Inter-relatedness of the origins of the deep femoral artery and femoral circumflex arteries

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Abstract

124 femoral regions were dissected and the origins of the deep femoral and femoral circumflex arteries were demonstrated. The specimens were grouped according to the origins of the femoral circumflex arteries.

In group A, where both femoral circumflex arteries arise from the deep femoral artery, it was noted that the medial femoral circumflex artery has a more proximal origin than the lateral femoral circumflex artery.

In group B, where either one or both femoral circumflex arteries arise from the common femoral artery it was noted that the deep femoral artery originated most distally when measured from the mid point of the inguinal ligament. It was also noted that in some specimens in group B, either one or both femoral circumflex arteries arise at the same level as the deep femoral artery. In none of the specimens were the origins of the femoral circumflex arteries distal to the origin of the deep femoral artery.

Key Words: deep femoral artery, medial femoral circumflex artery, lateral femoral circumflex artery, common femoral artery.

Introduction

The external iliac artery continues into the thigh as the common femoral artery (CFA) (1). The deep femoral artery (DFA) arises from the CFA about 4cm below the mid point of the inguinal ligament. Medial and lateral femoral circumflex arteries are usually given off from the deep femoral artery. Occasionally one or both circumflex arteries may arise directly from common femoral artery (2).

The branches of the DFA and the circun femoral arteries anastomose with branch the internal iliac artery in the hip region with branches of the popliteal artery aroun knee joint. These anastomoses play an impo role in the blood supply to the proximal distal regions of the femur (3,4).

The branching patterns of the DFA and circumflex femoral arteries have extensively studied (5,6,7). Yet the rel positions of the origins of these vessels hav been adequately described.

The objective of this study is to analys inter-relatedness of the origins of the DF the femoral circumflex arteries.

Materials and Methods

124 femoral regions of 36 males and 28 fe obtained from cadavers were dissected i Department of Anatomy of the Facul Medicine, Colombo. Four specimens wer included in the study as the femoral arter the region of the femoral triangle damaged during the process of inje formaldehyde for preservation. The CF the origins of the DFA and the fe circumflex arteries were demonstrated.

The specimens were divided into two g (group A and group B) according to the o of the femoral circumflex arteries (Fig. group A both femoral circumflex ar originated from the DFA and in group B one or both femoral circumflex arteries from the CFA.

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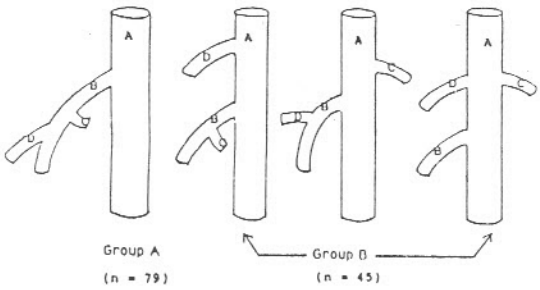

Fig. 1
Patterns of origin of the femoral circumflex arteries

A – common femoral artery
B – deep femoral artery
C – medial circumflex artery
D – lateral circumflex artery

The distances of origin of the femoral circumflex arteries from the origin of the DFA was measured in group A. Measurements were made in centimeters using a calibrated vernier sliding caliper. The point of the acute angle made by the branching arteries were considered as the referral points (5). The differences in the mean distances were statistically analysed using the Student's t test. The relative positions of the origins of the medial femoral circumflex artery (MFC) and the lateral femoral circumflex artery (LFC) were noted. The relative positions of the origins of the DFA, MFC and LFC was noted in group B.

Results

Table 1 shows the mean distance of origin of the MFC and LFC in group A of specimens. The mean distance of origin of the MFC was 1.882 cm and that of the LFC was 2.362cm, measured from the origin of the DFA. The difference between the mean distances were significant ($p<0.001$). This shows that the MFC has a more proximal origin than the LFC, along the trunk of the DFA.

Table 2 shows the relative positions of the origins of the MFC and LFC along the DFA in group A of specimens. In 70(88.6%) the origin of the MFC was proximal to the origin of the LFC.

Table 1. The distance of origin of the MFC and LFC in group A, measured from the origin of DFA (n = 79)

Artery	Distance (cm)	SD
MFC	1,882	±0.92
LFC	2,362	±0.86

Group A – both circumflex arteries arising from the DFA
MFC – medial femoral circumflex artery
LFC – lateral femoral circumflex artery
DFA – deep femoral artery
cm – centimeters
SD – standard deviation

Table 2. The relative positions of the origins of the MFC and LFC along the DFA in group A(n = 79)

Artery	position	number	%
MFC	proximal	70	88.6
LFC	proximal	06	7.6
MFC and LFC	same level	03	3.8

Group A – both femoral circumflex arteries arising from DFA.
MFC – medial femoral circumflex artery
LFC – lateral femoral circumflex artery
DFA – deep femoral artery

Table 3 shows the relative positions of the origins of the MFC and LFC in group B in relation to the origin of the DFA from the CFA. In a majority, either MFC and/or LFC arose from the CFA at the same level as the DFA.

Discussion

The DFA arises from the CFA within 8cm below the mid point of the inguinal ligament with a mean distance of 4.4cm(6). The circumflex arteries are usually given off from the DFA. Occasionally either one or both circumflex arteries may arise from the CFA. Clarke and

Table 3. The position of the MFC and LFC along the CFA in relation to the origin of the DFA in group B(n = 45)

Artery	proximal	same level	distal
	n(%)	n(%)	n(%)
MFC	17(37.7)	19(42.3)	–
LFC	04(08.8)	02(04.5)	–
MFC and LFC	–	03(06.7)	–

Group B – one or both circumflex arteries arising from the common femoral artery.
MFC – medial femoral circumflex artery
LFC – lateral femoral circumflex artery
DFA – deep femoral artery
n = number

Colborn has shown that in 60% the MFC arose from the DFA and in 40% from the CFA(7). The LFC is less variable and in more than 70% it arises from the DFA(8). It has been shown that when the femoral circumflex arteries arose from the CFA there is a distal migration of the origin of the DFA(9).

When the femoral artery is ligated above the origin of the DFA the collateral circulations formed by the branches of the DFA and the femoral circumflex arteries open up. These anastomotic channels consists of

1. Superior and inferior gluteal branches of the internal iliac artery with the branches of the MFC and LFC.
2. The obturator branch of the internal iliac artery with the ascending branch of the MFC.
3. Inferior gluteal branch of the internal iliac artery with perforating branches of the DFA(10).

In addition to this the descending branch of the LFC anastomoses with the lateral superior genicular branch of the popliteal artery in the formation of the genicular anastomoses(11). Although variations in the anatomy of the origin and distribution of the DFA and the femoral circumflex arteries had been extensively studied, the inter-relatedness of their origins has not been adequately described (5,6,7). A knowledge of these variations is important in the identification of these vessels in surgery of the femoral region and in the interpretation of femoral arteriograms (12, 13, 14, 15).

In this study both femoral circumflex arteries arose from the DFA in 79 specimens (Fig. 1). In this group the mean distance of origin of the MFC was 1.882cm and that of LFC was 2.362cm. As the difference between the mean distances were statistically significant it is evident that the origin of the MFC is much more proximal than the origin of the LFC along the trunk of the DFA.

As shown in Table 2, in 70(88.6%) specimens of group A, the origin of the MFC was more proximal than the origin of the LFC, when they were arising from the trunk of the DFA. Yet it is important to note that in 3(3.8%), both femoral circumflex arteries had a common origin and in 6(7.6%) the origin of the LFC was much more proximal than the origin of the MFC. These findings are important in the identification of the femoral circumflex arteries and their anastomotic channels in femoral arteriograms(15).

In 45 specimens belonging to group B either one or both femoral circumflex arteries arose directly from the CFA(Fig. 1). In this study it was observed that when one or both femoral circumflex arteries were arising directly from the CFA, their origins were much more proximal than the origin of the DFA (Table 3). Among 6 specimens where the LFC originated from the CFA, in 4(8.8%) the origin of the LFC was proximal to that of the DFA. In 36 specimens where the MFC was arising from the CFA, in 17(37.7%) the origin of the MFC was proximal to that of the DFA.

In 3 specimens where both femoral circumflex arteries arose directly from the CFA, their origins were at the same level as the origin of the DFA.

In none of the specimens were the origins of the femoral circumflex arteries distal to that of the DFA. It was also observed that in 24(53.5%) the origin of one or both femoral circumflex arteries were at the same level as the origin of the DFA.

A knowledge of the relative positions of the origins of the DFA and the femoral circumflex arteries may be important in surgery of the femoral region in trauma and in occlusive arterial diseases.

Conclusions

This study shows that

1. when both femoral circumflex arteries arose from the DFA, the origin of the MFC along the DFA is more frequently proximally situated than that of the LFC.
2. when both femoral circumflex arteries arose from the CFA they do so at the same level as the origin of the DFA.
3. in a majority, the origin of the femoral circumflex arteries are at the same level as the origin of the DFA, along the CFA.
4. the MFC or LFC never has their origins distal to that of the DFA.

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