Three - Dimensional, Digital, and Gross Anatomy of the Lisfranc Ligament

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My disclosure is in the Final AOFAS Program Book. I have no potential conflicts with this presentation.
There are inconsistencies in the descriptive anatomy of the Lisfranc ligament.

No information is available on the orientation of fibers or presence of bundles, nor are there three-dimensional anatomic data on the ligaments or their attachments.

This study was performed to assess the three-dimensional anatomy of the Lisfranc ligament and its attachment sites.
Methods

- 37 cadaver feet dissected
- A 3-D digitizer was used to digitize bony & articular surfaces, ligament attachment sites, at approximately 1 mm intervals; the positional accuracy was 0.23 mm
- Surface areas of the entire bone, articular regions, Lisfranc and plantar ligament attachment regions were determined
- Gross anatomic details were noted
Microscribe 3 DX digitizer in use with the software program *Spider*.
The colored contours represent each 20th percentile increment, ranging from the 20th percentile in burgundy through the 80th to 100th percentile in yellow.

Three-dimensional articulating views of the surrounding anatomical structures of the Lisfranc ligament shown in red and the plantar ligament shown in green. (A) Plantar view, (B) Anterior view, (C) Posterior view, (D) Plantar Oblique view.
Results

- The Lisfranc ligament had a single bundle in 73% of the specimens (27 of 37) and two bundles in 27% (10 of 37).

- Both variations had a single attachment to the 2nd metatarsal (M2; mean attachment surface area \([\text{mas}]\), 135 mm\(^2\)).

- The single-bundle variation attached to the medial cuneiform (C1; \(\text{mas} \) area, 140 mm\(^2\)).
Results

- The plantar ligament, C1-M2-M3, attached to the anterior plantar surface of the lateral aspect of C1 (mas area, 64 mm²) and had attachment sites at the bases of M2 and M3.

- Its fibers ran anteriorly and inferiorly, with attachments to the proximal inferomedial aspect of M2 (mas area, 63 mm²) and fibers extended to a smaller attachment site at the plantar aspect of M3 (mas area, 26 mm²).
Conclusions / Relevance

- The Lisfranc ligament is variable in anatomy and can have a single- or double-bundle arrangement. Its area of attachment is larger than that of the plantar ligament.

- Anatomic description of the location, dimensions, and variability in position and surface area of the ligament attachment sites and of orientation of the bundles provides information for future attempts at repair or reconstruction of the Lisfranc ligament.
References


