation AP</td>
<td><img src="image3.png" alt="MRI images" /></td>
</tr>
<tr>
<td>• Arthrogram</td>
<td><img src="image4.png" alt="MRI images" /></td>
</tr>
<tr>
<td>• Ultrasound</td>
<td><img src="image5.png" alt="MRI images" /></td>
</tr>
<tr>
<td>• MRI</td>
<td><img src="image6.png" alt="MRI images" /></td>
</tr>
<tr>
<td>• MR Arthrogram- assess for labral tears or integrity of rotator cuff repair</td>
<td><img src="image7.png" alt="MRI images" /></td>
</tr>
</tbody>
</table>
Rotator Cuff Tears in Asymptomatic Patients

- Prevalence of rotator cuff tears is extremely high
- MRI of asymptomatic volunteers demonstrates partial or complete tears in 54% of people > 60 y.o. (Sher et al, 1995)
- Ultrasound of asymptomatic subjects detected a prevalence of rotator cuff tears in 40% of subjects > 50 y.o.
- Rotator cuff disease is found commonly in asymptomatic people

Non-Surgical Management

- PT to develop stabilizing rotator cuff force couple, strengthen scapular stabilizers, and stretch tight areas of the joint capsule
- NSAID’s
- Corticosteroid injections?
  - Wei et al, JBJS- rat study; single dose of steroid may not have long term effects on collagen gene expression, but collagen composition may be acutely by an injection

Treatment

Success of Non-Operative Treatment
Multi-Center Orthopaedic Outcomes Network (MOON) Group (2009)

- 327 patients enrolled with chronic full-thickness rotator cuff tears
- 3 months (including surgery or cured at 6 weeks)
  - 49/214 (22.89%)
- 1 year
  - 10/162 (6%) went to surgery
- 2 years
  - 0/28 have gone on to surgery
- A trial of rehabilitation may be indicated prior to proceeding with surgery in those patients with chronic full-thickness rotator cuff tears.
Surgical Indications

- Surgery indicated if acute trauma associated with significant weakness of the shoulder and posterior cuff involvement (infraspinatus, teres minor) or subscapularis involvement as seen with an anterior shoulder dislocation
- Young patients with higher functional demands
- Failure of 3-6 months of conservative management

Prognostic Factors for Success of Rotator Cuff Repair

- A number of retrospective studies have identified features associated with poor outcome after surgical management:
  - Duration of symptoms
  - Fatty infiltration of the atrophied
  - Larger rotator cuff tears
  - Age of the patient
  - Worker’s Compensation claims
  - Limited pre-operative ROM
  - Multiple comorbidities

Repair Techniques

- Open
- Mini-open- combination of open and arthroscopic surgery
- All arthroscopic

Mini-Open Rotator Cuff Repair
### All Arthroscopic Rotator Cuff Repair


- Systematic review of literature
- No difference in clinical outcomes with arthroscopic versus open repair
- Slight decrease in pain and increase in range-of-motion in short-term with arthroscopic repair
- Slight increase in re-tear rates in larger tears (>3 cm) with arthroscopic repair

### Conclusions

- Diagnosis is made with a thorough history and physical examination in conjunction with radiographic studies.
- Not all rotator cuff tears need repaired
- Need to develop more definitive indications for surgery based on prospective studies
- Although trend is toward less invasive surgery, there are similar clinical/radiographic results with arthroscopic and open repair

### Arthroscopic Versus Open?