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Research Paper

Profunda Femoris Artery and its Branching Pattern and Variations

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Key Words: Profunda femoris artery, Variations, Medial circumflex artery, Lateral circumflex artery & Perforators

Abstract: Profunda femoris artery is the main artery of the posterior compartment of thigh. 40 adult specimens and 10 foetal specimens were dissected and the level of origin of Profunda femoris artery in adult cadavers varied from 2 cms to 9 cms from midpoint of inguinal ligament and 0.8 cms to 1 cms in fetuses. In the adult in 4 specimens Lateral circumflex femoral artery was arising from Femoral artery, and in 5 specimens Medial circumflex was arising from Femoral artery & out of 10 fetus specimens in 8 specimens Medial & Lateral circumflex femoral arteries were arising from the Femoral artery and in two specimens from the Profunda femoris artery. All the Perforating arteries were arising from Profunda femoris except in 1 adult specimen where the second perforator was arising from Femoral artery. Profunda femoris artery is an important large branch of Femoral artery taking part in the longitudinal anastomoses at the back of the thigh. Thorough knowledge about the normal course and the variations of Arteria profunda femoris is essential for the vascular and orthopaedic surgeons and hence a detailed study of this artery was undertaken.

Profunda femoris artery (deep femoral artery) is an important large branch of femoral artery 3.5 cm distal to the taking part in the longitudinal anastomoses at the back of the thigh. Since superficial femoral artery occlusion is more common, surgical exposure of the Profunda femoris artery is often necessary in vascular reconstructive procedures. Management of groin sepsis involving the Femoral artery requires removal of infected tissue or prosthetic material and restoration of blood flow in many cases through the Profunda femoris artery.

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The knowledge about the normal Profunda femoris artery and its variations are very important for the vascular surgeon according to which he can modify the surgical procedure in a more satisfactory way. This will help him to prevent most of the common post operative complications. A thorough knowledge about the normal course and its variations were essential.

Hence a detailed study of the profunda femoris artery and its variations in the branching pattern was undertaken.

Materials and Methods

40 thigh specimens from adult human cadavers and 10 thigh specimens from dead born fetuses were made use of. Conventional dissection method was used for the study.

Observations

Observations were made under the following headings:

i. The level of origin of profunda femoris artery from the midpoint of inguinal ligament.
ii. Relation of origin of profunda femoris artery to femoral artery
iii. Branches

The distance of origin of the profunda femoris artery from the midpoint of the inguinal ligament ranged from 0.2 to 9 cm with an average 3.88 cm in adult cadavers (Table 1). In 36 specimens the distance of the origin of the profunda femoris artery from the midpoint of the inguinal ligament was less than 3.88 cm & in four specimens it was more than 3.88 cm (Table 2)(Fig.1).

In the dead born fetuses the origin of the Profunda femoris artery from the midpoint of the inguinal ligament ranged from 0.80 to 1.00cms with an average of 0.94 cm in length (Table 3) (Fig. 2). In four specimens origin of Profunda femoris from the midpoint of the inguinal ligament was less than 0.94 cm and in 6 specimens it was more than 0.94 cm. 38(95%) out of 40 adult specimens had the normal posterolateral origin (Fig. 3) and two (5%) of them had a more lateral origin (Fig. 4) (Table 4) from the femoral artery.

In all the 10 fetus specimens the profunda femoris artery was arising from the lateral side of the Femoral artery.

Regarding the branches, in 35(87.5%) out of 40 specimens of adult cadavers the Medial circumflex femoral artery was arising from the posteromedial side of the profunda femoris artery (Fig. 5). In 5(12.5%) specimens it was arising directly from the Femoral artery (Fig. 6) (Table 5). In 36(90%) out of 40 specimens Lateral circumflex femoral artery was arising from the profunda femoris artery (Fig. 7). In four (10%) specimens it was arising from Femoral artery (Fig. 8) (Table 6).

ADULT CADAVERIC PRESENT STUDY			
TABLE – I			
DISTANCE OF ORIGIN OF PROFUNDA FEMORIS ARTERY FROM THE MIDPOINT OF INGUINAL LIGAMENT			
Spec.No	Distance in cm	Spec. No	Distance in cm
1	9	21	9
2	3.8	22	3.8
3	3.5	23	3.5
4	3.5	24	3.5
5	3.6	25	3.6
6	3.5	26	3.5
7	2	27	2
8	3.6	28	3.6
9	3.6	29	3.6
10	3.7	30	3.7
11	6	31	6
12	3.5	32	3.5
13	3.5	33	3.5
14	3.7	34	3.7
15	3.4	35	3.4
16	3.6	36	3.6
17	3.5	37	3.5
18	3.6	38	3.6
19	3.5	39	3.5
20	3.5	40	3.5
			Average length: 3.88 cm

VARIABLE	SPECIMENS IN NUMBER	PERCEENTAGE
Less than 3.88 cms	36	90%
More than 3.88 cms	04	10%

Table 2

DISTANCE OF ORIGIN OF PFA FROM INGUINAL LIGAMENT	
AVERAGE DISTANCE = 3.88 cms	
DISTANCE	PERCENTAGE
Less than the average distance	90%
More than average distace	10%

In 2(20%) out of 10 fetus specimens the Lateral & Medial circumflex femoral arteries were arising the Femoral artery (fig 9) and in the rest of the eight specimens (80%) they were arising from the Profunda femoris artery.

Table 3

Fetal cadaveric present study	
Distance of origin of profunda femoris artery from the inguinal ligament	
Spec. No.	Distance in cm
1	0.9
2	1.0
3	0.8
4	1.0
5	1.0

6	0.9
7	1.0
8	0.8
9	1.0
10	1.0

Average length: 0.94 cm		
Variable	Specimen in number	Percentage
Less than 0.94 cm	4	40%
More than 0.94 cm	6	60%

In 34 (85%) specimens the Lateral circumflex femoral artery gave three branches - ascending, transverse & descending (Fig. 7, 8). In 6 (15%) specimens four branches were arising – 1 ascending, 2 transverse and 1 descending (Table 7) (Fig. 10).

Table 4

Origin and course of profunda femoris artery from femoral artery	
Type	Present study
Posterolateral	95%
Lateral	5%

Table 5

Origin of medial circumflex femoral artery	
From profunda femoris artery	87.5%
From femoral artery	12.5%

All the perforating arteries were arising from profunda femoris (Fig. 11) except in 1 adult specimen where the second perforator was arising from Femoral artery (Fig. 12) (Table 8).

Table 6

Origin of lateral circumflex femoral artery	
From profunda femoris artery	90%
From femoral artery	10%

Table 7

Lateral circumflex artery – branches	
Three branches	85%
Four branches	15%

Table 8

Origin of perforators	
From profunda femoris artery	95%
From femoral artery	5%

Discussion

A number of scientists have worked on this area. According to them the origin ranged from 1 to 9.7 cm. In the present study the distance varied from 2 to 9 cm with an average distance of 3.88 cm. The present finding in the South Indian cadavers coincided with that of others (Susan, 2005; Wood Jones, 1953; Boilean Grant, 1958; Gene et al. 1995; Sinnatamby, 1999).

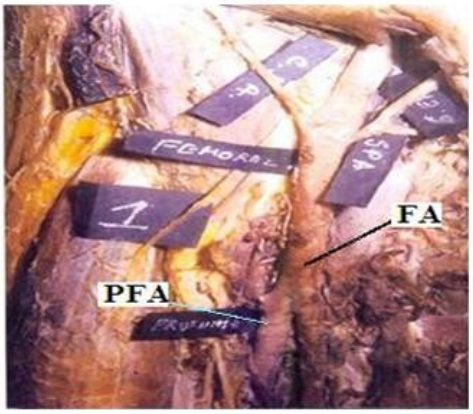
According to Hollinshed (1957), Gene (1995), the origin of profunda femoris artery was posterolateral in 95% cases so also in the present study. The more lateral origin seen in 5% of cases coincides with that of Susan (2005) and Sinnatamby (1999).

Medial circumflex femoral artery was arising from the profunda femoris artery in 84.5% cases and in 12.5 % from the Femoral artery and these findings were similar to that of Gene (1995).

According to Hollinshed, Lateral circumflex was arising from the profunda femoris in 90% of the cases and in 10% from the Femoral artery and the present study reveals the same percentage of incidence. The Lateral circumflex artery giving more than three branches in 15% of the specimens was not reported by the earlier workers.

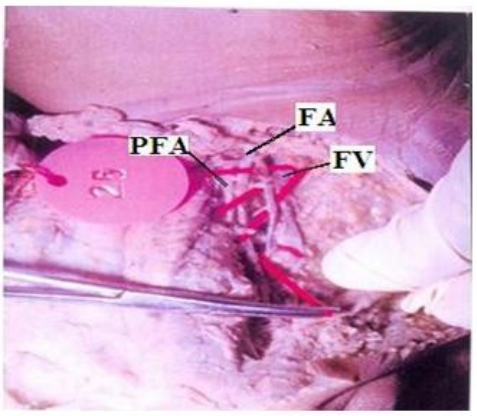
In 95% of the specimens three perforators were seen arising from the profunda agreeing with the findings of many authors. In 5% of the specimens, the 1st and 3rd perforators were arising from the profunda femoris and the 2nd arising from the Femoral artery. This was rare and was not documented so far.

Fig. 1 Right side long distance of origin of profunda femoris in adult cadavers (More than average distance- 3.88cm)



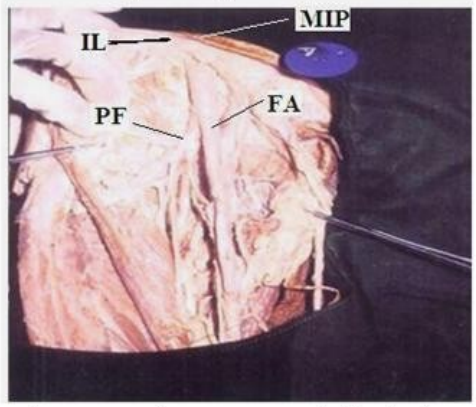
(PFA – profunda femoris artery, FA- femoral artery)

Fig.2 In fetus origin of profunda femoris from femoral artery was close to the midpoint of inguinal ligament



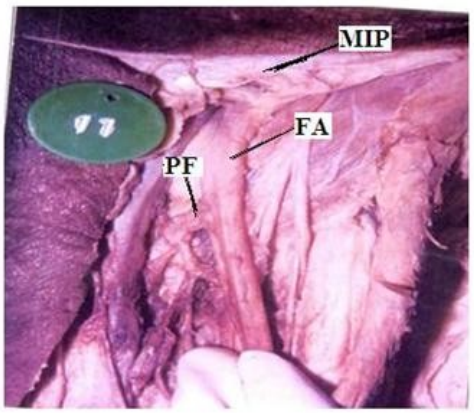
(FA- Femoral artery, FV – Femoral vein, PF- Profunda femoris artery)

Fig. 3 Right side- Normal posterolateral origin of PFA from Femoral artery. IL- inguinal ligament



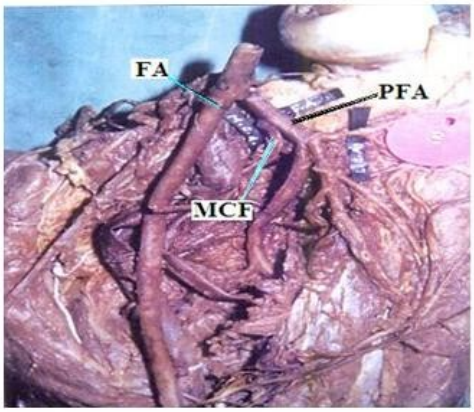
(FA- Femoral artery MIP- Mid inguinal point, PF- Profunda femoris artery)

Fig.4 Right side- Lateral origin of PFA from Femoral artery



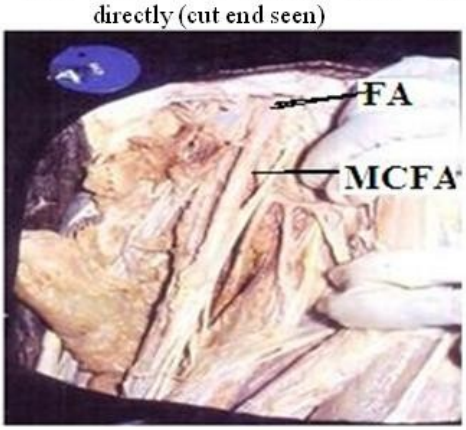
(MIP- Mid inguinal point, FA- Femoral artery, PFA- Profunda femoris artery)

Fig.5 Left side MCFA from PFA ; PFA- Profunda femoris artery,



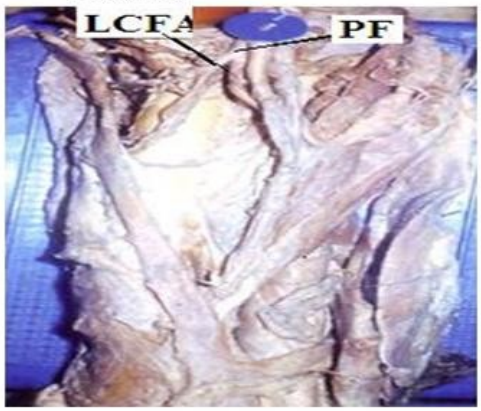
(MCFA- Medial circumflex femoral artery)

Fig.6 Right side MCFA from FA directly (cut end seen)



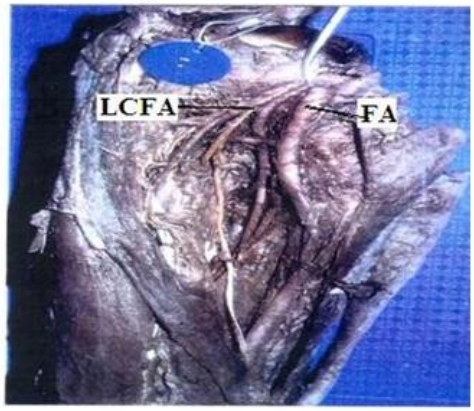
(MCFA- Medial circumflex femoral artery, FA- Femoral artery)

Fig.7 Left side LCFA – from PFA With 3 branches



(PFA- Profunda femoris artery, LCFA- Lateral circumflex femoral artery)

Fig.8 Right side LCFA – from femoral artery with 3 Branches



(LCFA- Lateral circumflex femoral artery, FA – Femoral artery)

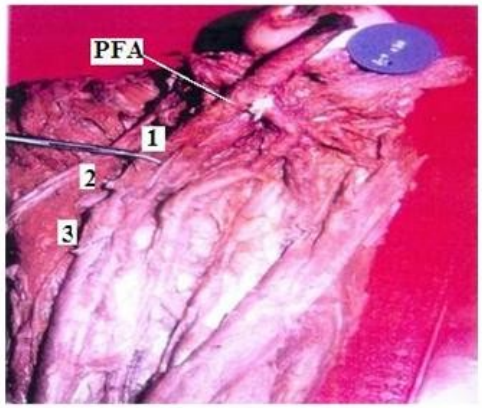
Fig.9 In fetus on the right side LCFA and MCFA from the femoral artery

LCFA- Lateral circumflex femoral artery, FA – Femoral artery, MCFA- Medial circumflex femoral artery

Fig.10 Right side 4 branches from LCFA

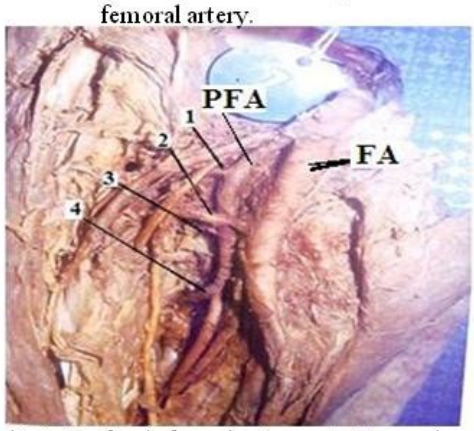
(LCFA- Lateral circumflex femoral artery, FA – Femoral artery)

Fig.11 Right side PFA with 3 perforators – Normal



(PFA- Profunda femoris artery; 1,2,3- Perforators)

Fig.12 3-Perferators coming from the profunda femoris & second perforator was coming from the femoral artery.



(PFA- Profunda femoris artery, FA: Femoral artery)

Conclusion

The profunda femoris artery is the artery of the posterior compartment and the knowledge about its variation is immaterial for orthopedic and vascular surgeons. In addition to the variations reported by the earlier authors, the present study revealed four branches arising from Lateral circumflex artery and the 2nd perforating artery arising from the Femoral artery.

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