UCL Reconstruction Variations

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New York City Football Club
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Evolutionary Pressure

Complexity of the Surgery
Extensive Dissection
Flexor Mass Mobilization
Research: Anatomical and biomechanical studies
Isometry, Fixation strength
Surgeon Skill
Innovation, Marketing

1. Scope vs No Scope
Arthroscopy
• Diagnose UCL – assess laxity
• Address additional pathology
  – Loose bodies
  – Impingement
  – Synovitis
Arthroscopy
Summary Scope
• Case by case basis
• Additional info on laxity of ligament
• Can treat posterior impingement

2. Approach
Approach
• Flexor takedown
• Flexor elevate
• Flexor split

Surgical Approach
RTP / RTS
• No differences

Subsequent forearm injuries
• Muscle Split/Docking and Muscle elevate/Modified Jobe techniques (5.3% vs. 5.2%, respectively

2018 MLB HITS data

3. Ulnar Nerve
Ulnar Nerve

Factors
• Surgeon preference
• Neuritis/Neuropathy
• Subluxation
  – 16% of pop ulnar nerve instability
• Anconeus Epitrochlearis
17 articles (n = 1518 cases)
- 12% postoperative ulnar neuropathy
- Neuropathy
  - Ulnar nerve transposition 16.1%
  - No handling of the ulnar nerve 3.9%

Ulnar nerve transposition
- More likely the Modified Jobe technique than the Docking
- No correlation with RTP RTS
  - Multivariate analysis stratified by technique, graft type, age, pitching role, throwing side dominance, and level of play

2018 MLB HITS data

Ulnar Nerve

Summary
- Controversial
- Lets ask experts during the panel
Graft Source

- Palmaris – 20% absent
- Gracilus – larger (ligament ossified, revision)
- Allograft – healing issues
- Toe extensor
- Ipsilateral or contralateral

Do Major League Baseball Team Physicians Harvest the Semitendinosus From the Drive Leg or Landing Leg When Performing Ulnar Collateral Ligament Reconstruction on Elite Baseball Pitchers?

- 52 MLB team orthopaedic surgeons
- 77% MLB team physicians completed the survey
Graft Source

Summary
• Controversial
• Lets ask the experts

• Tunnel creation
• Location and size
### Ulnar Bone Bridge

**AAOS Advances Reconstruction: Elbow**

#### Authors
- **Humeral**
  - Technique
  - Tunnel diameter
  - Tunnel length
  - Exit tunnel size
- **Ulnar**
  - Tunnel technique
  - Tunnel size
  - Bridge size

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**Ulnar Bone Bridge**

- Stress fractures through ulnar bone bridge

*Paletta et al. AJSM 2006*
Ulnar Tunnels – Jobe and Docking

Docking Technique

Graft Tensioning
Docking Technique

Why does tunnel length matter?

Short tunnel $\rightarrow$ More sensitive to graft length, may "bottom out" before adequate tension

Short tunnel $\rightarrow$ More sensitive to improper exit tunnel placement
**Humeral Tunnels**

- Maximum Central Humeral Tunnel Depth by Varied Angle in Sagittal Plane
- Tunnel Angulations

<table>
<thead>
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<th>Tunnel Depth (mm)</th>
<th>Tunnel Angle</th>
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<tr>
<td>10</td>
<td>15º</td>
</tr>
<tr>
<td>20</td>
<td>30º</td>
</tr>
<tr>
<td>30</td>
<td>45º</td>
</tr>
<tr>
<td>40</td>
<td>60º</td>
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*p < .05

- Maximum Central Humeral Tunnel Depth by Varied Starting Point
- Tunnel Depth (mm)

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<tr>
<th>Tunnel Depth (mm)</th>
<th>Starting Point from Center of Medial Epicondyle</th>
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<tr>
<td>10</td>
<td>0 mm</td>
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<tr>
<td>20</td>
<td>2 mm</td>
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<tr>
<td>30</td>
<td>4 mm</td>
</tr>
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*p < .05

**Techniques**

**Instrumentation**

**MCL Reconstruction Techniques**
Single Tunnel Cortical Button
• Strength
• Minimize bone tunnels
  – Bone deformity
  – Fractures
  – Prior tunnels

Technique Variations
• 21 yo college RHP
• Previous MCL recon 3 yrs prior with allograft
• Recurrent tear of graft

Technique Variations
MCL Reconstruction
Technique Variations
MCL Reconstruction
Technique Variations

Cortical Button

--

CASE

• 20 yo college pitcher undergoes UCL recon OSH
• First game back feels a pop and pain

--

CASE

New humeral single tunnel
Gracilus tendon
Button fixation

--
4 Strand Graft
UCL Variations

Summary
• Controversial
• Ask the experts

Thank you

Comparison of Outcomes Based on Graft Type and Tunnel Configuration for Primary Ulnar Collateral Ligament Reconstruction in Professional Baseball Pitchers
• 566 professional baseball pitchers who underwent UCL reconstruction between 2010 and 2014
- overall RTP was 79.9% and RSL was 71.2%.

- RTP rates were similar for the Docking vs. 29 Modified Jobe techniques (80.1% vs. 82.4%; p=0.537) and for the two primary autograft types (83.1% for palmaris vs. 80.7% for gracilis; p=0.584). The risk of subsequent elbow surgery was 10.5% for the Docking
  vs. 14.8% for the Modified Jobe Technique, respectively (p=0.203). Significant trends towards an increasing use of palmaris autograft (p=0.023) and the docking technique (p=0.006) were noted; MLB pitchers were more likely than MiLB pitchers in RTP (p=0.007) and RSL (p=0.017), but these remained significant after controlling for number of starts (OR 2.98; 95% CI 1.05 to 8.40; p=0.039) and forearm injuries (OR 5.69; 95% CI 2.24 to 14.40; p<0.001). No specific variables correlated with the risk for subsequent elbow or revision UCL surgery in the multivariate analysis. The use of concomitant ulnar nerve transposition did not affect outcomes.

- Subsequent forearm injuries rates were also similar for the Docking and Modified Jobe techniques (5.3% vs. 5.2%; p=0.999) and for the two primary autograft types (5.0% for palmaris longus vs. 6.7% for gracilis; p=0.506).

- Ultimately, 12.9% of patients required subsequent elbow surgery, and 4.9% of patients required revision.

- 185 UCL reconstruction.