

CASE STUDY

# A Variation in Origin of Profunda Femoris Artery: A Case Report

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## ABSTRACT

**Introduction-** During regular dissection at Anatomy Dissection Hall, a variation came across in the origin of Profunda Femoris artery in a formalin fixed male cadaver. The Profunda Femoris artery being the largest branch of the Femoral Artery and it is the main supplier artery of all the three compartments of the thigh. Usual origination of the Profunda Femoris artery is from the posterior or posterolateral aspect of Femoral artery. Anatomical knowledge of the variations of femoral artery and its branches is very important to reduce complication chances while performing clinical procedures related to the femoral area and replacement surgeries meant for hip joint.

**Methods-** Regular dissection at Anatomy Dissection Hall.

**Result & Conclusion-** In this present case while dissecting anterior aspect of thigh of the left lower limb, we came across one of the rarest type of variation ever documented with regards to the origin of large Profunda Femoris Artery from the medial aspect of parental Femoral Artery. The anterior aspect of thigh of the right lower limb does not show any anatomical variation. This particular anatomical variation is useful for clinical perspective as the Profunda Femoris is one of the most preferred choice for surgeons in field of surgeries associated with reconstruction of vessels. So, its origin and most possible variations that we came across are of great relevance and importance.

**Key Words** Anatomical variation, Femoral artery, Profunda Femoris artery, Reconstruction, Surgery

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## INTRODUCTION

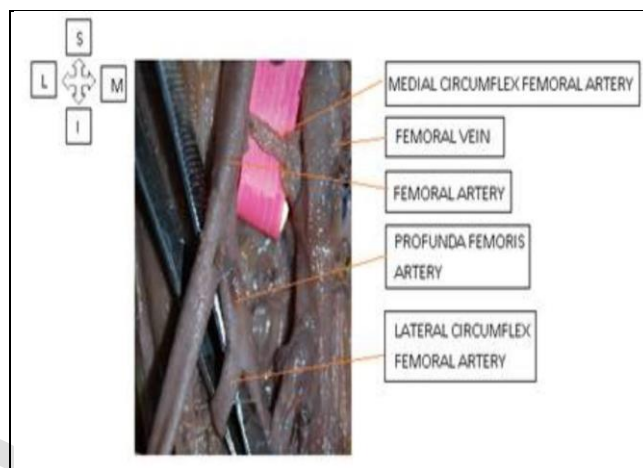
It is clinically very important for the Anatomists and Surgeons to know various patterns of Femoral Artery and its branches. The Femoral Artery is considered to be one of the main artery of prime importance of the lower limb which emerges as the continuation of External Iliac Artery which positionally lies distal to the

inguinal ligament<sup>1</sup>. The chief supplier to all three compartments of thigh is Profunda Femoris Artery which is also enumerated by the title of deep artery of the thigh and is known to be the largest branch of the Femoral Artery. In the femoral triangle it usually arises from the lateral side of the Femoral Artery (Figure 1). From lateral aspect of Femoral Artery in an area about

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4-5 cm distal to mid Inguinal point this artery takes its origin<sup>2</sup>. The origin of Profunda Femoris artery is considered to be from the anterior aspect of Iliacus muscle. In its further course when the artery proceeds downwards, it passes from the posterior aspect of the Femoral vessels and by crossing across the Femoral triangle it relates to the Adductor longus muscle belly by passing deep to it. Thereafter, it shows two different course, first by passing between the Adductor longus and Adductor brevis, and second course by passing between Adductor longus and Adductor magnus. Its terminal end pierces the Adductor magnus muscle and make a way across the muscle to anastomose with upper muscular branches of the Popliteal Artery. The branching pattern of Profunda Femoris Artery shows its medial and lateral branches termed as medial and lateral Circumflex Femoral Arteries and three perforating arteries are also in its branching pattern. Just before its termination it merges with the fourth perforating artery. The posterior aspect of Femur is enclosed like an envelope by these 3-4 perforating branches of profunda femoris artery.<sup>[3]</sup> The perforating arteries are main suppliers of muscles of all the three fascial compartments (Adductor magnus, Hamstring, Vastus lateralis). The knowledge of originating site of Profunda Femoris Artery is very important as it is useful for many invasive and non-invasive procedures like Doppler, Ultrasonography and MR angiography. In today's era during breast reconstruction, the branches of Profunda femoris artery are used in reconstructing the anterolateral

perforator thigh flap in the form of long stalk called pedicle which has its vascular supply.<sup>[4]</sup> The emerging scope of interventional and defining radiology has prompted me to study in detail the variation in originating site of Profunda Femoris Artery.



**Figure 1** Normal origin of Profunda Femoris Artery  
**Action of Profunda Femoris Artery-**

The Adductor, Extensor and Flexor muscles mainly receive their vascular nutrition from profunda femoris artery. In patients with femoropopliteal arterial occlusive diseases, it acts as a major collateral artery of the lower limb<sup>5</sup>.

### Known Variation –

The variations that are documented shows that the Profunda Femoris Artery unusually arises from posterior aspect of Femoral Artery and sometimes posterolateral aspect of Femoral Artery seems to be its originating site.<sup>[6]</sup> In a study on 33 embalmed cadavers considering variation in both lower limbs the Profunda femoris artery was concluded to be originating from medial side of femoral artery in overall ratio of 3.03% and it courses superficial to femoral vein<sup>7</sup>.

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### MATERIALS AND METHODS

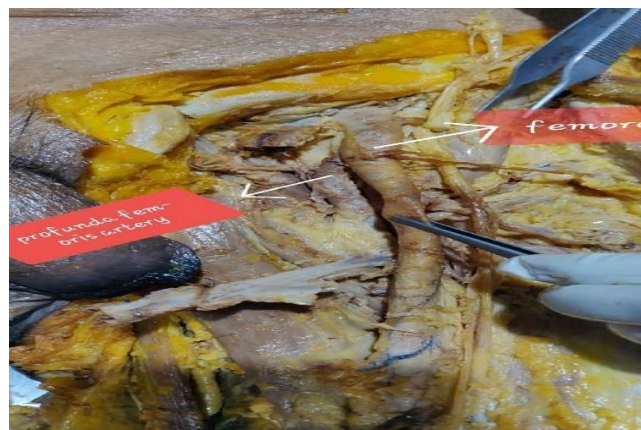
During routine dissection of the left lower limb of a formalin fixed male cadaver, we came across a marked variation in the originating site of Profunda Femoris Artery.

### CASE REPORT

An anatomical variation in the origin of Profunda Femoris Artery from its parental artery was observed during the dissection of a formalin fixed male cadaver in dissection hall of Anatomy Department. While dissecting the anterior aspect of thigh of the left lower limb, the skin was incised and reflected which was then followed by superficial fascia. The superior inguinal lymph nodes along with superior vessels were then identified and marked. Then incision on Fascia lata was given to make easy exposure and approach to Femoral triangle. The Inguinal canal, Adductor longus and Sartorius were identified. Then we split the Femoral sheath to expose out its contents namely Femoral Artery and Femoral canal<sup>8</sup>. At the base of femoral triangle the femoral vein, femoral artery and femoral nerve were at their usual positions from medial to lateral.

Then we identify the root of the originating site of large Profunda Femoris Artery in the middle of the femoral triangle approximately located in vicinity of 4-5 cm below mid inguinal point, which surprisingly arises from the medial aspect of Femoral Artery. It is one of the type of a very rare variation that has been acknowledged and

documented. No muscular variation was noticed in that area. The other limb was unremarkable. The anatomical relations of Profunda Femoris Artery at its originating site with respect to Femoral Artery was seen and this rare variation was then photographed. (Figure:2)



**Figure 2** Variation in origin of Profunda Femoris Artery

### DISCUSSION

In lower animals, the Profunda Femoris was supposed to be a branch of Internal Iliac Artery. But due to ongoing process of evolution, it becomes branch of Femoral Artery in human beings. This variation might be due to developmental arrest at different stages of evolution<sup>9</sup>. Embryologically two processes helps in formation of blood vessels viz. Vasculogenesis and Angiogenesis. These processes are aided by several factors. VEGF (vascular endothelial growth factor) regulates both the process until adult circulation gets established. So, any alteration or disturbance in this process may lead to variation possibility in vessels.

The Profunda Femoris artery shows a usual pattern of origination which is also the most common pattern and that is from the lateral

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aspect of Femoral Artery. The percentage of cases of its origin in different sex has shown great variation in different comparable studies related to profunda femoris artery. To mark this particular variation, we had gone through another study planned on both lower limbs and both sex, regarding its origination which concludes that in males in almost 42% cases the profunda femoris artery originates from the posterolateral aspect of the femoral artery, in 24% cases it takes its origin from posterior aspect of femoral artery, in 20% cases the originating site is lateral side and 14% of cases shows origin from posteromedial aspect. This when compared with variation data found in opposite sex i.e., in females the drawn conclusion was that in almost 42.5% cases it took its origin from posterolateral aspect, in 27.5% cases the originating site was found to be the posterior aspect of femoral artery. The lateral side origination in females seems to be almost equal to that of males i.e., 20% and in 7.5% cases it originated from posteromedial aspect of femoral artery<sup>10</sup>.

In another comparative study of this sort, Profunda Femoris Artery is found to be commonly positioned in posterolateral aspect of its parental artery i.e., Femoral Artery in almost 66% cases and posterior to Femoral Artery in 22% of lower limb<sup>11</sup>.

Another study on 10 cadavers has concluded with the result that overall, 49.2% of cadavers when examined, they showed posterolateral origin of Profunda femoris artery on right sided limb and in 67.2% of cases variation was found on left

sided lower limb. Another important observation in this study is Profunda femoris artery has shown lateral origination in 33.9% cases on the right sided and 23.7% on the left sided lower limb, but the least percentage of cadaveric studies shows it to be of posteromedial origin. The other parameters closely related to this structural vicinity shows no remarkable variations of any sort ( $P \geq 0.05$ )<sup>12</sup>.

Another dissection-based study concluded that the most common site of origin of Profunda femoris artery is posterolateral aspect of Femoral Artery. In this study the conclusion drawn by analysing the data shows that in 53.03% cases the Profunda femoris artery originated from posterolateral aspect of Femoral Artery.<sup>[7]</sup> But posterolateral and lateral side origin has been considered as the most common pattern for the origin of Profunda femoris Artery. It was found that in almost 71.21% of cases dissected, the Profunda femoris artery had taken its origination from Posterolateral and Lateral aspect of Femoral Artery. The prevalence ratio of Lateral side origination is more marked than that of posterolateral aspect origination<sup>13</sup>. These findings related to Profunda femoris artery origination from different aspects of femoral artery in different sex and in both right and left lower limbs are providing comparable data to our case report.

But in this present case, we found that Profunda Femoris Artery is emerging from medial aspect of Femoral Artery which is one of its kind of

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rarest variation found in this context and it definitely needs documentation.

## CONCLUSION

The knowledge of site and aspect of origin of Profunda Femoris in relation to its parental artery i.e., Femoral Artery is useful while performing the puncturing of Femoral Artery in Iatrogenic femoral fistula cases thereby avoiding the arterio-venous complications.

Its knowledge is useful while treating various complicated conditions like Pseudoaneurysm, Embolism, Thrombosis, Atherosclerosis which are common in lower limb vessels. Surgeons use it in many operations like the anterolateral flap of thigh and many reconstructive and plastic surgeries.

The vessels injury may cause intraoperative and post-operative bleeding. This variation will be a boon for the surgeries that are planned in Femoral triangle. Moreover, the Profunda Femoris is one of the most preferred choice for surgeons in field of reconstructive surgeries. So, its origin and most possible variations that we came across are of great relevance and importance.



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