ACL Reconstruction

Tips to Prevent Failure

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- Stryker
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Off Label Usage
- None

Incidence of Second ACL Injuries
2 Years After Primary ACL Reconstruction and Return to Sport

AJSM 2014
78 ACL reconstruction patients compared 47 athletes without surgery

- All participated in pivoting/cutting sports
- Followed for injury & athlete exposure (AE) data for a 2 year period

6x increased risk of a 2nd ACL injury when compared to healthy control participants

30% of athletes suffered a 2nd ACL injury within 24 months of RTS

21% contralateral ACL
9% graft re-tear

Are Female Soccer Players at an Increased Risk of Second Anterior Cruciate Ligament Injury Compared With Their Athletic Peers?

Matteo M. Alleva, MD, MSCE, Alyse F. Morgan, MD, BSc, Aaron J. Krych, MD, Nicholas P. Anderson, MD, and Diane D. Dalen, MD

Investigation performed at Mayo Clinic, Rochester, Minnesota, USA

AJSM 2014

AJSM 2016
90 female soccer players compared to 90 female non-soccer players (mean age 19.6 years)

Graft Failures: 11% vs 1%
Contralateral ACL: 17% vs 4%

2nd ACL tear in...
28% of all female soccer players
34% of those who returned to soccer

Tips to Prevent Failure

- Identify all injured structures
- Assess alignment & slope
- Perform meticulous surgery
- Address associated problems
- Focus rehabilitation
- Confirm return-to-play criteria
Accurate Diagnosis

Physical Exam
- Lachman & dynamic subluxation
- varus/valgus stress @ 0 & 30°
- posterior sag & drawer
- dial test @ 30 & 90°
- posterolateral drawer
- anteromedial drawer

Accurate Diagnosis

Radiographs
- AP (standing)
- Lateral (full extension)
- Merchant
- PA flexion (45°)
  - Full length standing
  - Lateral tibia standing

Mechanical Axis
Accurate Diagnosis

MRI
• confirm ACL disruption

Accurate Diagnosis

MRI
• confirm ACL disruption
• meniscus tears
**Accurate Diagnosis**

**MRI**
- confirm ACL disruption
- meniscus tears
- articular cartilage lesions
Accurate Diagnosis

MRI
- confirm ACL disruption
- meniscus tears
- articular cartilage lesions
- periarticular fractures

Salter-Harris Type 2 Physeal Fracture

Accurate Diagnosis

MRI
- confirm ACL disruption
- meniscus tears
- articular cartilage lesions
- periarticular fractures
- associated ligament injuries
Meticulous Surgical Technique

1. Graft Harvest
2. Notchplasty (as needed)
3. Tunnel Placement
4. Graft Passage
5. Graft Fixation

Technical error is the most common reason for primary ACL reconstruction failure

Femoral tunnel malposition is the most common technical error
Rationale for Strategic Graft Placement in Anterior Cruciate Ligament Reconstruction: **I.D.E.A.L. Femoral Tunnel Position**
Pearle, McAllister, Howell

- Isometry
- Direct Insertion
- Eccentric
- Anatomical
- Low tension

- anterior (high)
- proximal (deep)
- within femoral footprint
- low tension-flexion pattern
Address Associated Problems

• Meniscus repair
• Limb re-alignment
• Other ligament repair/reconstruction
• Articular cartilage restoration
• Tibial slope reduction
• Anterolateral complex reconstruction?

• Repair the meniscus to protect the ACL graft
18 year-old male elite wrestler

- injured left knee while playing high school football
- jumped over opposing player & landed with a valgus twisting force
- felt a pop with immediate pain and swelling
- Positive Lachman test on the sidelines
1) What would be your definitive management for this patient? (See arthroscopic view of meniscal tear below)

- Non-operative
- Meniscectomy alone
- ACL Reconstruction AND Meniscectomy
- ACL Reconstruction AND Meniscus Repair
- ACL Reconstruction AND Meniscus Transplantation
- Other

Submit
1) What would be your definitive management for this patient? (See arthroscopic view of meniscal tear below)

<table>
<thead>
<tr>
<th>Management</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-operative</td>
<td>0%</td>
</tr>
<tr>
<td>Meniscectomy alone</td>
<td>0%</td>
</tr>
<tr>
<td>ACL Reconstruction AND Meniscectomy (74/526)</td>
<td>14%</td>
</tr>
<tr>
<td>ACL Reconstruction AND Meniscus Repair (429/526)</td>
<td>81%</td>
</tr>
<tr>
<td>ACL Reconstruction AND Meniscus Transplantation (18/526)</td>
<td>3%</td>
</tr>
</tbody>
</table>

2) If performing a ACL reconstruction with meniscal REPAIR, when would you do the operation?

- Immediately - within 2 weeks
- 3-6 weeks once most motion returns
- > 6 weeks when patient has full ROM
- Other

- 32% (157/484)
- 46% (224/484)
- 21% (183/484)
Radial Repair

Lateral Meniscus

3) What repair technique do you prefer for a mid-third, radial meniscus tear when performed with an ACL reconstruction?

- Inside-out
- Outside-in
- All-inside device
- All-inside suture (intra-articular knots)
- Other

Submit
Patellar Tendon Autograft
ACL Reconstruction

4) What is your postoperative protocol in the first 4 weeks after repair of a radial tear or unstable root tear??

- Non-weight bearing, brace locked in extension (121/446)
- Non-weight bearing, 90 degrees knee flexion (121/446)
- Partial weight bearing, 90 degrees knee flexion (103/446)
- Partial weight bearing, full range of motion (103/446)
- Weight bearing as tolerated, 90 degrees knee flexion (89/446)
- Weight bearing as tolerated, full range of motion (89/446)
- Other

Submit
5) Which of the following meniscus tear types do you most frequently repair when performing ACL reconstruction in a young patient:

- Vertical tear within 6 mm of the meniscoseminal junction (110/385)
- Partial-thickness radial tears (45/385)
- Full-thickness radial tears (75/385)
- Unstable root tears (59/385)
- Horizontal cleavage tears (24/385)
- All tear types (80/385)
- Other

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3 years after
Patellar Tendon Autograft
ACL reconstruction &
Complex Lateral Meniscus Repair

- Resumed Division 1 collegiate wrestling
- No pain, swelling, catching, locking or giving-way
- 5 year follow-up examination & X-rays planned
Limb Re-alignment

- Evaluate coronal plane alignment on the standing AP X-ray
- Obtain a full-length standing (hip to ankle) X-ray if indicated
- Perform a re-alignment osteotomy for mechanical axis $>5^\circ$ varus or valgus

Other Ligaments

- Identify associated patholaxity:
  - physical exam
  - MRI
  - stress fluoro
Articular Cartilage

- Osteochondral *Fixation*
- Debridement
- Microfracture
- Osteochondral *Autograft*
- Osteochondral *Allograft*
- *Cell-based* Regeneration

Osteochondral Fracture

Lateral Femoral Condyle

Tibial Slope Reduction

*Deflexion* osteotomy indications:

1. Tibial slope >13°
2. Anterior tibial translation >10mm

Pre-op Calculation

Lateral Tibia monopodal standing
Anterior Translation: 12 mm
Monopodal Stance
Posterior Slope: 25 degrees
Anterior Translation: 12 mm
Monopodal Stance
**Focus Rehabilitation**

- Pain control
- Reduction of swelling/effusion
- Range of motion (terminal extension)
- Strength
- Proprioception
- Sport-specific activities

“Decreased neuromuscular control & high-risk movement biomechanics, which appear to be heavily influenced by abnormal trunk & lower extremity movement patterns, not only predict first knee injury risk but also re-injury risk.”
Confirm Return-to-Play Criteria

- Qualitative assessment of movement patterns
- Serial strength & functional testing to identify neuromuscular strategies
- Rehabilitation protocols targeted to eliminate limb asymmetries

ACL Reconstruction: Tips to Optimize Outcome

- Assess alignment & slope
- Identify all injured structures
- Perform Meticulous Surgery
- Address Associated Problems
- Focus Rehabilitation
- Confirm Return-to-Play Criteria

Thank You