

# Accessory Belly of the Rectus Femoris Muscle – A Case Report

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## ABSTRACT

Accounting for variability in human morphology reduces iatrogenic injury and leads to positive clinical outcomes. Variations in the quadriceps femoris muscle group, including accessory muscular components, fascicular orientation, and relationships to the patellar tendon have been the focus of many research studies. Most reports describing variability associated with the

rectus femoris muscle have closely examined common but underappreciated accessory muscular slips closer to the hip joint. Here we describe a significant accessory rectus femoris muscle belly in a 103-year-old white male donor discovered during anatomical dissection. The supernumerary muscle belly shared an origin from the ilium with the rest of the rectus femoris muscle and coursed through most of the thigh before blending with the distal vastus lateralis muscle. This finding prompted further investigation and a review of the literature.

**Key Words:** Rectus femoris muscle; Quadriceps femoris variation; Muscle variation

## INTRODUCTION

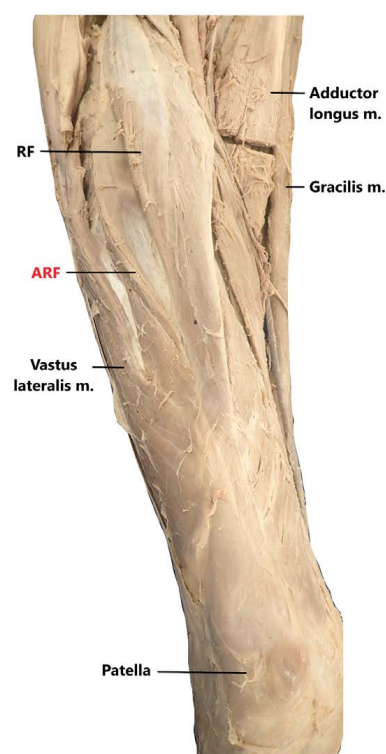
Supernumerary and non-canonical muscle components are commonly encountered in the study of human anatomy but are often underleveraged at the level of clinical application. Many variable or atypical muscle morphologies have risen to the level of clinical consideration. Accessory muscular components of the forearm may interrupt normal contractile activity, resulting in pain [1]. An additional muscle in the lateral compartment of the leg, peroneus quartus, may contribute to swelling and dysfunction at the ankle joint [2]. Pain derived from an extensor digitorum brevis or “le muscle manieux” may be mistaken for a ganglion cyst on the dorsum of the hand [3]. Symptoms arising from these variations are frequently misdiagnosed, which can result in undue pain and superfluous healthcare costs for patients. Knowledge of the potential for variability can also inform other areas in the clinical arena, notably muscular flaps, employed as either local pedicle flaps or free muscle transfers. Utilizing musculature in this way has proven useful in managing amputations, chronic ulceration, and prior graft infections [4-6]. Effectively describing and cataloging natural anatomical variation serves to strengthen clinician awareness and may contribute to alternative treatment options during clinical planning.

## CASE REPORT

During a routine dissection of a 103-year-old white male formalin-fixed whole-body donor, an additional (third) rectus femoris muscle belly was found fusing distally with the vastus lateralis muscle (Figures 1 and 2). In situ, the additional muscle belly was notably situated between the vastus lateralis muscle and rectus femoris muscle, with most of the mass situated directly proximal to the origin of the patellar tendon. The accessory belly was found to share an origin with the rectus femoris muscle, immediately arising from the anterior inferior iliac spine. The proximal portion of the accessory muscle belly was broad, flat, and tendinous, although the muscle’s width and cross-sectional area increased significantly as it blended with the vastus lateralis muscle (Figure 3). The muscle’s trajectory and relationships were carefully dissected until completely revealed.

## DISCUSSION

Traditionally, the rectus femoris muscle is described as a bipennate fusiform muscle with two heads, a thick round head arising from the anterior inferior iliac spine and a flat broad head arising from a groove superior to the acetabulum [7]. A review of the literature uncovered several descriptions of the variability discovered in the rectus femoris muscle. Tubbs et al. found the rectus femoris muscle to have a third head in 80 of 96 lower extremities (83%); however, this finding on average was limited to a small 2-4 cm head attached



**Figure 1)** Anterior view of right thigh. RF- rectus femoris muscle, ARF- accessory rectus femoris muscle belly.

to the iliofemoral ligament and tendon of gluteus minimus muscle [8]. One report describes two unilaterally foreshortened rectus femoris muscles, prematurely narrowing to a thin tendon before joining the confluence of the patellar tendon [9]. Another case report identified a bilateral accessory head emerging from the intertrochanteric line before blending with the rectus femoris muscle in the distal thigh [10]. In a study of 10 cadaveric specimens, Becker et al. reported that 50% had fascicles of the vastus lateralis muscle inserting into the distal rectus femoris tendon, a morphology also described by Macalister in 1875 [11,12]. Similarly, in a Japanese sample of 50 lower extremities (25 male cadavers), Mori found that the “terminal” rectus femoris tendon was fused with the vastus lateralis muscle in 8% of cases and with the

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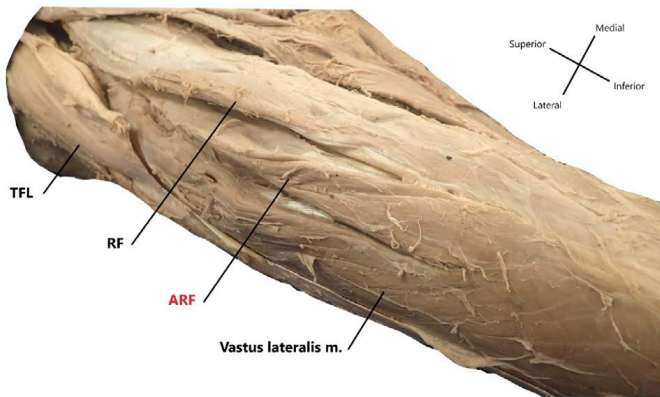
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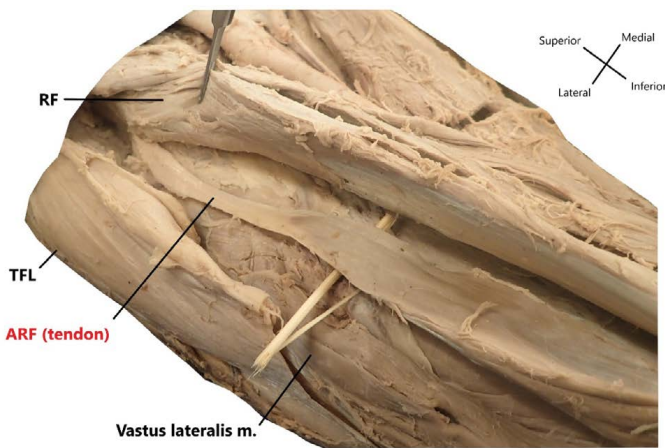
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**Figure 2)** Anterolateral view of right thigh. RF- rectus femoris muscle, ARF- accessory rectus femoris muscle belly, TFL- tensor fasciae latae muscle.



**Figure 3)** Anterolateral view of proximal right thigh. RF- rectus femoris muscle (retracted), ARF- accessory rectus femoris muscle, TFL- tensor fasciae latae muscle.

fascia of rectus femoris in 12% of cases [13]. Gruber described a rare slip arising from the periphery of the acetabulum and blending with the vastus lateralis muscle [14].

Results of the literature review demonstrated wide variability in rectus femoris muscle morphology, particularly compared to other muscle groups/compartments. Unanticipated rectus femoris muscle morphology may negatively affect clinical interventions, particularly in cases where muscular flaps may be utilized. Also, significant asymmetrical muscular contributions to the quadriceps femoris group's tendon may result in patellar instability, interfering with recovery following total knee arthroplasties [15]. Future directions for this research should include larger, more inclusive prevalence studies to establish expectations for variability in form, including inter-demographic differences. Additionally, studies investigating variability detectable in medical imaging may encourage clinical integration. Bringing sufficient awareness to anomalous muscular forms may empower clinicians with the ability to better plan procedures, resulting in improved patient outcomes.

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