

Study of Femoral Artery & Its Deep Branches in Femoral Triangle

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Abstract

Background: The knowledge of Anatomy and anatomical variation of femoral artery is important to place the arterial cannula, to introduce the catheter for cardiac catheter for cardiac angiogram, making arteriovenous fistula for haemodialysis, to avoid injury to the femoral artery during surgery in femoral and inguinal region and to avoid excessive bleeding during fracture of neck of femur and hip dislocation. **Objectives:** To study the origin and branching pattern of femoral artery and to study the origin and branching pattern of femoral artery. **Methods:** The present study was conducted on 50 lower limbs from embalmed human cadavers from the Department of Anatomy, Bangalore Medical College and Research Institute, Bengaluru. Femoral triangle was dissected and the femoral artery and branches were traced, the distance between midinguinal point and point of origin of branches were noted. **Results:** Endovascular intervention therapy like femoral catheterisation and aortofemoral and aortopopliteal surgeries are common nowadays. Angiogram or angiography is performed through FA in atherosclerosis of peripheral blood vessels of lower part of the leg. All these procedures need precise knowledge of anatomy of FA. Hence in this study an attempt is made to study the origin, course, and branching pattern of FA.

Keywords: Femoral Artery; Profunda Femoral Artery; Deep External Pudendal Artery; Mid Inguinal Point.

Introduction

The femoral artery (FA) is the continuation of the external iliac artery. It extends from mid-inguinal point (MIP), descends in the femoral triangle, passes through the adductor canal, and continues as popliteal artery at the hiatus of adductor magnus near the junction of the middle and distal thirds of the thigh. Branches of femoral artery in the femoral triangle are as follows a) Superficial epigastric artery, b) Superficial circumflex iliac artery, c) Superficial external pudendal artery, d) Deep external pudendal artery (DEPA) e) Muscular branches supply sartorius, vastus medialis and the adductors and f) The

profunda femoris artery (PF) or deep femoral artery is a large branch that arises laterally from FA about 3.5cm distal to the inguinal ligament [1].

Review of Literature

FA arose from the inferior gluteal or internal iliac artery. In these cases the external iliac artery ended as PFA or LCFA [2]. A study conducted on 48 femoral triangles and observed that the origin of profunda was most commonly located between the inguinal ligament and apex of the femoral triangle. The circumflex femoral arteries commonly sprung from profund [3]. The profunda femoris artery was seen arising from femoral artery 2.5cm below the mid inguinal point from its posteromedial aspect [4].

A rare variation of the PFA originating from the medial side of the FA and coursing in front of the femoral vein on the left side of [5]. A study found the origin of profunda femoris arteries from either posterior or medial aspect of the femoral artery and then coursed superficial to femoral vein in 5 cases [6].

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Material & Methods

The present study was conducted in 50 formalin-fixed lower limbs from the Department of Anatomy, Bangalore Medical College and Research Institute, Bangalore. Dissection of FA and its branches were carried out & the Length of FA from its origin in MIP, Origin of DEPA from MIP, Distance of PFA from MIP and Relation of origin of PFA to FA was observed. Measurements were done using digital callipers.

Results

The femoral artery length measured from MIP to its termination, approximately 20.9-32 cm was recorded. The mean length of FA was 25.83 cm (ranging from 20.9-32 cm) (Table 1).

The mean distance of origin of DEPA from MIP was 4.8 cm (ranging from 1-7.7 cm). Mean distance of PF from MIP was 4.8 cm (ranging from 0-7.7 cm) (Table 2).

Table 1: Length of femoral artery from MIP to adductor canal in different specimens

Length of femoral artery (cm)	No. & percentage of specimens
20.1 – 23	11 (22%)
23.1 – 26	15 (30%)
26.1 – 29	14 (28%)
29.1 – 32	10 (20%)

Table 2: Distances of origin of DEPA and PFA from FA from MIP

Distance from MIP (cm)	No. of DEPA taking origin	No. of PFA taking origin
0 – 3.5 cm	11 (22%)	16 (32%)
3.6 – 7.7 cm	39 (78%)	34 (68%)

Table 3: Variations of origin of PFA according to Bergman's² study

Distance between origin of PFA and MIP (cm)	Percentage
2.5- 5.1	68
<2.5	24.6
>5.1	7.4
2.5-3.8	42.6

Table 4: Comparison of variations related to origin of PFA in different studies

Serial No.	Authors	Median distance of origin of PFA from MPIL (cm)	Most common site of origin of PFA in femoral triangle
1	Siddarth et al.(1985) ⁸	4.4	Proximal half
2	Dixit et al. (2001) ³	4.75	Midway
5	Prakash (2009) ⁹	4.2	Proximal 1/3 rd
6	Present study	4.5	Middle 1/3 rd

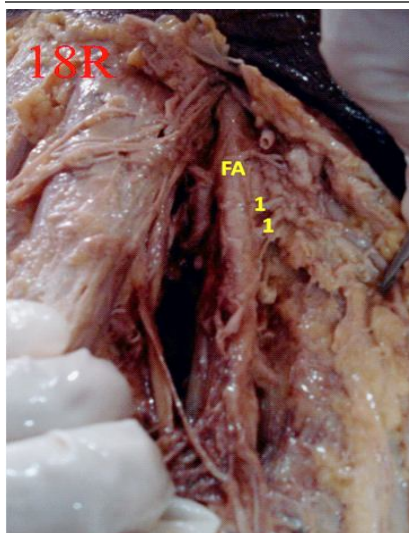


Fig. 1: Specimen showing normal origin & branching pattern of FA & PFA

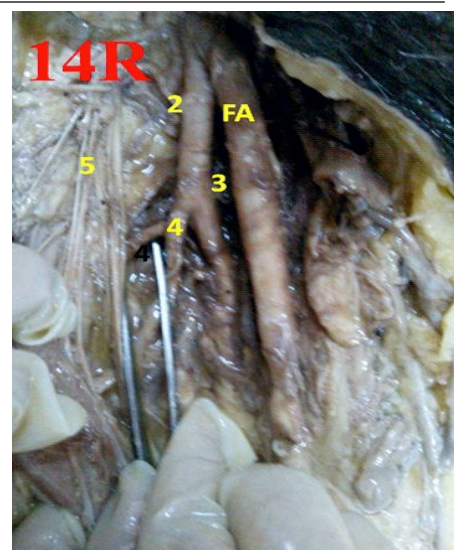


Fig. 2: Specimen showing high origin of PFA

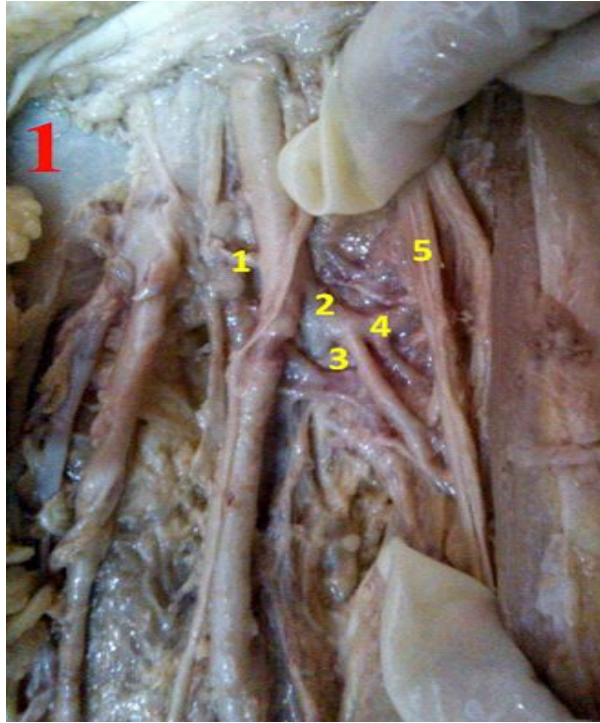


Fig. 3: Specimen showing 2 DEPA
 1 - Deep circumflex femoral artery
 2 - Profunda femoris artery
 3 - Medial circumflex femoral artery
 4 - Lateral circumflex femoral artery
 5 - Femoral nerve

Origin of PF was posterolateral in 30 cases (60%), posterior in 13 (26%), & lateral in 7 (14%) to FA.

Discussion

DEPA arises lower than the other superficial arteries [7]. In the present study, the DEPA arose from FA in all 50 specimens (100%) as a separate branch. In one specimen (2%), 2 DEPA were found as separate branches from FA. Comparison of the point of origin of PF from inguinal ligament is as shown in Table 1. Different level of origin of PG is compared in Table 2. PFA is a large branch of FA, originates laterally 3.5cm distal to midinguinal point [1]. According to a study the median distance between origin of PFA and MIP is 4.4cm². The PFA originated from FA 0-8cm below inguinal ligament [8]. The mean distance of origin of PFA was 4.4cm and 70% originated 3-6 cm from MIP.

A study conducted on 430 thighs found following variation in origin of PFA showing in following schematic diagram [2] (Table 3).

The same study mentioned the origin of PFA from posterolateral side in 40%, posterior in 37%, lateral in 12%, posteromedial in 9% and medial in 2% cases [2] (Table 4).

Median Measurements of Femoral, Profunda Femoris and Perforating Arteries

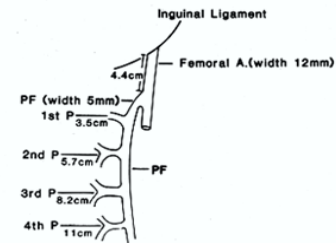


Fig. 1:

Origin of Profunda Femoris, 100 Legs

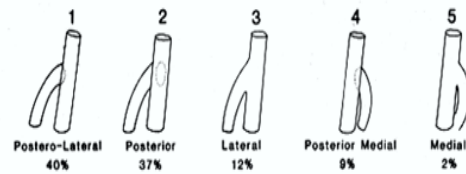


Fig. 2:

A study mentioned the most common origin of PFA was posterolateral (40%), 37% posterior origin, 12% lateral origin, 9% posteromedial and 2% medial in origin [8]. Origin of PFA from posterolateral aspect of FA in 35.41% and from the posterior aspect in 31.25% [3]. The mean distance of separation of PFA from femoral artery was 4.2 cm distal to the MIP [9]. The PFA arose from the posterolateral aspect of the FA and 2-4cm distal to the inguinal ligament [10].

Conclusion

Modern techniques for diagnosis and treatment of cardiovascular disorders frequently require percutaneous penetration into a peripheral artery. FA is the second only to radial, as the site of choice for the placement of an arterial line. Its superficial position below inguinal ligament makes it easily accessible and readily punctured by a hypodermic needle. Hence study of anatomy and anatomical variations of the femoral artery and its branches have significant role in arterial interventions, both in diagnostic and treatment aspect.

References

1. Standring S. Pelvic Girdle, Gluteal region and Thigh. Grays Anatomy. 40thed. New York; Elsevier Churchill Livingstone: 2008. p1378-80.
2. Bergman RA, Afifi AK, Miyauchi R, origin of deep group and circumflex group of arteries, cardiovascular system, Illustrated Encyclopedia of

- Human Anatomic Variation. OpusII.
3. Dixit DP, Mehta LA, Kothari ML. Variation in the origin and course of profunda femoris. *J AnatSoc India* 2001; 50(1):6-7.
 4. Nanjaiah CM and Dakshayini KR. Anamalous branching pattern of femoral artery. *Anatomica Karnataka* 2005 June; 2(1):62-63.
 5. Chitra R. A rare variational anatomy of the Profunda Femoris artery. *Folia Morph* 2008 May; 67(2):157-8.
 6. Dixit D, Dharati M, Kubavat B, Sureshbhai P, Rathod C, Mital M. Pateld, Tulsibhai C. Singele. A Study Of Variations In The Origin Of Profunda Femoris Artery And Its Circumflex Branches. *Int J Biol Med Res.* 2011; 2(4):1084–1089.
 7. Hollinshed WH. *Anatomy for surgeons. Vol.3, Philadelphia: Hoeber- Harper International; 1966; 3:705.*
 8. Siddarth P, Smith NL, Mason RA, Giron F, Variational anatomy of the deep femoral artery, *Anat rec*, 1985; 212(2):206-209.
 9. Prakash, JyothiKumari, et al. Variations in the origins of the Profunda Femoris, medial and lateral circumflex arteries: a cadaver study in the Indian population. *Romanian Journal of Morphology and Embryology* 2010; 51(1):206-209.
 10. Decker GAG, du Plessis DJ. Lee McGregor's synopsis of Surgical Anatomy. 12th ed. Bombay: K.M.Varghese Company; 1986:p.244.
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