Radiographic Outcomes of Hammertoe Treatments: A Retrospective Comparative Study

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Disclosures

✶ My disclosure is in the Final AOFAS Program Book.

✶ I have no potential conflicts with this presentation.

✶ LSW is a consultant for Wright Medical Technologies and receives royalties from the Weil Hammertoe Implant.

✶ LWJ is a consultant for Wright Medical Technologies
Purpose

- The purpose of this study was to compare the long-term outcomes of second hammertoe deformities that underwent proximal interphalangeal (PIP) joint correction using arthroplasty, arthrodesis or interpositional implant arthroplasty.

- Retrospective Comparative Study
  - EBM Level of evidence: III (Therapeutic)
Purpose

**background**

- Indications for surgical correction of hammertoe
- Pain
- Pressure over the dorsal aspect of the PIP joint
- Hypertrophic callus on the dorsum of the digit.

- There are many reports regarding the outcomes of PIP joint interpositional implant arthroplasty, PIP joint arthrodesis, and PIP joint arthroplasty.

- However, there are no studies that compare the outcomes of all three with significant follow-up.

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Methods

- Medical records from patients who underwent second PIP joint correction between January 1998 to December 2008 were retrospectively reviewed.
- A total of 114 patients (136 cases) were included in the study that had complete medical records and anterior-posterior (AP) and lateral (LAT) radiographic views pre-operatively and post-operatively.
- Visual analog pain scale (VAS)
- Revision surgeries
- Second PIP joint angle was measured on AP and LAT views.
Methods

- Separated into three treatment groups
  - Arthroplasty
  - Arthrodesis
  - Interposition Implant
    Arthroplasty (Implant)
Methods

Anterior-posterior
- Pre-operative
- Post-operative

Lateral
- Pre-operative
- Post-operative
All statistical analyses were performed with SPSS version 14.0 for a personal computer (SPSS Science Inc, Chicago, Ill).

We used a two-way repeated measures analysis of variance (ANOVA). Inferential statistics included paired two-tailed t tests for continuous variables.

The a priori alpha level was .05 for all statistical tests.
Results

Demographics

- **Arthroplasty Group**
  - Average follow-up of 45.3 months
  - 39 patients/45 cases with an average age of 62.7.
  - Seventeen (37.8%) cases elected revision surgery.

- **Arthrodesis Group**
  - Average follow-up of 47.8 months
  - 34 patients/43 cases with an average age of 55.5
  - Six (14.6%) cases elected revision surgery.

- **Implant Group**
  - Average follow-up of 67.4 months
  - 41 patients/48 cases with an average age of 67.4
  - Four (10.4%) cases elected revision surgery.
## Results

### Table 1

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean Pre-operative VAS (SD)</th>
<th>Mean Post-operative VAS (SD)</th>
<th>Paired T-test P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthroplasty (N=45)</td>
<td>7.1 (2.1)</td>
<td>1.0 (1.2)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Arthrodesis (N=43)</td>
<td>8.0 (2.0)</td>
<td>1.9 (1.6)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Implant (N=48)</td>
<td>8.2 (1.8)</td>
<td>1.3 (1.4)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

ANOVA: Not enough variance

### Table 2

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean Pre-operative AP (SD)</th>
<th>Mean Post-operative AP (SD)</th>
<th>Paired T-test P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthroplasty (N=45)</td>
<td>8.2 (7.9)</td>
<td>11.4 (7.7)</td>
<td>&lt;0.05</td>
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<tr>
<td>Arthrodesis (N=43)</td>
<td>7.2 (7.8)</td>
<td>5.4 (8.0)</td>
<td>0.59</td>
</tr>
<tr>
<td>Implant (N=48)</td>
<td>7.8 (7.9)</td>
<td>2.9 (5.5)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

ANOVA: Not enough variance

### Table 3

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mean Pre-operative LAT (SD)</th>
<th>Mean Post-operative LAT (SD)</th>
<th>Paired T-test P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthroplasty (N=45)</td>
<td>46.9 (17.8)</td>
<td>31.5 (11.7)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Arthrodesis (N=43)</td>
<td>46.4 (17.1)</td>
<td>24.7 (14.1)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Implant (N=48)</td>
<td>49.1 (14.3)</td>
<td>24.2 (5.7)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

ANOVA: Not enough variance

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Discussion

- Our study demonstrates that all three techniques significantly improve pain.
- Significantly corrects in the sagittal plane (LAT).
- However, only the implant group significantly corrected the deformity in the axial plane (AP).
- Moreover, surgical revisions were lower in this group.

- There are many studies that demonstrate great results of different techniques\(^1-7\), however, this study is the first to compare the results of three popular hammertoe treatments with long-term follow-up.
## Discussion

<table>
<thead>
<tr>
<th>Strength</th>
<th>Weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative study</td>
<td>Observer bias</td>
</tr>
<tr>
<td>Statistical analysis</td>
<td>Variability in patient selection</td>
</tr>
<tr>
<td>Follow-up</td>
<td>Underpowered to determine variance</td>
</tr>
</tbody>
</table>

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Conclusions

In conclusion, our study confirms that all three techniques provide adequate pain relief and sagittal plane correction.

However, interpositional implant arthroplasty provides significant correction in the axial plane with less chance for revision surgery.
References


Thank You