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
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% (Tashjian 2015)

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

Why?

- Intrinsic
  - Vascularity
  - Internal strain
  - Morphology
  - Stiffness
  - Genetics

- Extrinsic
  - Subacromial Impingement
  - Internal Impingement
  - Acromial shape
  - Spurring
  - Mechanics
If 95% of People with Rotator Cuff Tears are not having Surgery....

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...

Rotator Cuff Tears

Physical Exam

**Early**
- Usually full passive ROM
- Stiffness RARE! (9%)
- Pain with Elevation
- Loss of IR
- Night Pain
- Weakness is uncommon

**Later**
- Spinati atrophy
- Weakness of Elevation
- Weakness of ER (at side)
- Drop sign
- Lag sign
- Biceps rupture

Genetic influences in the aetiology of tears of the rotator cuff

SIBLING RISK OF A FULL-THICKNESS TEAR

P. Harvie,
S. J. Ostlere,
J. Toh,
E. G. McNally,
K. Clipsham,
B. J. Burton,
T. C. B. Pollard,
A. J. Carr

- 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)
Rotator Cuff Inspection for atrophy

Physical Exam
- Cervical Spine
- AC Joint

Range of Motion

Range of Motion
Strength Testing

Subscapularis Tests

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>
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<td>80</td>
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<td>86%</td>
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<td>Jobe-Pain</td>
<td>Itoi 1999</td>
<td>143</td>
<td></td>
<td>1.55</td>
<td>81</td>
<td>51%</td>
<td>62%</td>
<td>1.64</td>
<td>0.57</td>
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<td>0.35</td>
<td>93</td>
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<td>1.50</td>
<td>64</td>
<td>80%</td>
<td>2.4</td>
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<td>0.75</td>
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<td>0.84</td>
<td>85</td>
<td>347</td>
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<td>2.318</td>
<td>0.624</td>
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<td>Full Can-Weakness</td>
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<td>0.77</td>
<td>879</td>
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<td>2.289</td>
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<td>Supraspinatus Test</td>
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<td>0.89</td>
<td>30.1</td>
<td>0.1</td>
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<td>Neer</td>
<td>MacDonald 2000</td>
<td>86</td>
<td></td>
<td>0.83</td>
<td>0.59</td>
<td>400</td>
<td>0.86</td>
<td>1.673</td>
<td>0.329</td>
<td>99%</td>
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<td>0.472</td>
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<td>0.428</td>
<td>0.375</td>
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<td>Painful Arc</td>
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<td>0.758</td>
<td>0.615</td>
<td>0.615</td>
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<td>1.566</td>
<td>0.361</td>
<td>90%</td>
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<td>Rent test (palpation)</td>
<td>Wolf 2001</td>
<td>109</td>
<td></td>
<td>0.86</td>
<td>0.86</td>
<td>0.368</td>
<td>0.968</td>
<td>39.1</td>
<td>0.0</td>
<td>96%</td>
</tr>
</tbody>
</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

Rotator Cuff Disease

“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 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

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

Features NOT Predictors of Surgery

<table>
<thead>
<tr>
<th>Patient Factors</th>
<th>Structural Factors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, sex, BMI</td>
<td>Number of tendons torn</td>
</tr>
<tr>
<td>Handedness</td>
<td>Amount of retraction</td>
</tr>
<tr>
<td>Education, occupation</td>
<td>Forward elevation strength</td>
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<tr>
<td>Work-compensation status</td>
<td></td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
</tr>
<tr>
<td>Pain level</td>
<td></td>
</tr>
<tr>
<td>Duration of symptoms</td>
<td></td>
</tr>
<tr>
<td>SANE score</td>
<td></td>
</tr>
</tbody>
</table>

85% Follow up at 5 years
3% died, 16% lost to follow up
24% had surgery
Those that had surgery decided early
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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</thead>
<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>
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<tr>
<td>LENGTH</td>
<td>5 years total (3 ½ years recruitment)</td>
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<td>RECRUITMENT TARGET</td>
<td>700</td>
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<tr>
<td>PARTICIPATING SITES</td>
<td>12 (including Vanderbilt)</td>
</tr>
</tbody>
</table>

### Participating Sites

- **COORDINATING CENTER & RECRUITING SITE:** Vanderbilt University Medical Center

- **RECRUITING SITES:**
  - Washington University in St. Louis
  - University of Kentucky
  - Sports Medicine Institute of Cincinnati
  - Pennsylvania Medicine
  - Orthopedic Institute of Cincinnati
  - UT Southwestern Medical Center

### 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)

## 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