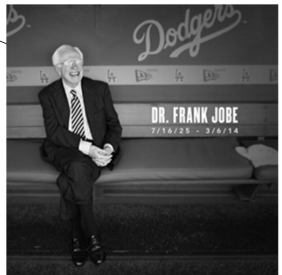
Partial Thickness Rotator Cuff Tears in the Throwing Athlete



Neal S. ElAttrache, M.D.

Disclosure

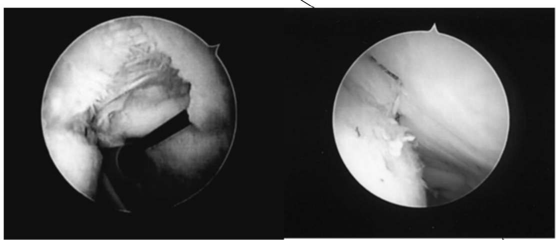
I, Neal ElAttrache, or a family member(s), have relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation as follows:

Joint patent agreement with Arthrex

Partial Thickness Rotator Cuff Tears

- More common source of pain than previously appreciated
- Not a singular condition
- Results from variety of insults to cuff producing different locations (intratendinous, bursal vs articular surface) and patterns of failure
- Most common on articular surface
- Different mechanisms can co-exist
- Do not heal spontaneously, may progress

New Frontier?



Pathophysiology

"A surprising degree of lamination can be encountered, the [articular surface] fibers demonstrating the greatest degree of retraction."

Ellman

"Some tears extend into the depth of the tendon, dissecting into two layers."

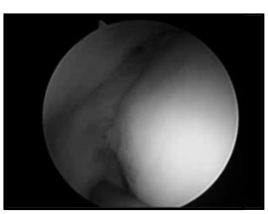
Walch AJSM 92

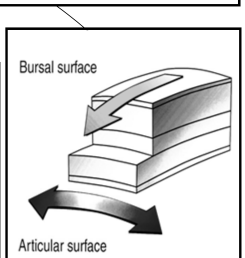
"Intra-tendinous tearing … suggests the presence of shear within the tendon."

"Spontaneous healing appears unlikely."

Fukuda

Etiology - IT Factors





Clark, Harryman JBJS 1992

Healing with Rehabilitation

Risk for Progression

Symptomatic PASTA Lesions
40 Patients (Av FU 13.5 months)

Smaller	**20%**
Larger	**51%**
Full thickness	**29%**

Yamanaka etal. Clin Ortho 1994

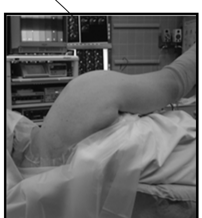
Healing after Débridement

On second-look arthroscopy, "… healing … was never observed..."

Weber Arthroscopy 1999

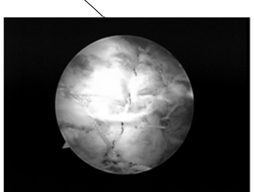
Results from débridement and acromioplasty (without repair >50% tears) were fair.

Weber Arthroscopy 1999



Bursal Surface Tears

- More often associated with classic SA pathology and impingement
- Older patients > 45
- Treatment
  - Conservative
    - NSAIDS, therapy, ? injection
  - Surgical
    - SAD $\pm$ DCR
    - Debride or repair bursal surface depending on depth of tear



Partial Articular Surface Tendon Avulsion (PASTA) Lesion

- More common than previously thought (MRI, scope)
- Younger patients < 45
- Overhead athletes
- Shear/traction/avulsion
- Frequently involves delamination
- Bursal surface usually intact
- Associated with internal impingement

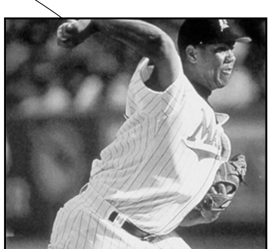
PASTA/PAINT Lesions

- Significant problem in throwers
- Solution is uncertain
- Often associated with superior labral tears, but PTRCT may be the main source of pain
- In study of pro pitchers with sup labral repair:
  - Return to prior level of play 57%
  - If players had isolated sup labral repair, return to play 80%
  - In players w/PTRCT, return to play 12.5%

Neri, ElAttrache, et al, AJSM 2011

History

- Age < 45
- Repetitive overhead activity
- Acute trauma
- Activity related pain (abduction/ER)

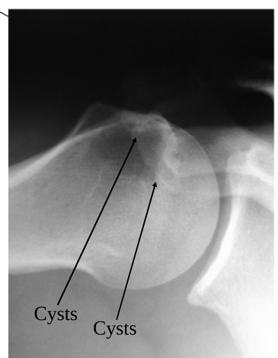


Physical Examination

- Occasional IRD
- Impingement signs and test equivocal
- Tenderness at greater tuberosity
- Postitive relocation test, O'Brien's test, flexion/adduction/IR test
- Pain with resisted abd/ER and supraspinatus test

Imaging

- Radiographs – subcortical cysts/erosions at greater tuberosity

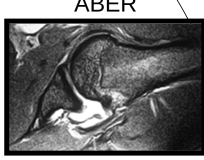


Imaging

- MR Arthrogram – best demonstrates lesion

Sagittal

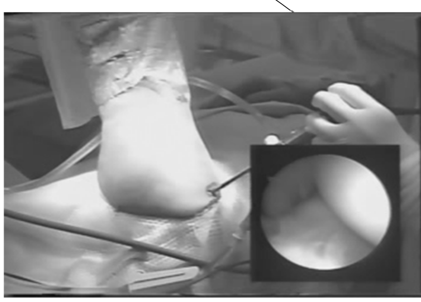
ABER



Diagnostic Arthroscopy and Bursoscopy

- Lateral decubitus position
- Standard posterior viewing portal
- Anterior working portal
- localize lesion and lateral subacromial portal w/ spinal needle

Internal Impingement



Options

Scope Debridement

Scope AS / IT Repair

Mini – Open Repair

Open Repair

Debridement
Andrews,1985

- Helpful for inspection and mechanical symptoms
- Decrease pain by resection of devitalized tissue

However, spontaneous healing unlikely:

- Separation of torn margins and shear
- Hypovascularity
- No synovial layer
- Continued impingement

Fukuda

Surgical Decision Making

- Loss of 50% of the footprint attachment for supraspinatus appears to be critical amount if the majority of the supraspinatus tendon is involved
- Articular sided tendon strain increases significantly with partial tears $\geq$ 50% of footprint
- Repairs of PASTA lesion $\geq$ 50% return strain to normal

Mazzocca, AJSM 2009

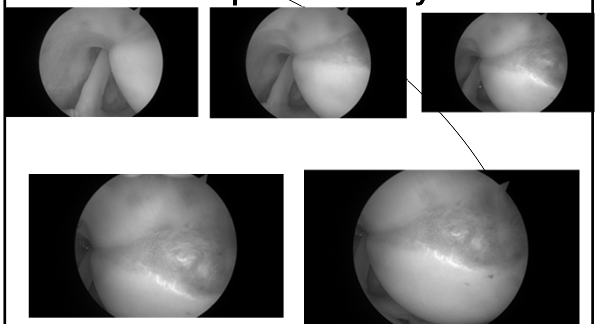
Surgical Decision Making

- In situ repairs of partial thickness RC tears of 50% thickness have greater strength than DR repair after tear completion
- Therefore unless remaining tendon fibers have significant pathology attempt should be made to repair the torn articular lamina and preserve the native intact portion of the tendon

Lomas, Ahmad, JSES 2008

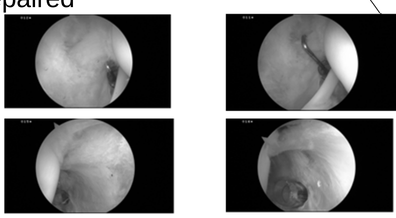
Question: Can we apply these indications to throwers?????

Articular Surface Footprint Anatomy



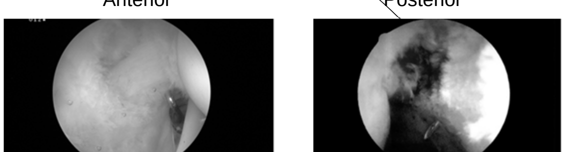
Surgical Decision Making

- Issue in question is what and how much of the articular surface should be repaired



Rotator Cuff Cable

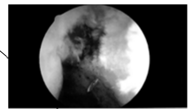
Anterior Posterior

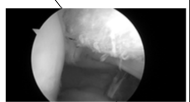


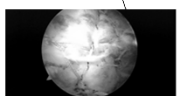
Current pilot study – disruption of cable produces to microinstability

Personal Guidelines for Treatment

- If 25-50% of cuff is torn, debride + SA bursectomy; if delaminated - IT repair; acromioplasty only if abrasion
- If 50-75% of cuff is torn with ER/supra weakness and pain – AS repair to cable footprint; IT repair if delaminated
  – Leave rim rent open
- If > 75% of cuff is torn and remaining tissue poor quality, complete and repair both laminae

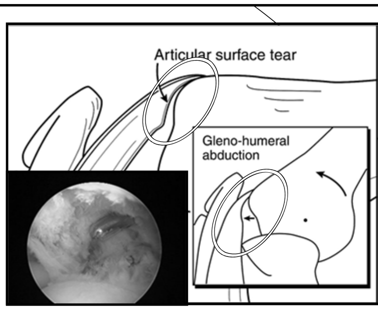




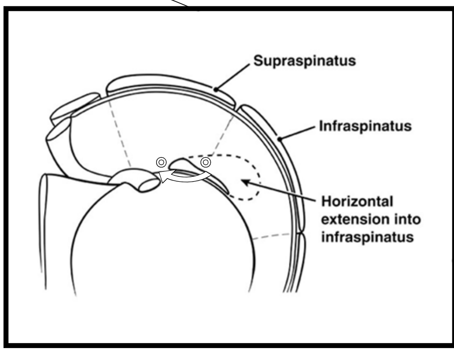


Intratendinous Repair

Visualization



Drawings courtesy of John Conway, MD



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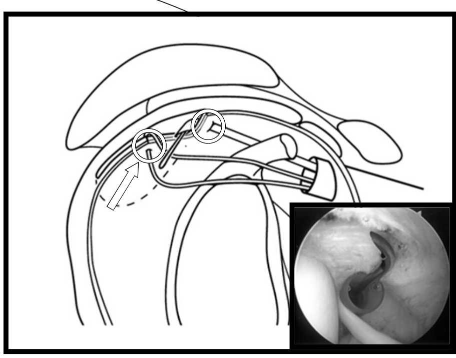

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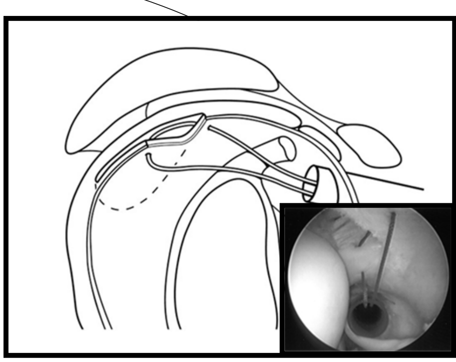

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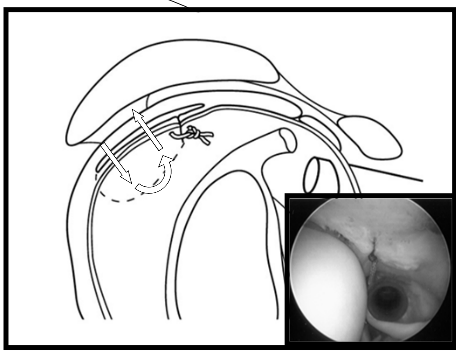

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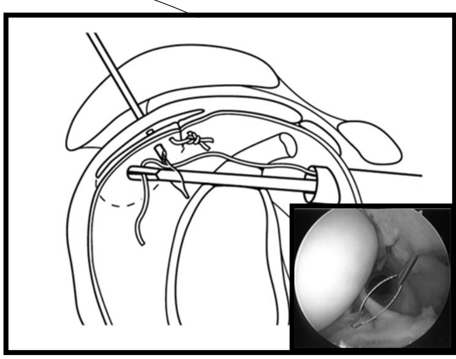

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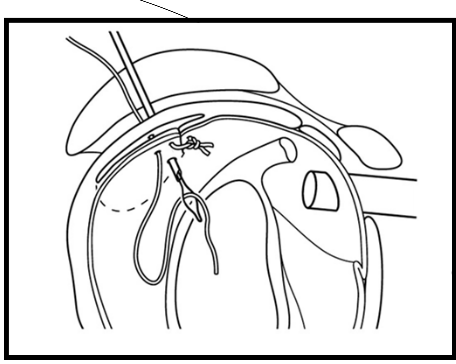

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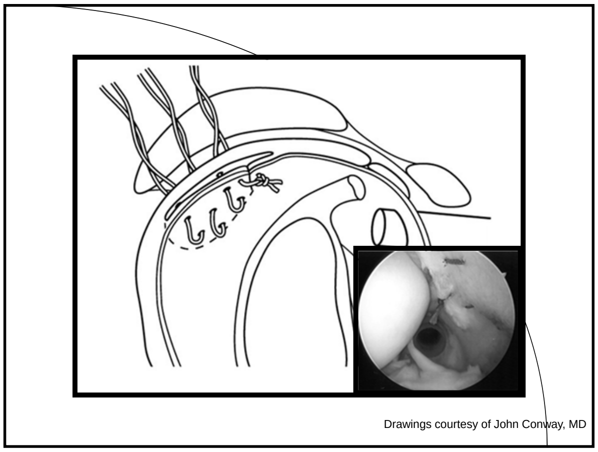
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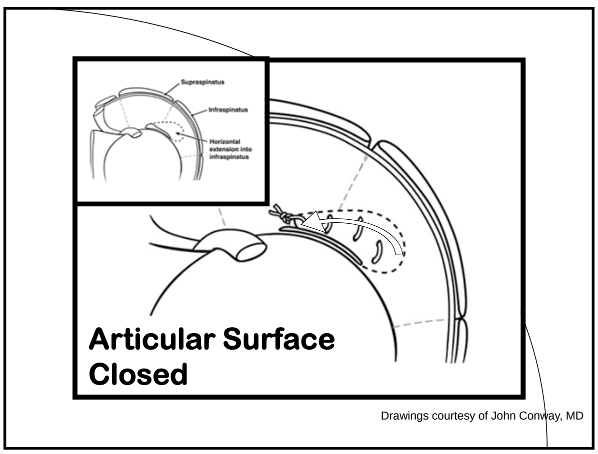
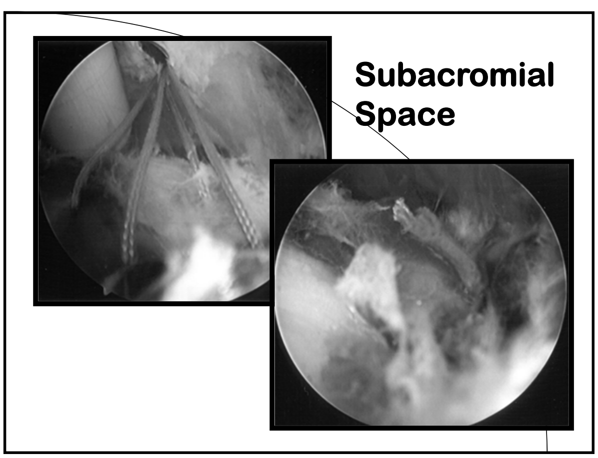
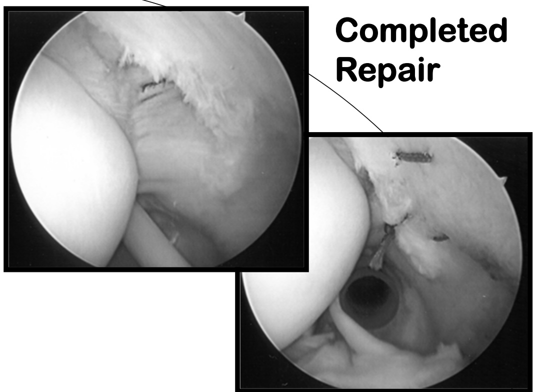
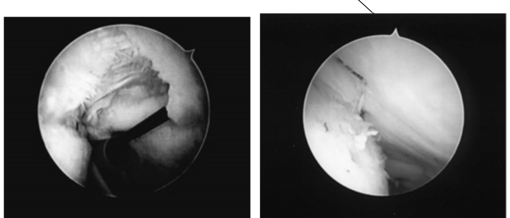

Supraspinatus
Infraspinatus
Horizontal extension into infraspinatus
Articular Surface Closed
Drawings courtesy of John Conway, MD


Subacromial Space

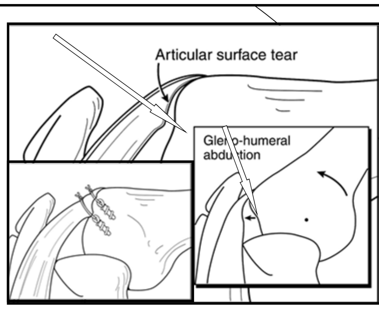
Completed Repair



AS/IT Repair



Suture Anchor Placement



Case Study

History

- 30 yo RHD professional pitcher
- Previous SLAP repair 2 years earlier
- Returned to pitching 1 full year
- Ant/post shoulder pain during and after pitching beginning in early spring training
- Treated with modalities and PT – posterior capsule stretching, scapular stabilization, cuff strengthening, subacromial and bicipital groove injection

Case Study

History

- Able to keep pitching and called up to majors at All-star break
- MRI done when called up revealing "cuff tendinopathy"
- Able to keep pitching with PT and subacromial corticosteroid injection which was effective for approx. 3 wks
- Anterior pain resolved but had worsening post/sup pain after pitching as significant and more so than prior to injection

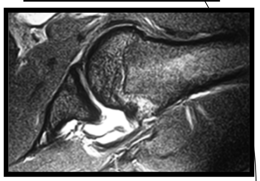
Case Study

Exam

- No focal atrophy
- PROM
  - R ext rot in scaption 105˚
  - R int rot in scaption 30 ˚
  - L ext rot in scaption 95 ˚
  - L int rot in scaption 60 ˚
- AROM
  - R with painful catching sensation on elevation in scapular plane between 60 – 90 ˚
- + relocation, + speeds
- + O'Brien, + Neer & Hawkins
- Mild weakness and pain with resisted ER

Case Study

- Repeat MRI with contrast showed articular sided cuff tear



AS/IT Cuff Repair

Video

JG - 1/10/2011

- 31 y.o. right hand dominant pitcher
- c/o posterior shoulder pain with throwing
- ROM: ER 100 deg, IR 35 deg
- Strength 5/5 except ER 4/5 with pain
- Neg Neer, Hawkins, Speeds, stability tests
- Pos O'Brien's with posterior pain, relocation
- Injection resulted in complete pain relief

JG – 6/2/2011

- Increased post-sup shoulder pain at ball release during game
- Treated with repeat injection and PT
  - Post capsule stretching
  - Modalities
  - Scapular muscle and cuff strengthening

JG – 7/27/2011

- Continued pain on throwing program

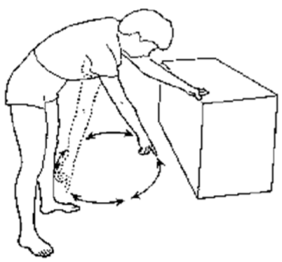
MRI/Surgery Photos

Goals of Post-operative Rehab

- Protect integrity of repair while healing
- Restore capsular compliance and ROM
- Restore scapulo-humeral synchrony
- Restore optimal mechanics (total body)
- Restore proprioception
- Restore strength and endurance

Post-Operative Rehabilitation

- Shoulder protected in Ultra Sling for 4 weeks
- First day elbow and wrist AROM 3x day, hand exercises with ball
- Second week, Codman and Pendulum exercises started, up to 90° of passive elevation with neutral rotation



Post-Operative Rehabilitation

- Active elevation initiated at 6 weeks and progressed as tolerated
- Stretching of posterior capsule and pec minor
- Avoid internal impingement position (hyperangulation)
- Full activities range from 4 to 6 months, depending on activity
- Progressive throwing program at 6 months if reversible IRD corrected

Preliminary Results

One Year Follow-up (2012)
- 10/12 (83%) Throwing

Two Year Follow-up
- 8/11 (73%) Play 1 Yr

2014 Follow-up
- 11/14 Play 1 year (79%)
- Gathering KJOC scores

Thank You