

FEMORAL ARTERY LENGTH, FROM ITS POINT OF ORIGIN TO THE ORIGIN OF THE DEEP FEMORAL ARTERY

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ABSTRACT

In our study, we determined the length of the femoral arteries, on a CT Revolution Evo 128 slice machine – General Electric, from their point of origin to the deep femoral artery origin, on a number of 48 cases (35 male cases and 13 female cases) on each of the two femoral arteries, right and left. The length was determined considering gender, and a comparison between the lengths of both femoral arteries was made, noting existing length differences between them. The left femoral artery length was found between 18,1 and 66,1 mm, in men being between 18,1 and 66,1 mm, and in women, between 24,1 and 41,2 mm. The right femoral artery length was between 15,7-53,6 mm, in men being from 15,7 to 49,1 mm, and in women from 16,4 to 26,4 mm. Comparing both femoral artery lengths, we noticed that in 23 cases, the right femoral artery was longer than the left one by 0,3-19,3 mm, in male cases the right femoral artery being longer in 20 cases, with differences between 0,3-13,5 mm, and in female cases, it was found longer in 3 cases, with differences found between 0,3 and 19,3 mm. The left femoral artery was longer than the right one by 0,4-31,1 mm, in 15 male cases with differences from 0,4 to 31,1 mm, and in 10 female cases, the differences were between 4,0-19,3 mm.

Keywords: proximal femoral artery, length

INTRODUCTION

After [1], “the femoral artery directly continues the external iliac artery and gives birth to the deep femoral artery, under the Fallopiian arcade, having a considerable volume, which made some authors consider it as a bifurcation branch of the femoral artery. But the deep femoral artery has highly variable points of origin, thus leading to the alteration of the origins of collateral arteries”. “The common femoral artery continues the external iliac artery, from the femoral arcade, until the third adductor hiatus, the deep femoral artery emerging on the posterior side of the common femoral artery” [2]. According to [3], “it’s the femoral pulse artery, it being present even in case of collapse, in absence of a peripheral pulse, the femoral artery emerging under the inguinal ligament, in the vascular lacunae”. After [4], “the femoral artery is part of the neurovascular

bundle which crosses from the pelvis to the inferior limb, on the lateral side of the femoral ring, the femoral nerve being found on its lateral side, the artery emerging a little after the passing from under the femoral ligament, either through a single trunk, or through separate arteries”.

For a long time, the proximal segment of the femoral artery, from its origin to the origin of the deep femoral artery, was named the *common femoral artery*, having in mind that at this level, the femoral artery ends, and is divided into the deep and superficial femoral arteries.

MATERIALS AND METHODOLOGY

Our study was performed on a number of 48 cases, from which 35 were male (72,92%) and 13 were female (27,08%), for each of the two femoral arteries, right and left, of which we determined their length, from their origin, to the deep femoral artery origin. The length was determined in patients without any known prior vascular pathology, with ages between 31 and 72 years, taking into account the gender of the patients, and the comparison between the two femoral artery lengths, recording any length differences found. The images were obtained, having a written consent form of the examined patient, on a CT Revolution Evo 128 slice machine, from General Electric, belonging to “Medimar” Imagistic Services, within “St. Andrew’s” County Clinical Emergency Hospital from Constanta, Romania.

RESULTS

The length of the left femoral artery had values between 18,1 and 66,1 mm, the extreme values, minimum and maximum, being registered each in only one case, both values belonging to the male gender. Most frequently, in 38 cases (79,17%) length values were found between 21,8 and 47,4 mm.

In male gender patients, the length had values from 18,1 to 66,1 mm, more frequent, in 34 cases (97,14% of male cases) being from 18,1 to 47,4 mm. In female gender patients, we found length values between 24,1 and 41,2 mm, more frequent, in 11 cases (84,62% of female cases) being between 24,1 and 33,9 mm.

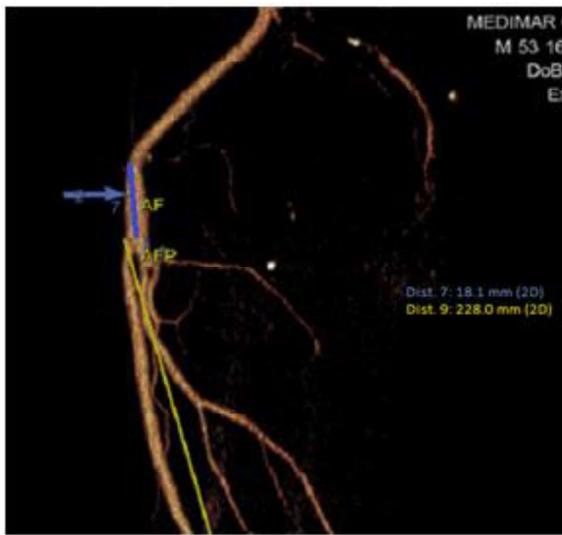


Fig. 1. Left femoral artery length: 18,1mm
(male gender)

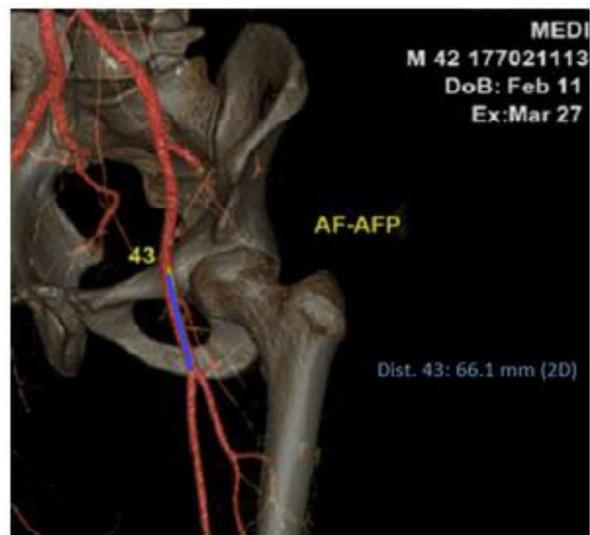


Fig. 2. Left femoral artery length: 66,1mm
(male gender)



Fig. 3. Left femoral artery length: 24,1mm
(female gender)

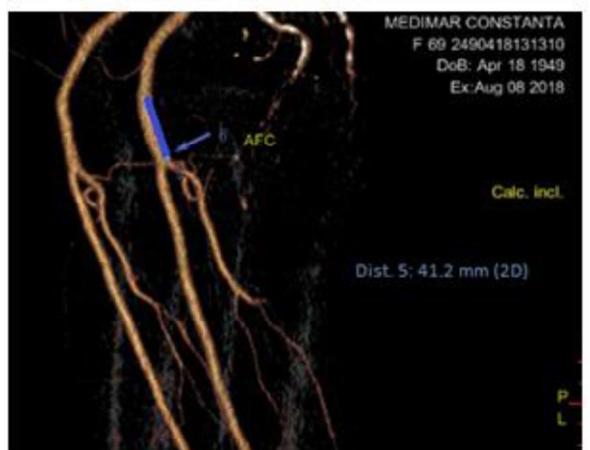


Fig. 4. Left femoral artery length: 41,2 mm
(female gender)

The right femoral artery length varied between 15,7 and 53,6 mm, the extreme values, minimum and maximum, being registered, as well, in only one case each, the minimum value being found in a male patient, and the maximum value, in a female patient. Most frequently, in 41 cases (85,42%) the length had values ranging from 20,2 to 49,1 mm.

In male gender patients, length values varied from 15,7 to 49,1 mm, most frequently, in 33 cases (94,29% male cases) being from 20,2 to 49,1 mm. In female gender patients, the length had values ranging from 16,4 to 53,6 mm, most frequently, in 10 cases (76,92% female cases) ranging from 16,4 to 26,4 mm.

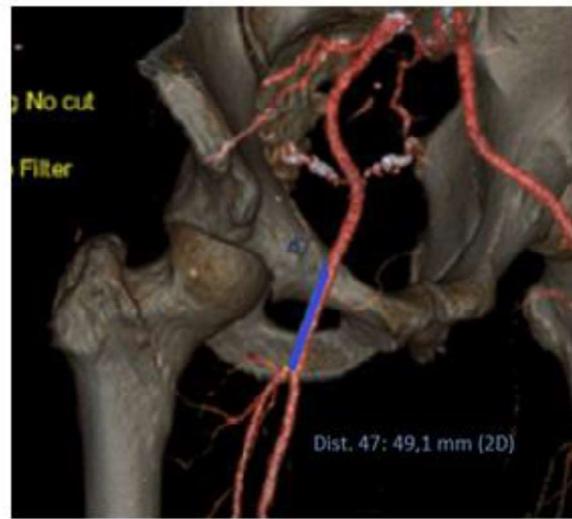
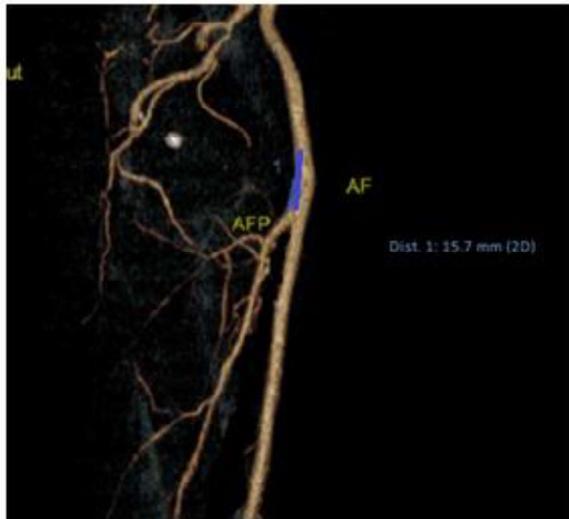


Fig. 5. Right femoral artery length: 15,7mm (male gender) *Fig. 6. Right femoral artery length: 49,1 mm (male gender)*

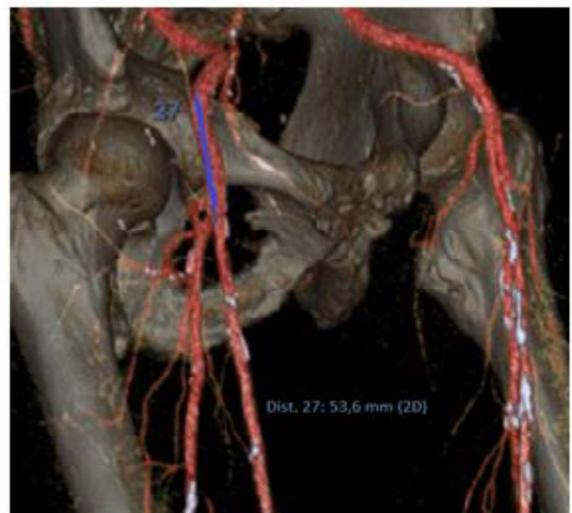
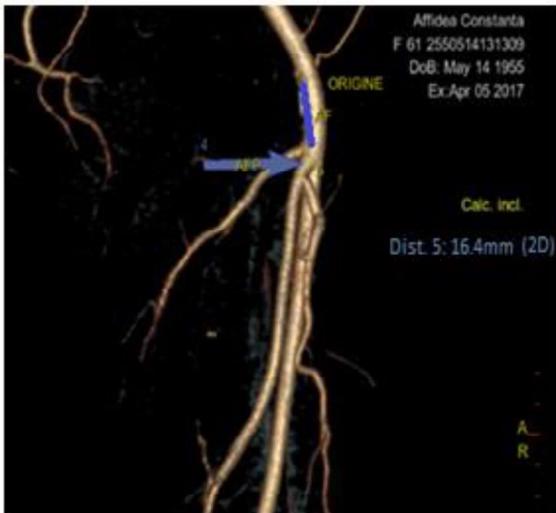


Fig. 7. Right femoral artery length: 16,4 mm (female gender) *Fig. 8. Right femoral artery length: 53,6 mm (female gender)*

Making a comparison between the two femoral artery lengths, we found that, in 23 cases (47,92%), the right femoral artery was longer than the left one by 0,3-19,3 mm, most frequently, in 8 cases (34,78%) being longer by 0,3-1,6 mm.

In male gender patients, the right femoral artery was found to be longer in 20 cases (86,96% male cases), with differences being between 0,3 and 13,5 mm, more frequent, in 16 cases (45,71% male cases) the difference ranging from 0,3 to 4,9 mm.

In female gender patients, the right femoral artery was found to be lengthier in 3 cases (13,04% female cases), with variations between 0,3 to 19,3 mm.

The left femoral artery was longer than the right one by 0,4 to 31,1 mm, in 25 cases (52,08%).

In male gender patients, the left femoral artery was found longer in 15 cases (42,86% male cases), with variations ranging from 0,4 to 31,1 mm, more frequent the difference between the 2 arteries being from 0,4 to 4,9 mm, in 16 cases (64% male cases).

In female gender patients, the left femoral artery was longer in 10 cases (76,92% female cases), with differences ranging from 4,0 to 19,3 mm, in 90% of female cases the differences being between 4,0 and 14,2 mm.

DISCUSSIONS

Information regarding femoral artery morphometry, especially regarding the proximal femoral artery length (until the deep femoral artery origin) is scarce in anatomy reference literature, although this arterial segment is frequently used in medical practice. In classical literature, it is considered that “the deep femoral artery emerges on the posterior side of the femoral artery, in the inferior of the Scarpa triangle, at 4-5 cm under the crural arch, but the bifurcation of the common femoral artery has variable sites of origin, thus baring alterations regarding collateral arteries origins” [1], [4]. [2], [3], [5] state that the deep femoral artery emerges at approximately 4 cm under the inguinal ligament. Henle [cited by 1] has registered 6 cases in which the femoral artery ends on the anterior side of the thigh, being replaced in these cases by the ischiatic artery, which is continued by the popliteal artery (ischio-popliteal artery trunk, found in birds). [1] observed 3 such cases, and Chretien [cited by 1], cites 2 cases in both thighs of a 15 years old child.

[1] cites a case in which the external iliac artery ended with 3 branches of equal volume, which remained intertwined on a 4 cm distance: the internal branch was the deep femoral artery, the middle branch was the common femoral artery, and the lateral branch was the quadriceps artery [6].

According to Quain [cited by 1], on a study consisting of 543 cases, the deep femoral artery had its origin under the femoral arcade as follows:

- 0-13 mm: 13 cases (2,39%);
- 13-25 mm: 146 cases (26,89%);
- 25-37 mm: 183 cases (33,70%);
- 37-50 mm: 109 cases (20,07%);
- 50-62 mm: 19 cases (3,50%);
- 62-75 mm: 72 cases (13,26%);
- 10 cm: 1 case (0,18%).

Making a comparison between our results and those of Quain, it can be observed that we didn't find any case in either femoral artery, in which the length was lower than 13 mm. We found the maximum length of the right femoral artery in only one case, with a value of 53,6 mm (2,08%), whereas Quain found it in 16,94% of cases, and of the left femoral artery, also in only one case, with a value of 66,1 mm (2,08%), whereas in Quain's study it was found higher than 62 mm in 13,44% of cases.

Viguerie [cited by 1], divided the first 8 cm of the femoral artery in sections of 2 cm, noticing that the deep femoral artery could emerge:

- In the 1st part: in 26 cases (8,50%);
- In the 2nd part: in 134 cases (43,79%);
- In the 3rd part: in 136 cases (44,44%);
- In the 4th part: in 10 cases (3,27%).

Comparing the results of our study with those of Viguerie's study, we found the femoral artery length smaller than 2 cm in 14,58% cases in the right femoral artery (larger by 6,08% cases), and in the left femoral artery in 18,75% cases (larger by 10,25% cases). Femoral artery length between 2 and 4 cm was found in 66,67% cases in the right femoral artery (larger by 22,88% cases) and in 54,17% cases in the left femoral artery (larger by 10,38% cases). The femoral artery length with values ranging from 4 to 6 cm was found in 18,75% cases (smaller by 25,69% cases) in the right femoral artery, taking into account that we didn't find a higher value than 53,6 mm. In the left femoral artery, the length between 4-6 cm was found in 25% cases (smaller by 19,44% cases than Viguerie's). We found a single length with values higher than 6 cm in the left femoral artery (6,61 cm), in 2,08% cases, while Viguerie found it in 3,27% cases (higher by 1,19% cases).

We have to mention that the two authors don't give lengths taking into account the femoral artery's position (right or left), or gender. We noticed that the left femoral artery was longer by 4,16% cases, in men being longer by 14,28% of male cases, and in women, by 63,88% of female cases.

CONCLUSION

The femoral artery's morphometry, from its point of origin, until the emergence of the deep femoral artery (Scarpa's triangle), according to [4], "represents the elective region for femoral artery access at the thigh's root. It can be punctured for drawing arterial blood and represents a path for medication administration to the lower limbs (injections of vasodilating agents)". "It's the elective path for a Seldinger catheterization, and for a great part of vascular radiological explorations, by introducing a catheter percutaneously in the arterial tree. It is, as well, one of the arteries used in cardiac surgery for extracorporeal

circulation circuits, also being one of the arteries that can be used for prosthetic implantation in sight of periodical hemodialysis” [3].

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