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ANATOMICAL VARIATIONS OF THE ORIGIN OF PROFUNDA FEMORIS ARTERY – A CADAVERIC STUDY

Anatomy

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ABSTRACT

INTRODUCTION: The Profunda Femoris Artery (PFA) is a large branch arises from the lateral or posterolateral part of the Femoral Artery (FA), about 3 to 5cm below the inguinal ligament. The PFA is in close proximity to femoral vessels in the femoral triangle the precise anatomical knowledge of PFA and its branches is of great significance in preventing profuse haemorrhage, pseudo aneurysms and traumatic AV fistulae while doing any procedures or surgeries in that area.

AIM & OBJECTIVES: To study the anatomical variations in source of origin, site of origin and distance of origin from midpoint of inguinal ligament of PFA.

MATERIALS AND METHODS: The present observational study was conducted on the dissection of 70 lower limbs of 35 adult cadavers (27 male & 8 female) in the Department of Anatomy S.V.S Medical College, Mahabubnagar over a period of 2 years. Contents of the femoral triangle were dissected as per Cunningham's manual. The source of origin, site, distance of origin from mid points of inguinal ligament and course of PFA were noted. Collected data was analysed statistically.

RESULTS: In the present study the PFA was arising from the femoral artery in all these 70 Lower Limbs. The commonest site of origin of PFA was postero lateral side of femoral artery in 17 (48.6%) Limbs on right side, 16(45.8%) limbs on left side, followed by lateral side of FA in14(40%) limbs on right side, 12(34.3%) limbs on left side ,followed by posterior in 4(11.4%) limbs on each side. The PFA was originating from medial side of FA only in 3 (4.29%) left limbs

The PFA was taking origin below the inguinal ligament most commonly at the distance of 3-4cm in 10(29) limbs on right side, 15(43%) limbs on left side and at 4-5cm in 8(23%) limbs on right side, 5(14%) limbs on left side, at 2-3cm in 8 (23%) limbs on right side, 6(17%) limbs on left side, at 5-7cm in 3(8.5%) limbs on right in 1 (3%) limbs on left side.

The PFA was taking origin higher level with in 2cm below the midpoint of inguinal ligament in 6 (17%) limbs on right side, 8(23%) limbs on left side.

CONCLUSIONS: The knowledge of site and level of origin of Profundafemoris artery helps in avoiding the formation of iatrogenic femoral arteriovenous fistula (0.1-1.5%) while performing femoral artery puncture during femoral puncture, cardiac catheterisation and radiological procedures

KEYWORDS

Femoral artery, Origin, Distance, Profunda femoris artery

INTRODUCTION:

The Profunda Femoris Artery (PFA) (Deep Femoral Artery) is a large branch arises from the lateral or posterolateral part of the Femoral Artery (FA), about 3 to 5cm below the inguinal ligament.[1,3,8]

Profunda femoris artery usually gives rise to Medial circumflex femoral artery (MCFA), Lateral circumflex femoral artery(LCFA) and Perforating arteries and multiple muscular branches. It is the chief blood supply to the most of muscles and skin of thigh. PFA contribute to the Trochanteric and Cruciate anastomoses at upper end of femur and anastomosis around knee joint below, thus becoming a major collateral channel between the ilio – femoral segment above and popliteal system below in the lower limb.[1,2,3]

The PFA is in close proximity to femoral vessels in the femoral triangle the precise anatomical knowledge of PFA and its branches is of great significance in preventing profuse haemorrhage, pseudo aneurysms and traumatic AV fistulae while doing any procedures or surgeries in that area.

The status of PFA is important in the choice of lower limb revascularization such as Profundaplasty[4] in vascular occlusive diseases and trauma of the limbs. It is also used in coronary artery bypass grafting (CABG)[5] and used for extra cranial – intracranial (EC-IC)[6] bypass surgery by neuro surgeons.

AIM & OBJECTIVES:

To study the anatomical variations in source of origin, site of origin and distance of origin from mid point of inguinal ligament of PFA.

MATERIALS AND METHODS:

The present observational study was conducted on the dissection of 70 lower limbs of 35 adult cadavers (27 male & 8 female) in the Department of Anatomy S.V.S Medical College, MahabubNagar over a period of 2 years.

Contents of the femoral triangle were dissected by giving following incisions.

Incisions:

Incision I: From anterior superior iliac spine to the public tubercle.

Incision II: A transverse incision at the junction of the middle third and lower 1/3rdof thigh.

Incision III: A vertical incision from the midpoint of incision I downwards to the middle of incision II and downwards to knee.

Skin, superficial fascia, deep fascia was reflected, femoral vessels and PFA were exposed by opening the femoral sheath. The source of origin, site, distance of origin from mid points of inguinal ligament and course of PFA were noted. Collected data was analysed statistically.

RESULTS:

The present study was conducted on 70 lower limbs of 35 adult cadavers. (27 male & 8 female) in the Department of Anatomy. The following observations were noted.

Source of origin of PFA

In all these 70 Lower Limbs the PFA was arising from the femoral artery only.

But the disposition or site of the origin of the PFA from femoral

artery is postero lateral, lateral, posterior and rarely medial as shown in table-1.

Table No-1: Showing the Site of origin of PFA from femoral artery

Position of origin of PFA	Right lower Limb		Left lower Limb		Both lower limbs	
	No (35)	%	No (35)	%	No (70)	%
Postero -Lateral	17	48.6	16	45.8	33	47.1
Lateral	14	40	12	34.3	26	37.1
Posterior	4	11.4	4	11.43	8	11.4
Medial	0	0	3	8.57	3	4.3

The commonest site of origin of PFA was postero lateral side of femoral artery in 17 (48.6%) Limbs on right side, 16(45.8%) limbs on left side (Figure-1), next common origin was lateral side of FA in14(40%) limbs on right side, 12(34.3%) limbs on left side (Figure-2) followed by posterior in 4(11.4%) limbs on each side (Figure-3). The PFA was originating from medial side of FA only in 3 (4.29%) left limbs (Figure-4).

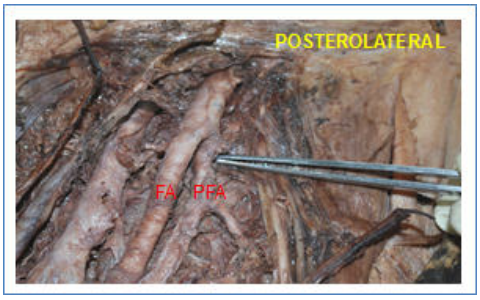

Figure-1. Site of origin of PFA (Postero-lateral) (Right limb)

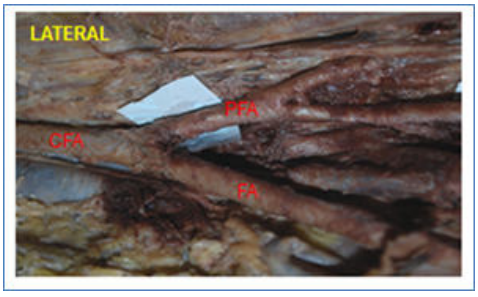

Figure-2. Site of origin of PFA (Lateral) (Left limb).

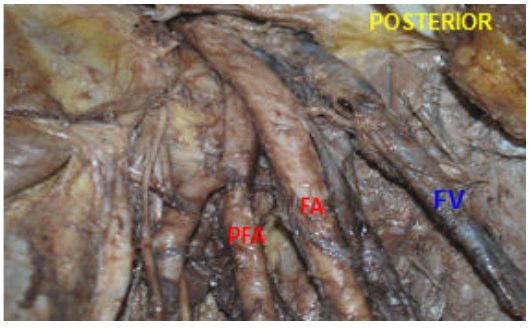

Figure-3. Site of origin of PFA (Posterior) (Right limb)

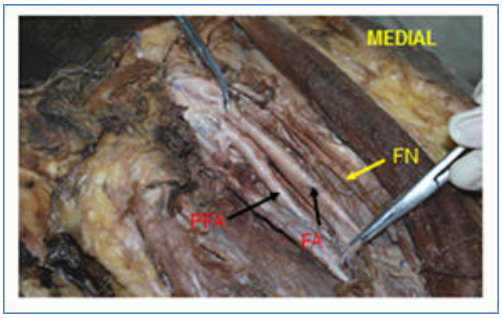

Figure-4. Site of origin of PFA (Medial) (Left limb)

Table no-2. Showing the Distance of origin of PFA below the midpoint of inguinal ligament

Distance range (cm)	Right lower Limb		Left lower Limb		Both lower limbs	
	No (35)	%	No (35)	%	No (70)	%
0-2	6	17	8	23	14	20
2-3	8	23	6	17	13	19
3-4	10	29	15	43	25	36
4-5	8	23	5	14	13	19
5-7	3	9	1	3	4	6

The PFA was taking origin below the inguinal ligament most commonly at the distance of 3-4cm (Figure-5) in 10(29) limbs on right side, 15(43%) limbs on left side and at 4-5cm in 8(23%) limbs on right side, 5(14%) limbs on left side, at 2-3cm in 8 (23%) limbs on right side, 6(17%) limbs on left side, at 5-7cm in 3(8.5%) limbs on right in 1 (3%) limbs on left side.

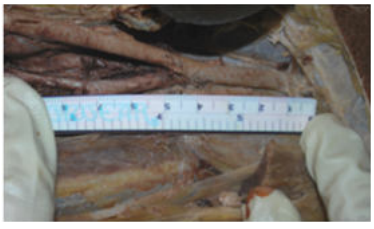

Figure-5: Distance of origin of PFA (4-5cm) (Left limb)

The PFA was taking origin higher level with in 2cm below the midpoint of inguinal ligament in 6 (17%) limbs on right side, 8(23%) limbs on left side (Figure-6)

Figure-6: Distance of origin of PFA (Left limb)

DISCUSSION:

The knowledge of the site of origin of PFA is of practical importance while performing femoral puncture, interventional radiological procedures and surgeries in femoral triangle area and hip surgeries through posterior approach to prevent undue haemorrhage, iatrogenic AV fistulae and avascular necrosis of head of the femur.

The PFA arises from the femoral artery in all of these 70 limbs in the present study these results are in consistent with the studies done by Sahana [10], Prakash et al [11].

Site of origin of PFA mostly from posterolateral aspect of femoral artery in both sides in the present study(47.14%), and same was reported in the several studies[11,12,13,14] Our results were similar to that of results of (48%) Lippert H and Pabst R[18] and of (50%) Prakash[11] et al, and close to (42.1%) Daksha[14] et al study, higher than that of several studies done by (40%) Siddarth & Smith [7], (39%) Marina Baptist [12].

In the present study the next common site of origin of PFA is lateral in 37.14% limbs when compared to 5% of T. Manjappa and L.C. Prasanna[15] study. The posterior origin is seen only in 11.43% unlike higher incidence of posterior origin of PFA as reported in studies done by Prakash et al 46.9% limbs.

In 4.29% (3/70),PFA is taking origin from the medial aspect of femoral artery and coursing over the femoral vein and is comparable to 5% of T.Manjappa and L.C. Prasanna[15] and such type of variation carries a risk of damage to the large arterial channel while collecting blood in infants.

Distance of origin of PFA from midpoint of inguinal ligament in

the present study is mostly between 3-4cms as seen in 35.71% of limbs correlating with other studies done by (39.5%) Daksha[14] et al and (40%) Marina Baptist[12].

The next common distance of origin in the present study is 4-5cms in 20% correlating with median distance of 4.4cms in 100 legs as reported by Siddarth & Smith[7] but varying with Dixit. Dp[13].

In 11.42% (18/70) in different cadavers the PFA is taking higher origin at less than 1cm below the inguinal ligament and such high origin of PFA is reported by Daksha[14] et al. The advantage of such high origin of PFA is that it can be used for catheterisation for doing angiograms, selective therapeutic embolization, ultrasound and Doppler imaging digital subtraction angiography and magnetic resonance imaging.

CONCLUSIONS:

The anatomical knowledge of PFA and its branches is of great significance in preventing profuse haemorrhage, pseudo aneurysms and traumatic AV fistulae while doing any procedures or surgeries in that area.

In the present study the origin of PFA from the femoral artery in all these 70 limbs .The most common site of origin of Profunda femoris artery is from the Posterolateral aspect of Femoral artery in 47.14%) and the next common site is lateral in37.14% limbs. The Profunda femoris artery is arising from medial side of femoral artery and crossing anterior to the femoral vein in 4.29% in our study.

In the present study the distance of origin of Profunda femoris artery from the femoral artery is 3-5cms below the midpoint of inguinal ligament in 54.29%. Profunda femoris artery is taking higher origin at less than 1cm below the inguinal ligament in 11.43% of limbs and the advantage of such high origin of PFA make it more accessible for various clinical procedures in femoral triangle.

CONFLICTS OF INTEREST: None

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