



## VARIATIONS IN THE BRANCHING PATTERN OF FEMORAL ARTERY AND PROFUNDA FEMORIS ARTERY IN WESTERN UP

### Anatomy

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### ABSTRACT

The femoral artery is a large artery in thigh and the main arterial supply to the lower limb & is easily accessible to catheterization. The femoral & profunda femoris artery is used for arteriography, ultrasound and Doppler imaging, digital subtraction angiography and magnetic resonance imaging. The knowledge of femoral artery is important to avoid complication like arteriovenous fistula during transfemoral approach, also procedure like hemodialysis for renal failure and embolization of arteries of the specific regions of the body. The study was conducted on 50 (36 male and 14 female) lower limbs from adult human cadavers aging from 30-70 years used for routine dissection procedure for UG students. Origin of femoral artery in 14% cases its lateral & in 10 % cases its medial to in relation to mid inguinal point; similarly in 8% cases origin of superficial external pudendal & superficial epigastric arising from the common trunk. In the origin of profunda femoris from femoral in 12% cases it was posterolateral & in 4% cases it was posterior origin. In the study it was also observed that in 4% cases lateral circumflex femoral & in 6% cases medial circumflex femoral artery arising from femoral artery. Based on these variations it concluded that femoral artery has a complex variation in its origin, relationship with its branching patterns which is very useful to the cardiologists, radiologists, plastic surgeons and vascular surgeons in the future.

### KEYWORDS

Artery, Profunda, Circumflex, Inguinal, Angiography, Hemodialysis

### Introduction:

Arteries are the muscular tubes which convey blood from heart to various parts of the body. The word artery was first discovered by William Harvey. The femoral artery [Latin: arteriafemoralis] is a large artery in thigh and the main arterial supply to the lower & is easily accessible to catheterization. The profunda femoris artery is used for arteriography, ultrasound and Doppler imaging, digital subtraction angiography and magnetic resonance imaging. In recent era, profunda femoris is being used for haemodialysis other than femoral artery and also the branches of profunda femoris are used in anterolateral perforator thigh flap as along vascular pedicle during breast reconstruction after mastectomy in case of carcinoma of breast.

Angiography is performed through femoral artery in atherosclerosis of the peripheral blood vessels of lower part of the leg. Several factors have to be considered when selecting the entry point through femoral artery. The knowledge of femoral artery is important to avoid complication like arteriovenous fistula during transfemoral approach, also procedure like hemodialysis for renal failure and embolization of arteries of the specific regions of the body. In modern technique for diagnosis and treatment of cardiovascular disorder frequently requires percutaneous penetration into peripheral artery. The femoral artery at the groin is readily punctured by hypodermic needle and is the most convenient site from which the arterial blood sample can be obtained. Hence in our study and attempt is made to study the origin, course and branching pattern of femoral artery and profunda femoris artery and its branches.

### Materials and methods:

The material used for the study consist of 50 (36 male and 14 female) lower limbs from adult human cadavers used for routine dissection procedure for under graduate student in the year 2015-2017 in Department of Anatomy Saraswathi institute of medical sciences, Hapur and LLRM medical college, Meerut India. The femoral artery and its branching patterns were studied by conventional dissection method. All the lower limbs from cadaver, both male and female aging from 30-70 years are included in this study & lower limbs with

degenerative or pathological deformities or injuries were excluded. All the variations and measurements were taken immediate after dissection by measuring tape in mm.

### Observation & Results:

All the parameters of femoral artery and its branching patterns were studied by conventional dissection method & all findings were noted and summarized as follows under the following headings.

#### 1. Origin of femoral artery in relation to mid inguinal point:

Out of 50 adult specimens, only in 38 specimens the origin of femoral artery coincided with the mid inguinal point. In 7 specimens the origin of femoral artery is lateral to the mid inguinal point, more towards midpoint of inguinal ligament. In the remaining 5 specimens the origin of femoral artery was medial to mid inguinal point.

S. No.	Origin Of Superficial External Pudendal Artery (SEPA) & Superficial Epigastric Artery (SEA)	No. Of Cases	Percentage
1.	Arising from separate trunk of femoral artery	46	92%
2.	Arising as a common trunk	4	8%

**Table no. 1: Origin of femoral artery in relation to mid inguinal point.**

**2. Origin of the superficial circumflex iliac artery:** In 48 specimens (96%), the superficial circumflex iliac artery was seen arising as a separate trunk from the lateral side of the femoral artery. In remaining 2 specimens (4%), the superficial circumflex iliac artery was absent.

**3. Origin of the superficial external pudendal artery:** In 46 adult specimen's (92%), the superficial external pudendal artery was seen arising from the femoral artery as a single trunk only and in rest 4 adult specimens (8%) superficial external pudendal artery arose as a common trunk with superficial epigastric artery from the femoral

artery. No case of double trunk of origin of superficial external pudendal artery was seen.

**4. Origin of the superficial epigastric artery:** In 46 specimens, the superficial epigastric artery was seen arising as a single trunk from the anterior aspect of the femoral artery. In 4 adult specimens, the superficial epigastric artery was seen arising as a common trunk with superficial external pudendal artery (photograph no. 1).

S. No.	Origin Of Superficial External Pudendal Artery (SEPA) & Superficial Epigastric Artery (SEA)	No. Of Cases	Percentage
1.	Arising from separate trunk of femoral artery	46	92%
2.	Arising as a common trunk	4	8%

Table no. 2: Origin of superficial external pudendal & superficial epigastric artery

**5. Origin of the deep external pudendal artery:** In all 50 adult specimens the deep external pudendal artery arises from the medial side of the femoral artery and passes medially across the pectineus anterior to adductor longus, posterior to femoral vein covered by fascia lata, which it pierces to supply the skin of the perineum and scrotum.

**6. Origin of the profunda femoris artery:** The distance between the origins of profunda femoris artery from the inguinal ligament varied between 1 to 4.2 cm. The average distance being 3.4 cm. Out of 50 adult specimens, in 40 specimens, profunda femoris artery arose laterally from the femoral artery, whereas in 6 remaining specimens profunda femoris artery arose posterolaterally from the femoral artery. In 4 cases profunda femoris artery arise posteriorly.

S. No.	Origin Of Profund Femoris Artery (PFA) From Femoral Artery	No. Of Cases	Percentage
1.	Lateral	40	80%
2.	Posterolateral	6	12%
3.	Posterior	4	8%

Table no. 3: Origin of the profunda femoris artery.

**7. Presence of abnormal branches from femoral artery:** In the present study the origin of lateral circumflex femoral artery (LCFA) from femoral artery in 2 cases (4%), of which in 1 case (2%), the origin of the lateral circumflex femoral artery is proximal to the origin of the profunda femoris artery. In 1 case (2%), the origin of lateral circumflex femoral artery is distal to the origin of profunda femoris artery. In another 3 cases (6%), the origin of medial circumflex femoral (MCFA) artery from femoral artery (photograph no 2 & 3).

S. No.	Origin Of Abnormal Branches Of Femoral Artery (FA)	Study Done By Keen	Present Study Percentage
1.	Both LCFA & MCFA from PFA	42%	90%
2.	LCFA from FA	20%	4%
3.	MCFA from FA	31%	6%
4.	Both LCFA & MCFA from FA	7%	0%

Table no. 4: Presence of abnormal branches from femoral artery.



Photograph 1: Showing superficial epigastric artery (SEA) & superficial external pudendal artery (SEPA) originating from single trunk.



Photograph 2: Showing LCFA originating from femoral artery.



Photograph 3: Showing MCFA originating from femoral artery.

**Discussion and Conclusion:**

Henry Gray (1858), JD Boyd, Barry J et al (1971), Sir John Bruce, Robert Wamsley, James A Ross (1964), Richard S Snell (1973) & Keith L Moore (1980) have reported that the origin of femoral artery is midway between anterior superior iliac spine and pubic symphysis. According to Scott P et al (2005) the surface marking of both deep inguinal ring and the femoral artery is closer to the mid inguinal point than the midpoint of the inguinal ligament.

Morris (1893), Hollinshed (1958), Buchanan's (1906) & Sheng T et al (1986) quoted that the superficial circumflex iliac artery arises as a separate branch just below the superficial epigastric. Buchanan's (1906), Morris (1893), Taylor et al (1975) & Robert JA (2002) said that the superficial circumflex iliac artery may arise in common trunk with the superficial epigastric artery. Taylor also concluded that from 20 operated cases found that in 5 cases (25%) had absence of the superficial circumflex iliac artery & in 17% cases the superficial circumflex iliac artery arise from the profunda femoris artery.

Tanyeli E (2006) quoted that superficial external pudendal artery arises medially from the femoral artery close to the superficial circumflex iliac artery. Taylor et al (1975), Castro M (1998) & Remya M et al (2007) said that in 3 cases (15%) had a common trunk for cases the superficial epigastric artery and the superficial external pudendal artery. Russel TW (1957), Bruce J et al (1964) quoted that the deep external pudendal artery arises from the medial surface of the femoral artery. Sir John Bruce, Robert Wamsley, James A Ross (1964), Robert Rutherford (1976) & Uflacker R (1997) also stated that the profunda femoris artery arises 4 cm distal to the inguinal ligament. Buchanan's (1906), Russel T (1957), Hollinshed (1958) Harold Ellis (1960), Lockhardt Hamilton (1959), Moore KL (1980) & Cameron JL (1984) quoted that the distance of origin of the profunda femoris artery below the inguinal ligament is 3.75 to 5 cm.

Quain (1844), Henry Gray (1858), Buchannans (1906), Russel TW (1957), Hamilton L (1959) John Bruce (1964), Snell R (1973), Rutherford RB et al (1976), Vani and Saritha (2004) stated that profunda femoris artery arises laterally from the femoral artery in most of the cases. Morris (1893), Hollinshed et al (1958), Uflacker R (1997) & Dixit D et al (2001) stated that the profunda femoris artery arises from the posterolateral part of the femoral artery. Quain (1844) & Dixit D (2001) also stated that the profunda femoris artery rarely arises from the posterior aspect of the femoral artery. Quain (1844) & Schrutz (1894) stated that the profunda femoris artery sometimes arises medially from the femoral artery. Tanyeli E et al (2006) found in a male cadaver where the deep femoral artery was originating from the anterior aspect of the femoral artery which was not found in the present study.

Hollinshed (1958), Vazquez MT (2006), Tanyeli E et al (2006) &

Baptist M (2007) said that the lateral circumflex femoral artery arises less frequently from the femoral artery above the origin of the profunda. Similarly Hollinshed (1958), Keen (1961), Siddharth P (1985), Vazquez MT (2006) & Baptist M (2007) quoted that the medial circumflex femoral artery typically arises from the medial or posteromedial aspect of profunda femoris or also from the femoral artery.

Based on this study, I hereby conclude that femoral artery has a complex variation in its origin, relationship with its branching patterns. I hope that this study of the branching pattern of the femoral artery will be definitely useful to the cardiologists, radiologists, plastic surgeons and vascular surgeons in the future.

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