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ANATOMICAL STUDY OF SCIATIC NERVE VARIATIONS: A REVIEW BASED ON CASE STUDIES

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ABSTRACT
Sciatic is also known as the ischiadic nerve comprised of five nerves and occurs right and left side of the lower spine; it contains fibers from anterior and posterior divisions of the lumbo sacral plexus. Sciatic nerve covers each side of the lower spine along with gluteal region and back of the thigh. Sciatica means condition of pain caused by compression or irritation of the sciatic nerve the symptoms include pain, numbness and tingling. It may also cause inability to walk. Looking towards the significant prevalence of sciatica it is important to study sciatic nerve and its variations anatomically; present article summarizes various study of sciatica nerve variation in a view to explore its anatomical positioning.

KEYWORDS: Sciatic nerve, Sciatica, piriformis, anatomical.

INTRODUCTION

Anatomy of the Sciatic Nerve

Sciatic is widest nerve arises from lumbosacral plexus. It is about 2 cm wide. Anterior and posterior divisions of spinal nerves formed sciatic nerve. It has two common components peroneal and tibial component. Posterior and anterior division of spinal nerves resulted common peroneal and tibial component respectively. It formed in pelvic region and emerges into gluteal region passing below piriformis as a single nerve trunk. It covers back of thigh and apex of popliteal fossa where it ended into tibial and common peroneal nerve. It supplies to the muscles of back thigh, leg and foot.[1]

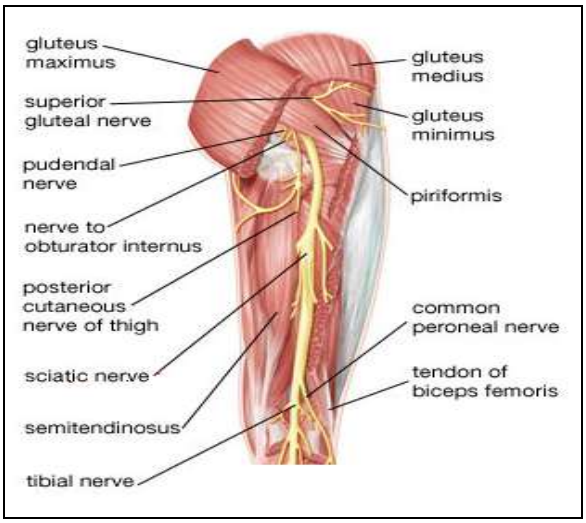

Figure 1. Anatomical Positioning of Sciatic Nerve.

Sciatica

The downward movement of common peroneal and the ventral components formed sciatic nerve. The compression followed by irritation in this nerve induces painful condition called sciatica which also involves distortion of the nerve root or its sensory ganglion. The causative factor may be trauma, lifting of heavy objects, continuous working in forward bending position, improper sitting posture and jerking movement etc. Ayurveda described sciatica as *gridhrasi* which is a *vataja nanatmaja vyadhi*. The signs and symptoms involve *ruka, toda* and *muhuspandana* in the *sphika, kati, pristha, uru, janu* and *jangha*. Middle age people are most likely to get sciatica syndrome. Anatomically sciatica is a lumbo-sacral radicular syndrome along with nerve root pain. Lumbar disc herniaion and lumbar canal or foraminal stenosis are common pathologies which may cause sciatic pain. As per traditional text of ayurveda *gridhrasi* is curable initially while it becomes incurable (*asadhya*) if associated with muscle wasting & stiffness.[2, 3]

ANATOMICAL VARIATIONS

The anatomical positioning and divisions of sciatic nerve is very important as surgical and clinical point of view. The anatomical study of sciatic nerve play significant role diagnostic as well as therapeutic. The anatomical distribution of sciatic nerve may vary unusually and these anatomical variations must be considered for correct clinical implication of sciatic nerve. This article presented normal anatomical positioning of sciatic nerve along with some variations investigated by various

researchers. The main variations occur in its exit from pelvis and division into terminal branches.

The sciatic nerve variation and relation to the piriformis muscle may be as follows

- Undivided nerve below undivided muscle
- Divisions of nerve between and below undivided muscle
- Divisions above and below undivided muscle
- Undivided nerve between heads
- Divisions between and above heads
- Undivided nerve above undivided muscle

Common Sciatic Nerve Variations

A study observed the terminal branches of sciatic nerve arises from the lumbosacral plexus and runs throughout the course separately. Study also observed sciatic nerve variations; few are related to piriformis. Most of variations were belongs from category of undivided nerve below undivided muscle while the variations related to the "divisions of nerve between and below undivided muscle" and "divisions above and below undivided muscle" were observed equally. Study also witnessed inferior gluteal artery in between the common peroneal and tibial components over the piriformis muscle.[4]

Trifurcation Anatomical Variation

Sciatic nerve arises from the sacral plexus. Sciatic nerve divides at the upper angle of the popliteal fossa while its usual variation is high division into tibial and peroneal nerves. Posteriorly it related to the cutaneous nerve of the thigh and the gluteus maximus. It contains both motor and sensory fibers thus considered as mixed nerve. Posterior of the thigh muscles, hip and knee joint supplied by the motor branches while sensory branches supply the tibial and foot areas. It bifurcates into two divisions; tibial and common peroneal at the lower part of the posterior compartment of the thigh.

Different studies reported variations on sciatic nerve division; these anatomical variations may be due to the piriformis syndrome, muscle atrophy and sciatica. A study observed trifurcation of the sciatic nerve on the back of the thighs in the middle of the popliteal fossa which is very unusual. Sciatic nerve also observed with trunk which divided into lateral cutaneous nerve of the calf and communicating nerve.[5]

Bilateral Variation of Divisions

The sciatic nerve divides into common peroneal and tibial nerve and this division of sciatic nerve is variable. A study observed bilateral variation in division of the sciatic nerve within the pelvis. Study observed bilateral variation of sciatic nerve bifurcation in the gluteal region. Sciatic nerve bifurcation occurred within the pelvis on left side gluteal region. The common peroneal nerve emerges at superior of the piriformis muscle while tibial nerve to the inferior of the piriformis muscle. The common peroneal nerve through piriformis muscle by dividing the muscle into two parts while tibial nerve below the inferior border of piriformis muscle. These variations in bifurcation may cause different clinical presentations of sciatica and piriformis syndrome.[6]

Variant Exhibiting Intra-Pelvic Division

Different races and populations possess variations of sciatic nerve with a variable frequency. A study presented high division of sciatic nerve in the pelvis. Tibial component emerged below the piriformis while common peroneal component pierce the piriformis to leave the pelvis. The branches of sciatic not reunite in the gluteal or thigh region. The muscular branches of the tibial component to the hamstring muscles observed as arising from the tibial nerve.[7]

Anatomical Variations in the Bifurcation

Sciatic nerve is broad and flat at initial point while it becomes rounded peripherally. The bifurcation into its two trunks occurs between the sacral plexus and popliteal space. Significant variations in the bifurcation may be occurs in sciatic nerve. A study observed that sciatic nerve divided in the pelvis in left lower limb, common peroneal nerve emerged through the bifid piriformis and tibial nerve below the muscle. Study also identified a specimen in which the right sciatic nerve divided at the ischial tuberosity and the left sciatic nerve divided in pelvis and both tibial nerve while common peroneal nerve emerged below the piriformis. Investigation also found bilateral variation, sciatic nerve on the right side divided above the popliteal crease but below the superior angle of popliteal fossa, while left side sciatic nerve divided at the level of the popliteal crease.[8]

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