



High Origin Of Profunda Femoris Artery And Variant Branching Pattern Of Femoral Artery

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Abstract

Femoral artery, the artery of femoral region enters the femoral triangle behind the inguinal ligament at mid inguinal point. It gives out six branches in femoral triangle of which three superficial branches are superficial epigastric artery, superficial circumflex iliac artery along with superficial external pudendal artery and the three deep branches are deep external pudendal artery, muscular branches along with profunda femoris artery.

During routine dissection of femoral triangle, it was observed that the profunda femoris artery was arising high up from femoral artery almost at the level of mid inguinal point. The femoral sheath that encloses femoral artery and vein was very short and some of the branches which were supposed to emerge from femoral artery were seen emerging from profunda femoris artery. This was seen unilaterally in the left lower limb.

Procedures like arteriography, vascular reconstruction of proximal leg necessitates precise anatomy of profunda femoris artery along with the femoral artery. The knowledge of site of profunda femoris artery origin is important as it helps in avoiding iatrogenic femoral arterio-venous fistula while performing femoral artery puncture, and enables to identify the correct site of making incision for surgical exposure.

The direction of the origin of profunda femoris artery is important in catheter application, making flaps with pedicles, reconstruction surgeries and bypass procedures made to supply the lower extremities.

Key words: Femoral artery, Profunda femoris artery (PFA), variation, branching pattern

Introduction

Profunda femoris artery and its variations are the topic of interest for surgeons and anatomists.¹ PFA is an important artery of anterior aspect of thigh. PFA is the branch of femoral artery which usually arises from lateral aspect of femoral artery, about 3.5 cm distal to inguinal ligament. It gives off lateral and medial circumflex femoral arteries.² Variations related to femoral artery can be seen in terms of point of origin, course and branches. These variations have received attention of surgeons, radiologists, cardiologists and anatomists with respect to surgical interventions.³

The profunda femoral artery plays a major role in collateral blood flow in the atherosclerotic occlusive disease through collateral pathways in the lower pelvis, starting from the internal iliac arteries more so, if aorto-iliac lesions are associated with femoro-popliteal lesions.⁴ Here, profunda femoris artery represents a “bridge” between the lower pelvis circulation and the infra-popliteal circulation, through collateral pathways such as genicular arteries.⁵

Materials and Methods:

The present variation was observed in a female cadaver aged 86 years donated to department of Rachana Shareera, SDM College of Ayurveda and Hospital, Hassan.

Femoral triangle and its contents were dissected and the profunda femoris artery was exposed. Dissection of femoral triangle was done by reflecting the skin, superficial fascia and deep fascia. After separating the superficial structures, the femoral artery and profunda femoris arteries were exposed by opening the femoral sheath. The following observations were made after dissecting and exposing the artery under the following parameters. A) Origin of the profunda femoris artery. B) Distance from midpoint of inguinal ligament in cm. C) Origin of circumflex femoral arteries D) the variations regarding level and site of origin of the branches of femoral artery were noted.

Case Study:

During routine dissection of the lower limb of a female cadaver aged about 86 years, in the Department of Rachana Shareera, SDM college of Ayurveda, while dissecting femoral triangle, variation related to the femoral artery and its branches were unilaterally observed in the left limb. While the femoral triangle was exposed, it was observed that the branching of femoral artery was just below the inguinal ligament at the mid inguinal point (fig 1). Just above the continuation of femoral artery from external iliac artery, 2 branches of external iliac artery, one to the left and other to the right were seen.

The left branch was slightly above the superficial circumflex iliac artery and it was identified as deep circumflex iliac artery passing towards the anterior superior iliac spine (fig 2). The right branch emerging exactly opposite to deep circumflex iliac artery was identified as inferior epigastric artery (fig 3). After passing below the inguinal ligament, the femoral artery was only 1cm in length and suddenly there was high origin of profunda femoris artery (fig 4). The femoral artery which was seen as continuation of external iliac artery was very short, about 0.6cm in length and was immediately giving a large branch laterally, which was identified as profunda femoris artery.

This part of femoral artery was covered by femoral sheath. Branches of femoral artery namely the superficial epigastric artery and superficial external pudendal artery were not found emerging directly from the femoral artery before it gave PFA. The profunda femoris artery arising from femoral artery at a distance of 0.7cm from the inguinal ligament immediately gave rise to a common trunk (fig 5) which further divided into medial and lateral branches. The medial branch (fig 6) was seen passing towards the pudendum and was dividing into two branches namely the superficial and deep external pudendal artery.

The lateral branch was passing forwards and laterally towards the neck of femur for formation of trochanteric anastomosis and was identified as lateral circumflex femoral artery (LCFA) (fig 8). Profunda femoris passing downwards gave a small branch which was passing medially and identified as medial circumflex femoral artery (MCFA) (fig 7).

The profunda femoris continued downwards giving rise to perforating branches and terminated as the fourth perforating branch. The missing branch namely superficial epigastric artery was not seen emerging either from femoral artery or from PFA.

The dissection of anterior abdominal wall with exposing the branches of inferior epigastric artery might have involved in exposure of cutaneous innervation to the area of distribution of superficial epigastric artery.

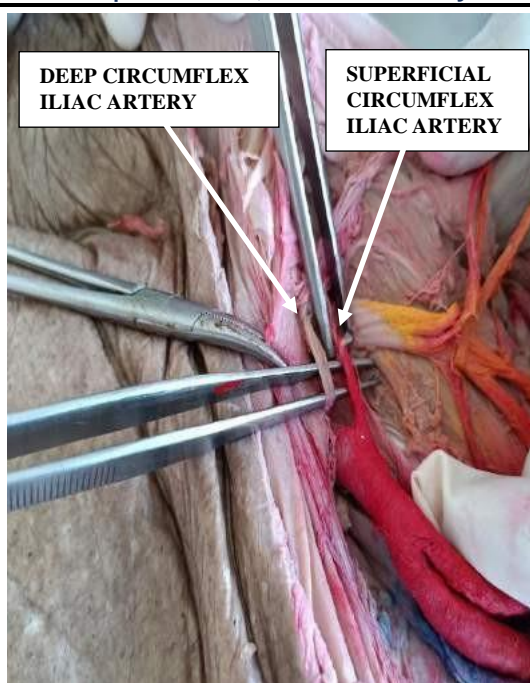


Fig. 1: High origin of profunda femoris artery almost at mid and superficial external iliac artery (branch of femoral artery) arising from external iliac artery and passing laterally

Fig 2: Deep circumflex iliac artery (branch of external iliac inguinal point artery)

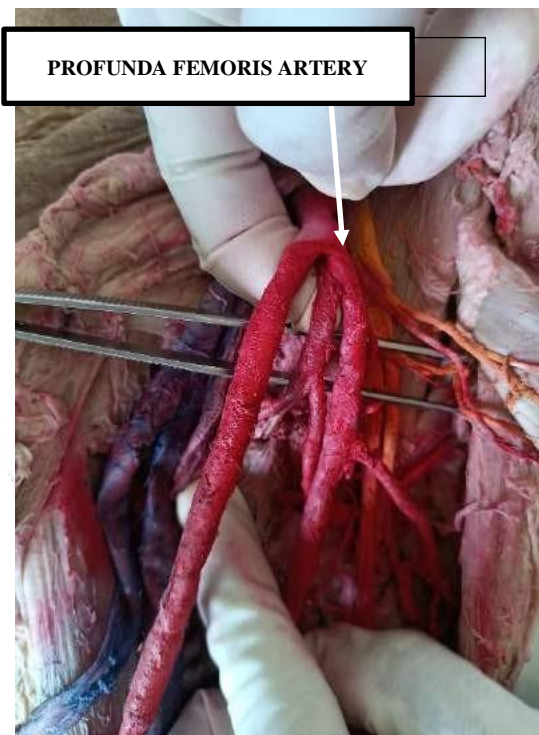
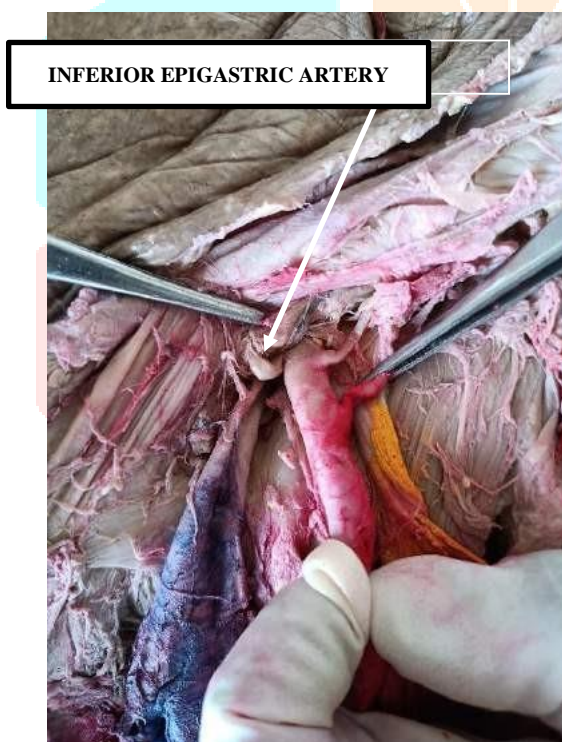


Fig 3: Inferior epigastric artery (branch of external iliac medially opposite to deep circumflex iliac artery)

Fig 4: High origin of profunda femoris artery from femoral artery (emerging from femoral artery)

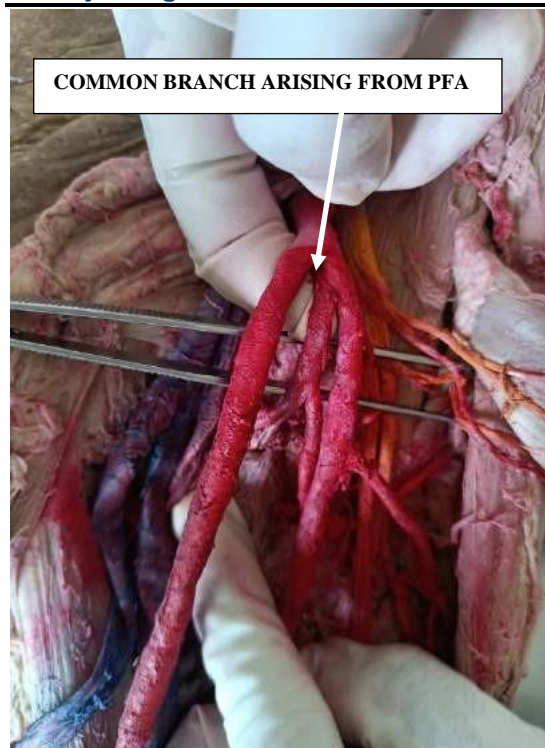


Fig 5: Common branch of PFA diving into medial common lateral lateral circumflex femoral artery



Fig 6: Common pudendal artery diving into superficial and deep pudendal artery and branches pudendal arteries



Fig 7: Medial circumflex femoral artery (branch of PFA) branch from PFA

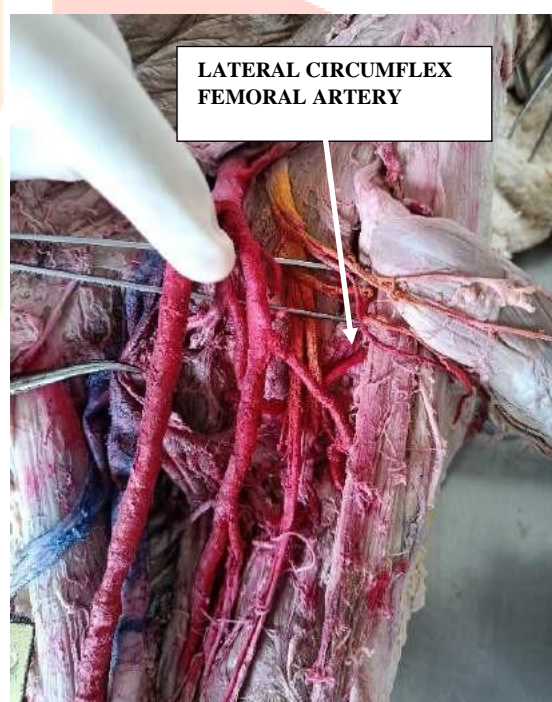


Fig 8: Lateral circumflex femoral artery emerging from common

Discussion:

The femoral artery is easily accessible to catheterization. The profunda femoris artery is useful for ultrasound, arteriography, digital subtraction angiography, Doppler imaging and magnetic resonance imaging. In recent times, PFA is being used for hemodialysis and its branches are used during breast reconstruction after mastectomy in cases of carcinoma of breast and in anterolateral perforator thigh flap as long vascular pedicle.⁶ In Superficial femoral artery occlusion, the profunda femoris artery acts as an effective collateral bed between the ileo-femoral segment and the popliteal artery along with its branches.

Femoral artery rarely divides distal to origin of PFA into two trunks reuniting near the adductor opening. PFA in its origin is sometimes medial or rarely posterior to the femoral artery.⁷

According to a study conducted by Muhammad N Mengal et al, the frequency of normal/low, high, and very high femoral bifurcations was 66%, 26%, and 8%, respectively.⁸

Table 1 below, shows the average distance of origin of PFA from femoral artery, measured from mid inguinal point as recorded and published by one of the authors.⁹

Table-1 shows average distance of origin of PFA from midpoint of inguinal ligament

Name of the Author	Average Distance
Snell R.S. [5]	4 cm
Grays [1]	3.5 cm
Vuksanovic B.A. [6]	3.75 cm
Prakash [7]	4.2 cm
Marina [4]	3.2-4.1cm
Samarawickrama [3]	5 cm
Dixit [8]	47.5 cm
Bannister [9]	3.5 cm
Siddharth [10]	4.4 cm
William P. [11]	5.31 cm

In the present study, we found that PFA was having a high origin (fig 1) almost at the mid inguinal point from the femoral trunk and the branches of femoral artery namely superficial and deep external pudendal artery were originating from a common trunk branching out from PFA. MCFA was seen originating directly from PFA whereas LCFA was a branch emerging out from the common trunk.

High origin of profunda femoris artery is an advantage for catheterization and further investigation of any arterial system of the body.

Conclusion: An understanding of normal anatomical variation is vital for performing a broadrange of surgical treatment modalities and medical procedures. But, despite their importance for effective diagnosis and treatment, they are overlooked in medical curriculum and clinical practice. They represent a variant of normal presentation and as such usually do not require therapeutic activities. They may present as diagnostic dilemma or become symptomatic under certain conditions. Variation in the branching pattern or position and course of blood vessels as seen in the present study, can affect routine clinical procedures such as blood pressure monitoring, intra venous drug application. They may provide grafting material for bypass surgeries but may as well create difficulties and necessitates changes in the selected surgical techniques during complex interventions like catheterization of cardiac cavities, flap surgeries or amputations.

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