Case Report :

Third (Intermediate) head of gastrocnemius muscle; a case report and literature review

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Abstract

Anatomical variations of limb musculature are common. During the routine dissection for teaching musculoskeletal course for second year students of Medicine, a third (Intermediate) head of the gastrocnemius muscle was detected in a70-year-old female cadaver in left lower limb. It was originated from the posterior surface of the distal end of the femur by small tendon and extended as long muscular belly. Throughout its course, this belly crosses superficial to the popliteal fossa beneath the skin on its way to join the medial side of the lateral head of gastrocnemius muscle. Furthermore, the intermediate head takes its innervation from the nerve to the lateral head of gastrocnemius that passes on its deeper aspect. No such variation was found in the right lower limb. Knowledge of these variants is very important in clinical practice.

Keywords:
Gastrocnemius, Dissection, Variation, intermediate head and Cadaver.

الملخص

تعتبر الاختلافات التشريحية لعضلات الأطراف شائعة. أثناء التشريح الروتيني لتدريس مقرر العضلات والعظام للسنة الثانية لطلاب الطب، تم اكتشاف رأس ثالث (متوسط) لعضلة الساق في جثة أنثى تبلغ من العمر ٧٠ عاما في الطرف السفلي الأيسر. نشأ منا لسطح الخلفي للنهاية البعيدة لعظم الفخذ بواسطة وتر صغير ويمتد مثل البطن العضلي الطويل. خلا ل مساره يتقاطع هذا البطن سطحيًا مع الحفرة المأبضية تحت الجلد في طريقه للانضمام إلى الجانب الإنسي للرأس الجانبي لعضلة الساق. علاوة على ذلك ،يأخذ الرأس الوسيط تعصيبه من العصب إلى الرأس الجانبي لعضلة الساق الذي يمر على جانبه الأعمق. لم يتم العثور على مثل هذا الاختلاف في الطرف السفلي الأيمن. معرفة هذه المتغيرات مهمة جدا في الممارسة السريرية.

Introduction:

The gastrocnemius muscle is the superficial muscle of the back of the leg. It was a powerful planter flexor of the ankle joint[1]. The gastrocnemius muscle proximally originated by two heads, the medial head arose from the popliteal surface of the femur superior to the medial condyle and the lateral head arose from lateral aspect of lateral condyle of the femur. Distally it attaches to the posterior surface of calcaneum via Achilles tendon[1]. The gastrocne-

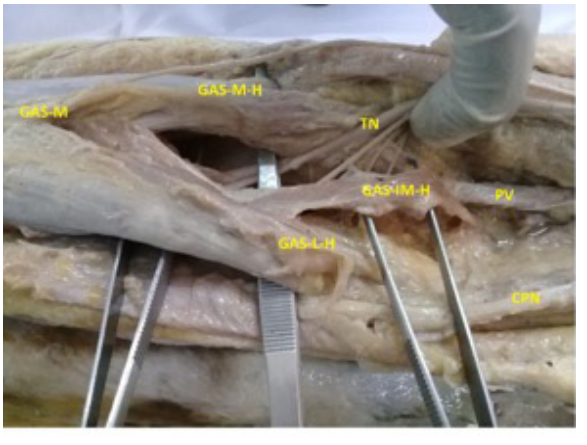
mius muscle take origin from both diaphysis and shaft the lateral head arises by a tendon from the lateral surface of lateral condyle and by few fleshly fibers from the lateral supracondylar ridge. The medial head arises by tendon from the medial supracondylar and by fibrous from the popliteal surface of the femur [2].

In a case report the gastrocnemius muscle was observed with three heads. Accessory third head was fused with the medial head with sural nerve entrapped between them [3]. Amuscular belly was noted in the middle of the popliteal fossa. It was arising by two tendons from the biceps femoris long head and semitendinosus muscle. It has a tendon courses between the two heads of gastrocnemius muscle and runs on superficial to the tendocalcalcneus [4].

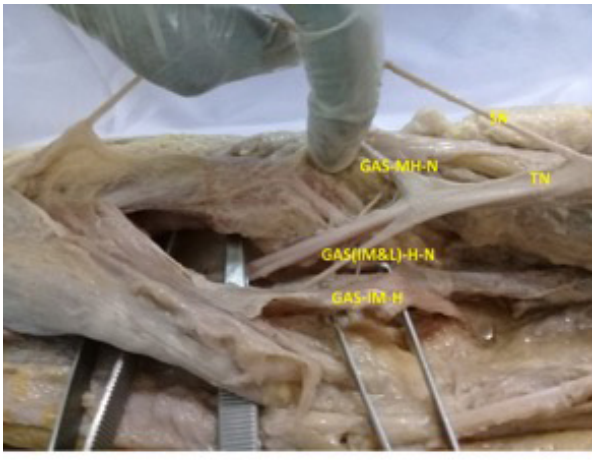
Case report:

During the routine dissection for second year medical students at the department of Anatomy of Riyadh International College of Medicine for the academic year 2018-2019. A third (Intermediate) head of the gastrocnemius muscle was detected in a 70-year-old female cadaver in left lower limb. The contents of popliteal fossa and the gastrocnemius muscle heads were carefully dissected and cleaned. An intermediate head of the gastrocnemius was observed, it had its origin from the posterior surface of the distal end of the femur by small tendon about 1 cm just lateral to the popliteal vessels. Further, when followed distally it was extended as long muscle belly running beneath the skin of the popliteal fossa with the tibial nerve and popliteal vessels deeperto it. The intermediate head finally joins the lateral head of gastrocnemius on its medial aspect near its junction with medial head. The intermediate head measured 5.48 cm long. The tibial nerve gives a common branch which passes on the deeper aspect to the intermediate and lateral heads. Then the intermediate and lateral heads were joining the medial head where they constitute gastrocnemius muscle, which was the normal in morphology as demonstrated in Figures 1&2.No other variation or variant was encountered.

"Fig. 1."Showing the third head (intermediate) (GAS-IM-H) of the gastrocnemius muscle(GAS-M) joining the lateral head (GAS-L-H). Also shown in the figure are medial head of gastrocnemius (GAS-M-H), popliteal vein (PV), tibial nerve (TN), and common peroneal nerve (CPN)



"Fig. 2." Showing the nerve supply to the (GAS-IM&L-H) third head (Intermediate) (GAS-IM-H) and lateral head (GAS-L-H), medial head of gastrocnemius (GAS-M-H) and tibial nerve (TN) and (SN)sural nerve



Discussion:

Variations of muscles have been usually benign;it occurs due to genetic factors or embryological errors [5]. Anomaly of the gastrocnemius muscle of origins and accessory heads are usually encountered at the popliteal fossa [6]. Additional slips of the gastrocnemius muscle may have different sites of origin [7]. A study of thirty west Nigerian cadavers, the gastrocnemiusmuscle were found attached by four heads representing 51.7%,followed bytwo-headed gastrocnemius muscle representing 35% and lastly three-headed muscleinabout 13.3% of investigated limbs [8].

Srinivasa et al reported accessory muscular belly about 4.8 cm long was in the popliteal region. It has a separate branch of the tibial nerve;the belly extends to fuse with the medial head of the gastrocnemius muscle with the popliteal vessels entrapped between them [9]. A north Indian70-year-old male cadaver showed additional head for gastrocnemius muscle, it was originating from the supracondylar ridge and lateral condyle of the femur. The three headsunited together to form the tendocalcaneus [10]. Yildirim et al describes the third additional head as gastrocnemius tertius whichwasfound on two sides, his case presentedalso an unilateral accessory soleus muscle. The medial head of the gastrocnemius muscle receives the junction of right gastrocnemius tertius [11].

In a 54-year-old femaletheleft lower extremity showed a muscular belly representingthe third head of the gastrocnemius muscle. This belly was coming proximally from the popliteal surface of the femur shaft,at the lower part of the popliteal fossa, it fusedheads of the gastrocnemius muscle[12]. In comparison to previous literature to the current case, the intermediate head of the gastrocnemiusmuscle measured about 4.48 cm in length, it was arising from the posterior surface of the lower end of the femur and extended straightly to merge with the lateral head near its fusion with the medial head.

20 out of 1,039 investigated knees demonstrated a third head arising from the back of the distal end of the femur and finally fused with the medial aspect of the lateral head of the gastrocnemius. One case

of a third head of the gastrocnemius was seen which joined the medial head of the gastrocnemius.Regarding the relation between the third and the popliteal vessels in 20 presented cases the popliteal vessel gained a lateral position [13].

In accordance with this case observation there is similarity in the origin, course and termination of the third head of the gastrocnemius muscle of the previous study. Rajan et al named the caput tertium for gastrocnemiusthird head, it joins the medial head of the gastrocnemius. The third and medial heads seemed to constrict the popliteal vessels [13]. In contrast to the present case the popliteal vessels were crossing medially to the intermediate head, so they were appearing not at danger to be entrapped.

Conclusion:

A third (Intermediate) head of the gastrocnemius muscle was observed in left lower limb of a female cadaver. Knowledge about such a variant muscle in the popliteal region should be considered in the diagnosis and management of various procedures in the fields of surgery, radiology and physiotherapy.

Conflict of Interests:

None.

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