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Anatomical variations of profunda femoris artery and its clinical importance

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Abstract
Introduction: Profunda femoris artery arises on the posterolateral aspect of femoral artery about 3.5 cm distal to inguinal ligament in femoral triangle. Profunda femoris artery (PFA) is the largest branch of femoral artery which supplies all the muscles of thigh. During the procedures like arterial catheterization damage to PFA may invite unwanted and unexpected complications. To minimise complications precise anatomy of PFA is important.
Method and Material: Femoral triangles of 70 lower limbs of 29 male and 6 female embalmed cadavers were dissected to study origin, course and branches of PFA. The external diameter of femoral artery and PFA was measured.
Results: In all the lower limbs PFA was present and in majority of cases the commonest site of origin was posterolateral aspect of femoral artery. The mean distance from inguinal ligament from where PFA was arising from femoral artery was 3.2 cm. In majority of lower limbs lateral circumflex femoral artery was arising from PFA.
Conclusion: Point of origin of PFA was similar in some cases and different in other cases. Detail knowledge regarding variations in point of origin, branches of PFA is clinically significant and should not be ignored.

Keywords: profunda femoris artery (PFA), 70 lower limbs, clinical importance

Introduction

PFA is the branch of femoral artery which arises from lateral aspect of femoral artery 3.5 cm distal to inguinal ligament in femoral triangle [1]. Profunda femoris artery (PFA) is the largest branch of femoral artery which supplies all the muscles of thigh. The femoral artery is second site of choice after radial artery for placement of an arterial line. When easily accessible veins are collapsed femoral vein is used for collection of blood. Thus femoral triangle is clinically useful and important area for accessing vessels. Origin of PFA from femoral artery at short distance distal to inguinal ligament. Shorter the distance of origin of PFA higher is the risk of iatrogenic damage of PFA. PFA and its variations are the topics of interest for surgeons and anatomists. Along with femoral artery, PFA is also the important artery of anterior aspect of thigh. It gives lateral and medial circumflex femoral arteries from lateral and medial aspect respectively [2]. The MCFA and LCFA branches anastomose with the internal and external iliac arteries [1]. During the procedures like arterial catheterization damage to PFA may invite unwanted and unexpected complications. The anatomical knowledge of the site of origin of PFA is useful in avoiding femoral arterio-venous fistula formed during puncture of femoral artery [3]. To minimise complications precise anatomy of PFA is important.

Materials and Methods

Femoral triangles of 70 lower limbs of 29 male and 6 female embalmed cadavers obtained from department of anatomy were dissected. To study origin, course and branches of PFA. After removing skin and superficial fascia, femoral artery, vein and nerve was identified. PFA was searched on the lateral aspect of femoral artery. The origin, course and branches were noted. The distance of origin of PFA from midpoint of inguinal ligament was measured with the help of scale. The width of femoral and PFA was measured with the help of divider and scale.

Results

1. In all lower limbs PFA was present.
2. In 56 and 14 lower limbs PFA was originating from lateral [Fig-1], [Fig-3] and [Fig-5] and posterolateral aspect [Fig-4] of femoral artery respectively.
3. The point of origin was similar on both sides in 46 lower limbs [Fig-5] while it was different on two sides in 24 lower limbs (10 males and 2 female) [Fig-1].
4. The mean distance from inguinal ligament from where PFA was arising from femoral artery was 3.2 cm [Table-1]. While in 18 lower limbs PFA was arising just below the inguinal ligament [Fig-2], [Fig-3].
5. The mean width of femoral artery was 10 cm and of PFA was 6 mm.
6. Absence of lateral circumflex femoral artery was seen in 1 lower limb. Ascending, transverse and descending branches were arising from PFA [Fig-2].
7. In 10 lower limbs lateral circumflex femoral artery was originating from femoral artery [Fig-4

Discussion

Femoral artery is commonly used for various therapeutic and diagnostic procedures like catheterization, angiography etc. Moreover PFA and its branches are used for various surgical procedures like Anterolateral thigh flap, plastic and

reconstructive surgeries. Hence knowledge of variation in the origin of PFA and its branches is very important and will definitely reduce the risk of damaging them. Procedures like arteriography, Doppler imaging, vascular reconstruction of proximal leg necessitates precise anatomy of PFA along with the femoral artery. Origin of PFA is from lateral aspect of femoral artery [1], in 46% it is from posterior aspect, in 30% from posterolateral aspect and in 23% is from lateral aspect [4]. In the present study 80% of lower limbs showed origin of PFA from lateral aspect of femoral artery [Fig-1], [Fig-3] and [Fig-5] and in 20% of lower limbs it was from posterolateral aspect [Fig-4].The distance between midpoint of inguinal ligament and origin of PFA is clinically important. Too much proximal origin and or too much distal origin of PFA may invite unwanted problems. Judkin technique is undertaken where femoral artery is approached by puncturing the vessel 1 to 3 cm below the inguinal ligament [5]. Knowledge of the site of origin of PFA helps in avoiding iatrogenic femoral A-V fistulas or severe secondary haemorrhage when performing a femoral arterial puncture [2] Following table shows average distance from midpoint of inguinal ligament measured by various authors.

Table 1: shows average distance of origin of PFA from midpoint of inguinal ligament

Name of the Author	Average Distance
Grays [1]	.5 cm
Samarawickrama [4]	5 cm
Vuksanovic B.A [6]	3.75 cm
Prakash [3]	4.2 cm
Marina [5]	3.2-4.1cm
Snell R.S [7].	4 cm
Dixit [8].	47.5 cm
Bannister [9].	3.5 cm
Siddharth [10].	4.4 cm
William P [11].	5.31 cm
Present study	3.2 cm [Fig-3]

In 1 out of 431 cases PFA was originated above the inguinal ligament, in 1.6% it was originated deep to inguinal ligament and in 3.01% cases it was originated half inch below the inguinal ligament [12]. In the present study in 18 lower limbs PFA was arising just below the inguinal ligament [Fig-2, 3].The external and internal diameters are important as it gives judgment of the diameter of guide wire which is to be used in procedures. We have measured the width of the femoral and PFA with the help of divider and scale. The mean width of femoral artery was 10 cm and of PFA was 6 mm. In two lower limbs there was no much difference in between caliber of femoral and PFA [Fig-3]. PFA acts as a collateral vessel in the occlusion of the femoral artery and for this important function it has to have a larger calibre [13] In majority of cases (40) where the point of origin of PFA was similar on both sides, same width was found [Fig-5] while in remaining 6 lower limbs width was different on both sides. Out of 24 lower limbs where the point of origin of PFA was different on two sides width was found same in 20 lower limbs and different in 4 lower limbs [Fig-1]. PFA gives lateral and medial circumflex femoral artery in addition to perforating branches. Lateral circumflex femoral artery gives ascending, transverse and descending branches. Variations are seen in branching pattern of PFA unilaterally and or bilaterally. Following table shows variations noticed by various authors.

Table 2: Shows comparison of results of various authors with present study

Name of author	Lateral circumflex artery arising from PFA (%)	Lateral circumflex artery arising from femoral artery (%)
Uzel M [14].	77.3	22.7
Fukuda [15].	78.6	21.4
Dixit D.P [8].	83.34	16.66
Choi S.W [16].	86.8	13.2
Tansatit T [17].	56.67	43.33
Prakash [3]	81.25	18.75
Present Study	80.0	20.0

In two lower limbs (3.3%) lateral circumflex femoral artery was absent

Anatomical facts should be considered before planning different diagnostic and therapeutic interventions on femoral artery and its branches [3]. Details of origin and branches of femoral and PFA can be studied with high resolution ultrasonic imaging before any invasive procedure in the femoral triangle to achieve impressive goals.

Fig 1: shows different point of origin and different caliber of PFA on two sides

Fig 2: shows unilateral origin of PFA just below inguinal ligament and absence of lateral circumflex femoral artery.

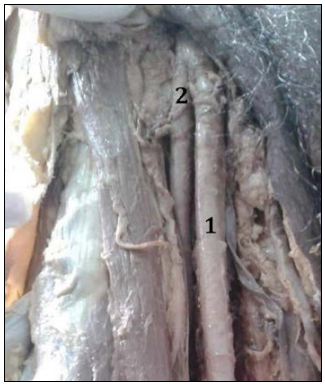

Fig 3: shows unilateral higher origin of PFA just below inguinal ligament from femoral artery on right side

Fig 4: shows origin of lateral circumflex femoral artery from femoral artery directly and PFA originated from posterolateral aspect of femoral artery

Fig 5: shows similar point of origin of PFA from femoral artery on both sides 4.

Conclusions

Knowledge of variations in the branching pattern of FA and PF artery are very essential for surgeons for carrying out various surgical procedures in and around femoral triangle, radiologists for diagnosis and interpretations of radiographs coupled with new variations for anatomists. Point of origin of PFA was similar in some cases and different in other cases. Detail knowledge regarding variations in point of origin, branches of PFA is clinically significant and should not be ignored.

References

1. Standring S. Grays Anatomy, 40th ed., Philadelphia, Elsevier Churchill Livingstone, 2004, 1379-1380.
2. Mc Minn RMH. Last's Anatomy, 9th ed., London, Churchill Livingstone, 1994, 155-6.
3. Prakash KJ, 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.
4. Samarawickrama MB, Nanayakkara BG, Wimalagunarathna KWR, Nishantha DG, Walawage UB. Galle Medical Journal. 2009; 14(1):31-34.
5. Baptist M, Sultana F, Hussain T. Professional Med. J. 2007; 14(3):523-527.
6. Vuksanovic BA, Stefanivic N, Pavlovic S, Duraskosvic R, Randelovic J. Facta Universitatis, Medicine and Biology. 2007; 14(3):112-116.
7. Snell RS. Clinical Anatomy of Medical Students, 4th ed., Little Brown and Co, Boston, 1992, 607.
8. Dixit D, Kubavat D, Rathod S, Patel M, Singel T. Int. J Biol. Med. Res. 2011; 2(4):1084-1089.
9. Bannister LH, Berry MM, Collins P. Gray's Anatomy, 38th ed., Churchill livingstone, Medical division of Longman Group, UK, 1566-8.
10. Siddharth P, Smith NL, Mason RA, Giron F. Anat. Rec. 1985; 212(2):206-209.
11. Chleborad WP, Dawson DL. Clinical Anatomy, 1990; 3(1):33 -40.
12. Quain R. Anatomy of Arteries of the Human Body, London, Taylor and Walton, 1844, 476-8.
13. Vaas F. Arch Chir. Neerl. 1975; 27(1):25-34.
14. Uzel M, Tanyeli E, Yildirim M. Folia Morphol. 2008; 67(4):226-230.

15. Fukuda H, Ashida M, Ishii R, Abe S, Ibukuro K. Surg. Radiol. Anat. 2005; 27(3):260-264.
16. Choi SW, Park JY, Hur MS, Park HD, Kang HJ, HU KS, Kim HJ. J Craniofac. Surg. 2007; 18(4):866-871.
17. Tansatit T, Wanidchaploi S, Sanguansit P. J Med. Assoc. Thai. 2008; 91(9):1404-1409.