Management of Rotator Cuff Problems in Baseball

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Disclosures

Arthrex

DJO
Smith & Nephew

Journal of Shoulder and Elbow Surgery
Journal of Bone and Joint Surgery
American Journal of Sports Medicine
Orthopaedic Journal of Sports Medicine
The Physician and Sports Medicine
Rotator Cuff Function During Throwing

- Supraspinatus, infraspinatus activity are lower; Latissimus and subscapularis activity much greater in professional vs. amateur athlete

Gowan, 1987
Types of Partial Rotator Cuff Tears

- Traumatic articular
- True PASTA
- Internal impingement/thrower’s
- Traumatic bursal
- Attritional articular
- Attritional bursal
- Intra-substance
- Calcific articular
- Calcific bursal
Thrower’s Cuff Tears

- Partial thickness tears, almost always occur on the articular (under) side of the cuff
- Usual location is at junction of supraspinatus and infraspinatus
- Typically see ulceration/wearing away
- Results from a combination of factors:
  - Eccentric failure/overload
  - Shear and torsional forces
  - Mechanical “impingement”
- Technically not ‘repairable’
• PASTA lesion
  - Articular layer pulls off from the footprint
  - Technically repairable
The Problem is: What is the Problem?

Sometimes the RCT is not the problem …

More than 50% mature MLB pitchers have an asymptomatic PT-RCT (Lesniak AJSM 2013)

The Thrower’s PASTA is likely adaptive allowing greater horizontal AB, ER & performance

Jim Bradley :
“The Thrower’s PASTA is probably well tolerated as long as it is less than full thickness, contained within the rotator crescent & both rotator cable anchors are intact”
My Approach

• Solid clinical basics:
  • Thorough history
  • Careful physical exam
  • Good imaging (tendon status; muscle changes; concomitant pathology)

• Be sure you're addressing the right problem!
Positive Exam Findings with RC based symptoms

- Painful arc of motion
- Positive rotator cuff provocative tests (e.g. Neer, Hawkins, Empty Can)
- Greater tuberosity tenderness
- Rotator cuff weakness (+/- pain)
### TABLE 1
Interobserver Agreement for Partial-Thickness Rotator Cuff Tears\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Full- vs Partial-Thickness Tear</th>
<th>Articular vs Bursal Surface</th>
<th>Depth or Grade of Tear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement</td>
<td>0.95</td>
<td>0.92</td>
<td>0.49</td>
</tr>
<tr>
<td>Kappa</td>
<td>0.85</td>
<td>0.85</td>
<td>0.19</td>
</tr>
<tr>
<td>Agreement beyond chance</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
</tbody>
</table>

\(^a\) Kuhn, et al. AJSM 2007
Patient With Partial Thickness Rotator Cuff Tear
- Painful arc of motion with active shoulder function
  - +/- Pain and weakness on resisted RTC testing
  - +/- Night pain
  - Failure of non-operative modalities

Intra-operative Assessment of Partial Thickness Tear
- Intra-articular debridement until normal tendon fibers identified

Doesn’t work for overhead athletes!!
Start with Non-operative Treatment

• Start with PT/ATC treatments
• Correct all deficits back to baseline
• Maximize medical therapy
• Selective injections:
  • Consider biologic for acute: US guided intra-articular
  • Corticosteroid for more chronic (intra-articular and subacromial)
Surgical Treatment Options

- Arthroscopic debridement
- Arthroscopic repair:
  - Trans-tendon/in situ repair
  - Completion to full thickness followed by repair
  - Grafting/augmentation
- Open repair
Arthroscopic Debridement
PASTA Bridge

Courtesy of Stephen Burkhart, MD
PASTA Bridge
PASTA Bridge
PASTA Bridge
PASTA Bridge
What percentage of pro pitchers have asymptomatic rotator cuff tears?

1. 10%
   - 0%
2. 25%
   - 8.2%
3. 50%
   - 65.57%
4. 65%
   - 24.59%
5. 0%; cuff tears always cause symptoms
   - 1.64%
Level IV (2012)

- Evaluated 17 high-level baseball players who underwent simultaneous arthroscopic SLAP and infraspinatus repair
  - **6/17 were not able to return (35%)**
  - 5/17 returned to lower level
  - 6/17 same level or higher
Surgical Treatment of Rotator Cuff Injuries

- 33 MLB pitchers with rotator cuff surgery
- *Performance did not return to pre-injury levels in any player*
- No greater attrition rate than pitchers without RCT

Namdari S, Baldwin K, Ahn A, Huffman GR, Sennett BJ


**Performance after rotator cuff tear and operative treatment: a case-control study of major league baseball pitchers.**
Surgical Treatment of Rotator Cuff Injuries

Débridement of small partial-thickness rotator cuff tears in elite overhead throwers.

Reynolds SB, Dugas JR, Cain EL, McMichael CS, Andrews JR.

- 37/67 (55%) return to pitching at the same level at 18 months
“Despite advances in imaging, diagnosis, and surgical techniques, our ability to return these patients to their elite level is modest at best when nonoperative management fails and surgical treatment is performed. If a surgical route is needed, debridement alone is the most frequent procedure given concerns of over constraint and poor return to play with surgical repair of the partial thickness rotator cuff tear.”
Emerging Therapies for PTRCTs
Biologics

• Goal is to optimize the local healing environment

• Categories include:
  • Cells (e.g. PRP, stem cells)
  • Non-viable compounds (e.g. growth factors)
  • Tissues (e.g. allograft, placental tissue)
Biologics

- Sources include:
  - Autologous/autograft (PRP; bone marrow aspirate)
  - Allograft
  - Xenograft
  - Synthetic

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Sports Medicine
Placental Tissue Matrix

- Derived from full-term pregnancy placentas
- Applications in wound healing, ophthalmology, other disciplines
- Animal models suggest rotator cuff regeneration
- Human PTRCT data pending
Human Placental Tissue

- Technically an allograft; supplement and/or replace damaged connective tissue
- Extracellular Matrix of:
  - Collagen
  - Growth factors
  - Bioactive molecules
- **No blood draw or aspiration**
Implantable Bursal Patch

• Highly-porous type I collagen implant
• Role is biologic, indirectly mechanically
Evidence of healing of partial-thickness rotator cuff tears following arthroscopic augmentation with a collagen implant: a 2-year MRI follow-up

- N = 13 w/ intermediate- to high-grade PTRCTs treated w/ bursal-sided implant
  - Mean age 53.8 years, follow-up 27 months
- No partial thickness tears progressed
  - Tendon thickness increased 2.2mm at 3 months
- 7/13 (54%) filled tendon in completely
- 5/13 (38%) showed improved tendon quality
- Improved Constant/ASES scores
N = 32
- Mean age 54.6 years, follow-up 12.4 months
• 8/32 (25%) showed no defect on MRI
• 23/32 (72%) had tear size decrease
  - Mean tendon thickness 3.1mm → 5.4mm at 3 months → 5.2mm at 1 year
• Constant and ASES scores improved above MCIDs
Impact of Platelet-Rich Plasma on Arthroscopic Repair of Small- to Medium-Sized Rotator Cuff Tears
A Randomized Controlled Trial

MUSCULOSKELETAL SURGERY
December 2016, Volume 100, Supplement 1, pp 25–32

Platelet-rich plasma supplementation in arthroscopic repair of full-thickness rotator cuff tears: a randomized clinical trial

European Journal of Orthopaedic Surgery & Traumatology
December 2016, Volume 26, Issue 8, pp 837–842

Subacromial injection of autologous platelet-rich plasma versus corticosteroid for the treatment of symptomatic partial rotator cuff tears

Authors
Ahmed Shams, Mohamed El-Sayed, Osama Gamal, Waled Ewes

PRP may lead to reduction of pain
Key Takeaways

• Be sure of the cause of symptoms; many (most?) players have rotator cuff pathology
• Non-operative treatment remains the best option in the majority of cases
• Biologic therapies are emerging; be thoughtful in their utilization
Thank You!

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