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Study Of Branching Pattern And Surgical Anatomy Of Femoral Artery

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Abstract

Background: The femoral artery is the continuation of the external iliac artery. It begins behind the inguinal ligament midway between the anterior superior iliac spine and pubic symphysis, descends along the anteromedial part of the thigh in the femoral triangle, enters and passes through the adductor canal, and becomes the popliteal artery as it passes through an opening in adductor Magnus near the junction of the middle and distal thirds of the thigh. Since the femoral artery has vast clinical applications in almost all fields of medicine, it is crucial to know the arterial characteristics of the lower extremity before proceeding with any interventional or surgical procedure. Due to the above-said reasons, We have done a cadaveric study about the femoral artery, its branching pattern, and variations, with its clinical application. The origin of the femoral artery coincided with the mid-inguinal point in most cases. The origin of the profundal femoris artery is lateral to the femoral artery in most cases.

Aim Of The Study: We hope that this study of the branching pattern and surgical anatomy of the femoral artery will be useful to cardiologists, radiologists, plastic surgeons, and vascular surgeons in the future. Knowledge of the anatomical variants in the deep femoral artery is imperative both for interventional radiologists and surgeons. Especially in reconstructive surgery, the possibility of different sources supplying the skin and the pedicle compel surgeons to acquire an awareness of this subject

Methods: the study was conducted in the year 2020, at the Department Of Anatomy, Government Medical College, Vellore, Tamil Nadu, India We studied femoral artery and its branches on 25 embalmed and formalin-fixed cadavers by dissection method. We observed that the profundal femoris artery, the largest branch of the femoral artery arises from the posterolateral aspect in the majority of the cadavers. The lateral circumflex femoral artery originates from the femoral artery in nearly 70% of cadavers. The diameter of the femoral artery was measured at the level of 1cm below the inguinal ligament with the use of vernier calipers and by silicone gel method. Initially the vernier calipers were checked for zero error with the jaws closed. The jaws of the calipers were placed on the inner side of the vessel wall with firm pressure on the artery. When both the locking screws of the calipers, were tightened the caliper was removed from the artery and the measurement in the main scale of the calipers was read to the nearest tenth of a centimeter.

Results: In all the specimens the femoral vein is medial to the femoral artery at the base of the femoral triangle; in the distal femoral triangle and the upper part of the adductor canal the femoral vein is posterior to the femoral artery, and in the distal part of the adductor canal the vein is posterolateral to the femoral artery. In the majority of specimens, the superficial circumflex iliac artery arises as a separate trunk from the femoral artery (90%). In 10% of the cases, the superficial circumflex iliac artery is absent. In 96% of specimens superficial external

pudendal artery arises from the femoral artery as a single trunk. In 96% of specimens superficial epigastric artery arises from the femoral artery as a single trunk. In 4% of the cases, the superficial external pudendal artery and superficial epigastric artery have a common trunk of origin from the femoral artery. The superficial external pudendal artery is anterior to the arch of the great saphenous vein in 52% of cases and posterior to the arch of the great saphenous vein in 32% of cases. In all cases, the deep external pudendal artery arises from the medial surface of the femoral artery. The distance of the origin of the profound femoris artery below the inguinal ligament is less than 2.5cm in 12% of cases, between 2.5-3.8cm in 68% of cases, and between 3.8-5.1cm in 20% of cases. The origin of the profunda femoris artery is lateral to the femoral artery in most cases (76%). In 16% of the cases, the origin of the profound femoris artery is posterolateral to the femoral artery and in 8% of the cases, the origin of the profunda femoris artery is posterior to the femoral artery.

Conclusion: Anatomy of the femoral artery and its branches is crucial from point of view of surgeons, interventional radiologists, physicians, etc. so this study will be very useful in reducing the chances of intra-operative secondary hemorrhage and post-operative complications.

Keywords: Circumflex, Interventional, Cannulation, Ontogeny, Phylogeny

Introduction

Femoral artery being the artery of the lower limb, an important organ in human locomotion is one such which the above scientists come across daily in their professional life. Apart from the above scientists, plastic surgeons, oncologists, vascular surgeons, anesthetists, and nephrologists also encounter the femoral artery in different procedures. [1] Hence ` the femoral artery being one of the most important main arteries in the human body, the knowledge of variations in it will enhance the ability of the above scientists. This inculcated the interest to study the different aspects of the femoral artery. [2] The femoral artery is the continuation of the external iliac artery. It begins behind the inguinal ligament midway between the anterior superior iliac spine and pubic symphysis, descends along the anteromedial part of the thigh in the femoral triangle, enters and passes through the adductor canal, and becomes the popliteal artery as it passes through an opening in adductor Magnus near the junction of the middle and distal thirds of the thigh. Its first three or four centimeters are enclosed with its vein, in the femoral sheath.[3] The part of the artery proximal to the origin of the profunda femoris artery is often clinically termed the common femoral, while that distal to the profunda origin is termed the superficial femoral artery. The profunda femoris artery is termed a deep femoral artery. In the femoral triangle, anterior to the artery are the skin, superficial fascia, superficial inguinal lymph nodes, fascia lata, femoral sheath, superficial circumflex iliac vein, and the femoral branch of the genitofemoral nerve. Near the apex of the triangle, the medial femoral cutaneous nerve crosses the artery from the lateral to the medial side.[4] Posteriorly lie the femoral sheath and the tendons of the psoas, pectineus, and adductor longus. The femoral vein is medial to the artery in the proximal part of the triangle and becomes posterior distally at the apex. In the adductor canal, anterior to the artery are the skin, superficial and deep fascia, sartorius, and the fibrous roof of the canal. [5] The saphenous nerve is first lateral then anterior and finally medial to the artery. The posterior is adductor longus and adductor Magnus; The femoral vein is also posterior proximally but becomes lateral distally. Antero lateral are vastus medialis and its nerve. [6] The superficial epigastric artery arises anteriorly from the femoral artery about 1 cm distal to the inguinal ligament. It traverses the cribriform fascia to ascend anterior to the ligament and runs in the abdominal superficial fascia almost up to the umbilicus. [7] The superficial circumflex iliac artery is the smallest superficial branch of the femoral artery and arises near or with the superficial epigastric artery. It usually emerges through the fascia lata, lateral to the saphenous opening, and turns laterally distal to the inguinal ligament towards the anterior superior iliac spine. [8] The superficial external pudendal artery arises medially from the femoral artery, close to the preceding branches. Emerging from the cribriform fascia, it passes medially usually deep to the long saphenous vein, across the spermatic cord, to supply

Volume 5, Issue 6; November-December 2022; Page No 640-655

the lower abdominal, penile, scrotal, or labial skin, anastomosing with branches of the internal pudendal artery. The deep external pudendal artery passes medially across the pectineus and anterior or posterior to the adductor longus, covered by fascia lata, which it pierces to supply the skin of the perineum and scrotum or labium majus. The profunda femoris artery is a large branch that arises laterally from the femoral artery about 3.5 cm distal to the inguinal ligament. [9] At first lateral to the femoral artery, it spirals posterior to this and the femoral vein to reach the medial side of the femur. The descending genicular artery, the distal branch of the femoral artery, arises just proximal to the adductor opening and immediately supplies a saphenous branch. One articular branch crosses above the femoropatellar surface forming an arch with a lateral superior genicular artery and supplying the knee joint. The saphenous branch emerges distally through the roof of the adductor canal to accompany the saphenous nerve to the medial side of the knee.[10]

Methods: the study was conducted in the year 2020, at the Department Of Anatomy, Government Medical College, Vellore, Tamil Nadu, India We studied the femoral artery and its branches on 25 embalmed and formalin-fixed cadavers by dissection method. We observed that the profunda femoris artery, the largest branch of the femoral artery arises from the posterolateral aspect in the majority of the cadavers. The lateral circumflex femoral artery originates from the femoral artery in nearly 70% of cadavers. The diameter of the femoral artery was measured at the level of 1cm below the inguinal ligament with the use of vernier calipers and by silicone gel method. Initially the vernier calipers were checked for zero error with the jaws closed. The jaws of the calipers were placed on the inner side of the vessel wall with a firm pressure on the artery. When both the locking screws of the calipers,were tightened the caliper was removed from the artery and the measurement in the main scale of the calipers was read to the nearest tenth of a centimeter.A horizontal incision was made along the inguinal ligament from the anterior superior iliac spine to the pubic tubercle and the incision was carried down along the external genitalia and carried down vertically along the medial border of the thigh , medial part of the knee, down to the legs upto the level of the tibial tuberosity. Horizontal incision was made from this point laterally. The skin flap was reflected from medial to lateral side.In the superficial fascia the superficial branches of femoral artery were found to arise from the femoral artery. The superficial circumflex iliac artery is the smallest branch of the femoral artery was found to course in the lateral part of the groin. The superficial external pudendal artery were found to arise medially to supply the external genital organs. The superficial epigastric artery was found to run superiorly to the anterior abdominal wall. The superficial arteries were found to accompany with their corresponding veins.The deep fascia was then reflected. The great saphenous vein was identified through the anterior wall of the femoral sheath and its entry into the femoral vein was also exposed. The femoral sheath was split laterally and the femoral artery was exposed. The sartorius and the adductor longus were exposed down to the apex of the triangle where they meet. The femoral artery was traced. The deep external pudendal artery arises from the upper part of the femoral artery and runs medially was also found.The root of the profunda femoris artery arising from the femoral artery about 4cm below the inguinal ligament was also identified. Sometimes the lateral circumflex and the medial circumflex femoral arteries arise from the femoral artery were also traced.The diameter of the femoral artery was measured in 10 lower limbs specimens by preparing moulds of silicone gel by the following method. The femoral artery was tied 3 cm below the inguinal ligament. Another tie was made in the external iliac artery, proximal to the origin of the femoral artery. A small niche was made near the proximal tie, to allow the nozzle of the silicone gel filled syringe to pass through. The nozzle of the silicone gel filled syringe was inserted through the niche made near the proximal end. The silicone gel was injected into the tied segment and was left undisturbed for 24 hours. After a period of 24 hours the femoral artery was cut 1 cm below the inguinal ligament and was marked ‘T’ and another cut was made at the level of the distal tie. Now the walls of the femoral artery were dissected out and the diameter of the moulds of the femoral artery was measured by measuring the diameter of the mould at the proximal end marked T by using vernier calipers to the nearest tenth of the centimeter.The thigh was amputated from the 3 adult cadavers . The head of the femur was separated from

Volume 5, Issue 6; November-December 2022; Page No 640-655

the acetabulum of the hip bone and another cut was made below the knee joint. A thorough wash was given to the femoral artery and its branches by injecting normal saline into the femoral artery and the saline was allowed to flow out from the lower end that is the popliteal artery. This procedure was done till the saline was clear and free of debris.The study was done by visualizing the pictures taken serially from 5 minutes after injecting the contrast. The angiograms were collected and then the femoral artery, its superficial branches, profunda femoris artery, descending genicular artery and presence of collateral channels were noted and then angiographic pictures were mounted on the lobby and photographs were taken for documentation.CT Scanning is a noninvasive, painless, medical test that helps physicians diagnose and treat medical conditions. CT imaging uses special x-ray equipment to produce multiple images or pictures of the inside of the body and a computer to join them toghether in cross sectional views of the area being studied.

Table 1 Origin Of Femoral Artery In Relation To Mid Inguinal Point.

BODY NO	S.No	Gender	Side of the limb	Distance between pubic symphysis and anterior superior iliac spine(in cms)	Mid point of the distance between pubic symphysis and anterior superior iliac spine-mid inguinalpoint	Distance of origin of femoral artery and pubic symphysis
1	1	F	R	14.8	7.4	7.1
	2		L	14.8	7.4	7.1-MEDIAL
2	3	M	R	16.4	8.2	8.2
	4		L	16.4	8.2	8.2
3	5	M	R	17.6	8.8	9.1
	6		L	17.6	8.8	9.1-LATERAL
4	7	F	R	14.2	7.1	7.1
	8		L	14.2	7.1	7.1
5	9	M	R	18	9	9.3
	10		L	18	9	9.3-LATERAL
6	11	M	R	16	8	8
	12		L	16	8	8
7	13	M	R	16.8	8.4	8.7
	14		L	16.8	8.4	8.7-LATERAL

Volume 5, Issue 6; November-December 2022; Page No 640-655

8	15	F	R	16.8	8.4	8.2
	16		L	16.8	8.4	8.2-MEDIAL
9	17	M	R	17	8.5	8.5
	18		L	17	8.5	8.5
10	19	M	R	18	9	9
	20		L	18	9	9
11	21	F	R	16.2	8.1	8.1
	22		L	16.2	8.1	8.1

BODY NO	**S.No**	**Gender**	**Side of the limb**	**Distance between pubic symphysis and anterior superior iliac spine(in cms)**	**Mid point of the distance between pubic symphysis and anterior superior iliac spine-mid inguinalpoint**	**Distance of origin of femoral artery and pubic symphysis**
12	23	M	R	18	9	9
	24		L	18	9	9
13	25	M	R	16.6	8.3	8.3
	26		L	16.6	8.3	8.3
14	27	F	R	15	7.5	7.5
	28		L	15	7.5	7.5
15	29	M	R	17.2	8.6	8.6
	30		L	17.2	8.6	8.6
16	31	M	R	16.6	8.3	8.3
	32		L	16.6	8.3	8.3
17	33	M	R	15.8	7.9	7.9
	34		L	15.8	7.9	7.9
18	35	M	R	16.4	8.2	8.2
	36		L	16.4	8.2	8.2
19	37	F	R	15.6	7.8	7.8
	38		L	15.6	7.8	7.8
20	39	F	R	18	9	9

Volume 5, Issue 6; November-December 2022; Page No 640-655

	40		L	18	9	9
21	41	M	R	14.6	7.3	7.3
	42		L	14.6	7.3	7.3
22	43	F	R	18.8	9.4	9.4
	44		L	18.8	9.4	9.4
23	45	M	R	19.2	9.6	9.6
	46		L	19.2	9.6	9.6
24	47	M	R	17.4	8.7	8.7
	48		L	17.4	8.7	8.7
25	49	M	R	18	9	9
	50		L	18	9	9

Table –2: Origin Of Femoral Artery In Relation To Mid Inguinal Point.

S.No		No. of adult Cases	Percentage
1	Origin of femoral artery coinciding with to mid inguinal point	40	80%
2	Origin of femoral artery lateral to mid inguinal point	6	12%
3	Origin of femoral artery medial to mid inguinal point	4	8%

Table – 3 Diameter Of The Femoral Artery By Direct Dissection Method

S.No	Gender	Diameter (in mm)	Diameter (in mm)
		right side	left side
1	F	5	5
2	M	7	7
3	M	8	8
4	F	7	7
5	M	8	8
6	M	8	8
7	M	8	8

Volume 5, Issue 6; November-December 2022; Page No 640-655

8	F	6	6
9	M	8	8
10	M	7	7
11	M	6	6
12	M	8	8
13	M	8	8
14	F	5	5
15	M	8	8
16	M	7	7
17	M	7	7
18	M	8	8
19	F	6	6
20	F	7	7

The mean diameter of common femoral artery in males is 7.25 mm and in females is 5.8 mm. The range of the intra luminal diameter in females is 5- 7mm and the range of the intra luminal diameter in males is 7-8mm

Table – 4 Diameter of the femoral artery by moulds prepared from silicone gel

The diameter of the femoral artery measured by direct dissection method was confirmed by moulds prepared from silicone gel in 10 adult femoral artery specimens and tabulated as follows:

S.No	Body no	Gender	Diameter on right side	Diameter on left side
1	8	FEMALE	6	6
2	3	MALE	8	8
3	10	MALE	7	7
4	19	FEMALE	6	6
5	21	MALE	8	8

The mean diameter in males is 8cm and that in females is 6cm. Also the minimal luminal diameter in females is less than that in males.

Volume 5, Issue 6; November-December 2022; Page No 640-655

Table – 5 Origin Of Superficial Circumflex Iliac Artery

S.No	Superficial circumflex iliac artery	No. of adult specimens	Percentage
1.	Arising as a separate trunk	45	90%
2.	Absence of SCIA	5	10%

Table – 6 Origin of Superficial External Pudendal Artery

Origin Of Superficial External Pudendal Artery	No. of adult specimens	Percentage
Arising as a separate trunk from femoral artery	48	96%
Arising as a common trunk with superficial epigastric artery	2	4%

Table – 7 Relationship of superficial external pudendal artery and great saphenous vein

S. NO.	Relationship Of Superficial External Pudendal Artery And Great Saphenous Vein.	No of Specimens	Percentage
1	EPA NOT VISUALISED	8	16%
2	EPA POSTERIOR	16	32%
3	EPA ANTERIOR	26	52%

Table – 8 Origin Of Superficial Epigastric Artery

S. No.	Origin of superficial epigastric artery	No. of adult specimens	Percentage
1	Arose as a separate trunk from the femoral artery	48	96%

Volume 5, Issue 6; November-December 2022; Page No 640-655

2	Arose as a common trunk with superficial external pudendal artery.	2	4%

Table – 9 Distance between the origin of profunda femoris artery from the inguinal ligament

S.No	Gender	Distance of origin of PFA from inguinal ligament (RIGHT SIDE) in cms.	Distance of origin of PFA from inguinal ligament (LEFT SIDE) in cms.
1	F	3.8	3.8
2	M	3.6	4
3	M	3.7	3.8
4	F	1	1
5	M	3.7	3.7
6	M	3.8	3.6
7	M	1	3.6
8	F	3.6	3.8
9	M	3.7	3.7
10	M	1.5	3.8
11	F	3.7	3.8
12	M	4.0	3.6
13	M	3.7	3.7
14	F	3.8	3.7
15	M	3.6	1.5
16	M	3.7	3.5
17	M	3.5	4
18	M	2	3.7
19	F	3.8	3.5
20	M	3.5	3.7
21	M	3	4
22	M	4	4.2
23	M	4	3.8
24	M	3.8	4.0
25	M	4.0	4

Volume 5, Issue 6; November-December 2022; Page No 640-655

The mean distance between the origin of profunda femoris artery from the inguinal ligament is 3.4 cm

Table – 10 Distance Between The Origin Of Profunda Femoris Artery From The Inguinal Ligament In Foetal Specimens

S.No	Gender	Distance of origin of PFA from inguinal ligament (RIGHT SIDE) cm	Distance of origin of PFA from inguinal ligament (LEFT SIDE) cm
1	M	1.5	1.5
2	M	1.2	1.2
3	M	1.8	1.8

Mean 1.33 cm

Table – 11 Origin of profunda femoris artery from the femoral artery

S.No	Type	No of adult specimens	Percentage
1	Lateral	38	76%
2	Posterolateral	8	16%
3	Posterior	4	8%

Table – 12 Diameter of femoral artery by 64 slice computerised tomographic scan of pelvis

S.No	Gender	Diameter of femoral artery –right side (mm)	Diameter of femoral artery –left side(mm)
1	M	9.3	9.3
2	F	8.3	8.4
3	M	6	10
4	F	6	8
5	M	7.3	7.3
6	M	7.3	7.3
7	F	6.1	6.1

Volume 5, Issue 6; November-December 2022; Page No 640-655

8	M	6.6	6.6
9	M	9.3	9.4
10	M	8.4	8.4

Table-13 Origin of the Femoral Artery in Relation to the Mid Inguinal Point-Present study

S.No	Origin of the femoral artery in relation to the mid inguinal point	No. of adult cases	Percentage
1.	Origin of the femoral artery coinciding with the mid inguinal point	40	80%
2.	Origin of the femoral artery lateral to the mid inguinal point	6	12%
3	Origin of the femoral artery medial to the mid inguinal point	4	8%

Table 14 Origin of the Superficial Circumflex Iliac Artery-Present study

S.No	Superficial circumflex iliac artery	No. of adult cases	Percentage
1.	Arising as a separate trunk	45	90%
2.	Absence of Superficial circumflex iliac artery	5	10%

Table –15 Origin of the Superficial Circumflex Iliac Artery

S.No	Origin of the Superficial Circumflex Iliac Artery	Taylor and Daniel from 400 groin dissections	Taylor and Daniel from 20 operated cases	Robert J. Allen	Present study
1.	SCIA arising as a separate trunk from the femoral artery	17%	45%	_	90%

Volume 5, Issue 6; November-December 2022; Page No 640-655

2.	SCIA arising as a common trunk with SEA	48%	15%	79%	_
3.	Absence of SCIA	_	25%	_	10%
4.	Origin of SCIA from the femoral artery	17%	_	_	_

Table 16 Relationship of the Superficial External Pudendal Artery and Great Saphenous Vein

S.No		M. Donnelly	Ass ndaiye	Preethi	Present study
1.	Superficial external pudendal artery anterior to the great saphenous vein	16.8%	_	10%	32%
2.	Superficial external pudendal artery posterior to the great saphenous vein	4.6%	56%	8%	52%
3.	Superficial external pudendal artery not visualized at the sapheno femoral junction	73.1%		74%	16%

Table -17 Origin of Profunda Femoris Artery below the Inguinal Ligament - Present study

S. No		No. of adult cases	Percentage
1.	Less than 2.5 cm	6	12%
2.	2.5-3.8 cm	34	68%
3.	3.8 – 5.1 cm	10	20%

Table –18 Origin of Profunda Femoris Artery below the Inguinal Ligament

S.No	Origin of profunda femoris artery below the inguinal ligament	Quain	Present study
1.	Less than 2.5 cm	24.6%	12%

Volume 5, Issue 6; November-December 2022; Page No 640-655

2.	2.5 to 3.8 cm	42.6%	68%
3.	3.8 – 5.1 cm	25.34%	20%
4.	Greater than 5.1 cm	7.4%	-

Table 19 Origin of the Profunda Femoris Artery in Relation to the Femoral Artery-Present study

S.No		No. of adult cases	Percentage
1.	Lateral	38	76%
2.	Posterolateral	8	16%
3.	Posterior	4	8%

Table 20 Origin of the Profunda Femoris Artery in Relation to the Femoral Artery

S.No.		Dixit D.P. Mehta	Present study
1.	Lateral	-	76%
2.	Posterolateral	35.41%	26%
3.	posterior	31.25%	8%

Table 21 Presence of Abnormal Arteries from the Femoral Artery

S.No.		Keen	Present study
1.	Both LCFA and MCFA from PFA	42%	92%
2.	LCFA from FA	20%	6%
3.	MCFA from FA	31%	2%
4.	Both LCFA and MCFA from FA	7%	-

Discussion

In all 50 cases the distance between pubic symphysis and anterior superior iliac spine was measured using a measuring tape and defined as inguinal distance. The mid point of this line is defined as mid inguinal point. The distance between pubic symphysis to mid point of common femoral artery where it crosses the inguinal ligament was measured. This is the femoral distance. Then the total number of cases where the

Volume 5, Issue 6; November-December 2022; Page No 640-655

location of common femoral artery coincided with the mid inguinal point was noted. Out of 50 adult specimens, only in 40 specimens the origin of femoral artery coincided with the mid inguinal point . In 6 specimens the origin of femoral artery is lateral to the mid inguinal point, more towards mid point of inguinal ligament. In the remaining 4 specimens the origin of femoral artery was medial to mid inguinal point..In all 6 foetal limbs, the origin of femoral artery coincided with the mid inguinal point.[11] The diameter of the femoral artery is measured 1cm below the inguinal ligament using vernier calipers. In 40 adult specimens, the diameter of femoral artery ranged from 5-8 mm. The mean diameter of common femoral artery in males is 7.25mm and in females is 5.8 mm. The range of the intra luminal diameter in females is 5- 7mm, and the range of the intra luminal diameter in males is 7-8mm .[12] The mean diameter of common femoral artery is lower in women when compared to men. The likelihood of symptomatic lumen obstruction by a closure device component may be increased in women because of smaller arterial dimensions .The diameter of the femoral artery was measured by moulds prepared from silicone gel in 10 adult femoral artery specimens and was tabulated . The mean diameter in males is 8cm and that in females is 6 cm. Also the minimal luminal diameter in females is less than that in males.[13] In all 50 adult specimens, at the base of the femoral triangle the femoral vein is medial to the femoral artery; in the distal femoral triangle and in the proximal part of the adductor canal, the femoral vein is posterior to the femoral artery; in the distal adductor canal the femoral vein is posterolateral to the femoral artery. In all 6 foetal specimens, at the base of the femoral triangle the femoral vein is medial to the femoral artery; in the distal femoral triangle and in the proximal part of the adductor canal, the femoral vein is posterior to the femoral artery; in the distal adductor canal the femoral vein is posterolateral to the femoral artery.[14] Out of 50 adult lower limbs specimens, in 45 specimens(90%), the superficial circumflex iliac artery was seen arising as a separate trunk from the lateral side of the femoral arteryIn remaining 5 specimens (10%), the superficial circumflex iliac artery was absent. In all 6 foetal specimens , the superficial circumflex iliac artery was seen arising as a separate trunk from the femoral artery.[15] Out of 50 adult specimens, in 48 adult specimens superficial external pudendal artery was seen arising from the femoral artery as a single trunk only. In 2 adult specimens superficial external pudendal artery arose as a common trunk with superficial epigastric artery from the femoral artery. No case of double trunk of origin of superficial external pudendal artery was seen.[16] In all 6 foetal specimens superficial external pudendal artery was seen arising from the femoral artery as a single trunk only.Relationship of superficial external pudendal artery to great saphenous vein was recorded in 50 specimens. In 8 cases (16%) the superficial external pudendal artery was not visualised at the sapheno femoral junction.In 26 cases (52%) the superficial external pudendal artery was found posterior to great saphenous vein . In 16 cases (32%) the superficial external pudendal artery was found anterior to great saphenous vein . [17] In all 6 foetal specimens the superficial external pudendal artery was found posterior to the great saphenous vein. Out of 50 adult specimens in 48 specimens, the superficial epigastric artery was seen arising as a single trunk from the anterior aspect of the femoral artery. In 2 adult specimens, the superficial epigastric artery was seen arising as a common trunk with superficial external pudendal artery. In all 6 foetal specimens superficial epigastric artery was seen arising as a single trunk from the anterior aspect of the femoral artery [18].In all 50 adult specimens the deep external pudendal artery arises from the medial side of the femoral artery and passes medially across the pectineus anterior to adductor longus, posterior to femoral vein covered by fascia lata, which it pierces to supply the skin of the perineum and scrotum. In all 6 foetal specimens deep external pudendal artery arises from the medial side of the femoral artery and passes medially across the pectineus anterior to adductor longus, posterior to femoral vein covered by fascia lata, which it pierces to supply the skin of the perineum and scrotum. [19] Out of 50 adult specimens the distance between the origin of profunda femoris artery from the inguinal ligament varied between 1 to 4.2 cms. The average distance being 3.4 cm.In all 6 foetal limbs, distance between the origin of profunda femoris artery from the inguinal ligament varied between 1.2 to 1.8 cm. [20] Out of 50 adult specimens, in 38 specimens, profunda femoris artery arose laterally from the femoral artery, (Pic21) whereas in 8 remaining specimens profunda femoris artery arose

Volume 5, Issue 6; November-December 2022; Page No 640-655

posterolaterally from the femoral artery. (Pic 22) In 4 cases profunda femoris artery arose posteriorly.In all 6 foetal specimens, the profunda femoris artery arose laterally.[21] In all 50 adult specimens, the descending genicular artery arises from the femoral artery just proximal to the adductor opening and immediately divides into saphenous and articular branch. In all 6 foetal specimens, the descending genicular artery arises from the femoral artery just proximal to the adductor opening and immediately divides into saphenous and articular branch. [22]In the present study the origin of lateral circumflex femoral artery from femoral artery-3 cases (6%), of which in 2 cases(4%), the origin of the lateral circumflex femoral artery is proximal to the origin of the profunda femoris artery. In 1 case (2%), the origin of lateral circumflex femoral artery is distal to the origin of profunda femoris artery. In another 1 case(2%), the origin of medial circumflex femoral artery from femoral artery . In all 6 foetal specimens lateral circumflex femoral artery and the medial circumflex femoral artery was not found arising from femoral artery.Adult femoral angiogram was done in 3 cadavers . In the cadaveric angiogram the superficial external pudendal artery and the superficial epigastric artery are seen and the superficial circumflex iliac artery was not clearly visualized. [23] The profunda femoris artery was found to arise from the lateral surface of the femoral artery and the lateral circumflex femoral artery and the medial circumflex femoral artery was seen arising from the profunda femoris artery. In all 50 adult specimens, the descending genicular artery arises from the femoral artery just proximal to the adductor opening & immediately divides into saphenous and articular branch. Adult femoral angiograms were observed , films collected and studied. [24] In all 10 clinical cases, the superficial circumflex iliac artery, the superficial external pudendal artery and the superficial epigastric artery was seen arising as a separate trunk from the femoral artery , the profunda femoris artery was seen arising from the femoral artery, the lateral circumflex femoral artery and the medial circumflex femoral artery arises from the profunda femoris artery The origin of the decending genicular artery from the femoral artery was noted. In one case there was mid superficial femoral artery obstruction with extensive collaterals noted and photographed for documentation. [25]In all 20 computerized tomographic scans of pelvis the origin of femoral artery in relation to mid inguinal point, the diameter of femoral artery, the relationship of femoral artery and femoral vein, the origin of superficial branches of femoral artery and deep branches of femoral artery were noted. [26] In all 10 cases, femoral artery entered the thigh at the mid inguinal point, normal branching pattern of the femoral artery was noted. No anatomical variation in the branching patterns of femoral artery was noted. However, in 1 case, obstruction of the superficial femoral artery was noted . The diameter of the femoral artery in all the 10 cases was noted and tabulated. The minimal luminal diameter in males varies from 6-10mm.[27] The minimal diameter in females varies from 6-8.4mm.The minimal luminal diameter in females is lower in females when compared to males.Out of 20 limbs studied by 64 slice computerized tomographic scans, in 3 limbs (15%) there was overlapping of the femoral vein over the femoral artery.In remaining 17 limbs, (85%) the femoral vein was found lying medial to the femoral artery and the femoral artery and the femoral vein pairs in these cases. [28,29,30]

Conclusion

femoral artery has a complex variation in its origin, relationship with the arch of great saphenous vein and its branching patterns. I hope that this study of the branching pattern and surgical anatomy of the femoral artery will be definitely useful to the cardiologists, radiologists, plastic surgeons and vascular surgeons in the future.

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Volume 5, Issue 6; November-December 2022; Page No 640-655

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Volume 5, Issue 6; November-December 2022; Page No 640-655