Why Classify?

- **Diagnosis to direct Intervention:**
  - What should be done with “this problem”?
- **Prognosis**: How should “this problem” go?
- **Communication:**
  - Research: Understanding “this problem”
  - Payers: What is usual care for “this problem”
- “This problem” usually means “diagnosis”
  - Does pathology adequately classify?

Key features

1. **Pathology** is first step
   - But, pathology is not homogenous, thus rehab treatment is not
2. **Then**, Rehabilitation decision-making
   - **Irritability**
   - **Impairments**
     - Match treatment intensity & interventions with further classification category

---

Pathoanatomic Diagnosis VS Rehab Classification

- **Pathoanatomic Dx**
  - Primary Tissue Pathology
  - Stable over an episode of care
  - Guides general Rx strategy
  - Informs prognosis
  - Surgical Decisions

- **Rehab Classification**
  - Irritability / Impairment
  - Often changes over episode of care
  - Guides specific rehab Rx
    - **Physical stress dosage**
    - **Specific impairments**
  - May inform prognosis?
What’s in a name…. 

- ‘subacromial impingement’
  - Limited support for compression mechanism
  - Perpetuates flawed reasoning & treatment
- Rotator Cuff Tendinopathy
  - Is the tendon the pain generator?
- Subacromial Pain Syndrome (SPS)
  - Allows for uncertainty of the pain generator: tendons, bursae, biceps, CNS, other...
  - Allows for other mechanisms

Heterogeneous pathology

- Subacromial Pain Syndrome (SPS)
  - Includes: SPS, PT-RCT
  - Potentially even FT-RCT
- More later about differential Dx of these pathologies
### Pathoanatomic Dx vs Rehab Classification

| Pathoanatomic Dx | Rehabilitation
|------------------|------------------|
| Primary Tissue Pathology | – Irritability / Impairment
| Stable over episode of care | – Often changes over episode of care
| Guides general Rx strategy | – Guides specific rehab Rx
| Informs prognosis | – Specific Impairments
| Surgical Decisions | – May inform prognosis?

### A Staged Algorithm for Rehabilitation

**Limitations (at least a few):**
- Conceptual Stage
- Does an “irritability” capture key features determining application of physical stress?
- Does not directly address “non-physical” issues
- Reliability
- Validity

**Potential Features:**
- Relatively simple
- Captures thought process of many seasoned clinicians
- Possible broad application
- Not “separate” from medical framework

---

**Rotator Cuff Disease**

Tendinopathy → Partial thickness RC tear → Full Thickness RC tear

- Tendinopathy
  - Potential inflammation (Dean, 2015)
- Partial thickness RC tear
  - Articular, bursal, mid-substance
- Full-thickness RC tear
  - Complete rupture superior to inferior
  - Not necessarily side to side
  - “Hole” in the sock

---

**Rotator Cuff Disease: Diagnosis, Classification, and Rehabilitation Management**

Lori Michener, PhD, PT, ATC, SCS, FAPTA

Professor | Director of Clinical Outcomes and Research
Director – COOR Lab
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Rotator Cuff Tendinopathy

- Full-thickness RC tear
- Partial thickness RC tear
- Tendon pathology without tear
- Subacromial impingement

Subacromial Pain Syndrome

- Subacromial Pain Syndrome (SPS)
  - Allows for uncertainty of the pain generator: tendons, bursae, biceps, CNS, other...
  - Allows for mechanisms other than impingement
- Other names – ex: RC Related Shoulder Pain

Tendon Degeneration with Overload

- Inflammation present (Dean BJ, BJSM, 2015)
- Abnormal collagen laydown
- Tendon thickens initially \( \rightarrow \) then thins
  - **Thicker** in SPS (Michener LA, 2015; Joensen J, 2009; Leong HT, 2012)
  - **Thins** with progressive tendon disease
  - Initial response to use \( \rightarrow \)**Thickens**

Mechanisms of RC (Tendon) Disease

- Mechanisms:
  - Overload and Compression
- Factors contributing to the mechanisms:
  - Intrinsic factors – within the tendon
  - Impingement
    - Subacromial: anterior – superior
    - Internal: posterior – superior
  - Extrinsic factors – external to the tendon
  - Other factors –
    - Personal and Environmental factors

Tendon overload

- Neovascularization?
  - Conflicting evidence (Lewis J, 2009; Kardouni JR, 2013)

- Is the tendon painful?
Is compression in the SA Outlet causing tendon changes?
Compression or ‘impingement’ of RC tendons
- Subacromial (SA) space
SA space measured
AHD= acromiohumeral distance
10 – 15 mm in healthy

Tendon compression – is it possible?
SA space and shoulder pain:
- Space is smaller: ↓ AHD in ‘impingement’
- Tendon is thicker: initially with disease & ‘overuse’
- Occupation ratio > : supraspinatus tendon: AHD
  • ‘Impingement’: tendon occupies > amt of AHD
    (Michener LA, 2013)
  • Overhead athletes & Spinal Cord Injury (SCI)
    (Belley AF, 2016; Maenhout A, 2012; Wang HK, 2005)

Tendon compression – is it possible?
- Compression observed— cadaveric (Hughes PC, et al, 2012)
- Compression risk:
  – Smallest AHD: supraspinatus tendon 0 - 60°
    Smallest AHD: tendon footprint 30 - 90°
    (Lawrence R, JOR, 2017)
  – Tendon is not ‘available’ for compression (under the acromion) above ~ 70° elevation
    (Giphart JE, 2012; Thompson MD, 2011; Bay MU, 2007)

Glenohumeral impingement
- Posterior / Internal
  – Compression between the posterior glenoid and the humeral head
  – Described in overhead athletes
  – Recent evidence – maybe in non-overhead athletes
    (Doh HK, PM R, 2017; Lawrence R, CSM, 2017)

So is it compression or is it degeneration?
- Both compression AND degeneration are causes
  – Less support for compression
**Rotator Cuff Tendinopathy: What’s the Evidence for Diagnosis?**

- Subacromial Pain Syndrome (SPS)
  - Tendinopathy
  - Bursitis
  - Partial-thickness RC tears
- Full-thickness Rotator Cuff Tear (FT-RCT)

**Recommendations for Diagnostic Values Interpretation**

**Screen (Rule/ Out)**
- Sensitivity: SnNOut
  * Sn > 80%
- Likelihood ratio (– LR)
  * – LR ≤ 0.5

**Confirm (Rule/ IN)**
- Specificity: SpPIn
  * Sp ≥ 80%
- +Likelihood ratio (+LR)
  * +LR ≥ 2.0

**Dx SA pain - Systemic Reviews**


**Confirm SA pain** (R/In) – single tests
1. Painful arc
2. Resisted ER (ERRT) – pain or weak
3. Full Can
4. Drop Arm

**Screen Out SA pain** (R/Out) – single tests
1. Painful arc
2. Resisted ER (ERRT) – pain or weakness
3. Hawkins
4. Neer
5. Full Can
6. Drop Arm

* Combo of tests too! *

**BLUF**

**Combo of Tests: SA Pain**

3/3 tests: (Park HB, JBJS; 2005)
- Hawkins, Painful arc, ER resistance (Pain/Weak)
  - All 3+: +LR of 10.56
  - All 3–: –LR of 0.17

3/5 tests: (Michener LA, APMR, 2009)
- Hawkins, Neer, Painful arc, Empty can, ER resistance
  - If > 3+/ 5 : +LR of 2.93
  - If < 3+/ 5: –LR of 0.34

**Diagnosis FT-RCT - Systemic Reviews**


**Confirm FT-RCT** (R/In) – single tests
1. Painful arc
2. Resist ER- marked weak
3. Drop Arm
4. ER lag - massive tears
5. Atrophy infraspinatus
6. IR lag & lift off
7. Belly off- subscap

**Screen Out FT-RCT** (R/Out) – single tests
1. Resisted ER marked weak
2. IR lag and lift off
3. Full Can
4. Empty/Jobe Can

History: Age > 60/65yo and c/o night pain
STAR-Shoulder for Rehabilitation
Rotator Cuff Disease: Rehab and Surgery
Lori Michener, PhD, PT, ATC, SCS, FAPTA

Combination of Tests: **FT- RCT**

  - >65yo, ER weak (ERRT), night pain
  - All 3 +: R/In +LR: 9.84
  - All 3 -: R/Out - LR: 0.54
- **Test Combo** (Park, H.B. et al; JBJS, 2005)
  - 3 Tests: Drop arm, Painful arc, ERRT
  - All 3 tests + R/In +LR: 15.57
  - All 3 tests - R/Out - LR: 0.16

Treatment for Impairments and FUNCTION/ DISABILITY

- Weak and/or motor control
  - Cuff, scapula, shoulder
- Tight- pec minor, post shoulder
- Posture – thoracic & shoulder
- Scapular humeral motion deficits
- Final OUTCOME: Function/ Disability
  - Shoulder rated Outcomes
  - PSFS
  - PASS

Penn Shoulder Score

- Pain (0–30 pts)
  - Rest
  - Normal ADL
  - Strenuous
- Satisfaction (0-10 pts)

How do I know if what the patient scores is “enough” for them?

- Anchor for the patient’s score
  - PASS – Patient acceptable symptom state
  - GRoC – Global Rating of Change
**Feeling Good Rather Than Feeling Better Matters More to Patients**

FLORENCIA TUBACH, MAXIME DOUCADOY, BRUNO FAISSAID, GABRIEL BARON, ISABEILLE DOUCARTE, PHILIPPE RAYAUD

- Feeling good – PASS
  - “Taking into account your level of pain and also your functional impairment, if you were to remain for the next few months as you are today, would you consider that your current state is satisfactory?” “Yes” or “No”
  - Responders to treatment
- Feeling better – clinically important change (MCID)

**Does Surgery results in Good Outcomes for SAPS?**

- SAPS
  - SAD: 70 – 92% success (Ellman & Kay, 1991; Spangehl, 2002)
  - **Bottom line:**
    - Surgery is helpful, BUT consider only after Rehabilitation
    - Rehab: 3-6 months, dependent on patient progression and goals

**Rehab – SAPS: Exercise**

- SAPS - Exercise
  - LOTS of studies
  - Systematic Reviews (SR) of RCTs (11, 12, 16 individual studies) (Michener L, 2004; Kromer TO, 2009; Brudvig T, 2011; Braun C, 2010)
  - And a SR of SRs (Littlewood C, 2013)
  - **Overall findings:**
    - Exercise (stretch & strengthen) is effective – but clinical significance is uncertain
    - All programs also had some level of patient education

**Rehab – SAPS: Manual Therapy**

- SAPS - Manual Therapy
  - Exercise + manual therapy to upper quadrant (shoulder and spine) has a greater ↓ pain & disability than exercise alone
  - Some SRs report this, but some do not
  - Type of Manual Therapy – **Bottom line**
    - Spine + shoulder OR spine – effective, but limited
    - GH mobilizations alone – not effective

**Thoracic Manipulation and Shoulder Pain**

- Generally, systematic reviews supports short & long-term benefits of spinal manipulation alone or in combination
  - Non-specific shoulder pain
  - Rotator cuff disease / Subacromial pain syndrome
  - **BUT**
    - Treatment effects are small
    - Comparative treatments are likely just as effective
    - Inconsistent findings – mixed group of responders

1 Roy JS, et al, 2015
OUTCOMES of Manipulation for Shoulder Pain

Manipulation ONLY – Cervical & thoracic, ribs
  ▪ Only Manipulation: ↓ pain & ↑ function
  ▪ Manipulation vs. other treatment or sham SMT
  ▪ No superior benefit of manipulation

Mintken PE, et al, PTJ, 2010
Haik M, et al, APMR, 2017
Stuncu JB, J Man Manip Ther, 2009
Boyles RE, et al, Man Ther, 2009
Bergman GJD, Ann Internal Med, 2004

Thoracic Manipulation and Shoulder Pain

• So, is there a subgroup of patients with shoulder pain who may likely respond to thoracic manipulation?

RCT: Manip + Ex vs. Ex
(Mintken P, et al; 2016)

• Patient perceived overall success:
  – GRoC: 4 wks & 6 months
  – PASS: (patient acceptable symptom state) @ 4wks

PASS: “in 6 months, if left the way you are today, would you be satisfied”

Rehabilitation – SAPS: Manual Therapy

GH mobilizations specifically
  ▪ Addition of GH mobs YES – ↓ pain (Conroy DE, JOSPT, 1998)
  ▪ Addition of MWM – no benefit (Kachingwe et al, 2008)
  ▪ 1 study (Large N): Addition of GH mobs NOT helpful in addition to Exercise (Yiasemides R et al, PTJ, 2011)

Bottom line: The addition of GH mobs likely NOT helpful to improve outcomes

Rehabilitation – SAPS: HEP & US

• SAPS – HEP and US
  – Home-based exercise – as effective as supervised PT (systematic reviews)
  – US: not effective, except with calcific tendinopathy (systematic reviews)
    ▪ Note – imaging evidence needed
Operative Treatments for SAPS: how successful is it?

- n=313 randomized:
  - SADS, arthroscopy (placebo), no treatment
- No diff bw surgery groups on Oxford Shoulder Score
- Small, not clinically meaningful benefit of surgery vs. no treatment

Non-operative Treatment: how successful is it?

- Full-thickness tears
  - 75 – 80% of patients do not request surgery at 2 years follow-up
  - Limited evidence of substantial tear progression with non-surgical approach
- Older, chronic tears, respond to rehab in 3 – 4 months:
  ** Rehab should be first option

Considerations

- Full-thickness tears
  - Pain does not correlate with (Dunn W, 2014; Unrah, 2014)
  - Size of the tear
  - Tendon retraction
  - Superior HH translation
  - Impairments
- But - Are we ‘kicking the can down the road’?

Who should have surgery as the first option?

- Full-thickness tears
  - Age, acute tears, functional demands, goals
  - Young/ younger, acute tear, hi function, hi goals
  - Younger with chronic tears, and hi function/ goals
  ** Consider surgery as the first option

Rotator Cuff Disease

- Chronic FT-RCT
  - > 60 yo: Irreparable tear?
  - Initial Non-Operative Treatment
- Acute Tears
  - Chronic FT-RCT
  - Early Surgical Repair
- Tendiopathy
  - PT-RCT – Small tears
  - Prolonged Non-Operative Treatment


Thank you!
Shoulder Instability: Diagnosis & Treatment

Controversies

Amee L. Seitz, PT PhD, DPT, OCS

Feb 23, 2018
APTA CSM- New Orleans

Diagnosis and Rehabilitation in Patients with Shoulder Instability

Amee L. Seitz, PT, PhD, DPT, OCS
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Chicago, Illinois USA

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OBJECTIVES

- Understand:
  1. Shoulder Instability Diagnosis vs. Classification
  2. Relationship between pathoanatomical diagnoses associated with shoulder instability and functional status/outcome non-op rehab
  3. Controversies: Which is more effective treatment for patients with instability – surgery or rehabilitation? Does everyone need rehabilitation as first treatment?
  4. Current Best Practice for physical therapy treatment of shoulder instability: what we think we know... what we don’t know

Spectrum of Shoulder Instability: Classification

- Atraumatic, multidirectional, bilateral rehabilitation, Inferior capsular shift (AMBRI)
- Traumatic, Unilateral, Bankart Surgery (TUBS)

CASE: Soccer Player

- 23 yo male professional soccer player
- Dislocation R dominant shoulder with a collision with another player
- Relocation on field
- Sling
- X-Rays:
  - Hill Sachs Lesion
  - Otherwise negative

Shoulder Dislocation Incidence Rate by Age and Gender

Overall rate 24/100,000 p-year

Higher Risk

Incidence of Shoulder Dislocations and the Rate of Recurrent Instability in Soldiers


Joseph R. Kardouni1, Craig J. McDonald1, and Amee L. Seitz2

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Overall</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-19</td>
<td>12.5</td>
<td>10.2</td>
<td>14.0</td>
</tr>
<tr>
<td>20-29</td>
<td>62.2</td>
<td>58.2</td>
<td>68.2</td>
</tr>
<tr>
<td>30-39</td>
<td>19.5</td>
<td>15.0</td>
<td>25.8</td>
</tr>
<tr>
<td>40-49</td>
<td>15.4</td>
<td>13.9</td>
<td>17.0</td>
</tr>
<tr>
<td>50-59</td>
<td>16.8</td>
<td>14.0</td>
<td>19.8</td>
</tr>
<tr>
<td>60-69</td>
<td>11.7</td>
<td>9.5</td>
<td>14.3</td>
</tr>
<tr>
<td>70-79</td>
<td>8.3</td>
<td>6.5</td>
<td>10.3</td>
</tr>
<tr>
<td>80+</td>
<td>2.8</td>
<td>2.2</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Army Soldiers: 3.13/1000 p-year
General US population: 0.24/1000 p-year
Non-traumatic instability/subluxations

- **Incidence:** adds 3% per year to cumulative rate of anterior instability events in US military academy students (38/4141)
- Is this under diagnosed?

<table>
<thead>
<tr>
<th>Measure</th>
<th>Gledhill Instability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key positive findings</td>
<td>“Yes”</td>
</tr>
<tr>
<td>Age usually &lt; 45y</td>
<td>History of dislocation or subluxation</td>
</tr>
<tr>
<td>Apprehension test</td>
<td>Bankart reflex</td>
</tr>
<tr>
<td>Shoulder laxity</td>
<td>Gledhill test</td>
</tr>
</tbody>
</table>

| Key negative findings | “No” |
| No history of dislocation or subluxation | No apprehension with testing |

Pathoanatomic Diagnoses in Traumatic Instability

- Bigliani et al cadaveric study bone-ligament-bone tensile failure study
  - 40% fail glenoid attachment
  - 35% fail at mid-substance
  - 25% fail at humeral attachment

Other Common Pathoanatomic Diagnoses w/ Dislocation

- Labral lesions
  - Bankart
  - Other labral lesions
  - Glenoid defect
- Hill Sachs Lesions (Humerus)

Pathoanatomic Diagnoses in Non-Traumatic Instability

- 43/226 patients with “atraumatic instability”
  - Little to no trauma → “subluxation”
  - Minimal residual pain/symptoms
- Non-responders to physiotherapy
- Pathology Identified
  - Labral lesions: 44.2%
  - Bankart lesions: 30.2%
  - Complex labral/capsular lesions: 25.6%
  - Hill Sachs lesions: 60.5%
  - Chondral glenoid lesions: 23%

Pathoanatomic Dx Relationship Non-Operative Functional Outcome

<table>
<thead>
<tr>
<th>Risk factors which predispose first-time traumatic anterior shoulder dislocations to recurrent instability in adults: a systematic review and meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk factor</td>
</tr>
</tbody>
</table>
| OOA | 8.5%
| OOA less severe | 10.5%
| Bankart & Hill Sachs | 25%
| Complex labral/capsular | 25%
| Chondral glenoid | 25%

Pathology Identified

- Labral lesions = 44.2%
- Bankart lesions = 30.2%
- Complex labral/capsular lesions = 25.6%
- Hill Sachs lesions = 60.5%
- Chondral glenoid lesions = 23%

Pathology Identified

- Bankart & Hill Sachs lesions in 33-50% “subluxation”

Owens et al 2010 JBJS

Pathoanatomic Dx Relationship Non-Operative Functional Outcome

<table>
<thead>
<tr>
<th>Specific to Military Population</th>
</tr>
</thead>
</table>

Odds Ratios for Risk of Chronic or Recurrent Injury by Comorbid Injury

| Specific to Military Population |

Incidence of Shoulder Dislocations and the Rate of Recurrent Instability in Soldiers.
Shoulder Instability: Diagnosis & Treatment

Controversies

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Pathoanatomic Diagnosis Relationship
Non-Operative Outcome - Recurrence

Factors Negative Impact on Outcome
- Axillary nerve injuries Kardouni 2016, Visser 1999
- Large Bony Bankart
- Large/Engaging “on track” Hill-Sachs lesions: Kardouni et al 2016

Positive Impact on Outcome
- Greater tuberosity fractures: Olds et al 2016

CASE: Soccer Player

• 23 yo male professional soccer player
• Dislocation R dominant shoulder with a collision with another player
• Relocation on field
• Sling
• X-Rays: Hill Sachs Lesion

CASE

Exercise-based management versus surgery for multidirectional instability of the glenohumeral joint: a systematic review

4 studies: No RCTs, 2 retrospective cohorts, 2 pre/post cohorts

Low quality evidence
- Exercise better than surgery
- Satisfaction
- Self-report outcome measures

Low quality evidence surgery
- Shoulder kinematics
- Likelihood return to sport

Conflicting evidence w lack of baseline measures

Comparison of 2 Exercise Rehabilitation Programs for Multidirectional Instability of the Glenohumeral Joint

The American Journal of Sports Medicine 2018;46(1):87-97

Rockwood Program, 1992

Scapular motor control + GH joint strengthening

“Motor Control + Strengthening” program

Watson et al. Shoulder & Elbow 2017

OBJECTIVE #1

OBJECTIVE #2

何 is the most effective treatment for shoulder instability, surgery or rehabilitation?

VERSUS

Does everyone need rehabilitation as first treatment following traumatic dislocation?

MDI

MDI

Rockwood Program, 1992

Rockwood Program, 1992

Watson et al. Shoulder & Elbow 2017

All exercises: 5 repetitions with a 5s hold at the end range of the exercise.
Shoulder Instability: Diagnosis & Treatment
Controversies
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Comparison of 2 Exercise Rehabilitation Programs for Multidirectional Instability of the Glenohumeral Joint

- Greater improvements in motor control / strengthening program (Watson)
  - WOSI 12 weeks and 24 (>MCID) weeks
  - Melbourne Instability Shoulder Score at 24 weeks
  - Generalizability to whom??

- Other components in rehabilitation programs that may also be helpful
  - Proprioceptive training
  - Closed chain
  - Kinetic Chain/ trunk/ UE strengthening

Surgical versus non-surgical treatment for acute anterior shoulder dislocation (Review)
N=123 total; >80% males

4 RCTs Surgery vs Non-surgical
Bottoni et al. 2002
- N=24 male active military
- Mean age 22yrs
- 4 weeks immobilization + rehabilitation vs Bankart repair

Kirkley et al. 1999
- N=40 participants (35 males)
- Mean age 22yrs
- 3 week immobilization + rehabilitation vs Bankart repair

Wintzell et al. 1999
- N=30 consecutive pts
- Mean age 24 years
- 1 week immobilization + normal use vs Arthroscopic lavage

Sandow et al. 1996
- N=39 <26 year old
- 4 weeks immobilization + rehabilitation vs Bankart repair

Results: Recurrence Dislocation 2yr f/u

- Recurrence Dislocation 2yr f/u
- Recurrence Dislocation 2yr f/u
- Recurrence Dislocation 2yr f/u

Figure 2. Survival curve of nonrecurrence after conservative and surgical treatment of anterior shoulder dislocation showing a significant difference in recurrence between the 2 treatment modalities. N=76 patients

Primary Repair Versus Conservative Treatment of First-Time Traumatic Anterior Dislocation of the Shoulder: A Randomized Study With 10-Year Follow-up
Bent Wulff Jakobsen, Hans Viggo Johannsen, Peter Suder, Jens Ole Søjbjerg

Arthroscopic lavage
Bankart Repair

- 1 week immobilization + normal use
- 3-4 weeks immobilization + rehabilitation

Results: Recurrence Dislocation 2yr f/u

- Recurrence Dislocation 2yr f/u
- Recurrence Dislocation 2yr f/u
- Recurrence Dislocation 2yr f/u

Figure 2. Survival curve of nonrecurrence after conservative and surgical treatment of anterior shoulder dislocation showing a significant difference in recurrence between the 2 treatment modalities. N=76 patients
Controversies
Shoulder Instability: Diagnosis & Treatment

Study reported in abstract only
Sandow M, Liu SH. Arthroscopic Bankart repair for shoulder dislocation: A prospective randomized trial. JSES 1996; S81

Results: Recurrence Dislocation 2yr f/u

Rehabilitation Protocol
Bottoni et al.
1. 4 weeks sling immobilization, limited active ROM and “some exercises” under physiotherapist supervision;
2. 4 weeks of progressive passive motion exercises followed by active-assisted ROM exercises without resistance
3. 4 weeks of progressively greater resistance exercises
4. Return to full active duty, contact sports and activities requiring overhead or heavy lifting restricted until 4 months
Kirkley et al.
1. 3 Weeks immobilization, then both groups had the same staged (4 to 6 weeks; 7 to 8 weeks; 9 to 12 weeks) rehabilitation protocol of progressive exercises, including easing of the restrictions in ER ROM
2. 3 month for return to non-contact or non-overhead sports;
3. 4 months for contact sports
Wintzell et al.
• 1 week immobilization + normal use
Sandow et al. 3 week immobilization→ rehab? abstract only

Best Practices Non-operative Rehabilitation
• Is immobilization s/p dislocation for 3-4 weeks standard of care?
  – 1 week?
  – 3 weeks?
• Staged progression from PROM→ AROM→ Strength timing appropriate in non-operative group?
Shoulder Instability: Diagnosis & Treatment

Controversies

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Immobilization Duration

Conservative management following closed reduction of traumatic anterior dislocation of the shoulder (Review)

Hanchard 2014

- There is lack of evidence for duration of immobilization
  - No randomized clinical trials
  - High risk of bias in currently published results or confounding
  - No harm identified with shorter duration
  - What tissues are we protecting with immobilization?

Duration of Immobilization (1 week vs. 3 or 4 weeks)

Paterson et al J Bone Joint Surg Am. 2010;82:204-31

<table>
<thead>
<tr>
<th>Study</th>
<th>Duration of Immobilization</th>
<th>Rate of Recurrence</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>3 weeks</td>
<td>21%</td>
<td>0.52</td>
</tr>
<tr>
<td>1995</td>
<td>2 weeks</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>3 weeks</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>2 weeks</td>
<td>32%</td>
<td></td>
</tr>
</tbody>
</table>

Results

Pooled meta-analysis

Patients younger <30 yo demonstrated that the rate of recurrent instability was 41% (forty of ninety-seven) in patients who had been immobilized for one week or less and 37% (thirty-four of ninety-three) in patients who had been immobilized for three weeks or longer (p = 0.52).

bottom Line........

Rehabilitation Non-Op Same as Surgery?

2 Randomized Trials

IS THIS CONTEMPORARY Non-op rehab s/p dislocation??

Bottoni et al. 2002* 24 males in military
Kirkley et al. 1999* 40 patients
Wintzell et al. 1999* lavage vs no rehab
Sandow et al 1996* abstract only

Rehabilitation Non-Op Same as Surgery?

LIMITED EVIDENCE SUPPORTING PRIMARY SURGERY FOR YOUNG ADULTS, USUALLY MALE, ENGAGED IN HIGH DEMAND PHYSICAL ACTIVITIES FOLLOWING THEIR 1ST ACUTE TRAUMATIC SHOULDER DISLOCATION

“THERE IS NO EVIDENCE FOR OTHER PATIENT GROUPS” Handoll, Cochrane Review 2009

Which is the most effective treatment for instability, surgery vs rehabilitation?

Randomized trials compare surgical intervention to non-surgical management:

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- Kirkley et al. 1999* 40 patients
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GUIDELINE FOR ARTHROSCOPIC ANTERIOR CASUALLAR REPAIR

Rehabilitation Non-Op Same as Surgery?

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Which is the most effective treatment for instability, surgery vs rehabilitation?
**Shoulder Instability: Diagnosis & Treatment**

**Controversies**

Amee L. Seitz, PT PhD, DPT, OCS

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### Bottom Line Surgery vs. Non-Op

- First time only dislocation: Rehab vs Bankart
  - 2 published randomized trials
  - 59/64 total patients males, 24 military population
  - Mean age 22 years
  - Greater likelihood of recurrence with rehab
- The comparator rehabilitation program (strengthening initiated at 8 weeks) not likely the standard of care for rehabilitation
- Immobilization time (3-4 weeks versus shorter duration) is not standard of care for non-op
- What is the optimal non-operative treatment?

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### Surgery first in high demand?

- A key area of controversy
- The trials recruited the population at highest risk of recurrence and further tissue damage
- Shoulder instability also occurred in the surgical treatment group (6/28=21%)
- Only 50% of patients with recurrence in the conservative treatment group chose subsequent surgery

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### Conclusions

- Rehabilitation first choice for shoulder instability although evidence is lacking
- Following first time dislocation a trial of PT is warranted in majority of patients
- Exceptions may exist in young male military or athlete consider return time / cost / patient preferences and expectations YET EVIDENCE for primary surgery IS NOT compared to CONTEMPORARY rehabilitation PRACTICE
- Pathoanatomic diagnoses of Bony Bankart, nerve injury increase recurrence, Bankart lesions do not
- More aggressive non-operative treatment rehabilitation program → neuromuscular control / strengthening started ≤ one week with is warranted

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Thank you for your attention!
Management of Superior Labral Anterior-to-Posterior (SLAP) Lesions of the Shoulder

In press Journal of Athletic Training

Lori Michener, PT, PhD, SCS
Tim Uhl, PhD, PT, ATC
Kellie Bliven, PhD, ATC
Sue Falsone, PT, ACT, SCS
Jeff Abrams, MD
James Tibone, MD

Incidence

- Kim et al (JBJS 2003) —
  - Onset during sport (OR 9.7)
  - High demand job (OR 8.66)
  - Biops Load II: SLAP
  - Jerk Test: Posterior Inferior Labral Tear

Clinically:
- 139 SLAP lesions of 544 scopes (26%)
- Type I (74%), II (21%), III (0.7%), IV (4%)

Pathology:
- Over 40 → Supraspinatus tear &/or OA
- Under 40 → Bankart Lesion

Typical Clinical Relevance

- Dominant arm
- Male
- Under age of 40
- High performance overhead activity
  - Decreased velocity & control
- Shoulder Trauma History
  - Fall on outstretched hand
  - MVA with seatbelt
- Shoulder Instability
- Incidence 3 - 11.7%
  (Snyder et al 1990)
SLAP Type III or >

SLAP Repair in Throwers

Poor Outcomes – in all 3 Systematic Review Articles

SLAP + biceps tenodesis.... 38%

Osti Musc Lig Tend J 2013

Baseball Return to Play 22-64%

SLAP is Not the Problem?

48% Asymptomatic MLB pitchers had an SLAP lesion

Lesniak et al AJSM 2012

45% Asymptomatic mature pitchers had MRI Labrum Tear

Miniaci et al AJSM 2001

What/Who are these Patients?

SLAP lesion
- 22% incidence w/ Bankart
  (Snyder et al JSES 95)
- +/- Instability
This talk is NOT about patients w/ instability

SLAP lesion
- 22% incidence w/ Bankart
  (Snyder et al JSES 95)
- +/- Instability
This talk is NOT about patients w/ instability
Do “SLAP’s” Hurt?

Biceps tenodesis or tenotomy may be considered if the biceps is
- Synovitic
- Hypertrophied
- Frayed
- Unstable biceps anchor

Failed SLAP repair may consider a combined repair of the SLAP tear combined with biceps tenodesis or tenotomy (Bullock et al. '08; Gupta et al. '13; Werner et al. '14).

Biceps Outcome?

When does a non-op program fail?

Right Patient: Key Considerations for Differential
- How long do you have?
  - Athlete vs. Worker’s comp vs. Crossfitter vs. “Dad”
- Mechanism of injury
  - Acute event
  - Hyper ER/ABD vs. Traction
- What is functional complaint?
  - Loading vs. End ROM
- What are other impairments?
  - Irritability level; Magnitude of deficits

Don’t Be Insane….

- Persistent or onset of new weakness when reaching or overhead
- Onset of new, resting/night pain
- Regular follow up for 1st year for US

But…30-40% of patients will NOT see meaningful change in pain and disability…..
**UE Sport Demands**

- Overhead activity
- Pain post/deep & often “biceps”
- ROM
  - ER @ 0 & 90/90
  - Pain?
  - Click?
  - IR?
  - HA?
- Joint end feel
  - Post/inferior

**Physical Exam to Drive Treatment**

- History
  - Overhead activity
- Pain
  - “biceps”
- ROM
  - ER @ 0 & 90/90
- Muscle Performance
- "Bicipital"
- Pain?
- Click?
- IR?
- HA?

**Reliability and Diagnostic Accuracy of History and Physical Examination for Diagnosing Glenoid Labral Tears**

Matthew K. Woloshyn, MD, PT, William C. Skolasky, MD, Kevin P. Murphy, MD, Sali J. Mattay, MD, PT, AOCPT, and Lori A. Modarei, MD, PT, AOCPT

- 65 consecutive patients scheduled for orthopedic surgery
- Joint & shoulder surgeons were invited to participate in the study.

**#1 Match Treatment:**

- Patient Presentation, Goals, and Expectations
  - Overhead athletes with SLAP tears
  - should undergo non-operative management with the goals to
    - decrease pain
    - improve function
    - return to previous activity levels


**How Long !???**

- 3-6 months of non-operative management prior to undergoing surgery
- Failure of non-operative management is characterized by the inability to
  - regain pain free ROM (abs/ER)
  - near normal rotator cuff strength (ER)
  - inability to return to their desired level of activity

(Neri, Cheeley et al. 2009; Edwards, Lee et al. 2010; Neri, ElAttrache et al. 2011; Gupta, Bruce et al. 2013)
When Will I “know”?  

**Modifiers**
- Pain intensity
- Tissue(s) involved
- Age
- Goals/Sport
- Psychosocial

#2 Restore Shoulder ROM

- Range of Motion-not specific to SLAP
  - IR ROM
  - HA ROM
  - Total Arc

(Peterson, Lee et al. 2010; Fedoke, Ramkumar et al. 2014)

**Preservation of ER ROM- SORT B**
- Deficits in external rotation range of motion are the most consistent complaints associated with poor outcomes after surgery.
- Surgical considerations include:
  - Anchor placement- anterior to “12 O’clock”
  - Anatomical variants (e.g., foveas)
  - Over constraining repair


**Scapular Adaptations?**
- Lost 30° of total arc and 20° of IR

(Plausinis ‘06, Gerber ’13, Haryman ’92)
Extensibility NOT Flexibility

(Borstad et al, 2008; Tsai et al, 1999; McClure et al, 2007)

Flexibility & Extensibility


Effectiveness of Manual Therapy and Stretching for Baseball Players With Shoulder Range of Motion Deficits


Mechanisms of Shoulder Range of Motion Deficits in Asymptomatic Baseball Players

#3 Restore Muscle Performance

- ER strength associated
  - ↓ AHD and ↓ disability
  - ↓ symptoms
  - ↓ response to ↑ ER strength
  - ↑ disability and ↓ symptoms
  - Similar deficits observed with induced pain
  - ↑ Scapular Muscle Function
  - UTLT & UTSA imbalance


- Scapular Muscle Function
  - UTLT & UTSA imbalance

- Ludewig et al. 1996; Cools et al. 2004

- All Level 1 evidence includes muscle performance exercises

- Michener et al. JHR 2004; Kuhn et al. JSES 2009

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"Posterior Chain"


### Chronic Load (% of normal avg)

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### Acute Load (% of normal avg)

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### Systematically Monitor & Progress Load

- TherEx Load
  - Sets x Reps x Weight
  - 15% increase/week

<table>
<thead>
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<td>0</td>
<td>7.5</td>
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### What is Patient's Load?

- How much time/week last week?
- How much time/week when healthy or goal?
Phased Periodization

**Phase I**
- **Volume**
- **Predictable sequence**
- **Useful for transition to gym and HEP**
- **Difficult to overlap strength/power/endurance phases**

**Phase II**
- **Intensity**
- **Within/Between Session**

**Phase III/IV**
- **Technique**
- **Within/Between Session**

Periodization Considerations

**Linear**
- Volume and load altered more frequently
- Allows more frequent changes in stimuli
- May produce greater neuromuscular effects
- Can address strength and power at same time

**Non-Linear**
- Volume and load altered more frequently
- Allows more frequent changes in stimuli
- May produce greater neuromuscular effects
- Can address strength and power at same time

Progressive Resistance

- **Rotator Cuff**
  - Performance
    - IR/ER @ 90/90 for 30 secs w/ green sport cord
    - Prone endurance test
      - 1” x 5/7lb >20 reps
  - Scapula
    - < subtle scapular dyskinesis w/ 3lb or 5lb weight for 10 reps
    - 60 secs w/ 90 reps of CKC stability test

#4 Progressive, Functional Return

- **Rotator Cuff**
  - Performance
    - IR/ER @ 90/90 for 30 secs w/ green sport cord
    - Prone endurance test
      - 1” x 5/7lb >20 reps
  - Scapula
    - < subtle scapular dyskinesis w/ 3lb or 5lb weight for 10 reps
    - 60 secs w/ 90 reps of CKC stability test
#5 Kinetic Chain

Significantly altered thoracic rotation patterns after SLAP repair.

Pitchers with SLAP repair vs BT Tenodesis

Chalmers et al AJSM 2016

Kinetic Chain and Trunk Rot Specificity

Palmer et al JAT 2015; Oliver G JSCR 2010; Lehman G et al JSCR 2013; Oliver GD et al JSCR 2015

Non op program effective for 60-70% of athletes

Key maybe getting rid of bad treatment not improving the "average" treatment

Still 30-40% of patients will need other intervention

"other" factors including patient expectations, beliefs and preferences drive outcomes

A program might be effective but if it doesn't demonstrate efficacy it is irrelevant.

What decreases efficacy?

Time

Complexity

Resources

Stick to what is most likely to work 1st

Appropriate manual therapy

Match exercise

Dose exercise

Fundamentals Win.....