The Distal Tibiofibular Ankle Syndesmosis: A Qualitative and Quantitative Anatomical Investigation

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My disclosure is in the Final AOFAS Mobile App.
I have potential conflicts with this presentation due to consultancy for Arthrex Inc. and Stryker.

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Background

- Syndesmosis sprains can contribute to chronic pain and instability, and often require operative treatment.
- Currently, the literature lacks sufficient objective data detailing the complex anatomy and localized osseous landmarks essential for current surgical techniques.\textsuperscript{1,4}
Purpose

• To qualitatively and quantitatively analyze the anatomy of the three syndesmotic ligaments, including the anterior inferior tibiofibular ligament (AITFL), posterior inferior tibiofibular ligament (PITFL), and the interosseous tibiofibular ligament (ITFL) with respect to surgically relevant bony landmarks.
Methods

- Sixteen ankle specimens were dissected to identify the anterior inferior tibiofibular ligament (AITFL), posterior inferior tibiofibular ligament (PITFL), interosseous tibiofibular ligament (ITFL), and bony anatomy.
- Ligament lengths, footprints, and orientations were measured in reference to bony landmarks using an anatomically based coordinate system and a three dimensional coordinate measuring device and reported as means with 95% confidence intervals.
Anterior Inferior Tibiofibular Ligament

- Present in all specimens
- Minimum and median of 3 bands
- Attached along the distolateral margin of the anterolateral tibial tubercle
  - Tibial footprint: 33.2 [30.3, 36.1] mm²
- Attached on the anterior border of the fibula.
  - Fibular footprint: 34.2 [30.2, 38.1] mm²
Posterior Inferior Tibiofibular Ligament

- Present in all specimens
  - Both superficial and deep constituents

- Superficial Fibers
  - Attached along inferior margin of the posterolateral tibial tubercle and posterior fibular border
  - Tibial footprint: 84.5 [76.8, 92.3] mm$^2$
  - Fibular footprint: 108.1 [96.0, 120.1] mm$^2$

- Deep fibers
  - Attached inferior and medial to superficial fibers along the tibial plafond and immediately proximal to the posterior fibular fossa
  - Tibial footprint: 52.2 [44.8, 59.6] mm$^2$
  - Fibular footprint: 53.9 [47.3, 60.6] mm$^2$
Interosseous Tibiofibular Ligament

- Present in all specimens
- Fibrous expansion of the distal interosseous membrane
  - Pyramidal ligamentous network of fibers
  - Originated 49.4 mm proximal to the central aspect of the tibial plafond
  - Terminated 9.3 mm proximal to the central aspect of the tibial plafond

Inferior Tip Lateral Malleolus
Synovial Recess/Articular Cartilage

- A synovial-lined joint space was found in all specimens
  - Border superiorly by the distal border of the ITFL
- Articular Cartilage
  - All specimens had an area of tibial cartilage along the lateral aspect of the plafond
  - In 14/16 (87.5%) of specimens, there were corresponding direct articulating facets of tibial and fibular cartilage along the anterior tibiofibular joint
Conclusions

• Syndesmotic ligaments were uniform in their locations and sites of attachment
• Qualitative and quantitative anatomy of the syndesmosis ligaments and clinically relevant structures was reproducibly defined with respect to surgically relevant bony prominences
Clinical Relevance

- Anatomic attachment sites and distances to bony prominences can help optimize current surgical fixation techniques, improve anatomic restoration, and reduce the risk of iatrogenic injury from malreduction or misplaced implants.
- Quantitative data also provides the consistency required for the development of novel anatomic reconstructions.
References


