



A CASE REPORT - ABSENCE OF PERONEUS TERTIUS MUSCLE

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Article Info	ABSTRACT
<p><i>Received 15/01/2015</i> <i>Revised 27/01/2015</i> <i>Accepted 12/02/2015</i></p> <p>Key words: Absence of Peroneus tertius, Asymptomatic, Tendon graft surgeries.</p>	<p>Peroneus tertius (fibularis tertius) is a uniquely human muscle. It often appears to be part of extensor digitorum longus, and might be described as its 'fifth tendon'. The muscle fibres operating on this tendon arise from the distal third or more of the medial surface of the fibula, the adjoining anterior surface of the interosseous membrane, and the anterior crural intermuscular septum. The tendon passes behind the superior extensor retinaculum and within the loop of the inferior extensor retinaculum it shares with extensor digitorum longus. Peroneus tertius lies lateral to extensor digitorum longus. It is inserted into the medial part of the dorsal surface of the base of the fifth metatarsal bone, and a thin expansion usually extends forwards along the medial border of the shaft of the bone. During routine dissection, we observed that Peroneus tertius was absent on the left lower limb of a 70 years old donated embalmed male cadaver in the Department of Anatomy, K.J.Somaiya Medical College, Sion, Mumbai, India. Usually, the Peroneus tertius is involved in dorsiflexion and eversion of the foot. In many cases, the absence of Peroneus tertius may be asymptomatic and it may be incidentally detected during cadaveric dissections or autopsies. The existence of Peroneus tertius may help in the swing phase of bipedal walking. The Peroneus tertius may be used for tendon graft surgeries. The pull of the Peroneus tertius may be responsible for causing stress on the fifth metacarpal and account for all stress fractures in any individual. The absence of the Peroneus tertius may puzzle any transplant and foot surgeons performing graft operations. We as anatomists discuss the clinical implications of the absence of Peroneus tertius.</p>

INTRODUCTION

Peroneus tertius (fibularis tertius) is a uniquely human muscle. It often appears to be part of extensor digitorum longus, and might be described as its 'fifth tendon'. The muscle fibres operating on this tendon arise from the distal third or more of the medial surface of the fibula, the adjoining anterior surface of the interosseous membrane, and the anterior crural intermuscular septum. The tendon passes behind the superior extensor retinaculum and within the loop of the inferior extensor retinaculum it shares with extensor digitorum longus. Peroneus tertius lies lateral to extensor digitorum longus. It is inserted into the medial part of the dorsal surface of the base of the fifth metatarsal bone, and a thin expansion

usually extends forwards along the medial border of the shaft of the bone. Peroneus tertius is supplied by the same vessels as extensor digitorum longus. The main blood supply to extensor digitorum longus is derived from anteriorly and laterally placed branches of the anterior tibial artery, supplemented distally from the perforating branch of the peroneal artery. Proximally there may also be a supply from the lateral inferior genicular, popliteal or anterior tibial recurrent arteries. At the ankle and in the foot, the tendons are supplied by the anterior lateral malleolar artery and network, and by lateral tarsal, metatarsal plantar and digital arteries. In the foot it receives an additional supply from the termination of the arcuate



artery and the fourth dorsal metacarpal. Peroneus tertius is innervated by the deep peroneal nerve. L5, S1. During the swing phase of gait electromyographic studies show that peroneus tertius acts with extensor digitorum longus and tibialis anterior to produce dorsiflexion and eversion of the foot (Jungers et al 1993). This levels the foot and helps the toes to clear the ground, an action that improves the economy of bipedal walking. Peroneus tertius is not active during stance phase, a finding that contradicts suggestions that it acts primarily to support the lateral longitudinal arch or to transfer the centre of pressure of the foot medially. Peroneus tertius cannot be tested in isolation, but its tendon can sometimes be seen when the foot is dorsiflexed against resistance [1]. This muscle is seldom found in other primates, a fact that has linked its function to efficient terrestrial bipedalism [1–3]. Peroneus tertius is considered to be a part of the EDL muscle and it is often described as the fifth tendon of the EDL [1]. Although closely associated with the EDL, the PT has been considered the migrated part of the extensor digitorum brevis of the little toe [4]. The PT has been reported to

attain a bulk similar to the EDL, even remain rudimentary, or absent in 4.4–10% cases [1, 4]. The presence of PT is important for dorsiflexion and extension of the foot in swing phase of the gait [1]. The insertion of the PT might play an important role in the causation of torsional stresses as observed in Jones fractures and stress fractures [5]. Foot surgeons might use the PT muscle flap for transposition and also for correcting any laxity in the ankle joint [6, 7]. Thus, the presence or absence of PT may be important from the academic and clinical point of view.

MATERIALS & METHODS

Exposure of the dorsum of the foot was achieved following classical incisions and dissection procedures on a donated embalmed 70 years old male cadaver in the department of Anatomy at K.J. Somaiya Medical College, Sion, Mumbai. All the extensor tendons were exposed.

OBSERVATIONS

Peroneus tertius was absent in the left lower limb.

Figure 1. The photographic presentation of the unusual absent peroneus tertius

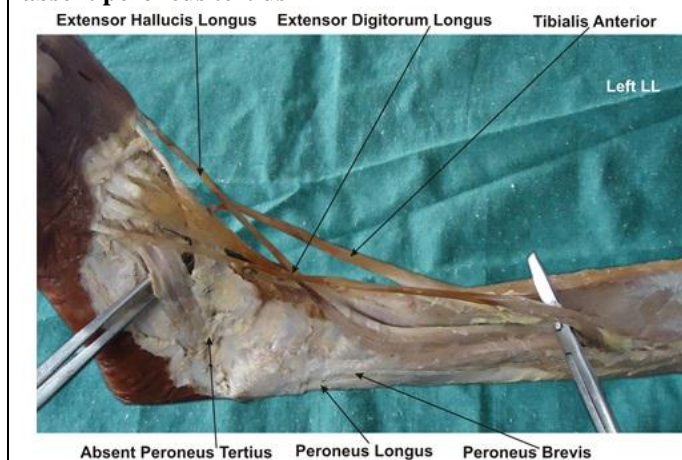
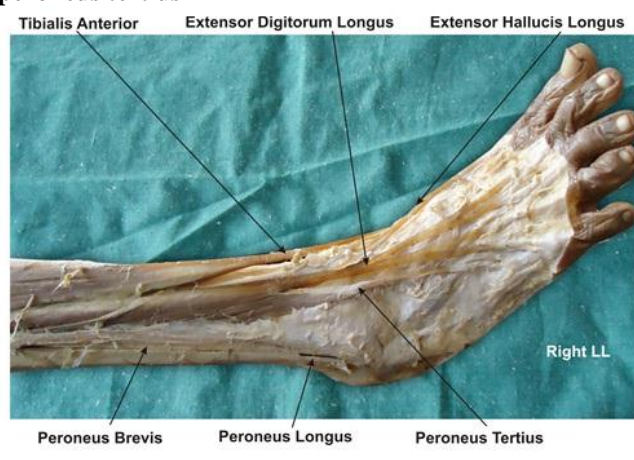


Figure 2. The photographic presentation of normal peroneus tertius



DISCUSSION

Recently PT is called as fibularis tertius (FT) [8]. The PT normally originates from the medial surface of the distal third of the fibula [1–3]. In the present case, it was absent and there was no thickening of the EDL.

The PT-muscle is absent in many primates with much variation in the humans. Interestingly, in the animal kingdom, the PT-muscle is found occasionally in the apes and monkeys but its incidence increases in the gorillas [9]. The variability of the muscle suggests that the absence of PT-muscle may be a primitive condition for anthropoids [10]. With evolution, the frequency of the PT has increased and perhaps that is the reason why it might be found in 95% of the human population [9].

Studies have been designed to determine the exact time of its earliest time of appearance of PT in humans so as to know the nature of early bipedalism [11].

The PT-tendon can be used for transplant surgeries. In foot drop, the tibialis posterior tendon manipulation might be required. There are past reports of the tibialis posterior tendon being transferred to the anterior compartment and anastomosed to the PT-tendon [12]. PT causes dorsiflexion and eversion of the foot during the swing phase of gait and it is important that the toes be lifted from the ground to assist in bipedal walking [4]. The attachment of the PT to the fifth metatarsal might define its role in providing proper support to the outer aspect of the sole of the foot. We, as anatomists believe that in the absence of the PT as seen in the present study, the support along the lateral border would be weakened. It should not be forgotten that both Jones' fractures and stress fractures involve the proximal fifth metatarsal and the insertion of the PT might play an important role in imposing torsional stress [5]. Under such circumstances,



the absence of the PT might be considered a boon to individuals who would be less vulnerable to such stress fractures. The PT may be considered as an accessory muscle for eversion and dorsiflexion. Witvrouw et al in their studies have shown that eversion or dorsiflexion may not be affected in the absence of the PT [13]. Thus, the absence of PT would not cause much clinical problems as thought earlier but its absence in any individual might perplex the operating surgeons planning a transplant or resection. We as anatomists would surely advocate prior imaging techniques to prove its existence before any surgical operation on the foot.

CONCLUSION

In the present case, it was found that the PT was absent and its absence did not result in thickening of the lateral fourth slip of the EDL. Anthropologically, the PT-muscle has been found to be evolutionary in nature with its role in bipedal walking. The stress component exerted on the fifth toe would certainly be altered in cases where it is absent. The absence of PT is an interesting finding, which could be important for anatomists, anthropologists, surgeons and orthopedic surgeons.

REFERENCES

1. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE, Ferguson MWJ. (eds). (2005). Gray's Anatomy. The anatomical basis of medicine and surgery, 39th edition, Churchill Livingstone, Edinburgh, 1497 - 1498
2. Snell RS. (2000). Clinical anatomy for medical students, 7th edition, Lippincott Williams & Wilkins, Baltimore, 561–562.
3. Sinnatamby CS. (2000). Last's Anatomy. Regional and Applied, 10th edition, Churchill Livingstone, Edinburgh, 148.
4. Joshi SD, Joshi SS, Athavale SA. (2006). Morphology of peroneus tertius muscle, *Clin Anat*, 19(7), 611–614.
5. Vertullo CJ, Glisson RR, Nunley JA. (2004). Torsional strains in the proximal fifth metatarsal, implications for Jones and stress fracture management. *Foot Ankle Int*, 25(9), 650–656.
6. Arnold PG, Yugueros P, Hanssen AD. (1999). Muscle flaps in osteomyelitis of the lower extremity, a 20-year account. *Plast Reconstr Surg*, 104(1), 107–110.
7. Karlsson J, Wiger P. (2002). Longitudinal split of the peroneus brevis tendon and lateral ankle instability, treatment of concomitant lesions. *J Athl Train*, 37(4), 463–466.
8. Rourke K, Dafydd H, Parkin IG. (2007). Fibularis tertius, revisiting the anatomy, *Clin Anat*, 20(8), 946–949.
9. Kimura K, Takashashi Y. (1985). The peroneus tertius muscle in the crab-eating monkey (*Macaca fascicularis*). *Okajimas Folia Anat Jpn*, 62(3–4), 173–185.
10. Jungers WL, Meldrum DJ, Stern JTJR. (1993). The functional and evolutionary significance of the human peroneus tertius muscle. *J Hum Evol*, 25, 377–386.
11. Grine FE. (1988). New postcranial remains from Swartkrans and their bearing on the functional morphology and behavior of *Paranthropus robustus*. In, GRINE F. E. (edn), Evolutionary history of the “robust” Australopithecines, Aldine de Gruyter, Hawthorne, New York, 149–172.
12. Ozkan T, Tuncer S, Ozturk K, Aydin A, Ozkan S. (2009). Tibialis posterior tendon transfer for persistent drop foot after peroneal nerve repair. *J Reconstr Microsurg*, 25(3), 157–164.
13. Witvrouw E, Borre KV, Willems TM, Huysmans J, Broos E, De Clercq D. (2006). The significance of peroneus tertius muscle in ankle injuries, a prospective study. *Am J Sports Med*, 34(7), 1159–1163.

COMPETING INTERESTS

The authors declare that they have no competing interest.

AUTHORS' CONTRIBUTIONS

SK wrote the case report, SPS performed the literature review, SR obtained the photograph for the case, RMM performed the literature search and RU assisted with writing the paper. STS helped to draft the manuscript. All authors have read and approved the final version manuscript.

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