



## VARIATIONS IN THE ORIGIN OF MEDIAL CIRCUMFLEX FEMORAL ARTERY

**Dr Faiza P K**

Senior Resident, Department of Anatomy, Government Medical College, Calicut, Kerala

**Dr Ashalatha P R\***

Additional Professor, Department of Anatomy, Government Medical College, Calicut, Kerala \*Corresponding Author

**ABSTRACT** Medial circumflex femoral artery (MCFA) usually arises from the Profunda femoris artery (PFA) in the femoral triangle and is the chief source of blood supply to the head of femur. Knowledge about the anatomy of MCFA is essential during orthopedic procedures and interventional surgeries.

**AIM:** To study the variations in the origin of medial circumflex femoral artery

**MATERIALS AND METHODS:** 100 lower limbs, by dissection method.

**RESULTS:** MCFA arose from PFA in 65% and from FA (Femoral artery) in 35%. A common stem for PFA and MCFA was found in 15%. A common stem for MCFA, Lateral circumflex femoral artery and PFA was found in 4%.

**KEYWORDS :** Medial circumflex femoral artery (MCFA), Profunda femoris artery (PFA), Femoral artery (FA)

### INTRODUCTION

The medial circumflex femoral artery (MCFA)<sup>1</sup> usually originates from the posteromedial aspect of the profunda femoris artery (PFA), but often originates from the femoral artery itself. It supplies the adductor muscles and curves medially round the femur between Pectineus and Psoas major and then Obturator externus and Adductor brevis, finally appearing between Quadratus femoris and the upper border of Adductor magnus, dividing into transverse and ascending branches. The transverse branch takes part in the cruciate anastomosis. The ascending branch ascends on the tendon of Obturator externus, anterior to Quadratus femoris, to the trochanteric fossa, where it anastomoses with branches of the gluteal and lateral circumflex femoral arteries. An acetabular branch at the proximal edge of Adductor brevis enters the hip joint under the transverse acetabular ligament with a branch from the obturator artery. It supplies the fat in the fossa, and reaches the femoral head along its ligament.

The medial circumflex femoral artery is the chief source of blood supply to the head and neck of femur. So, the precise knowledge of the anatomy of the artery is essential during reconstructive surgeries of the hip joint and if it is damaged, may cause avascular necrosis of the head of femur. Selective arteriography of medial circumflex femoral artery in the patients with idiopathic ischaemic necrosis of the femoral head is done to determine its arterial supply<sup>2</sup>.

Due to its high position, it can be damaged when the femoral artery is punctured for various cardiac interventional procedures, or it may be damaged while collecting blood in infants from the femoral vein. Knowledge of variation of the artery is useful during exposure of the saphenous vein for ligation at its junction with the femoral vein<sup>3</sup>. Medial circumflex femoral artery has great importance in the flap plastic surgery as a vascular pedicle content, such as the transverse upper gracilis flap, and medial circumflex femoral perforator free flap.

Knowledge of the origin and course of medial femoral circumflex artery is also essential when performing both trochanteric and intertrochanteric osteotomies, thus avoiding iatrogenic avascular necrosis of the head of femur in reconstructive surgery of the hip and fixation of acetabular fractures through the posterior approach<sup>4</sup>.

### AIM AND OBJECTIVES

#### AIM

The study aims at finding the variations in origin of medial circumflex femoral artery in the femoral triangle by dissection method in human cadavers.

#### OBJECTIVES

To find out

1. Variations in the origin of medial circumflex femoral artery
2. Distance of origin of MCFA from the origin of PFA

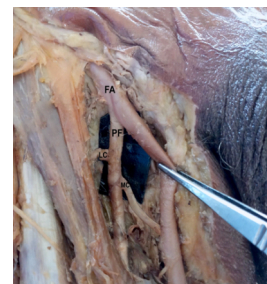
### MATERIALS AND METHODS

The present study was done in 100 lower limbs of 50 adult

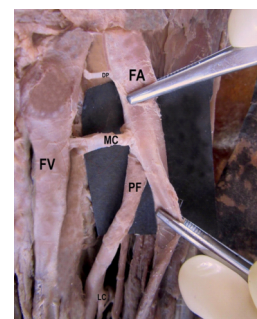
cadavers of both sex in the Department of Anatomy, Government Medical College, Kozhikode, Kerala. Dissection of femoral triangle was done according to Cunningham's Manual of Practical Anatomy Volume 1. The femoral artery, origins of Profunda femoris and medial circumflex femoral arteries were traced. Photographs were taken to document the variations.

### RESULTS

In the present study, MCFA was identified in all 100 limbs. MCFA was found to originate from PFA directly in 65% (FIG 1). The artery was found to be arising from femoral artery in 35% specimens. It originated from Femoral artery superior/proximal to the origin of PFA in 13% (FIG 2), inferior/distal to origin of PFA in 3% (FIG 3) and as a common stem with PFA in 15% (FIG 4). A common stem for PFA, MCFA and LCFA was found in 4% (FIG 5).

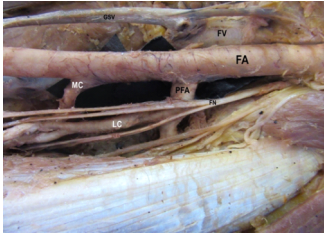


**FIG 1: ORIGIN OF MCFA FROM MEDIAL SIDE OF PFA**  
(FA-femoral artery, MC-Medial circumflex femoral artery, PF-Profunda femoris artery, LC-Lateral circumflex femoral artery)

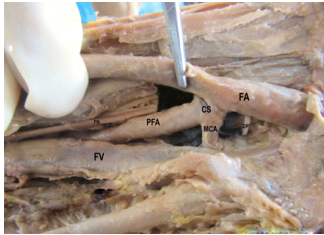


**FIG 2: MCFA ARISING FROM FA SUPERIOR/PROXIMAL TO THE ORIGIN OF PFA**

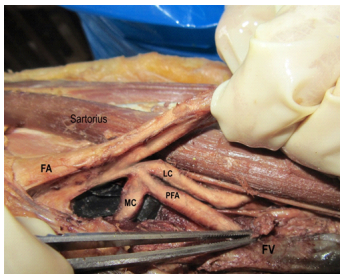
(FA-femoral artery, MC-Medial circumflex femoral artery, PF-Profunda femoris artery, FV-Femoral vein, LC-Lateral circumflex femoral artery, DP-Deep external pudendal artery)



**FIG 3: MCFA ARISING FROM FA INFERIOR/DISTAL TO ORIGIN OF PFA**  
(FA-femoral artery,MC-Medial circumflex femoral artery, PFA-Profunda femoris artery,LC-Lateral circumflex femoral artery,FN-Femoral nerve)



**FIG 4:MCFA ARISING FROM FA AS A COMMON STEM WITH PFA**  
(FA-femoral artery, CS-Common stem, MCA-Medial circumflex femoral artery, PFA-Profunda femoris artery, FV- femoral vein DP-Deep external pudendal artery,)



**FIG 5:COMMON STEM FOR PFA,MCFA AND LCFA**  
(FA-femoral artery,MC-Medial circumflex femoral artery,PFA-Profunda femoris artery,LC-Lateral circumflex femoral artery)

Tomaszewski KA et al<sup>5</sup> classified the origin of MCFA into following types:

- Type 1-MCFA branching from the PFA
- Type 2-MCFA branching from the common femoral artery as a single trunk (FA superior/proximal to the origin of PFA is termed as common femoral artery)
- Type 3-MCFA branching from the common femoral artery with the PFA
- Type 4-MCFA branching from the superficial femoral artery(FA inferior/distal to the origin of PFA is termed as superficial femoral artery)
- Type 5-Anomalies A. Aplasia, B. Duplications

Based on this study, the origin of MCFA observed in the present study can be classified as follows:

**TABLE 1: ORIGIN OF MCFA ACCORDING TO TOMASZEWSKI KA ET AL**

Origin of MCFA	Frequency(%)
Type 1	65
Type 2	13
Type 3	19
Type 4	3
Type 5	0

Distance of origin of MCFA from the origin of PFA ranged between 0-10 mm in 55% limbs,11-20 mm in 29%, 21-30 mm in 11% and 31-40 mm in 5%.

## DISCUSSION

In the present study, MCFA originated from PFA in 65% and from FA in 35% limbs.Comparison of the variations related to the origin of medial femoral circumflex femoral arteries in different studies is shown in TABLE –2

**TABLE 2: ORIGIN OF MCFA; A COMPARISON BETWEEN PREVIOUS STUDIES AND PRESENT STUDY**

Author(s)	No of limbs	Origin of MCFA	
		From PFA	From FA including common stem
Sidharth P et al <sup>6</sup> (1985)	100	63%	37%
M B Samarawickrama et al <sup>7</sup> (2009)	26	62%	38%
Prakash et al <sup>8</sup> (2010)	64	67.2%	32.8%
Aghera BR et al <sup>4</sup> (2014)	102	80.38%	10.78%
Soumya S et al <sup>9</sup> (2014)	50	92%	8%
Darji A et al <sup>2</sup> (2015)	110	89.23%	10..77%
Swetha B and Amarappa N <sup>10</sup> (2016)	40	90%	10%
Verma RK et al <sup>11</sup> (2016)	38	73.68%	26.32%
Present study	100	65%	35%

## Distance of origin of MCFA from the origin of PFA:

In the present study, in majority of limbs (55%) the origin of MCFA was between 0-10mm from the origin of PFA .This is similar to the observations recorded by Dixit D et al<sup>12</sup> and Aghera B R et al<sup>3</sup>

Anatomical variations reported at the level of division of the femoral artery can be explained as found in the lower animals, where the Profunda femoris artery is a branch of the internal iliac artery. During the course of evolution, the origin shifted distally from the femoral artery. Ontogeny repeats phylogeny. Hence, developmental arrest at different stages may lead to anatomical variations related to the division of the femoral artery<sup>6</sup>.

## CONCLUSION

The present study was conducted in the Department of Anatomy, Government Medical College, Kozhikode, Kerala.A total of 50 adult cadavers(100 lower limbs) were dissected to study the origin of MCFA and variations were noted. The findings of study can be summarized as follows;

- MCFA originated from PFA in 65%.
- It originated from femoral artery in 35%.Of these,MCFA arose superior to the origin of PFA in 13%,inferior to the origin of PFA in 3% and along with PFA from common trunk in 19%.
- The distance of origin of MCFA from the origin of PFA was between 0-10 mm in 55% limbs.

A thorough knowledge of the anatomy of medial femoral circumflex artery is of surgical importance during vascular diagnostic interventional procedures and surgeries.It also helps in reducing the chances of intra-operative secondary haemorrhage and post-operative complications.

## REFERENCES

1. Standring S. Pelvic girdle, Gluteal region and hip joint, Femoral artery, In: Gray's Anatomy, The anatomical basis of clinical practice. 40th edn. Elsevier Churchill Livingstone, London, 2008;1378-1380
2. Darji A, Shrimankar P, Chauhan H, Khatri, Singel T C. Cadaveric Study Of Variations In The Origin Of Medial Circumflex Femoral Artery IJBAR 2015 ;6 (7): 541-545 DOI:10.7439/ijbar
3. Aghera BR,Karunakar P,Sujatha K,Fathima T. Morphological Study Of Medial Circumflex Femoral Artery In Human Cadavers. Int J Anat Res 2014;2(4):636-639. DOI: 10.16965/ijar.2014.514
4. Gautier E, Ganz K, Krugl N, Gill T, Ganz R. Anatomy Of The Medial Femoral Circumflex Artery And Its Surgical Implications, J Bone Joint Surg. 2000; 82(5): 679-683
5. Tomaszewski KA, Henry BM, Vikse J, et al. The Origin Of The Medial Circumflex Femoral Artery: A Meta-Analysis And Proposal Of A New Classification System. Peer J. 2016; 4: e1726, doi: 10.7717/peerj.1726
6. Siddharth P, Smith N L, Mason R A, Giron F: Variational Anatomy of the Deep Femoral Artery. The Anatomical Record 1985 ;212(2): 206-9
7. Samarawickrama MB, Nanayakkara BG, Wimalagunaratna KWR, Nishantha DG,

- Walawag UB; Branching Pattern Of The Femoral Artery At The Femoral Triangle: A Cadaver Study, Galle Medical Journal 2009;14(1):31-34.
8. Prakash, Kumar J, Kumar BA, Jose BA, Yadav Kumar S, Singh G. Variations In The Origins Of The Profunda Femoris And The Medial And The Lateral Femoral Circumflex Arteries: A Cadaver Study In The Indian Population. Rom J Morphol Embryol. 2010;51(1):167-70.
  9. Sowmya S, Meenakshi P, Sharmada KL. Study Of Medial Circumflex Femoral Artery And Its Clinical And Surgical Importance. Int J Anat Res 2014;2(4):748-751. DOI: 10.16965/ijar.2014.539
  10. Swetha. B, Amarappa N. Study Of Profunda Femoris Branching Pattern In Human Cadavers. Int J Anat Res 2016;4(3):2822-2827. DOI: 10.16965/ijar.2016.345
  11. Verma R K, Pankaj A K, Rani A, Kumar N, Rani A. Variations In The Origin Of Profunda Femoris And Circumflex Femoral Arteries: A Cadaveric Study. Ind J of clin Anat & Physio 2016;3(4):478-481 DOI:10.5958/2394-2126.2016.00110.9
  12. Dixit D, Kubavat Dharati M, Rathod Suresh Bhai P, Patel Mittal M, Singel Tulsi Bhai C. Study Of Variation In Origin Of Profunda Femoris Artery And Its Circumflex Branches, Int J Biol Med Res 2011;2:1084-89.