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Research article

ANATOMICAL, CLINICAL, EMBRYOLOGICAL BASIS OF THE ORIGINS OF THE LATERAL CIRCUMFLEX FEMORAL ARTERIES - A CADAVER STUDY

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Abstract

Background: The aim &objective of the study is to investigate the origin of variations of lateral circumflex femoral artery in human cadavers.

Materials and Methods: This present study was performed at the department of Anatomy, RVM Institute of Medical Sciences, Telangana, India. A standard dissecting procedure was used to find the variations of femoral artery in cadavers in this study.

Results: out of total 50 number of lower limbs, 94% of the lower limbs LCFA had origin from PFA and 6 % from SFA on left side, likewise in the right lower limbs 98% of the lower limbs LCFA had origin from PFA and 2% had origin from SFA. In the present study, the most common origin of the lateral circumflex femoral artery was originated from profunda femoral artery but abnormal variations in the branching pattern of the lateral circumflex femoral artery also recorded in present study.

Conclusion: Knowledge of these variations related to the present cadaveric study are significant in clinical procedures. The anatomical variations of the arteries of the thigh are worthy considerations when operating endovascular treatments from the femoral artery.

Keywords: Lateral circumflex femoral artery, Profunda femoris artery, superficial femoral artery.

INTRODUCTION

Lateral circumflex femoral artery (LCFA) and its anatomical variations are clinically significant for preoperative angiographic assessment of femoral arterial system in surgical procedures concerning the LCFA[1,2].LCFA is the branch, which arose from the lateral part of the profunda femoris artery (PFA) and runs parallel and laterally on the back of the sartorius and rectus femoris muscles, then divides into ascending, transverse, and descending branches [3]. The branches of LCFA provides the trochanteric anastomosis by its ascending branch, cruciate anastomosis by descending branch and around the knee joint by a twig from its

descending branch[4].Understanding of variations of the circumflex femoral arteries is essential when undertaking clinical performances in the femoral region and in hip joint replacement and for plastic surgeons [5]. The LCFA is utilized in a various type of clinical procedures, which includes aortopopliteal bypass [6], coronary artery bypass grafting [7] and its branches can be used in various procedures such as vascularised iliac transplant especially ascending branch and descending branch can be used as a collateral for an obstructed superficial femoral artery (SFA) [8]. Many cases were reported in the grade of variation in the origin of the LCFA, so the objectives of our study were to verify the population incidence and to estimate the various branching patterns and embryological reasons of LCFA. However, in the present study we reported the variant origin, course of LCFA as described.

MATERIALS & METHODS

The present anatomical study of femoral artery and its variations was conducted on 50 number of adult cadaver lower limbs both right and left sides. Present study was conducted in the department of Anatomy, RVM Institute of Medical Sciences and Research center, Telangana state, India. The dissection procedure followed according to standard dissection manual and criteria. The skin flap was reflected medially on the anterior compartment of the thigh after giving incision. Subcutaneous fat, superficial vessels and nerves are moved away then identified the sartorius and adductor longus under the fascia Lata. Dissected femoral triangle and traced femoral artery and its superficial and deep branches and observed the relations of it. LCFA origin, course and branches, distribution was traced completely. LCFA Data was taken and analysed, tabulated according to standard methods.

RESULTS

Present results showed that, out of total 50 number of lower limbs, 94% of the lower limbs LCFA had origin from PFA and 6 % from SFA on left side (Figure: 1), likewise in the right lower limbs 98% of the lower limbs LCFA had origin from PFA and 2% had origin from SFA (Figure: 2). Data was expressed and tabulated and analysed in the table 1.

Side of the leg	**Origin of LCFA**		**Origin of LCFA**	
	PFA	%	SFA	%
Left leg	47/50	94	3/50	6
Right Leg	49/50	98	1/50	2

TABLE.1: Origin of LCFA from SFA on both left and right side of lower limbs.

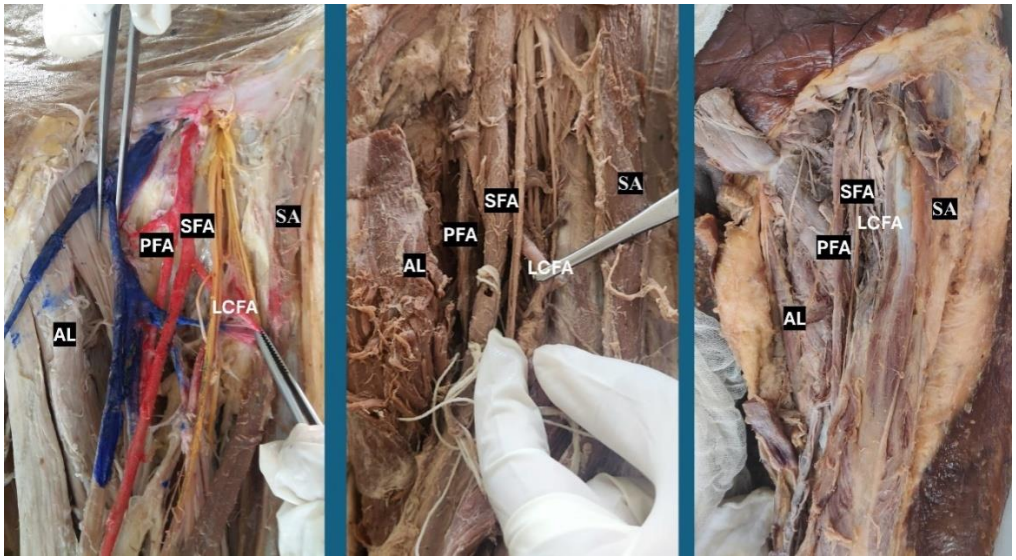

Figure.1: Showed left femoral triangle. Origin of Lateral circumflex femoral artery (LCFA) from Superficial femoral artery (SFA). (SA: Sartorius, AL: Adductor longus, SFA: Superficial femoral artery, PFA: Profunda femoral artery, LCFA: Lateral circumflex femoral artery).

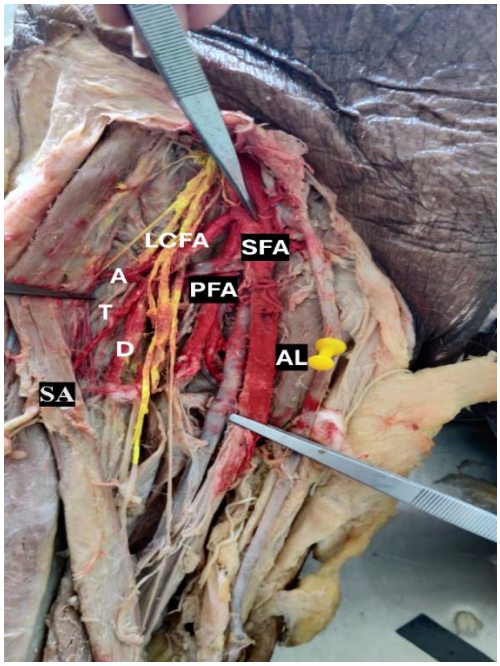

Figure.2: Showed Right femoral triangle. Origin of Lateral circumflex femoral artery (LCFA) from Superficial femoral artery (SFA). (SA: Sartorius, AL: Adductor longus, SFA: Superficial femoral artery, PFA: Profunda femoral artery, LCFA: Lateral circumflex femoral artery).

DISCUSSION

The LCFA, commonly a branch of PFA, go over between divisions of femoral nerve, posterior to sartorius and rectus femoris muscles and divides into ascending, transverse and descending branches. The LCFA promotes blood supply to head, neck, greater trochanter of femur also vastus lateralis muscle and knee joint[9]. In the present study conducted on femoral arteries and its branches, results showed that LCFA originated from directly from SFA in 4 cases among 50 lower limbs. Such kind of unusual anatomical variations are considered as developmental anomalies. The embryological basis of arteries of the lower limb is derived from the fifth lumbar artery as an axis artery and in this process, a few of the branches are progressively degenerate and some of them widen and form a standard pattern of arteries. The persistence of the twigs that are supposed to disappear, lead to various vascular anomalous vessels. Variations of lateral circumflex femoral artery may be due to following reasons. Deviation in the mode and proximodistal level of branching, Abnormal vessels that connect with principal vessels, arcades or plexuses, Occurrence of unusual compound arterial segments and presence of unsuspected neural mycological or osteo ligamentous relationships [10].

The anomalous origin of LCFA was classified into various types and patterns according to previous literature. The classification of origin of medial and lateral circumflex femoral arteries into three different patterns and distribution related to sex and side has also been proposed from previous study. In the pattern I, medial circumflex femoral artery (MCFA) and lateral circumflex femoral arteries arise from the Profunda femoris artery in 78.8% and this pattern is more common in females. Type Ia, MCFA origin is proximal to the origin of lateral circumflex femoral artery in 53.2%, Type Ib, LCFA origin is proximal to the origin of medial circumflex femoral artery in 23.4%, Type Ic, both arteries arise from a common trunk in 23.4%. In the Pattern II, one of the arteries arise from the femoral artery and the other from the profunda femoris artery in 20.5%. Type IIa, the MCFA arises from the femoral artery in 77.8% and Type IIb, LCFA arises from the femoral artery in 22.2%.In the pattern III, both arteries arise from the femoral artery in 0.5% [11].

A study was conducted in 55 cadavers which resulted origin of LCFA was from PFA in 85 cases, from FA in 21 cases and FA and LCFA as a common trunk in 1 case, FA, LCFA, MCFA as a common trunk in 1 case [12]. Previous study reported that, origin of LCFA was found from PFA in 75.6% of the left side and 82.2% in right side legs and transverse branch of LCFA was absent in 4.4% of lower limbs [13]. Knowledge of LCFA variations is important in surgical practice because inadequate data of the anatomy of the LCFA in hip arthroplasty may leads to haemorrhages of ascending branch of LCFA [14, 15]. Results of previous study showed origin of LCFA in 123 cases out of 200 limbs [16]. Another study showed results that 75.75% of cases, LCFA took origin from PFA and from femoral artery in 22.72% cases and LCHA originated from higher levels in 9.09% [17]. LCFA flap is utilized for reconstruction of large defects over the face and resulting to gunshot wounds [18]. Previous studies reported that anatomic pattern and calibre of both LCFA and their perforators were nourishing the antero lateral thigh flap, so variations of it considered in plastic surgeries [19]. Arterial grafts provide appropriate patency rates for coronary artery bypass grafting (CABG) than saphenous veins in both the short and long duration [20].

CONCLUSION

In our study results, the most common origin of the LCFA was observed from PFA and unusual cases from SFA. Variations in the branching pattern of the FA, PFA, LCFA is uncommon in various populations in the world. Knowledge of these variations linked to the LCFA are valuable in clinical practice during vascular diagnostic intervention and surgeries respectively to proximal anterior thigh and hip arthroplasty.

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