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Variant origin of the lateral circumflex femoral artery in a black Kenyan population

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Variant origin of lateral circumflex femoral artery (FA) is important during harvesting of anterolateral thigh flaps, aortopopliteal by-pass, coronary artery grafting, and vascularised iliac transplant. The frequencies of variant origins display ethnic variations, but reports from black Africans are scarce. This study, therefore, aimed to describe the variant origins of lateral circumflex FA in a black Kenyan population. Eighty-four (42 right and 42 left) lateral femoral circumflex arteries from 42 cadavers (31 male and 11 female) were exposed by dissection of the femoral triangles at the Department of Human Anatomy, University of Nairobi. The arteries were then traced proximally to their parent trunks. Sites of origin were recorded and representative images of the variations taken using a high-resolution digital camera. Data were analysed using Statistical Program for Social Scientists version 16.0 for Windows and presented in tables and macrographs. The lateral circumflex artery was a branch of the profunda femoris in only 65.5% of cases. Variant origins included from a common trunk with medial circumflex artery (14.3%), with profunda femoris (10.7%), as a trifurcation with profunda femoris and medial circumflex FA (7.1%), and from FA (2.4%). Variant origin of the lateral circumflex FA occured in nearly 35% of the Kenyan population studied, much lower than in oriental populations. The most frequent variant origin is as a common trunk with medial circumflex femoral and profunda femoris, with a very low prevalence of origin from FA. The unusual origins make the artery more vulnerable to iatrogenic injury during surgery and catheterisation. Preoperative angiographic evaluation of the femoral arterial system is recommended. (Folia Morphol 2012; 71, 1: 15–18)

Key words: lateral circumflex femoral artery, origin, Kenyans

INTRODUCTION

The lateral circumflex femoral artery (LCFA) is usually a branch of the profunda femoris artery (PFA). Its variant anatomy is important during harvesting of anterolateral thigh flaps, aortopopliteal by-pass, coronary artery grafting, and vascularised iliac transplant [1, 4, 5]. Its pattern of origin displays ethnic variations [15]. Knowledge of these variations is required to minimise inadvertent injury to the femoral arterial system in catheterisation of the femoral artery (FA) and in vascular reconstructive procedures in the leg and thigh [10, 17]. Data from black Africans is, however, scarce and altogether absent from Kenya. This study, therefore, investigated the variant origin of this artery.

MATERIAL AND METHODS

Eighty-four femoral arteries (42 right and 42 left) from 42 cadavers (31 males and 11 females) were studied at the Department of Human Ana-

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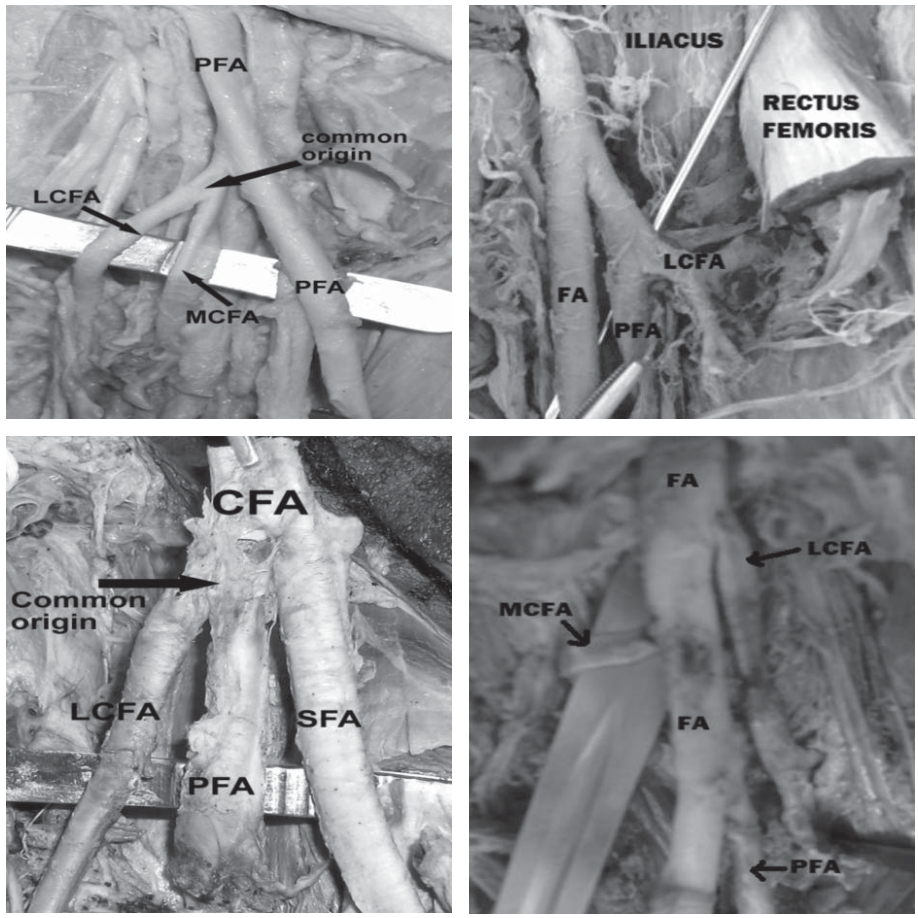

Figure 1. Variant origins of lateral circumflex femoral artery (LCFA); **A.** Common origin with medial circumflex femoral artery (MCFA); **B.** Common trunk with profunda femoris artery (PFA); **C.** Common origin with PFA giving impression of a trifurcation; **D.** Origin from femoral artery (FA).

tomy, University of Nairobi, Kenya. The femoral triangle was exposed by making incisions along the inguinal ligament from pubic symphysis to anterior superior iliac spine. Vertical medial and lateral incisions were made down to the femoral condyles and the skin removed. Superficial and deep fasciae were removed together with cutaneous nerves, veins, and lymphatics. Sartorius and rectus femoris muscles were then detached from their origins and reflected distally. Fibrofatty tissue was cleared and the femoral sheath opened to allow full access to the FA and its branches. Femoral vein and superficial arteries were sacrificed to clarify the dissection field. The femoral and profunda femoris arteries were exposed and origin of LCFA studied for variations. Variant patterns were noted and photographed using a high-resolution digital camera. Data was analysed by Statistical Programme for Social Scientists, SPSS® version 16.0 for windows and presented by means of tables and macrographs.

RESULTS

The LCFA was present bilaterally in all cases. It was the first branch of profunda femoris in 65.5% of cases. In 34.5% it was variant, arising from a common trunk with medial circumflex femoral artery (MCFA, 14.3%) (Fig. 1A); with profunda femoris (10.7%) (Fig. 1B); as a trifurcation with PFA and MCFA (7.0%) (Fig. 1C); and from FA (2.4%) (Fig. 1D).

DISCUSSION

The LCFA usually arises from the PFA. Observations of the present study reveal that LCFA originates from the PFA only in about 65% of cases, lower than most of the prevailing data (Table 1). Aberrant origin of this artery may cause inadvertent injury during surgery [6]. The high frequency of variations implies that surgeons working with this population should exercise extra diligence when operating in the proximal thigh.

Table 1. Origin of lateral circumflex femoral artery in various populations

Author	Population	Origin from profunda femoris	Origin from femoral artery
Uzel et al.; 2008 [15]	Turkish	77.3	22.7
Fukuda et al.; 2005 [5]	Japanese	78.6	21.4
Choi et al.; 2007 [4]	Chinese	86.8	13.2
Tansatit et al.; 2008 [14]	–	56.67	43.33
Prakash et al.; 2010 [10]	Indian	81.25	18.75
Samarawickaina et al.; 2009 [11]	Sri Lankan	92.3	7.7
Boonkham and Plakornkul; 1987 [3]	Thai	77	21.3
Current study	Kenyan	65.5	2.4

The most frequent variant origin of LCFA is from the FA [3, 6, 15]. In the present study, most of the variant origins did not involve the FA, but rather were related to modes of origin from the PFA. Common trunk with MCFA, for example, occurred in 14.3% of cases, lower than the result of 23.4% found in the Turkish population [15]. The profunda femoris and its branches are encountered during cannulation of FA for clinical and diagnostic procedures [1]. This implies that, in the Kenyan population, due care must be exercised.

Origin from the FA occurred in 2.4% of cases, comparable to 2.5% in a Pakistani population [1] but lower than most of the others (Table 1). Origin of LCFA from the FA is associated with lower level of separation of the profunda femoris from the FA [10]. This suggests that the division of the FA in the Kenyan population is higher up. This, in turn, implies that the profunda femoris is more vulnerable to injury during catheterisation of the FA.

In several cases, the LCFA branches off at the bifurcation of the FA with profunda femoris in a trifurcation, similar to that described for the MCFA [2]. Not a single case of LCFA originating from the FA distal to the PFA origin was described, contrary to 4–15% described in literature [8].

The normal pattern reported in several samples is that both circumflex arteries arise equally from the PFA or FA [13]. Observations of the current and previous studies reveal wide diversity, probably related to ethnic variation. These variations may have and an embryological basis. The embryological development of the vascular plexus of the lower limb is based on an unusual selection of channels, some of which enlarge while others disappear, thereby establishing the final pattern [9]. Variations of circumflex femoral arteries probably result from embryological abnormalities during the selection of capillary channels in the developing arterial network of the lower limb [16].

It is important to have accurate knowledge of these variant origins during surgery in the femoral triangle and around the hip, in vascular reconstructive procedures or in understanding the pathogenesis of disease affecting proximal portion of the femur and acetabulum [7, 12], and in angiographic procedures on the FA system [8]. Furthermore, it is valuable when the LCFA system has to be transferred as a single composite free tissue for restoration of functional and structural integrity in posttraumatic lower limb reconstruction [4]. The knowledge is also necessary to minimise postoperative complications [10]. Accordingly, the diversity of origins observed in the present study suggests that preoperative angiographic evaluation of the system is important to mitigate inadvertent injury and postoperative complications.

CONCLUSIONS

Variant origin of the LCFA occurs in nearly 35% in the Kenyan population studied, much lower than in oriental populations. The most frequent variant origin is as a common trunk with the medial circumflex femoral and profunda femoris, with a very low prevalence of origin from FA. The unusual origins make the artery more vulnerable to iatrogenic injury during surgery and catheterisation. Preoperative angiographic evaluation of the femoral arterial system is recommended.

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