



A CADAVERIC STUDY OF LENGTH OF POPLITEAL ARTERY

Anatomy

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ABSTRACT

The popliteal artery is the continuation of femoral artery when the latter passes from adductor hiatus. Popliteal artery descends in an oblique manner from medial border of femur to lower border of popliteus muscle laterally. It divides into anterior tibial artery and a trunk known as tibioperoneal trunk. The trunk then bifurcates into posterior tibial artery and peroneal artery or fibular artery. The length of popliteal artery is measured from its origin to termination. Popliteal artery is the common artery for vascular injury during surgical procedure around knee joint and it is also common site for aneurysm and entrapment syndrome. **Material and methods:** Thirty cadavers (60 lower limbs) embalmed with 10% formalin. **Result:** The mean length of popliteal artery on right side was 18.3 cm and on left side 18.6 cm. The overall length of popliteal artery was 18.4 cm. **Conclusion:** The present study of length of the popliteal artery from its origin to its termination will be helpful for orthopaedic surgeons, interventional radiologists and surgeons.

KEYWORDS

popliteal artery, adductor hiatus, tibioperoneal trunk, interventional radiologists.

INTRODUCTION

Popliteal artery is major artery of lower limb which is a continuation of femoral artery. It takes origin after passing through the adductor hiatus (AH) (1). Popliteal artery is positioned behind the knee joint where it traverses popliteal fossa. Popliteal artery descends in an oblique manner from medial border of femur to lower border of popliteus muscle (2). Popliteal artery terminates at the lower border of popliteus muscle by dividing into anterior tibial artery and a trunk known as tibioperoneal trunk. Then tibioperoneal trunk divides into posterior tibial artery and peroneal artery (3).

Knowledge of the length of the popliteal artery is necessary as it can provide a proper guideline to surgeons and orthopaedicians to locate the artery and ligating it and its branches during various surgical procedures around knee joint like arthroscopic surgery, vascular grafting, direct surgical repair, transluminal angioplasty, total knee replacement, proximal tibia osteotomy, distal femur re-construction.

As the popliteal artery is close to tibia and femur so there are risks of vascular injuries with fracture and/or dislocation of knee joint and there is also increased risk of haemorrhage during arthroscopy of knee joint. During radiological interventional procedures, the knowledge of origin, branching pattern and variations of the popliteal arterial study is helpful for the radiologists too.

MATERIAL AND METHODS

Study Design: Descriptive Study

A total of 60 lower limbs from 30 embalmed adult cadavers with 10% formalin irrespective of age, sex and race available in the Department of Anatomy in Medical Colleges, were taken for this study with the exclusion criteria that deformed and diseased lower limbs were excluded from the study. 30 right and 30 left popliteal artery were used to take measurement.

Dissection was done using scalpel, toothed forceps, plain forceps, scissor, gloves. In prone position of cadaver, vertical incision is made on back of mid-thigh to back of mid-leg and two horizontal incisions to be made on the upper and the lower limit of vertical incision. Reflect the skin flaps laterally. Strip the superficial fascia, the deep fascia from the posterior surface of the popliteal fossa and remove the fat from its upper angle to expose the tibial nerve.

Lift the upper part of the tibial nerve from the popliteal vessel. The vein is posterolateral to the artery with the genicular twig of the obturator nerve in the groove between them. Remove the fascia from the popliteal vein. It also encloses the artery and parallel venous channels which run on it. Remove these separate channels to expose the artery. Measurement of length of popliteal artery were taken by measuring tape (in cm) from adductor hiatus to its termination.



Fig no. 1: Showing the back of thigh and leg (upper part) where measurement of length of popliteal artery taken from adductor hiatus to its termination where it divides into anterior tibial artery and tibioperoneal trunk.

RESULT

The mean length of popliteal artery from adductor hiatus to its termination was 18.3 cm and 18.6 cm on right and left side respectively (Table 1). The overall length of popliteal artery was 18.4 cm in this study.

Table no. 1: showing the maximum, minimum and mean length of right and left popliteal artery.

Sr. No.	LENGTH (TYPE)	LENGTH - RIGHT (in cm)	LENGTH - LEFT (in cm)
1	Maximum	20.4	21.2
2	Minimum	17.5	17.2
3	Mean	18.3	18.6

DISCUSSION

Most common peripheral aneurysm is popliteal artery aneurysms with an incidence of 70 -80%. An enlargement of the popliteal artery more than 50% of its original diameter is defined as a popliteal artery aneurysm and male population older than 65 years of age are more prone to it. Differential diagnosis are Baker's cyst, cystic adventitial disease, entrapment syndrome and epitheloid hemangioma. Patent aneurysms of more than 2 cm diameter or if thrombus is present within the aneurysm, then invasive treatment is indicated (4).

The incidence of popliteal artery entrapment syndrome is 0.6% to 3.5%. While the prevalence of asymptomatic popliteal artery occlusion is estimated as 80%. Popliteal artery entrapment syndrome (PAES) present bilaterally in up to two-thirds of cases. A study suggested that male to female ratio is 15:1. PAES is described into two groups: congenital or anatomical and functional (5).

There are various studies done for length of popliteal artery which are as follows shown in table no. 2:

Table no. 2: showing the studies done for length of PA.

SR. NO.	AUTHORS	LENGTH OF PA (in cm)
1	H. Gaylis (1974)	17.5
2	Colborn et al (1994)	20
3	Ozgur et al (2009)	19.1
4	Selda et al (2010)	12.6
5	Ankit K et al (2014)	11.2
6	Present study (2023)	18.4

H. Gaylis (1974) observed the average length of popliteal artery is 17.5cm in his arteriographic study (6). Colborn et al (1994) reported that the length of popliteal artery from adductor hiatus to distal edges of femoral condyles (in transverse plane) was about 20 cm (7). Ozgur et al (2009) in their study of branching pattern of popliteal artery on 40 lower extremities, found that the length of popliteal artery was 191.1 ± 34.7 mm from adductor hiatus to origin of anterior tibial artery and from adductor hiatus to femoral condyles (FCs) was 138.1 ± 23.8 mm (8). Selda et al (2010) found during routine dissection in the Department of Anatomy for the medical students, there is a high-origin of anterior tibial artery on ventral surface of the popliteus muscle on the left side in a 75 year old male cadaver embalmed with formalin. The length of popliteal artery from adductor hiatus to the division or bifurcation of popliteal artery was 126.82 mm (9). Ankit Khandelwal et al (2014) observed in the study of branching pattern of popliteal artery on 40 lower limbs that the average length of popliteal artery was about 11.2 cm in contradiction to normal average length which is 20 cm (10).

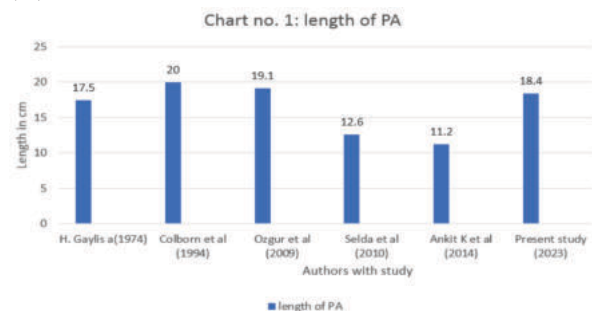


Chart no. 1: showing the length of PA found in other studies.

The finding of present study was similar to the report of H. Gaylis (1974) and Ozgur et al (2009).

CONCLUSION

The knee joint and popliteal artery have dynamic chances for emergency and elective procedures. Knowledge of the length of popliteal artery is necessary to avoid damaging the artery and its branches, if neglected then can lead to limb disability or life-threatening haemorrhage. Awareness of the knowledge of length popliteal artery is important for radiologists and surgeons. Although the surgical field has many advancements but still the chances of complications are high such as fistula formation, pseudoaneurysm during orthopaedic procedures like high tibial osteotomy.

Abbreviation

PA - Popliteal artery
cm - centimeter
AH - Adductor hiatus
PAES - Popliteal artery entrapment syndrome
FCs - Femoral condyles

Conflicts of Interests: None

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