Primary Repair of ACL Tears

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TAMPA BAY RAYS (1995 – PRESENT)
Knee Ligaments

- Anterior Cruciate Ligament
- Posterior Cruciate Ligament
- Medial Collateral Ligament
- Lateral Collateral Ligament
Blood Supply

- Medial and Lateral Collateral Ligaments have a direct blood supply
- Anterior and Posterior Cruciate Ligaments have a poor blood supply
ACL Function

- Prevent anterior translation of tibia to femur.
- Restrain tibial rotation
ACL Anatomy

- Anterior-medial bundle (tight in flexion)
  - Function: retains anterior translation
ACL Anatomy

- Posterior-lateral bundle (tight in extension)
  - Function: rotational stability
ACL Surgery

- Repair
  - Historic
  - Open
  - Limited fixation
  - Mixed outcomes
ACL Surgery

- ACL Reconstruction
  - Arthroscopic
  - Graft choices
  - Accelerated rehab
  - Gold standard
ACL Repair

- New technique
  - Arthroscopic
  - Excellent fixation
  - Improved outcome
ACL Repair

- Indications
  - Sufficient ACL to repair
  - Open physis
  - Moderate demand
Primary Repair of the Anterior Cruciate Ligament: A Systematic Review

Samuel A. Taylor, M.D., M. Michael Khair, M.D., Timothy R. Roberts, M.L.S., and Gregory S. DiFelice, M.D.
ACL Repairs

- A tool for specific injuries
- New indication for familiar tools
- 2 studies
Indications for ACL Repair

- Proximal tears – Sherman classification
- Avulsed off femur
- Partial tears
- Open physis
Study #1 – DiFelice et al.

- DiFelice et al. Arthroscopy 2015
  - 11 consecutive cases
  - 2 anchors
  - 10/11 patients with excellent results
  - KT-1000 arthrometer and knee score tests
DiFelice Technique
Study #2 – Achtnich et al

- Achtnich et al. Arthroscopy 2016
  - 420 total ACL patients
  - 41 patients underwent repair
  - Single anchor
  - Microfracture
ACL Repair Algorithm

420 ACL injuries

41 Prox ACL avulsion tears

379 excluded patients

19 declined primary repair

22 consented primary repair

19 ACL reconstruction

1 intraoperative inadequate tissue quality

21 primary ACL repair

20 ACL reconstruction

21 primary ACL repair
Study #2 – Achtnich et al

- 6 weeks from injury
- 28 months follow-up with KT-1000 and IKDC score
- 20 patients follow-up
- 15% failure rate in repair group
- 100% success in reconstructed group
Overview of ACL Repair
ACL Repair – My Results

- 138 ACL repairs performed out of 405 total ACL surgeries since 2014
- 34% of ACL injuries treated effectively with ACL repair surgery
- To date, 10 failures, and one patient requiring MUA due to lack of extension
- Effective treatment of ACL injury in the right patient
ACL Repair Technique

- #2 FiberWire is passed as Krackow locking stitch through ACL remnant
- Microfracture performed within notch at location of anchor placement to create bleeding bone bed
- Hole punched/tapped in notch to receive SwiveLock anchor
- Suture passed through anchor and inserted at intercondylar ridge
ACL Repair Location

- Punch hole located within intercondylar notch at the ridge
- Anchor dimensions are 4.75 mm x 19.1 mm
ACL Repair Technique
ACL Repair Technique
ACL Repair – End Result
MRI – Before and After ACL Repair
My Second Look – due to notch impingement
My Second Look – due to notch impingement

<table>
<thead>
<tr>
<th>4/3/17 repair</th>
<th>11/1/17 2nd look</th>
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- [Image of repair]
- [Image of second look]
Testing the Repair

• At the conclusion of every repair:
  ○ Take the knee through full range of motion
  ○ Lachman exam
  ○ Pivot shift

• If a repair isn’t rock solid, reconstruct it.
A New Device - The Bone Clamp

- WHITTLING NO MORE!
- Cuts down graft preparation time
- Reproducible results
- Securely holds graft for suture passing
The Bone Clamp

- Idea behind the sizing of the bone plug is based on the Pythagorean Theorem

\[ a^2 + b^2 = c^2 \]

In order for \( c \) to be 10mm, sides \( a \) and \( b \) are 6 mm and 8 mm respectively
The Bone Clamp
The Koco Clamp

- The Koco clamp securely holds the bone plug.
- A TPS saw blade is passed over the bone plug, removing excess bone.
The Bone Clamp

- Bone plug is rotated 90°, tendinous portion turned away, and cut is repeated

- Small holes drilled through bone plug while cradled in the bone clamp for passing of suture
Similar to the UCL repair, primary ACL repair may be indicated as the right surgery for the right patient.


Citations

