Radiographic Assessment of Lower Extremity Alignment in Ankle Arthritis Using Long-Leg Alignment Views

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NO CONFLICT TO DISCLOSE

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Benjamin R. Williams

My disclosure is in the Final AOFAS Mobile App.

I have no potential conflicts with this presentation.
Ankle Arthritis

- Ankle arthritis has been reported to be as physically and mentally disabling as hip arthritis.
- 70% of ankle arthritis cases are reported to be post-traumatic.
- Lower extremity deformities are common.
  - These deformities, whether proximal or distal to the knee and whether post-traumatic or otherwise, have an effect on the biomechanical load at the ankle joint.
Long-Leg Alignment

- Long leg alignment views are currently used in knee and hip surgeries to assess multilevel angular deformities.
- In knee arthroplasty, restoring mechanical alignment of the knee is critical for a successful joint replacement.
- Radiographs of the ankle capture deformities at the ankle and distal tibia, but will miss a deformity present in the more proximal aspects of the lower extremity.
Purpose of Study

- To use the long-leg alignment view in conjunction with standard ankle radiographs to evaluate the presence of lower extremity deformity in the setting of ankle arthritis
  - The presence of these deformities may have significant impact on surgical decision-making in this cohort of patients
- Investigate the mean axis deviation (MAD) at the knee through a long-leg alignment view and determine if there is a correlation to the degree of ankle arthritis
- Determine the prevalence, specific location and characteristics of lower extremity deformity in patients who present with ankle arthritis
Outcome Assessment

- **Radiographic Measurements for affected and unaffected sides**
  - Mean axis of deviation (MAD) at the knee
  - Anatomic medial proximal tibial angle (aMPTA)
  - Anatomic lateral distal tibial angle (aLDTA)
  - Joint line congruence angle (JLCA) at the knee

- **Arthritis Classification Scales**
  - **Knee**
    - Kellgren-Lawrence
  - **Ankle**
    - Takakura
    - van Dijk
    - COFAS
## Results

- 53 patients (59 arthritic ankles) without prior ankle surgery
  - Mean age 59 years (range, 28 to 85 years)
  - 24 left and 35 right ankles

- 15 female patients and 38 male patients

### Patient’s grouped by Arthritis Grades

<table>
<thead>
<tr>
<th></th>
<th>Grade 0</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 3a</th>
<th>Grade 3b</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Dijk</td>
<td>0</td>
<td>0</td>
<td>13 (22%)</td>
<td>46 (78%)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Takakura</td>
<td>X</td>
<td>0</td>
<td>2 (3%)</td>
<td>X</td>
<td>4 (7%)</td>
<td>26 (44%)</td>
<td>27 (46%)</td>
</tr>
<tr>
<td>COFAS</td>
<td>1 (2%)</td>
<td>9 (15%)</td>
<td>4 (7%)</td>
<td>10 (17%)</td>
<td>X</td>
<td>X</td>
<td>35 (59%)</td>
</tr>
<tr>
<td>Kellgren-Lawrence (knee)</td>
<td>2 (4%)</td>
<td>17 (31%)</td>
<td>22 (41%)</td>
<td>11 (20%)</td>
<td>X</td>
<td>X</td>
<td>2 (4%)</td>
</tr>
</tbody>
</table>

- 53 patients (59 arthritic ankles) without prior ankle surgery
- Mean age 59 years (range, 28 to 85 years)
- 24 left and 35 right ankles

- 15 female patients and 38 male patients
Results cont.

- 47 patients had unilateral ankle arthritis
- When compared to the contralateral, unaffected ankle:
  - **57.4%** of patients had a change in MAD ($\Delta$ MAD) $\geq$ 10 mm
  - **25.5%** of patients had a $\Delta$ JLCA $\geq$ 3°
  - **19.1%** of patients had a $\Delta$ aMPTA $\geq$ 5°
  - **48.9%** of patients had a $\Delta$ aLDTA $\geq$ 5°
- A higher aLDTA was a **significant predictor** for allocation to a grade 3 van Dijk ankle arthritis grade
- **No predictive effect** was found between the proximal radiographic parameters and degree of ankle arthritis
- A Kellgren-Lawrence knee arthritis grade increase from 2 to 3 correlated with an increase in van Dijk ankle arthritis grade from 2 to 3
Case example

The clinical utility of the LLA is demonstrated by this patient
- The ankle radiograph demonstrated ankle arthritis without visualizing more proximal deformity
- The LLA view shows a genu varus deformity which likely contributes to the patient's compensatory valgus ankle arthritis.
- Angular measurements indicate a varus aMPTA, suggesting a proximal tibia osteotomy may be needed to correct overall alignment.
Conclusions

- In patients with ankle arthritis, there is a high prevalence of lower extremity malalignment using radiographic parameters measured with a LLA view when compared to the unaffected extremity.

- While proximal malalignment was not found to be predictive of degree of ankle arthritis, it is important to recognize the presence of these deformities when surgical planning is performed.

- We recommend obtaining LLA view in all patients with ankle arthritis, in particular those who will undergo a total ankle arthroplasty.
References


