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A CADAVERIC STUDY ON HIGHER DIVISION OF SCIATIC NERVE AND ITS CLINICAL SIGNIFICANCE

Anatomy

Dr Sunil Oza — Associate professor, Department of Anatomy, C U Shah Medical College, Surendranagar

***Dr Subhash Gujar** — Associate professor, Department of Anatomy, GMERS Medical College, Vad nagar *Corresponding Author

Dr Jaidev Singh Shekhawat — Assistant professor, Department of Anatomy, C U Shah Medical College, Surendranagar

ABSTRACT

Background: The sciatic nerve (SN) originates from sacral plexus in the pelvis by union of the ventral branch of lumber and sacral vertebra L4, L5, S1, S2 and S3 sciatic nerve roots value. Sciatic nerve palsy occurs after total hip replacement surgery in about 1 percent of cases.
Objective: Therefore, the present study was designed to a cadaveric cram on higher division of sciatic nerve and its clinical significance.
Materials and Methods: The present study was conducted in Department of anatomy, C. U. Shah Medical College, Surendranagar, Gujarat, over the epoch of five years. Total 25 cadavers (50 Lower limbs) were dissected as part of routine dissection for 1st year Medical students for Anatomy course.
Results: In the present study of 25 cadavers, Among them 46 specimens (92%) the sciatic nerve (SN) had a normal course after its exit below the piriformis and divided into TN and CPN at the superior angle of popliteal fossa, while in 4 specimens (8%) there was high division of SN within the pelvis in which the SN divided above the piriformis into TN & CPN, having a varied course.
Conclusion: It concluded the information concerning the variation in the level of division of the sciatic nerve and how it leaves the pelvis is vital to avoid accidental injury to the nerve during several surgical events in the gluteal region.

KEYWORDS

Nerve, Piriformis, Tibial Nerve, Common Peroneal Nerve.

INTRODUCTION

The sciatic nerve is the thickest nerve in our body. [1] The sciatic nerve (SN) originates from sacral plexus in the pelvis by union of the ventral branch of lumber and sacral vertebra L4, L5, S1, S2 and S3 sciatic nerve roots value. It is two centimeters (cm) wide, leaves the pelvis through the larger sciatic foramen below the piriformis and move down between the greater tro-chanter and Ischial tuberosity in the gluteal region. It splits into two elements at any level from its origin to its usual division inside the upper part of popliteal fossa into two terminal branches common peroneal nerve (CPN) and tibial nerve (TN). It is a mix nerve includes motor and sensory nerve fibers and motor branches supply the various muscles of the posterior compartment of thigh, hip joint and knee joint. Fruthermore, sensory branches innervations the entire tibial and foot areas apart from antero-medial tibial region and medial margin of the foot.[2]

The superior division of sciatic nerve inside the pelvis is very scarce. It has academic and clinical significance in Neurology, General Surgery, Orthopaedics, Anaesthesiology, Sports medicine and physiotherapy. The facts of sciatic nerve variation is also very significant for paramedical staffs who frequently give intramuscular injections into the gluteal region.[3] abnormal injury or compression of sciatic nerve causes paralysis or paresis of the thigh muscles.[4]

Higher division of SN, that escorts to compression of nerve consequential in piriformis syndrome, partial block of SN during popliteal block anesthesia and have a clinical importance in the etiology and pathogenesis of sciatica, in that case one cannot flex the lower limb in the knee joint. Moreover, aversion and plantar flexion of the extremity are also pretentious.[5]

A awareness of this anomaly is chief vital for neurophysiotherapists who carry out nerve conduction velocity tests during daily routine practice. Orthopedics and the Surgeons should also bestow due recognition and respect to this variation during surgical drainage of abscesses. It may be damaged due to misplaced intramuscular injections into gluteus maximus. Sciatic nerve palsy occurs after total hip replacement surgery in about 1 percent of cases. [6] Hence, the present study was undertaken to a cadaveric study on higher division of sciatic nerve and its clinical significance in cadavers of population of Saurashtra region Gujarat, India.

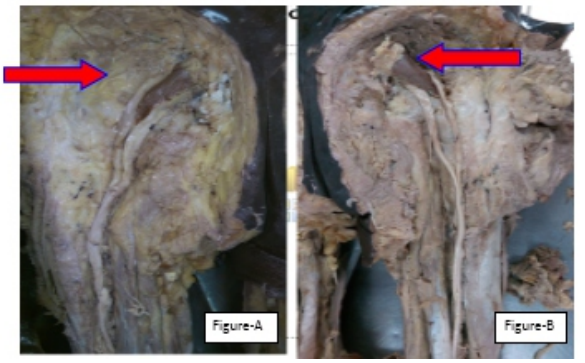
MATERIALS AND METHODS

The present study was conducted in Department of anatomy, C. U. Shah Medical College, Surendranagar, Gujarat, over the epoch of five years. Total 25 cadavers (50 Lower limbs) were dissected as part of routine dissection for 1st year Medical students for Anatomy course.

The gluteal region, back of the thigh and popliteal fossa were exposed during routine dissection. The gluteus maximus muscle was cut from it insertion and reflected towards its origin. The biceps femoris muscle was retracted and the nerve was then exposed in popliteal fossa. The exit of the nerve from pelvis, its relation to piriformis and level of division of the nerve were recorded. The level of SN division was described topographically with respect to the region where the division took place. The entire course of the nerve was delineated and looked for any possible variations.[7] The study protocol was approved by institutional ethics committee.

RESULTS

In the present study of 25 cadavers, total of 50 gluteal regions specimens were examined for the variation in the course and division of the sciatic nerve (SN). Among them 46 specimens (92%) the sciatic nerve (SN) had a normal course after its exit below the piriformis and divided into TN and CPN at the superior angle of popliteal fossa, while in 4 specimens (8%) there was high division of SN within the pelvis in which the SN divided above the piriformis into TN & CPN, having a varied course. TN passed below the piriformis and CPN passed above the piriformis to enter into the gluteal region. Both the nerve had sovereign course in the superior part of the thigh. Later both the components merged in the middle one third of the back of thigh and subsequently re-split normally at the superior angle of the popliteal fossa into TN and CPN respectively.



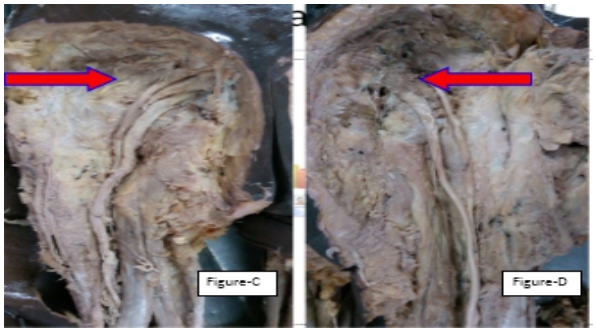


Figure: 1 Showed Higher Division of Sciatic Nerve Variation [ABC&D]

DISCUSSION

In the present study performed on 25 cadavers, total 50 gluteal regions specimens were examined for the variation in the course and division of the sciatic nerve (SN). In which, out of 50 specimens from 25 cadavers, in 4 (8%) specimen's higher division of sciatic nerve was recorded. A more recent, observational study was done by Shivaji et al, (8) in north India and found 5 (16.67%) out of 30 cadaver variations in sciatic nerve bifurcation which was accordance with our present findings. Another study reported 8% lower limbs higher division of sciatic nerve variation [4]. Our outcomes are agreement with aforementioned study.

Table: 1; Depict the level of division of sciatic nerve in comparison with the previous studies

Author	No. of specimens	Level of division in %	
		Before exiting pelvis	After exiting pelvis
Prakash et al, [9]	43	16.3	83.7
Gabrielli et al,[10]	40	13.7	86.3
Ugrenovic et al,[11]	100	4	96.0
Present Study	50	8	92

Table-1 showed, several studies [9, 10, 11] were performed on higher division of sciatic nerve. It has been found that high division of sciatic nerve before exiting pelvis were 16.3%, 13.7% and 4%, respectively. Results from aforementioned studies almost similar to our study (High division of SN was noted in 8% cases).

CONCLUSION

High division of Sciatic nerve was reported in 8% cases, all showed high division within the pelvis in the present study. Information concerning the variation in the level of division of the sciatic nerve and how it leaves the pelvis is vital to avoid accidental injury to the nerve during several surgical events in the gluteal region. Variations comparable to high division of sciatic nerve can escort to nerve injury during deep intramuscular injections, malfunction of sciatic nerve block anesthesia during a variety of surgical procedures. The reason of Piriformis syndrome is entrapment of sciatic nerve when it exits through greater sciatic notch. It also gives the anatomical foundation for impulsive re-innervations of muscles subsequent nerve injury.

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