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CADAVERIC STUDY: MORPHOLOGICAL STUDY OF BRANCHES OF FEMORAL ARTERY IN FRONT OF THIGH

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ABSTRACT

The femoral artery and its branches supply blood to the thigh and related regions. Angiography and different investigations are done by catheterization of the femoral artery. 50 femoral triangles in 25 human were dissected. The femoral artery and its major branches were dissected. The average distance of the superficial circumflex iliac artery origin from mid inguinal point on right side 12.6 mm and on left side 14.4 mm. with highest distance 45mm. Average distance of origin of the superficial epigastric artery on right side 23.08mm and on left side 22.28mm from the mid inguinal point. Average distance of origin of the superficial external pudendal artery on right side 26.4mm and on left side 26.5mm from the mid inguinal point. The profunda femoris artery originated from either posterior posterolateral or lateral aspect of the common femoral artery. The distance of origin of profunda femoris from the mid inguinal point on the right side and left side commonly placed between 40 and 60mm. Deep external pudendal artery arises at the distance of 30.02 mm on right side and 29.80 mm on left side . The maximum distance from the midinguinal point is 65mm and minimum distance 5 mm. Descending genicular arteries arises from the superomedial side of the femoral artery at the distance of 29.61 mm on right side and 28.71 mm distance on the left side. Lateral circumflex femoral artery generally arises from the profunda femoris artery but in 20% it arises from the femoral artery. The average distance of the lateral circumflex femoral artery origin from the mid inguinal point on right side 65.93mm and on left side 63.95 mm. Average distance from the origin of the profunda femoris artery on right side 18.03 mm and on left side 19.45 mm. Medial circumflex femoral artery arises from the profunda femoris artery but in 36% it arises directly from the femoral artery.

Key Words: *Femoral Artery, Profunda Femoris, Medial Femoral Circumflex, Lateral Femoral Circumflex*

INTRODUCTION

The femoral artery is a large artery in the thigh. Its branches supply blood to the thigh and related regions. Angiography and different investigations are done by catheterization of the femoral artery. Normal anatomy and variations in origins of the profunda femoris, medial circumflex femoral and lateral circumflex femoral arteries are essential for clinicians for interventional procedures. For vascular reconstructive procedures in the proximal leg profunda femoris artery is useful (Siddharth *et al.*, 2005). The profunda femoris artery is used for arteriography, ultrasound and Doppler imaging, digital subtraction angiography and magnetic resonance imaging. Therefore knowledge of variations in height origin of femoral artery and profunda femoris artery and its branches distribution is of great significance.

MATERIALS AND METHODS

Cadavers preserved by injection method of embalming at Government Medical College Surat Gujarat were used for dissection purpose after due permission from authority. For this purpose 50 femoral triangles in 25 human were dissected. The femoral sheath was identified and its compartments were dissected thus clearing the femoral artery and its major branches. The profunda femoris artery with its medial and lateral circumflex femoral branches were dissected and identified, their origin and course were studied. The relation of the profunda femoris at its origin to the femoral artery was studied. The distance

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of the site of origin of the profunda from the mid inguinal point was measured with a scale and a caliper. The site of origin of the medial and lateral circumflex femoral arteries was studied and the distance of site of origin of each of them from the origin of profunda femoris was measured.

RESULTS AND DISCUSSION

Superficial branches of the femoral artery include superficial circumflex iliac, superficial pudendal and superficial epigastric. The observation of the superficial circumflex iliac arteries as follows:

The average distance of the superficial circumflex iliac artery origin from mid inguinal point on right side 12.6 mm and on left side 14.4 mm with highest distance 45mm. The Superficial circumflex iliac artery arises from the lateral side in all cases.

Average distance of origin of the superficial epigastric artery on right side 23.08mm and on left side 22.28mm from the mid inguinal point. Average distance of origin of the superficial external pudendal artery on right side 26.4mm and on left side 26.5mm from the mid inguinal point.

Table 1: Showing the average distance of the superficial arteries from the mid inguinal point

	Distance on Right side(mm)	Distance on Left side(mm)
Superficial circumflex iliac	12.6	14.4
Superficial epigastric	23.08	22.28
Superficial external pudendal	26.4	26.5

The profunda femoris artery originated from either posterior (4/50 in right side and 3/50 in left side), posterolateral (26/50 in right side and 28/50 in left side) or lateral (20/50 in right side and 19/50 in left side) aspect of the common femoral artery.

The distance of origin of profunda femoris from the mid inguinal point on the right side and left side commonly placed between 40 and 60mm with average on right side 47.9 mm and on left side 44.5 mm.

Table 2: Distance of profunda femoris artery from the mid inguinal point

Distance from mid inguinal point	No. on Right side	No. on Left side
10-20mm	2	2
20-30mm	3	3
30-40mm	5	6
40-50mm	12	14
50-60mm	14	12
60-70mm	12	13
70mm-80mm	2	0

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Deep external pudendal artery arises at the distance of 30.02 mm on right side and 29.80 mm on left side from the midinguinal point. The artery arises from the medial side of the femoral artery but in 2 cases it arises from the antero medial side.

The maximum distance from the midinguinal point is 65mm and minimum distance 5mm. In the case of maximum distance the deep external pudendal artery arises at the same level of the profunda femoris artery. Descending genicular artery arises from the superomedial side of the femoral artery at the distance of 29.61 mm on right side and 28.71 mm distance on the left side from the mid inguinal point.

Lateral circumflex femoral artery generally arises from the profunda femoris artery but in 10 cases (20%) it arises from the femoral artery out of which 6 cases are bilateral.

The average distance of the lateral circumflex femoral artery origin from the mid inguinal point on right side 65.93mm and on left side 63.95 mm. Average distance from the origin of the profunda femoris artery on right side 18.03 mm and on left side 19.45 mm.

Medial circumflex femoral artery arises from the profunda femoris artery but in 18 cases (36%) it arises directly from the femoral artery out of which 9 cases are bilateral. Average distance from the origin of the mid inguinal point on right side 67.45mm and on the left side 69.08 mm.

Table 3: Showing distance of the branches of femoral artery from the mid inguinal point

Name of branch	Distance on right side	Distance on left side
Superficial circumflex iliac	12.6 mm	14.4mm
Superficial external pudendal	26.4mm	26.5mm
Superficial epigastric	23.08mm	22.28mm
Profunda femoris artery	47.9mm	44.5mm
Deep external pudendal	30.02mm	29.08mm
Descending genicular	29.61mm	28.71mm

Different anatomical variations are visible at division of the femoral artery. This explained by fact that profunda femoris is actually branch of the internal iliac artery slowly shifted to femoral artery in humans with progressive evolution. Hence anatomical variations may be visible along course of femoral artery. Vaas (1975) noted that the profunda femoris artery acts as a collateral vessel in the occlusion of the femoral artery and for this important function, having a large caliber.

Anatomy of origin is important to puncture femoral artery to avoid complications like arteriovenous fistula formation.

The variation of the femoral artery is shown in figure below.

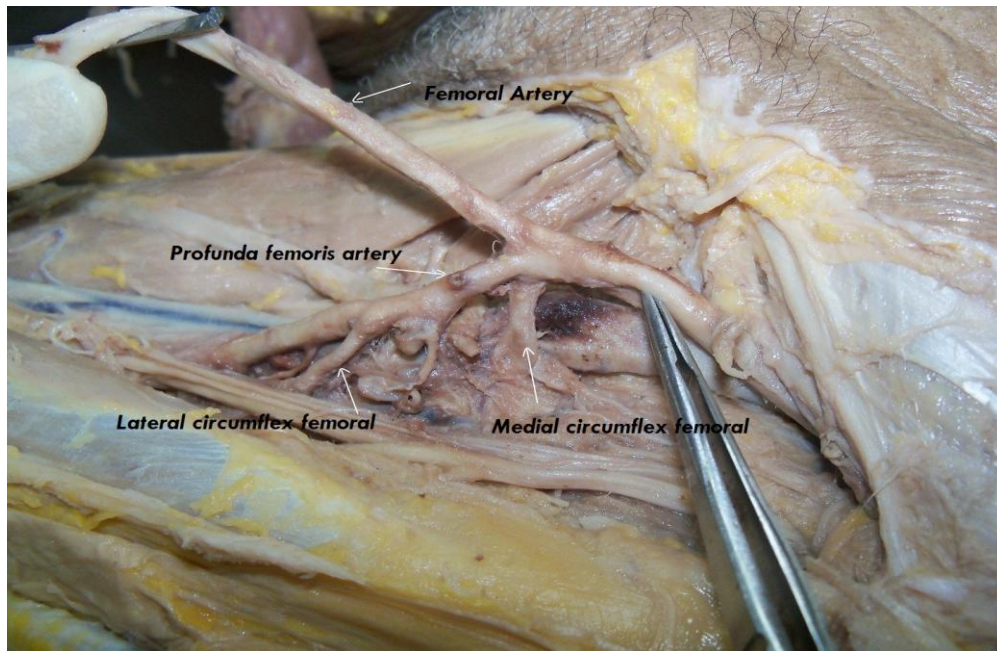


Figure 1: Showing the femoral artery shows the common stem from where the profunda femoris artery and medial circumflex femoral artery arises.

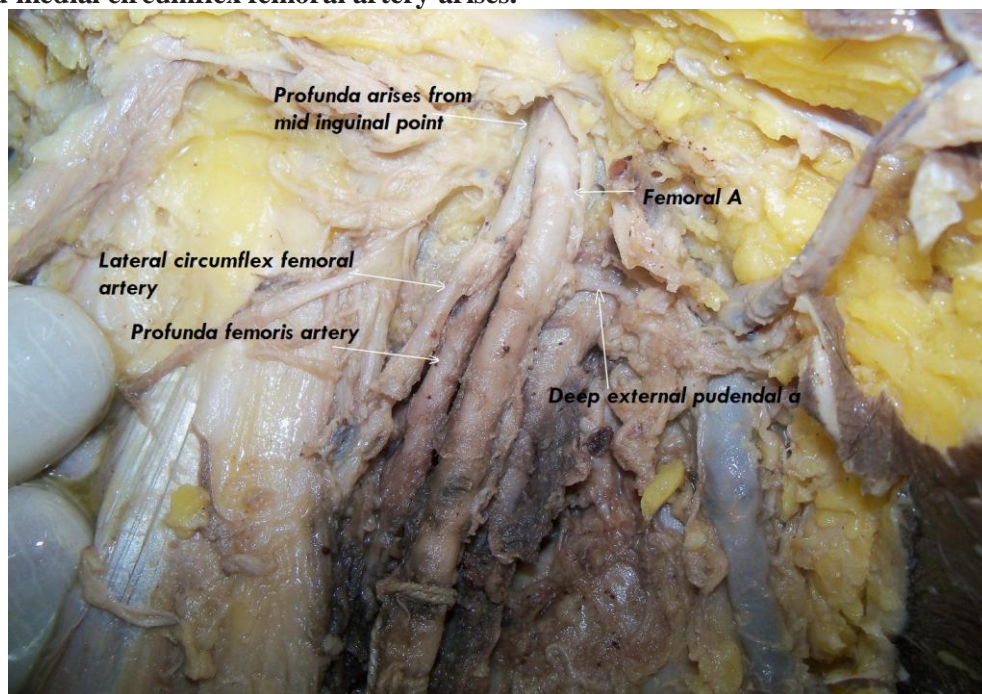


Figure 2: Showing higher origin of the profunda femoris artery at the mid inguinal point

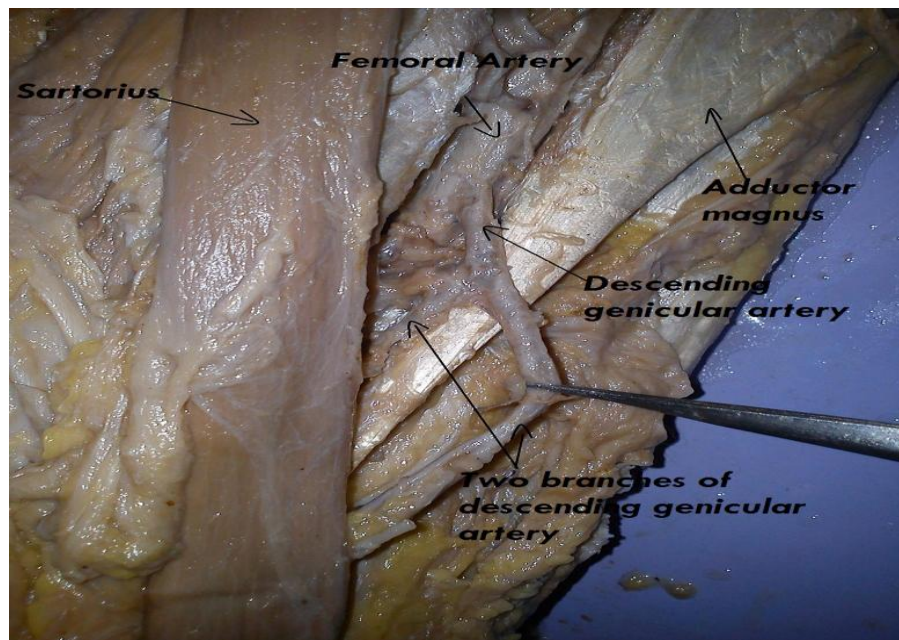


Figure 3: Showing descending genicular artery

Following table is for comparing the variations of origin of profunda femoris artery in different studies.

Table 4: Showing comparison of the origin of the profunda femoris artery

Different studies	Distance of origin of profunda femoris artery from mid inguinal point
Siddharth P <i>et al.</i> , 1985	44mm
Dixit DP <i>et al.</i> , 2001	47.5mm
Bannister LH <i>et al.</i> , 1995	35mm
Snell RS., 1992	40mm
Present Study	47.9mm on Rt side 44.5mm on left side average of 46.2 mm

As we can see from above table that the average distance of the profunda femoris artery origin from the mid inguinal point is around 40 to 50 mm in adult cadavers. There is significant difference between right and the left side but the reasons not known. Study on the prevalence of anatomical variations related to the origin of medial and lateral femoral circumflex arteries by various authors has been discussed in below table. We observed that origins of the medial and lateral femoral circumflex arteries directly from the femoral artery were associated with distal shift of the level of separation of the profunda femoral artery from the femoral artery.

None of the study shows the distance of the superficial branches distance from the mid inguinal point. We have studied the distance of the superficial branches of the femoral artery from the mid inguinal point. Our study shows that Deep external pudendal artery arises at the distance of 30.02 mm on right side and 29.80 mm on left side from the midinguinal point. The artery arises from the medial side of the femoral artery

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but in 2 cases it arises from the antero medial side. The maximum distance from the midinguinal point is 65mm and minimum distance 5mm. In the case of maximum distance the deep external pudendal artery arises at the same level of the profunda femoris artery. In our study Descending genicular artery arises from the superomedial side of the femoral artery at the distance of 29.61 mm on right side and 28.71 mm distance on the left side from the mid inguinal point.

The anatomical knowledge of the level of origin is important in avoiding iatrogenic femoral arteriovenous fistula formed during puncture of femoral artery. Table Below compares the variations related to the site of origin of profunda femoris artery in different studies as we can see from above table that the average distance of the profunda femoris artery origin from the mid inguinal point is around 40 to 50 mm in adult cadavers.

There is significant difference between right and the left side but the reasons not known.

Studies on the prevalence of anatomical variations related to the origin of medial and lateral femoral circumflex arteries by various authors have been discussed in below table. We observed that origins of the medial and lateral femoral circumflex arteries directly from the femoral artery were associated with distal shift of the level of separation of the profunda femoral artery from the femoral artery.

Table 5: Medial circumflex femoral artery origin and lateral circumflex femoral artery origin prevalence

Study	Origin from profunda femoris artery	Origin from common femoral artery including common stream
Tanyeli E <i>et al.</i> 2006	79.0	21.0
Siddharth P <i>et al.</i> , 1985	63.0	37.0
Dixit DP <i>et al.</i> 2001	62.5	37.5
Gautier E <i>et al.</i> 2008	83.7	16.7
Clarke SM and Colborn GL 1993	53.0	47.0
Present study	64.0	36.0
Lateral circumflex femoral artery origin		
Uzel M <i>et al.</i> 2008	77.3	22.7
Fukuda H <i>et al.</i> 2005	78.6	21.4
Dixit DP <i>et al.</i> 2001	83.34	16.66
Choi SW <i>et al.</i> 2007	86.8	13.2
Present study	80.0	20.0

Conclusion

These variations of the origin of profunda femoris artery from the femoral artery and its branches along with internal diameter of the femoral artery needs to be taken into account and considered in all the surgical and interventional procedures. The origin of the profunda femoris artery in our study is placed

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more distally than the other studies. However, the left profunda femoris originates more proximally than the right profunda origin in most of the cases. We encountered that in 23% of cases the profunda is originated from the lateral aspect of the common femoral artery. Interestingly the profunda started laterally when it originates closer to the inguinal ligament. The lateral circumflex femoral artery and medial circumflex femoral artery commonly originate from the profunda femoris artery close to the origin of the profunda femoris artery. 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.

REFERENCES

- Bannister LH, Berry MM and Collins P (1995).** Gray's Anatomy. In: Cardiovascular system, 38 Edition, Edited by Gray H, Bannister LH, Berry MM, Williams PL. Churchill Livingstone London. **15** 66–68.
- Colborn GL, Mattar SG, Taylor B, Skandalakis JE and Lumsden AB (1995).** The surgical anatomy of the deep femoral artery. *American Journal of Surgery* **61**(4) 336-46.
- Choi SW, Park JY, Hur MS, Park HD, Kang HJ, Hu KS and Kim HJ (2007).** An anatomic assessment on perforators of the lateral circumflex femoral artery for anterolateral thigh flap. *Journal of Craniofacial Surgery* **18**(4) 866–871.
- Clarke SM and Colborn GL (1993).** The medial femoral circumflex artery: its clinical anatomy and nomenclature. *Clinical Anatomy* **6**(2) 94–105.
- Dixit DP, Mehta LA and Kothari ML (2001).** Variations in the Origin and Course of Profunda Femoris. *Journal of Anatomical Society of India* **50**(1) 6-7.
- Fukuda H, Ashida M, Ishii R, Abe S and Ibukuro K (2005).** Anatomical variants of the lateral femoral circumflex artery: an angiographic study. *Surgical Radiological Anatomy* **27** 260–264.
- Gautier E, Ganz K, Krugel N, Gill T and Ganz R (2008).** Anatomy of the medial circumflex femoral artery. *Journal of Bone and Joint Surgery [Britain]* **82-B** 679-83.
- Siddharth P, Smith NL, Mason RA and Giron (2005).** Variational Anatomy of the Deep Femoral Artery. *The Anatomical Record* **212**(2) 206-9.
- Siddharth P, Smith NL, Mason R A and Giron F (1985).** Variational anatomy of the deep femoral artery. *Anatomical Record* **212**(2) 206–209.
- Snell RS (1992).** *Clinical anatomy of medical student* **4**, Edited by Sell RS. Little Brown and Company, Boston 607.
- Tanyeli E, Uzel M, Yildirim M and Celik HH (2006).** An anatomical study of the origins of the medial circumflex femoral artery in the Turkish population. *Folia Morphology* **65**(3) 209–212.
- Uzel M, Tanveli E and Yildirim M (2008).** An anatomical study of the origins of lateral circumflex femoral artery in the Turkish population. *Folia Morphology* **67**(4) 226-30.
- Vaas F (1975).** Some considerations concerning the deep femoral artery, *Archivum Chirurgicum Neerlandicum* **27**(1) 25–34.