Revision Analysis of Robotic-Assisted and Manual Unicompartmental Knee Arthroplasty

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Disclosures

Dr. Mont is a consultant of Stryker Orthopaedics.

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Unicompartmental Knee Arthroplasty

• Unicompartmental knee arthroplasty (UKA) for the treatment of end-stage knee osteoarthritis has shown potential advantages in pain, function, and recovery compared to TKA \(^1\).

• Manual UKA (mUKA) has reported higher revision rates compared to manual TKA \(^2\).
Robotic Arm-Assisted UKA

- Robotic-arm assisted UKA (rUKA) has demonstrated more accurate component positioning to plan with significantly lower median errors for all component parameters, and a shorter inpatient length of stay (LOS) compared to mUKA [3,4,5].

- rUKA has also been associated with lower early post-operative pain scores, improved patient outcomes, and satisfaction indices when compared to mUKAs[3].
Purpose

• The purpose of this study was to evaluate hospital admissions for revision surgeries associated with robotic-arm assisted unicompartmental knee arthroplasty.
Methods

• UKA procedures were identified using a commercial administrative claims database.

• Patients ≥18 years of age with mUKA or a rUKA were candidates for inclusion identified by the presence of appropriate billing codes (DRG 461, 462, 469, 470).

• Procedures between March 1, 2013 and July 31, 2015 were used to calculate the rate of revisions within 24-months of the index procedure.

• Cases were propensity matched 2:1 based on age, sex, race, geographic division, high cost comorbidities, and concentration of healthcare specialists per 100,000 population to control for outside confounding factors at index.

• A total of 738 commercial health plan patients (246 rUKA, 492 mUKA) were selected for inclusion in the analysis.

• Revision rates and the associated costs were compared between the two cohorts.

• The Mann-Whitney U test was used to compare continuous variables and Fisher’s exact tests were used to analyze discrete categorical variables.
Results

At 24-months patients who underwent rUKA had:

- Fewer revision procedures (0.81% vs. 5.28% p=0.002)
- Shorter mean LOS during revision (2.00 vs. 2.33 days; p>0.05)
- Lower mean revision costs ($26,512 vs. $30,430; p>0.05)
- A 12.38% reduction in index LOS (1.77 vs. 2.02 days; p=0.0047) and an associated cost reduction of 2.02% to the health plan when compared to mUKA cases ($25,786 vs. $26,307; p>0.05).

### Table: Outcomes Category

<table>
<thead>
<tr>
<th>Category</th>
<th>rUKA&lt;sup&gt;a&lt;/sup&gt;</th>
<th>mUKA&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Δ</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Index Procedures</td>
<td>246</td>
<td>492</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Index Outcomes</strong></td>
<td></td>
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</tr>
<tr>
<td>Average Cost</td>
<td>$25,786</td>
<td>$26,307</td>
<td>-$521</td>
<td>0.3996</td>
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<td>Average LOS&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.77</td>
<td>2.02</td>
<td>-0.25</td>
<td>0.0047</td>
</tr>
<tr>
<td><strong>24 Month Revision Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revision Rate [n]</td>
<td>0.81% [2]</td>
<td>5.28% [26]</td>
<td>-4.47%</td>
<td>0.0017</td>
</tr>
<tr>
<td>Average Cost</td>
<td>$26,512</td>
<td>$30,430</td>
<td>-$3,918</td>
<td>0.5468</td>
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<td>Average LOS&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.00</td>
<td>2.33</td>
<td>-0.33</td>
<td>0.9277</td>
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<td><strong>24 Month Inpatient Episode</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Average Cost</td>
<td>$26,001</td>
<td>$27,977</td>
<td>-$1,975</td>
<td>0.1144</td>
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<tr>
<td>Average LOS&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.78</td>
<td>2.15</td>
<td>-0.37</td>
<td>0.0045</td>
</tr>
</tbody>
</table>

**KEY:**
- UKA: Robotic-arm assisted unicompartmental knee arthroplasty
- mUKA: Manual unicompartmental knee arthroplasty
- LOS: Length of Stay
Limitations

• Reliance on a large administrative claims database makes it challenging to precisely identify the population of interest and the sequence of their clinical events, both of which may have been incorrectly coded (in a minority of cases).

• The effect of type and duration of anesthesia, anticoagulation used, and other risk factors were not assessed.
Conclusions

• rUKA patients had:
  • Fewer revision procedures
  • Shorter LOS
  • Lower mean costs for the health plan for both the index stay and the revision stay at 24-months following the primary UKA procedure.

• Robotic arm-assisted UKA may lead to improvements in cost containment and quality of care over 24 months for the treatment of isolated compartment end-stage knee osteoarthritis.
References


Thank You