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Case Report

Anatomy Section

Musculotendinous Slip of Adductor Magnus with Femoral Artery Variation: A Case Report

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ABSTRACT

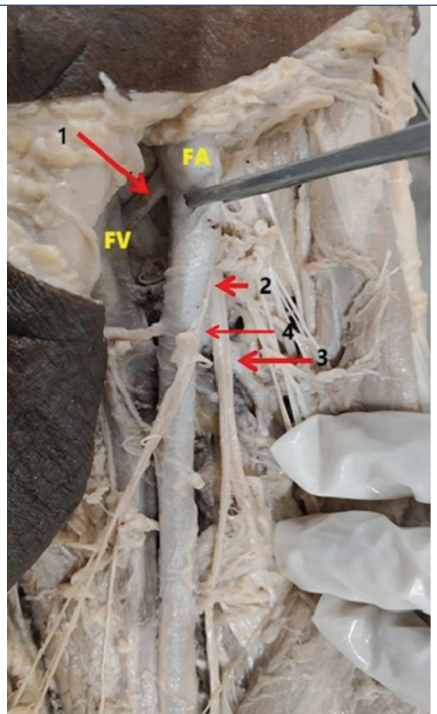
The adductor canal and adductor hiatus are clinically important due to their narrow anatomical configuration. The present case report (a 65-year-old male cadaver) describes a variation in the left lower limb in which the medial circumflex femoral artery arose from the left femoral artery, and a musculotendinous band was present at the popliteal opening of the adductor hiatus, effectively dividing it into two compartments. The femoral artery passed deep to this band, while the popliteal vein remained superficial. The band originated from the linea aspera and inserted into the hamstring part of the adductor magnus. An indentation produced by the band was visible on the popliteal artery, which also demonstrated a reduced diameter at the level of compression compared to measurements taken proximal and distal to the band. Additionally, dilation of the artery was observed distal to the band. Such fibrous bands may develop due to repetitive physical activity, leading to increased stress around the vessels. Recognition of these bands is crucial for distinguishing mechanical vascular compression from traumatic vessel occlusion, atherosclerotic obstruction, and neuromuscular impairments. Awareness of these anatomical variations can also aid surgeons and physiotherapists during lower limb interventions.

Keywords: Adductor canal, Adductor hiatus, Fibrous band, Narrow anatomical configuration

CASE REPORT

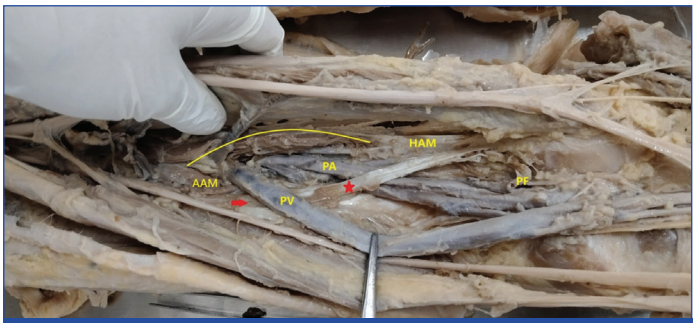
During a routine anatomy dissection conducted for medical undergraduates in the Department of Anatomy, a 65-year-old male cadaver exhibited variations in the branching pattern of the femoral artery and the presence of a musculotendinous band dividing the popliteal opening of the adductor hiatus in the left lower limb.

In the femoral triangle, the Medial Circumflex Femoral Artery (MCFA) was observed to arise directly from the femoral artery [Table/Fig-1]. The femoral artery also gave rise to the Profunda Femoral Artery (PFA). The PFA further branched into the lateral circumflex femoral artery and perforating branches but did not give rise to the MCFA [Table/Fig-1]. The course of the femoral artery and PFA remained normal throughout the anterior compartment of the thigh.

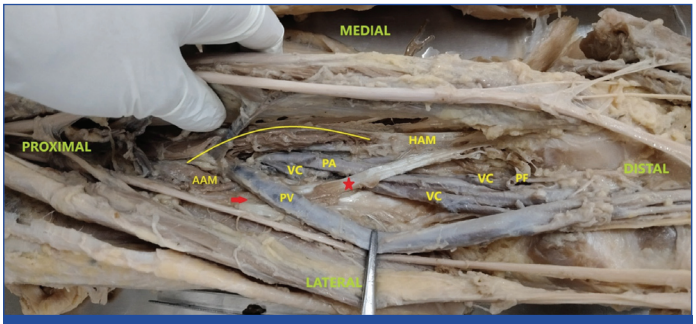


[Table/Fig-1]: Medial circumflex femoral Artery (Red Arrow 1), Anterior division of femoral nerve (red Arrow 2), Lateral circumflex femoral artery (red Arrow 3), profunda femoral artery (red Arrow 4). Femoral Vein (FV) and Femoral Artery (FA).

Upon opening the adductor canal, the course and relations of the vessels were found to be intact, and both the canal and the adductor hiatus appeared normal. The adductor hiatus was oval in shape on both sides. However, within the popliteal fossa, the adductor hiatus on the left side was divided into two openings by a musculotendinous slip of the adductor magnus [Table/Fig-2a,b]. Through these openings, the popliteal artery passed deep to the band, whereas the popliteal vein remained superficial. The remaining popliteal vessels followed a normal anatomical course.



[Table/Fig-2a]: Adductor hiatus (Yellow arched line), Musculotendinous band (Red star), Hamstring part of Adductor Magnus (HAM), Popliteal Vein (PV), Popliteal Artery (PA), Popliteal Fossa (PF), Adductor part of Adductor Magnus (AAM) and Origin of band from the Linea Aspera (Red arrow)



[Table/Fig-2b]: Showing the Adductor hiatus (yellow arched line), musculotendinous band (red star), Hamstring part of Adductor Magnus (HAM), Popliteal Vein (PV), Popliteal Artery (PA), Popliteal Fossa (PF), Adductor part of Adductor Magnus (AAM) and Origin of band from the Linea Aspera (red arrow), Venae comitantes (VC).

The musculotendinous slip originated from the linea aspera, in continuation with the insertion of the adductor component of the

adductor magnus, and inserted into the tendon of the hamstring part of the same muscle, which was attached to the adductor tubercle. A fibrous band indentation was noted on the popliteal artery, along with dilation of the vessel distal to the site of compression [Table/Fig-3].

[Table/Fig-3]: Indentation caused by the musculotendinous band (red Arrow 1), and dilation of the popliteal artery just below the fibrous band (red Arrow 2)

The length of the fibrous band was measured from its origin to its insertion into the tendon of the hamstring part of the adductor magnus using a measuring tape. Its breadth and thickness were measured using a Vernier caliper [Table/Fig-4].

Musculotendinous band	Length (in cm)	Thickness (in mm)		Breadth (in cm)	
		Muscular part	Tendinous part	Muscular part	Tendinous part
	8	1.7	0.7	1	0.8

[Table/Fig-4]: Measurements of musculotendinous band of Adductor Magnus.

The diameter of the popliteal artery was measured using a Vernier caliper proximal and distal to the band to confirm vascular compression. On the left side, the artery measured 5.8 mm proximal to the band, 4.6 mm at the level of the band, and 5.7 mm distal to it. Distal dilation of the artery was observed, measuring approximately 6.7 mm. On the right side, no musculotendinous band was present, and all anatomical structures appeared normal. The diameter of the right popliteal artery measured approximately 5.7 mm just below the adductor hiatus, 5.0 mm at the mid-popliteal fossa, and 5.5 mm between these two points.

DISCUSSION

The femoral artery is a continuation of the external iliac artery and gives rise to a large branch, the PFA, within the femoral triangle. The PFA further divides into the medial and lateral circumflex femoral arteries and four perforating arteries [1]. In the present case, the MCFA was observed to originate from the left femoral artery. A study by Manjappa T et al., reported that in 40% of cases the MCFA arises from the right femoral artery, while in 35% of cases it originates from the left femoral artery [2]. Another study reported that in 33.3% of cases, the MCFA arose from the right femoral artery [3]. A review of anatomical variations of the PFA indicates that the MCFA more frequently arises from the right femoral artery than from the left [4].

The femoral artery exits the anterior compartment of the thigh by passing through the adductor canal and adductor hiatus, where it continues as the popliteal artery. The popliteal vein, in turn, continues proximally as the femoral vein [1]. In the present study, the course and relations of the femoral artery in the anterior compartment were found to be normal. However, at the popliteal opening of the adductor hiatus, the vessel was compressed by a musculotendinous band.

There are no cadaveric reports describing a musculotendinous band of the adductor magnus passing over the femoral artery at the adductor hiatus. However, several reports have documented cases of Adductor Canal Compression Syndrome (ACCS), in which the femoral artery is compressed by a fibrous band arising from the adductor magnus. The first case of ACCS was reported by Palma EC et al., in which a fibrous band from the adductor magnus compressed the femoral artery within the adductor canal. The authors hypothesised that this condition may be less prevalent in females due to the wider adductor canal and the obliquity of the femur [5].

In contrast, Zhou Y et al., reported a case involving an 18-year-old female who presented with an absent popliteal artery pulse and ischaemia of the left leg. During surgery, a musculotendinous band from the adductor magnus was found to be compressing the femoral artery within the adductor canal. Removal of the band resulted in resolution of ischaemia and complete recovery [6]. Another case of ACCS was reported in a 19-year-old athlete. Evidence suggests that athletes and young individuals are more susceptible to ACCS due to repetitive activities causing sustained compression of the neurovascular structures [7]. In yet another case report of ACCS in a 46-year-old female athlete, thrombosis of the femoral, popliteal, and external iliac vessels was observed [8].

In the present case, although no clinical symptoms were available, a thinning of the popliteal artery was observed at the level where it passed beneath the band. This finding suggests the possibility of some degree of arterial insufficiency in the affected limb. Such fibrous bands may develop due to repetitive physical activity, leading to increased stress on vessels located in confined anatomical spaces between muscles and bones [6-8]. Furthermore, it has been hypothesised that the formation of fibrous bands may be related to age-associated changes in the connective tissue surrounding the vessels [9].

Supporting this hypothesis, a study examining the adductor hiatus in 44 lower limbs of Nigerian individuals reported that 26 thighs had an oval fibrous type of adductor hiatus, 12 had an oval muscular type, and the remaining 4 demonstrated a bridge-type opening, of which two were muscular and two were fibrous. The present study highlights that structural variations of the adductor hiatus do not conform to a single pattern and that the morphology of the adductor hiatus may differ between the two limbs of the same individual [10].

CONCLUSION(S)

Knowledge of such anatomical variations is essential for distinguishing mechanical vascular compression from traumatic vessel occlusion, atherosclerotic obstruction, and neuromuscular impairments. Awareness of these variations can also assist surgeons and physiotherapists in planning and performing lower limb interventions.

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