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CASE REPORT

Bilateral Anomalous Insertions of Fibularis Brevis: A Case Report

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Abstract

During a routine dissection of a 52-year-old male, atypical insertions of the fibularis brevis muscle were noted bilaterally. The fibularis brevis tendon most commonly inserts into the lateral aspect of the tuberosity at the base of the fifth metatarsal. Upon evaluation of the cadaver, an accessory band of the fibularis brevis tendon splitting into medial and lateral bands was noted on the right foot. The medial band inserted onto the fourth dorsal interosseous muscle, as well as the dorsal surface of the distal aspect of the fifth metatarsal. The lateral band was found to insert onto the dorsal aspect of the tuberosity at the fifth metatarsal distal to where the main band of the fibularis brevis tendon inserted. The left foot revealed a single accessory band of the fibularis brevis tendon that inserted onto the fourth dorsal interosseous muscle. Further examination also uncovered the fibularis digiti quinti tendon splitting from the fibularis brevis tendon at the level of the lateral malleolus and then emerging distally between the main and accessory bands of the fibularis brevis tendon before finally inserting onto the extensor aponeurosis of the fifth toe. This case report describes bilateral anatomical variations of fibularis brevis tendon insertion along with the unilateral presence of fibularis digiti quinti. While previous studies have been conducted regarding anatomical variability within fibularis brevis tendon insertions and fibularis digiti quinti presence, none have described or classified the two variations seen in our dissection. A detailed understanding of variable tendinous insertions along the lateral foot is important for physicians to successfully evaluate and treat patients with foot pain.

Introduction

The lateral compartment of the leg contains the Fibularis Brevis muscle (FBM) and the Fibularis Longus muscle (FLM) [1]. The FBM originates from the distal two-thirds of the lateral surface of the fibula and passes posterior to the lateral malleolus, along with the fibularis longus tendon, through a canal created by the superior and inferior fibular retinacula [1]. The FBM is innervated by the superficial fibular nerve and receives blood supply from the anterior tibial and fibular arteries [1]. Its primary functions are foot eversion and plantarflexion [1].

Most commonly, the Fibularis Brevis tendon (FBT) inserts into the lateral aspect of the tuberosity at the base of the fifth metatarsal [2]. This insertion has been described in literature but there is no clear consensus on its morphological variations [2-6]. One study proposed a classification for FBT insertion based upon the presence and location of an accessory band (Table 1) [2]. Knowledge of the anatomical variations of FBT insertion is important for clinicians evaluating patients with lateral foot pain. Examples include foot and ankle surgeons performing reconstructive surgery and radiologists ensuring accurate imaging interpretation (Table 1).

The presence of accessory fibular muscles and tendons, such as the Fibularis Digiti Quinti (FDQ), fibularis tertius muscle, and fibularis quartus muscle have also been described [2, 7]. The FDQ is a small muscle originating from a slip of FBT and inserting onto the aponeurosis of the fifth toe [8, 9]. When present, accessory fibular muscles and tendons are typically asymptomatic but may alter biomechanics and can be associated with pain or compressive neuropathy [8, 10].

The present study describes the case of a cadaveric specimen with bilateral anomalous insertions of the FBT in addition to a unilateral anomalous FDQ.

Case Information

An embalmed, 52 year-old male cadaver underwent routine dissection during a fourth year medical school orthopaedic surgical anatomy course. Both left and right lower limbs were dissected using standard techniques. Dissection began with the removal of skin and superficial fascia overlying the dorsolateral

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foot and lateral compartment of the leg. The deep fascia was then carefully removed to expose the fibularis brevis muscle and its tendinous insertion.

Inspection of the right foot revealed an accessory band of FBT that split into medial and lateral bands. The medial band inserted broadly onto the fourth dorsal interosseous muscle in addition to the dorsal surface of the distal aspect of the fifth metatarsal. The lateral band inserted onto the dorsal aspect of the tuberosity at the base of the fifth metatarsal distal to the insertion of the main band of the FBT (Figure 1).

Inspection of the left foot revealed a single accessory band of FBT inserting onto the fourth dorsal interosseous muscle. Additionally, an FDQ tendon was identified splitting from FBT at the level of the lateral malleolus. The FDQ then emerged distally between the main and accessory bands of FBT before inserting onto the extensor aponeurosis of the fifth toe (Figure 2).

Table 1: FBT classification system proposed by Olewnik [2]. There are two key types with associated subtypes determined by the site of attachment of the accessory band.

Classification	Description
Type 1	The main tendon has a single distal attachment at the lateral base of the fifth metatarsal.
Type 2	The main tendon has a bifurcated distal attachment at the lateral base of the fifth metatarsal.
Subtype A	The accessory band inserts to fifth metatarsal on the dorsal surface, and at the attachment point the FBT joins with a segment of the fibularis tertius tendon.
Subtype B	The accessory band splits into a lateral band that inserts on the dorsal side of the base of the fifth metatarsal and a stronger medial band that inserts onto the middle part of the shaft of the fifth metatarsal.
Subtype C	The accessory band splits into a lateral band that inserts on the dorsal side of the base of the fifth metatarsal and a medial band that fuses with the fibularis tertius tendon creating a fourth interosseus dorsalis muscle.

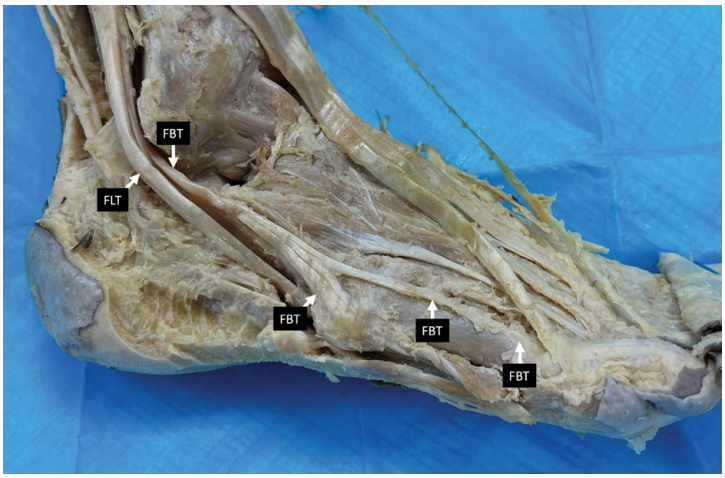

Figure 1: The lateral aspect of the right foot with the medial accessory band inserting into the fourth dorsal interosseous muscle, as well as the dorsal side of the fifth metatarsal and the lateral accessory band inserting into the dorsal side of the fifth metatarsal tuberosity distal to the main band insertion.

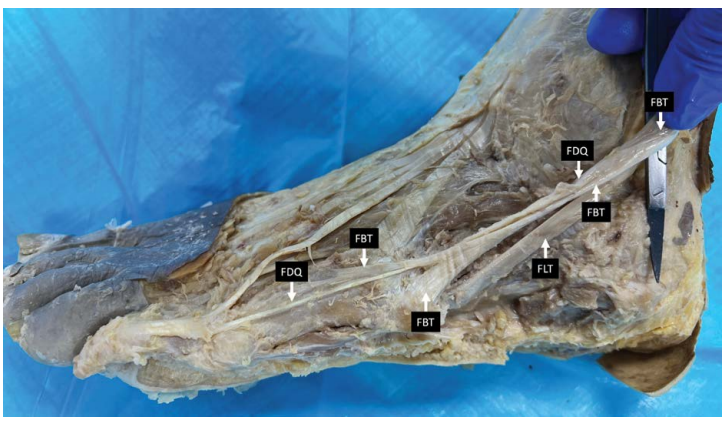

Figure 2: The lateral aspect of the left foot with the insertion of the accessory band of the FBT onto the dorsal interosseous muscle, and the FDQ tendon splitting from the FBT and emerging distally between the main and accessory bands before inserting on the fifth toe.

Discussion

Many studies have described anatomical variations of FBT insertion, as well as the presence of FDQ [2-6]. Olewnik et al. suggested a classification system based upon the presence and location of an accessory band (Table 1) [2]. However, another study subsequently described an anatomical variation of FBT that could not be classified according to this system [6].

Our study describes the dissection of a cadaveric subject with bilateral anatomical variations of FBT insertion in addition to the unilateral presence of FDQ. The FBT insertion on the right side could not be clearly classified according to Olewnik et al., because the medial accessory band demonstrated insertions onto distal aspect of the fifth metatarsal in addition to insertions onto the fourth dorsal interosseous muscle [2]. Therefore, the FBT insertion in the right foot of our subject may be best described as a combination between type 2B and 2C [2].

The FBT insertion on the left side could be classified as type 2C, which was observed in 2 out of 102 (1.96%) feet by Olewnik et al. [2]. The left side also demonstrated the presence of FDQ which, in our case, emerged between the accessory and main bands of FBT. The presence of FDQ with a type 2 FBT insertion was not observed by Olewnik et al. [2]. While Ruzik et al. described the case of one subject with a type 2B FBT and the presence of FDQ, the FDQ tendon in their case did not emerge between the heads of FBT and did not insert into the extensor aponeurosis of the fifth toe [6]. To the best of our knowledge, a type 2C FBT insertion with the presence of FDQ has not been described in the literature.

In conclusion, our study describes bilateral anatomical variations of FBT insertion in addition to the unilateral presence of FDQ. While many studies have described anatomic variability in FBT insertion and the presence of FDQ, neither of the variations in our study have been previously described or can be clearly classified according to existing systems. Although they are typically asymptomatic, such anatomical variations may affect foot biomechanics and can be associated with pain or compressive neuropathy [8, 10]. Surgically, the FBT has been a tendon graft source for reconstructive surgery in patients with ankle instability [11]. Thus, a detailed knowledge of the variable tendinous insertions along the lateral foot is important for both clinicians evaluating patients with lateral foot pain and radiologists making accurate imaging interpretations.

References

1. Netter F (2023) Netter Atlas of Human Anatomy: Classic Regional Approach. *Elsevier*. [View Article]
2. Olewnik Ł, Podgórski M, Ruzik K, Polguj M, Topol M (2020) New classification of the distal attachment of the fibularis brevis — Anatomical variations and potential clinical implications. *Foot and Ankle Surgery* 26: 308-13. [View Article]
3. Bardeen CR (1906) Development and variation of the nerves and the musculature of the inferior extremity and of the neighboring regions of the trunk in man. *American Journal of Anatomy* 6: 259-390. [View Article]
4. Anson BJ (1966) Morris' human anatomy The Blakiston Division, McGraw-Hill Book Company, New York. 12th Edition- 1623p. [View Article]
5. Johnson JD, Buratti RA, Balfour GW (1993) Accessory peroneus brevis muscle. The Journal of foot and ankle surgery : official publication of the American College of Foot and Ankle Surgeons 32: 132-33. [View Article]
6. Ruzik K, Westrych K, Konschake M, Tubbs RS, Karauda P, *et al.* (2022) Case report of unusual insertion of the fibularis brevis muscle. *Surg Radiol Anat* 44: 485-89. [View Article]
7. Yammine K (2015) The accessory peroneal (fibular) muscles: peroneus quartus and peroneus digiti quinti. A systematic review and meta-analysis. *Surg Radiol Anat* 37: 617-27. [View Article]
8. Chaney ME, Dao TV, Brechtel BS, Belovich SJ, Siesel KJ, *et al.* (2018) The fibularis digiti quinti tendon: A cadaveric study with anthropological and clinical considerations. *The Foot* 34: 45-47. [View Article]
9. Demir BT, Gümüşalan Y, Üzel M, Çevik HB (2015) The variations of peroneus digiti quinti muscle and its contribution to the extension of the fifth toe. A cadaveric study. *Saudi Med J* 36: 1285-89. [View Article]
10. Donley BG, Leyes M (2001) Peroneus Quartus Muscle:A Rare Cause of Chronic Lateral Ankle Pain. *The American Journal of Sports Medicine* 29: 373-75. [View Article]
11. Sammarco GJ, Idusuyi OB (1999) Reconstruction of the lateral ankle ligaments using a split peroneus brevis tendon graft. *Foot Ankle Int* 20: 97-103. [View Article]

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