Robotic Assisted Unicopartimental Knee Arthroplasty: Can We Improve Accuracy?

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Disclosures

• M. Iñiguez: Nothing to disclose
• R. Negrin: Academic consultant Smith & Nephew and Zimmer Biomet
• J. Duboy: Academic consultant Smith & Nephew
• M. Wainer: Nothing to disclose
• N. Reyes: Nothing to disclose
• C. Infante: Nothing to disclose
• J. Soto: Nothing to disclose
• R. Diaz: Nothing to disclose
Unicompartmental Knee Arthroplasty

• 10% of all knee Replacements.
• Advantages of TKA: Better functional results, faster recovery, less blood loss
• But: Higher Revision Rates!
  • poor alignment of the post-operative extremity
  • implant malpositioning.
• Improving precision
  • Better clinical results
  • Higher survival rates.
Robotic assisted Surgery in Knee Arthroplasty

• Most studies conducted with other robots
• Escasa Literatura con Navio™
• Main Advantages: Imageless system, Open
Objetive

To evaluate the **precision** of the Navio™ robotics assisted system in the positioning of unicompartmental knee implants compared with the conventional technique by means of radiological surgery planning in cadaveric models.
Materials and Methods

• Experimental cadaveric pilot study
• 26 fresh-frozen cadaveric models (hemipelvis-knee-foot)
  • Randomized in 2 groups

• Navio™ Robotic System
  (Blue Belt Technologies, Plymouth, Minnesota, USA)
• Medial unicompartmental knee implant Journey UNI
  (Smith & Nephew Inc, Cordova, TN, USA)
X-Rays
Results

Medial Distal Femoral Angle

Greater dispersion in conventional surgery V/s robótica

- Welch
  - F=5,787
  - p=0,0057
  - SIGNIFICANT
- Non parametric U-Mann-Whitney
  - p=0,5114
  - NOT SIGNIFICANT

Medial Proximal Tibial Angle

Greater dispersion in conventional surgery

- Welch
  - F=5,797
  - p=0,0057
  - SIGNIFICANT
- Non parametric U-Mann-Whitney
  - p=0,2840
  - NOT SIGNIFICANT
Results

Tibio-femoral Angle

- NO DIFFERENCES
- Welch
  - $F=2.634$
  - $p=0.1152$
  - NOT SIGNIFICANT
- Non parametric U-Mann-Whitney
  - $p=0.5441$
  - NOT SIGNIFICANT

Sagital Femoral Angle

- NO DIFFERENCES
- Welch
  - $F=2.041$
  - $p=0.2417$
  - NOT SIGNIFICANT
- Non parametric U-Mann-Whitney
  - $p=0.2508$
  - NOT SIGNIFICANT
Results

Tibial Slope

- Greater variance in conventional group.
- Welch
  - $F=3.944$
  - $p=0.0279$
  - SIGNIFICANT
- Non parametric U-Mann-Whitney
  - $p=0.3632$
  - NOT SIGNIFICANT

Femoral and Tibial Component Size

- Femoral Fisher’s exact test
  - $p=0.00188$
  - SIGNIFICANT
- Tibial size with no significance
## Results

<table>
<thead>
<tr>
<th></th>
<th>F de Welch VARIANCES</th>
<th>Significance</th>
<th>Non parametric (U-Mann-Whitney)</th>
<th>Significance</th>
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<tbody>
<tr>
<td><strong>MDFA</strong></td>
<td>F=5,787 p=0,0057</td>
<td>YES</td>
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<td><strong>MTPA</strong></td>
<td>F=5,797 p=0,0057</td>
<td>YES</td>
<td>p=0,2840</td>
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<tr>
<td><strong>Tibial Slope</strong></td>
<td>F=3,944 p=0,0279</td>
<td>YES</td>
<td>p=0,3632</td>
<td>NO</td>
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<tr>
<td><strong>Tibio-femoral angle</strong></td>
<td>F=2,634 p=0,1152</td>
<td>NO</td>
<td>p=0,5441</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Sagital femoral Angle</strong></td>
<td>F=2,041 p=0,2417</td>
<td>NO</td>
<td>p=0,2508</td>
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<td><strong>Fisher Extact Test</strong></td>
<td>Fisher p=0,0188</td>
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<td><strong>Femoral component size</strong></td>
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</tbody>
</table>
Conclusion

• There are differences in the variances of medial distal femoral angles, medial proximal tibial angle and tibial slope
• Less Dispersion and "outliers" in robotic surgery

• Use of Robotic assisted surgery results in greater precision than conventional surgery

• Robotic and conventional surgery do not show differences in angular accuracy of component placement

• Robotic assisted surgery allows to better predict the size of the femoral component, compared with conventional surgery