Reliability of the “Clinical Tibiofibular Line” Technique for Open Syndesmosis Reduction Assessment

Christopher W. Reb, DO
Daniel C. Herman, MD, PhD
Gregory C. Berlet, MD
Reliability of the “Clinical Tibiofibular Line” Technique for Open Syndesmosis Reduction Assessment

Our disclosures are in the Final AOFAS Mobile App. There is a potential conflict with this presentation due to: Consultant, Wright Medical Technologies, Inc. (GCB); Research Grant, DJO Global (GCB)
Introduction

• When intraoperative CT is unavailable, open syndesmosis assessment is a universally available safe alternative that is more accurate than radiographic assessment.
• However, it has a documented malreduction rate of up to 16%.
• This may be improved by a validated technique for assessing the accuracy of the open syndesmosis reduction.
• No such technique currently exists.
Purpose

• The ‘tibiofibular line’ (TFL) was described as a tangential line between the flat anterolateral surface of the distal fibula and the anterolateral tubercle of the distal tibia as viewed on ankle axial CT images 10 millimeters (mm) above the plafond (Fig 1a).

• The purpose of this study was to assess the feasibility of adapting the CT-based TFL method into a reliable intraoperative open technique.
Methods

- This was an IRB-exempt study utilizing 10 cadaveric lower limbs.
- Three observers were instructed to clinically simulate the TFL by using two surgical rulers.
- The axial plane was marked 10 mm above the tibial plafond (Fig. b-c).
- The first ruler was held tangent to the flat anterolateral surface of the fibula (Fig. d).
- Then, it was advanced anteromedially until it either contacted or overhung the anterior tibial tubercle (Fig. e).
- A second ruler was used to measure the narrowest distance between the first ruler and anterior tibial tubercle (Fig. f).
Methods

• Sagittal plane fibula displacement randomized to 0, +/- 2.5mm, or +/- 5mm per measurement series.
• Four measurement series conducted.
• Three observers repeated measurements 3 times per series.
• Total of 1080 clinical TFL measurements obtained.
## Results

### Intraobserver and Interobserver Reliability

<table>
<thead>
<tr>
<th>Intraclass Correlation Coefficients</th>
<th>Observer 1</th>
<th>Observer 2</th>
<th>Observer 3</th>
<th>All Observers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series 1</td>
<td>0.977</td>
<td>0.962</td>
<td>0.977</td>
<td>0.93</td>
</tr>
<tr>
<td>Series 2</td>
<td>0.88</td>
<td>0.783</td>
<td>0.755</td>
<td>0.77</td>
</tr>
<tr>
<td>Series 3</td>
<td>0.856</td>
<td>0.932</td>
<td>0.724</td>
<td>0.675</td>
</tr>
<tr>
<td>Series 4</td>
<td>0.946</td>
<td>0.981</td>
<td>0.782</td>
<td>0.692</td>
</tr>
<tr>
<td><strong>Legend:</strong></td>
<td>Excellent</td>
<td>Good</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean **intra**observer reliability was 0.88 (range, 0.72 to 0.98).  
Mean **inter**observer reliability was 0.75 (range, 0.68 to 0.93).
### Results

<table>
<thead>
<tr>
<th>Intraclass Correlation Coefficients</th>
<th>0mm</th>
<th>+/-' 2.5mm</th>
<th>+/-' 5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer 1</td>
<td>0.98</td>
<td>0.92</td>
<td>0.88</td>
</tr>
<tr>
<td>Observer 2</td>
<td>0.96</td>
<td>0.96</td>
<td>0.78</td>
</tr>
<tr>
<td>Observer 3</td>
<td>0.98</td>
<td>0.78</td>
<td>0.76</td>
</tr>
<tr>
<td>All Observers</td>
<td>0.93</td>
<td>0.70</td>
<td>0.77</td>
</tr>
</tbody>
</table>

**Legend:**
- **Excellent**
- **Good**

Observer reliability was highest for 0mm displacement and generally lower with greater fibula displacement magnitudes.
Discussion

• Intraoperative computed tomography is the gold standard for syndesmosis reduction assessment but its availability is limited due to feasibility and cost constraints.

• The importance of the current study is the concept of translating the objectivity of a CT-based technique into the otherwise highly subjective open technique.
Discussion

• The present study demonstrated excellent to near perfect intraobserver and good to excellent interobserver reliability for the clinical tibiofibular line technique.

• Although severely limited by the lack of the CT TFL measurements needed to assess the accuracy of clinical TFL measurements, it appears that future work is merited to address this
References