

A Case of Absent Vasculogenesis of the Lateral Circumflex Femoral Artery

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Introduction

The lateral circumflex femoral artery (LCFA) is a branch of the Profunda femoris artery (PFA). Sometimes it directly arises from the Femoral artery (FA). The LCFA supplies the muscles in the lateral compartment of the thigh. Both the LCFA and the medial circumflex femoral artery (MCFA) encircles the femoral shaft thus contributing to the blood supply of the neck and head of the femur [1].

The LCFA courses laterally leaving the femoral triangle, dividing into the ascending, transverse and descending arteries. The ascending branch supplies the anterior part of the gluteal region, transverse branch contributes to the trochanteric anastomosis, while the descending branch supplies the knee joint via its genicular branches. Thus LCFA stands as the main blood supply to the upper end of the femur, the anterior compartment muscles and the knee joint [2].

In clinical practice, the branches of the LCFA are used in anterolateral thigh flaps [3]. Other clinical procedures like aorto-popliteal bypass, extracranial-intracranial bypass surgeries and coronary artery bypass grafting [4,5]. Arterial grafts proves to be better grafts than veins. Good anatomical knowledge of the branching patterns of the branches of Femoral artery is essential requirement to perform the above clinical procedures. Variations in the anatomy of the LCFA have been noted in considerable number of studies, with varying branching patterns and origins as well as clinical implications.

Case

During cadaveric dissection, a unique case of absent of LCFA was detected in the right thigh of a 63 years old adult Indian male cadaver. The Profunda Femoris Artery (PFA) was found to arise from the Femoral Artery (FA), at a distance of 7 cm from the mid inguinal point. LCFA was seen to arise directly from FA from its lateral aspect at a distance of 5 cm from the mid inguinal point and continued deep to the posterior division of femoral nerve, thus not dividing femoral nerve into anterior and posterior divisions. An unique feature found was that after coursing for an ultra-short course, the LCFA ended blindly in a 2cm stump.

Discussion

Variation of absence of LCFA are few. Anatomical knowledge of arterial variations is extremely important to avoid post operative complications.

Embryogenically arrests in the growth pattern at different stages of an artery is associated with many growth factors. Vasculogenesis in the lower limb is preceded by morphological and molecular changes that occur in the limb mesenchyme, thus resulting in vascular abnormalities [6]. One study by Jayaswal MK quoted the absence of LFCA in one limb [7].

Anatomical basis

Capillary plexus formation

As endothelial cells are committed and differentiated during vasculogenesis, their proliferation, migration and coalescence into a

primitive capillary plexus must be coordinated well. VEGF (vascular endothelial growth factor) signalling is critically important in this process, as it promotes endothelial cell proliferation and modulates migration. FGF2 (fibroblast growth factor) is also involved in the stimulation of endothelial cell proliferation and has been shown to function synergistically with VEGF.

Vascular Remodelling

Once a primitive endothelium has been formed and patterned, the next aspect of blood vessel development is remodelling of the plexus to promote the establishment of a mature circulatory network.

Endothelial cell proliferation, migration and survival.

Vascular remodelling is a complex process, in which a balance between signals to induce and inhibit endothelial cell proliferation must be attained. This process involves multiple signalling cascades as well as cell-cell and cell-matrix communications. Factors involved in maintaining the appropriate rate of endothelial cell proliferation include VEGF, FGF2, retinoic acid (RA) and transforming growth factor beta (TGFB1). VEGF and FGF2 are needed for the induction of endothelial cell proliferation. However counteractive anti-proliferative signals such as RA and TGFB1 are an equally essential requirement for appropriate blood vessel formation.

Conclusion

An agenesis in the arterial formation was encountered in the lower limb may be due to lack of balance between the inducing and inhibiting signals of endothelial cell proliferation. We anatomists must report the vascular variations which are encountered during dissections as it may add tremendous significance for perfect clinical procedures of the region.

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