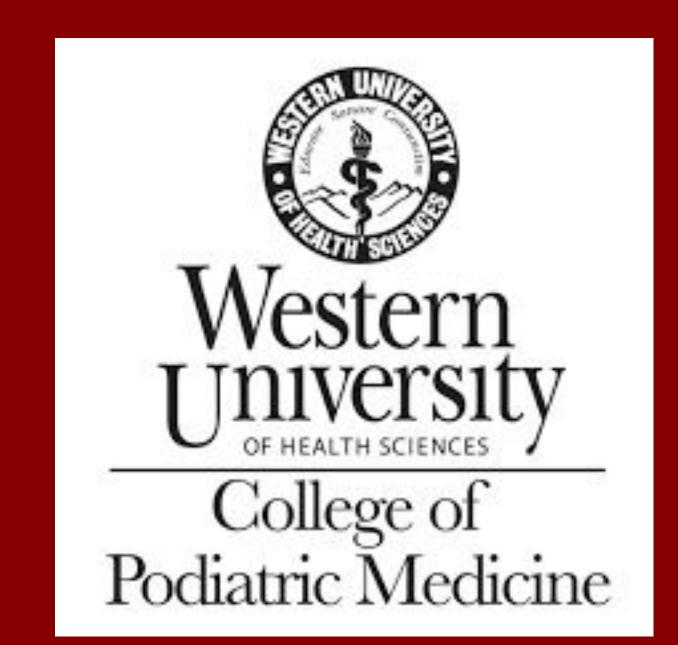


The Incidence and Classification of the Peroneus Tertius, Peroneus Quartus &

Peroneus Digiti Quinti: A Cadaveric Study

Garrett Wireman ATC, BS, MS-2 & Eduardo Glass BS, MS-2



Statement of Purpose

The goals of this study is to focus on three muscles of the lateral ankle that both exhibit high degree of variation and measure correlations of the prevalence between each variant lateral muscle and to classify this lateral triangular complex. The origins, insertions and routes of the muscles are also a focus of this study. The three muscles are the peroneus tertius (PT), the peroneus quartus (PQ) and the peroneus digiti quinti (PDQ).

Literature Review

The peroneus quartus and peroneus digiti quinti are variants belonging to the accessory peroneal muscles, but are not variants of the same structure. There is a high degree of terminology for the description of this muscle group, due to the high variation and prevalence of the muscle group in relevant literature. This has lead to clinical misdiagnosis and unknown etiologies. The peroneal muscles are noted due to the common occurrence that both the PDQ and the PQ arise commonly from the peroneus brevis (PB) in the lateral crural compartment along with the peroneus longus (PL) and innervated by the superficial peroneal nerve.

One outlier study of the PDQ is reported by Chaney et al of occuring in 71% of their study. Others report having the PDQ occur between 32-34.3% in their studies.

Different studies have varying reports of occurence of the PQ, reports at 5.2%, 10.2 and 21.7%, with the median at 13.45%.

Frequency of the PT show up with varying numbers, with reports at 85%, 88.2%, 90% and 100%.

Level of Evidence

Level III Evidence, Meaning

Methodology

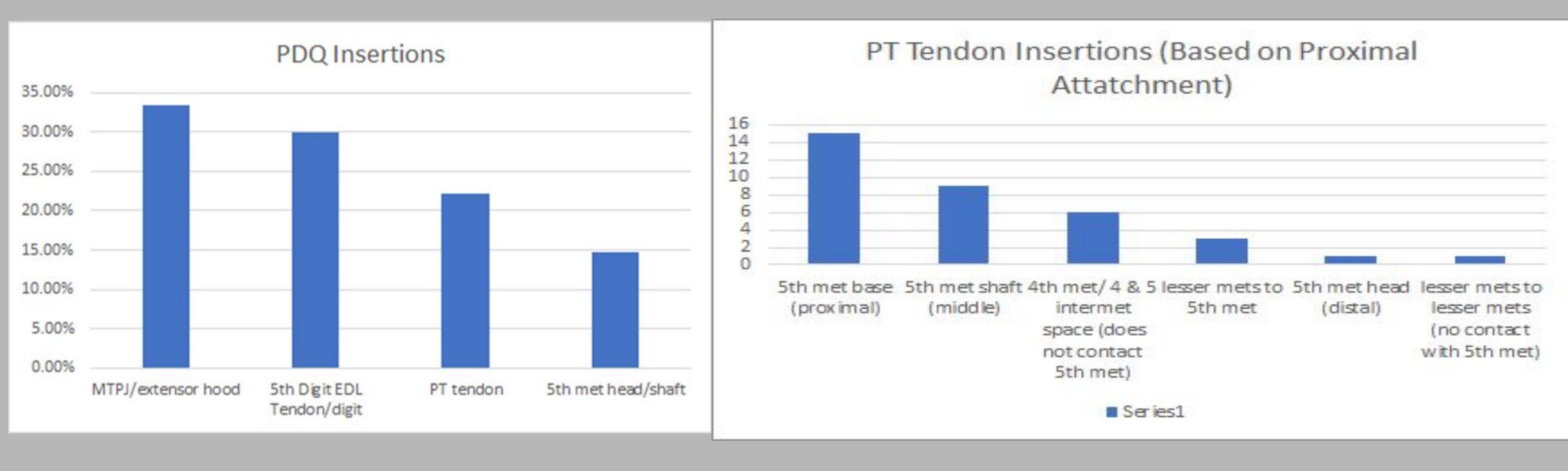
Cadavers were donated to the 2018 Intensive Summer Anatomy Course at Western University of Health Sciences for Doctor of Podiatric Medicine and Doctor of Osteopathic Medicine candidates. Fourteen bodies with twenty-seven usable limbs were dissected and studied.

A classification system was built based on the structures of study on their occurence alone and with other lateral structures present. Data, description and pictures were collected of each limb regardless of findings.

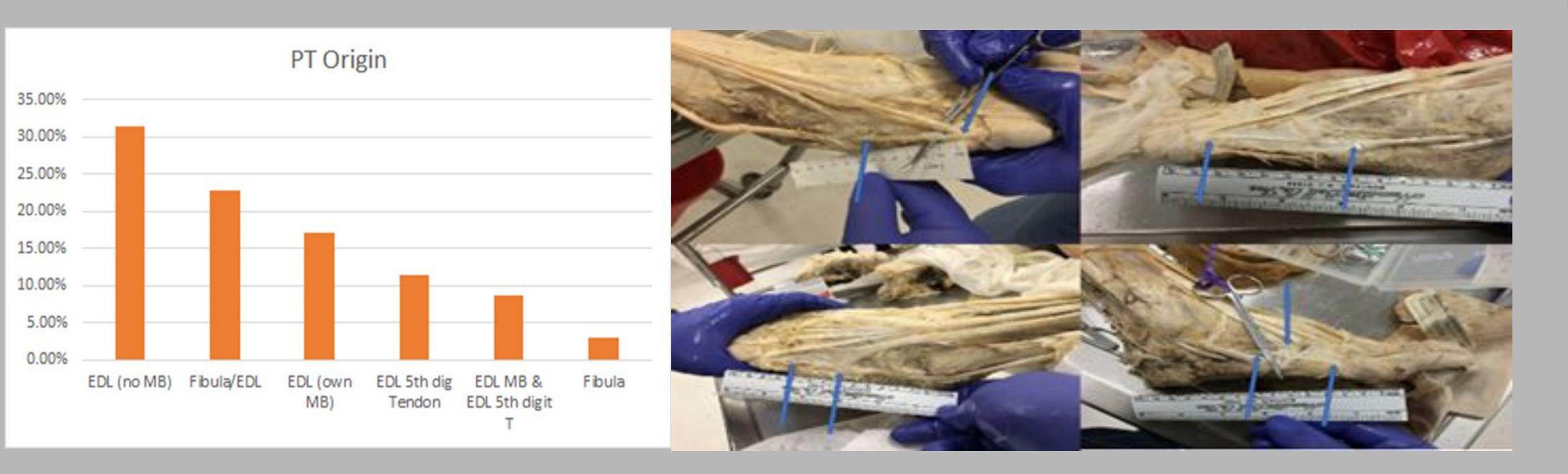
Results

The PT was observed in 100% of the cadavers. 35 individual PT structures were found in the 27 legs. The PT had 6 common origins and insertions. While some contained their own muscle bellies and others did not.

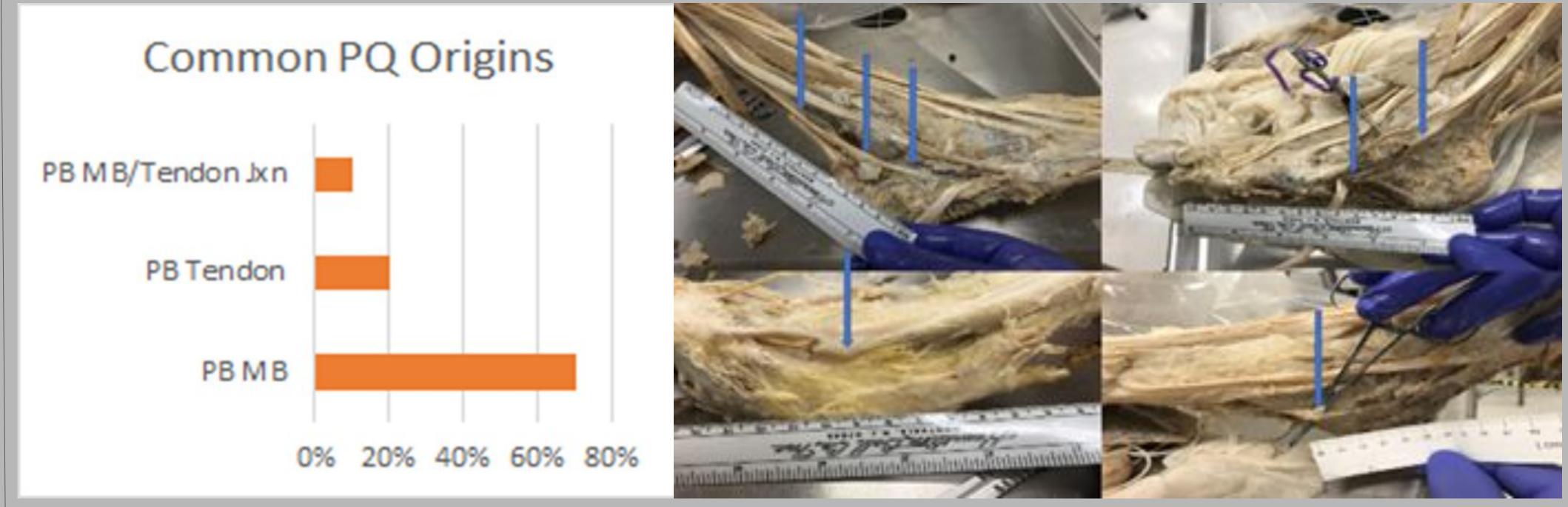
The PDQ was observed in 23 of the 27 legs, a prevalence of 85.2%. Its origin site was fixed, forming at the PB tendon, as the PB tendon is inserting into the base of the fifth styloid. However, insertion varied with 5 common points.



10 out of 27 legs exhibited a PQ, while the remaining 63% was absent for this structure. All ten of the PQ originated from the distal third PB and coursed through the fibular groove. The fibular trochlea was the common site of insertion, with 9 of the 10 structures exhibiting this form. The remaining PQ took an unorthodox insertion by joining the Peroneus Longus tendon.



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A lateral triangular complex classification system has been designed upon the PT, PDQ and PQ existence within a subjects foot and ankle. The lateral triangular complex can be subdivided into I, II and III which corresponds with the number of structures that occur within a subject. Furthering the classification, each structure is designated an alphabetical character a, b or c, which represents the PT, PDQ and PQ respectively.

1 Single structure	Subtypes
PT only	Ia
PDQ only	Ib
PQ only	Ic
II- Two structures	
PT and PDQ	IIab (most Common)
PT and PQ	IIac
PQ and PDQ	IIbc
III-All three structures	No subtype-Complete Lateral Triangle



Ia occured in 3 out of 27 limbs or 11.11% of the time. Ib and Ic was not exhibited in the subjects. IIab had the highest rate of occurrence at 51.85% or 14 out of 27 limbs. Only one subject had type IIac. Type IIbc was not exhibited in the subjects. Lastly, type III had the second highest rate of 33.33% with 9 out of 27 ankles having a complete lateral triangular complex.

Discussion

The lateral triangular complex refers to three structures of the lower extremity. Often, the lateral triangle is incomplete as not all the structures always occur at the same time, which is one reason for the creation of a classification system that is readily usable. There is discrepancies amongst the literature defining the incidence and functions of the separate parts of this complex as well as its clinical significance. Though measurements of dimensions and data collections of these structures have been done, there was no defining classification for these structures. Therefore, a classification system was designed to readily classify the morphology of the lateral triangular complex.

Most literature cites the PDQ at 32-34.3% in their studies, while some outliers reported at 71 and 79.5%. The study found to correlate with the outlier studies with having an even higher incidence of 85.2%.

The PQ had an incidence of 37 percent This rate is significantly higher than the current literature which places it at 5.2-21.7%

Though there was 0% incidence of type Ib and Ic there is potential for this type to exist because other studies show the PT is not always occuring. Therefore, according to the Yammine & Eric lateral accessory replacement phenomenon, they would have encountered type Ib and Ic in this study's classification system.

The PDQ may help create the rigid beam effect on the lateral forefoot as supination happens. The PQ alone, would help evert the calcaneus based on the anatomy. There is suspicion that the PDQ and PQ functions more as proprioceptive role. Whether or not this occurs with a biomechanic component is yet to be determined or quantified.

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