

Case Report

A CASE REPORT ON VARIATION IN ORIGIN OF GASTROCNEMIUS MUSCLE

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ABSTRACT

The purpose of this study was to observe the proximal (origin) and distal (insertion) attachments of the triceps surae. Our one finding coincides with the literature. Ten adult human donated embalmed cadavers (five males and five females) in the Department of Anatomy, Medical University (1), Yangon, Myanmar and five human foetuses, three male foetuses and two female foetuses (crown rump lengths ranging from 18 cm to 28 cm) from North Okkala General Hospital, Yangon, Myanmar, making a total of thirty lower limbs on both sides were dissected. The back of thigh, back of knee region and back of leg of both sides of the lower limbs were dissected to study the variations in the origin and insertion of triceps surae muscle.

All the dissected specimens showed that the triceps surae muscle had medial and lateral heads of gastrocnemius and soleus muscle. Origin of the medial and lateral heads of gastrocnemius was from the posterior aspect of medial and lateral condyles of the femur respectively.

During dissection, in the case of 60 years old female cadaver, the variant origin of gastrocnemius muscle on left limb was observed. In this case, the lateral head of gastrocnemius was originated by muscular fibres from the upper part of fascia covering the plantaris muscle.

Soleus was originated by two heads which arose from the soleal line, middle third of the tibia, back of the head and shaft of the fibula. Two heads of gastrocnemius was attached to a broad tendon which joined the

tendon of the soleus to form the calcaneal tendon. The calcaneal tendon was inserted onto the calcaneal tuberosity.

KEY WORDS: Triceps surae muscle; Gastrocnemius muscle; origin, insertion

INTRODUCTION

Triceps surae is a tripartite muscle (from Latin, surae, calf) "three-headed calf" muscle which is an important postural and locomotor muscle. It is formed by the medial and lateral heads of gastrocnemius and soleus which are prominent superficial calf muscles of the posterior group and chief plantar flexors of the foot. Gastrocnemius and soleus fuse to form a common tendon called tendo Achilles which derives its name from a hero of Greek mythology. This tendon tears across in sudden stress in middle age. It occurs two inches above the calcaneal insertion. The calf muscle retracts towards the popliteal space and a gap can be felt at the site of tear. Pulled calf muscle or calf muscle tears also occur in young adult during athletic pursuits and there is sudden local tenderness and swelling over the calf.

Tenosynovitis is a result of excessive use of the calf muscle in athletes and ballet dancers. Tendo Achilles bursitis also occurs in girls and young women with high heels.

Gastrocnemius muscle (from Latin, stomach of leg /belly of leg meaning to the bulge of the calf) which is a two joint muscle of calf and two headed muscle can flex the knee and plantarflex the foot but it is unable to exert its full power on both joints at the same time.

It consists of two bulging, parallel bellies or heads which attach to the posterior aspect of lateral condyle and to the posterior aspect of medial condyle of the femur near the adductor tubercle.

Soleus is a thick flat sheet. It is shaped like the sole of a boot. It can plantar flex the ankle joint. It is more powerful than the gastrocnemius but its contraction is slower than those of gastrocnemius. These two muscles also assist in inversion of foot. Soleus is originated by two heads; the fibular head arises from the back of the head and from the proximal third of the posterior surface of the shaft of the fibula, and from the lateral intermuscular septum between it and peroneus longus. The tibial head arises from the soleal line and from the middle third of the medial border of the tibia. It also originates from the posterior intermuscular septum between superficial and deep flexors.

Perforating veins from great saphenous vein enter the substance of soleus and are pumped empty by contraction of the muscle, thus aiding venous return. Stagnation in these veins predispose to deep vein thrombosis and the danger of pulmonary embolism. The soleal pump is aided by the 'sole pump' and soleus muscle is referred to as the body's second heart. The soleus pumps venous blood but the heart pumps arterial blood.

Plantaris is a small tapering slip with a short belly and a long slender tendon. It originates from inferior end of lateral supracondylar line of fibular and runs distally between the gastrocnemius and soleus muscle.

The two heads of gastrocnemius are attached to the anterior surface of a broad tendon which narrows and joins the tendon of the soleus to form the calcaneal tendon which is inserted onto the calcaneal tuberosity. This tendon is stout, strong, heavy and prominent at the back of the ankle joint. It is about 15 cm long and

attached to the middle of the posterior surface of the calcaneum and separated from the upper half of this surface by a bursa. Gastrocnemius provides the main forward propulsive force during takeoff phase of foot in running, walking, dancing and jumping. Soleus which is antigravity muscle serves chiefly in maintaining the posture of the leg upon the foot.

Case Report:

During dissection, of a 60 years old donated embalmed female cadaver in the Department of Anatomy, Medical university (1) of Myanmar, Yangon, the variant origin of gastrocnemius muscle on left lower limb was observed. The back of thigh, back of knee region and back of leg of both sides of the lower limbs were dissected to observe the variations in the origin and insertion of triceps surae muscle.

In the present findings of all specimens we observed, Triceps surae was a tripartite muscle which was formed by the medial and lateral heads of gastrocnemius and soleus. It was observed as prominent superficial calf muscles of the posterior group of the foot.

We also observed two bulging, parallel bellies or heads. Lateral head of gastrocnemius arose by a tendon from the upper part of the postero lateral aspect of the lateral condyle of the femur. Medial head arose by a tendon from the popliteal surface of the femur above the medial condyle and from the upper part of the medial condyle near the adductor tubercle.

However, in one case we observed, the lateral head of gastrocnemius was originated by muscular fibres from the upper part of fascia covering the plantaris muscle. The photograph of the variant gastrocnemius muscle was taken for proper documentation.

We also noted that medial head was slightly larger and extended a little more distally than lateral head. The heads came together at the inferior margin of the popliteal fossa where they formed the inferolateral and inferomedial boundaries of this fossa.

Fibres of gastrocnemius were so short and mainly vertical in direction. These two bellies passed downward into a membranous fusion and converged upon a membranous sheet, common broad aponeurosis which fused with the aponeurosis of the soleus. The medial half of the aponeurosis was separated from soleus down to the heel, and the slender tendon of plantaris lied sandwiched between the two aponeurosis. A bursa was found between the medial head and the capsule over the medial condyle of the femur.

In the present work we observed, the proximal attachment of the soleus which was inverted V-shaped or cone shape muscle. Soleus was observed as flat sheet and two heads; the fibular head arose from the back of the fibula head and from the proximal third of the posterior surface of the shaft of the fibula. The tibial head arose from the tendinous arch to soleal line of the tibia, It was also noted as originating from the posterior intermuscular septum and from the lateral intermuscularseptum between it and the peroneus longus & and the middle third of the medial border of the tibia. It was also from the medial intermuscularseptum between it and tibia and also from the intervening posterior intermuscularseptum between superficial and deep flexors.

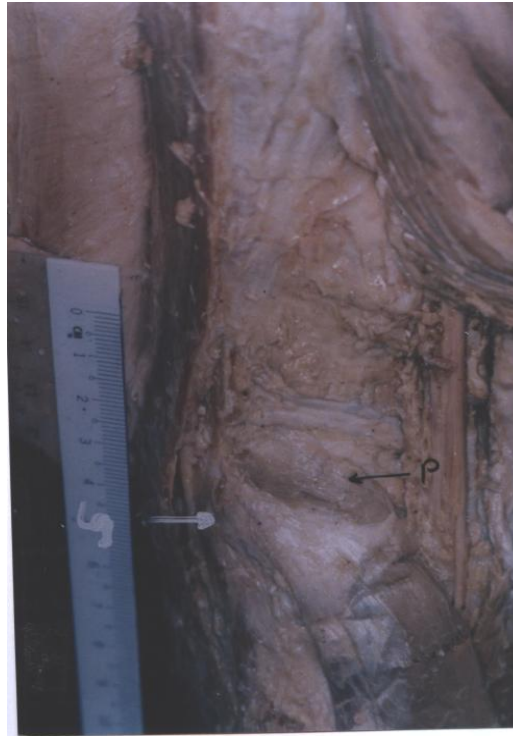


Figure: Photographic presentation of the variant origin of gastrocnemius. Muscular fibres of lateral head of gastrocnemius (lg) arising from fascia covering plantaris muscle (P) on the left side of human adult.

The muscle fibres of soleus extended much more distally than those of the gastrocnemius and bulged on each side of the upper part of tendon of gastrocnemius. From the fibular and tibial origins arose broad aponeurosis that united proximally on the deep surface of the muscle so as to form a fibrous arch over the posterior tibial vessels and nerves. Distally they diverged and became narrower, but the fibular aponeurosis was continued on the fibular side and the tibial aponeurosis on the tibial side of the muscle as far as the distal quarter of the leg.

Muscle fibres of gastrocnemius pass downward and converge upon a membranous sheet, which fuses with the aponeurosis of soleus as the triceps surae. Calcaneal tendon was observed as forming the broad tendon of two heads of gastrocnemius and the tendon of the soleus. It was attached to a smooth transverse area on the middle of the posterior surface of the calcaneum.

Tendo calcaneus bursa was found between calcaneus tendon and the thickened deep fascia above its insertion. There was no synovial sheath around the tendo calcaneus.

Discussion:

In the present work, the triceps surae muscle was observed as a fleshy tripartite muscle which was formed by the medial and lateral heads of gastrocnemius and soleus muscle. Lateral head of gastrocnemius arose by a tendon from the upper part of the postero lateral aspect of the lateral condyle of the femur and medial head arose by a tendon from the popliteal surface of the femur above the medial condyle and from the upper part of the medial condyle near the adductor tubercle. This finding was in agreement with the statement described by Basmajian [3] and Jacob and Francone [12].

In the present case the variation was observed in female specimen.

In this finding, the lateral head of gastrocnemius was originated by muscular fibres from upper part of fascia covering the plantaris muscle. This observation was not mentioned in available literature. Thus our finding coincides with the literature.

We also observed that the proximal attachment of the soleus which was inverted V-shaped arising from the posterior fibular head, upper quarter of the posterior surface of the shaft of the fibula and then along a tendinous arch to line of tibia and posterior intermuscular septum. Our observed finding was the same as discussed by Gardner, Gray and O' Rahilly [8].

Moreover we also found that the direction of the muscle fibres of gastrocnemius were mainly vertical and they passed downward and converged upon a membranous sheet, common broad aponeurosis which fused with the aponeurosis of soleus. This was in accordance with the statement mentioned by Basmajian & Slonecker [4].

In the present work, two heads of gastrocnemius were attached to the anterior surface of a broad tendon which narrowed and joined the tendon of the soleus to form the calcaneal tendon which was inserted onto the calcaneal tuberosity. This tendon was attached to the middle of the posterior surface of the calcaneum. Therefore we agreed with those described by S' chaeffer [19], Joseph [13] and Williams [21].

Conclusion:

The triceps surae is a tripartite muscle formed by the medial and lateral heads of gastrocnemius and soleus which are prominent superficial calf muscles of the posterior group of the foot. The finding of such variation of the origin of gastrocnemius muscle should be kept in mind by the surgeons and the orthopaedicians. It may confuse during surgical operation.

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