

## ABSENCE OF DEEP FEMORAL ARTERY: A CASE REPORT

### AUSÊNCIA DE ARTÉRIA FEMORAL PROFUNDA: RELATO DE CASO

### AUSENCIA DE ARTERIA FEMORAL PROFUNDA: REPORTE DE UN CASO



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**Danielle Saiene Alencar Furtado<sup>1</sup>, Bruna Renata de Oliveira Carvalho<sup>2</sup>, Fábio Moniz de Rezende<sup>3</sup>**

#### ABSTRACT

Anatomical variations of the deep femoral artery are widely studied and of great interest to anatomists, surgeons, and interventional radiologists due to their significant clinical relevance. It plays an essential role in the blood supply to the adductor, flexor, and extensor muscles of the thigh, as well as the hip joint and femur, and is also crucial for collateral blood flow between the lower pelvis and the infrapopliteal circulation. Our objective was to report a case of absent deep femoral artery. In our study, anatomical variations were observed in the arteries of the femoral segment, in which the femoral circumflex arteries originated directly from the femoral artery, and the absence of the deep femoral artery was also evidenced, with this variation being classified as type 3. In conclusion, the location and point of origin of the deep femoral artery from the femoral artery are highly variable in the general population. Although several studies indicate that the most common origin is in the posterior region of the thigh, in the proximal third, it is likely that posterior, posterolateral and lateral origins occur with similar prevalence.

**Keywords:** Femoral Artery. Deep Femoral Artery. Anatomy.

#### RESUMO

Variações anatômicas da artéria femoral profunda são amplamente estudadas e de grande interesse para anatomistas, cirurgiões e radiologistas intervencionistas devido à sua significativa relevância clínica. Ela desempenha um papel essencial no suprimento sanguíneo para os músculos adutores, flexores e extensores da coxa, bem como para a articulação do quadril e fêmur, e também é crucial para o fluxo sanguíneo colateral entre a pelve inferior e a circulação infrapoplíteia. Nosso objetivo foi relatar um caso de artéria femoral profunda ausente. Em nosso estudo, foram observadas variações anatômicas nas artérias do segmento femoral, nas quais as artérias circunflexas femorais se originavam diretamente da artéria femoral, e a ausência da artéria femoral profunda também foi evidenciada, sendo essa variação classificada como tipo 3. Em conclusão, a localização e o ponto de origem da artéria femoral profunda a partir da artéria femoral são altamente variáveis na população em geral. Embora vários estudos indiquem que a origem mais comum seja na região posterior da coxa, no terço proximal, é provável que origens posterior, posterolateral e lateral ocorram com prevalência semelhante.

<sup>1</sup> Undergraduate in Medicine. Faculdade Santa Teresa.

<sup>2</sup> Undergraduate in Medicine. Faculdade Santa Teresa.

<sup>3</sup> Doctor. Universidade do Estado do Rio de Janeiro (UERJ).

**Palavras-chave:** Artéria Femoral. Artéria Femoral Profunda. Anatomia.

## RESUMEN

Las variaciones anatómicas de la arteria femoral profunda son ampliamente estudiadas y de gran interés para anatomistas, cirujanos y radiólogos intervencionistas debido a su significativa relevancia clínica. Desempeña un papel esencial en el suministro de sangre a los músculos aductores, flexores y extensores del muslo, así como a la articulación de la cadera y el fémur, y también es crucial para el flujo sanguíneo colateral entre la pelvis inferior y la circulación infrapoplítea. Nuestro objetivo fue reportar un caso de arteria femoral profunda ausente. En nuestro estudio, se observaron variaciones anatómicas en las arterias del segmento femoral, en el que las arterias circunflejas femorales se originaron directamente de la arteria femoral, y también se evidenció la ausencia de la arteria femoral profunda, clasificándose esta variación como tipo 3. En conclusión, la ubicación y el punto de origen de la arteria femoral profunda de la arteria femoral son altamente variables en la población general. Aunque varios estudios indican que el origen más común está en la región posterior del muslo, en el tercio proximal, es probable que los orígenes posterior, posterolateral y lateral se presenten con prevalencia similar.

**Palabras clave:** Arteria Femoral. Arteria Femoral Profunda. Anatomía.

## 1 INTRODUCTION

Anatomical variations of the deep femoral artery (DFA) are widely studied and of great interest to anatomists, surgeons, and interventional radiologists due to their significant clinical relevance (MANJAPPA et al., 2014). The DFA, the largest branch of the lateral or posterior portion of the femoral artery (FA), originates in the femoral triangle, usually 3–6 cm below the inguinal ligament (TZOUMA, 2020). It plays an essential role in the blood supply to the adductor, flexor, and extensor muscles of the thigh, as well as the hip joint and femur, and is also crucial for collateral blood flow between the lower pelvis and the infrapopliteal circulation. The main branches of the DFA include the lateral circumflex femoral artery (LCFA) and the medial circumflex femoral artery (MCFA) on its medial wall. The complexity of the vascular anatomy of these vessels is extremely important, given their role in various surgical, orthopedic, plastic and reconstructive interventions (CHOY, 2013).

It is well documented in the literature that the deep femoral artery gives off important branches, such as the femoral circumflex arteries. The primary artery supplying the hip joint is the medial femoral circumflex artery (MFCA), while the lateral femoral circumflex artery (LCCA) supplies blood to the soft tissues surrounding the joint. These two vessels are the first branches of the deep femoral artery or may originate directly from the femoral artery. In addition, two other vessels may contribute to the blood supply to the femoral head: the piriform branch of the inferior gluteal artery and the obturator artery via the foveal artery. The obturator artery has several anatomical variations, the most common being known as the corona mortis, which has been the subject of detailed studies, although the scientific literature lacks descriptions of the corona mortis in the context of hip vascularization (ZLOTOROWICZ, 2012; GROSE, 2008).

Identifying the lateral origin of the lateral circumflex femoral artery is crucial for locating the divisions of the femoral nerve. This arterial trunk runs between the anterior and posterior divisions of the femoral nerve, before branching ascending, transversely, and descending. These branches contribute significantly to anastomoses around the femoral neck and greater trochanter. Conversely, the medial circumflex femoral artery emerges medially from the deep femoral artery, following a path between the pectineus muscle and the adductor longus until it approaches the femoral neck. This artery plays a crucial role in irrigating the femoral head and neck, dividing into transverse, ascending, and acetabular branches that participate in cruciate and trochanteric anastomoses. There are four perforating arteries in total, the latter being a direct continuation of the deep femoral artery. These arteries perforate the adductor

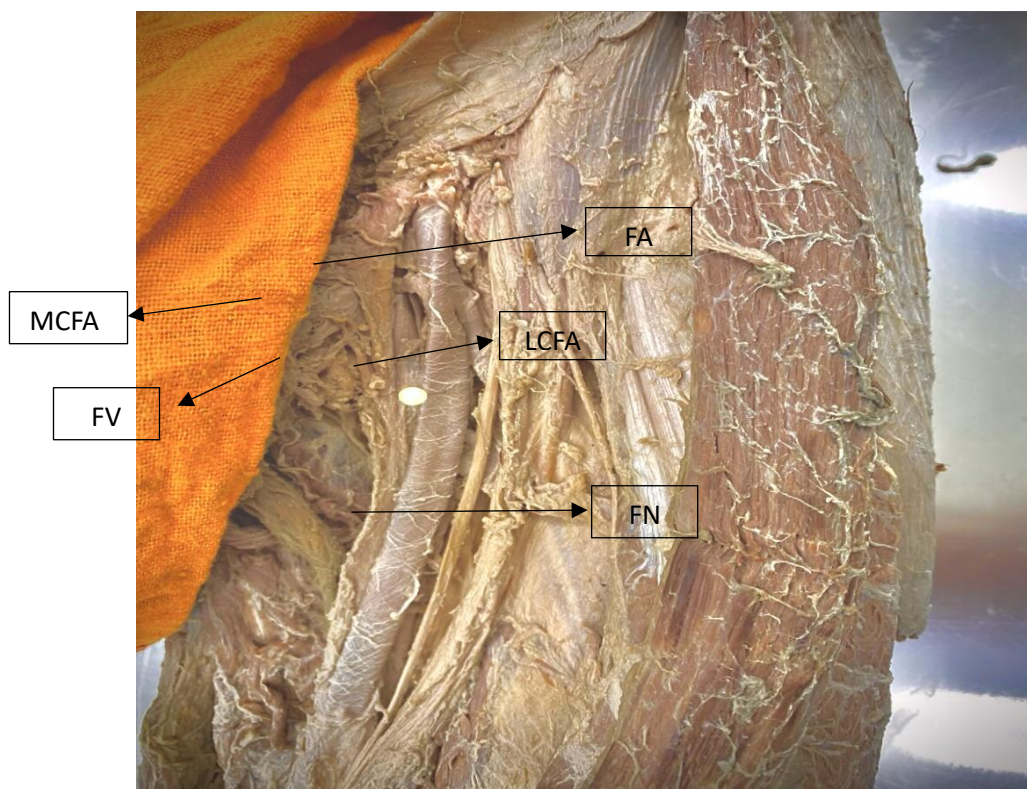
magnus muscle and the lateral intermuscular septum, supplying blood to the hamstring muscles. They end in the lateral vessel muscle, where they connect to each other through a series of anastomoses.

## 2 CASE REPORT

During a routine dissection of the left femoral segment of a cadaver belonging to the Human Anatomy Laboratory, the absence of the deep femoral artery was observed. The dissection began with an incision and reflection of the skin. In the next step, the fascia lata was incised, exposing the femoral trigone as described by Tillmann and Schünke (1993). The femoral artery and its branches were exposed. During this procedure, the medial and lateral circumflex femoral arteries (MCFA, LCFA) were observed emerging directly from the femoral artery.

**Figure 1**

*Left femoral artery and circumflex arteries of the femur*



Legend: FA: left femoral artery; LCA: lateral circumflex femoral artery; MCA: medial circumflex femoral artery; FN: Femoral nerve; FV: Femoral vein; MCFA: Medial Femoral Circumflex Artery.  
Source: Anatomy Laboratory.

### 3 DISCUSSION

The anatomical variations found in the division of the femoral artery can be explained by evolution and ontogeny. In lower animals, the deep femoral artery is a branch of the internal iliac artery. Over the course of evolution, its origin shifts distally, becoming a direct branch of the femoral artery. This phenomenon, known as ontogeny repeating phylogeny, can result in different stages of development and, consequently, anatomical variations related to the division of the femoral artery.

Because the deep femoral artery is commonly involved in vascular reconstruction procedures in the thigh region, familiarity with its various branches is advantageous. Furthermore, plastic surgeons consider the branches of the deep femoral artery (PFA) when planning procedures using myocutaneous flaps. Similarly, knowledge of variations in the deep femoral artery (PFA) is essential in the preoperative clinical assessment for surgical revascularization of the iliofemoral and femoropopliteal segments (Manjappa and Prasanna, 2014).

Bergman et al. (1988) note that several vessels of the deep femoral complex may separate to varying degrees, with some originating independently of the femoral artery; this separation may be so pronounced that a definitive deep femoral vessel may be absent. Varied patterns of origin of the deep femoral artery and its branches have been documented, based both on racial differences and on variations between the lower limbs of the same individual.

In the study by Vázquez et al., (2007) 221 embalmed cadavers were analyzed. Their research generated a new classification of the arterial pattern of the femoral compartment, as follows: Type 1: Both circumflex arteries arise from the deep femoral artery; Type 1a: The origin of the medial femoral circumflex artery is more proximal than the lateral femoral circumflex artery; Type 1b: The origin of the lateral femoral circumflex artery is proximal to the medial femoral circumflex artery; Type 1c: Both arteries arise from a common trunk; Type 2: One of the arteries arises from the femoral artery and the other from the deep femoral artery; Type 2a: The medial femoral circumflex artery arises from the femoral artery; Type 2b: The lateral femoral circumflex artery arises from the femoral artery; Type 3: Both arteries arise from the femoral artery.

In our study, anatomical variations were observed in the arteries of the femoral segment, in which the femoral circumflex arteries originated directly from the femoral artery, as well as the absence of the deep femoral artery, this variation being classified as type 3



(VÁZQUEZ et al., 2007). Otag et al., (2012) evaluated 1,036 angiographic films, and their research found the absence of the deep femoral artery in four cases (0.4%). CLAASSEN (2021) analyzed 111 thighs and detected that the femoral circumflex arteries arose mainly from the deep femoral artery (74.7%), however, the deep femoral artery was absent in 3.6%.

We observed an association between the direct origins of the lateral and medial circumflex femoral arteries and the distal deviation of the deep femoral artery division. This suggests that the origin of these arteries influences the anatomy of the deep femoral artery, indicating a correlation between branching patterns and the development of vascular anatomy.

The deep femoral artery plays a crucial role as a collateral vessel in the event of femoral artery occlusion, being essential for alternative circulation. Therefore, it is essential that it have adequate caliber, which can be determined based on the comparative anatomy discussed above.

#### **4 CONCLUSION**

In summary, the location and origin of the profunda femoris artery from the femoral artery are highly variable in the general population. Although several studies indicate that the most common origin is in the posterior region of the thigh, in the proximal third, posterior, posterolateral, and lateral origins likely occur with similar prevalence. However, due to the considerable variation in location and origin, a precise anatomical understanding of the profunda femoris artery is essential for physicians performing procedures in the femoral region.

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