



A rare case of higher division of femoral nerve intervened by accessory iliacus muscle: clinical significance

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Abstract

The knowledge of anatomic variation in the division of the femoral nerve is important for the anesthetists as well as the surgeons to ensure a complete femoral nerve block and conduct a successful surgery. We report a rare case of higher division of femoral nerve 3.5 cm proximal to the inguinal ligament intervened by an accessory iliacus muscle. Aberrant slips of iliacus either by splitting or covering the femoral nerve may act as potential factor in femoral nerve compression, as in this case. The anterior and posterior divisions of femoral nerve continued deep to the inguinal ligament, separated by accessory iliacus, and presented an unusual communication in between them in the upper thigh. To our knowledge, the present case of higher branching pattern of femoral nerve well above the inguinal ligament is rather rare and clinically significant.

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Key words {accessory iliacus muscle} {aberrant slips of iliacus} {inguinal ligament} {femoral nerve block} {variation}

Introduction

The femoral nerve (FN), the largest branch of the lumbar plexus, arises from the dorsal divisions of ventral rami of the second, third, and fourth lumbar nerves. The FN descends through the psoas major muscle to emerge on its lateral margin and later enters the thigh deep to the inguinal ligament at the lateral edge of the femoral sheath that separates it from the femoral artery. Two cm below the inguinal ligament it divides into anterior (AD) and posterior (PD) divisions [1]. Any deviation in the usual anatomical position and branching of the nerve trunk in this location could be significant for both the surgeons and anesthetists in eliciting a complete femoral nerve block.

Many instances of femoral nerve compression in the iliac fossa as a resultant of muscular compression have been reported [2–6]. Aberrant slips of iliacus either by splitting or covering the FN may act as potential factor in femoral nerve compression. The piercing of FN by muscular slips from iliacus and psoas in 17 specimens (7%) and covering of the nerve in 2 specimens (0.8%) was found in a study of 242 specimens [3]. Bifurcation of the nerve with psoas major musculature passing between with an intermediate connection between the two nerve segments before a more distal rejoining prior

to its exit from the pelvis was also seen in the literature [6]. We present a case of higher division of FN proximal to the inguinal ligament, intervened by an accessory slip of iliacus muscle. The posterior division of FN coursed between the accessory iliacus and the iliacus muscle. A rare case of higher origin of FN 3.2 cm above the inguinal ligament, similar to our case was reported [7].

Case Report

During routine dissection on the right lower limb of a 56-year-old male cadaver, for undergraduate teaching program, we encountered a unique unilateral variation in the division of the right FN. The division of the femoral nerve was above the inguinal ligament. An accessory slip of iliacus muscle appeared to divide the FN about 3.5 cm proximal to the midpoint of inguinal ligament with the PD passing behind and the AD in front of the slip. In the iliac fossa the trunk of the FN and both the divisions coursed lateral to the psoas major muscle (Figure 1). In the femoral triangle the AD was present lateral to the femoral artery whereas the PD was further laterally placed but behind the accessory slip of iliacus muscle. The AD further gave the nerve to pectineus, the intermediate cutaneous nerve of thigh, medial cutaneous nerve of thigh and two branches to the sartorius muscle. An interesting

observation was the oblique communication over the slip of iliacus muscle between the AD and PD about 4.5 cm distal to the inguinal ligament (Figure 2).

Discussion

The FN is an important structure of the anterior compartment of the thigh and reports of its higher division are very rare as most of the articles available in this regard deal with the variations either in the formation of the nerve-trunk from its spinal contributions or its splitting in the iliac fossa to be rejoined again before passing beneath the inguinal ligament to enter the upper thigh [2–4, 6]. A rare case of bilateral higher origin of FN 3.2 cm above the inguinal ligament similar to ours was reported by Das and Vasudeva, but in our case it was unilateral and associated with accessory iliacus muscle. They further commented that any attempt to perform femoral nerve block in such a case would lead to either of the AD or PD getting blocked with resultant effect of partial or incomplete anesthesia [7]. In our case there was a communication between the divisions due to which the chance of complete anesthesia would have been comparatively higher if any of the divisions were to be blocked.

The usual causes of FN dysfunction are direct injury (trauma), prolonged pressure on the nerve, and compression of the nerve by adjacent parts of the body or disease-related structures such as a tumor [8]. The FN may often be injured by suture or staples, tissue scar entrapment, local anesthesia blockade or direct compression [9, 10]. Even though rare, transient lesion of the FN after mesh hernioplasty for a recurrent inguinal hernia was also reported [10]. FN entrapment involves pressure on the nerve when it passes through a muscle, and prolonged pressure may result in ischemia leading to lack of oxygen that can cause further complications [5, 8]. Frequent

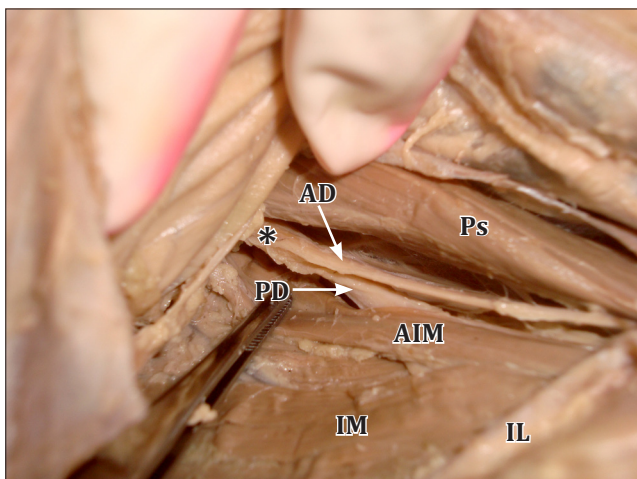


Figure 1. Higher division of femoral nerve trunk in the right iliac fossa. (AD: anterior division of femoral nerve; PD: posterior division of femoral nerve; IM: iliacus muscle; AIM: accessory iliacus muscle; Ps: psoas major muscle; IL: inguinal ligament; asterisk: the femoral nerve trunk)

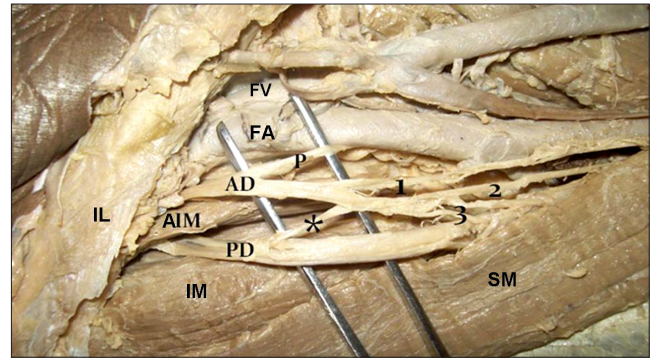


Figure 2. Branches of femoral nerve in the femoral triangle. (FV: femoral vein; FA: femoral artery; IL: inguinal ligament; IM: iliacus muscle; AIM: accessory iliacus muscle; AD: anterior division of femoral nerve; PD: posterior division of femoral nerve; P: nerve to pectineus muscle; 1: medial cutaneous nerve; 2: intermediate cutaneous nerve; 3: nerves to sartorius; SM: sartorius muscle; asterisk: the communicating branch between AD and PD)

coexistence of accessory iliacus with the splitting of femoral nerve, causing nerve compression has been reported [2–4]. The accessory iliacus might cause tension on the femoral nerve resulting in referred pain to the hip and knee joints and to the lumbar dermatomes L2, 3 and 4 [2–4]. In our case the accessory slip of iliacus passed between the AD and PD which could possibly lead to entrapment of posterior division since it lies between the accessory slip of iliacus and the main muscle mass of iliacus. The entrapment symptoms could be sensation changes in thigh, knee or leg such as decreased sensation, numbness, tingling, burning, uncommonly pain, and a feeling of the knee ‘giving way’ or buckling; weakness of the knee or leg including difficulty going up and down stairs, especially down [8].

The higher division of the femoral nerve above the inguinal ligament and the presence of accessory iliacus muscle slip in between the two divisions may cause nerve entrapment symptoms, the awareness of which help the clinicians to diagnose FN entrapment easily. Thorough knowledge of the pertinent anatomy [11] of the region is essential for the anesthetists and the surgeons especially orthopedists while operating on the anterolateral aspect of the thigh or while performing total knee arthroplasty [12] to ensure successful femoral nerve blocks.

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