Anterolateral vs. Medial Plating for Distal Extra-Articular Tibia Fractures

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My disclosure is in the Final AOFAS Program Book. I have no potential conflicts with this presentation.
• Distal tibia extra-articular fractures can be difficult to treat
  • Tenuous soft tissue
  • Complex fracture patterns

• **Medial plating:**
  • Minimally invasive approach
  • Technical ease

• **Anterolateral plating**
  • Robust soft tissue coverage
  • Better fracture visualization

• Fracture pattern should be considered when deciding between plate applications

• **Objective:** Compare biomechanical properties of both plate options to stabilize varus and valgus fractures
Methods

- 16 4th generation tibia bone models with simulated oblique OTA 43-A1.2 distal tibia fractures

**Valgus Pattern Model**
- 45° osteotomy proximal/lateral to distal/medial

**Varus Pattern Model**
- 45° osteotomy proximal/medial to distal/lateral
Methods

- Osteotomies plated using a **medial or anterolateral** distal tibial locking plate
- Specimens potted into a custom jig in polymethylmethacrylate cement

**Loading Protocol**

- **Compressive Stiffness** → Body weight *(standing)*
- **Torsional Stiffness** → Internal / External Rotation
- **Cyclic Loading** → 2 x body weight *(walking)*
- **Load to Failure**

- Statistical analysis was performed using Mann Whitney U tests.
Results

- **Varus Fracture Pattern** → *Medial plating stiffer* in both compression and torsion
- **Valgus Fracture Pattern** → *No difference* between medial and anterolateral plating

<table>
<thead>
<tr>
<th>Cut</th>
<th>Plate</th>
<th>Fracture Site Displacement (mm)</th>
<th>Stiffness (N/mm)</th>
<th>Fracture Site Rotation (Deg)</th>
<th>Torsional Stiffness (Nm/deg)</th>
<th>Fracture Site Rotation (Deg)</th>
<th>Torsional Stiffness (Nm/deg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varus</td>
<td>Anterolateral</td>
<td>0.6±0.5*</td>
<td>1290±652*</td>
<td>5.1±0.7*</td>
<td>1.2±0.1*</td>
<td>1.5±0.5*</td>
<td>4.7±1.6*</td>
</tr>
<tr>
<td></td>
<td>Medial</td>
<td>0.1±0.0*</td>
<td>6211±3147*</td>
<td>1.4±0.4*</td>
<td>2.7±1.3*</td>
<td>0.6±0.1*</td>
<td>8.9±1.5*</td>
</tr>
<tr>
<td>Valgus</td>
<td>Anterolateral</td>
<td>0.2±0.1</td>
<td>3793±1621</td>
<td>3.3±0.3</td>
<td>1.9±0.2</td>
<td>4.3±0.5</td>
<td>1.5±0.2</td>
</tr>
<tr>
<td></td>
<td>Medial</td>
<td>0.2±0.1</td>
<td>2690±1325</td>
<td>2.6±0.8</td>
<td>2.0±0.8</td>
<td>4.5±1.4</td>
<td>1.3±0.3</td>
</tr>
</tbody>
</table>

*Comparison in which there was a statistically significant difference between medial and anterolateral plates, p < 0.05
**Conclusion**

- **Medial plates** had superior biomechanical performance compared to anterolateral plates when used to stabilize varus fracture patterns. In this application they functioned in anti-glide mode.

- For valgus fracture patterns, no biomechanical differences between anterolateral and medial plating were observed.

- In clinical practice, surgeons should take this biomechanical evidence into account and perform a plating that optimizes stability.
References