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Peroneus Tertius an Evolutionary Appearing Muscle: A Case Report

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ABSTRACT The aim is to highlight a variation encountered in the insertion pattern of peroneus tertius muscle and correlating it with the available previous research studies and literature and also to analyze the anatomical basis of possible clinical entities related to this variation. This study was undertaken in sixty lower limbs in thirty adult cadavers in which peroneus tertius muscle was dissected in each limb. A variation encountered was recorded, analyzed and photographed.The insertion was extended on the dorsal aspect of almost whole of the shaft of 5th metatarsal. The variation in insertion of the peroneus tertius might play an important role in the causation of torsional stresses as observed in stress fractures. Thus it may have a clinical and phylogenetic viewpoint that has been highlighted in this case report. Knowledge of variation, may have useful clinical applications in cases of leg or foot trauma requiring tendoplasty or tendon transfer operations.

INTRODUCTION

Peroneus tertius is a muscle of the anterior compartment of the leg. The peroneus tertius muscle originates from the anterior surface of the fibula and the interosseous membrane and inserts into the medial side of the dorsal region of the base of the fifth metatarsal bone. Frequent variations seen in the musculature of the leg as regards their mode of origin and insertion indicate that they have not yet reached their final stage of evolution (Bhargava et al. 1961). The musculature of the human lower limb has greatly modified, because of the peculiar mode of progression. Some of the muscles are still in the process of evolution, they are either degenerating like the plantaris or are appearing like the peroneus tertius. Usually, the peroneus tertius is involved in dorsiflexion and eversion of the foot. Usually insertion of peroneus tertius is into the medial side of the dorsal region of the base of the fifth metatarsal bone (Bhargava et al. 1961).

Variations in the arrangement of muscles, as regards their mode of attachment and degree of subdivision are encountered frequently. It had been suggested that the degree of subdivision depends on the action of some organizer and on this basis classifies anomalies. Only some of these can be explained on the basis of comparative study. Function modifies the structure greatly and these changes are independent of the organiser theory (Bhargava et al. 1961). If the organiser starts working prematurely or prolongs its action, this results in abnormal splitting of the muscle mass, giving rise to supernumerary muscles. If the organiser starts functioning late or its action is too short, we have fusion of muscles belonging to the same or fundamentally different muscle mass (Bhatt et al. 2010).

The function of the peroneus tertius is eversion and dorsiflexion of the foot. These two strength parameters have been identified as important parameters in the development of ankle ligament injuries (Witvrouw et al. 2006). Peroneus tertius muscle is helpful in the swing phase of the bipedal mode of locomotion. The pull of the peroneus tertius may be responsible for causing stress on the fifth metatarsal and account for all stress fractures in any individual (Das et al. 2009).

CASE REPORT

During cadaveric dissection of the 60 lower limbs in the Department of Anatomy, Govt. Medical College, Amritsar (Punjab), when the muscle peroneus tertius was dissected from its origin to the insertion, we observed that in one case the insertion was on dorsal aspect of almost whole of the shaft of 5th metatarsal (Fig. 1). In the rest of the cadavers, the insertion followed the normal text book pattern.

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Fig. 1. Extended insertion of peroneus tertius on shaft of 5th metatarsal

RESULTS

In the present study, the Peroneus tertius in 59 limbs out of 60 in the present study got inserted on the medial part of dorsal surface of base of 5th metatarsal, thus confirmed to standard textbook pattern. In a middle aged male cadaver the insertion was on dorsal aspect of almost whole of the shaft of 5th metatarsal in his left limb. This variation in the insertion of muscle on the shaft of 5th metatarsal (Fig. 1) has been rarely reported by previous workers.

DISCUSSION

Peroneus tertius (PT) muscle is peculiar to man, and man is the only member among the primates in whom this muscle occurs. The muscle is variable in its development and attachment. Because of functional demands of bipedal gait and plantigrade foot, part of extensor digitorum brevis (EDB) has migrated upwards into the leg from the dorsum of foot. Peroneus tertius is a muscle, evolution of which renders more importance (Joshi et al. 2006). The Peroneus tertius is usually considered to be a differentiated portion of the Extensor Digitorum Longus and its variations therefore, are commonly interpreted as mere variations in the degree of differentiation from this muscle (Badkamkar and Mysorekar 1962).

This is one of the important muscles which aid a man to stand upright and to walk; but it is found in no other animal. It is purely human. Further, it is found in the human embryo early in its development. Therefore, it, like the foot to which it belongs, must be a specific character evolved early in the growth of the human stock (Purucker 1977).

Peroneus tertius may be completely absent in four percent (Borley et al. 2008). The additional Peroneus tertius accessorius, originates from the lower end of the anterior surface of fibula and immediately ends in a slender tendon and is inserted in the styloid process of the fifth metatarsal with Peroneus brevis (Mehta and Janakiram 1976). The tendon of Peroneus tertius may insert into the extensor tendon of the fifth toe or sometimes the tendon may insert into the third or fourth metatarsal bones (Bhadkamkar and Mysorekar, 1962).

In study by Joshi et al. (2006) on 110 cadavers, in 12 percent, the tendon of peroneus tertius was thick or even thicker than the tendon of Extensor digitorum longus. In 4 percent, the tendon extended beyond fifth metatarsal up to metatarsophalangeal joint of fifth toe, and in 1.5 percent, it extended up to the proximal phalanx of little toe. They concluded that PT, which is predominantly human, is extending its purchase both proximally and distally. In study by Rourke et al. (2007), in all cases the tendon inserted into the dorsal surface of the shafts of both the fourth and fifth metatarsals.

In the study by Figen et al. (2009), in one case the peroneus tertius originated from the middle and lower third of the fibula and crural fascia but not from the extensor digitorum longus muscle. The peroneus tertius had an unusually large muscle bulk and its tendon was also thicker and wider than in the other cadavers. The tendon descended anteriorly and laterally and fanned out near its attachment point towards the almost entire dorso-lateral surface of the fifth metatarsal. According to Vertullo et al. (2004), the insertion of the peroneus tertius might play an important role in the causation of torsional stresses as observed in Jones fractures and stress fractures. Foot surgeons might use the peroneus tertius muscle flap for transposition and also for correcting any laxity in the ankle joint (Das et al. 2009). So, greater area of insertion may increase the stability of the joint.

CONCLUSION

Thus the musculature of the human lower limb has greatly modified, because of the peculiar

mode of progression. Some of the muscles are still in the process of evolution and are appearing like the Peroneus tertius. Frequent variations seen in the lateral musculature of the leg as regards their mode of origin and insertion indicate that they have not yet reached their final stage of evolution. Phylogenetically, peroneus tertius is peculiar to humans who are associated with bipedal gait. Stress exerted on fifth metatarsal might be altered when variation in insertion of peroneus tertius is there. Thus variation is important for anatomists, plastic surgeons and orthopedic surgeons.

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