"OVIDIUS" UNIVERSITY OF CONSTANȚA

DOCTORAL SCHOOL OF MEDICINE
FIELD OF MEDICINE

FEMORAL ARTERY MORPHOPHISIOLOGY

- THESIS SUMMARY -

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Constanţa
2020

SUMMARY

Key words: ***femoral artery system – morphophisiology.***

INTRODUCTION

Femoral arteries are voluminous arteries with long collateral branches, which descend across the thigh region, irrigating it anteriorly, also posteriorly in most part, also participating through their collateral branches in the vascularization of the antero-lateral abdominal wall and the knee.

Normal morphology knowledge of the femoral arteries, has an anatomical importance, taking into account that it's poorly described in medical literature, but also has a clinical importance (medical, radiological and surgical), due to multiple procedures at this level: explorations and surgeries:

- It's the femoral pulse artery, which can be felt even in case of collapse, when the peripheral pulses are abolished, the artery being perfectly perceived at its origin;
- Can be punctured for arterial blood prelevation;
- Occasionally constitutes a route for medication delivery for the lower limbs (vasodilator injections);
- It's the preferred access route for Seldinger arterial catheterization, for most of the radiological vascular examinations, a percutaneously inserted catheter into the arterial shaft being used;
- It's one of the arteries used in cardiac surgery to establish the extracorporeal circulation;
- Sometimes, it is one of the arteries used for prosthesis implantation in conventional hemodialysis;
- Hemostasis by femoral artery compression is performed at the level of the inguinal fold and at the level of the femoral triangle.

The thesis represents a study of fundamental scientifical medical research, being known that, without fundamental research, which mean knowledge, there can be no applied research. Studies have an important role in new therapy and explorations development, the normal parameters obtained from this study being of high use in the appreciation of vascular anatomical alterations (morphometry, ramification, trajectory), and also physiological ones (blood flow velocity, resistivity index, pulsatility index), which can appear in various organic afflictions, at thigh level.

All these considerations represent the reasons for which I have chosen to study the femoral artery morphophisiology, subject which belongs to the discipline of anatomy of our faculty, wishing to enhance the poorly known literature data of this artery.

OBJECTIVES

Taking into consideration that data on the femoral arteries are rather scarce and often contradictory, I decided to approach certain aspects regarding arteries origin in relation to nearby bone anatomical references (spinal cord, ribs, sternoclavicular joint), in order to describe both femoral arteries trajectories, from their point of origin, to the popliteal arteries origin.

I will try to thoroughly describe exo and endovascular morphometry of the femoral arteries at the level of the common arterial trunk, profound femoral artery and superficial femoral artery, taking into account the following aspects: length, diameter (depending on gender, right/left comparison, comparison between these three femoral artery segments).

I will describe the collateral branches regarding their origin from the common trunk, studying their morphometry, trajectory, especially at the level of circumflex, pudendal, profound femoral and perforating arteries.

In order to accomplish my main purpose, various methods will be used: dissection, plastic mass injection followed by dissection or corrosion, and imagistic methods: computerized tomography with contrast substances and Doppler ultrasonography. High performance and fiable machines have been used, this way raising results accuracy, comparisons fidelity, and conclusions relevance, which will be gathered from this study.

MATERIAL AND METHODS

My study was performed on a number of 188 cases, from which, 36 cases by dissection, 27 cases by plastic mass injection, 60 cases of Doppler ultrasonography explorations and 65 being represented by computed tomography angiography (CTA).

Dissection was performed on formolized human cadavers, adults and infants (with ages between 5 and 9 months), which were in the human anatomy laboratory within the Faculty of Medicine of Ovidius University of Constanta, in the same place, plastic mass injections were made.

Plastic mass injection were performed on fresh organs, using Technovit 7143, a substance of german origin, an autopolymerizing resin based on metyl metacrylate, in the form of powder and liquid, for the substance mix were used 2 parts powder and 1 part liquid, in glass or metallic containers, which could be easily cleaned after the injection, thus avoiding its solidification in the used container.

Doppler ultrasonography is a non-invasive method, easy to perform and allows femoral arteries visualization, as well as its branches, also being able to measure velocities, diameters and vascular parameters [1].

The ultrasounds were performed on a General Electric – Voluson 730 Expert ultrasonography. For the femoral arteries visualization, convex or linear transducers were used, with a frequency between 5 and 7,5 MHz.

30 patients were examined (60 ultrasounds), with ages between 20 and 60 years, 17 men (34 ultrasounds) and 13 women (26 ultrasounds). All patients were examined in dorsal decubitus position and in complete resting position.

The measurements were made bilaterally, on both common femoral arteries, in the proximal, middle and inferior or distal third (before the bifurcation), as well as in the profound and superficial femoral arteries at their point of origin, in patients without any declared prior vascular pathology.

The most difficult to examine area of the femoral artery is situated in Hunter's canal (the adductor canal). At this level, atheromatous lesions and focal stenosis are more frequently found [2].

The measurements were made in both femoral arteries, the following parameters being determined:

1. Peak systolic velocity (PS);
2. End diastolic velocity (ED);
3. Systolic-diastolic ratio (S/D);
4. Resistivity index (IR);
5. Pulsatility index (IP);
6. Endoluminal diameter of each examined segment [3].

In our study, through CTA, using an iodine contrast substance, we appreciated femoral arteries morphometry (right and left, common, profound and superficial) and their branches in 65 patients, both male and female, with ages between 25 and 70 years.

The angiographies I had the possibility of examining consisted of only 3 simple angiographies, present in the anatomy laboratory, the other 62 being CTA's, from the Medimar Medical Imagistic Center, within St Andrew's Emergency Clinical County Hospital of Constanta. In total, a number of 1060 CT-scans were examined. CTA's were made on a computerized tomography machine GE LightSpeed VCT64 Slice CT, and only scans without any pathological signs were taken into account, this study being one of medical fundamental scientific research.

Not all the anatomic references studied were appreciated on the same number of cases, in the same patient, not all morphological details being available.

The normal femoral artery morphology was evaluated considering the following aspects:

- The origin level of every artery, comparison between right and left, relations with the coxal bone anatomic references (pubis, ischion branch, pectineal surface, obturator foramen);
- In the CTA's, we followed each femoral artery's morphometry (external diameters and endoluminal, length), aspects which were also followed in right/left comparison; we also followed the collateral branches' level of origin in relation to their origin from the correspondent arterial segment: common, superficial and profound, the distance between these collaterals, as well as the distance in relation to the arterial trunk origin from which they emerge.

- The trajectory and femoral artery relations as well as their collaterals were evaluated;
- Femoral artery's, their collateral branches, as well as terminal branches' morphological variations were noted: morphometric variations, trajectory variations, possible arterial trunks, collateral branches number variability (the absence of some collateral branches, or the existence of some supplimentary collateral branches), collateral branches origin variations.

The noted references through CTA were followed regarding gender and compared right/left, as well as a comparison between the three femoral artery segments: common, profound and superficial.

PERSONAL RESULTS

Common femoral arteries (CFA) origin was determined at the inguinal ligament level, and at the level of origin of the profound femoral arteries (PFA), which corresponds with the common femoral arteries terminal segment, thus representing the femoral common artery length (from the inguinal ligament, to the bifurcation).

Common right femoral artery origin in relation to the middle of the inguinal ligament was followed on CTAs, 31 men (75,31%) and 10 women (24,69%).

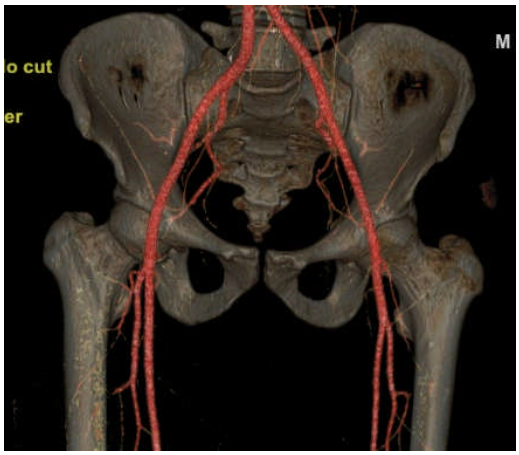


Fig. 1. CFA right and left origin is in the middle of the inguinal ligament (male gender).

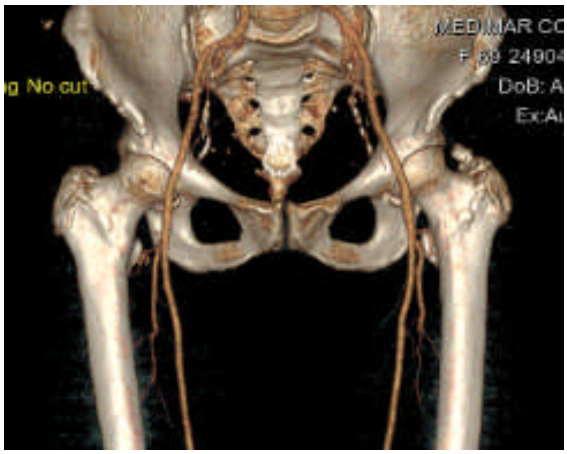


Fig. 2. CFA right and left origin is in the middle of the inguinal ligament (female gender).

Common left femoral artery origin in relation to the middle of the inguinal ligament was evaluated on 42 patients, from which 32 were male (76,19%) and 10 female (23,81%).

Fig. 3. Left CFA origin is at the middle of the inguinal ligament (male gender).

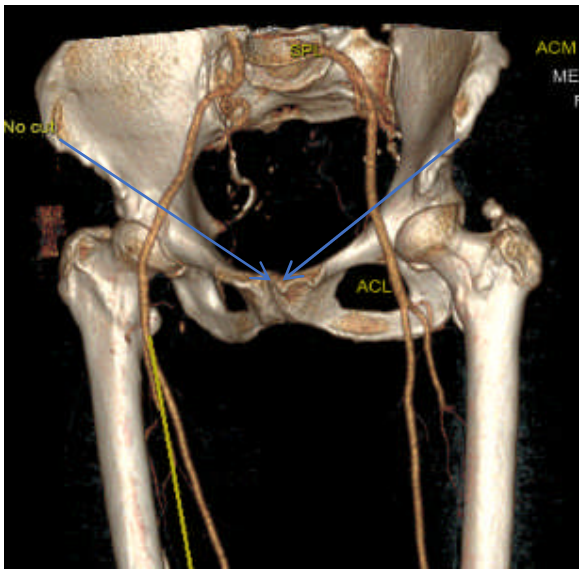


Fig. 4. Left CFA origin is at the middle of the inguinal ligament (female gender).

We observed that there isn't a symmetry regarding the origin of the common femoral artery, bilaterally, the right common femoral artery having its origin more frequently at the middle of the inguinal ligament (41,46% of cases), while the left common femoral artery had its origin more frequently at 1- 2,5 cm medial from the middle of the inguinal ligament (42,86% of cases).

Table 1. CFA level of origin

AUTHOR	CFA level of origin
Paturet [4]	little medial to the middle of the inguinal ligament
Testut [5]	middle of the femoral arcade
Rouvière [6]	middle of the inguinal fold
Bastide [7]	middle of the inguinal fold
Kamina [8]	middle of the inguinal fold
Robacki [9]	middle of the inguinal arcade
Mihalache [10]	1 cm medial to the medial half of the femoral artery
Personal results	*right: 41,46% - middle of the inguinal ligament; 34,15% - medial to the middle of the inguinal ligament; 24,39% - lateral to the middle of the inguinal ligament;* *left: 34,15% - medial to the middle of the inguinal ligament; 33,33% - middle of the inguinal ligament; 23,81% - lateral to the middle of the inguinal ligament;*

Profound femoral arteries origin was determined in relation with the following:

- The artery from which it emerged (common femoral or external iliac);
- The side of the artery from which it emerged;
- The CFA level of origin in relation to the distance from the inguinal ligament (which represents, in the same time, the CFA terminal level and the profound and superficial femoral origin level);
- Anatomical bone references to which corresponded posteriorly the origin of the profound femoral artery.

Side of corresponding CFA from which the right PFA emerged was determined on a number of 42 cases, 34 male cases (80, 95%) and 8 female cases (19,05%). The right profound femoral artery had its origin only from the right common femoral artery.

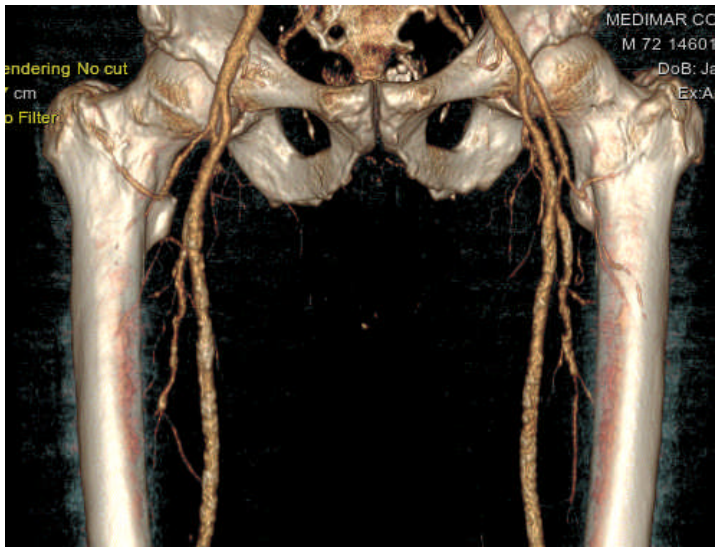
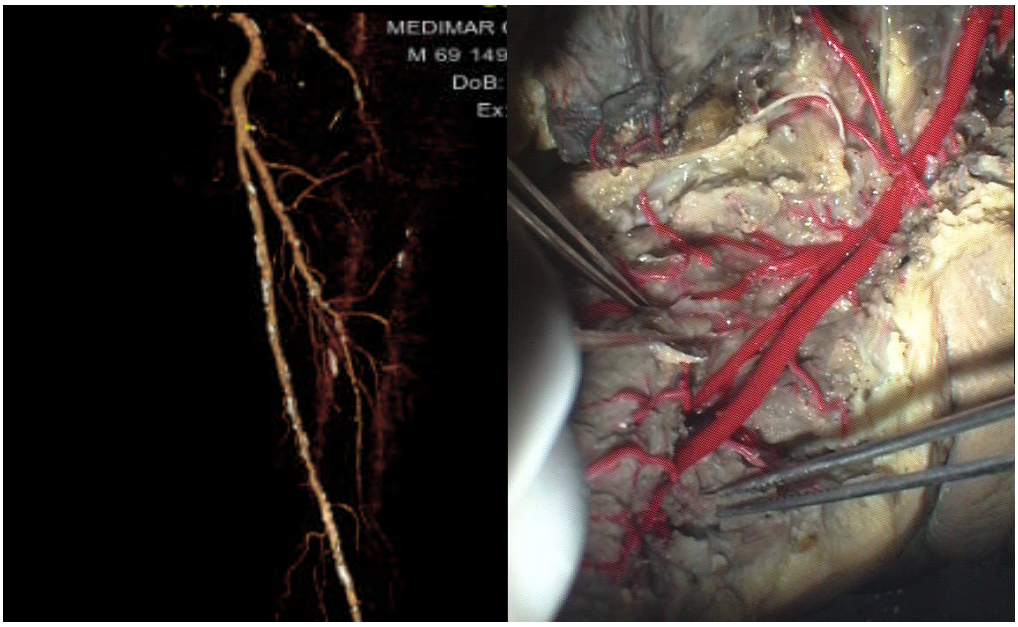


Fig. 5. The left PFA has its origin on the postero-lateral side of the CFA, being higher up to the origin of the right PFA (male gender).

Side of corresponding CFA from which the left PFA emerged was determined on a number of 38 cases, 32 male cases (84, 21%) and 6 female cases (15,79%). In 36 cases (94,74%), the left PFA origin was situated at CFA level, and in 2 cases (5,26%) its origin was situated at the level of the external iliac artery.



A B

Fig. 6. A. Originea AFP stângi este situată pe faţa laterală a femuralei comune (sex masculin); B. AFP stângă îşi are originea pe faţa postero-medială a AFC.

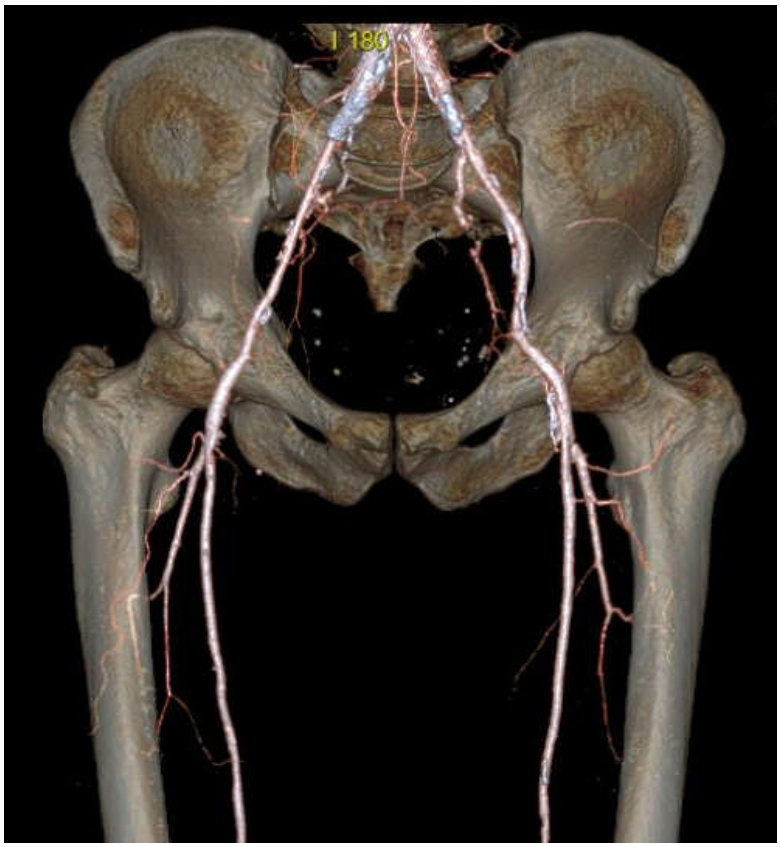


Fig. 7. Originea AFP stângi din artera iliacă externă (sex masculin)

In only one case we found a double right profound femoral trunk, which divides in two right profound femoral arteries, a superior one and an inferior one, and the usual collateral branches (the two circumflex femoral arteries, medial and lateral, and four perforating), emerging from the superior profound femoral, from the inferior one emerging only muscular branches.

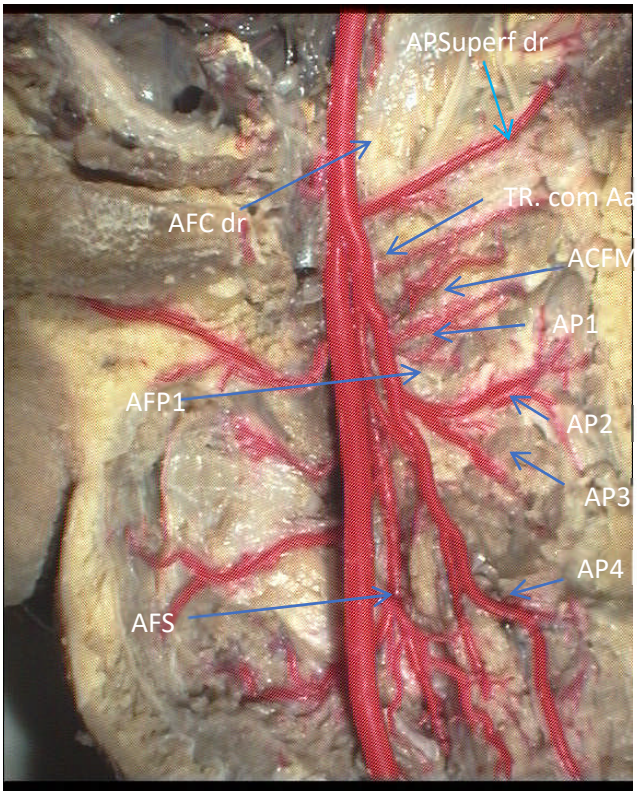


Fig. 8. Case with 2 PFA. TR com AaFP: common trunk of the PFA, AFP1:PFA superior; AFP2: PFA inferior; AP1, AP2, AP3, AP4: perforating arteries 1, 2, 3, 4; APSuperf dr: right superficial pudendal artery.

We didn't find in the consulted literature the comparison at the level of origin of the two profound femoral arteries, right and left, I found that the left PFA had a higher situated origin in 11,12% of cases, than the right PFA.

The external diameters, endoluinale diameters and artery length from their level of origin until their end, were measured. The values obtained stabilised the femoral artery principal trunks (common, profound and superficial), from the collateral branches being evaluated only circumflexe femoral arteries (medial and lateral) and the perforating arteries.

The distance between the linguinal ligament and PFA's origin, which represents, in the same time, the CFA corresponding length , was determine on a number of 46 cases, 36 male cases (78,26%) and 10 female cases (21,74%). We found this distance between 15,7-53,6 mm, with a difference bertween extreme values of 37,9 mm.

As was the case of the right PFA, the distance between the inguinal ligament and the left PFA origin, represents, in the same time, the length of the corresponding CFA, beig determined on a number of 46 cases, 36 being male gender cases (78,26%) and 10 female gender cases (21,74%). I found this distance having values between 10,0-66,1 mm, with a diference between the extreme values of 56,1 mm.

Table. 2. The distance between the inguinal ligament and the CFA terminal level (CFA length).

AUTHOR	CFA LENGTH/ CM
Testut [5]	4-5
Paturet [4]	4-5
Rouvière [6]	4
Gray [11]	3,5
Moore [12]	1-5
Kamina [8]	4
Basmajian [13]	4
Robacki [9]	4-5
Diaconescu [14]	4-5
Bordei [15]	4-5
Lahlaidi [16]	5
Zierler [17]	2,5
Dudea [2]	2,5
Personal results	*R: 1,57-5,36* *L: 1,0-6,61*

The external diameter at the right CFA level of origin was determined on a number of 36 cases, 28 male cases (77,78%) and 8 female cases (22,22%), being found between 6,4-13,2 mm, with a diference between extreme values of 6,8 mm.

The external diameter at the right CFA terminal level was determined on a number of 22 cases, 18 male cases (81,36%) and 4 female cases (18,64%), being found between 8,1-12,9 mm, with a diference between extreme values of 4,8 mm.

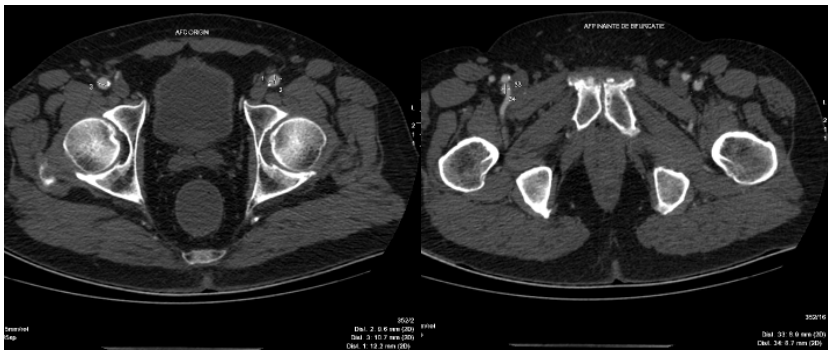


Fig. 9. Diametrul AFC drepte la origine este de 10.7 mm iar la terminare 8,9 mm (sex masculin).

Comparing the right CFA external diameter, between the origin and the terminal level, on a number of 22 cases, from which 18 were in the male gender (81,82%) and only 4 cases in the female gender (18,18%), we observed that in 12 cases (54,55%), the diameter at its point of origin was larger, by differences between 0,2-2,0 mm, between the extreme values being a diference of 1,8 mm.

The external diameter at the left CFA level of origin was determined on a number of 38 cases, 28 male cases (73,68%) and 10 female cases (26,32%), being found between 6,0-12,7 mm, with a diference between extreme values of 6,7 mm.

The external diameter at the left CFA terminal level was determined on a number of 28 cases, 20 male cases (71,43%) and 8 female cases (28,57%), being found between 6,7-12,8 mm, with a diference between extreme values of 6,1 mm.

I found the following average values:

- Right CFA origin diameter was 10,02 mm, in the male cases (9,98 mm), being smaller than the female gender (10,14 mm) with 0,16 mm;
- Left CFA origin diameter was 9,76 mm, in the male cases (10,80 mm), being higher than the female gender (8,78 mm) with 2,02 mm;
- Right CFA terminal diameter was 10,12 mm, in the male cases (9,98 mm), being higher than the female gender (10,06 mm) with 0,08 mm;
- Left CFA terminal diameter was 9,49 mm, in the male cases (10,22 mm), being higher than the female gender (9,34 mm) with 0,88 mm;

Table . 3. CFA diameter at origin

AUTHOR	DIAMETER AT ORIGIN / MM
Paturet [4]	8-9
Kamina [8]	8-9
Kenneth [18]	6,6
Lorbeer [19]	10,2
Czyzewska [20]	media: 8,05; F: 7,62; M: 8,75
Sandgren [21]	media: M: 7,1; F: 7,7
Crişan [22]	8,2
Mihalache [10]	8-9
Dudea [2]	8,2
Zierler [17]	8,2
Rezultate personale	*AFC dr: media- 10,02; M: 9,98; F: 10,14; AFC st: media- 9,76; M: 10,80; F: 8,78.*

In the consulted literature, femoral arteries diameters, at origin and at terminal level, were specified only by [16], and [15] specified the diameters of the common femoral arteries, superficial and profound arteries. None of these authors specified diameters regarding gender and didn't differentiate the diameters bilaterally.

In women, calibre differences between the left and right CFA, are in favour of the right artery, and are higher than those in men, not being able to find the left CFA diameters at its origin larger than the right one in female cases.

Right superficial femoral artery external diameters at its origin were followed on a number of 34 cases, 26 male cases (76,47% of cases) and 8 female cases (23,53% of cases). Its diameters had registered values between 6,6-10,1 mm, with a difference between the extreme values of 3,5 mm. Right superficial femoral artery diameters at ½ of the thigh were evaluated also on 34 cases, 26 male cases (76,47% of cases) and 8 female cases (23,53% of cases), and had values between 4,9-10,5 mm, with a difference between extreme values of 5,6 mm. Right superficial femoral artery external diameters at terminal level was followed also on 34 cases, with the same gender distribution, and had values between 5,3-9,9 mm, with a difference between the extreme values of 4,6 mm.

Left superficial femoral artery external diameters at its origin were followed on a number of 40 cases, 32 male cases (80% of cases) and 8 female cases (20% of cases). Its diameters had registered values between 5,6-13,5 mm, with a difference between the extreme values of 7,9 mm. Left superficial femoral artery diameters at ½ of the thigh were

evaluated on 39 cases, 31 male cases (77,49% of cases) and 8 female cases (20,51% of cases), and had values between 5,2-9,9 mm, with a difference between extreme values of 4,7 mm. Left superficial femoral artery external diameters at terminal level was followed on 38 cases, 30 male cases (78,95% of cases) and 8 female cases (21,05% of cases), and had values between 4,9-9,5 mm, with a difference between the extreme values of 4,6 mm.

Right profound femoral artery external diameters were followed on a number of 34 cases, 26 male cases (76,47%) and 8 female cases (23,53% of cases), and had values at its origin between 5,5-8,9 mm, the difference between the extreme values being 3,4 mm.

Left profound femoral artery external diameters at its origin were followed on a number of 40 cases, 32 male cases (80%) and 8 female cases (20% of cases), and had values between 4,4-10,2 mm, the difference between the extreme values being 5,8 mm.

Right PFA external diameter at origin in relation to right SFA external diameter at origin was evaluated on a number of 34 cases, 26 male cases (76,47% of cases) and 8 female cases (23,23%). Right SFA diameter was found to be larger in 24 cases (70,59% of cases), 20 male cases (58,82% of cases and 83,83% of the 24 cases) and 4 female cases (11,76% of cases and 16,67% of the 24 cases). In these 24 cases, the differences were found between 0,6-4,2 mm, the difference between the extreme values being 3,6 mm.

In 10 cases (29,41% of cases), the right PFA external diameter was found to be larger than the SFA diameter, 6 male cases (17,65% of cases and 60 % of the 10 cases), and 4 female cases (11,76% of cases and 40% of the 10 cases). In these cases, the diameter differences were found between 0,1-1,5 mm, the difference between the extreme values being of 1,4 mm.

Left PFA external diameter at origin in relation to left SFA external diameter at origin was evaluated on a number of 38 cases, 26 male cases (68,42% of cases) and 12 female cases (31,58%). The left SFA diameter was found to be larger in 30 cases (78,95% of cases), 22 male cases (57,89% of cases and 73,33% of the 30 cases) and 8 female cases (21,05% of cases and 26,67% of the 30 cases). In these 30 cases, the differences were found between 0,3-7,8 mm, the difference between the extreme values being 7,5 mm.

In 8 cases (21,05% of cases), the left PFA external diameter was found to be larger than the SFA diameter with differences between 0,2-0,5 mm, the difference between the extreme values being of 0,3 mm.

FEMORAL ULTRASOUND MORPHOMETRY

Ultrasound diameters, left and right, were followed in all femoral arteries (common, superficial and profound) on a number of 60 cases, 34 male cases (56,67% of cases) and 26 female cases (43,33% of cases).

Right CFA ultrasound diameter at its origin was found between 6,1-8,9 mm, the difference between the extreme values being 2,8 mm.

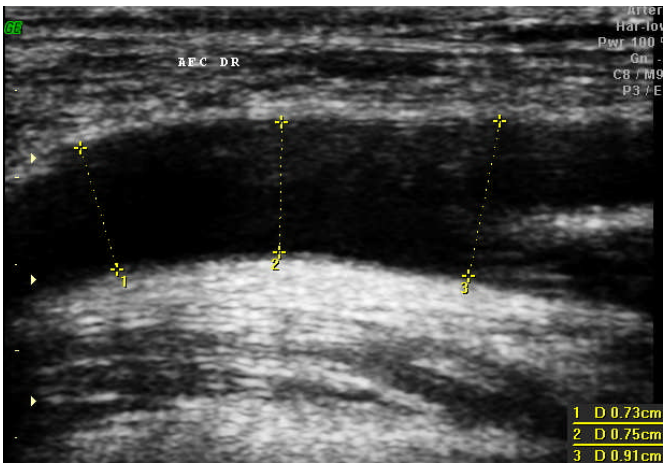


Fig. 10. Right CFA diameters: at origin-7,3 mm, terminal level-9,1 mm; between the origin and the terminal level, the diameters rises by 1,8 mm (male gender).

Right CFA ultrasound diameter at terminal was found between 6,3-12,9 mm, the difference between the extreme values being 6,6 mm.

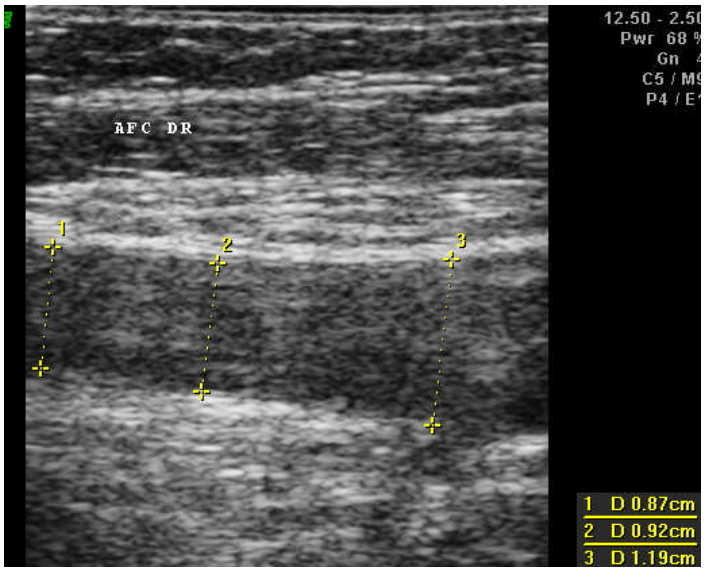


Fig. 11. Right CFA diameters: at terminal level - 11,9 mm, and at origin - 8,7 mm, being larger at terminal level by 3,2 mm (male gender).

Left CFA ultrasound diameter at its origin was found between 6,1-8,9 mm, the differences between the extreme values being 2,8 mm ; and at its terminal level, was found between 6,8-12,5 mm, the difference between the extreme values being 5,8 mm.

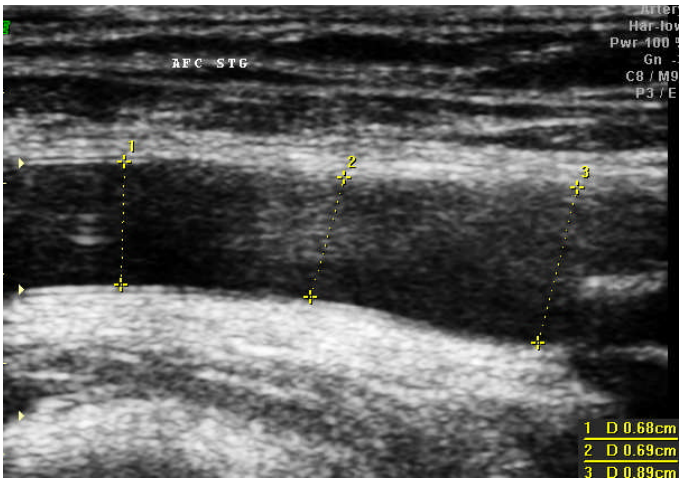


Fig. 12. Left CFA diameters: at origin – 6,8 mm, at terminal level – 8,9 mm; between its origin and terminal level the diameters growing by 2,1 mm (male gender).

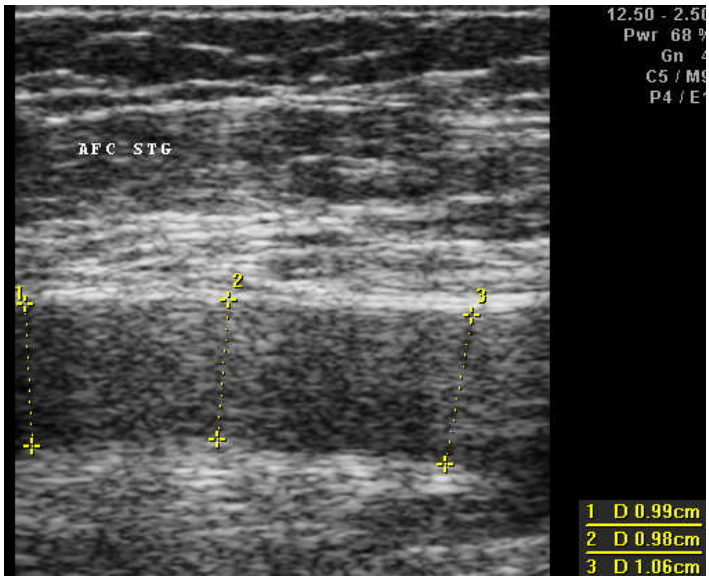


Fig. 13. Left CFA ultrasound diameter at terminal level - 10,6 mm, and at origin - 9,9 mm, at terminal level being larger by 0,7 mm (male gender).

In 40 cases (66,67% of cases), we found the left CFA diameters larger than the right CFA diameter, with differences between 0,1-1,2 mm, the difference between the extreme values being 1,1 mm.

In only 1 case (1,67% of cases), the right CFA diameter was equal with the Left CFA diameter, at their point of origin, this case being recorded in the female gender.

Right SFA ultrasound diameter had values between 4,3-7,3 mm, with a difference between the extreme values of 3,0 mm, and in the **left SFA**, had values between 2,5-6,6 mm, with a difference between the extreme values of 4,1 mm.

Left SFA diameter was found to be larger than the right SFA diameter in 36 cases (60% of cases), with differences between 0,1-1,0 mm, between the extreme values recording a difference of 0,9 mm.

Left PFA ultrasound diameter was found to be between 3,0-6,7 mm, between the extreme values existing a difference of 3,7 mm ; and of the right PFA was found between 2,8-5,8 mm, with a diffenrence between the extreme values of 3,0 mm.

The right PFA diameter was found to be larger than the left PFA diameter in 40 cases (66,67% of cases), with differences between 0,1-1,9 mm, between the extreme values being a difference of 1,8 mm.

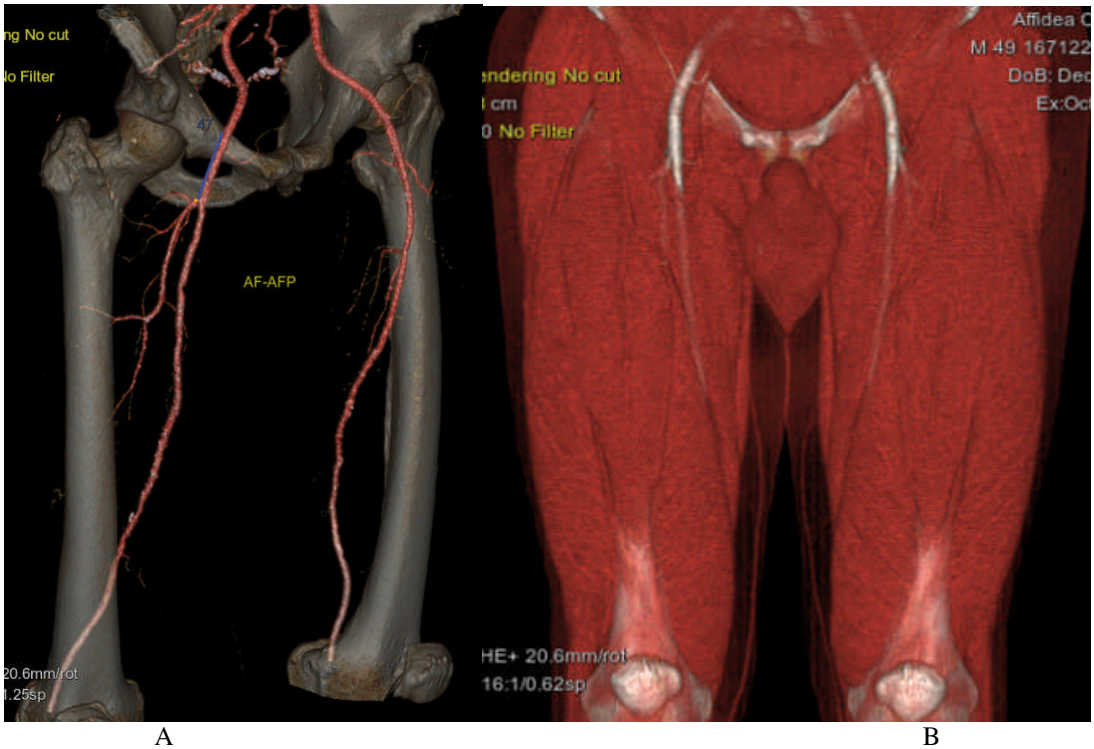
At CFA level, vertical and horizontal endoluminal ultrasound diameters were meassured, at its level of origin and its terminal level, which were compared between these parameters, and also bilaterally.

Common femoral arteries (CFA) are continued in a straight line by the superficial femoral arteries (SFA), which are continued themselves terminally by the popliteal arteries (APp).

From its point of origin, the CFA may be rectilinear, being vertical until its bifurcation, or oblique, on one or both sides, or may be curved, with its concavity situated medially or laterally.

SFA until its terminal level, can describe only one wide curve with its concavity situated laterally or medially, can describe two overlapped curves, superior and inferior with an opposing concavity, or may even describe three or four curves, haing a very sinuous trajectory.

Most frequently, the bilateral trajectories of the femoral arteries is asymmetric, in approximately 28% of cases, we found a symmetric trajectory of the two femoral arteries, right and left, taking into account the CFA and the SFA.



A B

Fig. 14. A. Right CFA is linear oblique inferior, SFA being oblique infero-medially, describing a wide curve with its concavity lateral; Left CFA and the upper segment of the SFA describe, until above the middle of the femur, a curve with its concavity medial, followed by another curve laterally concave, untile above the medial femoral condyle; B. CFA are slightly curved, with their concavity medial, after which, the trajectory of the arteries becomes linear oblique infero-medial.

The two circumflex femoral arteries, lateral and medial, were studied considering their level of origin, and their diameters at origin, on a number of 88 cases, from which there were 51 right circumflex arteries (57,95% of cases), 27 lateral circumflex arteries (52,94% of the right circumflexes) and 24 medial circumflex arteries (47,06% of the right circumflexes).

Most frequently, in 66 cases (75% of cases), the circumflex arteries had their origin in the PFA, in 17 cases (19,31% of cases) they had their origin in the CFA, and in 4 cases (4,55% of cases), their origin was in SFA, in only one case, we found the origin of the right lateral circumflex femoral artery in the external iliac artery (1,14% of cases).

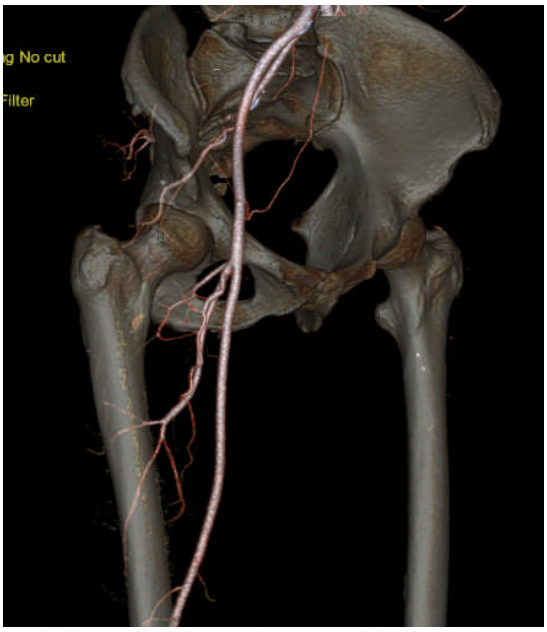


Fig. 15. Right lateral circumflex femoral artery origin from the external iliac artery.

We found 4 cases in which the circumflex arteries, lateral and medial, emerged from a common trunk of the PFA, 2 cases being of the left side and the other 2 being on the right side.

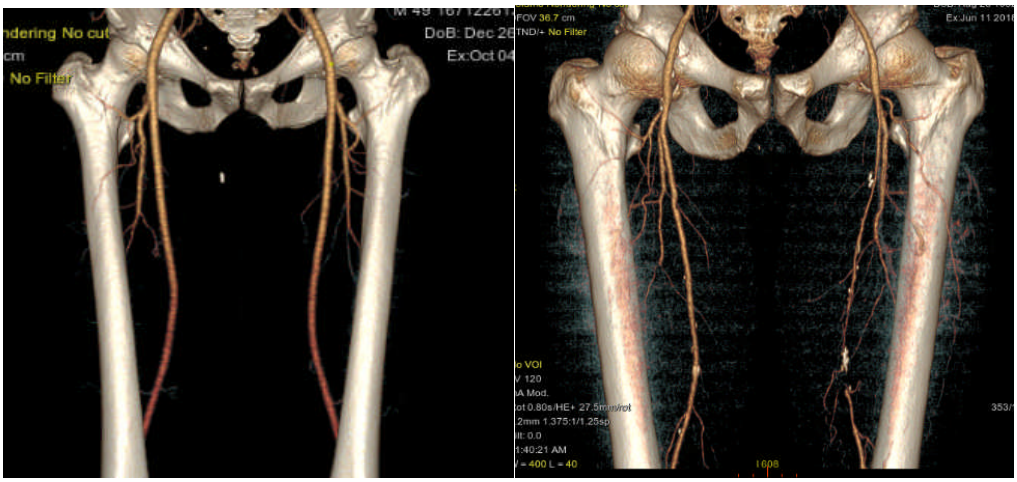


Fig. 16. Both left circumflex femoral arteries, medial and lateral, emerge from a common trunk of the PFA.

The external diameter of the **1st right perforating arteries (right PA 1)** was followed on a number of 32 cases, 24 male cases (75% of cases) and 8 female cases (25% of cases), and had diameter values between 2,5-6,1 mm, the difference between the extreme values being 2,6 mm.

The external diameter of the **1st left perforating arteries (left PA 1)** was followed on a number of 40 cases, 30 male cases (75% of cases) and 10 female cases (25% of cases), and had diameter values between 2,0-5,5 mm, the difference between the extreme values being 3,5 mm.

The external diameter of the **2nd right perforating arteries (right PA 2)** was followed on a number of 34 cases, 26 male cases (76,47% of cases) and 8 female cases (23,53% of cases), and had diameter values between 2,0-5,5 mm, the difference between the extreme values being 3,5 mm.

The external diameter of the **2nd left perforating arteries (left PA 2)** was followed on a number of 38 cases, 30 male cases (78,95% of cases) and 8 female cases (21,05% of cases), and had diameter values between 1,6-5,7 mm, the difference between the extreme values being 4,1 mm.

CONCLUSIONS

- The knowledge of the normal parameters of the femoral artery and its branches, in healthy patients, both male and female, of different ages, is essential for the medical practice.
- I analized the femoral arteries morphometry (common, lateral and medial circumflex femoral arteries, superficial, profound and perforating), comparing them bilaterally, taking into account the age and gender of the patients, in different levels: origin, terminal, bifurcation, middle of the length of the blood vessel, etc., through non-invasive methods (Doppler ultrasonography and CTA).
- I used the forementioned methods because they allow a positive diagnosis, quick and fiable, in the vascular pathology (anevrism, ectasia or vessel hypoplasia, arterial stenosis), as well as in the atherosclerotic alterations gained with age growth, thus being able to monitorize the process of vascular remodeling.
- I noticed differences between the left and right femoral arteries trajectories, these being more frequently asymmetric between both sides of the body.
- I measured femoral vessels diameters in different segments of the lower limb arteries, the obtained values could be utilised as reference values in the making of nomograms, which are important for the medical pathology.
- I observed that there aren't significant differences between the left and right artery dimensions, the only exceptions being the right common femoral arteries, in both genders, where significantly higher values were recorded.
- I realized that superficial femoral artery diameters, in most cases, were larger than the profound femoral artery diameters, in both genders.
- I noticed that arterial diameters in male subjects were larger in almost all examined arteries, than those of the female subjects.
- In the studied group, two particular cases were emphasized, one which presented two profound femoral arteries in the same lower limb, and one which presented the emergence of the profound femoral artery from the external iliac artery.
- Significantly statistic correlations between the patients age and the examined vessels diameters were observed, in female studied groups, as well as men, the diameters becoming larger with age.

- Femoral arteries normal morphology knowledge has a most important anatomical importance, considering that it is scarcely described in the reference literature, but also having a clinical importance (medical, radiological and surgical), given the interventions that are performed at this level: exploratory and surgical. Also, knowing these processes allows us to differentiate between the physiological vessel alterations and the pathological.

PAPER ORIGINALITY

- Lack of information regarding femoral artery morphology and physiology.
- The multitude of data gathered, many not being mentioned in medical literature such as the comparisons between right and left femoral arteries, between genders, between the profound femoral artery and the common femoral artery at their point of origin, between the superficial femoral artery and the profound femoral artery at their point of origin, middle portion and terminal.
- Multiple methods of research: dissection, plastic mass injection, Doppler ultrasonography and computed tomography angiography (CTA).
- Abundence of images, which led to many ultrasound and CT-scan images, 1241 images, 93 graphics and 197 figures.
- Comparison between CT and ultrasonography morphometry.
- Origin prevalence of the circumflex femoral arteries, medial and lateral: from a common trunk, from the common femoral artery, from the profound femoral artery or the external iliac artery.
- Particular cases: one with two profound femoral arteries, and another one with the profound femoral artery emergence from the external iliac artery.
- The significant impact of this paper over exploration accuracy and diagnosis of vascular afflictions in the femoral arteries.

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