



An Anatomical Variation of Unilateral Higher Division of Sciatic Nerve – A Case Report

KEYWORDS

High division, Sciatic nerve, Variation, Unilateral.

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ABSTRACT We report a case with unilateral high division of sciatic nerve. During routine dissection for first year MBBS students, anatomical variation in the termination of the sciatic nerve was encountered in a cadaver that had unilateral right sided high division of sciatic nerve, in the Department of Anatomy, Sri Ramachandra Medical College and Research Institute, Chennai. The clinical manifestations of unilateral high division of sciatic nerve ranges from sciatica, injury during deep intramuscular injections to entrapment neuropathy called piriformis syndrome and failed sciatic nerve block. Knowledge regarding point of bifurcation of sciatic nerve plays a novel role in clinical practice by neurologists, surgeons, anaesthetists and radiologists.

INTRODUCTION

The sciatic nerve is the widest nerve in the body. It is almost 2 cm wide. It is the largest branch of the lumbosacral plexus and consists of tibial component originating from ventral branches of L4, 5, S1, S2, S3 spinal segments and common peroneal component from dorsal branches of L4, L5, S1, S2 spinal segments. The nerve leaves the pelvis through the greater sciatic foramen and enters the pelvis below the piriformis muscle. Further descends on the posterior surface of the obturator internus, two gemelli and quadratus femoris muscle and divides in the upper angle of popliteal fossa into two divisions, the tibial and common peroneal nerve. ^[1]

CASE REPORT

During routine dissection for the first year MBBS students, anatomical variation in the termination of the sciatic nerve was encountered in a cadaver that had unilateral high division of sciatic nerve, in the Department of Anatomy, Sri Ramachandra Medical College and Research Institute, Chennai. On observation, the anatomical variation was on the right inferior extremity. In the present case, the sciatic nerve divided just below the piriformis muscle into tibial and common peroneal components. Both the nerves passed downwards between ischial tuberosity and greater trochanter along the back of thigh and remain separate throughout their course (Figure 1). On the left inferior extremity there was no anatomical variation observed in relation to the sciatic nerve. The sciatic nerve came out through the pelvis inferior to the lower border of piriformis. It descended downward along the back of thigh and terminated at the superior angle of popliteal fossa.



Figure 1: Shows unilateral high division of sciatic nerve in the right inferior extremity.

PF – Piriformis Muscle

SC.NR – Sciatic Nerve

TB.NR - Tibial Nerve

CP.NR – Common Peroneal Nerve

DISCUSSION

The etiology is embryological. Embryologically, the nerves contributing to the lower limb form two plexuses (lumbar and sacral). Further the elements from each of these plexuses grow out into the limb and divide into dorsal and ventral components. The sciatic nerve is formed when the large dorsal component of the sacral plexus (common peroneal component) and the ventral component (tibial component) move downward close together. The two portions of the sciatic nerve develops separately in early embryonic stage, but to unify, both components are bound into single trunk by a common epineural connective tissue sheath. The point where common epineural connective tissue terminates, division of sciatic nerve into common peroneal nerve and tibial nerve is seen.^[2]

According to previous literatures, various anatomical variations were encountered in sciatic nerve, its course and distribution. Many authors have classified the high division of sciatic nerve. Beaton and Anson classification is as follows:^[3]

Type 1: Undivided nerve below undivided muscle

Type 2: Divisions of nerve between and below undivided muscle

Type 3: Divisions above and below undivided muscle

Type 4: Undivided nerve between heads

Type 5: Divisions between and above heads

Type 6: Undivided nerve above undivided muscle

The common site of sciatic nerve division into tibial and common peroneal component is at the junction of the middle and lower thirds of the thigh, near the apex of the popliteal fossa, but the division may occur at any level above or below this point.

Our case is a variation before the exit from gluteal region and falls under type 1 (undivided nerve below undivided muscle). Not many studies pertaining to unilateral high division of sciatic nerve is present and therefore it is a rare entity.

The existence of variable relationship between sciatic nerve, its components and piriformis muscle is of vital importance in health problems and novel clinical practice. The clinical manifestations of unilateral high division of

sciatic nerve ranges from sciatica, injury during deep intramuscular injections to entrapment neuropathy called piriformis syndrome and failed sciatic nerve block.

During sciatic nerve block, local anaesthetic medication is infiltrated into connective tissue sheath around the nerve. Complete sciatic nerve blockage will fail if the sciatic nerve is present as separately sheathed bundles upto the lower gluteal level. This condition if present, might lead to failure of sciatic nerve blocks even after multiple attempts.^[4]

Compression of sciatic nerve anywhere during its course may contribute to clinical conditions like sciatica and piriformis syndrome. Sciatica is directly due to a lumbar disc pressing on the sciatic nerve as it exits the intervertebral foramen in the lumbar spine.

Compression of sciatic nerve by the piriformis muscle leads to an entrapment neuropathy called piriformis syndrome. This syndrome occurs generally depending upon to the perforation of the piriformis muscle by the sciatic nerve, or as a postoperative complication.^[5] The management of piriformis syndrome includes analgesic, muscle relaxants, injection of local anesthetic agents, steroid (like methylprednisolone) or botulinum toxin into the piriformis muscle. To avoid blind injection in the gluteal region, the use of electromyography or computed tomography (CT) guided injection is preferred.^[6]

Wrong administration of intramuscular injections in the gluteal region is frequently encountered in clinical practice. The common peroneal component is most affected because its nerve fibers are present more superficially in the common sheath. Sciatic nerve injury may result in paralysis of hamstring muscles and all muscles below knee joint leading to 'foot drop'.^[7] For safe intramuscular injections in gluteal region, needle should be placed in the upper outer quadrant, superior to the line joining posterior superior iliac spine and superior border of greater trochanter.

CONCLUSION

A rare entity of unilateral higher division of sciatic nerve is a very important anatomical variation. Preoperative nerve imaging by MR, intra operative management and post operative care results is a complete and novel surgical treatment of gluteal region interventions. Gross and clinical knowledge of anatomical landmarks of gluteal region, sciatic nerve, its course, point of bifurcation, branches and distribution plays a vital role in clinical practice of neurology, orthopaedics, anesthesia, sports medicine and radiologists.

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