Flexor Digitorum Brevis - An Anatomical Variation

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Abstract

The first layer of sole of foot consists of 3 muscles and Flexor Digitorum Brevis (FDB) is one of them. This muscle usually divides into four tendons, which pass to the lateral four toes. This paper reports a case in which the muscle variates with three tendons of the same muscle in the right foot. FDB flexes the lesser toes at proximal interphalangeal joint. The muscles of second layer, flexor hallucis longus and flexor digitorum longus (FDL) of the foot although presented with normal anatomy and FDL had 4 tendons. This variation is important from an evolutionary aspect that explains the atrophy of the muscles that are not used over time and may be a result of bipedal evolution, which emphasises the gradual reduction in use of little toe. These kind of variations are also important for the anatomists, sports people and surgeons for tendon transfer and designing foot prosthesis etc.

Keywords: Flexor digitorum brevis, Variation, Evolution, Anatomy, Foot.

Introduction

Many variations of the muscles of leg and foot have been reported over the time by various authors1. This variation was observed during routine cadaveric dissection at department of Anatomy MGM Medical College, Indore. It is customary to group the planter muscles of the foot in four layers, because this is the order in which they are encountered during dissection2. This superficial layer includes abductor hallucis, abductor digitii minimi and flexor digitorum brevis (FDB) (Figure-1).

All three extend from the calcaneal tuberosity to the toes, and all assist in maintaining the concavity of the foot. FDB arises by a narrow tendon from the medial process of the calcaneal tuberosity, central part of the plantar aponeurosis and the inter-muscular septa between it and adjacent muscles. It then divides into four tendons which pass to the lateral four toes and enter digital tendon sheaths.

Here they are accompanied by the tendons of flexor digitorum longus (FDL), which lie deep to them. At the bases of the proximal phalanges, each tendon divides around the corresponding tendon of FDL: the two slips then reunite and partially decussate, forming a tunnel through which the tendon of FDL passes to the distal phalanx2.

FDB is supplied by the lateral and medial plantar arteries, the plantar metatarsal arteries and the plantar digital arteries to the lateral four toes and innervated by the medial plantar nerve, S1 and S2. It flexes the lesser toes at the proximal interphalangeal joint, and its effect is same in any position of the ankle joint. It reinforces the longitudinal arch of foot, along with other muscles of the foot. Distortion of arches of foot is a consequence of paralysis of this muscle.

Figure-1
Muscles of 1st layer of sole of foot

Case Report

During routine cadaveric dissection for postgraduate medical students at department of Anatomy, MGM Medical College, Indore, an anatomic variation was found in Flexor Digitorum muscle of the right foot. The FDB was exposed after removal of planter skin, adipose tissue and central part of plantar aponeurosis. In the sole of right foot, FDB had 3 muscle bellies inserting into second, third and fourth toes and the 4th tendon of FDB muscle was absent (Figure-2). The left foot although showed 4 bellies of FDB. FPL of both feet were normal and showed 4 bellies.
From a clinical point of view, FDB musculocutaneous flap is used in the construction of the heel pad and FDB tendon transfer is employed in the correction of flexible claw and hammer toe deformities. Thus, an in-depth knowledge of the anatomical variations of this muscle will facilitate preoperative diagnosis as well as the surgical procedures of foot.

Conclusion
Understanding muscle architecture of foot may assist the surgeons in designing foot prosthesis, in procedures such as tendon transfer and anatomists in understanding the evolutionary changes affecting foot. Reporting of such anatomical variations could also facilitate diagnostic imaging of foot.

References