



Case Report

Rare variation of flexor digitorum longus muscle of leg — a case report

Published online April 8th, 2011 © <http://www.ijav.org>

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Received October 21st, 2010; accepted March 26th, 2011

ABSTRACT

Flexor digitorum longus is one of the muscles of posterior compartment of leg. This paper primarily focuses on the variation of flexor digitorum longus muscle of leg. Sixty inferior extremities were dissected. A small muscle taking origin from the tendon of flexor digitorum longus was observed. Some of the fibers were originating from the fascia covering the flexor digitorum longus and tibialis posterior. Its tendon merged with the tendon of flexor digitorum longus going to second digit in sole of foot and quadratus plantae. Nerve supply of this muscle was from a small branch of tibial nerve from its undersurface. Supernumerary muscles in the ankle joint or nearby region can be a factor of compression in tarsal tunnel syndrome. MRI is the modality of choice in diagnosing accessory muscles. Functional and clinical significance is important not only for the anatomist and clinicians but also for the pathologists and sports people. © IJAV. 2011; 4: 69–71.

Key words [flexor digitorum longus] [anatomic variation] [accessory muscles] [tarsal tunnel syndrome]

Introduction

The posterior compartment of leg is the largest but it diminishes markedly as it approaches the ankle. Flexor digitorum longus is thin and pointed proximally and gradually widens as it descends in the posterior compartment of leg. It arises from the posterior surface of the tibia medial to tibialis posterior from just below the soleal line to within seven or eight cm of the distal end of bone; it also arises from the fascia covering tibialis posterior. The muscle ends in a tendon that extends along almost the whole of its posterior surface. It passes deep to flexor retinaculum and enters sole of the foot. It continues across the sole to form the whole of long flexor tendons of the fifth toe and contributes to those of second, third and fourth toes. The tendons of quadratus plantae insert into the flexor digitorum longus tendons of the second, third and fourth toes. The long flexor tendons of the lateral four toes are attached to the plantar surfaces of the bases of their distal phalanges. It is innervated by branches of the tibial nerve [1].

Multiple accessory, supernumerary and variant muscles have been described in the anatomic, radiologic and surgical literature. Here, we present a case report of a variant muscle originating from the tendon of flexor digitorum longus muscle of the leg.

Case Report

Sixty inferior extremities of thirty embalmed adult human cadavers were studied in the Department of Anatomy, Govt. Medical College, Amritsar. They were dissected as per dissection steps provided by Cunningham's Manual of Practical Anatomy [2]. The cadavers were labeled from one to thirty with suffix R (right) or L (left) extremity and M (male) or F (female).

Out of sixty lower limbs, a variant muscle was observed in a male cadaver. It was a unilateral variation seen in left lower limb. A small muscle was originating from the tendon of flexor digitorum longus, going between flexor hallucis longus and tibialis posterior into the sole (Figure 1). Some of the fibers were originating from the fascia covering the flexor digitorum longus and tibialis posterior.

The insertion of tendon of this variant muscle was traced, it merged with the tendon of flexor digitorum longus to the second toe and quadratus plantae (Figure 2).

Nerve supply of this muscle was from a small branch of tibial nerve from its undersurface (Figure 1).

Discussion

All the variations observed are explainable ontogenically and phylogenically, thus supporting the theory "ontogeny repeats phylogeny". Majority of the limbs show variations



Figure 1. Photograph shows a *small muscle (AM)* originating from the tendon of *flexor digitorum longus (FDL)*.

that are distributed in a bilateral symmetrical manner, giving additional weightage to the popular belief that right and left limbs of an embryo tend to develop as mirror image so symmetry being expected "a priori" [3]. But, here the variation found was unilateral.

The development of given muscular mass or stratum into several special new muscles, can be affected in different ways. The original muscle may break up into a proximal and a distal segment. The result of such a division is that two muscles are found, a proximal and a distal one. This differentiation of the muscle into a proximal and a distal segment was of great advantage to the reptiles, since the two muscles became capable of acting independently of one another, and the limb could execute more specialized motions. All the long flexors and tensors of toes are only the distal parts of muscles which originally arising from the trunk or pelvic girdle, extended down to the toes as one continuous and very simple muscle. The latter conditions still obtain in genus *Cryptobranchus*. Origin of the short flexors from tendons of the long flexors is an exception in mammals, while in the amphibia it is the rule [4].

The accessory part of the flexor digitorum group varies a good deal. Its range of origin is sometimes increased upon the calcaneus, and sometimes upon the tibia a little above the ankle and many examples have been described of its receiving and accession – an "accessorius longus" or "secundus" from higher up the leg. The muscle so named has arisen either from the fibula at the upper part of its lower third, between the peroneus brevis and flexor hallucis, or from the deep fascia of the leg over the tibial vessels or from the flexor digitorum longus [5]. The flexor digitorum accessorius longus is a variant muscle with a reported prevalence of 2 to 8% in cadaveric studies [6]. It either inserts onto the flexor digitorum longus tendon prior to splitting into its four tendon slips or onto the quadratus plantae muscle. It is thought to assist in toe flexion.

A supplementary head of the muscle, flexor accessorius longus, with its own tendon may arise from the fibula, tibia or deep fascia and insert into the main tendon or into quadratus plantae in the foot. There may be communicating slips to tibialis anterior or to flexor hallucis longus [1]. In

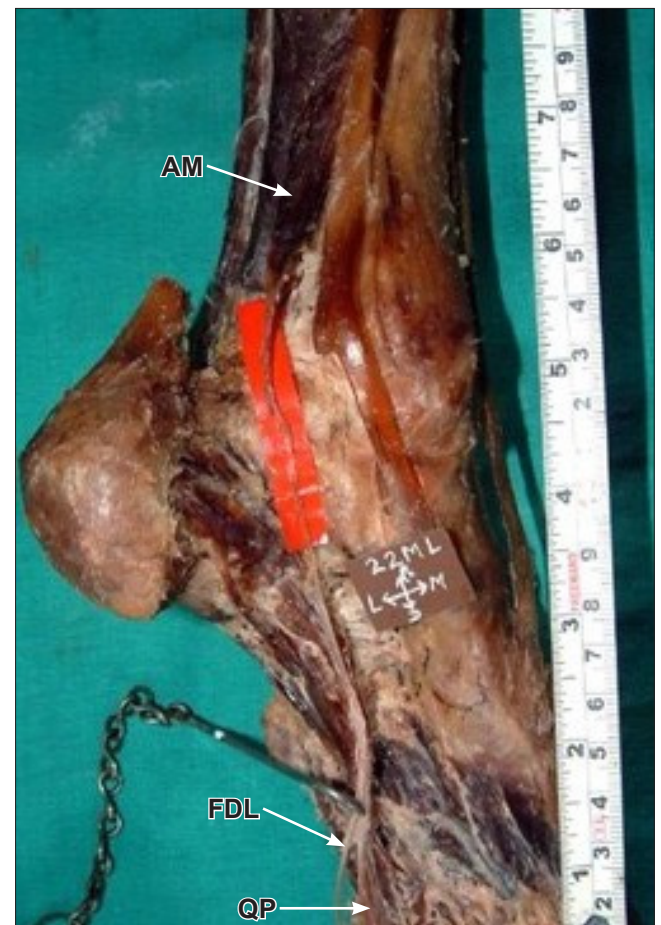


Figure 2. Photograph shows the tendon of *variant muscle (AM)* merging with the tendon of *flexor digitorum longus (FDL)* to second digit and *quadratus plantae (QP)*.

our case, a small muscle was originating from the tendon of flexor digitorum longus (going between flexor hallucis longus and tibialis posterior into the sole). However, some of the fibers were originating from the fascia covering the flexor digitorum longus and tibialis posterior. Regarding its insertion, it merged with the tendon of flexor digitorum longus to the second toe and quadratus plantae.

Another rare muscle, peroneocalcaneus internus deep to the flexor retinaculum in the posterior compartment of leg has been reported. It has a prevalence of 1% [7]. But, it originates along the inner part of lower third of fibula and inserts onto a small tubercle on the medial calcaneus below the sustentaculum tali [8].

Magnetic resonance imaging (MRI) is the modality of choice in diagnosing accessory muscles, delineating their relationship to adjacent structures and differentiating them from soft tissue tumors. Accessory muscles are isointense to skeletal muscle on all pulse sequences and can insert by fleshy muscular or tendinous insertions. Accessory muscles around the ankle include the flexor digitorum accessorius longus, the peroneocalcaneus internus, the accessory soleus and the accessory peroneal muscles [6]. Supernumerary muscle in the ankle joint or in the nearby region can be a factor

of compression in tarsal tunnel syndrome [9]. Surgeon must appreciate the change in the anatomical relationships along the medial side of the leg while performing double incision compartment fasciotomy to obtain a complete release of the muscular portion of the deep posterior compartment of leg [10]. Functional and clinical significance of the variation is important not only for the anatomists and clinicians but also for the pathologists and sports people.

Conclusion

Multiple accessory, supernumerary and anomalous muscles have been described in the anatomic, radiologic and surgical literature. Accessory muscles of the ankle are typically asymptomatic but can cause pain, compressive neuropathy, compartment syndrome or rigid hindfoot deformities, and can also mimic soft tissue tumors [9]. From the above literature review it is quite evident that flexor digitorum longus is an important muscle as its functional and clinical significance is important not only for the anatomist and clinicians but also for the pathologists and sports personals. Its variations are not very common. Knowledge of these accessory muscles, their specific location and characteristic MRI appearance assist in avoiding wrong diagnosis, guiding treatment and directing surgical options.

References

- [1] Standring S, Ellis H, Healy JC, Johnson D, Williams A, Collins P, Wigley C. *Gray's Anatomy*. 39th Ed., Churchill Livingstone, New York. 2005; 1500.
- [2] Romanes GJ. The lower limb. In: *Cunningham's Manual of Practical Anatomy*, 15th Ed., Oxford University Press, New York. 1986; 190–214.
- [3] Keen JA. A study of the arterial variations in the limbs, with special reference to symmetry of vascular patterns. *Am J Anat*. 1961; 108: 245–261.
- [4] Gadow H. Observations in comparative myology. *J Anat Physiol*. 1882; 16: 493–514.
- [5] Humphry GM. Lectures on the varieties in the muscles of man. *Br Med J*. 1873; 2: 78–80.
- [6] Carrol JF. Accessory muscles of the ankle. MRI web clinic – November 2008. <http://www.radsources.us/clinic/0811>. Accessed May 12, 2010.
- [7] Mellado JM, Rosenberg ZS, Beltran J, Colon E. The peroneocalcaneus internus muscle: MR imaging features. *AJR Am J Roentgenol*. 1997; 169: 585–588.
- [8] Best A, Cize E, Linklater J, Sullivan M. Posterior impingement of the ankle caused by anomalous muscles. A report of four cases. *J Bone Joint Surg Am*. 2005; 87: 2075–2078.
- [9] Nathan H, Gloabe H, Yosipovitch Z. Flexor digitorum accessorius longus. *Clin Orthop Relat Res*. 1975; 113: 158–161.
- [10] Cheney RA, Melaragno PG, Prayson MJ, Bennett GL, Njus GO. Anatomic investigation of the deep posterior compartment of the leg. *Foot Ankle Int*. 1998; 18: 98–101.