

VARIATIONS IN DIVISION OF SCIATIC NERVE: A CADAVERIC STUDY

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ABSTRACT

INTRODUCTION

Sciatic nerve is the largest and thickest nerve in the body. It arises from the lumbar plexus within the pelvis. The nerve emerges from the pelvis to enter into its component nerves –tibial and common peroneal nerve. The division normally occurs at the lower apex of the superior angle of popliteal fossa of the thigh. However the division shows variations which may be inside the pelvis or outside the pelvis. When outside, the division may occur anywhere from exit to apex of the popliteal fossa where nerve normally divides. These abnormal divisions of the may be aetiological factors for the pathologies related to the nerve.

MATERIALS AND METHODS

The study was done on twenty cadavers used in routine dissection for the under graduate students from Kanyakumari Government Medical College, Asaripalam, Nagercoil, Kanyakumari District, Tamilnadu. The cadavers were fixed in 10% in formalin, glycerine, isopropylol, and sodium chloride solution. Of these, two cadavers showed higher division of sciatic nerve. The division has occurred at the lower border of piriformis and divided nerve has emerged from the lower border of the piriformis. Variations were seen on both the sides in these two bodies.

CONCLUSION

A thorough knowledge of division sciatic nerve helps in differential diagnosis of sciatica of various origins & its management by the different treatment methods.

KEYWORDS

Lumbar Plexus, Sciatic Nerve, Tibial Nerve, Common Peroneal Nerve, Piriformis.

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INTRODUCTION: Relationship between sciatic nerve and piriformis is variable. The undivided sciatic nerve may run above the piriformis muscle or through the muscle. Major division of the nerve may lie on the either side of the muscle which is a most common variant. One division may lie on the either side of the muscle and other division may lie either above the piriformis or below the piriformis. Sometimes piriformis can cause entrapment of the sciatic nerve. This condition is known as Piriformis Syndrome [Gray's Anatomy-Susan Standring]¹

Sciatic Nerve is the thickest nerve in the body having width 1.5 to 2cms extending from the pelvis to upper border of popliteal fossa. At the level of junction middle and lower one third thigh, it divides into two terminal branches namely tibial and common peroneal (Common Fibular nerve). Posterior compartments of thigh is supplied by Sciatic nerve

and muscles of leg and foot are supplied by two terminal branches. It is through the greater sciatic foramen sciatic nerve exit from the pelvis and enter the gluteal region below the piriformis. [Kulkarni Neeta V].² Greek word, Sciatic is derived from "Ischiadicus". It is also known as Ischiatic nerve is the largest and thickest nerve in the human body/It has five nerves which is formed on either side of lower spine. In 85%-90%, sciatic nerve divides at the apex of the popliteal fossa into tibial nerve & common peroneal nerve Any compression or irritation of the nerve is called Sciatica. The symptoms include pain in the nerve, tingling and numbness associated with weakness. [Saritha et al]³

MATERIALS AND METHODS: This cadaveric study for high division of sciatic was observed during routine dissection for study purposes of the first year M.B.B.S students in the Department of Anatomy at Kanyakumari Government Medical College, Asaripalam, Nagercoil, Kanyakumari District, Tamilnadu, twenty unknown human formalin fixed cadavers (in 10% formalin, glycerine, isopropylol, and sodium chloride solution) constituted the materials for the present study. Out of them, two male cadavers showed high division of sciatic nerve.

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The gluteus maximus was reflected to expose the underlying structures. Piriformis Superior and Inferior Gemilli, Obturator Internus tendons and Sciatic Nerve were identified. The nerves were not bound by common epineurium. Neither of the components pierced the piriformis. Rest of the male and female cadavers showed the normal division of sciatic nerves that is upper angle of popliteal fossa.

DISCUSSION: Variations of the division of sciatic nerve at the different levels has been reported by various authors.

Sometimes sciatic nerve terminates into two terminal branches higher up within the pelvis, or in the gluteal region, or in the upper part of thigh, then common peroneal nerve pierces the piriformis muscle or it may pass superior to it and tibial component may pass inferior to piriformis muscle [Kulkarni Neeta V]².

Piriformis syndrome is a condition where piriformis muscle gets hypertrophied at the greater sciatic foramen giving rise to compression of sciatic nerve. This syndrome occurs in sports person athletics where they used their gluteal muscles during cycling and during skating. This is more commonly seen in women [Singh Inderbir edited by Sudha Seshayan]⁴.

The pain in the back may be caused by a condition called Sacralisation where there is partial or complete fusion of sacrum with 5th lumbar vertebra. They are cause of the low back pain, [Singh Inderbir-Human Embryology] but this pain has to be differentiated from Sciatica⁵.

Various authors have studied lot variations in high division of sciatic nerve: Smoll [2010] stated that anomalies sciatic nerve & piriformis ranges from 1;5 to 35.8%. He studied in the 18 previous studies & 6062 cadavers and found the variations in the cadavers in 16.9% and 16.2% in surgical case series [Smoll].⁶

Sharma et al [2010] observed in male cadaver aged 60 years the two division of sciatic were separate bilaterally in the gluteal region where tibial nerve was passing below piriformis and common peroneal nerve piecing the piriformis muscle. High division of sciatic nerve may be the cause for failure of popliteal block.⁷

Studies of Vloka. JD et al (2001) states that sciatic nerve has divided at the mean distance ranging from 0-115mm above the popliteal fossa. An ideal popliteal is piercing the needle about 100mm above the popliteal crease, proximal to the division of sciatic nerve.⁸

Saritha et al studied on twenty five cadavers that is Variations of sciatic nerve were in 12% fifty lower limbs. However it may rarely been separated within the pelvis. In such cases they may cause nerve compression under anatomic structures. [2011]Sciatic endometriosis is a rare condition as detected by MRI, cyclic pain vary with menstrual cycle (Savitha et al).³

Arifoglu et al. [1997] Reported a case of double superior gemillus and double piriformis muscle associated with high sciatic nerve division passing between two heads of piriformis.⁹

Babinski et al. [2003] observed a rare variations high division of sciatic nerve surrounding gemillus superior muscle. The common peroneal nerve passing above the muscle and tibial nerve passing below the muscle. This type of variations may contribute to formation of piriformis syndrome, coccygodynia and atrophy of the muscle.¹⁰

Saleh et al. [2009] has said in their studies that division of sciatic nerve takes place at different levels nearly 50-100mm above which may be cause for frequent failures in the popliteal block.¹¹

Guvencer et al. [2009] studied on the variations of sciatic nerve and its high division in 25 formalin fixed male cadavers.¹² The study showed that whole sciatic without division in pelvis in 52% of cases while in 48% of cases there was high division of sciatic nerve. The divided branches of sciatic nerves left pelvis through infra piriform fossa men in 24%. In another 24% of cases, only one branch left the pelvis through infra piriform foramen, where as other branch came out of pelvis through different route.

PRESENT STUDY: In this study 90% of sciatic nerve of the right and left lower limb showed normal course and division at the angle of popliteal fossa into tibial component and common peroneal component. But only in ten percent (in two cadavers out of twenty cadavers) showed higher division of the nerves below the piriformis. There are no double superior gemillus and double piriformis muscle which is associated with high sciatic nerve division as seen in.

Arifoglu et al [1997]⁹ studies. There are no rare variations of high division of sciatic nerve surrounding gemillus superior muscle and coccygodynia and atrophy of the muscles were not seen unlike in studies of Babinski et al [2003].¹⁰ In the Guvencer et al [2009]¹² studies, divided branches of sciatic nerves left pelvis through infra piriform foramen in 24%.but in present studies only 10% showed high division of sciatic nerve below the piriformis.

CONCLUSION: Failure of Popliteal block is due to High division of sciatic nerve. When division takes place within pelvis, it causes severe nerve compression by various anatomical structures. This study on frequent variation of sciatic nerve make the surgeons alert to prevent any error in the treatment

Take Home Message: Thus this study helps us to throw light on sciatica of various aetiology as well as piriformis syndrome which helps in the effective management of sciatic nerve both clinically and surgically The compression caused by the structures other than intervertebral disc prolapse are of importance to the surgeons in effectively relieving the cause behind sciatica of varied aetiology The pain in the back may also be caused by a condition called Sacralisation where there is partial or complete fusion of sacrum with 5th lumbar vertebra. This study also helps us to know clinical aetiology of sciatica.

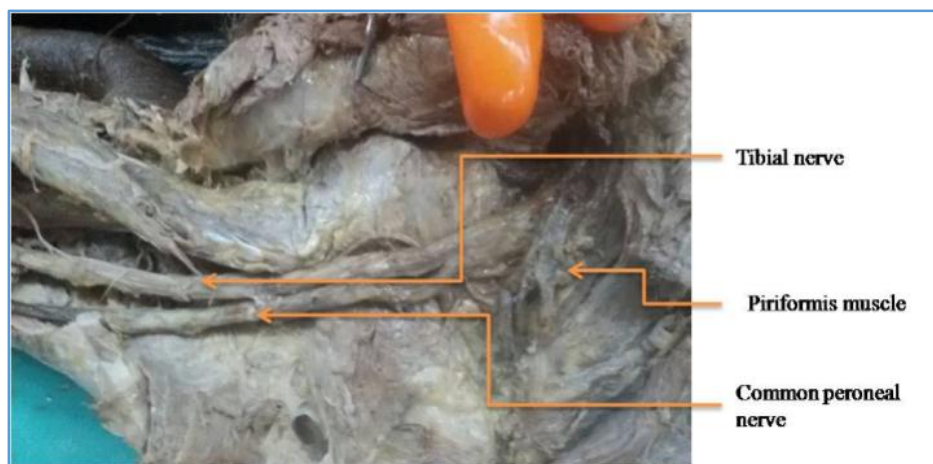


Figure 1

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