

# Variation of lateral circumflex femoral artery and its possible clinical and diagnostic implications

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During dissection of right femoral triangle of 75 year old male cadaver fixed in 10% formaline in department of anatomy, abnormal configuration of lateral circumflex femoral artery coupled with variant branching pattern of femoral and profunda femoris arteries were observed. Two lateral circumflex femoral arteries- one from the common stump with profunda femoris artery at a distance of 4.5 cm from inguinal ligament and another from femoral artery directly at a distance of 3.5 cm from the common stump was observed.

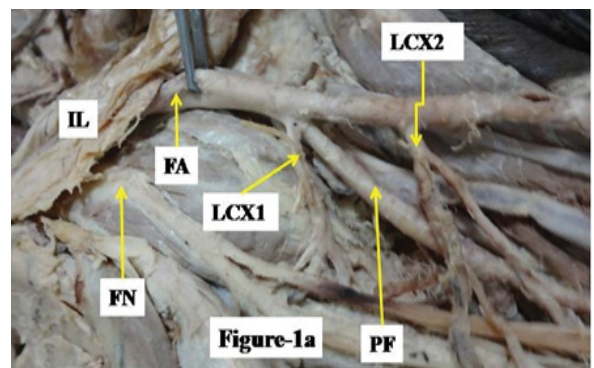
In addition to this, medial circumflex femoral artery arose directly from femoral artery at a distance of 3.5cm from inguinal ligament. There was no other abnormality in the branching pattern of either femoral artery or profunda femoris artery. Besides the use of femoral, profunda femoris and their branches in various diagnostic and therapeutic procedures by surgeons and radiologists, these rare and common variations may also create iatrogenic complications.

**Key words:** Femoral artery; Femoral triangle; Variation; Lateral circumflex femoral artery; Medial circumflex femoral artery

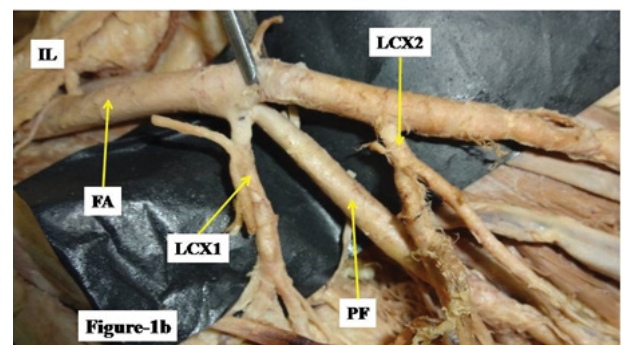
The profunda femoris artery (PF) arises from the lateral aspect of the femoral artery (FA) in the femoral triangle approximately 3.5 cm distal to the inguinal ligament. This is the main artery which supplies the adductor, extensor and flexor muscles of the thigh. Profunda femoris artery gives medial and lateral circumflex femoral arteries and four perforating arteries (1). Peripheral angiograms are used to evaluate peripheral occlusive arterial diseases, suspected congenital vascular anomalies, arterial status in trauma, imaging of vascular malignancies, and demonstration of the vascularity of malignancies and for identifying diseases inherent to the arterial system. The arteriography, doppler imaging in ultrasound, digital subtraction angiography and magnetic resonance imaging (2,3) is used for detecting the variations, diseases and injuries in profunda femoris artery. Now a days, profunda femoris is also used for haemodialysis other than femoral artery and also the branches of profunda femoris are used in anterolateral perforator thigh flap as long vascular pedicle during breast reconstruction after mastectomy in cases of carcinoma of breast (4). The precise knowledge of variations in branching pattern of femoral artery and profunda femoris is essential for carrying out above mentioned procedures. We detected a rare variation of occurrence of duplicate lateral circumflex femoral artery associated with rare multiple variations of femoral artery, profunda femoris artery and their branches as described in case report section. These variations can constrain the planning of therapies pertaining to above mentioned procedures. Therefore femoral, profunda femoris arteries and their branching pattern are most essential not only for above mentioned procedures and imagery interpretation but also for adding to discoveries in anatomy.

## CASE PRESENTATION

During dissection of right femoral triangle of a male cadaver aged 75 years fixed in 10% formaline for teaching undergraduate medical students in the department of Anatomy, AIIMS Rishikesh, anomalous configuration of femoral and profunda femoris arteries and their branches were observed. Right femoral artery after descending by 4.5 cm from inguinal ligament gave a common stump on the posterior aspect of femoral artery. This common stump instantly bifurcated into lateral circumflex and profunda femoris arteries (Figures 1a and 1b). Profunda femoris artery advanced further and exited the femoral triangle passing through a gap between pectineus and adductor longus muscles. Femoral artery advancing further for 3.5 cm from the origin of common stump gave abnormal duplicate lateral circumflex femoral artery (Figures 1a and 1b). This is rare finding. This artery further divided into ascending, descending and transverse branches. The medial circumflex femoral artery originated anomalously from femoral artery



**Figure 1a)** Showing duplicates lateral circumflex femoral artery and associated variations. IL Inguinal ligament; FA Femoral artery; PF Profunda femoris artery; LCX1 Lateral circumflex femoral artery arising as a common stump with profunda femoris artery; LCX2 Duplicate/second lateral circumflex femoral artery arising from femoral artery



**Figure 1b)** Showing duplicate lateral circumflex femoral artery. Here black sheet is placed deep to femoral and profunda femoris artery to display the variations more clearly

about 3.5 cm distal to inguinal ligament. These variations were observed unilaterally. On the left side, the branching pattern and configuration was found as described in standard text books of anatomy.

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## DISCUSSION

Femoral artery in femoral triangle is commonly used for catheterization. Profunda femoris artery, the largest branch of femoral artery is also used for various diagnostic and therapeutic procedures. Hence knowledge of variations of branching pattern of femoral artery and profunda femoris artery is of paramount importance for clinicians.

Normally PF originates from FA in femoral triangle 3-4 cm distal to inguinal ligament. High origin of PF from femoral artery has been reported by few authors (5). But in the present study profunda femoris artery arose from femoral artery 4.5 cm distal to inguinal ligament which provides variant configuration of this artery. The common stump separated from FA splitted into profunda femoris artery and lateral circumflex femoral artery. Profunda femoris artery arising from FA as common stump with lateral circumflex femoral artery was also reported by Atulya et al. (6) and Sangeeta et al. (7). Our case has another rare variation. The femoral artery, after travelling 3.5 cm from origin of common stump further, gave second, duplicate lateral circumflex artery. Double circumflex femoral artery was detected in one right limb out of fourteen lower limbs (7.14%).

Furthermore medial circumflex artery arose directly from the femoral artery 3.5 cm distal to inguinal ligament instead of profunda femoris artery. This variation is also reported by Bergman et al. (8).

The femoral artery is the most preferred artery for catheterization because of easy accessibility. It is also used in several plastic and reconstructive procedures (9).

In the present study, two lateral circumflex arteries arising from PF artery with incidence of 7.14% were observed. Double occurrence of lateral circumflex femoral artery as in present case are of great significance for preventing flap necrosis, particularly tensor fascia latae, when used in plastic and reconstructive surgery and also important for the vascular surgeons and interventional radiologists (10). Occurrence of duplicate lateral circumflex femoral artery also advantageous as it causes increase perfusion of surrounding structures and also if one artery is blocked by thrombo-embolic phenomenon, the other branch may sustain the circulation. The knowledge of these variations is also essential in the surgical repair of femoral hernias, in vascular reconstructive procedures in the proximal leg. Plastic surgeons

use the muscular branches while incorporating myocutaneous flaps and occurrence of double lateral circumflex arteries increases success rate in these procedures.

Thus knowledge of variations in configuration of lateral circumflex arteries are of utmost use to surgeons especially vascular surgeons carrying out diagnostic and therapeutic procedures around femoral triangle, to radiologists for avoiding misinterpretation of radiographs and anatomists for rare variations.

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