Evaluation and Management of Atraumatic Shoulder Pain

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Outline

• Anatomy
• Biomechanics
• Differential Diagnosis
  • Pathology
• Evaluation (X rays!!)
• Treatment vs. Referral
Force Couples

Infraspinatus
Subscapularis

Supraspinatus
Differential Diagnosis

- Rotator Cuff Disease
- Adhesive Capsulitis
- Glenohumeral Osteoarthritis
  - Calcific Tendinitis

Evaluation

- History and Physical Exam
- Traumatic is different
- Always get X-rays
- MRI for pre surgical planning
Rotator Cuff Disease

- Shoulder Impingement
- Rotator Cuff Tendinosis
- Rotator Cuff Tendinitis
- Shoulder Bursitis
- Long Head of Biceps Tendinosis

All are essentially the same process

Rotator Cuff Disease

- Degenerative process
- Increasing with Aging Population
- Not clearly an overuse problem
### Rotator Cuff Tears

**Prevalence**

- 5-39% Cadaveric studies
- 9% Postmortem (DePalma et al. ICS ‘50)
- 18% by Arthrogram (Pettersson Act Scand ‘42)
- 28% in age > 60 yrs. (Sher et al. JBJS ‘95)
- Over age 80 >50% (Tashijian 2015)

- MRI and Cadaveric studies support 10-40% of population >60 yo has cuff tear

### Why?

<table>
<thead>
<tr>
<th>Intrinsic</th>
<th>Extrinsic</th>
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<tbody>
<tr>
<td>Vascularity</td>
<td>Subacromial</td>
</tr>
<tr>
<td>Internal strain</td>
<td>Impingement</td>
</tr>
<tr>
<td>Morphology</td>
<td>Internal</td>
</tr>
<tr>
<td>Stiffness</td>
<td>Impingement</td>
</tr>
<tr>
<td>Genetics</td>
<td>Acromial shape</td>
</tr>
<tr>
<td></td>
<td>Spurring</td>
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<td>Mechanics</td>
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Genetic influences in the aetiology of tears of the rotator cuff

SIBLING RISK OF A FULL-THICKNESS TEAR


- 205 pts
- 129 Siblings, 150 spouses
- Relative risk of symptomatic full-thickness tears in siblings versus controls was 4.65 (95% CI 2.42 to 8.63)

Prevalence Data

- MRI and Cadaveric studies support 10-40% of population >60 yo has Cuff tear
- US Population 2010=308.4 million
  - Over Age 60 = 57 million
- Conservative Estimate (10%):
  - 5.7 million cuff tears in USA
- BUT – only 270,000 rotator cuff surgeries are done each year….
- 4.7% of People with Cuff Tears have Surgery…
If 95% of People with Rotator Cuff Tears are not having Surgery….

Rotator Cuff Tears
Physical Exam

<table>
<thead>
<tr>
<th>Early</th>
<th>Later</th>
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<tbody>
<tr>
<td>• Usually full passive ROM</td>
<td>• Spinati atrophy</td>
</tr>
<tr>
<td>• Stiffness RARE! (9%)</td>
<td>• Weakness of Elevation</td>
</tr>
<tr>
<td>• Pain with Elevation</td>
<td>• Weakness of ER (at side)</td>
</tr>
<tr>
<td>• Loss of IR</td>
<td>• Drop sign</td>
</tr>
<tr>
<td>• Night Pain</td>
<td>• Lag sign</td>
</tr>
<tr>
<td>• Weakness is uncommon</td>
<td>• Biceps rupture</td>
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</table>
Rotator Cuff
Inspection for atrophy

Physical Exam

Cervical Spine  AC Joint
Range of Motion
Strength Testing

Subscapularis Tests

Lift-off

Belly Press
# Impingement Signs

## Physical Exam – Rotator Cuff Tears

<table>
<thead>
<tr>
<th>Test</th>
<th>Authors</th>
<th>LOE</th>
<th>N</th>
<th>Sens</th>
<th>Spec</th>
<th>PPV</th>
<th>NPV</th>
<th>+LR</th>
<th>-LR</th>
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<td>143</td>
<td>.63</td>
<td>.55</td>
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<td>.77</td>
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<td>.91</td>
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<td>Supraspinatus Test</td>
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<td>50</td>
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<td>.697</td>
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<td>.697</td>
<td>1.37</td>
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<td>Neer</td>
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<td>85</td>
<td>.833</td>
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<td>1.693</td>
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<tr>
<td>Hawkins</td>
<td>Park 2005</td>
<td>913</td>
<td>.687</td>
<td>.483</td>
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<td>1.33</td>
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<td>Rent test (palpation)</td>
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<td>.957</td>
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<td>.968</td>
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</table>
70 y/o Female 3 yrs of treatment for RCD
4 injections, 1 full yr PT, 2 MRI’s

48 y/o M. Marine, weeping
53 y/o with 2 months of pain

MRI

"My rotator cuff is torn"  "My rotator cuff is torn"
A Prospective Evaluation of Survivorship of Asymptomatic Degenerative Rotator Cuff Tears

- 228 pt f/u 5 yrs,
- 49% Enlarged, Mean time 2.8 yrs
- 46% Increased pain
- 61% Full thickness, 44% PTT enlarged

Patients with symptomatic rotator cuffs may be at risk for size progression over time

Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study

- 452 pts with full thickness tears
- Standardized PT program
- Followed 2 yrs
- Less than 25% opted for surgery, most did so early 3-12wks
Effectiveness of Therapy
5 Year Outcomes

85% Follow up at 5 years
3% died, 16% lost to follow up
24% had Surgery
Those that had Surgery Decided Early

Features NOT Predictors of Surgery

Patient Factors
- Age, sex, BMI
- Handedness
- Education, occupation
- Work-compensation status
- Comorbidities
- Pain level
- Duration of symptoms
- SANE score

Structural Factors:
- Number of tendons torn
- Amount of retraction
- Forward elevation strength
### What are the Predictors of Failure of Non-operative Treatment?

- **Anatomic Severity of Tear**: NO ASSOCIATION
- **Symptoms (pain, strength)**: NO ASSOCIATION

**Associations**
- Higher Activity Level ($p=0.011$)
- Not Smoking ($p=0.023$)
- Younger Age ($p=0.042$)

### Predictors of Failure of Non-operative Treatment?

**Strongest Association**

- **Low Patient Expectations Regarding Success with Therapy** ($p<0.0001$)
- If a patient thought PT would not be effective- it generally wasn’t
- If a patient thought PT would be effective- It was
Operative versus Non-Operative Treatment for the Management of Full Thickness Rotator Cuff Tears: A Systematic Review & Meta-analysis

Christine Piper MD, Alice Hughes MD, Yan Ma PhD, Haijun Wang PhD, Andrew Neviaser MD

Purpose

• There has been recent trend toward surgery for atraumatic rotator cuff tears, however, no consensus exists on whether surgery is the optimal treatment.
• The aim of this study is to analyze the Level I and II research comparing operative versus non-operative management for atraumatic rotator cuff tears.
Methods

- 258 patients w/ 1 yr follow-up
- Mean age: 59-64 years
- Clinical outcomes measures: Constant-Murley score and the Visual Analog Pain Scale

Results

- Statistically significant differences in both Constant & VAS scores, favoring surgery after 1 year of follow up with a mean difference of 5.64 and 1.08 respectively.
Conclusions

- There was a statistically significant improvement in outcomes for patients managed operatively compared to non-operatively.
- The difference in both Constant Score and VAS were small and do not meet the minimal difference considered clinically significant.
Study Overview

<table>
<thead>
<tr>
<th>STUDY TITLE</th>
<th>Operative versus Non-Operative Treatment for Atraumatic Rotator Cuff Tears: A Multicenter Randomized Controlled Pragmatic Trial</th>
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<tbody>
<tr>
<td>SHORT TITLE</td>
<td>Arthroscopic Rotator Cuff (ARC) Clinical Trial</td>
</tr>
<tr>
<td>PRINCIPAL INVESTIGATOR</td>
<td>Nitin Jain, MD, MSPH</td>
</tr>
<tr>
<td>FUNDED BY</td>
<td>Patient-Centered Outcomes Research Institute (PCORI)</td>
</tr>
<tr>
<td>LENGTH</td>
<td>5 years total (3 ½ years recruitment)</td>
</tr>
<tr>
<td>RECRUITMENT TARGET</td>
<td>700</td>
</tr>
<tr>
<td>PARTICIPATING SITES</td>
<td>12 (including Vanderbilt)</td>
</tr>
</tbody>
</table>

Participating Sites

<table>
<thead>
<tr>
<th>COORDINATING CENTER &amp; RECRUITING SITE:</th>
<th>VANDERBILT UNIVERSITY MEDICAL CENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECRUITING SITES:</td>
<td>Washington University in St. Louis</td>
</tr>
<tr>
<td></td>
<td>Orthopedic Institute</td>
</tr>
</tbody>
</table>
Reasons to Operate

- Trauma
- Pain
- Function
- Progression
- Fatty Degeneration

Rotator Cuff Summary

- Multifactorial in Origin
- History, PE, X-Ray
  - Surgery for
    1. Traumatic tears
    2. Younger patients
    3. Larger tears
    4. Failure of Non Op
Rotator Cuff Arthropathy

Indications for Reverse

- RCA
- Massive Tears in Elderly
- Fractures
- Revision Arthroplasty
- Severe OA
Adhesive Capsulitis

- A painful, gradual loss of both active and passive glenohumeral motion resulting from progressive fibrosis and ultimate contracture of the glenohumeral joint capsule.
- Terminology is an issue
Demographics

- 2-5% of population
- Females > males
- Between ages 40 and 60
- Non-dominant shoulder
- More common in diabetics (and more resistant to treatment)

Keys to Diagnosis

- Early → Pain in all planes of motion
- Later → Mechanical restriction of passive ROM
- Easiest to feel as tethering of ER at the side
- X-Rays - Normal! (or osteopenia)
Keys to Diagnosis

Stages

- Stage I  Pre-adhesive
- Stage II  Acute adhesive synovitis
- Stage III  Maturation
- Stage IV  Chronic
Physical Therapy - High-grade vs Low-grade

- 100 patients
  - Sx >3mos, >50% loss PROM
- Randomized to:
  - HGPT-intensive mobilization at end-range positions
  - LGPT-passive mobilization within pain free zone
- Outcomes
  - ROM
  - Shoulder Rating Questionnaire
  - Shoulder Disability Questionnaire
- F/U 3,6,12 months
- Results
  - Both groups improved
  - HGMT significantly better for passive abduction (3, 12 months); external rotation (12 months)


Long-term Outcomes

- Shaffer et al 1992,
- Retrospective review, brought patients back for examination
  - Average 7 years from diagnosis
  - 92 patients met criteria, 62 participated (67%)
  - 31 (50%) with mild pain and/or stiffness
  - 60% with evidence of restriction in at least 1 plane
  - 7 (11%) reported interference with function
  - No correlation between ROM and complaints

### Arthroscopy

- Prospective study of 73 patients (LOE 4)
  - Arthroscopic Capsulotomy
    - Mean symptom duration - 19.7 months!!
    - Mean age 52, 57% females
    - 70% of patients had aggravation of pain at 4.5 weeks, 37% required corticosteroid injection
    - 12 month - changes in pain, function, and ROM maintained
    - 11% had recurrence of pain or stiffness


### Adhesive Capsulitis

- When to refer?
  - Failure to improve after treatment of 4 months
  - Unsatisfied with function or level of pain after 8-12 months of physical therapy.
## Summary

1. Rotator Cuff Disease
2. Adhesive Capsulitis
3. Glenohumeral Osteoarthritis
4. Calcific Tendinitis
   - History and Physical Exam
   - Traumatic is different
   - Always get X-rays