

Accessory Belly of the Plantaris Muscle and its Clinical Relevance

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Abstract

The plantaris muscle is accessory flexor group muscle of the lower leg. The muscle originates from the lower part of the lateral supracondylar line of the femur and the oblique popliteal ligament, inserted medial to calcaneal tuberosity. During the routine dissection for the undergraduate medical students we encountered accessory plantaris muscle originating medial side of the femoral condyle and capsular ligament. Both the normal lateral and accessory medial tendons fused to form long slender tendon and inserted medial to calcaneal tuberosity. Knowledge of variable origin, course and the insertion of the plantaris muscle is important for surgeons performing various reconstructive surgeries.

Keywords: Plantaris; Achilles tendon; Vestigial; Tendon grafting.

Introduction

Plantaris muscle is a small flexor group muscle presents short belly and a long thin tendon. It is one of the superficial muscles of the posterior compartment of the leg along with soleus and gastrocnemius contributes the bulk of the calf. Together with the gastrocnemius, and soleus, they are collectively referred to as the triceps surae muscle. Plantaris arises from the lower part of the lateral supracondylar line and the oblique popliteal ligament. Its small fusiform belly is 7 to 13cm long and ends in a long slender tendon which crosses obliquely in an inferomedial direction between gastrocnemius and soleus, then runs distally along the medial border of calcaneal tendon and inserts just medial to Achilles tendon, occasionally it fuses with the calcaneal tendon. It is innervated by tibial nerve (S1, S2). [1, 2] Plantaris acts as a weak plantar-flexor the ankle joint and flexor of the knee joint. Due to presence of high density muscle spindles, it carries proprioceptive function for larger more powerful plantar flexors. Plantaris is one of the vestigial muscle and often mistaken for a nerve by new medical students and thus called the "freshman nerve". Clinically, both the muscle belly and its tendon can be palpated respectively in popliteal fossa and along medial aspect of Achilles tendon near its insertion.[1] Plantaris muscle has been observed to present frequent variations in occurrence, origin, course, relation with surrounding neurovascular structures and insertion.[3] The anatomical knowledge of plantaris muscle variation is also important for clinicians for muscle tears and for surgeons performing reconstructive procedures.

Case Report

During routine cadaveric dissection for first year medical students, in the department of Anatomy BLDE University's Shri B M Patil Medical College & Research Centre Vijayapura, Karnataka state India. The left lower

limb of a 68-year-old male cadaver showed a variation in the morphology of plantaris muscle. The specimen was further dissected to trace the attachments of the plantaris muscle. Accessory belly of plantaris muscle arose from the fascia covering the popliteus muscle and fibrous capsule of knee joint, joining the tendon of the plantaris, measured 6.8cm in length and 0.5 cm in width. Both tendons then merged to form a single tendon that inserted medial to calcaneal tuberosity. The plantaris muscle originated from the capsule of the knee joint and the lateral head of the gastrocnemius. In the same limb, the plantaris muscle was entrapped between the tibial nerve and its branch to the soleus muscle (Figure 1).

Discussion

Anatomical variations in the origin and insertion are common appearance in the human body.[4] abnormal occurrence of the muscles compresses the surrounding neurovascular structures and produces complications.[5] plantaris muscle in the calf of the leg is regarded as vestigial muscle in human because of its slender diameter and seemingly minor contribution to the two more massive muscles with which it is associated and it lost its original attachment to the bottom of the foot (plantar aponeurosis) and gained its distal attachment secondarily to calcaneus bone of the heel due to process of evolution for erect posture and bipedal locomotion[1] Embryologically, it is considered as a derivative of deeper portion of lateral head of gastrocnemius and often represented as third head of gastrocnemius or 'gastrocnemius tertius'. It has been reported to be *absent* in about 8-12% of populations.[3] Origin plantaris muscle from lower part of lateral supracondylar line and posterior surface of lateral condyle of femur bone has been considered bilaterally as bicipital origin of the muscle.[6] Kwinter DM et al reported origin of additional distinct anomalous muscle on medial side of right leg considered as second plantaris due to its morphological resemblance Tendon of such muscle was seen to be merged with calcanean tendon.[7] Rana et al reported the muscle with bilateral existence of two separate bellies.[8] Arnar et al reported that injury to plantaris muscle and



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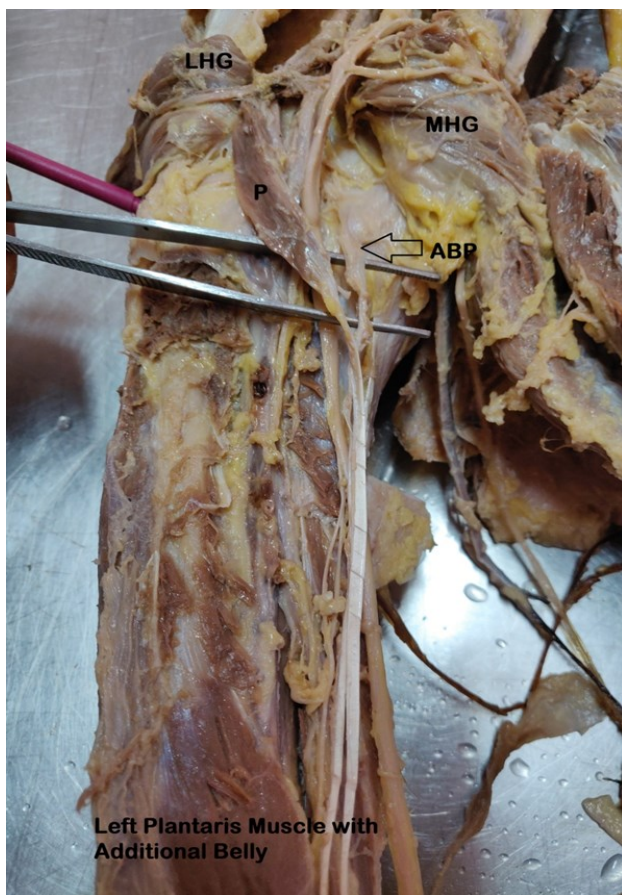


Figure 1. Left Leg Showing Plantaris Muscle (P) with Additional Muscle Belly of Plantaris (ABP) Medial head of Gastrocnemius (MHG) and Lateral head of Gastrocnemius (LHG) on Medial Side (Arrow Mark)

its tendon or associated tears of gastrocnemius, soleus and anterior cruciate ligament may be regarded as important cause of ‘Tennis leg’. Rupture of its tendon may be presented as non-specific lower leg pain[9]. Tendon of plantaris due to its excellent tensile strength has been successfully used as graft for reconstruction of flexor tendon in hand and anterior talofibular and calcaneofibular ligament of ankle [10]. This donor tendon is also tried for atrioventricular valve repair. [11]

Conclusion

Knowledge of rare anatomical variations regarding plantaris muscle is important in Achilles midportion tendinopathy. Plantaris muscle injury can present diagnostic challenge among clinicians and radiologists. Based on the morphology and prevalence of the plantaris muscles in Indian population, are ideal for the use of flaps and/or tendon graft in reconstructive surgery.

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