

CADAVERIC AND RADIOLOGICAL STUDY OF PROFUNDA FEMORIS ARTERY WITH ITS VARIATIONS AND ITS CLINICAL IMPLICATIONS

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Abstract

Background: The Origin and branching pattern of profunda femoris artery (PFA) is important for surgeons and interventional radiologists. Branching patterns of PFA have been described by many authors since 18th century. The aim of this present study is to identify the variations of origin of PFA and its circumflex branches origin from PFA related to inguinal ligament. **Materials and Methods:** 40 lower limbs from embalmed human cadavers (15 male and 5 female) were dissected and observed for the origins of PFA and its circumflex branches. 10 computerized tomographic lower limb angiograms from patients who underwent angiographic procedures were also included in the study. **Conclusion:** High origin of profunda femoris artery in 4 specimens out of 40 specimens. Average distance from mid inguinal point to the origin of profunda femoris artery was 3.95 centimeters. Origin of lateral circumflex femoral artery from femoral artery was seen in 4 specimens. Origin of the branches of the lateral circumflex femoral artery directly from the femoral artery was observed in 2 specimens. Origin of medial circumflex femoral artery from profunda femoris artery in all 40 specimens. Branching pattern of profunda femoris artery follow 90% of pattern I and 10% of pattern III.

Keywords: Lateral Circumflex Femoral Artery (LCFA), Medial Circumflex Femoral Artery (MCFA), Profunda Femoris Artery (PFA)

Introduction

In the current cutting-edge advancements in interventional radiology, even in the present times arteriography is the primary investigation for peripheral occlusive arterial diseases. The profunda femoris artery (PFA) is frequently used time and again in vascular procedures of the proximal leg. The profunda femoris artery is femoral artery's largest branch and originates from its lateral side about 3.5 centimeters lower to the inguinal ligament¹.

Arteria profunda femoris is the cardinal artery that supplies the muscles of thigh¹. This artery supplies the adductors, extensors and flexor muscles¹. In addition to that it establishes a number of anastomoses with the terminal branches of common iliac artery and the popliteal artery¹. The two main branches of PFA are Lateral Circumflex Femoral Artery (LCFA) and Medial Circumflex Femoral Artery (MCFA)³. The PFA is also the major artery in front of

thigh which is used for Arteriography, Ultrasound and Doppler imaging, Digital subtraction angiography and MRI³. The branches of PFA are also used in thigh flap as a vascular pedicle during breast reconstruction after mastectomy. The knowledge about the branching pattern of PFA is necessary to prevent the flap necrosis after reconstruction surgeries. The nutrient branch to the head and neck of femur is from MCFA³

Aim

Aim of this study is to perceive and find the normal course of the profunda femoris artery, its variations and of origin of its circumflex branches and their variations. Thereby contributing knowledge in performing clinical, diagnostic and surgical procedures. The expanding scope of interventional radiology has intrigued me to analyze on the variations of profunda femoris arteries in the South Indian population.

Materials and methods

Materials used in this study

The requirements used for this study were 40 specimens of lower limbs of both sides of 15 males and 5 female cadavers from the Department of Anatomy, Stanley Medical College, Chennai.

10 computerized tomographic lower limb angiogram from patients who underwent angiographic procedures in the department of Radiology, Stanley Medical College, Chennai. The patients were selected for the study after getting ethical committee clearance and proper written consent without disclosing their names.

Methodology

Dissection – 20 adult cadavers.

Radiology – 5 patients who underwent lower limb angiography.

A) Dissection method

The femoral triangle dissection was carried out according to the methodology given by Cunningham's manual of practical anatomy².

The distance and the site of origin of the profunda femoris artery to the mid-inguinal point was measured with the measuring tape and documented.

Their origin and course were studied along with the relation of profunda femoris artery to the femoral artery and femoral vein.

The site of origin of medial and lateral circumflex femoral arteries from profunda femoris artery with respect to inguinal ligament was observed and documented. The external circumference of profunda femoris artery near its origin from femoral artery was measured with the help of Vernier calipers and documented in millimeters. Length of the profunda femoris artery from its origin to first perforating branch also was measured and recorded. The length was measured between the threads tied at the origin of profunda femoris artery and at the origin of its first perforating branch.

The progression of the profunda femoris artery from its origin to the final perforator, and its branching pattern were noted.

B) Radiological study

Computerized tomographic lower limb angiogram images of 5 patients, who underwent this procedure in the Department of Radiology.

For these patients lower limb computerized tomographic angiography was done. The femoral and profunda femoris artery were photographed and studied.

Observation

The site of origin, length, diameter, course, relations and branching pattern of profunda femoris artery were studied by

Dissection method- 40 Specimens

Radiological study - From lower limb computerized tomographic angiogram-10 Images

The observations were summarized in accordance with the parameters taken for the study.

Origin of profunda femoris artery:**Table 1**

S.NO	Total number of Adult specimens (40)			
	Right Side(20)	%	Left Side(20)	%
1.From posterolateral aspect of femoral artery	20	100	20	100
2.Other modes of origin	-	-	-	-

Distance from mid inguinal point**Table 2**

S.no	Distance (mm-millimeters)	Total number of adult specimens(40)			
		Right Side (20)	%	Left Side (20)	%
1	20-30 mm	2	10	2	10
2	30-40 mm	7	35	6	30
3	40-50 mm	9	45	8	40
4	50-60 mm	2	10	4	10

Site of origin of its branches**Table 3: Site of origin of medial circumflex femoral artery**

S.no	Site of origin	Total number of specimens(40)			
		Right side (20)	%	Left Side cases(20)	%
1	From profunda femoris artery	20	100	20	100
2	From femoral artery as a common trunk	-	-	-	-
3.	From femoral artery	-	-	-	-
4.	Absent medial circumflex femoral artery	-	-	-	-

Distance of origin of lateral circumflex femoral artery from the origin of profunda femoris artery**Table 4**

Distance(mm-millimeters)	Total number of adult specimens (40)	
	Right Side(20)	Left side(20)

0-10	1	-
11-20	13	15
20-30	6	5

Distance of origin of medial circumflex artery from the profunda femoris artery**Table 5**

Distance(mm)	Total Number of specimens(40)	
	Right Side(20)	Left Side(20)
0-10	-	-
11-20	8	6
21-30	12	14
31-40	-	-
41-50	-	-

Length of the profunda femoris artery:**Table 6**

s.no	Range Length in centimeters	Adult specimens(40)			
		Right Side(20)	%	Left Side(20)	%
1	10-11	7	17.5	6	15
2	11-12	8	20	10	25
3	12-13	5	12.5	4	10

Course of the artery

In this study the profunda femoris artery has found to have normal course from its origin to the fourth perforating artery except in 4 specimens the branching pattern was different.

Branching Pattern:

Pattern I: Lateral circumflex femoral and medial circumflex femoral arteries arise from the profunda femoris artery⁴.

Pattern II: Medial circumflex femoral artery arise from the femoral artery and the lateral circumflex femoral artery from profunda femoris artery⁴.

Pattern III: Lateral circumflex femoral artery arise from the femoral artery and medial circumflex femoral artery from profunda femoris artery⁴.

Pattern IV: Both arteries arise from femoral artery⁴.

Table 8

Types	Total number of specimens(40)			
	Right Side (20)	%	Left Side (20)	%
Pattern I	16	90	20	100
Pattern II	-	-	-	-
Pattern III	4	10	-	-
Pattern IV	-	-	-	-

Radiological study

In this study of profunda femoris artery 10 images were obtained from computerized tomographic angiograms. All the 10 images followed the normal branching pattern of circumflex femoral arteries from profunda femoris artery. The distance of separation of profunda femoris artery from inguinal ligament was ranging from 3.5 to 5 cm.

Results

High origin of profunda femoris artery in 4 specimens out of 40 specimens.

Average distance from mid inguinal point to the origin of profunda femoris artery was 3.95 centimeters.

Origin of lateral circumflex femoral artery from femoral artery was seen in 4 specimens.

Origin of the branches of the lateral circumflex femoral artery directly from the femoral artery was observed in 2 specimens.

Origin of medial circumflex femoral artery from profunda femoris artery in all 40 specimens.

Average length of profunda femoris artery from its origin to the first perforator was 11.5 centimeters.

Femoral vein and femoral artery were related superficially to the profunda femoris artery.

Branching pattern of profunda femoris artery follow 90% of pattern I and 10% of pattern III

Conclusion

The profunda femoris artery exhibits a complex and variable branching pattern, supplying blood to the thigh muscles and plays a crucial role in circulation of the lower limb. Understanding the anatomy and variation is essential for surgeons, radiologists and for clinical diagnosis to treat vascular diseases. The intricate branching pattern of the profunda femoris artery serves as a testament of the human vascular system.

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