

*Case Report*

## Unilateral High Origin of Profunda Femoris and Variation of Its Branching

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*Received: 15/01/2015**Revised: 23/02/2015**Accepted: 03/03/2015*

### ABSTRACT

Profunda Femoris Artery [PFA] arises from lateral aspect of femoral artery 3.5 cm distal to inguinal ligament. It gives lateral and medial circumflex femoral arteries from lateral and medial aspect respectively. Following variation was reported in right lower limb of a 45 year male cadaver, during routine dissection for medical students. Profunda Femoris Artery [PFA] arose from lateral aspect of femoral artery 1 cm distal to inguinal ligament, running laterally and down words parallel to femoral artery the profunda femoris passed beneath rectus femoris, sartorius and vastus medialis successively, finally pierced adductor magnus as forth perforator artery, 6 cm above knee joint. It gave circumflex iliac artery as a first branch 3 cm below its origin, passed upwards and latterly, to anterior superior iliac spine and also gave a muscular branch to Sartorius on its way. Remaining perforators were found to be in usual position. The medial and lateral circumflex femoral arteries were arising from femoral artery itself instead of profunda femoris.

**Key words:** profunda femoris artery, femoral artery branches, circumflex iliac artery

### INTRODUCTION

Profunda Femoris Artery [PFA] arises from lateral aspect of femoral artery 3.5 cm distal to inguinal ligament. It gives lateral and medial circumflex femoral arteries from lateral and medial aspect respectively. <sup>(1)</sup> The femoral artery is second site of choice after radial artery for placement of an arterial line. When easily accessible veins are collapsed, femoral vein is used for collection of blood. Thus femoral triangle is clinically useful and important area for accessing vessels. <sup>(2)</sup> Shorter the distance of origin of PFA higher is the risk of iatrogenic damage of PFA. Any variation

in PFA should be taken in account to prevent unexpected and unpleasant complications.

### CASE REPORT

Following variation was reported in right lower limb of a 45 year male cadaver, during routine dissection for medical students. Profunda Femoris Artery [PFA] arose from lateral aspect of femoral artery 1 cm distal to inguinal ligament, running laterally and down words parallel to femoral artery the profunda femoris passed beneath rectus femoris, Sartorius and vastus medialis successively, finally pierced adductor

magnus as forth perforator artery, 6 cm above knee joint. It gave circumflex iliac artery as a first branch 3 cm below its origin. The circumflex iliac usually arises from femoral artery as a superficial branch. In present case it was given by profunda femoris, passed upwards and latterly, to anterior superior iliac spine and also gave a

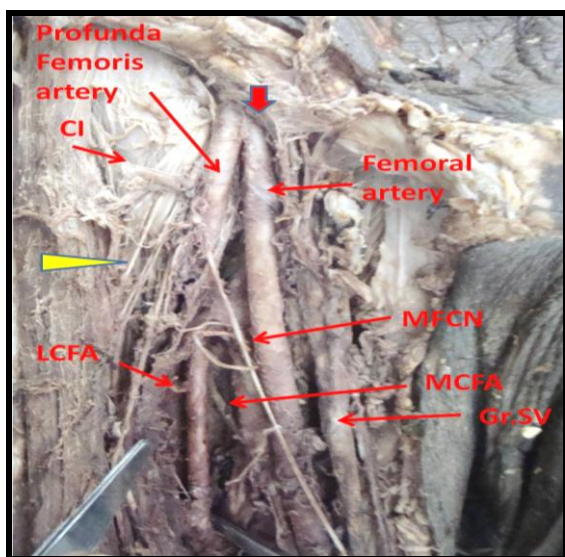
muscular branch to Sartorius on its way, remaining perforators were found to be in usual position. The medial and lateral circumflex femoral arteries arose from femoral artery instead of profunda femoris. [Figure: 1] The origin, course, branching pattern of femoral and profunda femoris artery was normal on left side.

**Table: 1 shows average distance from midpoint of inguinal ligament measured by various authors.**

Name of the Author	Samarawickrama (4)	Dixit (7)	Vuksanovic B.A. (8)	Prakash (9)	Bannister (10)	Siddharth (11)
Average Distance	5 cm	4.75 cm	3.75 cm	4.2 cm	3.5 cm	4.4 cm

**Table 2- shows comparison of results of various authors**

Name of the author	Uzel m. (12)	Fukuda (13)	Dixit d.p. (7)	Choi s.w. (14)	Tansatit t. (15)	Prakash (9)
Lateral circumflex artery Arising from PFA[%]	77.3	78.6	83.34	86.8	56.67	81.25
Lateral circumflex artery Arising from femoral artery	22.7	21.4	16.66	13.2	43.33	18.75



**Figure:1** showing Profunda Femoris Artery [PFA] arose [red arrow] from lateral aspect of femoral artery 1 cm distal to inguinal ligament, gave circumflex iliac artery [CI] as a first branch., running to anterior superior iliac spine and also gave a muscular branch to Sartorius on its way. The medial and lateral circumflex femoral arteries [MCFA AND LCFA] were arising from femoral artery. MCFN –medial cutaneous femoral nerve, Gr. SV–great saphenus vein, yellow arrow head – intermediate femoral cutaneous nerves

## DISCUSSION

The existence of variations of the lower limb vessels can most often be explained as an abnormal development of the arterial network of the lower limb in the

embryo, (2,3) Femoral artery develops from rete femorale in the ventral aspect of the thigh. It communicates with the external iliac artery above through rete pelvicum and sciatic artery below. The primary sciatic artery grows out from fifth lumbar inter segmental artery in the dorsal part of thigh, when the embryo is about 10 mm long and ends in plantar capillary plexus. As the development proceeds, anastomosis between the axis artery and rete femorale develops. It is generally accepted that increase of blood flow in these capillaries determines the final mature arterial pattern. Thus, the most appropriate channels enlarge while others contract and disappear. (2,3) Therefore, we can speculate that one possible reason for the observed variation in this case could be increased blood flow in the rete femorale vessels located at higher level, forming a high origin of PFA and increased blood flow in the rete femorale vessels, which are destined to form LCFA in this case.

Procedures like arteriography, Doppler imaging, vascular reconstruction of proximal leg necessitates precise anatomy of PFA along with the femoral artery.

Variations of PFA and their awareness will definitely reduce the risk of damaging them. Origin of PFA is from lateral aspect of femoral artery, in 46% it is from posterior aspect, in 30% from postero lateral aspect and in 23% is from lateral aspect. <sup>(4)</sup> The distance between midpoint of inguinal ligament and origin of PFA is clinically important. Judkin technique is undertaken where femoral artery is approached by puncturing the vessel 1 to 3 cm below the inguinal ligament. <sup>(5)</sup>

In 1 out of 431 cases PFA was originated above the inguinal ligament, in 1.6% it was originated deep to inguinal ligament and in 3.01% cases it was originated half inch below the inguinal ligament <sup>(6)</sup>

PFA gives lateral and medial circumflex femoral artery in addition to perforating branches. Lateral circumflex femoral artery gives ascending, transverse and descending branches. Variations are seen in branching pattern of PFA unilaterally and or bilaterally.

Origins of the medial and lateral femoral circumflex arteries directly from the femoral artery is associated with lower level of separation of the profunda femoral artery from the femoral artery, <sup>(7)</sup> but in this case PFA is given at a higher level than usual.

The knowledge of the site of PFA origin is very important as it helps in avoiding iatrogenic femoral arteriovenous fistula while performing FA puncture, and it enables to identify the correct site of making incision for surgical exposure of the FA and PFA junction. Shahin et al. <sup>(2)</sup> opined that, before the catheterization of femoral vessels and operations in the femoral triangle, high-resolution ultrasonic imaging can provide anatomic and functional information about the femoral vessels and would be of assistance in planning catheterization. High origin of PFA can cause problem in procedures like femoral arterial and venous

puncture and femoral nerve blocks, because of close relationship of vessels and nerve in femoral triangle. <sup>(5)</sup> Pseudoaneurysms can occur when the puncture site is the PFA or FA distal to the origin of the PFA. The direction of the origin of PFA is also important in catheter application, in making flaps with pedicles, in reconstructive surgery and bypass procedures made to supply the lower extremity. <sup>(7)</sup> The diameter of PFA decreases as the site of its origin becomes more distal from the IL. <sup>(2)</sup> It was also described that this knowledge is very useful in preventing the necrosis of flap, when used in plastic and reconstructive surgery. <sup>(2)</sup> The PFA is very useful in lower limb revascularization procedures done for non-healing ulcers and/or gangrene, to relieve the claudication pain. Details of origin and branches of femoral and PFA can be studied with high resolution ultrasonic imaging before any invasive procedure in the femoral triangle to achieve impressive goals.

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How to cite this article: Teli C, Vanitha, Kadlimatti HS et. al. Unilateral high origin of profunda femoris and variation of its branching. Int J Health Sci Res. 2015; 5(3):394-397.

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