Current Controversies in Shoulder Surgery:

Shoulder Instability
Rotator Cuff Injury and Repair
Reverse Shoulder Arthroplasty

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Sports Medicine and Shoulder Surgery
Disclosures

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  – OREF
  – NIH (R03)
Controversies in Shoulder Surgery

• Shoulder Instability
  – Natural history—has anything changed?
  – Evaluation—what is the best way to evaluate bone loss?
  – Management
    • Anchor type? Management of bone loss?

• Rotator Cuff Tears
  – Natural history—can we predict progression?
  – Evaluation—can we reliably use MRI to eval subscap tears?
  – Management—
    • When does non operative management work?
    • When/how to repair subscap tear?
    • When is it time to say no!

• Reverse Shoulder Arthroplasty
  – When is too young for RTSA?
  – How do we make it work better?
Shoulder Instability

• History
  – First time vs. multiple
  – Mechanism
  – Direction/voluntary
Shoulder Instability

• Physical Exam
  – ROM
  – Apprehension/Relocation
  – O’Brien’s
A predictive model of shoulder instability after a first-time anterior shoulder dislocation.

Mather RC 3rd, Orlando LA, Henderson RA, Lawrence JT, Taylor DC.
Department of Orthopaedic Surgery, Duke University Medical Center, Durham, NC 27710, USA. mathe016@mc.duke.edu
Summary:
Predictive model can be used based on historical data to provide information in first time dislocation

Table III  Results of a microsimulation of example model applications

<table>
<thead>
<tr>
<th>Scenario</th>
<th>WOSI</th>
<th>Recurrent instability</th>
<th>Surgical stabilizations</th>
<th>Stable at 10 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year one</td>
<td>Total</td>
<td>Primary</td>
</tr>
<tr>
<td>18-year-old male (A)</td>
<td>64</td>
<td>77%</td>
<td>82%</td>
<td>17%</td>
</tr>
<tr>
<td>30-year-old female painter (B)</td>
<td>68</td>
<td>34%</td>
<td>58%</td>
<td>23%</td>
</tr>
<tr>
<td>US military (C)</td>
<td>67</td>
<td>46%</td>
<td>70%</td>
<td>29%</td>
</tr>
</tbody>
</table>
Shoulder Instability

- Imaging
  - Xrays (make sure not locked posterior)
  - MRI (+/- intraarticular injection)
Best method to assess bone loss?
3-D CT is the Most Reliable Imaging Modality When Quantifying Glenoid Bone Loss

Julie Y. Bishop MD, Grant L. Jones MD, Michael A. Rerko MD, Chris Donaldson MD, MOON Shoulder Group

• Cadaveric specimens compared between XR, MRI, CT, 3DCT
• Kappa value: True vs. predicted bone loss
  – 3DCT (0.50)
  – CT (0.47)
  – MRI (0.27)
  – Xray (0.15)
Shoulder Instability

• What is the best technique for arthroscopic stabilization?
Kocalgo et al KSSTA 2010
• Thirty-eight athletes underwent arthroscopic Bankart repairs.
• Suture anchors in 18, knotless in 20
• No difference in outcomes:
  • Same post op scores (Rowe)
  • Same recurrence rates
What would you do?
Anatomical and Functional Results After Arthroscopic Hill-Sachs Remplissage

Pascal Boileau, MD, Kieran O’Shea, MD, Pablo Vargas, MD, Miguel Pinedo, MD, Jason Old, FRCSC, and Matthias Zumstein, MD

Investigation performed at the Department of Orthopaedic Surgery and Sports Traumatology, L’Archet Hospital II, University of Nice-Sophia-Antipolis, Nice, France

47 patients, avg age 29 years
8 degree loss of ER
98% stable at 2 years
90% return to sports

Percent Fill on CT arthrogram
Remplissage Repair—New Frontiers in the Prevention of Recurrent Shoulder Instability

A 2-Year Follow-up Comparative Study

Francesco Franceschi,* MD, Rocco Papalia,* MD, PhD, Giacomo Rizzello,* MD, Edoardo Franceschetti,* MD, Angelo Del Buono,* MD, Manlio Panasci,* MD, Nicola Maffulli,†† MD, PhD, MS, FRCS(Orth), and Vincenzo Denaro,* MD

<table>
<thead>
<tr>
<th></th>
<th>Remplissage and Bankart Group</th>
<th>Bankart-Only Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCLA score</td>
<td>31.16 ± 2.1</td>
<td>27.8 ± 7.3</td>
</tr>
<tr>
<td>Constant score</td>
<td>11.94 ± 0.97</td>
<td>20.3 ± 15.3</td>
</tr>
<tr>
<td>Rowe score</td>
<td>82.8 ± 5.6</td>
<td>73.1 ± 16.8</td>
</tr>
<tr>
<td>Forward elevation</td>
<td>168.9 ± 15.1</td>
<td>165.9 ± 17.1</td>
</tr>
<tr>
<td>External rotation beside body</td>
<td>56.0 ± 17.6</td>
<td>58.0 ± 15.8</td>
</tr>
<tr>
<td>Internal rotation</td>
<td>T6</td>
<td>T7</td>
</tr>
<tr>
<td>Redislocation rate, %</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

*TABLE 5: Matched Intergroup Differences*
Glenoid Bone Loss
Normalization of Glenohumeral Articular Contact Pressures After Latarjet or Iliac Crest Bone-Grafting

By Neil Ghodadra, MD, Aman Gupta, BS, Anthony A. Romeo, MD, Bernard R. Bach Jr., MD, Nikhil Verma, MD, Elizabeth Shewman, PhD, Jordan Goldstein, MD, and Matthew T. Provencher, MD, CDR, MC, USN

Investigation performed at Rush University Medical Center, Chicago, Illinois

JBJS 2012
The Latarjet Procedure for the Treatment of Recurrence of Anterior Instability of the Shoulder After Operative Repair

A Retrospective Case Series of Forty-nine Consecutive Patients

Samuel L. Schmid, MSc, Mazda Farshad, MD, Sabrina Catanzaro, RRN, and Christian Gerber, MD, FRCSEd(Hon)

Investigation performed at the Department of Orthopaedics, University Hospital Balgrist, University of Zürich, Zürich, Switzerland
Instability

• Remains a common problem with similar rates of recurrence
  – Management should be shared decision making with patients
• Consider (3D)CT scan when there is a concern for bone loss
• Arthroscopic Stabilization gold standard for most cases
  – Good outcomes expected
  – Remplissage for larger Hill-Sachs defects
  – Latarjet for anterior glenoid bone loss
Rotator Cuff Controversies

**Rotator Cuff Tears**

Natural history—can we predict progression?
Evaluation—can we reliably use MRI to eval subscap tears?
Management—
  When does non operative management work?
  When/how to repair subscap tear?
  When is it time to say no!
Diagnosis of rotator cuff tears

### Supraspinatus
- **History**
  - Pain at night/overhead activity
- **Physical Exam**
  - Loss active ROM
  - Provocative tests (80-85%)
- **Imaging (MRI)**
  - 90 % for FT tears

### Subscapularis
- **History**
  - Anterior pain
- **Physical Exam**
  - Lift off (75%)
  - Belly press (70%)
  - Bear Hug (60-70%)
- **Imaging**
  - MRI
The Accuracy of Magnetic Resonance Imaging and Magnetic Resonance Arthrogram Versus Arthroscopy in the Diagnosis of Subscapularis Tendon Injury

Abdullah Foad, M.D., and Coen A. Wijdicks, Ph.D.

40 patients scanned in 1.5 T scanner
Compared pre-op MRI to arthroscopic findings
MRI Sensitivity: 40%
MRA Sensitivity: 36%

Conclusion: MRI may not be accurate for the diagnosis of subscapularis tears
A Systematic Approach for Diagnosing Subscapularis Tendon Tears With Preoperative Magnetic Resonance Imaging Scans

Christopher R. Adams, M.D., Paul C. Brady, M.D., Samuel S. Koo, M.D., M.Ph., Pablo Narbona, M.D., Paolo Arrigoni, M.D., G. Joshua Karnes, and Stephen S. Burkhart, M.D.

![MRI images of shoulder joint](image)

### Table 2. Results of MRI Interpretations by Orthopaedic Surgeons Compared With Radiologists

<table>
<thead>
<tr>
<th>Groups</th>
<th>Surgeons</th>
<th>Radiologists</th>
<th>Statistical Difference Between Surgeons and Radiologists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>73% (60/82)</td>
<td>61% (50/82)</td>
<td>No, $P &gt; .05$</td>
</tr>
<tr>
<td>Specificity</td>
<td>94% (113/120)</td>
<td>96% (115/120)</td>
<td>No, $P &gt; .05$</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>90% (60/67)</td>
<td>91% (50/55)</td>
<td>No, $P &gt; .05$</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>84% (113/135)</td>
<td>78% (115/147)</td>
<td>No, $P &gt; .05$</td>
</tr>
<tr>
<td>Accuracy</td>
<td>86% (173/202)</td>
<td>82% (165/202)</td>
<td>No, $P &gt; .05$</td>
</tr>
</tbody>
</table>
Rotator cuff-non operative management

• MOON study group (in press)
  – 400 patients followed and treated with PT, NSAIDS
    • 70% small tears (50% minimal tears)
  – 15% required surgery

<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>Baseline Scores</th>
<th>6 weeks</th>
<th>P value</th>
<th>12 weeks</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-12 MCS</td>
<td>40.26</td>
<td>40.57</td>
<td>0.36</td>
<td>40.84</td>
<td>0.895</td>
</tr>
<tr>
<td>SF-12 PCS</td>
<td>35.34</td>
<td>35.64</td>
<td>&lt;0.0001</td>
<td>36.05</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ASES Score</td>
<td>54.47</td>
<td>77.98</td>
<td>&lt;0.0001</td>
<td>83.67</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
• 59 patients, 59 years old with full thickness tears
  – 24% increased >5 mm, 27% increased 2-5 mm, 36% had not changed
  – Older than 60, larger tears, fatty infiltration increased risk of progression
Natural History

• Melis et al. CORR 2010
  – 1688 patients followed non operatively
  – Fatty infiltration was related to
    • Older patients, larger tears
  – Occurred on average of 4 years after onset of symptoms

• Cheung et al. JSES 2011
  – Fatty infiltration increases with increasing tear size
  – FI can occur in the infraspinatus even in the setting of an intact tendon
    • Suggests a role of denervation in the pathogenesis of fatty infiltration
Rotator Cuff Repair

• What is the best repair strategy for rotator cuff tears?
A watertight construct in arthroscopic rotator cuff repair

Jonathan T. Nassos, MD\textsuperscript{a,*}, Neal S. ElAttrache, MD\textsuperscript{a}, Michael J. Angel, MD\textsuperscript{b}, James E. Tibone, MD\textsuperscript{a}, Orr Limpisvasti, MD\textsuperscript{a}, Thay Q. Lee, PhD\textsuperscript{c}
A watertight construct in arthroscopic rotator cuff repair

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![Leakage Area Graph](image)

* $p < 0.05$ vs. Single Row

* $p < 0.05$ vs. Knotless Transosseous Equivalent
Comparison of SR, DR, TOE 160 minutes after repair
Pressure highest/force highest with TOE
Loss the least with TOE
Clinical Outcomes

• Clinically—more anchors is (May be) better for larger (>1 cm) tears

Does Double-Row Rotator Cuff Repair Improve Functional Outcome of Patients Compared With Single-Row Technique?

A Systematic Review

Alexander M. DeHaan,* MD, Thomas W. Axelrad,* MD, PhD, Elizabeth Kaye,* MPH, PhD, Lorenzo Silvestri,* MD, Brian Puskas,* MD, and Timothy E. Foster,*† MD

Investigation performed at the Department of Orthopaedic Surgery and Sports Medicine, Boston University School of Medicine, Boston, Massachusetts
What would you do with this?
Arthroscopic Reconstruction of Isolated Subscapularis Tears: Clinical Results and Structural Integrity After 24 Months

Roderich Heikenfeld, M.D., Ioannis Gigis, M.D., Anastasios Chytas, M.D., Rico Lestringhaus, M.D., and Georgios Godolias, M.D.

- Arthroscopic repair in 19 shoulders
  - Constant score 81
  - 17/19 happy
  - 2 retorn
When to say no?
Rotator cuff repair

• Summary
  – Natural history—look at fat/atrophy as a predictor of worse outcomes

• Arthroscopic cuff repair
  – Single row for small tears
  – TOE for larger (>3 cm tears)
  – Fix subscap tears

• Expect decent, but not amazing outcomes
  – Still have not conquered biology
Reverse Shoulder Arthroplasty

The future, or too much of a good thing?
# Outcomes after RTSA

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Outcome</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuff Tear Arthropathy</td>
<td>Best overall ASES/Constant score vs. other etiologies</td>
<td>Mulieri JBJS 2011</td>
</tr>
<tr>
<td>Failed TSA</td>
<td>Constant 65% FF 106 deg 50% complication rate</td>
<td>Kelly JSES 2012</td>
</tr>
<tr>
<td>Fracture (hemi vs RTSA)</td>
<td>Better 5 year outcome with RTSA vs. hemi</td>
<td>Boyle JSES 2013</td>
</tr>
</tbody>
</table>
Reverse Shoulder Arthroplasty

• What is too young for RTSA?
Reverse total shoulder arthroplasty for massive irreparable rotator cuff tears in patients younger than 65 years old: results after five to fifteen years

Eugene T.H. Ek, MBBS, PhD, FRACS²,³, Lisa Neukom, MD⁴, Sabrina Catanzaro, RN⁴, Christian Gerber, MD, FRCSEd (Hon)⁴,*

Constant Score 74%
Forward flexion 120
Complications in 37%
6 (15%) failures (3 infxn, 3 glenoid loosening)
10 (25%) had revision, hemi, exchange
Surgical techniques

• Alternations implant design leads to less notching (JSES, in press 2013)
  – 54 patients with >2 year follow-up (avg. 2.6 years)
    • Majority CTA
    • Fx
    • Failed TSA
    • Infection
  – Zimmer RTSA (increased offset and lateralized glenosphere)
Scapular notching

Majority (81%) of patients have no notching or very minor notching only.
Scapular Notching

- Of the 9 patients with grade 2 and above, 7 of 9 have demonstrated progression since 1 year.
BPD

P<0.001, Mann Whitney U test

No notching | Notching
---|---
0 | 3
0.5 | 2.5
1 | 2
1.5 | 1.5
2 | 1
2.5 | 0.5
3 | 0

UCSF Sports Medicine
Radiographs vs. Notch Grade

Summary:

- Notching is less common with lateral offset/low neck shaft
- Get the baseplate as low as possible
- If there is notching at 1 year, need to follow closely
Summary

• Reverse TSA
  – Good option for CTA
  – Can be a good option for younger patients without another option
  – Good surgical technique important

  – Long term outcomes lacking so far
Thank you