

A CADAVERIC STUDY OF VARIATIONS IN THE ORIGIN OF LATERAL CIRCUMFLEX FEMORAL ARTERY

Apurva Pradipkumar Darji ^{*1}, Hitesh Chauhan ², Paras Shrimankar ³, Hardik Khatri ⁴, Swati Aterkar ⁵, C.A. Pensi ⁶, S. M. Patel ⁷.

^{*1}Tutor, Government Medical College, Bhavnagar, Gujarat, India.

²Tutor, B.J.Medical College, Ahmedabad, Gujarat, India.

³Associate Professor, B.J.Medical College, Ahmedabad, Gujarat, India.

⁴Assistant Professor, U.N.Mehta Institute of Cardiology and Research Centre, Gujarat, India.

⁵Ex- Professor and ⁶Ex- Professor and Head Of The Department, B.J.Medical College, Ahmedabad, Gujarat, India.

⁷Professor and Head of the Department, Government Medical College, Bhavnagar, Gujarat, India.

ABSTRACT

Introduction: The lateral circumflex femoral artery is a branch of the profunda femoris artery, which is the largest branch of femoral artery. The knowledge of origin and branching patterns of the lateral circumflex femoral artery is valuable for various surgeries and clinical procedures.

Objectives: To determine mode of origin of lateral circumflex femoral artery and to determine the distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery and from mid-inguinal point.

Materials and Method: 130 femoral triangles were studied and various measurements were noted and analysed from the department of anatomy of various Medical colleges of Gujarat.

Result and conclusion: The lateral circumflex femoral artery originated from profunda femoris artery in 119 cases and from femoral artery in 11 cases. In most of the cases, the distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery was ranging from 11 to 40 mm on both the sides.

KEY WORDS: Femoral artery, Lateral circumflex femoral artery, Profunda femoris artery.

Address for Correspondence: Dr. Apurva Pradipkumar Darji, J-104, Indraprasth-9; GST Crossing Road; New Ranip, Ahmedabad, Gujarat, India. **E-Mail:** apurvadarji@yahoo.in

Access this Article online

Quick Response code



DOI: 10.16965/ijar.2015.331

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 08 Dec 2015

Accepted: 19 Dec 2015

Peer Review: 08 Dec 2015

Published (O): 31 Dec 2015

Revised: None

Published (P): 31 Dec 2015

INTRODUCTION

The lateral circumflex femoral artery takes part in spinous, trochanteric, cruciate and genicular anastomoses [1]. Knowledge of the variations of the lateral circumflex artery is important for hip joint replacement surgery [2]. Branches of lateral circumflex femoral artery are used for various bypass surgeries [3-5]. Variations of

anatomy of lateral circumflex femoral arteries are very important for plastic surgeons as vascular flaps containing these vessels can be used as a graft for various reconstructive surgeries [6]. The commonly used vascular flaps containing branches of lateral circumflex femoral artery are antero-lateral thigh flaps [7] and the tensor-fascialata-myocutaneous flaps [8].

Present study under taken to determine mode of origin of lateral circumflex femoral artery. Determine the distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery and from mid-inguinal point when it arises from profunda femoris artery and from femoral artery respectively and to compare the obtained results with those of other studies.

MATERIALS AND METHODS

Present study carried out with 65 properly embalmed and formalin fixed cadavers were examined from the department of anatomy of various medical colleges of Gujarat, India.

The study was done with the help of set of dissection instruments, Vernier caliper, measuring tape, digital Camera and from various medical colleges, total 130 femoral triangles were dissected meticulously according to cunningham’s manual [9]. The root of the large profunda femoris artery arising from femoral artery below inguinal ligament was identified. The lateral circumflex femoral artery was dissected arising from the profunda femoris artery near its origin or from the adjacent femoral artery. The lateral circumflex femoral artery was traced as far as Sartorius. The distance between the pubic symphysis and anterior superior iliac spine was measured with the help of measure tap and the mid-point of this distance was taken as mid-inguinal point. Photographs of specimens showing branching pattern of femoral artery and their variations were taken with digital camera.

Keeping in view the aim of the study mentioned above, following observations were recorded and distances were measured in millimeters using vernier calliper.

1. Mode of origin (either from profunda femoris artery or from femoral artery).
2. The distance between origin of profunda femoris artery and origin of lateral circumflex femoral artery when it was arising from the profunda femoris artery.
3. The distance between the mid-inguinal point and origin of lateral circumflex femoral artery when it was arising from the femoral artery.
4. Any variation in its course & its branching pattern.

OBSERVATIONS

Various findings noted were as follows, Mode of origin of lateral circumflex femoral artery either from profunda femoris artery or from femoral artery was examined and recorded as per Table 1.

Distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery was examined and recorded as per Table-2 and Graph1; and mean of this distance was analysed.

Table 1: Mode of origin of lateral circumflex femoral artery.

Mode of origin	Right Side		Left Side	
	No. of cases	Percentage (%)	No. of cases	Percentage (%)
From profunda femoris artery	60	92.31	59	90.77
From femoral artery at the level of origin of profunda femoris artery	1	1.54	1	1.54
From femoral artery superior to profunda femoris artery	2	3.08	2	3.08
From femoral artery inferior to profunda femoris artery	2	3.08	2	3.08
From femoral artery as a common stem with medial circumflex femoral artery	-	-	1	1.54
Total	65		65	

Table 2: Distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery when it was a branch of profunda femoris artery.

Distance (mm)	Right Side		Left Side	
	No. of cases	Percentage (%)	No. of cases	Percentage (%)
0 – 10	0	0	1	1.54
11 – 20	11	16.92	13	20
21 – 30	15	23.08	18	27.69
31 – 40	19	29.23	17	26.15
41 – 50	5	7.69	9	13.85
51 – 60	6	9.23	1	1.54
60 – 70	4	6.15	0	0
Total	60	92.31	59	90.77

Graph 1: Showing the Distance of Origin of Lateral Circumflex femoral artery form the origin of profunda femoris artery.

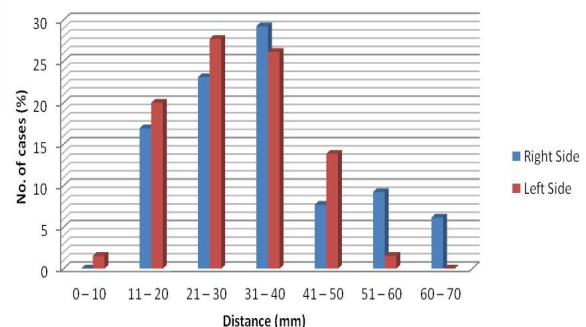


Table 2 shows that in most of the cases, the distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery was ranging from 11 to 40 mm on both the sides. Mean distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery when it was a branch of profunda femoris artery was 34.98 mm on the right side and 30.58 mm on the left side.

Distance of origin of lateral circumflex femoral artery from the mid-inguinal point when it was a branch of femoral artery was studied and recorded as per Table 3; and mean of this distance was analysed.

Distance (mm)	No. of cases	
	Right Side	Left Side
0-10	0	1
11-20	0	0
21-30	1	2
31-40	1	0
41-50	1	0
51-60	0	2
61-70	2	1
Total	5 (7.69%)	6 (9.23%)

Table 3: Distance of origin of lateral circumflex femoral artery from the mid-inguinal point when it was a branch of femoral artery.

Mean distance of origin of lateral circumflex femoral artery from mid-inguinal point was 43.25 mm on the right side and 40.17 mm on the left side.

DISCUSSION

Mode of origin of lateral circumflex femoral artery: Various authors observed the origin of lateral circumflex femoral artery from profunda femoris artery in 78.2%, 85%, 76%, 53%, 78.6%, 86.8%, 97.5%, 56.67%, 77.3%, 81.25%, 84.65%, 88.34% and 68.34% cases respectively [10-22].

Table 4: Comparisons of the mode of origin of lateral circumflex femoral artery in different studies.

Sr. No.	Authors	Year	Origin of LCFA from PFA (%)	Origin of LCFA from FA(%)
1	Adachi et al. [10]	1928	78.2	18.3
2	Hollinshead et al. [11]	1975	85	15
3	Lippert et al. [12]	1985	76	19
4	Clarke et al. [13]	1993	53	47
5	Fukuda et al. [14]	2005	78.6	21.4
6	Choi et al. [15]	2007	86.8	13.2
7	Bapist et al. [16]	2007	97.5	2.5
8	Tansatit et al. [17]	2008	56.67	43.33
9	Uzel et al. [18]	2008	77.3	22.7
10	Prakash et al. [19]	2009	81.25	18.75
11	Dixit et al. [20]	2011	84.65	15.35
12	Mamtha et al. [23]	2012	100	0
13	Kulkarni et al. [21]	2013	88.34	11.66
14	Anjankar et al. [22]	2014	68.34	31.66
15	Present Study	2014	91.54	8.46

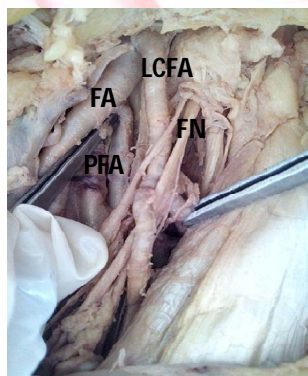


Fig. 1: Lateral circumflex femoral artery arising from femoral artery superior to origin of profunda femoris artery.

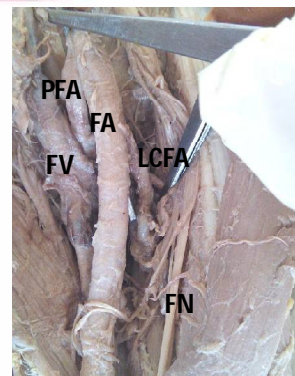


Fig. 2: Lateral circumflex femoral artery arising from femoral artery inferior to origin of profunda femoris artery.

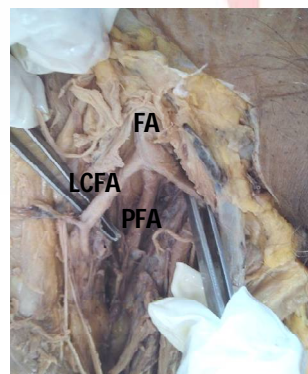


Fig. 3: Lateral circumflex femoral artery arising from femoral artery at the level of origin of profunda femoris artery.

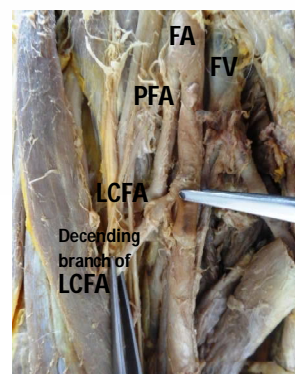


Fig. 4: Descending branch of Lateral circumflex femoral artery arising from femoral artery.

Sr. No.	Authors	Branches of lateral circumflex femoral artery			
		Ascending branch from FA, Descending from PFA	Ascending branch from PFA, Descending branch from FA	Descending branch from PFA	Ascending branch from PFA
1	Adachi et al. [10]	-	2.7	-	-
2	Lippert et al. [12]	-	3	-	-
3	Bergman et al. [24]	0.50%	3.2	-	-
4	Siddharth et al. [25]	-	3	-	-
5	Fukuda et al. [14]	3.10%	3.1	2.50%	2.50%
6	Uzel et al. [18]	0.90%	0.9	-	-
7	Mamtha et al. [23]	-	2.5	2.50%	2.50%
8	Present study	-	3.08	-	-

Table 5: Comparison of mode of origin of branches of lateral circumflex femoral artery in different studies.

Table 6: Comparison of the distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery in different studies.

Sr. No.	Author	Year	Total No.	Distance of origin of lateral circumflex femoral artery from profunda femoris artery (mm)													
				1-10		11-20		21-30		31-40		41-50		51-60		61-70	
				R	L	R	L	R	L	R	L	R	L	R	L	R	L
1	Samarwickrama et al. [26]	2009	26	3	2	3	2	5	4	1	1	0	2	0	1	-	-
2	Dixit et al. [20]	2011	228	11	10	32	25	45	42	14	21	7	12	4	4	-	-
3	Kulkarni et al. [21]	2013	60	4	5	7	8	12	7	1	3	3	3	-	-	-	-
4	Anjakaret al. [22]	2014	120	8	7	17	12	22	26	9	11	3	3	1	1	-	-
5	Present study	2014	130	-	1	11	13	15	18	19	17	5	9	6	1	4	-

Mamtha et al 2012 [23] observed 40 femoral triangles. Out of these, they did not find any case in which lateral circumflex femoral artery was originated from femoral artery.

In present study, the origin of lateral circumflex femoral artery from profunda femoris artery was found in 119 out of 130 lower limbs (91.54%) and from femoral artery in 11 lower limbs (8.46%).

Mode of origin of branches of lateral circumflex femoral artery: In present study, descending branch of lateral circumflex femoral artery originated from femoral artery separately was found in total 2 cases (3.08%)-1 case (1.54%) on the right side and 1 case (1.54%) on the left side.

Distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery

In present study, out of 65 femoral triangles studied, the distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery was most commonly varied from 31 to 40 mm on right side in 19 cases and from 21 to 30 mm on left side in 18 cases.

CONCLUSION

The results of the present study about origin and branching patterns of lateral circumflex femoral artery is very useful as a reference guide for

future studies about lateral circumflex femoral artery and its branches as well as for radiological, surgical and clinical interventions.

ABBREVIATIONS

- FA - Femoral Artery
- FN - Femoral Nerve
- FV - Femoral Vein
- PFA - Profunda Femoris Artery
- LCFA- Lateral Circumflex Femoral Artery

Conflicts of Interests: None

REFERENCES

- [1]. Standring S, Healy JC, Johnson D, Williams A, Collins P. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 40th ed. London: Elsevier, Churchill Livingstone 2008; p.409, 491-494,544,665-668,1349-85.
- [2]. Vasquez M T, Murillo J, Maranillo E, Parkin I, Sanudo J. Patterns of the circumflex femoral arteries. Clinical Anat 2007; 20(2):180-185.
- [3]. 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.
- [4]. 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.
- [5]. Gradman WS. Bypass to the lateral circumflex femoral artery. Ann Vasc Surg 1992; 6:344-346.

- [6]. Vuksanovic-Bozovic A, Stefanivæ N, Pavloviæ S, Ðuraškosviæ R, Ranđeloviæ J, Analysis of deep femoral artery origin variances on fetal material. *Facta Universitatis: Medicine and Biology* 2007;14(3):112-116.
- [7]. 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.
- [8]. Shetty A, Santosh S, Rakesh G, Narendra P, Raghu J. An Atypical Outsized Lateral Circumflex Femoral Artery and Its Clinical Implications. *Journal of Clinical and Diagnostic Research* 2012;6(7):1284-5.
- [9]. Cunningham's manual of practical anatomy. Vol.-1. Upper and lower limbs. 13th edi. London: Oxford university press 1966;132-69.
- [10]. Adachi B. Das arteriensystem der Japaner, Band II. Kyoto: Verlag der Kaiserlich 1928; p. 151. (cited by uzel)
- [11]. Hollinshead WJ. Anatomy for surgeon's. The Back and Limbs, vol.3. Newyork: Medical book department of harper and brothers 1958;705-42.
- [12]. Lippert H, Pabst R. Arterial variation in man, classification and frequency. J F Bergmann-Verlag N Munche 1985;416-20.
- [13]. Clarke SM, Colborn GL. The medial femoral artery: its clinical anatomy and nomenclature, *Clin Anat* 1993;6:94-105.
- [14]. Fukuda H, Ashida M, Ishii R, Abe S, Ibukuro, Anatomical variants of the lateral femoral circumflex artery: an angiographic study. *Surg Radiol Anat* 2005;27:260-64.
- [15]. Choi SW, Park JY, Hur MS, Park HD, Kang HJ, Hu KS et al. An anatomic assessment on perforators of the lateral circumflex femoral artery for anterolateral thigh flap, *J Craniofac Surg* 2007;18(4):866-71.
- [16]. Bapist M, Sultana F, Hssain T. Anatomical variation of the origin of profunda femoris artery, its branches and diameter of artery. *Professional Med J* 2007;14(3):523-7.
- [17]. Tansatit T, Wanidchaploi S, Sanguansit P. The anatomy of the lateral circumflex femoral artery in anterolateral thigh flap. *Thai: J Med Assoc* 2008;91(9):1404-09.
- [18]. Uzel M, Tanyeli E, Yildirim M. Anatomical study of the origin of the lateral circumflex femoral artery in the Turkish population. *Folia Morphol* 2008;67(4):226-30.
- [19]. Prakash, Kumari J, Bharadwaj AK, Jose BA, Yadav KS, Sing G. Variations in the origins of the profunda femoris, medial and lateral femoral circumflex arteries: a cadaver study in the Indian population, *Romanian journal of morphology and embryology* 2010;51(1):167-70.
- [20]. Dixit D, Dharati M, Suresh P, Mital M, Singel TC. A study of variations in the origin of profunda femoris artery and its circumflex branches. *Int J Biol Med Res* 2011; 2(4):1084-89.
- [21]. Kukarni SP, Nikade VV. A study of branching pattern of femoral artery in femoral triangle in cadavers. *International journal of recent trends in science and technology*. 2013;6(1):53-55.
- [22]. Anajankar VP, Panshewdikar PN, Thakare G, Mane U, Tekale V. Morphological study on branching pattern of femoral artery: a cadaveric study. *International journal of biomedical and pharmaceutical sciences* 2014;4(28):34-38.
- [23]. Mamatha H., Antony Sylvan D'souza, Jessica S., Suhani S. A cadaveric study on the variations in the origin, course and branching pattern of the profunda femoris artery. *Int J Cur Res Rev* 2012;04(19):137-44.
- [24]. Bergman AR, Afifi KA, Miyauchi R. Variation in deep femoral (profunda femoris) artery. *Illustrated encyclopedia of human anatomic variation: opus II: Cardiovascular system*. [cited 2011 may 27]. Available from: www.anatomyatlases.org.
- [25]. Siddharth P, Smith NL, Mason RA, Giron F. Variational anatomy of the deep femoral artery. *Anat Rec* 1985;212(2):206-9.
- [26]. Samarawickrama MB, Nanayakkara BG, Wimalagunarathna 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.

How to cite this article:

Apurva Pradipkumar Darji, Hitesh Chauhan, Paras Shrimankar, Hardik Khatri, Swati Aterkar, C.A. Pensi, S. M. Patel. A CADAVERIC STUDY OF VARIATIONS IN THE ORIGIN OF LATERAL CIRCUMFLEX FEMORAL ARTERY. *Int J Anat Res* 2015;3(4):1732-1736. DOI: 10.16965/ijar.2015.331