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A cadaveric study on anatomical variations of profunda femoris artery and its branches in West Bengal population

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Abstract
Profunda femoris artery is important vessel of lower limb for anatomists, radiologists and surgeons. The present study was conducted upon 70 lower limbs from 35 adult cadavers with aim of assessing the anatomical variations in origin and branching of profunda femoris artery in the anatomy department of tertiary medical institution of West Bengal.

Profunda femoris artery originated from common femoral artery in 94.3% limbs, from common femoral artery from a common trunk in 4.3%, limbs and absent in one case. Mean distance of origin of profunda femoris artery from mid-inguinal point was 3.29 cm and difference between left and right sides was not significant. Medial circumflex femoral artery originated from profunda femoris artery in 65.7% left limbs and 42.8% right limbs. Lateral circumflex femoral artery originated from profunda femoris artery in 74.3% left limbs and 85.7% right limbs, the difference being not significant statistically. Awareness about possible anatomical variations is important for those dealing with these vessels.

Keywords: profunda femoris artery, branches, anatomy, variations, cadaveric study

Introduction

Anatomy of lower limb vessels has become important for anatomists, interventional radiologists and cardiovascular surgeons. These are often approached for anomalies as well as access to vascular system [1]. Femoral artery is one of the common sites used for catheterization. It is the continuation of external iliac artery. Profunda femoris artery is the branch of femoral artery arising from its posterolateral aspect about 3.5 cm distal to inguinal ligament. On the medial and lateral sides, it gives medical circumflex femoral artery and lateral circumflex femoral artery respectively [2]. Profunda femoris artery is useful for USG, MRI, angiography and arteriography [3]. Lateral circumflex femoral artery is useful for CABG, aortopoliteal bypass and anterolateral thigh flap [4].

Variations in origin of profunda femoris artery, medial circumflex femoral aretery and lateral circumflex femoral artery result in differing approach to these vessels. Proper knowledge of these variations is essential for successful management by vascular surgeons, reconstructive surgeons, radiologists and anatomists. Very few studies have been conducted on this issue in this part of the country. Hence, the present study was conducted with aim of assessing the anatomical variations in origin and branching of profunda femoris artery.

Material and Methods

The present study was descriptive in nature conducted upon adult cadavers in the anatomy department of tertiary medical institution of West Bengal. 70 lower limbs from 35 adult cadavers of West Bengal population were included in this study. Careful dissection was done to expose femoral triangle of these cadavers and identify the contents including branches of femoral artery. Proper care was taken to demarcate the origin of profunda femoris artery and it's branching. Mid-inguinal point was taken as reference for all measurements. All measurements were conducted by researcher himself using scale and thread to avoid observational variations. Distance between site of origin of profunda femoris artery and mid-inguinal point was measured. Sites of origin of Medial Circumflex Femoral Artery and Lateral Circumflex Femoral Artery were studied and their distance from mid-inguinal point as well as site of origin of profunda femoris artery were also measured. All data were entered into Microsoft Excel and SPSS v 16.0 was used to calculate averages and 95% CI.

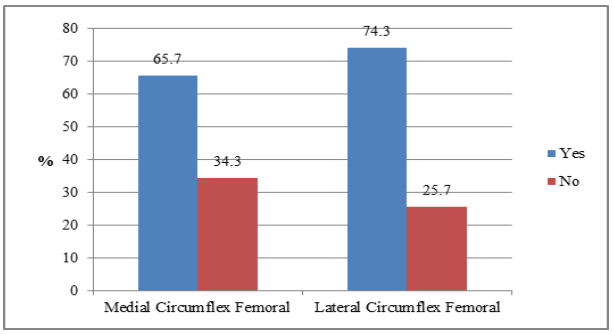

Fig 1: Chart showing origin of circumflex arteries from Profunda Femoris Artery

Results & Discussion

Profunda femoris artery originated from common femoral artery in 66 limbs (94.3%, 95% CI- 86%-98.4%). In three limbs, it originated from common femoral artery from a common trunk (4.3%, 95% CI - 0.9-12%). In one case, it was absent (1.4%, 95% CI-0-7.8%). Mean distance of origin of profunda femoris artery from mid-inguinal point was 3.29 cm (95% CI- 2.35-4.23 cm) and difference between left (3.37 cm, 95% CI-1.87-4.86 cm) and right sides (3.21cm, 95% CI-1.91-4.51 cm) was statistically not significant (t= 0.47, p=0.64). Average distance of origin of profunda femoris artery from mid-inguinal point was 3.2 cm as found by Sabnis [5]. The average distance of origin of the profunda femoris from the midpoint of inguinal ligament on the right side was 3.56 and on the left side was 3.195 cm as found by Manjappa *et al.* [6]. Jana *et al.* found that point of origin of profunda femoris artery was close to mid-inguinal point in 15% cases [7]. Samarawickrama *et al.* observed that the site of origin was lateral if profunda femoris originated close to mid-inguinal point [1]. If origin of profunda femoris artery lies high, it can cause problems in femoral nerve block or femoral arterial or venous puncture.

Origin of profunda femoris artery was posterolateral in 65.7% limbs of left side (95% CI- 53.4-76.7%) and 54.3% limbs of right side (95% CI- 41.9-66.3%). This difference was statistically not significant (X^2= 0.93, p=0.33). Samarawickrama *et al.* found that 46% profunda femoris artery originated from posterior and 23% from lateral aspect [1]. Jana *et al.* found that site of origin was lateral aspect in 50% cases, posterior in 25% and posterolateral in 26% [7]. Sabnis found that site of origin of profunda femoris artery was lateral in 86% and posterolateral in 14% cases [5]. The direction of origin of profunda femoris artery is needed for catheterization, in flap formation and in reconstructive surgery.

Medial circumflex femoral artery originated from profunda femoris artery in 65.7% left limbs (95% CI- 53.4-76.7%) and 42.8% right limbs (95% CI- 31.1-55.3%). Branching was seen at mean distance of 4.53 cm in left side and 3.69 cm on right side, the difference being statistically significant (t= 3.34, p=0.01). Common femoral artery led to its origin in 25.8 % left limbs and 54.3% right limbs. In this case, branching was seen at mean distance of 2.81 cm in left side (95% CI- 1.82-3.8 cm) and 3.07 cm on right side (95% CI- 2.41-3.73 cm), the difference not being statistically significant (t= 1.29, p=0.2). The position of origin was medial in most of the cases (64.3%, 95% CI- 51.9-75.4%), posterior being least common. Jana *et al.* observed that medial circumflex femoral artery originated from profunda femoris artery in 91% cases and from femoral artery in 7% cases [5]. Awareness about anatomical variations of medial circumflex femoral artery helps in performing trochanteric and intertrochanteric osteotomies and avoiding iatrogenic necrosis of femoral head.

Lateral circumflex femoral artery originated from profunda femoris artery in 74.3% left limbs (95% CI- 62.4-84%) and 85.7% right limbs (95% CI- 75.3-92.9%), the difference being statistically not significant. Mean distance of origin from mid-inguinal point was 5.29 cm on left side (95% CI-4.4-6.18 cm) and 5.82 cm on right side (95%CI- 4.72- 6.9 cm), the difference being statistically significant (t=1.75, p= 0.03). Most commonly, it arose from lateral part (74.2%, 95% CI-62.4-84%) followed by posterolateral and anterolateral positions. Sabnis *et al.* observed that lateral circumflex femoral artery originated from profunda femoris artery in 80% and femoral artery in 20% cases [5]. Uzel *et al.* also found few cases with lateral circumflex femoral artery originating from profunda femoris artery [4]. Jana *et al.* however found that it originated from profunda femoris artery in all cases [7]. Knowledge of relation between lateral circumflex femoral artery and femoral nerve is important for performing femoral nerve block safely.

It is evident from this discussion that origin and course of profunda femoris artery varied widely in adult cadavers of West Bengal. This information must be available to the persons dealing with lower limb vasculature, be it in the form of radiological investigations or vascular interventions.

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