Is The Entry point of a Tibiototalocalcaneal Intramedullary Nail with a Posterolateral Bend Safer?

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My disclosure is in the Final AOFAS Program Book.

- I have a potential conflict with this presentation due to
  - Financial support/material from Small Bone Innovations
Tibiotalocalcaneal arthrodesis

- Intramedullary nails are frequently used to perform tibiotalocalcaneal (TTC) fusions.
- Previous studies have highlighted the structures at risk during insertion of straight nails and lateral-curved nails.
- However, recently, a new nail design has become available which has a lateral as well as a posterior bend.
- Our purpose was to assess risk of injury by ascertaining location of plantar structures of the foot in relationship to the entry site of a TTC nail with a posterolateral bend.
Methods

- Materials
  - 6 fresh frozen cadaver legs
  - TTC nail
    - Distal lateral bend
    - Distal posterior bend
  - Digital Calipers

Picture of nail in coronal (left) and saggital (right) planes showing valgus and posterior curve.
Methods

• Technique
  • Nail inserted under simulated operative conditions using fluoroscopy
  • Plantar surface then dissected and plantar structures identified
  • Digital calipers used to measure distance between entry point and anatomic structures
# Results

## Distance of Entry Point from Anatomic Structures (mm)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Peroneus Longus</th>
<th>Abductor Hallucis</th>
<th>Flexor Hallucis Longus</th>
<th>Flexor Digitorum Longus</th>
<th>Medial Plantar artery</th>
<th>Medial Plantar Nerve</th>
<th>Lateral Plantar Artery</th>
<th>Lateral Plantar Nerve</th>
<th>First branch of Lateral Plantar Nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen 2</td>
<td>13.42</td>
<td>24.61</td>
<td>34.68</td>
<td>30.08</td>
<td>37.74</td>
<td>34.05</td>
<td>19.55</td>
<td>22.50</td>
<td>12.45</td>
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<td>Specimen 3</td>
<td>10.25</td>
<td>21.59</td>
<td>29.29</td>
<td>33.34</td>
<td>27.21</td>
<td>25.40</td>
<td>18.90</td>
<td>20.96</td>
<td>10.79</td>
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<tr>
<td>Specimen 4</td>
<td>13.09</td>
<td>20.64</td>
<td>35.65</td>
<td>37.96</td>
<td>36.57</td>
<td>30.96</td>
<td>13.06</td>
<td>18.13</td>
<td>7.82</td>
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<tr>
<td>Specimen 5</td>
<td>9.00</td>
<td>16.16</td>
<td>31.25</td>
<td>39.35</td>
<td>33.19</td>
<td>29.96</td>
<td>12.24</td>
<td>17.95</td>
<td>8.93</td>
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<tr>
<td>Specimen 6</td>
<td>13.35</td>
<td>18.06</td>
<td>25.94</td>
<td>28.46</td>
<td>28.79</td>
<td>33.42</td>
<td>17.26</td>
<td>21.72</td>
<td>11.82</td>
</tr>
</tbody>
</table>
Results

**Average Distance of Entry Point from Anatomic Structures**

- **PL =** Peroneus Longus
- **AH =** Abductor Hallucis
- **FHL =** Flexor Hallucis Longus
- **FDL =** Flexor Digitorum Longus
- **MPA =** Medial Plantar Artery
- **MPN =** Medial Plantar Nerve
- **LPA =** Lateral Plantar Artery
- **LPN =** Lateral Plantar Nerve
- **BN =** Baxter’s Nerve (First branch of Lateral Plantar Nerve)
Discussion

- No damage to neurovascular structures upon insertion of nail with posterolateral bend
- When compared to previous studies using straight or lateral curved nails, entry point is further away from neurovascular structures at risk

Limitations
- No control group
- Cadaver study
Conclusion

- TTC fusion with nail incorporating distal valgus and posterior curve has entry site farther away from plantar neurovascular structures of the foot compared to straight or valgus curved nails.

- Further research needed to provide clinical correlation


