Case Report

Access this article online

Quick Response Code:

Website : www.jecajournal.com

DOI: 10.4103/jeca.jeca_14_18

Bilateral "quadriceps gastrocnemius" and termination of small saphenous vein outside the popliteal fossa in a cadaver

Dawit Habte Woldeyes, Abebe Muche Moges[1]

Abstract:

The gastrocnemius muscle located on the posterior compartment of the leg, has two heads. Muscular variations presumably seriously compromise parts of the muscular, vascular, nervous, and skeletal and/or organ systems. The main causes of gastrocnemius muscle variation may be due to an error of embryologic developmental timing or persistence of an embryologic condition. On the other hand, variations in the origin, course, and termination of the superficial veins of the lower limb are common. However, variations of the short saphenous are rarely reported. Knowledge on the anatomical variations of structures has clinical significance to surgeons, radiologists who interpret plain and computerized imaging.

Keywords:

Bilateral, gastrocnemius, popliteal fossa, small saphenous vein, termination, variant muscle, variations

Introduction

Gastrocnemius is the most superficial muscle of the posterior (flexor) compartment and forms the "belly" of the calf. It has two heads, originated from condyles of the femur by strong, flat tendons (Standring, 2008). Variations in muscles are quite common and are totally benign. The main causes of gastrocnemius muscle variation may be due to an error of embryologic developmental timing or persistence of an embryologic condition. The muscular variations presumably seriously compromise parts of the muscular, vascular, nervous, and skeletal and/or organ systems (Dave *et al*., 2012). Occasionally, the lateral head or the whole muscle of gastrocnemius is absent. Rarely, the third head may arise from the popliteal surface of the femur (Moore *et al*., 2010).

Variations in the origin, course, and termination of the superficial veins of the lower limb are common (Anbumani *et al*., 2016). Usually, the short (small) saphenous vein begins as a continuation of the lateral marginal vein posterior to the lateral malleolus. It ascends lateral to the calcaneal tendon, including medially reaching the midline of calf, emerges at the lower limit of popliteal fossa before terminating into the popliteal vein. In spite of rare report on variations of the short saphenous vein, recent case report depicted abnormal termination and course of a small (short) saphenous vein in the thigh (Gupta *et al*., 2006).

Overall, knowledge on the aforementioned anatomical variations has clinical significance to surgeons, radiologists who interpret plain and computerized imaging. It is also useful for anesthesiologists who are applying needle to administer anesthetic blocks. Therefore, the aim of this paper is to

Department of Anatomy, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, [1]Department of Anatomy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

Address for correspondence:
Mr. Dawit Habte Woldeyes, Department of Anatomy, College of Medicine and Health Sciences, Bahir Dar University, P. O. Box 79, Bahir Dar, Ethiopia.
E-mail: dwthabte@gmail.com

How to cite this article: Woldeyes DH, Moges AM. Bilateral "quadriceps gastrocnemius" and termination of small saphenous vein outside the popliteal fossa in a cadaver. J Exp Clin Anat 2018;17(2):76-78.

report anatomical variations observed on gastrocnemius muscle and small saphenous vein during dissection.

Case Reports

During gross anatomy dissection session for 2nd-year medical students held at the Department of Human Anatomy, College of Medicine and Health Sciences, Bahir Dar University, two anatomical variations were detected in a male Ethiopia cadaver. The cadaver is approximately 35 years old and his clinical history is unknown. Pictures from the cadaver were employed and described in the following sections.

Case 1

During the dissection to demonstrate the muscles of the lower limb, a variant muscle was observed on both the lower limb legs; that is, both gastrocnemius muscles have four heads (four origins), both the new (accessory) heads of the muscles originate between the normal heads of the gastrocnemius muscles. The medial and lateral heads of the accessory gastrocnemius muscle form the boundaries of the popliteal fossa, which in turn cause narrowing of the spaces for popliteal vessels. The two heads join and form a small separate muscle belly; there is a fascia that separates the small separate muscle belly from the normal gastrocnemius [Figure 1].

Case 2

The cadaver was placed to prone position, and the posterior portion of the lower limb was dissected. Following the dissection, the course of small saphenous vein was properly examined. Surprisingly, the vein was terminated to the femoral vein at the middle of the thigh [Figure 2].

Discussion

Variations in muscles are quite common and frequently seen during routine dissections. In this report, the gastrocnemius muscle is found to be having four origins bilaterally. Reports in different areas of the world declare different variations.

The third head (Caput tertium) is the most common variation of the gastrocnemius muscle (Somaji *et al*., 1998). Unilateral third/accessory head of the gastrocnemius muscle was reported during routine educational dissection of female cadaver in American (Dave *et al*., 2012). A report in India states that there was an anomalous muscle which originated from the semimembranosus and biceps femoris muscles and then inserted into the superficial surface of the tendocalcaneus on one leg (Somaji *et al*., 1998). Furthermore, the study conducted using magnetic resonance imaging technique on 1039 consecutive knees reported the incidence of third head of gastrocnemius muscle in about 2% of the study subjects (Koplas *et al*., 2009).

A study conducted in Nigeria reported merely unilateral quadriceps gastrocnemius (named as medial, intermedio-medial, intermedio-lateral, and medial) (Ashaolu *et al*., 2014). However, in the present study, we found bilateral quadriceps gastrocnemius named as "medial," "intermedio-medial," "intermediolateral," and "lateral" heads.

Phylogenetically, the gastrocnemius muscle has been considered a muscle of the fibular side of the leg. It comes from the calcaneum blastomere and follows an ascending migration toward the inferior femoral epiphysis.

The third head may arise from the long head of biceps femoris muscle, linea aspera, lateral femoral epicondyle, knee joint capsule, or the fascia of leg. It may split and arise from more than one region or divide near its termination to join both heads of gastrocnemius. A rare variation where an unusual muscle that leaves the belly of semitendinosus and ends in the tendon that joins the fascia of leg is described as tensor fascia suralis/ischioaponeuroticus (Bergman *et al*., 1995).

On the other hand, anatomical studies done on the variations of short saphenous vein reported variations on the final destination of small saphenous vein (Standring, 2008; Anbumani *et al*., 2016; Abhinitha *et al*., 2013). The studies pointed out that the mentioned vein may join the long saphenous vein in the proximal thigh or may bifurcate subsequently join with long saphenous vein and popliteal or deep sural muscular veins, respectively. In the present case, the origin of the small saphenous vein and its course in the leg was quite normal; however, in the middle of posterior thigh muscles, it pierces deep

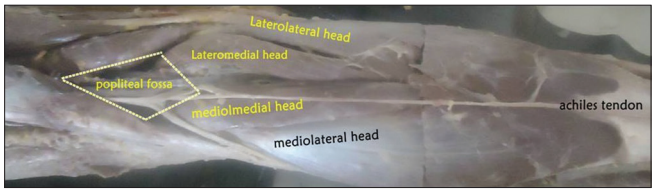

Figure 1: A cadaveric photograph showing the four-headed gastrocnemius muscle observed on the right legs, namely, "medio-lateral", "medio-medial", "latero-medial", "latero-lateral" heads

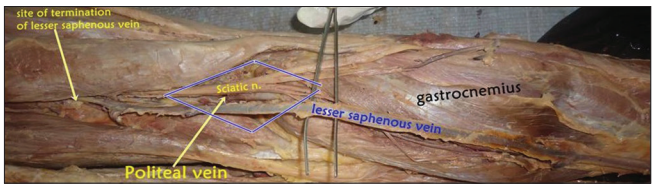

Figure 2: A cadaveric photograph showing the termination of the small saphenous vein on the right leg, terminating in the posterior thigh

fascia and terminates to the femoral vein [Figure 2]. This course, due to the muscular compression factor, it might trigger varicosity of the small saphenous vein. Our finding fits well with very recently published case report (Abhinitha *et al*., 2013). Furthermore, the study conducted on 50 lower limbs reported that short saphenous vein terminates into femoral vein, popliteal vein, great saphenous vein, and inferior gluteal vein in about 8%, 54%, 30%, and 8% of the cases, respectively (Anbumani *et al*., 2016). In another study done in India, thigh extension of the small saphenous vein was observed in 92% of the cases which the highest prevalence was observed compared to similar studies done on other populations by other scholars (Abhinitha *et al*., 2013).

Conclusion

These reports add substantial information to the existing knowledge about the anatomical structures described by the case. Knowledge of the embryology of neurovascular, muscular, and other structures of the body provides valuable information on the existence of multiple variations. The anatomical variations have surgical and/or diagnostic procedure importance.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1. Abhinitha P., Mohandasao K.G., Nayak S.B., Shetty S.D., Kumar N. (2013). Anomalous termination of a small (short) saphenous vein associated with its abnormal course in the thigh: A case report. OA Case Rep 2 (7):63.
2. Anbumani L., Anthony S., Thamarai A. (2016). An anatomical study on the variations of short saphenous vein and its termination. Int J Med Res Health Sci 5 (3):28-33.
3. Ashaolu J.O., Oniorisan O.A., Ukwenya V.O., Opabunmi O.A., Ajao M.S. (2014). The quadriceps gastrocnemius muscle. Surg Radiol Anat 36 (10):32.
4. Bergman A., Walker W., el-Khour Y. (1995). The third head of Gastrocnemius in CT images. Ann Anat 177 (3):291-4.
5. Dave M., Yagain V., Anadkat S. (2012). Unilateral third/accessory head of the gastrocnemius muscle: A case report. Int J Morphol 30 (3):1061-4.
6. Gupta K., Bhagwat S. (2006). An anomalous muscle in the region of the popliteal fossa: A case report. J Anat Soc India 55 (2):65-8.
7. Koplas M.C., Grooff P., Piraino D., Recht M. (2009). Third head of the gastrocnemius: An MR imaging study based on 1,039 consecutive knee examinations. Skeletal Radiol 38:349-54.
8. Moore K.L., Dally A.F., Agur A.M.R. (2010). Clinically Oriented Anatomy: The Abdomen. 6th ed. Lippincott Williams & Wilkins, Wolters Kluwer Business, Philadelphia.
9. Somaji S.N., Vincent R., Bairy K.L. (1998). An anomalous muscle in the region of the popliteal fossa: Case report. J Anat 192:307-8.
10. Standring S. (2008). Gray's Anatomy the Anatomical Basis of Clinical Practice. 40th ed. Churchill Livingstone, New York.