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Morphometric Study Of Common Femoral Artery And Its Clinical Significance.

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ABSTRACT

Common femoral artery is large and main artery of lower limb. It begins behind the inguinal ligament till the origin of any branches. Parameters included in study were length and diameter of common femoral artery which was measured by Vernier calliper by applying appropriate statistical test, main objective is to study morphometry and its clinical significance. Present study was carried on 120 right and left sided limbs. Sixty embalmed cadavers in Anatomy department of RMC Loni, India were selected. Length of common femoral artery in the range of 5-70mm on right side was 41.29 ± 11.02 mm, on left side 42.48 ± 10.87 mm. in 56.66% cases and shortest stem on left side in one case, it was 5.10 mm. Diameter in the range of 11-40mm $24.56 \text{mm} \pm 2.48$ mm on right side and 23.87 ± 2.69 mm on left side. Very small diameter was found in the range of 11-20mm in 18.33% cases on right side and 21.66% cases on left side. Common femoral artery is used in thigh flap surgeries, for catheterization, angiography, CT scan, MRI investigation. So such knowledge will be helpful to the Orthopaedic surgeons to avoid complication occurring during surgeries on fractures of head and neck of femur.

Keywords: common femoral artery, inguinal ligament.

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INTRODUCTION

The common femoral artery is the chief and large artery of the lower limbs. It begins behind the midpoint of inguinal ligament. The pulsations of the artery can be felt at mid inguinal point, where it can be compressed against the superior ramus of pubis and separated from it only by psoas tendon [1]. Clinically proximal to the origin of its branch profunda femoris artery; it is known as common femoral artery and distal to the origin of profunda femoris its called known as superficial femoral artery [2]. The common femoral artery is used for diagnosis of the heart, brain, kidneys, arms and leg disease. It is used as a catheter access artery [3]. Wires and catheters can be directed anywhere in the arterial system for intervention. Access in either the left or right common femoral artery is possible which depends on the type of intervention or for diagnostic purpose [4].

The femoral artery and its branches are involved in cruciate anastomosis and the arterial supply of head of femur and thigh region so its important during various surgical procedures in this region [5]. It is used to avoid the complications occurring during surgeries on fractures of head and neck of femur, in thigh flap surgeries; for catheterization, angiography, CT scan and MRI investigation [6].

MATERIAL AND METHODS

The institutional Ethical and Research Committee approval was obtained before beginning of the study. The present study was carried on 120 lower limbs of right and left sided sixty embalmed adult cadavers and both sexes, available in the Department of Anatomy, Rural Medical College, and PIMS Deemed to be University Loni; Maharashtra, India.

Dissection of femoral triangle carried out step wise; On both side branching pattern noted. Metrical parameters were length of common femoral artery was measured in each specimen of both triangles from midpoint of inguinal ligament till the origin of any deep branches. External diameter was taken at the origin of common femoral artery. The parameters were measured by Vernier calliper in mms. The collected data analyzed and tabulated by using the appropriate statistical z test. Data was analyzed by descriptive statistics as mean, SD, and percentage. Comparison of left side and right side were done by applying Z test between two sample proportions at 5% (p, 0.05) and 1% (p, 0.01) level of significance.

RESULT AND OBSERVATION

Table 1: Showing the length of common femoral artery from midpoint of inguinal ligament till the origin of any deep branches on both sides of limbs.

Range mm	Right side	Percentage frequency (%)	Left side	Percentage Frequency (%)
5-10	--	--	01	1.66%
11-20	11	18.33%	07	11.66%
21-30	07	11.66%	10	16.66%
31-40	16	26.66%	15	25%
41-50	18	30%	20	33.33%
51-60	07	11.66%	05	8.33%
61-70	01	1.66%	02	3.33%
Mean ± SD	41.29 ± 11.02		42.48 ± 10.87	

By applying Z test of difference between two proportions there is no significant difference between proportions of length of common femoral artery from midpoint of inguinal ligament in right and left side (i.e. p>0.05).

Length is in the range of 31-50 mm in 34 limbs on right side and 35 limbs on left side. In eight limbs on right side and seven limbs on left side, the length felt between 51-70 mm and range of length fall between 5-30 mm; it was seen arising on right side and left side in 18 limbs each. (fig- 2, 3)

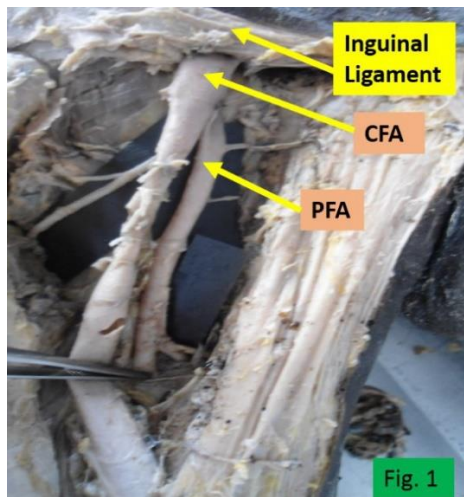


Figure 1 showing the short length of common femoral artery. IL-inguinal ligament,CF-common femoral artery,PF-profunda femoris artery

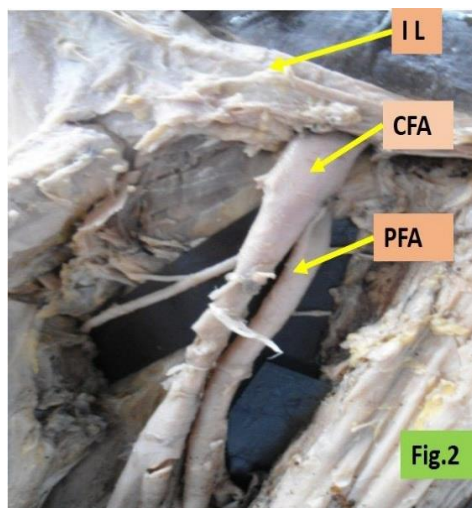


Figure 2 showing the short length of common femoral artery. CFA- common femoral artery.PF-profunda femoris artery.

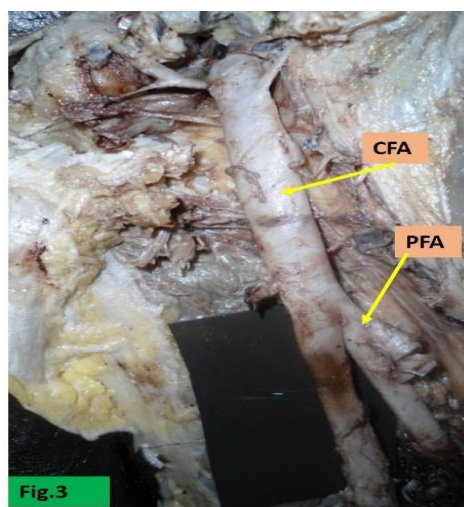


Figure 3 showing the longest length of common femoral artery. CFA- common femoral artery, PF-profunda femoris artery

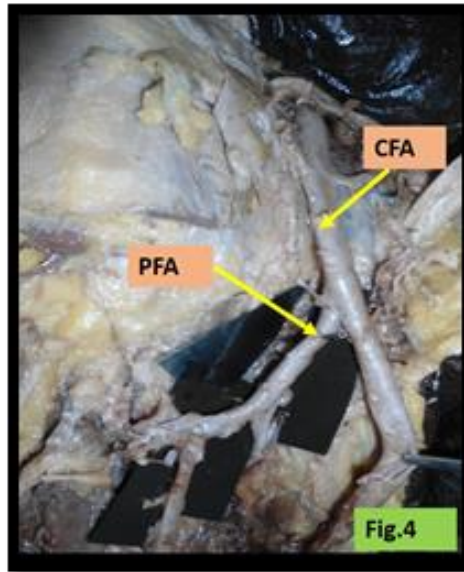


Figure 4 showing small diameter of common femoral artery. CFA- common femoral artery, PF - profunda femoris artery.

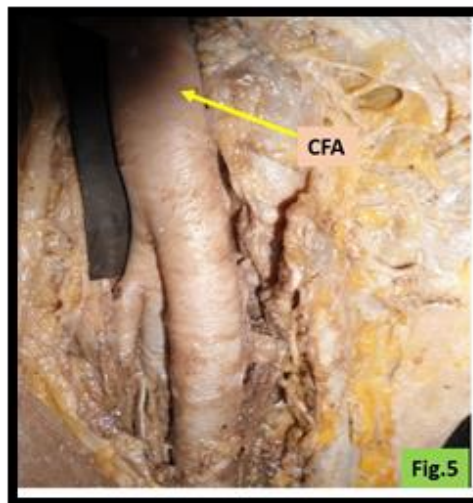


Figure 5 showing the largest diameter of the common femoral artery

Table 2: External diameter of common femoral artery on both sides

Range (mms)	Right sided	Percentage	Left sided	Percentage
11-20	11	18.33%	13	21.66%
21-30	40	66.66%	37	61.66%
31-40	9	15%	10	16.66%
Mean ± SD	24.56 ± 2.48		23.87 ± 2.69	

By applying Z test of difference between two proportions there is no significant difference between proportions of external diameter of common femoral artery in right and left side (i.e. $p > 0.05$). The external diameter of common femoral artery at the midpoint of inguinal ligament was found in range of 21-30 mm in 40 limbs on right side and 37 limbs on left side. In range of 31-40mm in nine limbs on right and ten limbs on left side. The external diameter of common femoral artery was very small in 11 limbs on right and 13 limbs on left in the range of 11-20mm. (fig-4, 5).

DISCUSSION

The existence variations of vessels of lower limb can most often be explained as an abnormal development of arterial network of the lower limb in the embryo [7,8]. The common femoral artery is used to access the arterial system in peripheral percutaneous vascular interventions. The common femoral artery is susceptible to peripheral arterial disease. When a common femoral artery is blocked by atherosclerosis, percutaneous intervention the opposite common femoral artery may be access for endarterectomy [9, 10]. Surgical cut down and removal of plaque of the common femoral artery is also common for embolectomy in lower limb arterial thrombolism [11]. The intravenous drug abuse is cause of infected femoral artery pseudoaneurysum. Untreated infected femoral artery pseudoaneurysum leads to sepsis, haemorrhage, loss of limb and death. In such case removal of debridement and ligation of common femoral artery proximal to the infected femoral artery pseudoaneurysum done [12]. The common femoral artery can be used to draw arterial blood when the blood pressure is so low that the radial or brachial arteries cannot be palpated. It is also used for endovascular therapy in critical limb ischemia so the surgeons recommended the common femoral artery for femoral stenosis [13]. General dilatation or aneurysum from the peripheral site commonly formed in the femoral artery. The femoral artery is susceptible to aneurysum second to the popliteal artery with the frequency of 1/10 of the aorta [14]. Femoral aneurysms are often present bilaterally [15,16]. The risk of growth and rupture of aneurysms in common femoral artery depends upon size of artery. 50-55mm aneurysms are surgically treated. Smaller aneurysms are treated with follow-up by ultrasonography. Further the diameters of common femoral artery also depends upon size of the body and sex. For all these reason the knowledge of the common femoral artery is essential in relation to the length and diameters of the common femoral artery.

We have considered the length of common femoral artery from midpoint of inguinal ligament to the origin of any deep branches of femoral artery. Amardeep Kaur et,al in 2019 studied on 40 limbs found the length of common femoral artery in the range of 310-350 mm; the external diameter of common femoral artery was in the range of 16-20 mm [17]. In present study the length of common femoral artery in the range of 61-70mm one case on right side and two cases on left side (Fig 3).and the external diameter of common femoral artery in range of 11-20 mm 11 limbs on right side (18.33%)and 13 limbs on left side 21.66% (fig 4).

Kulkarni S. et. at. reported in 2011on 60 femoral tringle and found the length of common femoral artery in the range of 10-20 mm ; in 4 limbs on right side and 8 limbs on left side, 40-50mm in limbs on right side and 3 limbs on left side . 61-70mm in 3 limbs on right side and zero limbs on left side [18].

In present study we found the length of common femoral artery in the range of 10-20mm in 11 limbs on right side(18.33%) and 7 limbs on left side (11.66%). Side. 31-50 mm in on right side 18 limbs (30%) and 20 limbs on left. (fig 5) ,61-70mm 1 on right side (1.66%) and 2 on left side (3.33%) . Sandgren T. et,al. reported the external diameter of common femoral artery et,al in 1998 on 122 healthy volunteer 59 male and 63 female where they found the external diameter of common femoral artery was 9.8mm \pm 9.7mm in male and 8.2mm \pm 8.2mm in female so the diameter increased in male than the female which depends upon size and age [19]. In our study we found external diameter of common femoral artery 24.56mm \pm 2.48mm on right side and 23.87mm \pm 2.69mm on left side. Sonssen in 1994, Sandgren in 1998, Prerace in 1993 and Devis in1997 in their studies reported the external diameters as 7,14,8,15 mm. In present study we found shortest stem was in one case on left side in range between 5-10 mm. One has to be very careful in dealing with the shortest stem of common femoral artery (Fig. 6) which was less than 3 cm of length. This length is important to enable identify the correct site for making incision for surgical exposure of the common femoral artery [20]. The long length of femoral artery has advantage for surgical procedure or for assessing the artery for therapeutic or diagnostic purpose because the chances of injury to other vessels will be less due to low level of ramification of femoral artery [21].

CONCLUSIONS

The knowledge of normal and variant anatomy of common femoral artery is important in angiographic interpretation and interventional procedure. The common femoral artery is commonly used in thigh flap surgeries, for catheterization angiography, CT scan and MRI investigation, plastic surgery, Doppler imaging. The knowledge of length and diameters of the common femoral artery will also be helpful to the Orthopaedic surgeons to avoid the complication of surgeries on fracture of head and neck of

femur. The course and ramification of the arteries of lower limb needs attention from surgeons, Orthopaedician, Radiologists, and Anatomists for more accuracy and precautions needed in respective fields.

References

- [1] Standring S. Grays anatomy text book 40th Edition Churchill Livingstone Elsevier London 2008. pp-1450-1452.
- [2] Parasa Savithri. A rare variation of right femoral artery. International Journal of anatomical Variation. 2013; 6:4-6.
- [3] Schunk, Michael, Schlte. Thieme atlas of Anatomy, General anatomy and Musculoskeletal system. 2006; Thieme, p -490, ISBN, 97831317.
- [4] Samarawickrama M.B, Nanayakkara B.G, Wimalagunaratna KWR, Nishantha D.G, Walawage U.B. Branching pattern of the femoral artery in the femoral triangle: a cadaver study. 2009; Galle Medical Journal. Vol 14: No 1:31-34.
- [5] Arora S, Michael A.M.D, Weber M.D, Charles J. Fox, M.D, Richard Neville, M.D, Anne Lidor, M.D, Anton N, Sidawy, D.C. Common femoral artery ligation and local debridement: A safe treatment for infected femoral artery pseudoaneurysms. 2000; Vol 33; No 5:991-993.
- [6] Bapist M, Sultana F, Hussain T. Anatomical variation in the origin of profunda femoris and its branches and diameter of the femoral artery. 2007; Med.J:3:523-527.
- [7] Sonesson B, Lanne T, Hansen F, Sandgren T. Infrarenal aortic diameter in the healthy person. Eur J Vasc Surg 1994; 8:89-95
- [8] Pearce W.H, Slaughter M.S, Maise S, Salyapongse A.N, Feinglass J, Mc Carthy W.J .et.al. Aortic diameter as a function of age, gender and body surface area. Surgery. 1993; 114:691—5.
- [9] Prakash, Kumari J, Bhardwaj A.K, Jose B. A, Yadav S.R. et.al. Variation in the origin of profunda femoris, medial and lateral circumflex femoral arteries: a cadaveric study in Indian population. Romanian J. of Morphology and Embryology. 2010, 51:(1): 167-170.
- [10] Jos C van den Berg. Optimal Techniques for Common Femoral Artery Access: Knowing the anatomy, choosing the best puncture site, and techniques for achieving safe common femoral artery access. 2013; Endovascular Today. 58-61.
- [11] M. Uzel, E. Tanyeli, Yildirim M. An anatomical study of the origin of Lateral circumflex femoral artery in Turkish population. Folia Morphol 2008; Vol.67, No.4, PP.226-230.
- [12] J.R. Sanudo, M. Roig, A. Rodriguez, B. Ferreira and J.M. Domenech et.al. Rare origin of the obturator, inferior epigastric and medial circumflex femoral arteries from a common trunk. 1993; J. Anat.:(183):161-163.
- [13] Davis R, Neiman H, Yao J. Ultrasound scan in diagnosis of peripheral aneurysms. Arch Surg 112: 55-8.
- [14] Mahasin F. Ali, Suhaib Alameen, Mohamed E.M. Gar-Elnabi and Caroline Edward Ayad. Measurement of the diameter of abdominal aortic and femoral artery in CTA. 2016; Asian Journal of Technology. Vol. 07, Issue:(11):3748-3751.
- [15] Anjankar P.V, Pradnyesh N, Panshewdikar, Thakre G, Mane U, Tekale V. Morphological study on branching pattern of femoral artery. A cadaveric study. Asian Journal of biomedical and pharmaceutical science. 04 (28): 2014: 34-3.
- [16] Vedat Sabanciogullary, Kisar M.I, Ekremolcu, Mehmet Cimen. The deep femoral artery and branching variation. Case report. Cumhuriyet Med J. 2009; 31:279-82.
- [17] Kaur A, Sharma A, Sharma M Kumar. Variation in the branching pattern of femoral artery. 2019; Int J Anat Res; 7:(12):617. DOI:10.16965/ijar.2018.433.
- [18] Kulkarni S, Nikade P, Vrushali V. A system of branching pattern of FA in femoral triangles in cadaver. International Journal of Recent Trends in science and Technology. 2013; Vol.6: No. 1: pp. 53-55.
- [19] Sandgren T, Sonesson B, Ahgren A.R, Lanne T. Factors predicting the diameter of the popliteal artery in healthy humans. J Vasc Surg. 1998; 28:284-9.
- [20] Dhaval K, Patil, Vaishali S, Anturliar. A study of the diameter of the femoral artery in cadavers. International Journal of anatomy 2019; 11(3):59-61.
- [21] Hughes P, Scott C, Bodenham A. Ultrasonography of the femoral vessels in the groin: implications for vascular access. Anaesthesia. 2000; 55 (12):1198-1202.