

Case Report

Anomalous superficial peroneal nerve with higher division: a case report

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ABSTRACT

The superficial peroneal nerve is one of the terminal branch of common peroneal nerve. There are reports in the available literature about the variant course and distribution of this nerve. The variations of the above nerve are important and provide important information to surgeons during dissection of lower limb. In the present case a rare higher division of superficial peroneal nerve into medial and lateral branches in the leg was seen in an adult male cadaver in left lower limb. Awareness of anatomical variations of superficial peroneal nerve presented here becomes important to avoid injury in clinical situations like pain over the lateral malleolus.

Keywords: Superficial peroneal nerve, Higher division

INTRODUCTION

The superficial peroneal nerve commences at the bifurcation of common peroneal nerve behind the head of the fibula near the knee. At first it lies deep to peroneus longus and then passes anteroinferiorly between the peroneus longus and peroneus brevis and finally between extensor digitorum longus and peronei muscles to pierce the deep fascia in the lower one third of leg, where it divides into medial and lateral branches.

The medial branch passes anterior to the ankle and divides into two dorsal digital nerves: one supplies the medial side of the great toe and the other supplies the adjacent sides of the second and third toes. The smaller lateral branch crosses the front of the ankle traverses the dorsum of the foot laterally. It divides into dorsal digital branches that supply the contiguous sides of the third, fourth and fifth toes and the skin of the lateral aspect of the ankle. Both branches, especially the lateral, are at risk during the placement of portal incisions for arthroscopy.

Superficial peroneal nerve supplies peroneus longus, peroneus brevis and the skin of the lower part of the front of the leg, the greater part of the dorsum of the foot, and most of the dorsal surfaces of the toes.¹

Absence of either the lateral or the medial cutaneous branches of superficial peroneal nerve, are seen in 8.6% and 0.8%, cases respectively.² It has been shown that in the absence of the medial cutaneous branch, the saphenous nerve innervates the medial part of the foot, while in the absence of the lateral cutaneous branch, the sural nerve supplies the lateral part of the dorsum of the foot.² Sometimes, the superficial peroneal nerve pierces the anterior intermuscular septum and passes from the lateral compartment into the anterior compartment, following a superficial course. In other cases, the medial and lateral branches divide before piercing the superficial fascia.³ The medial branch may be replaced by the deep peroneal (anterior tibial) nerve in its absence. The lateral branch of superficial peroneal nerve has been described as arising from the nerve to peroneus brevis.⁴ The

superficial peroneal nerve may bifurcate in the upper part of the leg and both the branches may remain in the lateral compartment.⁵ Very rarely the superficial peroneal nerve may be seen in the anterior intermuscular septum.⁶

CASE REPORT

During routine dissection classes to medical students, we have observed some important anatomic variations in left lower limb in an adult male cadaver. The variations were; higher division of superficial peroneal nerve into medial and lateral branches (Figure 1). The medial branch arises from the superficial peroneal nerve at the proximal calf beneath the crural fascia and pierced the anterior intermuscular septum to enter the superficial fascia of anterior compartment. However, the lateral branch descended in the anterior intermuscular septum in a peroneal tunnel, pierced the deep fascia of lateral compartment and gave cutaneous branches to the adjacent skin of front of leg. Both medial and lateral branches were providing motor branches to peroneus longus and brevis before piercing the deep fascia of leg.



Figure 1: Photograph showing anomalous higher division of superficial peroneal nerve. (SPN: Superficial peroneal nerve; ATN: Anterior tibial nerve; MBSP: medial branch of superficial peroneal nerve; LBSP: lateral branch of superficial peroneal nerve; PL: peroneus longus; PB: peroneus brevis).

DISCUSSION

The anatomy of the superficial peroneal nerve is of critical importance to surgeons performing a variety of procedures in the middle third of the lateral leg. Hence, a good knowledge of gross anatomy and common variations of the superficial peroneal nerve is required to prevent injuries during surgical procedures.

The variations of the superficial peroneal nerve are important in fasciotomy, fasciocutaneous flaps, traumatic and atraumatic pain syndromes of the leg, regional anesthesia of the ankle, and in the determination of the surgical procedure to foot and ankle.^{2,13}

It has been known that the superficial peroneal nerve and its terminal branches may be iatrogenically damaged at around the knee joint, lower leg, and ankle joint, respectively.⁸⁻¹⁰ Superficial peroneal nerve is suggested as an important and appropriate graft, particularly when multiple and long nerve grafts are needed.¹¹ Also, direct biopsy from the superficial peroneal nerve is used in the diagnosis of its diseases.¹² Furthermore, this nerve is under the risk of injury, during correction deformity surgery in childhood and adolescence. These require a well-known anatomy of this nerve and its variations.

Entrapment syndrome is an uncommon but easily diagnosed clinical problem related with the superficial peroneal nerve and its branches. Superficial peroneal nerve may divide into terminal branches before or after piercing the deep fascia of leg, and so the nerve itself or its terminal branches may be compressed while passing through the deep fascia.⁷ In such cases, several findings have reported such as symptoms aggravated with exercise, sensory loss on the dorsum of the foot, and swelling and sensitivity on the anterolateral parts of the leg with dorsiflexion of the ankle.¹³

In the present case also the superficial peroneal nerve divided into terminal branches before piercing the deep fascia of leg. Both medial and lateral branches were passing through the anterior intermuscular septum where they can be compressed. Moreover the lateral branch descended in the anterior intermuscular septum in a peroneal tunnel and pierced the deep fascia of lateral compartment above the ankle. There are very less reports in the literature suggesting either the superficial peroneal nerve or its branches can be seen in the anterior intermuscular septum.^{6,14} During the surgical procedures, if the lateral branch of superficial peroneal nerve is not identified in either anterior or lateral compartments, surgeon should look for the nerve in the anterior intermuscular septum as in the present case. One should never cut across the anterior intermuscular septum without first examining it very carefully for the presence of the superficial peroneal nerve or its branches. Inadvertent injury to the superficial peroneal nerve may create a painful neuroma or cause unwanted numbness on the dorsum of the foot. Also, when performing a release of the superficial peroneal nerve for the entrapment or when performing resection of the superficial peroneal nerve for a neuroma, one should always evaluate the septum specifically for a branch of the superficial peroneal nerve to prevent an incomplete release or resection, which would result in a therapeutic failure.

The area where the superficial peroneal nerve pierces the deep fascia and becomes superficial was reported as the junction of the middle and lower one-thirds of the leg.⁷ The distance between the site of piercing crural fascia and the lower end of the lateral malleolus was given as 6.5-12.3 cm, which is mainly in the lower one-third.^{2,7} In the present case, the piercing of medial and lateral branches were at different levels; medial being piercing the

intermuscular septum at the higher level above the ankle and the lateral branch piercing the deep fascia at an lower level in leg above the ankle. Even though the cases wherein the superficial peroneal nerve diverges into two and then pierces the fascia are not rare globally.^{5,7,10} We have observed higher division of superficial peroneal nerve only in one cadaver in our dissection lab.

Superficial peroneal nerve is usually accompanied by a small artery and vein. So, it may be used as a vascularized graft in peripheral nerve surgery by orthopaedicians. Its motor branches to the peroneal muscles can be used for a neurotization of the anterior tibial muscle in patients with L4 root injuries (poliomyelitis, spinal injuries).¹⁵ On the other hand, in plastic surgery small arteries and veins accompanying the superficial peroneal nerve may be used in vascularized skin grafts.¹⁶ The unusual variant location of lateral branch of superficial peroneal nerve in the anterior intermuscular septum in the present case will enable the surgeon to find and preserve the nerve during fasciotomy, neurolysis, neuroma resection, or bony and soft tissue reconstruction.

CONCLUSION

Knowledge of anatomical variations of the nerves in the lower limbs provides information to clinicians to avoid injury to them in clinical situations like pain over lateral malleolus. Although there are number of variations reported regarding superficial peroneal and sural nerves the case described here is unique and it will be of interest to anatomists and clinicians.

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