Minimum 10-Year Results of
Single-Bundle versus Double-Bundle
Posterior Cruciate Ligament Reconstruction:
Clinical, Radiologic, and Survivorship Outcomes

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Disclosure

No conflicts of interest
Biomechanical studies have shown that double-bundle (DB) posterior cruciate ligament reconstruction (PCLR) is better than single-bundle (SB) PCLR in restoring normal biomechanical function and stability. However, most clinical studies reported no differences between the 2 technical methods, and there is yet no long-term clinical comparative study.

**Purpose**: To compare the long-term clinical, radiologic, and survivorship outcomes between SB and DB PCLR

**Hypothesis**: DB PCLR would show superior results and survivorship outcomes to those of SB PCLR in the long-term follow-up.
Methods

2000 to 2008
Primary PCL reconstruction
(n=147)

Patients excluded:
- Age > 60 (5)
- Bilateral injury (3)
- Infection & fracture (4)
- Revision surgery (3)
- Follow up loss (12)

Isolated primary ACL reconstruction
(n=91)

Patients excluded:
- Multiple ligament injury (56)

64 patients enrolled

28 patients: Single-bundle
36 patients: Double-bundle
## Demographics

<table>
<thead>
<tr>
<th></th>
<th>SB (n=28)</th>
<th>DB (n=36)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) †</td>
<td>29.1±12.2</td>
<td>27.0±9.2</td>
<td>n.s.</td>
</tr>
<tr>
<td>Male / female, (n)</td>
<td>22 / 6</td>
<td>33 / 3</td>
<td>n.s.</td>
</tr>
<tr>
<td>Injury side, right / left, (n)</td>
<td>13 / 15</td>
<td>22 / 14</td>
<td>n.s.</td>
</tr>
<tr>
<td>BMI (kg/m²) †</td>
<td>25.0±4.5</td>
<td>25.0±4.3</td>
<td>n.s.</td>
</tr>
<tr>
<td>Associated meniscal injury, n (%)</td>
<td>3 (10.7%)</td>
<td>4 (11.7%)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Associated chondral injury, n (%)</td>
<td>5 (17.9%)</td>
<td>3 (8.3%)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Preoperative STSD (mm) †</td>
<td>10.2 ± 3.4</td>
<td>9.8 ± 4.3</td>
<td>n.s.</td>
</tr>
<tr>
<td>Follow-up (years) †</td>
<td>8.40±1.4</td>
<td>8.46±1.5</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

†Values are presented as mean ± standard deviation with range in parentheses. SB, single bundle; DB, double bundle; BMI, body mass index; STSD, side-to-side difference.
## Methods

- **Clinical evaluation**
  - IKDC, Lysholm, Tegner activity score

- **Radiologic evaluation**
  - Side to side difference (Telos stress radiographs)
  - OA progression (Kellgren-Lawrence grade)

- **Survivorship assessment**
  - Kaplan-Meier method

- **Definition of graft failure**
  - Need for additional surgery (revision, HTO, arthroplasty)
  - Graft complete tear (MRI)
  - STSD > 10mm (Telos)
**Surgical technique**

<table>
<thead>
<tr>
<th></th>
<th>SB reconstruction</th>
<th>DB reconstruction</th>
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<tbody>
<tr>
<td><strong>Graft</strong></td>
<td>Achilles allograft</td>
<td></td>
</tr>
<tr>
<td><strong>Femoral fixation</strong></td>
<td>Interference screw with back-up screw</td>
<td>Interference screw</td>
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<tr>
<td><strong>Tibial fixation</strong></td>
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## Clinical evaluation

<table>
<thead>
<tr>
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<th>SB (n = 28)</th>
<th>DB (n = 36)</th>
<th>P-value</th>
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<tbody>
<tr>
<td><strong>Clinical scores</strong></td>
<td></td>
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<td></td>
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<tr>
<td>IKDC subjective score†</td>
<td>67.2 ± 22.5</td>
<td>67.5 ± 20.7</td>
<td>0.969</td>
</tr>
<tr>
<td>Lysholm score†</td>
<td>73.8 ± 21.5</td>
<td>74.4 ± 18.4</td>
<td>0.938</td>
</tr>
<tr>
<td>Tegner activity score†</td>
<td>5.0 ± 1.8</td>
<td>4.8 ± 1.8</td>
<td>0.702</td>
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<tr>
<td><strong>Radiologic results</strong></td>
<td></td>
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<tr>
<td>STSD† (mm)</td>
<td>5.3 ± 3.5</td>
<td>5.0 ± 3.8</td>
<td>0.828</td>
</tr>
<tr>
<td>OA progression, n (%)</td>
<td>4 (14.3%)</td>
<td>5 (13.9%)</td>
<td>0.964</td>
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</tbody>
</table>
## Failure

<table>
<thead>
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<th>SB (n=28)</th>
<th>DB (n=36)</th>
<th>p value</th>
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<tbody>
<tr>
<td>n(%)</td>
<td>5 (17.9)</td>
<td>5 (13.9)</td>
<td>0.441</td>
</tr>
<tr>
<td>Need for additional surgery</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Graft complete tear</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>STSD &gt; 10mm</td>
<td>4</td>
<td>2</td>
<td></td>
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Survivorship

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<thead>
<tr>
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<th>SB</th>
<th>DB</th>
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<tbody>
<tr>
<td>5-year survival rate (%)</td>
<td>85.7</td>
<td>94.4</td>
</tr>
<tr>
<td>10-year survival rate (%)</td>
<td>82.1</td>
<td>88.9</td>
</tr>
<tr>
<td>15-year survival rate (%)</td>
<td>82.1</td>
<td>83.7</td>
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P = 0.568
Limitation

- Retrospective, nonrandomized study
- Focused only on the number of bundles

Conclusion

After long-term follow-up,

Both SB & DB for PCLR showed satisfactory outcomes.

There were no significant differences between SB and DB in terms of clinical, radiologic, and survivorship.
References


References