

CADAVERIC STUDY OF VARIATIONS IN BRANCHING PATTERN OF FEMORAL ARTERY AND PROFUNDA FEMORIS ARTERY

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ABSTRACT

Introduction: The knowledge of the variations in site of origin and course of the profunda femoris artery and its circumflex branches has great clinical importance during diagnostic imaging procedures as well as during surgeries that are performed in the femoral triangle.

Materials and Methods: We dissected 48 femoral triangles in 24 human cadavers which revealed interesting variations apart from the usual description about these arteries that is available in standard anatomy textbooks.

Results: The most common site of origin of profunda femoris artery was from the lateral aspect of the femoral artery. A rare variation of trifurcation of right femoral artery was found. The distance of origin of profunda femoris from the midpoint of the inguinal ligament on the right and left side commonly placed between 21-30 mm.

Discussion: Variations in the arterial patterns may be due to the divergence in the mode and proximo-distal level of branching or aberrant vessels that connect with the principal vessels, arcades or plexuses during the development of the blood vessels. Thus the knowledge of these variations can be of great help to the surgeons in reducing the chances of intra-operative secondary haemorrhage and post-operative complications.

KEY WORDS: Femoral Artery, Profunda Femoris Artery, Lateral Circumflex Artery, Medial Circumflex Artery.

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INTRODUCTION

The course and ramification of the vessels of the lower limbs have long received attention from anatomists and surgeons. The profunda femoris artery usually arises from the posterolateral aspect of the femoral artery. The medial and lateral circumflex femoral arteries normally arise from the profunda femoris artery near its origin [1]. The femoral artery is commonly used for arterial catheterization as it can be readily

accessed. Thereby it is used for investigation of any arterial system in the body and for various clinical procedures like coronary angioplasty. In addition to those the femoral artery at the femoral triangle is directly opened at the origin of the profunda femoris artery for femoral embolectomy in lower limb arterial thromboembolism. In all these cases the anatomical knowledge of the profunda femoris artery and the circumflex arteries is very important to prevent inadvertent damage to these during

clinical procedures [2]. The branching pattern and the course of femoral vessels have long received attention from both anatomists and surgeons. Many variations have been observed regarding the exact location of origin of profunda femoris artery from femoral artery [3]. The femoral artery is second choice for cannulation after the radial as the site for the placement of an arterial line. Its superficial position below the inguinal ligament makes it easily accessible. The most common complications include retroperitoneal hemorrhage and perforation of the gut and arterio-venous fistula. The lateral circumflex femoral artery occasionally arises from femoral artery [4].

MATERIALS AND METHODS

Dissections of 48 femoral triangles in 24 human cadavers during the educational dissection with undergraduate students of the department of Anatomy of MMIMS&R, Mullana (over a period of August 2013 to July 2014) and FH medical college, Tundla (over a period of August 2015 to July 2016). Femoral artery and the profunda femoris artery with its medial and lateral circumflex femoral branches were dissected and their origins were identified, in both lower limbs. Distance between origin of the profunda and mid point of inguinal ligament was measured in millimeters with a scale. Medial and Lateral circumflex femoral arteries were also studied and the distance of origin of each of them were measured from the origin of mid point of inguinal ligament.

RESULTS

We found that the profunda femoris artery originated from either posterior (14/48), Posterolateral (03/48), Lateral (30/48) and medial (01/48) aspect of the common femoral artery. In present study the position of the origin of the profunda femoris artery was commonly from the lateral side of common femoral artery on both side. (Table 1)

The distance of origin of profunda femoris from the midpoint of the inguinal ligament on the right and left side commonly placed between 21-30 mm. (Table 2). In our study the origin of lateral circumflex femoral artery on both side was from the profunda femoris artery in 47 out of 48 cases

(98%). On right side, It was from the profunda femoris common stem in 1 case (2%). Similarly on left side, in 1 case (2%) it was originated directly from femoral artery. Most of the time the distance of origin of the lateral circumflex femoral artery from the mid inguinal point was between 20-80mm (Table-3). 08 out of 24 on the right side were distanced between 71-80mm on the right side. Whereas 10 out of 24 on left side were between 20-40mm from mid inguinal point. (Table 3).

Table 1: Position Of Origin Of Profunda Femoris Artery.

POSITION	RIGHT	LEFT
Posterior	8	6
Posterior Lateral	--	3
Lateral	16	14
Medial	--	1

Table 2: Distance Between Mid Inguinal Point of Origin of Profunda Femoris Artery.

RANGE (mm)	RIGHT	LEFT
11-20	--	6
21-30	10	8
31-40	8	2
41-50	4	6
51-60	2	2

Table 3: Distance Of Origin Of Lateral Circumflex Artery From Mid Inguinal Point.

RANGE (mm)	RIGHT	LEFT
20-40	6	10
41-50	4	4
51-60	4	4
61-70	4	4
71-80	8	2

Table 4: Distance of Origin Of Medial Circumflex Artery From Mid Inguinal Point:

RANGE (mm)	RIGHT	LEFT
20-40	4	6
41-60	6	10
61-70	6	4
71-80	--	2
81-90	8	2

In our study the origin of medial circumflex femoral artery on both side was from the profunda femoris artery in 48 out of 48 cases (100%). In most of the cases the distance of origin of the

medial circumflex femoral artery from the mid inguinal point was between 20-90mm (Table-4). 08 out of 24 on the right side were distanced between 81-90mm on the right side. Whereas 10 out of 24 on left side were between 41-60mm from mid inguinal point. (Table 4)

In one case of female cadaver we noticed a rare variation of trifurcation of left femoral artery. The trifurcation of femoral artery was seen approximately 15 mm below the inguinal ligament. The trifurcated arteries from lateral to medial side were lateral circumflex femoral artery, Femoral artery and profunda femoris artery (Fig. 1). On tracing lateral circumflex femoral artery giving its usual branches. The femoral artery had its usual course and continued as popliteal artery. The profunda femoris artery originating from medial side of femoral artery, initially was superficial to the femoral vein.

Fig. 1: showing the trifurcated arteries from lateral to medial side were lateral circumflex femoral artery, Femoral artery and profunda femoris artery.

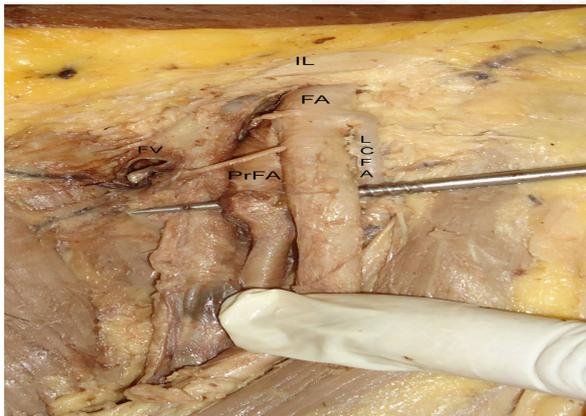


Fig. 2: Showing the lateral circumflex femoral artery was arising from the femoral artery.



In another case of male cadaver on right side we noticed that the lateral circumflex femoral artery was arising from the femoral artery,

proximal to the origin of the profunda femoris artery. In addition another lateral branch was seen arising from the profunda femoris artery making it double lateral circumflex femoral artery on the same side. (Fig. 2)

DISCUSSION

Normally, the lateral circumflex femoral artery takes its origin from the lateral side of the profunda femoris artery, passes in between the anterior and posterior divisions of the femoral nerve before dividing into ascending, transverse and descending branches [9]. Anatomical variations reported at the level of the division of the femoral artery can be explained as follows. In the lower animals, the profunda femoris artery is a branch of the internal iliac artery. During 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 [6]. Vaas F [7] reported that the profunda femoris artery acts as a collateral vessel in the occlusion of the femoral artery and for this important function, it has to have a large caliber, which can be explained based on the aforementioned comparative anatomy. The anatomical knowledge of the level of origin is important in avoiding iatrogenic femoral arteriovenous fistula formed during puncture of femoral artery [8].

Bergman et al have reported cases of double lateral circumflex femoral artery, one from the femoral artery and the other from the profunda femoris artery. They have also reported that the lateral circumflex femoral artery can be made up of a number of arteries represented by a common stem and also have reported the origin of the obturator artery from the lateral circumflex femoral artery [10].

Table 5: Compare the variations related to the site of origin of profunda femoris artery in different studies.

S.N.	Authors	Year of study	Medial distance of profunda femoris artery from mid point of inguinal
1	Siddharth P et al. [5]	1985	44 mm
2	Dixit DP et al. [8]	2001	47.5 mm
3	Bannister LH et al [11]	1995	35 mm
4	Snell RS [12]	1992	40 mm
5	Present study	2013-16	38 mm

CONCLUSION

The profunda femoris artery in our study originated mostly from the lateral side of the common femoral artery (30/48, 62.5%). six percent of the time (3/48) it originated from the posterolateral side of the femoral artery. These two sides of origin have been described in the anatomy texts as the sides of the origin of the artery. However, we encountered 14 out of 48 arteries (29%) originated from the posterior aspect of the common femoral artery. The lateral circumflex femoral artery mostly originated from the profunda femoris artery in 47 out of 48 arteries dissected (98%). This is the commonest pattern of origin of this artery sited in the literature. The figure was 77.3% in Turkish¹⁰ population where as in our study it was 98%. The rest 1% of case originated from a common trunk for the profunda and in 1% of case from common femoral artery. The medial circumflex artery on an average arose in 100% of cases from the profunda femoris artery which was similar to the finding in an Indian study. This knowledge is very valuable in preventing iatrogenic injury to these vessels during surgical procedures of the femoral triangle. Further study is necessary to identify gender differences to these arteries.

Conflicts of Interests: None

REFERENCES

- [1]. GJ Romanes. Upper and Lower limbs. Cunningham's Manual of Practical Anatomy. Vol 1, 15 ed. Oxford University Press, 1987:141.
- [2]. MB Samarawickrama, BG Nanayakkara et al, Branching pattern of the femoral artery at the femoral triangle: a cadaver study, galle medical journal. 2009;14(1):31-34.
- [3]. Vishal K, Vinay KV, et al, Anatomical variants of profunda femoris artery: among cadavers from south India, National journal of clinical anatomy 2014;3(1):8-11.
- [4]. Sinnatamby CS. Last's Anatomy Regional and Applied. 10th Ed., Churchill Livingstone. 1999;114-115.
- [5]. SIDDHARTH P, SMITH NL, MASON RA, GIRON F, Variational anatomy of the deep femoral artery, Anat Rec, 1985;212(2):206-209.
- [6]. Prakash, J. Kumari, Ak Bhardwaj et al, 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):167-170
- [7]. VAAS F, Some considerations concerning the deep femoral artery, Arch Chir Neerl, 1975;27(1):25-34.
- [8]. DIXIT DP, MEHTA LA, KOTHARI ML, Variations in the origin and course of profunda femoris, J Anat Soc India, 2001;50(1):6-7.
- [9]. Susan Standring, Gray's Anatomy; The Anatomical Basis of Clinical practice, 40 edn, Elsevier Churchill Livingstone; 2005. pp.1480.
- [10]. Uzel M, Tanyeli E, Yildirim M. An anatomical study of the origins of the lateral circumflex femoral artery in the Turkish population. Folia Morphol. 2008 Sep 30;67(4):226-30.
- [11]. BANNISTER LH, BERRY MM, COLLINS P, Cardiovascular system. In: GRAY H, BANNISTER LH, BERRY MM, WILLIAMS PL, Gray's Anatomy: the anatomical basis of Medicine and Surgery, 38th edition, Churchill Livingstone, London, 1995:1566-1568.
- [12]. SNELL RS, Clinical anatomy of medical student, 4th edition, Little Brown and Company, Boston, 1992:607.

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