Rotating Hinge Knee versus Constrained Condylar Knee in Revision Total Knee Arthroplasty: A meta-analysis

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Disclosure

• Jung-Ro Yoon M.D., In-Wook Seo M.D., Young-Soo Shin M.D.

• We have no financial conflicts to disclose
• Revision total knee arthroplasty (RTKA) associated with bone loss and ligament instability is often more challenging than primary total knee arthroplasty.

• The two commonly used prostheses of RTKA are
  ➢ rotating hinge knee (RHK)
  ➢ constrained condylar knee (CCK)
- **Rotating hinge knee (RHK)**
  - In general, more constrained prosthesis / result in higher complication rates and lower survivorship compared to CCK
  - contemporary RHK designs - decreased constraint / mitigated aseptic loosening [1-3]

- **Constrained condylar knee (CCK)**
  - less bone resection, good midterm survivorship [4]
  - Not indicated in high degrees of anteroposterior instability and extensor mechanism insufficiency. [5]
There is debate in the literature whether rotating hinge knee (RHK) or constrained condylar knee (CCK) prostheses lead to better clinical outcomes and survival rates in patients undergoing revision total knee arthroplasty (RTKA).

Purpose

to compare the survivorship and clinical outcomes of RHK and CCK prostheses
Methods and Results

• Multiple comprehensive databases (from 1976 to 2018)

→ 583 MEDLINE / 1301 EMBASE / 491 Web of Science / 937 SCOPUS / 52 Cochrane Library

• Finally **12 studies** were included [3, 6-16]
**Methods and Results (2)**

- **1 RCT of high quality** (by modified Jadad scale), **11 non-RCTs of high quality** (3 PCS and 8 RCS; by Newcastle–Ottawa Scale)
- Measured parameters - **SR** (survival rate) & **clinical outcomes** - FS (function score), PS (pain score), CR (complication rate), ROM (range of motion)

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Study type</th>
<th>Mean age (years)</th>
<th>Sample size (MO)</th>
<th>Prosthetic properties</th>
<th>Follow-up (months)</th>
<th>Infection/Non-infection</th>
<th>Quality score</th>
<th>Measured parameters</th>
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</thead>
<tbody>
<tr>
<td>Bhat et al. [10]</td>
<td>2008</td>
<td>RCS</td>
<td>69.3</td>
<td>61.3</td>
<td>CKK</td>
<td>Mean 30.0</td>
<td>Mean 100.0</td>
<td>NOS 8</td>
<td>SR</td>
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<tr>
<td>Barwick et al. [2]</td>
<td>2000</td>
<td>RCS</td>
<td>67.0</td>
<td>69.0</td>
<td>S-ROM modular</td>
<td>Mean 51.0</td>
<td>Mean 51.0</td>
<td>NOS 7</td>
<td>ROM, FS</td>
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<tr>
<td>Farrell et al. [9]</td>
<td>2013</td>
<td>RCS</td>
<td>35.0</td>
<td>35.0</td>
<td>S-ROM modular</td>
<td>Mean 65.0</td>
<td>Mean 75.0</td>
<td>NOS 7</td>
<td>ROM, CR, SR</td>
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<tr>
<td>Fucile et al. [12]</td>
<td>2008</td>
<td>RCS</td>
<td>60.7</td>
<td>60.0</td>
<td>Kom Tec abutment,</td>
<td>Mean 34.3</td>
<td>Mean 32.9</td>
<td>NOS 7</td>
<td>ROM, CR, SR</td>
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<tr>
<td>Horne et al. [13]</td>
<td>2016</td>
<td>RCS</td>
<td>40.8</td>
<td>71.2</td>
<td>S-ROM</td>
<td>Mean 54.0</td>
<td>Mean 106.0</td>
<td>NOS 6</td>
<td>PS, FS, ROM</td>
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<tr>
<td>Hosain et al. [14]</td>
<td>2010</td>
<td>RCS</td>
<td>65.0</td>
<td>65.0</td>
<td>540 (NA)</td>
<td>Mean 55.7</td>
<td>Mean 55.7</td>
<td>NOS 8</td>
<td>PS, ROM, SR</td>
</tr>
<tr>
<td>Huang et al. [15]</td>
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<td>RCS</td>
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<td>68.5</td>
<td>150 (111)</td>
<td>Mean 30.0</td>
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<td>16.0</td>
<td>S-ROM</td>
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<td>Rice et al. [17]</td>
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<td>74.6</td>
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<td>ROM</td>
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<td>190 (60/10)</td>
<td>160 (90/70)</td>
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<td>Vennes et al. [19]</td>
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<td>72.0</td>
<td>350 (NA)</td>
<td>Mean 50.8</td>
<td>Mean 50.8</td>
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<td>ROM, SR</td>
</tr>
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</table>
Results (3)

Function scores

Postoperative ROM
Results (4)

Complication rate

Survival rate
Survival rate; short-term (<5 years) and midterm (5-10 years)
Conclusion

- This meta-analysis revealed that 87.4% of RHK and 75.0% of CCK prostheses survive at short-term (<5 years), while 81.3% of RHK and 83.8% of CCK prostheses survive at midterm (5-10 years).
- The differences in standardized mean pain and function scores we detected were likely to be imperceptible to patients and almost certainly below the minimum clinically important level, despite a significant difference in both groups.
- Based on the findings of the current meta-analysis, RHK prostheses continue to be an option in complex RTKA with reasonable midterm survivorship.


Thanks for your attention