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CASE REPORT

A slip connecting the peroneus longus and tibialis posterior tendons at the forefoot: MRI, anatomic, and histologic findings in a cadaver

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ABSTRACT
The anatomy of the peroneus longus and tibialis posterior tendons is well described in literature from both anatomy and radiology. Though a slip connecting these two structures is described in the anatomic literature, its existence has not been confirmed with magnetic resonance imaging (MRI). In this study in a cadaver, such a connection is documented using high-resolution MRI with anatomic and histologic correlation. This connection can provide support to the Lisfranc joint complex and further stabilize the region of the first and second metatarsal bases.

Key words: • *peroneus longus tendon* • *tibialis posterior tendon* • *magnetic resonance imaging*

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The anatomy of the peroneus longus (PL) and tibialis posterior (TP) tendons in the hindfoot and midfoot as well as the distal branching of these two tendons has been previously described (1–3). However, although the existence of a sizable tendinous slip between these two tendons, close to the PL tendon insertion site at the first metatarsal base, is described in the anatomic literature, its presence has not been confirmed with magnetic resonance imaging (MRI) (3). Such a connection may provide support to the transverse arch of the foot.

In this cadaveric case, the connection described above is documented using high-resolution MRI with anatomic and histologic correlation.

Case report

Five feet were harvested from fresh, nonembalmed human cadavers (three females, two males; age range at death, 73 to 89 years; mean age at death, 82.4 years). The specimens, which had been amputated above the ankle joint, were immediately deep-frozen at -40°C (Bio-Freezer; Forma Scientific, Marietta, Ohio, USA). No evidence of prior surgical intervention or injury was observed visually in any of the specimens. The specimens were allowed to thaw for 24 h at room temperature prior to MRI.

Imaging of the plantar aspect of the feet was performed on a 1.5 Tesla (T) MRI scanner (Signa, GE Medical Systems, Milwaukee, Wisconsin, USA) with an extremity coil. A proton density weighted fast spin echo sequence was used to obtain images (repetition time/echo time, 3000/20 ms; field of view, 8–10 cm; section thickness, 2 mm; gap, 0; NEX, 4; and matrix, 448×256) in axial and coronal planes that were planned parallel to the plantar aspect according to localizer images.

After imaging, all cadaveric specimens were immediately frozen at -40°C for at least 48 h. Subsequently, a slip of 2 mm thickness with low signal intensity was observed in one of the specimens on the MR images between the PL and TP tendons at the level of the medial cuneiform (Fig. a–c). In this specimen, 3-mm-thick tissue slices were obtained in the axial plane using a band saw with a fine-toothed metal blade (Exakt Apparatebau GmbH, Norderstedt, Germany).

Anatomic inspection, which was recorded photographically, confirmed the slip between the PL and TP tendons at the level of the medial cuneiform bone (Fig. d). Histologic sections (n=2) representative of this slip, stained with hematoxylin-eosin and examined with a light microscope, revealed that it had a uniform, tendinous architecture. There was no surrounding synovial lining (Fig. e).

Discussion

In a previous report by Sarrafian (3), a sizable tendinous slip between the TP and PL tendons close to the PL tendon insertion site at the first

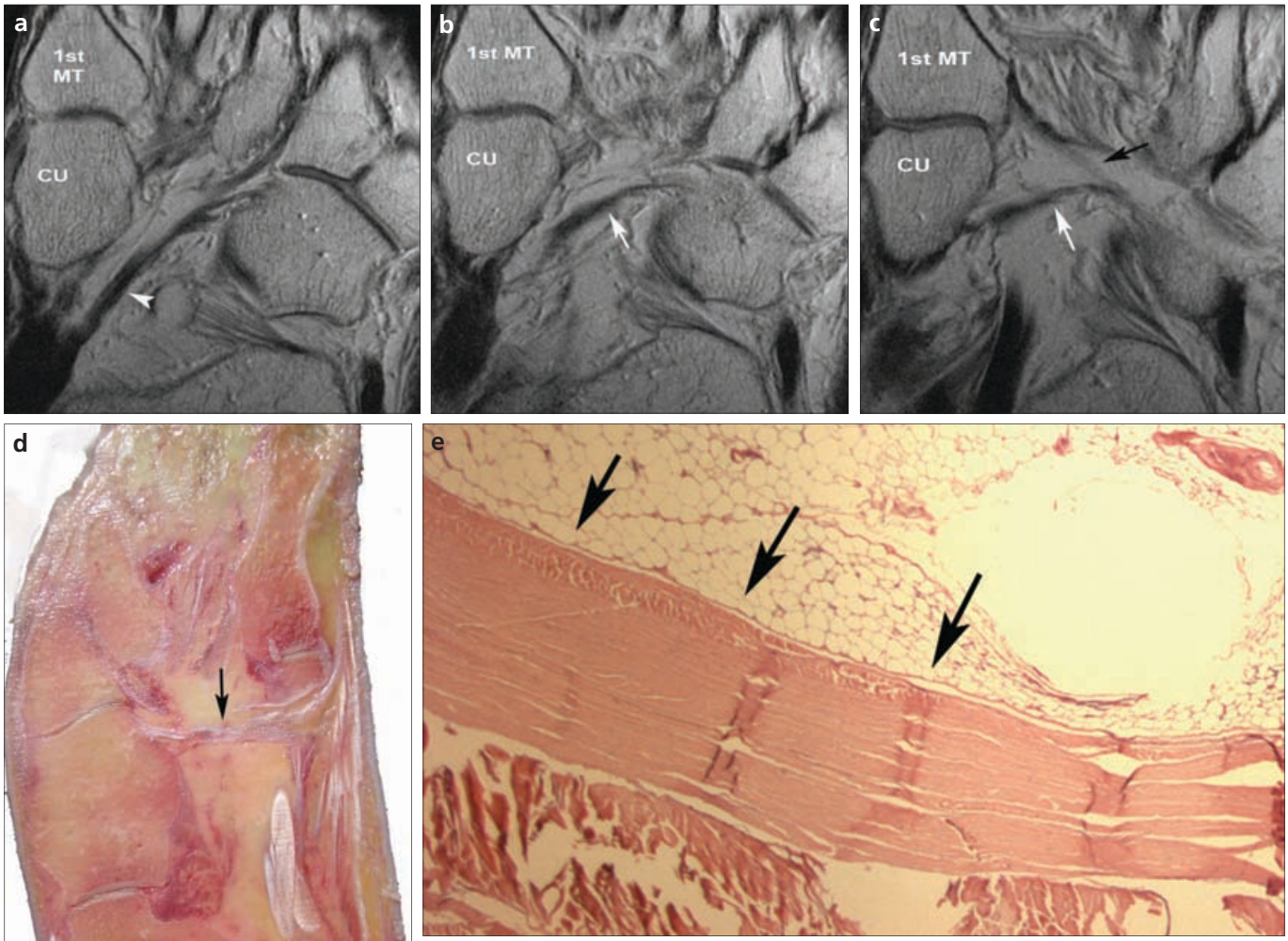

Figure. a–e. Sequential axial MR images **(a–c)** of the same specimen. At the level of the medial cuneiform (CU), an extension **(***white arrow,* **b, c)** of low signal intensity extends obliquely between the PL **(***black arrow,* **c)** and the TP **(***arrowhead,* **a)** tendons. Gross macroscopic appearance of the specimen **(d)** showing the connection *(arrow).* The tendinous slip **(***arrows,* **e)** is seen to be uniform in architecture, with no synovial lining around it.

metatarsal base was described. This slip has not been identified in MRI investigations. This is the first cadaveric case in which a slip connecting these two tendons has been defined in terms of the MRI, anatomic, and histologic features.

The interconnection between the PL and TP tendons has been reported to be in the range of 22% by Sarrafian (3). Although this interconnection has been addressed before, it has not been identified in MRI anatomic studies, nor has its histology been confirmed (1, 3). Although the functional importance of this interconnection is not documented, we believe that its presence can provide support to the Lisfranc joint complex, which is the keystone of the tarsometatarsal bony arch (4). This complex provides significant stability by connecting the cuneocuboid block to the bases of the metatarsals (3, 4). There are intermetatarsal ligaments connecting the second through fifth metatarsal bones; however, no such ligaments are found between the first and second metatarsals. Rather, the Lisfranc ligament is found nearby, arising from the lateral surface of the medial cuneiform bone and inserting into the base of the second metatarsal bone. The functional importance of the PL and TP tendons to the integrity of the tarsometatarsal joints is well documented. It is possible that an additional connection between the PL and the TP tendons, as documented in this case, can provide further stability in the region of the first and second metatarsal bases.

In his book, Sarrafian describes this slip emanating from the TP tendon and extending to the PL tendon (3). The TP muscle possesses a strong tendon functioning as the primary inverter of the foot (5). This slip may provide an added function to the PL tendon, which is primarily a plantar flexor of the first ray (5). Additional studies can further delineate the frequency and importance of this tendinous connection in a larger series.

In conclusion, familiarity with an occasional slip connecting the PL and TP tendons is essential for the accurate assessment of these structures.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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