Survey Results

What questions can we answer for you about rotator cuff problems?
1. How to do a good exam (5)  (this talk, next talk, afternoon hands on)
2. Indications for operation vs PT (4) (this talk)
3. Differential for shoulder pain (3) (Dr. Allen, next talk)
4. PRP/steroids—are they safe, effective? (2) (this talk)

Also—treatment algorithm, age differentials, is surgery needed?

What we will cover today?

• How can you use recent studies to improve your outcomes for rotator cuff patients?
  • How can I diagnose rotator cuff tears accurately?
  • What happens if the patient doesn’t have surgery?
  • What non operative management options work?
  • What are the indications for surgery?
  • How do patients do after surgery?
Outline

- How can you use recent studies to improve your outcomes for rotator cuff patients?
  - How can I diagnose rotator cuff tears accurately?
  - What happens if the patient doesn’t have surgery?
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How can I diagnose rotator cuff tears accurately?

- History:
  - Is there pain at night?
  - Is there pain with overhead activity?
  - Is there pain at rest?
  - Where is the pain located?

What is the best physical exam test for a rotator cuff problem?

A. Jobe’s test
B. Gerber’s test
C. Painful arc test
D. Range of motion
E. Neer’s test

How do I diagnose rotator cuff tears accurately?

- Past Medical History
  - Cuff—hypercholesterolemia, overhead activity, age over 60 years, history of cuff tear in self or family
  - OA—prior history of dislocation, age over 75 years
  - Frozen Shoulder—diabetes or thyroid disorder, age 45-60 years
What’s the best way for PCPs to examine the shoulder for RCD?

We concluded that there is insufficient evidence upon which to base selection of physical tests for shoulder impingement, and potentially related conditions, in primary care.

Rotator cuff disease exam

- Pain provocation tests
- Pain and strength tests
- Often the pain radiates to lateral shoulder/proximal arm (‘deltoid’)

Pain test: Painful arc

If painful, positive LR 3.7 for RCD.
If not painful, negative LR 0.36 for RCD.

Pain/strength test: Drop arm test

Positive LR 3.3, negative LR 0.82 for rotator cuff disease.
Rotator Cuff Impingement

- **Hawkins’ Test**
  - 75% sensitive
  - 49% specific

- **Neer’s Test**
  - 85% sensitive
  - 44% specific

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Supraspinatus

- **Jobe’s test**
  - 90° abduction
  - 30° anterior flexion
  - Internal rotation (palms down)
  - Pain/weakness
  - 53% sensitive/82% spec.
  - (Park, et al. JBJS 12)

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Infraspinatus

- **External rotation strength**
  - 0° abduction & 45° ER

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Pain & Strength test:
Subscapularis = internal rotation lag test aka ‘lift off’

- Positive LR 5.6, negative LR 0.04 for subscapularis tear.

JAMA. Rational clinical exam: Does this patient have rotator cuff disease? Aug 2013.
How can I diagnose rotator cuff tears accurately?

- Get a clear history (night pain, pain with overhead activity, weakness)
- Painful arc test
- Drop arm test
- Lift off test

A patient presents with a partial thickness rotator cuff tear on MRI. What is the likelihood that the tear gets bigger in the next 5 years?

- A. 0%
- B. 15%
- C. 35%
- D. 55%
- E. 75%

Defining the Natural History

- Defines disease progression
- Often interrupted by treatment
- Study painless tears

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Focus on recent studies where available
Knowns and unknowns regarding the natural history of cuff tears

- Partial tears and full thickness tears are common (Yamamoto JSES 2009)
- Many patients are asymptomatic with rotator cuff tears (Yamaguchi 2000, 2007, 2010)
- Tears tend to get larger over time (Keener JBJS 2015)
- Muscle quality deteriorates over time (Gladstone AJSM 2006, Keener JBJS 2015)

- Does location matter?
- Are some tears at higher risk for progression than others?

Tear Enlargement Risks

<table>
<thead>
<tr>
<th>Tear Type</th>
<th>2 yr</th>
<th>5 yr</th>
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</thead>
<tbody>
<tr>
<td>FTRCT’s</td>
<td>22%</td>
<td>50%</td>
</tr>
<tr>
<td>PTRCT’s</td>
<td>11%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Hand dominance associated with enlargement, HR=1.53

Critical Tear Size?

- Tear size not independent predictor of future enlargement risk!
- Location was important:
- Cable integrity may affect future enlargement risks
  - 52% vs. 67% enlargement risk cable intact vs cable deficient FTRCT, p=0.09

Keener et al JBJS 2015
Critical Tear Size – Muscle Degeneration

Tear size and distance to biceps important for muscle degeneration

Kim et al JBJS 2009, 2015

What else affects muscle degeneration?

- **Risks Greater For:**
  - Larger tears >15mm
  - Recent tear enlargement – double risk (44% vs 20%)
  - Enlargement > 1cm
  - Disruption of anterior cable attachment – triple risk
  - Muscle changes seen within 1 year of enlargement

Keener et al JBJS 2015

Summary of Natural History Studies

- **Lower risk tears**
  - Partial tears 35% will get bigger at 5 years
  - FTRCT’s < 15 mm width with an intact anterior cable

- **Higher risk tears**
  - FTRCT’s
    - >15-20 mm width
    - Recent tear enlargement
    - Disruption of anterior cable
How can you use recent studies to improve your outcomes for rotator cuff patients?

1. How can I diagnosis rotator cuff tears accurately?
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4. What are the indications for surgery?
5. How do patients do after surgery?

Focus on recent studies where available

What is the best predictor that physical therapy will work for a patient with a full thickness rotator cuff tear?

A. Size of the tear
B. Age of the patient
C. Sex of the patient
D. Location of the tear
E. Patient attitude of physical therapy
F. Physical therapist experience with rotator cuff tear

Non Operative Management Options for Cuff Disease

- Exercise for Rotator Cuff Tears

- Many Case Reports in Literature
- MOON Data Largest Series N=450 patients
- Symptomatic Atraumatic Full Thickness Rotator Cuff Tears
- Evidence Based Rehabilitation Program
- Prospective Cohort Study

Exercise for Rotator Cuff Tears

- Many Case Reports in Literature
- MOON Data Largest Series N=450 patients
- Symptomatic Atraumatic Full Thickness Rotator Cuff Tears
- Evidence Based Rehabilitation Program
- Prospective Cohort Study
Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study

METHODS
- 452 subjects were enrolled and given an EBM based physical therapy program
- Work with therapist until ready for Home Program
- Assess patients at 6, 12 weeks, 1, 2 years (now 5 years)

• Are you cured?
• Are you better and want to continue with therapy?
• Are you no better and want to have it repaired?

Patient Outcome Measures After Nonoperative Treatment

<table>
<thead>
<tr>
<th></th>
<th>Baseline Scores</th>
<th>6 Weeks</th>
<th>p-values</th>
<th>12 Weeks</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-12 MCS</td>
<td>40.3</td>
<td>40.6</td>
<td>0.29</td>
<td>40.9</td>
<td>0.79</td>
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<tr>
<td>SF-12 PCS</td>
<td>38.3</td>
<td>35.6</td>
<td>&lt;0.0001</td>
<td>36.0</td>
<td>&lt;0.0001</td>
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<tr>
<td>ASES</td>
<td>54.4</td>
<td>69.1</td>
<td>&lt;0.0001</td>
<td>75.3</td>
<td>&lt;0.0001</td>
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<tr>
<td>WORC</td>
<td>47.0</td>
<td>62.5</td>
<td>&lt;0.0001</td>
<td>69.4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>SANE</td>
<td>46.6</td>
<td>62.7</td>
<td>&lt;0.0001</td>
<td>70.0</td>
<td>&lt;0.0001</td>
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<tr>
<td>Marx Activity Scale</td>
<td>9.9</td>
<td>10.1</td>
<td>0.095</td>
<td>10.0</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Effectiveness of Therapy

N=433 (>95% Follow up)
<80% of Patients Had Surgery
Patients Chose to Have Surgery in First 12 Weeks

Predictors of Failure of Nonoperative 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
Do injections work for rotator cuff disease?

- Corticosteroid injections

  * A double-blind randomised controlled study comparing subacromial injection of tenoxicam or methylprednisolone in patients with subacromial impingement.
  * Nethikananth S, Hwang HT, Ujeyluya PK, Parsons N, Drew SJ, Griffin D.

  Short term benefit of corticosteroids vs NSAID injection (60% reduction in pain)

  Cochrane Systematic review
  * One trial suggested short-term benefit of intra-articular corticosteroid injection over physiotherapy in the short-term (success at seven weeks RR=1.66)

What about PRP?

  Randomized patients with partial tears to steroid vs PRP injection
  * Both groups got better
  * PRP slightly better than steroid at 12 weeks
  * No difference at 6 months
  * No difference in MRI findings at 6 months

Slight improvement with PRP
  * At 3 months, no difference at 6 months
What about PRP?

No difference between exercise and PRP injections at 1 year

Summary of non operative management for rotator cuff tears

- Physical therapy is an effective first line treatment for patients with atraumatic degenerative rotator cuff tears
  - Try for 6-12 weeks prior to recommending surgery
- Corticosteroid subacromial injections are effective for relieving pain and improving function in patients with partial thickness rotator cuff tears
  - Worth trying for patients with night pain waking up, limitations during day
- PRP does not really add benefit over other modalities

How can you use recent studies to improve your outcomes for rotator cuff patients?

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What is the best indication for rotator cuff surgery?

A. Pain
B. Size of the tear
C. Limitations in daily activities
D. Time of the year (met deductible! Yay!)
E. Location of the tear
Indications for surgery

- Tear size?
- Age?
- Pain?
- Function?
- Time since symptoms?

How do you pick the right patient to fix?

**Can we Use Predictors of a GOOD Outcome as Indications for Surgery?**

- Level IV Case Series-Level IV Systematic Review
- Predictors of Good Outcome as Indications for Surgery
- **Age and Gender** are **NOT** good indicators
- **Acute Tears** may Benefit from **Early Surgery**
- **Weakness or Functional Disability** May have Better Outcomes with Surgery


**PAIN?**

- **NOT A GREAT INDICATION**
- The Relationship between Pain and Cuff Tears is **NOT** Robust
  - Dunn et al JBJS 2014
  - Choo et al JSES 2015

He may not be Happy even after surgery

**Pain, psychiatry, and the rotator cuff**

Mental Health Has a Stronger Association with Patient-Reported Shoulder Pain and Function Than Tear Size in Patients with Full-Thickness Rotator Cuff Tears

<table>
<thead>
<tr>
<th>TABLE II</th>
<th>Blivert's Correlation of Patient Mental Well-Being with Patient-Reported Shoulder Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient-Reported Shoulder</td>
<td>Correlation with SF-36 Score</td>
</tr>
<tr>
<td>VAS shoulder pain</td>
<td>-0.476</td>
</tr>
<tr>
<td>VAS shoulder function</td>
<td>-0.332</td>
</tr>
<tr>
<td>SST</td>
<td>0.367</td>
</tr>
</tbody>
</table>

**Conclusions:** Patient mental health may play an influential role in patient-reported pain and function in patients with full-thickness rotator cuff tears. Further studies are needed to determine its effect on the outcome of the treatment of rotator cuff disease.

Wylie et al JBJS 2016

Lower MCS=worse pain
Higher MCS=better PRO
What are the Indications for Rotator Cuff Repair?

- **Acute Tears**: Should Probably Be Repaired Early
- **Weakness or Loss of Function**: Will be Improved if the Rotator Cuff Repair Heals
- **Patient Expectations**: If they think they need surgery, they probably wont get better until they get surgery.

- **Pain** alone should not be an indication for rotator cuff repair
- **Mental status** should be considered when discussing outcomes and expectations

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Maximizing Surgical Success

- Factors associated with poor outcomes, high retear rates after rotator cuff repair
  - **Diabetes** (Cho et al AJSM 2014)
  - **Smoking** (Bishop et al Arthrosc 2015)
  - **Older Age** (Park et al AJSM 2015)
  - **Mental Status** (Wylie et al JBJS 2016)
  - **Worker’s Comp** (likely not biologic at the cuff)

Outcomes of arthroscopic rotator cuff repair

**Good predictors**
- Small tear size
- Younger patients
- Good preoperative status

**Poor predictors**
- Older patients
- Larger tear size
- Workers comp
- Poor preoperative function

Focus on recent studies where available
Outcomes of arthroscopic rotator cuff repair

Seventy-six patients (37 females, 39 males) with a mean age of 57.0±7.3 years were included, 45 month average follow up.

- 67 of 76 (88.2%) patients returned to a sports activity, 70% to same sport
- The mean time to return to sports was 6 ± 4.9 months.
- Subjective sports level was judged better or identical to the preoperative level by 52 of 67 (77.6%) patients.
- The functional improvement evaluated by the WORC Index was strongly significant (P<0.00001) and 73 of 76 (96%) patients were satisfied.

Summary

- How can I diagnosis rotator cuff tears accurately?
  - Good history, physical exam (JAMA article 2013)
- What happens if the patient doesn’t have surgery?
  - 35% tear enlargement for partial, 50% tear enlargement for full thickness at 5 years, tear location does matter (Keener JBJS 2015)
- What non operative management options work?
  - Physical therapy, injections work well, PRP does not add much to the treatment (MOON study 2014, 2016)
- What are the indications for surgery?
  - Pain not a good indicator, loss of function, failure of non operative management (Kuhn 2015)
- How do patients do after surgery?
  - In good cases, 90% success rate, younger and healthier patients do better 80% return to sport (Antoni KSSTA 2016)

Treatment algorithm for cuff problems

- Impingement/No Weakness
  - NSAIDS
  - Physical Therapy
  - MRI
- Moderate pain with activity
  - NSAIDS
  - Consider injection
  - PT
  - Home Exercise Program
- Worse pain with activity
  - Medication
  - PT
  - Consider injection
  - Home Exercise Program
- Surgery if not better

Thank you
Treatment algorithm for cuff problems

1. **Mild pain with activity, Night pain, Subtle weakness**
   - Physical Therapy, NSAIDS
   - Better
   - Not Better
     - MRI
     - PT
     - NSAIDS
     - Consider injection
     - Home Exercise Program
     - Patient Education
   - Arthroscopic Cuff Repair

2. **Moderate pain with activity, Wakes pt. up, Difficulty with activities**
   - Physical Therapy, NSAIDS
   - Better
   - Not Better
     - MRI
     - PT
     - NSAIDS
     - Consider injection
     - Home Exercise Program
     - Patient Education
   - Home Exercise Program
   - Patient Education