



## Study of Lateral Circumflex Femoral Artery

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**Conflicts of Interest:** Nil

### Abstract

**Background:** The lateral circumflex femoral artery is a major branch of the profunda femoris artery. It plays a critical role in supplying blood to the head and neck of the femur and contributes to the anastomosis around the upper femur. This artery is frequently utilized in various bypass procedures, such as aortopopliteal bypass, anterolateral thigh flap, and coronary bypass surgeries. Knowledge of its anatomical variations and branching patterns is therefore essential for procedures like total hip arthroplasty and other surgeries to minimize risks of hemorrhage and other complications.

**Methods:** This study analyzed 102 lower limbs from adult, formalin-fixed human cadavers, which were dissected during routine anatomy sessions for undergraduate and postgraduate students in the Department of Anatomy at J.L.N. Medical College, Ajmer, Rajasthan between 2018 and 2021. Dissections followed the protocols of Cunningham’s Manual of Practical Anatomy.

**Results:** The lateral circumflex femoral artery was found to originate from the profunda femoris artery on the lateral aspect in 82 limbs (80.38%). It originated from the femoral artery with a common stem shared with the profunda femoris artery in 11 limbs (10.78%) and directly from the femoral artery in 7 limbs (7.8%).

**Conclusion:** Our findings, along with previous studies, highlight the importance of understanding the normal anatomy and possible variations in the origin and course of the lateral circumflex femoral artery. This knowledge is critical for vascular diagnostics and surgeries, as it can help reduce the risk of intraoperative bleeding and postoperative complications.

**Keywords:** Lateral circumflex femoral artery, profunda femoris artery, femoral artery.

### Introduction

The lateral circumflex femoral (LCF) artery is a branch of the profunda femoris artery, originating from its lateral aspect within the femoral triangle. It divides into ascending, transverse, and descending branches, serving as a key blood supply to the head and neck of the femur

and to the fatty tissue in the acetabular fossa [1]. Recognizing its anatomical variations is essential to avoid iatrogenic vascular necrosis of the femoral head during hip reconstructive surgeries and to safely access acetabular fractures via the posterolateral approach [2].

The LCF artery and its branches are also used in several procedures, including the anterolateral thigh flap [3], and occasionally for aortopopliteal by pass [4, 5] and coronary artery bypass grafting [6]. The ascending and descending branches provide vascular support for iliac transplants and function as collateral vessels [7, 8]. Some surgeons additionally utilize the descending branch as an alternative artery in extra-to-intracranial bypass surgeries. Past studies on the LCF artery's variations by numerous authors have highlighted its importance in reducing complications and hemorrhage risks during surgery.

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### Materials and Methods

The materials used for this study consist of 102 limbs of formalin fixed adult human cadavers used for the routine dissection procedure for under graduate and post graduate students in the department of Anatomy, J.L.N. Medical College, Ajmer, Rajasthan during 2018-2021. Around 102 femoral triangles were dissected, origin and course of artery was periodically recorded in data sheet. The routine dissection technique was employed from Cunningham's manual of practical Anatomy.

### Results

In this study, a total of 102 limbs were dissected to observe the origin of the lateral circumflex femoral (LCF) artery, with 72 limbs from male cadavers and 30 from female cadavers. The LCF artery was found to

originate from the lateral aspect of the profunda femoris artery in 82 limbs—58 from male cadavers and 24 from female cadavers.

In 11 limbs (7 male and 4 female), the LCF artery was found to share a common stem with the profunda femoris artery at its origin from the femoral artery. The LCF artery originated directly from the femoral artery above the profunda femoris artery in only 3 limbs (2 male and 1 female). Additionally, in 5 male limbs, the LCF artery originated below the profunda femoris artery, a rare variation not seen in any female limbs.

The typical distance of the LCF artery's origin from the profunda femoris artery ranged between 20-30 mm, observed as common in both sexes. This distance aligns with the typical course of the profunda femoris artery, and from there, the LCF artery branches into ascending, transverse, and descending divisions, contributing to the trochanteric and cruciate anastomoses around the femoral head and neck.

All observations regarding the LCF artery's origin, along with sex-based percentage frequencies, were organized in tabular form.

### Figures and Tables

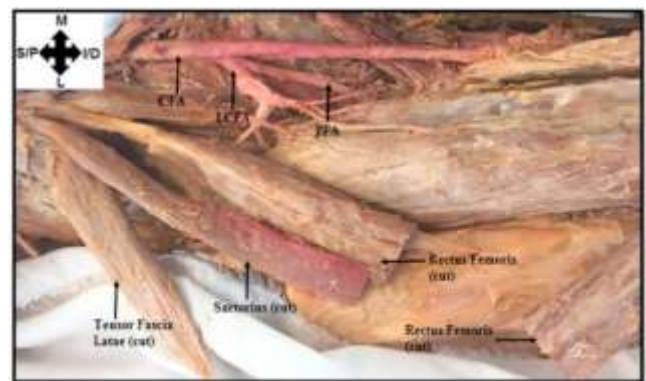


Fig. 1: Origin of LCF artery from PFA on lateral aspect.

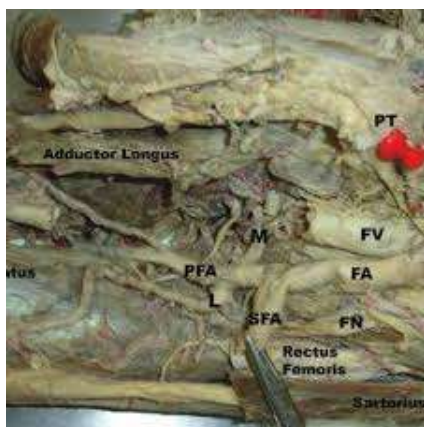


Fig. 2: Origin of LCF artery from FA common stem with PFA.

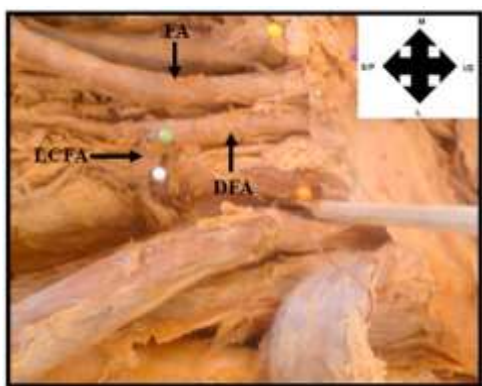
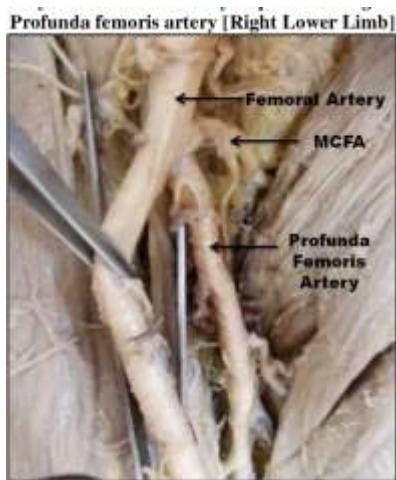


Fig. 3: Origin of LCF artery from FA superior to origin of PFA.



MCFA – Medial Circumflex Femoral Artery

Fig. 4: Origin of LCF artery from FA Inferior to origin of PFA.

Table 1: Site of origin of lateral circumflex femoral artery (102 limbs).

Site	No. of limbs only On right side	No. of limbs only on left side	No. of limbs on bilateral	Percentages
Origin from PFA on lateral aspect	7 M + 1 F = 8	5 M + 3 F = 8	46 M + 20 F = 66	56.86% M 23.53% F 80.39
Origin from FA Common stem with PFA	3M + 2 F = 5	2 M + 0 F = 2	2 M + 2 F = 4	6.86% M 3.92% F 10.78
Origin from FA superior to PFA	1M + 1 F = 2	1 M + 0 F = 1	0 M + 0 F = 0	1.96% M 0.98% F 2.94
Origin from FA inferior to PFA	1 M + 0 F = 1	4 M + 0 F = 4	0 M + 0 F = 0	4.90% M 0.00% F 0.049
LCF artery may be absent	0 M + 0 F = 0	0 M + 1 F = 1	0 M + 0 F = 0	0.00% M 0.97% F 0.97
Total	16	16	70	100 %

**Discussion**

The lateral circumflex femoral artery (LCF) and its branches are essential for supplying blood to the head and neck of the femur, the acetabular fossa, and the knee joint. Due to its proximity to these areas, there is a significant risk of damaging the artery following trauma or during procedures like total hip arthroplasty and other surgeries.

In this study, the most common origin of the LCF artery, observed bilaterally, was from the lateral aspect of the

profunda femoris artery, occurring in 80.39% of cases. The typical distance between the origins of the LCF and profunda femoris arteries was most often between 21–30 mm.

The lateral circumflex femoral artery (LCF) and its branches are vital for blood supply to the femoral head and neck, acetabular fossa, and knee joint. Due to its proximity to these areas, there is a significant risk of damaging the artery in cases of trauma or during procedures like total hip arthroplasty.

Table 2:

Sl. No.	Authors	Specimens Study	LCF of from PFA (%)	LCF from FA (common stem) (%)
1	Uzel M et al.	Cadavers	77.3	22.7
2	Fukuda H et al.	Angiograph	78.6	21.4
3	Dixit DP et al.	Cadavers	83.34	16.66
4	Choi SW et al.	Cadavers	86.8	13.2
5	Tansatit T et al.	Cadavers	56.67	43.33
6	Present study	Cadavers	80.39	18.62

In this study, the most common origin of the LCF artery bilaterally was from the lateral aspect of the profunda femoris artery, occurring in 80.39% of cases. Typically, the LCF artery’s origin was 21-30 mm from the profunda femoris artery origin.

Previous studies have reported similar findings. Uzel M. et al examined 110 inguinal regions, finding the LCF artery arising from the profunda femoris in 85 cases (77.3%) and from the femoral artery or a common stem in 25 cases (22.7%) [10]. In Prakash’s study, 81.25% (52 of 64) of extremities showed the LCF artery originating from the profunda femoris, while 18.75% (12 of 64) had it originating from the femoral artery [11].

Dixit D. et al reported that on the right side, the LCF artery originated from the profunda femoris artery in 72.8% of cases (83 cases), from the femoral artery as a

common stem in 17.5% (20 cases), from the femoral artery above the profunda femoris in 5.2% (6 cases), and below it in 2.6% (3 cases) [12].

In 1996, Bergman R.A. et al examined 200 limbs and found that in 123 cases, both the lateral and medial circumflex femoral arteries arose from the profunda femoris. In the remaining cases, the LCF artery originated from the femoral artery in 29 cases [13].

Table 2 provides a detailed comparison of our findings with those of previous studies.

**Conclusion**

Our study, along with others, highlights that variations in the branching pattern of the lateral circumflex femoral (LCF) artery are quite common. Vascular development in the lower limb occurs early, preceding morphological and molecular changes in the limb mesenchyme; thus, vascular variations are often the norm rather than the exception. Such atypical vascular patterns may arise from differences in branching modes, the proximodistal level of branching, or the presence of unusual compound arterial segments and aberrant vessels connecting with main vessels [1].

Understanding both typical anatomy and the range of variations in the origin and path of the LCF artery is crucial in surgical and diagnostic procedures. This knowledge not only supports precision in vascular interventions but also helps reduce the risks of intraoperative hemorrhage and postoperative complications.

**Abbreviations**

- LCF- Lateral Circumflex Femoral,
- PFA – Profunda Femoris Artery,
- FA – Femoral Artery

The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use

the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ... .” Instead, write “F. A. Author thanks ... .” Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page.

## References

1. Standring S. Pelvic girdle, Gluteal region and hip joint, Profunda femoris artery. In: Gray's Anatomy, The anatomical basis of clinical practice. 40th ed. Elsevier Churchill Livingstone, 2008: 1379-1380.
2. Kelmanovich D, Michael L, Sinha R, Macaulay W, Surgical Approaches to Total Hip Arthroplasty J South Ortho Asso 2003;12(2):90–94.
3. Valdatta L, Tuinder S, Buoro M, Thione A, Faga A, Putz R, Lateral circumflex femoral arterial system and perforators of the anterolateral thigh flap: an anatomic study. Ann Plast Surg, 2002;49:145–150.
4. Gradman WS, Bypass to the lateral circumflex femoral artery. Ann Vasc Surg, 1992;6:344–346.
5. Sugawara Y, Sato O, Miyata T, Kimura H, Namba T, Makuuchi M, Utilization of the lateral circumflex femoral artery as a midway outflow for aortopopliteal grafting: report of a case. Surg Today, 1998;28:967–970.
6. Fukuda H, Ashida M, Ishii R, Abe S, Ibukuro, Anatomical variants of the lateral femoral circumflex artery: an angiographic study. Surg Radiol Anat, 2005;27:260–264.
7. Xu DC, Kong JM, Zhong SZ, The ascending branch of the lateral circumflex femoral artery. A new supply for vascularised iliac transplantation. Surg Radiol Anat, 1989;11:263–264.
8. Hage JJ, Woerdeman LA, Lower limb necrosis after use of the anterolateral thigh free flap: is preoperative angiography indicated, Ann Plast Surg, 2004;52:315–318.
9. Baskaya MK, Kiehn MW, Ahmed AS, Ates Ö and Niemann DB, Alternative vascular graft for extracranial-intracranial bypass surgery: descending branch of the lateral circumflex femoral artery. Neurosurg Focus, 2008;24:1–7.
10. Uzel M, Tanyeli E, Yildirim M. Anatomical study of the origin of lateral circumflex femoral artery in Turkish population. Folia Morphol (Warsz) 2008;67(4):226-230.
11. Prakash, Jyoti K, Bhardwaj AK, Jose BA, Yadav SK, Singh G. Variations in the origins of the Profunda femoris, medial and lateral femoral circumflex arteries: a cadaveric study in Indian population. Rom J Morphol Embryo 2010;51:167-70.
12. Dixit D, Kubavat DM, Rathod SP, Pateld MM, Singel TC. A study of variations in the origin of profunda femoris artery and its circumflex branches. Int J Biol Med Res, 2011;2:1084–1089.
13. Bergman RA, Afifi AK, Miyauchi R. Illustrated encyclopaedia of human anatomic variation. Opus II: Cardiovascular system. Arteries. Lower limb, medial and lateral femoral circumflex arteries(<http://www.anatomyatlases.org/AnatomicVariants/Cardiovascular/Text/Arteries/FemoralCircumflexMedLat>).
14. Choi SW, Park JY, Hur MS, Park HD, Kang HJ, Hu KS and Kim HJ. An Anatomic assessment on perforators of the lateral circumflex femoral artery for anterolateral thigh flap. Journal of Craniofacial Surgery 2007;18(4):866–871.

15. Dixit DP, Mehta LA, Kothari ML. Variations in the origin and course of profunda femoris, J Anat Soc India, 2001;50:6–7.
16. Tansatit t, the anatomy of the lateral circumflex femoral artery in anterolateral thigh flap, J Med Assoc Thai, 2008;91(9):1404–1409.
17. Fukuda H, Ashida M, Ishii R, Abe S, Ibukuro. Anatomical variants of the lateral femoral circumflex artery: an angiographic study. Surg Radiol Anat 2005;27:260–264.
18. Keen JA. A study of the arterial variations in the limbs with special reference to symmetry of vascular patterns. Am J Anat 1961;245-61.