

Low Level Division of the Sciatic Nerve and Its Clinical Significance - Case Report

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Abstract

The anatomical knowledge regarding variation of the Sciatic nerve in the level of division and its location is of great importance in medical practise of neurology, orthopaedics, rehabilitation and anaesthesia. We report here a rare case of trifurcation of the Sciatic nerve of 50 year old male cadaver in the lower part of the popliteal fossa on the right side. Normally, the Sciatic nerve bifurcates into tibial and common peroneal nerve at the junction of the middle and lower thirds of the thigh, near the apex of the popliteal fossa. Low level division of the Sciatic nerve into three branches rarely occurs. In this case, the Sciatic nerve divided into tibial, common peroneal and peroneal communicating nerve. There was an absence of the Lateral sural nerve from the common peroneal nerve. This finding is of academic interest and clinical significance in performing effective injections at the popliteal crease for tibial and common peroneal nerve blocks and popliteal artery aneurysm surgeries.

Key words: *Sciatic nerve, trifurcation, popliteal fossa, nerve block, variation*

Introduction

Sciatic nerve, the largest nerve of the body, is derived from the anterior division of the L4-S3 spinal roots and is nearly 2cm wide at its origin.¹ It divides into two terminal branches, namely the tibial (ventral division of ventral rami L4-S3) and common peroneal nerve (Dorsal division of the ventral rami L4-S2). The common site of division of the Sciatic nerve is at the junction of the middle and lower thirds of the thigh, but the division may occur at any level above this point and rarely below it.² Several authors have reported variations on Sciatic nerve division into the tibial and common peroneal nerve from Sacral plexus to the lower part of the popliteal space.

In the popliteal fossa, the tibial nerve gives branches of muscular, genicular and medial sural cutaneous nerve. The common peroneal gives genicular branch, lateral sural nerve or lateral cutaneous nerve of calf and peroneal communicating nerve (PCN). The medial sural cutaneous nerve joins with peroneal communicating nerve at a highly variable level to form the sural nerve. The sural nerve supplies the skin of the lateral and posterior part of the inferior third of the leg and the lateral side of the foot.³

Case Report

During the routine dissection of the lower limb in the Department of Anatomy, a low level division of the Sciatic nerve with trifurcation was noted. The Sciatic nerve terminated in the lower part of the popliteal fossa by giving three branches. The three branches were tibial, common peroneal and peroneal communicating nerve (**fig 1**). The distance of the Sciatic nerve division to the popliteal crease was 24mm. The peroneal communicating nerve

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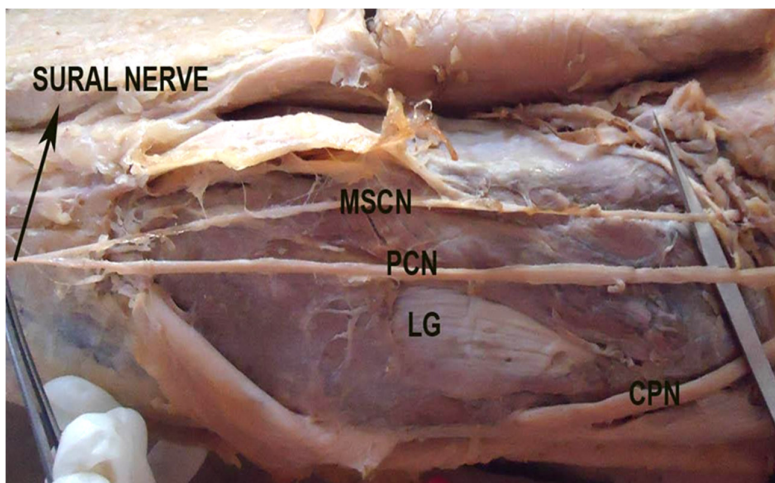
was thick than the normal and coursed over the lateral side of the leg. It then joined with the medial sural cutaneous nerve in the lower half of the leg to form the sural nerve (**fig 2**).

The lateral sural nerve was absent from the common peroneal nerve. Hence, the peroneal communicating nerve supplied the lateral side and distal half of the median and medial aspect of the calf.

Figure 1: Low level trifurcation of the sciatic nerve into tibial, common peroneal and peroneal communicating nerve



Figure 2: Peroneal communicating nerve joins with the medial sural cutaneous nerve to form the sural nerve in the lower half of the leg.



Legends

SN - Sciatic Nerve, TN - Tibial Nerve, CPN - Common peroneal nerve, PCN - Peroneal communicating nerve, MSCN - Medial sural cutaneous nerve, LG - Lateral head of gastrocnemius, MG - Medial head of gastrocnemius, ST - Semitendinosus, SM - Semimembranosus, BF - Biceps femoris

The variation was unilateral and the left lower limb was normal. The further course of the tibial and common peroneal nerve were normal.

Discussion

Numerous variation in the point of division of the Sciatic nerve have been reported in literature. Standard Anatomy textbooks have described the high division of the sciatic nerve in the pelvis in 10-15% of all the cases.^{4,5,6} Many of these variations are classified into different types depending on their relation to the piriformis muscle.^{7,8} A recent study reported that in high division of the Sciatic nerve in the pelvis, the common peroneal nerve pierced the accessory slip of the piriformis muscle and supplied the gluteus maximus muscle.⁹

Low level division of the Sciatic nerve is rare. Saleh et al studied the level of division of the sciatic nerve into the tibial nerve and common peroneal nerve above the knee in 30 cadavers, and reported that the sciatic nerve divided at a distance of 50–180 mm from the popliteal crease.¹⁰ Zhon L (2014) reported that the sciatic nerve divides at a range of 40-120mm above the popliteal crease.¹¹ In the present case, this was found to occur at 24mm. This shows that the nerve divided in the low level of the popliteal fossa.

Nayak S (2006) reported a trifurcation of the Sciatic nerve in the middle of the popliteal fossa into tibial nerve, common peroneal nerve and an abnormal trunk. The abnormal trunk divided into lateral cutaneous nerve of calf and peroneal communicating nerve.¹² Another case report by Sawant S.P (2013) reported bilateral trifurcation of the sciatic nerve in the middle of popliteal fossa into the tibial, superficial, deep peroneal nerves.¹³ In the present study, the Sciatic nerve was trifurcated in the low level of the popliteal fossa into tibial, common peroneal nerve and peroneal communicating nerve. There was an absence of lateral sural nerve.

Variations of the sural nerve and peroneal communicating nerve were also noted. The knowledge of the variation in the sural nerve and

peroneal communicating nerve is important because the sural nerve is the most frequently used sensory nerve in nerve transplantations.¹² Huelke D.F. (1958) noted the peroneal communicating nerve to be the main stem, giving cutaneous branches to the posterior aspect of the leg in 13.2% and absence of lateral sural nerve in 22%.¹⁴ In the present study, peroneal communicating nerve was the only cutaneous branch from the common peroneal nerve and supplied the posterior aspect of the leg. The lateral sural nerve was absent.

Kosinski C (1926) reported that in 40.2% of the cases the lateral sural nerve sends communicating branch which unites with medial sural cutaneous nerve to form sural nerve. In the remaining cases, it is purely a cutaneous nerve of the calf and supplies the lateral side and distal half of the median and medial aspect of the calf.¹⁵ In the present study, the lateral sural nerve was absent and the sural nerve was formed by the peroneal communicating nerve joining with medial sural cutaneous nerve.

Buys et al (2010) and Paqueron et al (1999) reported that blocking the tibial and common peroneal nerve separately provides a faster onset than a pre-bifurcation blocks of the sciatic nerve in popliteal nerve blocks.^{16,17} Knowledge of Anatomical correlation between the origin of the sciatic nerve, tibial nerve, common peroneal nerve are important when performing a Selective block.¹¹ Sohn Y et al (2015) stated that nerve block in the popliteal region involves a small or medium field sized field that surgeons sometimes inject blindly. Such injections does not take Anatomical variations of the sciatic nerve into account.¹⁸

Therefore, knowledge of the unusual variant branch, unusual division and thickness of the nerve will enable the surgeons to find and preserve the nerve during nerve blocks, neurolysis, neuroma resection or bony and soft tissue reconstruction.

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