PCL Double Bundle Reconstruction: Only Way to Go

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PCL Reconstruction

- Historically, PCLR ≠ ACLR
- Anatomic dbPCLR
  - Biomechanically validated
  - Decreases PTT
  - Good Outcomes
- Advancing anatomic dbPCLR \(\rightarrow\) outcomes of PCLR approaching outcomes of ACLR
RFL Research Pyramid

- Components
  - Clinical Outcomes
  - Anatomic Reconstructions
  - Anatomy, Biomechanics, and Objective Diagnosis

PCL Anatomy

- Anterolateral bundle (ALB) and posteromedial bundle (PMB)

Clinically Relevant Biomechanics

- Two part study
- Part I: Native Biomechanics
  - Define individual and collective function of the PCL bundles
  - Provide a framework for evaluating anatomic single vs. double bundle PCL reconstructions
Clinically Relevant Biomechanics

- Part II: Anatomic Recon
- Define anterior-posterior and rotary stability of SB vs. DB anatomic reconstructions

**aSB vs. aDB PCLR: Posterior Tibial Load**

(Wijdicks, AJSM, 2013)
Double-Bundle PCL Tensioning Angles
(Kennedy, AJSM 2014)

- DB PCLR reduced posterior translation, comparable to intact state
- PMB graft fixation angle 0°
  - PMB graft load at 15° > 0°
- ALB graft fixation angles 90° or 105°
  - ALB graft load at 75° > 90° or 105°

Endoscopic Double Bundle PCLR Surgical Technique

- Femoral attachments of AL & PM bundles marked with coagulator
- PCL tibial attachment site debrided distally along PCL facet until popliteus muscle

PCL Femoral Tunnels

- Closed sockets, anterolateral portal
- ALB → 11 mm; between trochlear point and medial arch point (roof)
- PMB → 7 mm; on wall anterior edge 5.8 mm from cartilage
- Place passing sutures
Reaming femoral tunnels

• ALB
  – 11 mm AL bundle at roof
  – Reamer placed at AL bundle center, adjacent to articular cartilage margin

• PMB
  – 7 mm PM bundle on wall
  – centered 8-9 mm posterior to edge of MFC articular cartilage,
  – 2 mm bone bridge between tunnels

PCL Tibial Tunnel

• One tunnel (8.9 mm distance between bundles)
• Locate at bundle ridge
• Always obtain intraop x-rays

PCL Tibial Tunnel

• Key part of procedure
• Too anterior = detach roots
• Too distal = non-anatomic
• Pin or reamer overpenetrates = artery / nerve damage
Ream PCL Tunnel

- 11-12 mm acorn reamer
  - (not smooth bore)
- Large curette posteriorly
- If feel champagne glass region chatter, drop hand to avoid posterior cut out

Pass PCL Grafts into Femoral Tunnels

- PMB first (notch edge) - fix with bioscrew
- ALB second (bone plug, fix with titanium screw)

Tibial Graft Passage
Verify Intra-articular Position

- Eliminate ACL slack sign with traction
- Graft not bunched up

Secure ALB / PMB on Tibia

- Screws and washers (less pain than staples)
- ALB - 90°, neutral rotation, restore tibiofemoral stepoff
- PMB - 0°, neutral
- Verify PD eliminated

Postop Rehabilitation

- Initiate POD #1
  - Prone flexion 0° - 90° x 2 weeks, then as tolerated
  - Quad activation, edema control, ankle pumps
- Place in PCL Rebound Brace
  - Brace POD #3-5
  - NWB x 6 weeks
Postop Rehabilitation

- Week 6 - 6 months
  - Initiate WBAT
  - Cycling, single plane activities
  - Leg press to 70º
  - PCL stress / valgus stress XR at 6 months
- 6 Months Onward
  - Jogging
  - Agility
  - Sports test for return to activity at 9-12 months

PCL Bracing

- Dynamic bracing
- 6 months
  - Sporting activities for 1 year

DB-PCLR Clinical Outcomes

<table>
<thead>
<tr>
<th>Patient Demographics</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total Patients</td>
<td>39</td>
</tr>
<tr>
<td>Acute/Chronic</td>
<td>18/21</td>
</tr>
<tr>
<td>Primary/Revision</td>
<td>32/7</td>
</tr>
<tr>
<td>Isolated/Combined</td>
<td>7/32</td>
</tr>
<tr>
<td>Follow-up Time</td>
<td>2.5 yrs (2.0 - 4.3 yrs)</td>
</tr>
</tbody>
</table>

*Fix them acutely if possible
DB PCLR Clinical Outcomes

- Acute vs. Chronic IKDC
- Overall PCL Stress X-rays:
  - Pre-op = 15 mm
  - Post-op = 0.9 mm (p<.001)

DB PCLR Clinical Outcomes

- Geeslin et al, 2016, Unpublished
  - 100 pts with combined and isolated PCL injury who underwent dbPCLR
  - Significant improvement pre-op to post-op at minimum 2 years follow up:
    - Lysholm (49→80)
    - WOMAC (39→10)
    - SF-12 PCS (38→50)
    - Tegner (2→5)

DB PCLR Summary

- Restores knee stability better than SB PCLR
- Technically simple
- Improved objective and subjective outcomes
- It’s quick, easy, and validated by science!!
Thank You