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

Category: Ankle,Trauma

Keywords: Ankle Sprain, Ankle Fracture, Trauma, Tibiofibular Line, Syndesmosis

Introduction/Purpose: 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 but none currently exists. 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 (Figure 1a). This finding was sensitive for syndesmosis malreduction. 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 (Figure 1b and 1c). The first ruler was held tangent to the flat anterolateral surface of the fibula (Figure 1d). Then, it was advanced anteromedially until it either contacted or overhung the anterior tibial tubercle (Figure 1e). Then, a second ruler was used to measure the narrowest distance between the first ruler and anterior tibial tubercle (Figure 1f). Observers repeated and recorded clinical TFL measurements three times per measurement series. Four measurement series were conducted: one with syndesmosis intact followed by three series with sagittal plane fibular displacements of known magnitudes. Intraclass correlation was used to assess intraobserver and interobserver reliability. Accuracy of clinical TFL measurements was not assessed due to lack of CT.

Results: The three observers generated a total of 1080 clinical TFL measurements. Mean intraobserver reliability was 0.88 (range, 0.72 to 0.98). For observers 1, 2, and 3, respectively, mean intraobserver reliability was 0.92 (range, 0.86 to 0.98), 0.92 (range, 0.78 to 0.98), and 0.80 (range, 0.72 to 0.97). Mean interobserver reliability was 0.75 (range, 0.68 to 0.93). Both intraobserver and interobserver reliability were highest for anatomic syndesmosis reduction (Intraobserver reliability mean 0.97, range, 0.96 to 0.98; Interobserver reliability 0.93) and lowest for the greatest magnitude of malreduction (Intraobserver reliability mean 0.81, range, 0.76 to 0.88; Interobserver reliability 0.77).

Conclusion: 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. The current findings indicate that this can be done with excellent to near perfect intraobserver and good to excellent interobserver reliability. Future work is merited to assess the accuracy of the clinical TFL measurements against a CT facilitated TFL measurement.