Posterior Stabilized Versus Cruciate-Substituting Total Knee Arthroplasty: Midterm Results

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Introduction

• There is limited consensus whether a non-post/cam cruciate-substituting (CS) device is an acceptable alternative to the PS device in primary knee arthroplasty.

• The PS knee has certainly been extremely successful, advancing the state of the art, and providing excellent 20-30 yr outcomes.
Introduction

• However, PCL-substituting devices have been in use with excellent shorter term results

• Possible advantages:
  – Simplified surgical technique with fewer steps
  – Preservation of bone w/o box cut
  – Elimination of poly wear of post
Introduction: Study Hypotheses

• This study compared the clinical and radiographic outcomes of these two devices

• The primary hypothesis was that the clinical outcomes would be equivalent

• The secondary hypothesis was that there would be measurable differences in the perioperative parameters such as tourniquet time and blood loss.
Materials / Methods

• Prospective, randomized study

• Compared the outcomes of the Stryker Triathlon® PS tibial insert vs CS lipped tibial insert

• 56 patients received the PS knee; 55 patients received the CS
Materials / Methods-Implants
Materials / Methods

• Inclusion Criteria: Patients with osteoarthritis undergoing primary total knee arthroplasty were screened

• Exclusion Criteria:
  – BMI > 40
  – Age > 80
  – Inflammatory arthritis
  – Prior osteotomy
  – Neuromuscular disease, metabolic bone disease, infection
Materials / Methods

• Assessments were performed preoperatively, 6 weeks, 6 months, and annually
  – Knee Society Score (original version, 1989)
  – Lower Extremity Activity Scale
  – Full x-rays series incl. long-standing x-rays for alignment

• Perioperative data collected included:
  – EBL
  – Total Hemovac drainage
  – Hgb pre and postop
Materials / Methods - Surgical Technique

- All surgeries performed by single surgeon with identical technique:
  - Tourniquet utilized
  - Medial parapatellar arthrotomy with eversion of patella
  - Measured resection technique, posterior referencing, IM femoral/EM tibial instrumentation
  - No navigation/”MIS”
  - Cement fixation, patella resurfaced
  - PCL (if present) always sacrificed
Results

• The mean follow-up period was 45 months (range, 30 - 57 months)

• There were no statistically significant differences in:
  – Preop demographic characteristics
  – Blood loss
  – Pre- & postoperative hemoglobin values
Results-Clinical and Radiographic Outcomes

• There were no significant differences in any clinical or radiographic parameters between groups at preop, 1 year, or 2 years postop incl.
  
  – the Knee Society scores
  – the Lower Extremity Activity Scale
  – ROM
  – alignment (preoperative versus 1-year postoperative)
## Knee Society Pain/Motion Scores

<table>
<thead>
<tr>
<th></th>
<th>PS Total (Men/Women)</th>
<th>CS Total (Men/Women)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreOp</td>
<td>50.3 (54.3/46.3)</td>
<td>48.6 (52.5/44.9)</td>
<td>.74</td>
</tr>
<tr>
<td>2 Yrs PO</td>
<td>94.3 (90.8/97.7)</td>
<td>91.4 (91.8/91.0)</td>
<td>.84</td>
</tr>
</tbody>
</table>
## Results - Range of Motion

<table>
<thead>
<tr>
<th></th>
<th>PS Total (Men/Women)</th>
<th>CS Total (Men/Women)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ROM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PreOp</td>
<td>5.9/114.0</td>
<td>4.7/114.7</td>
<td>.84</td>
</tr>
<tr>
<td>2 Yrs PO</td>
<td>1.2/125.1</td>
<td>1.0/124.4</td>
<td>.87</td>
</tr>
</tbody>
</table>
## Results - Transfusion & Tourniquet Time

<table>
<thead>
<tr>
<th></th>
<th>PS (n = 56)</th>
<th>CS (n = 55)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRBC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>.42</td>
<td>.22</td>
<td>.16</td>
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<tr>
<td>Male Subgroup</td>
<td>.33</td>
<td>0</td>
<td>&lt;.039</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tourniquet Time</th>
<th>PS (n = 56)</th>
<th>CS (n = 55)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>37.20</td>
<td>33.86</td>
<td>&lt;.002</td>
</tr>
</tbody>
</table>
Results-Complications

• There were no infections, or other surgical or device-related complications

• There were 2 reoperations:
  – Patella fracture at 6 months (CS)
  – Traumatic loosening of tibial baseplate secondary to MVA @ 1 Yr (PS)
Discussion

• As hypothesized, there were no objective differences in the clinical and radiographic outcomes between the two groups, over the minimum 2 year follow-up.

• The ROM data reveals that rollback provided by a post/cam device is not required for excellent flexion.

• There was a statistically longer tourniquet time for the PS group and

• more blood transfused in the male PS subgroup.
Conclusion

• No superiority of either device in terms of clinical outcomes
• Differences in perioperative outcomes, which may have financial and other implications
  – Cost of OR time
  – Cost and risk of transfusions
• Data supports the use of a PCL-substituting design as an alternative to the PS device
• Continued follow-up & greater enrollment will be required to determine if there are differences in long-term outcomes
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Thank You