The Flexor Digitorum Accessorius Longus—A Cadaveric Study

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Flexor digitorum accessorius longus is an anatomical variant that has previously been shown to be associated with a variety of pathological conditions localized to the posteromedial aspect of the ankle and hindfoot. In particular, this anomalous muscle has been reported to be the cause of tarsal tunnel syndrome. Despite recognition of this muscular anomaly as a cause of foot and ankle pathology, the origin, course, and insertion of flexor digitorum accessorius longus has not been thoroughly illustrated in the anatomical literature. In an effort to accurately detail the anatomy of the flexor digitorum accessorius longus, we undertook a cadaveric dissection and prepared a photographic study of this anomalous skeletal muscle. Level of Clinical Evidence: 5. (The Journal of Foot & Ankle Surgery 48(2):111–115, 2009)

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There are numerous anatomical variants of the lower extremity that are of significance to the foot and ankle surgeon. Appropriate understanding of the origin, insertion, and course of these muscles, as well as their potential to cause pathological processes, is paramount. The description of these muscles is remiss in many current anatomical texts.

The flexor digitorum accessorius longus (FDAL) is the second most commonly occurring muscle anomaly of the ankle region, second only to the peroneus quartus (1). Other anatomical variants localized to this area include the accessory soleus, tibiocalcaneus internus, and peroneocalcaneus internus. In a 1974 study of 100 cadaveric specimens, the FDAL was found in 12 (12%) of the limbs (2). More current literature describes a range of incidence between 3.9% and 12.0% (3). The presence of the FDAL within the tarsal tunnel can cause a variety of ankle pathologies, with tarsal tunnel and flexor hallucis longus syndromes being 2 of the more common pathological processes that have been associated with FDAL.

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The purpose of this cadaveric investigation was to review the origin, course, and insertion of the flexor digitorum accessorius longus muscle, and to accurately describe and illustrate this anatomical variant. It was our opinion that a detailed photographic depiction of the anatomical details of FDAL would be useful to surgeons treating conditions caused by this anomalous muscle, and aid the reader in understanding the potential pathology that it may cause.

Materials and Methods

The tarsal tunnel of a 51-year-old white male, right lower extremity cadaver specimen, procured from MedCure, Inc. (Portland, OR), was dissected in the skills laboratory of the Western Pennsylvania Hospital when the presence of the FDAL was observed. In an effort to clearly depict the origin, course, and insertion of this anomalous structure, the muscle was dissected in its entirety and photographed in detail.

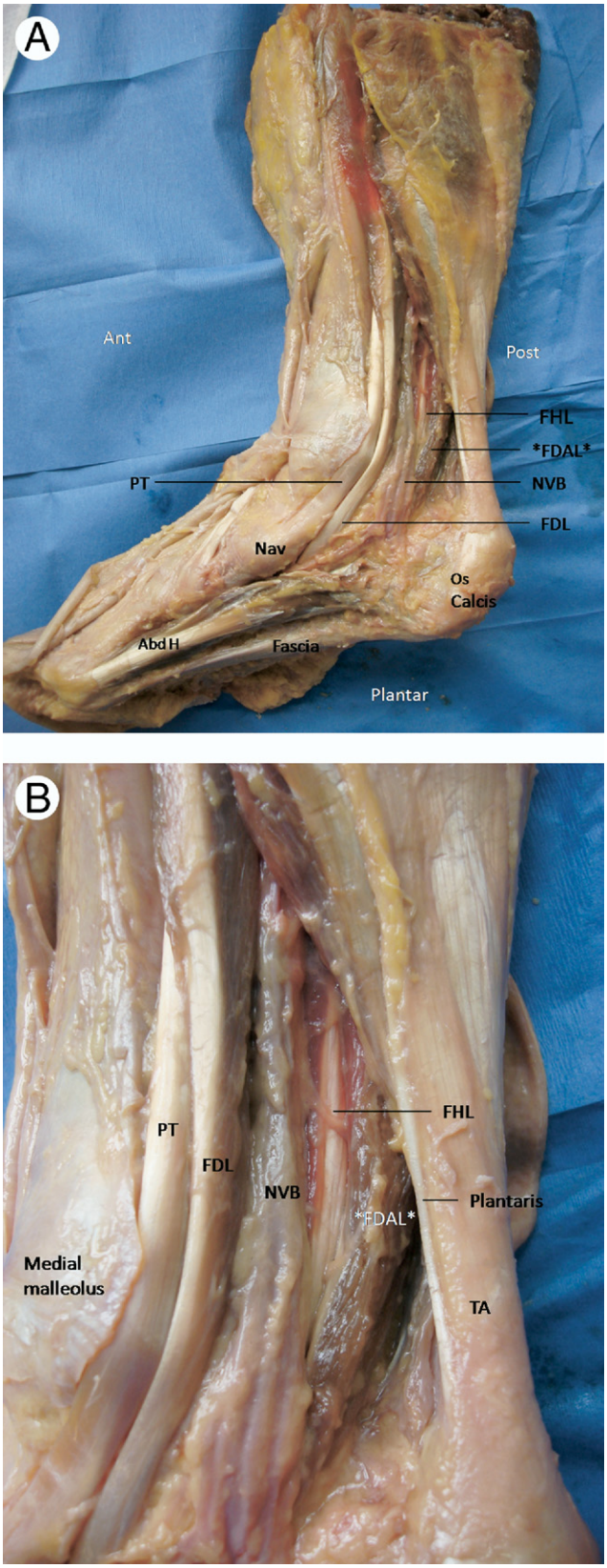
Results

The results of the anatomical dissection of the cadaveric specimen revealed the tarsal canal, from anteromedial to posterolateral, to consist of the posterior tibial tendon, flexor digitorum longus tendon, the neurovascular bundle, and the flexor hallucis longus tendon. The roof of the tarsal tunnel consisted of the flexor retinaculum, which is the specialized continuation of the deep fascia of the leg, with fibrous bands that extend to create the compartments of the tunnel. The floor of the tarsal canal consisted of the posterior medial malleolar surface of the tibia, medial talus, sustentaculum tali, and the medial calcaneal wall. The tibial nerve was observed to run posteromedial to the posterior tibial artery

and anterior to the flexor hallucis longus tendon as it entered the tarsal canal.

In this cadaveric dissection, the flexor digitorum accessorius longus was identified immediately after incision of the tarsal canal. The FDAL entered into the tarsal canal posterior to the flexor hallucis longus tendon (Figure 1, A). Typically, the tarsal canal is composed of the tendinous portions of the tibialis posterior, flexor digitorum longus, and flexor hallucis longus muscles. However, in this dissection, the FDAL extended into the tarsal canal as a large, bulky muscle belly (Figure 1, B). The musculotendinous junction was not seen until the most inferior border of the canal.

The FDAL originated from the posterior crural fascia and the proximal portion of the flexor digitorum longus in the proximal one third of the deep posterior compartment of the leg. It entered the canal as a muscle belly and exited as a tendinous slip. As it entered the plantar vault of the foot in the second layer of muscles, it coursed lateral to the flexor digitorum longus tendon (Figure 2, A) and just superficial to the flexor hallucis longus tendon (Figure 2, B). The flexor digitorum longus and the flexor hallucis longus tendons converged at the Master Knot of Henry. The FDAL inserted into the flexor digitorum longus tendon as it gave rise to the four tendinous slips to the digits and just distal to the Master Knot (Figure 2, B). From the medial view with the flexor digitorum longus tendon elevated, the spatial relationship between the FDAL and the tendons of the Master Knot of Henry was clearly appreciated (Figure 3).



Discussion

Anomalous muscles in the lower extremity are not uncommon, and it is important to have a thorough understanding of the anatomical locations and possible complications that these variations can cause. The FDAL is 1 of 4 variant muscles of the ankle region, and its prevalence has been reported to range from 3.9% to 12.0% (2, 4).

Tarsal tunnel is probably the most common condition that has been described in literature as a result of a flexor

FIGURE 1 (*A*) Medial view of the cadaveric right tarsal tunnel region shows the flexor digitorum accessorius longus as it enters the tarsal canal posterior to the flexor hallucis longus tendon. Ant, anterior; Post, posterior; PT, posterior tibial tendon; FHL, flexor hallucis longus tendon; FDAL, flexor digitorum accessorius longus; NVB, neurovascular bundle; FDL, flexor digitorum longus tendon; Nav, navicular; Abd H, abductor hallucis. (*B*) Medial view of the cadaveric right leg just proximal to the tarsal tunnel region shows the flexor digitorum accessorius longus as it extends into the tarsal canal as a large, bulky muscle belly. PT, posterior tibial tendon; FDL, flexor digitorum longus tendon; NVB, neurovascular bundle; FHL, flexor hallucis longus tendon and muscle; FDAL, flexor digitorum accessorius longus muscle; TA, tendoAchillis.