

Variations of Sciatic Nerve Its Exit in Relation to Piriformis Muscle in the Northern Ethiopia

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Abstract

Introduction- Sciatic nerve is thickest nerve, arising from L4–S3. It leaves the pelvis through the greater sciatic foramen distal to the Piriformis and descends lateral to the ischial tuberosity, then travels deep to the gluteus maximus and long head of biceps femoris. Anatomical variations of sciatic nerve can contribute to Piriformis Syndrome and sciatica. In addition to the position of the piriformis muscle there other causes for sciatica such as a posterior dislocation of the hip joint, herniated disc or pressure from the uterus during pregnancy may damage the nerve roots. A cross-sectional descriptive study conducted at the department of anatomy dissection laboratory, In Bahr dar, Gondar and Mekelle universities. Eighteen adult two female and sixteen male cadavers were dissected from the gluteal region. The total numbers of gluteal regions were 36 used for the study. The courses of sciatic nerve in relation to piriformis muscle were 3 types of course were observed as it comes out of the pelvic to the gluteal. 92% of the cases, sciatic nerve passes below Piriformis muscle.

Keywords: Sciatic nerve, Piriformis, Gluteal

Introduction

The sciatic nerve is the largest nerve in the body and is the main nerve from lumbosacral plexus composed of the tibial and common peroneal nerves. The sciatic nerve innervates muscles of the posterior compartment of the thigh (tibial component), which are largely extensors of the thigh at the hip and flexors of the leg at the knee. It also innervates all muscles below the knee, via its tibial and common fibular components (John et al 2000). Sciatic nerve is thickest nerve, arising from L4–S3. It leaves the pelvis through the greater sciatic foramen distal to the Piriformis and descends lateral to the ischial tuberosity, then travels deep to the gluteus maximus and long head of biceps femoris (Van De et al 2001, Wolfgang et al 2007, Marieb et al 2012). Medial to the sciatic nerve are the inferior gluteal nerve and vessels, the internal Pudendal vessels, and the Pudendal nerve (Moore et al 2012).

The Piriformis muscle is a muscle of the pelvic wall and of the gluteal region. It originates between the anterior sacral foramina on the anterolateral surface of the sacrum and passes laterally and inferiorly through the greater sciatic foramen. Piriformis is the landmark in the gluteal region for muscles, and neurovascular structures (John et al 2000, Van De et al 2001, Richard et al 2004).

Several studies declared that there are numerous variations both in the course and distribution of the sciatic nerve. The main variations were the relationship of sciatic nerve to Piriformis muscle and its level of bifurcation. The relationships between the Piriformis muscle and sciatic nerve have been classified by Beaton and Anson using a six category classification system (Beaton et al 1938). There are three types of variations characterized by the high division of the SN, and a fourth type that does not occur. These variations are classified as types I, II, III and IV (Beaton et al 1938).

In type I, the common peroneal nerve passes through the Piriformis muscle and the tibial nerve runs beneath its inferior margin. In type II variation, the common peroneal nerve extends over the superior margin and the tibial nerve passes under the inferior margin of Piriformis. In type III variation the SN does not divide and passes through Piriformis. Rarely, the undivided SN passes above Piriformis the type IV (Babinski et al 2003).

These anatomical variations of sciatic nerve can contribute to Piriformis Syndrome and sciatica (12). In addition to the position of the piriformis muscle there other causes for sciatica such as A posterior dislocation of the hip joint, herniated disc or pressure from the uterus during pregnancy may damage the nerve roots (Shailesh et al 2011, Vinayagam et al 2007).

Piriformis syndrome is an uncommon and often undiagnosed cause of buttock and leg pain. It may be caused by anatomic abnormalities of the Piriformis muscle and resulting in irritation of the sciatic nerve by the Piriformis muscle (Moura et al 1998, Benzon et al 2003). The abnormal passage of the sciatic nerve has been attributed to entrapment of sciatic nerve as it exits the greater sciatic notch in the gluteal region. Knowledge of such patterns

is also important for surgeons dealing with Piriformis syndrome which affects 5-6% of patients referred for the treatment of back and leg pain (Sharma et al 2010).

This will focus on the routes of exits of the sciatic nerve as this is important for surgeons as this is the area of frequent surgical intervention and deep intramuscular injections is provided in this region, failure in blockage of the sciatic nerve by anesthesia and injury during posterior hip operations (Babinski et al 2003, Guvencer et al 2009).

Methods and Materials

This was a cross-sectional descriptive study conducted at the department of anatomy dissection laboratory, In Bahr dar, Gondar and Mekelle universities which are 737 and 783 km from the capital city of Addis-Abeba. In this study only eighteen adult two female and sixteen male cadavers were dissected from the gluteal region to the transverse popliteal crease to expose the nerve and the piriformis muscle to determine the route of exit of the sciatic nerve. Ethical review and approval was sought from the research and ethics committee of the Gondar University and submitted to Mekelle University College of health sciences.

Data collection- eighteen unclaimed cadavers on the right and left side of the lower extremity were exposed by using scalp with surgical knife, blunt and toothed forceps, cutting scissors and tissue retractor. Those cadavers were embalmed according to conventional methods for anatomy practical session. And based on Cunningham's manual of dissection volume I. The Sciatic nerve and Piriformis were exposed after deep dissection of the gluteal region. Following proper exposure of those muscles and the nerve, the evidence of variation in the exit of Sciatic nerve in relation to Piriformis muscle was observed and recorded. The specimen was Photographed using Fuji film camera of 14 Mega pixels.

Results

In this study we observed a total number of 36 gluteal regions. Three types of course of sciatic nerve were observed as it comes out of the pelvic to the gluteal region in this study. These are

1. Undivided sciatic nerve passes below Piriformis muscle(fig-1)
2. Divided sciatic nerve passes above and below Piriformis muscle(fig-2)
3. Divided Sciatic nerve emerges below Piriformis muscle(fig-3)

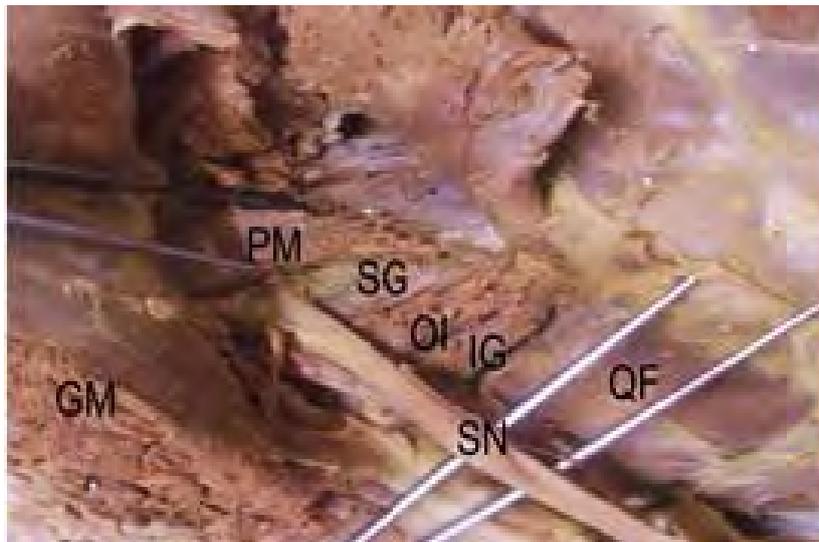


Figure 1: Undivided sciatic nerve passes below Piriformis muscle.



Figure 2: Divided sciatic nerve passes above and below Piriformis muscle.

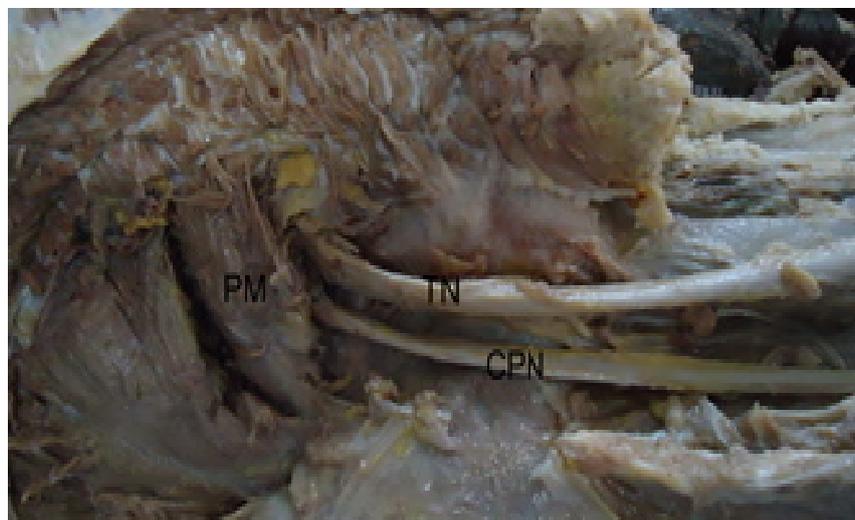


Figure 3: Divided Sciatic nerve emerges below Piriformis muscle.

In the present study, thirty-three (92%) extremities, undivided sciatic nerve passes below Piriformis muscle. In two (5.5%) extremities, divided sciatic nerve passes above and below Piriformis muscle and only one (2.8%) of the extremities showed divided sciatic nerve emerging below Piriformis muscle.

Discussion

In the present study 92% is observed with emergence of undivided sciatic nerve below Piriformis muscle. This result is in agrees with 90%, 91.8% observations reported by Beaton and Shailesh respectively (Beaton et al 1938, Shailesh et al 2011). However, lower percentages of sciatic nerve passing below Piriformis were observed by Pokorny et al(2006) 79%, Ewa et al(2002) 81%, Vicente et al (2007) in 85%, Guvencer et al(2009) 52% and JAJA et al(2011) 79.9%. In contrast, higher observation 100%, 96% was reported by Muthu Kumar et al (2011) and Ugrenovic et al (2005).

In this study 5.5% of type B1 sciatic nerve is divided in the pelvis and its two divisions come out below Piriformis muscle. This result is similar with 5.8%, 4.4%, 6% observations reported by Shailesh et al, Pokorny et al(2006), and Ewa et al(2002).

Type B3 Sciatic nerve is divided in the pelvis and its two divisions come out differently. The tibial nerve passing above Piriformis muscle while the Common Peroneal nerve comes out below Piriformis as observed in 2.8% in the present study. This result in agreement with 2.3%, 2.4% observations reported by Shailesh et al(2011) and JAJA et al(2011) respectively. In contrast the higher observation in 24% was reported by Guvencer et al(2009).

Conclusion

The findings of the study declare that in 92% of the cases, sciatic nerve passes below Piriformis muscle. Due to the sciatic nerve passage way; we have to consider during surgical procures and injection around this area or gluteal region

Limitation of the study

Unable to get more specimens

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