Partial Tears of the Rotator Cuff: What to do?

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The Current Situation...

- We know it’s a problem
- We don’t have a good solution
- Everyone has an opinion
- We know we can make the problem worse....
- But- can we make it better?
What do we really know?
Definition:

- What is a partial RTC tear?
  - Types
    - Bursal
    - Undersurface
    - Intrasubstance
Classification

- **Ellman**
  - Grade I
    - < 25% (< 3mm)
  - Grade II
    - 25-50% (3-6 mm)
  - Grade III
    - >50% (>6 mm)
Incidence:

- **Cadaver Studies:**
  - Fukuda 1990:
    - 249 cadaver dissections:
      - 7% complete
      - 13% partial
  - Uthoff:
    - 306 dissections
      - 19.9% complete tears
      - 32% partial

- **Clinical studies: articular vs. bursal**
  - Cordasco: 82%
  - Webber: 88%
PTRCT: Pathogenesis

- **Bursal:**
  - outlet impingement

- **Articular:**
  - Internal impingement:
    - repetitive normal contact
    - tight post capsule (Morgan)
    - lax anterior capsule (Jobe)

- **Intrasubstance:**
  - Traction (tensile overload)
  - Degenerative
  - Vascularity
PTRTC tears: Natural History

- **Yamanaka 1994- Conserv RX**
  - Serial arthrography: (40 pts. articular)
    - 52% enlarged
    - 28% full thickness tears
    - 10% smaller
    - 10% ‘healed’

- **Coradasco 2002- ASD Debride**
  - grade I-II: no progression at 10 years

- **Weber 1999: - ASD Debride**
  - grade III: 3/32 progressed to full 2-7 years.
    - NO healing observed at second look
Anatomy of the RTC

- **Rotator Cable:**
  - thickening of cuff (biceps to TM)

- **Rotator Crescent:**
  - thinner cuff tissue medial to cable (poor blood supply)
    - **Bursal side:**
      - Thicker collagen bundles
      - Parallel orientation
      - Greater tensile strength
    - **Articular side:**
      - Thinner
      - More random orientation
      - 50% less tensile strength
Anatomy:
Supraspinatus Footprint

- **Warren**: *AOSSM 2004*
  - 12.7-16.3 mm

- **Curtis**: *AANA 2002*
  - 16mm (12-22)

- **Nottage**: *Arthroscopy 2004:*
  - Tendon thickness
    - 12.1mm at midtendon
    - 11.6 ant
    - 12.5 post
Footprint: Summary

- Approximately 12-16mm
- Reasonable estimate: 6-8 mm = 50%
Diagnosis: Physical Exam

- **Bursal:**
  - imp tests (Neer, Hawkins, SA inj)

- **Articular:**
  - int imp test, relocation test

- **Intrasubstance:** MRI diagnosis
Diagnosis: Imaging

- **Innacurate !!!**
  - MRI:
    - Gartsman- 1995 83% false negative
  - MRI Arthrog:
    - Hodler 1992: 40% false neg
  - U/S:
    - Traughber 56% sensitive
Diagnosis: MRI Examples

- MRI – cuff degen.,
  bursal fluid
- MRA – filling defect;
- MRA - ABER view
- MRA - Intrasubstance
What are available treatment Options?

- Non-surgical
- Debride
- Debride + ASD
- Repair in situ
- Complete and repair
Non surgical Management

- Try First !!
  - MRI may be wrong !
  - 40% success (Breazeale, and Craig- 1997 OCNA)
  - McConville, Ianotti 1999 JAAOS
  - Morrison: Burkhead (ed) 1997
Non Surgical Management

- **Bursal side tears:**
  - NSAID
  - RTC strengthening
  - Cortisone inj

- **Articular side tears:**
  - Treat tight posterior capsule (stretching)
  - Stabilization exercises
Surgical Management:

- What do we know?
- Review of the literature…..
Surgical Results: Debridement Alone

Andrews 1985: 85%
Oglivie-Harris 1986: 50%
Snyder 1991: 84% no corr to size/no progression
Budoff 1998: 87% satisfied, 85% G/E by UCLA
Surgical Results: Debridement + ASD

● **Short Term**
  - Ryu 1991: 84% satisfactory (debrid=ASD)
  - Gartsman 1990 82.5% sig improved
  - Olsewski 1994 81% satisfactory
  - Esch 1988 82% satisfied (1 year)

● **Longer Term**
  - Weber 1997 Grade III (2-7 yrs)
    - 6/32 reops
    - No exc, 14 good, 8 fair, 9 poor
  - Cordasco: 2002 Grade I-II (4.5 years)
    - grade 1 & 2A 95% success (same as no tear !)
    - grade 2B: 38% failed
Be Careful What you Debride....

- You may regret it later.......
Surgical Results: ASD & Open Repair

- Itoi 1992: 82%
- Miller 1996: 95%
- Weber 1999: 94%
- Fakuda 1996: 94%
- Wright 1996: 85%
DATA: Summary

- Debridement works for small partial tears Grade 1AB, 2A
- No significant difference between debridement and ASD for these tears
- Completing tear + repair gives better results for more significant partial tears especially bursal sided 2B, all grade 3

**NOTE: NO GOOD DATA YET ON ARTHROSCOPIC PARTIAL REPAIRS !!**
Treatment Recommendations

- **Articular:**
  - < 50%: Debride
  - > 50%: Consider Repair

- **Bursal:**
  - < 25%: Debride
  - > 25%: Consider Repair

- *Consider: activity level, dominant arm and morbidity of repair!*
Articular Partial Thickness Tears of the RTC:

Decision Making

- Evaluate type/shape of tear
- Evaluate Footprint
- Measure depth of tear
Articular Tear Classification

- Tendon Split
- Degenerative
- Cable Avulsion
- Delamination
- “T” shaped Tear
Articular Tears: Partial Repair

- **Delamination:**
  - Repair to remaining bursal cuff

- **Split:**
  - Side to side repair

- **Avulsion**
  - Measure thickness
  - Abrade bony bed
  - Repair footprint
    *Do not over tighten undersurface only!*
Measuring Depth of Tear

Footprint
How to Measure Depth of Tear: **Avulsion**

Nottage Method *(Arthroscopy 2004)*

- Avg normal distance from tendon to articular margin: **1.5mm**
- Measure distance from undersurface tear to articular margin **7.5mm**
- Subtract **1.5mm**
  - **6mm**
- This # divided by normal tendon thickness = % torn

\[
\frac{6\text{ mm}}{12\text{ mm}} = 50\% \text{ tear}
\]
How to Measure Depth of Tear?

**Tissue loss**

1) Debride damaged tissue
2) Suture marker
3) “Poor man’s” depth guage
Case Examples

Repair of Partial Thickness Tears
Articular Split Tear: Partial Articular Repair Side to Side
Articular “T” Tear: Partial Articular Repair
Undersurface to bone
Articular Avulsion:
Partial Articular Repair:
Transtendon
Type of Tear: Intrasubstance

- When is this significant?
- When/how do you treat?

- MRI inaccurate:
- Intra-operative DX
Decision Making: Probing Intrasubstance tears
Complete the Tear & Repair
Intrasubstance Tear:

Video
Partial Bursal Side Tear: Repair Technique

- same as full thickness tear
Conclusion:

- Significant partial tears do not heal and probably enlarge
- Results of repair are better than ASD + debridement for significant partial tears
- Repair most Type 3 tears
- Consider repair Type 2 B tears
However

- Remember
  - Many patients still do well with debridement
  - Consider morbidity of repair vs. debridement
  - Take into account age, activity level, dominant arm

- Unanswered questions....
  - Completing tear and repair seems to work- BUT...

  - Does partial repair improve results ?
  - Effect of uneven tension on repaired partial tear ?
Sometimes repairing is worse...

Than removing.....
THANK YOU