

A rare case of bilateral high division of sciatic Nerve with unilateral divided piriformis and abnormal passage of tibial nerve bellow the inferior gemillus muscle

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Abstract: We report a very rare case of bilateral high division of sciatic nerve on the either side's of 53 years old male Sudanese Cadaver with unilateral left divided piriformis muscle. Sciatic nerve on the either sides divided within the pelvis into two terminal branches: common fibular nerve and tibial nerve and entered into the gluteal region .On the left side there is divided piriformis ' with superior and inferior equal parts, common fibular nerve pass between these 2 heads of piriformis and tibial nerve pass bellow the divided piriformismuscle and then bellow the inferior gemillus muscle. On the right side both branches of sciatic nerve: common fibular nerve and tibial nerve pass bellow the undivided piriformis muscle. Normal piriformis muscle on the right. What is rare is not to find bilateral high division of sciatic nerve but is very rare to find different types of high division in the same Cadaver. To our knowledge there is no literature reporting this type of variation.

Keywords: sciatic nerve, Cadaver.

INTRODUCTION

Sciatic is Greek word derived from "Ischiadicus". The sciatic nerve is also known as the ischiadic nerve or ischiatic nerve, is a large nerve in humans and other animals [1]. Sciatic nerve (SN) is the thickest nerve in the body, arising from lumbosacral plexus. Its measures about 2cm width and 0,5cm thick at it are origin from plexus. Normally it emerges through the greater sciatic foramen, leaves pelvis and enters into gluteal region by passing below piriformis as a single nerve enveloped by a single epineuralsheath [2].

In the gluteal region medial to it superior gluteal vessels and nerve and inferior pudendal vessels and nerve [1]. Then enter the posterior aspect of the thigh and subsequently divided into two terminal branches: common fibular and tibial nerves usually at superior angle of popliteal fossa [4-6]. Sciatic nerve supply muscles of posterior aspect of the thigh, all muscles below the knee joint "muscles of leg and foot" and also sensory supply to whole leg and foot except anteriomedial aspect of tibia and medial boarder of foot. Also supply hip, knee and ankle joints [7]. Pain caused by a compression or irritation of the sciatic nerve is called sciatica. The sciatica symptoms include nerve pain, numbness, tingling, and weakness. It may include inability to walk depending upon the where the pressure of the sciatic nerve occurs [3].

CASE REPORT

During routine dissection of Cadaver for teaching purposes for undergraduate students in our institute , it was found that 53 years old male Sudanese Cadaver have a bilateral high division of sciatic nerve. On both sides the sciatic nerve divided into two terminal branches: common fibular nerve and tibial nerve within the pelvis, each one surrounded by separated epineural sheath, and there is unilateral divided piriformis on the left side ' piriformis muscle has two parts: (superior and inferior equal parts) .Normal piriformis muscle on the right side. On the left side the common fibular nerves pass between two heads of divided piri formis muscle then take it is normal way posterior to the superior gemillus muscle, obturatorinternus muscle, inferior gemillus, and quadratus femoris muscle and back of the thigh. Tibial nerve pass bellow the two heads of piriformis muscle and then posterior to superior gemillus muscle and obturatorinternus muscle and finally pass anterior to the inferior gemillus and emerge from its inferior border to complete it is normal way like common fibular nerve. On the right side both branches common fibular and tibial nerves presented as separate roots from the spinal cord, each one surrounded by its own epineural sheath, and entered into the gluteal region by passing bellow undivided piriformis and then to the back of the thigh.

All above variations make this case is a very rare case of bilateral high division of sciatic nerve and unilateral

divided piriformis. To our knowledge there is no literature

describing this type of variation.

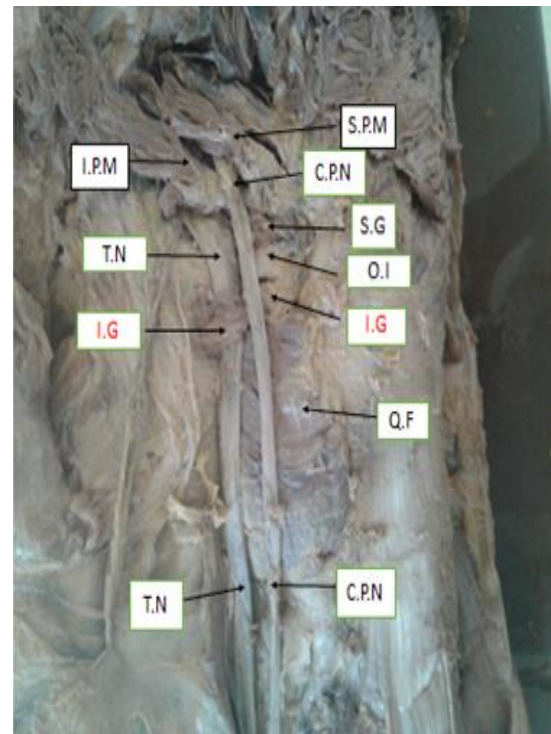
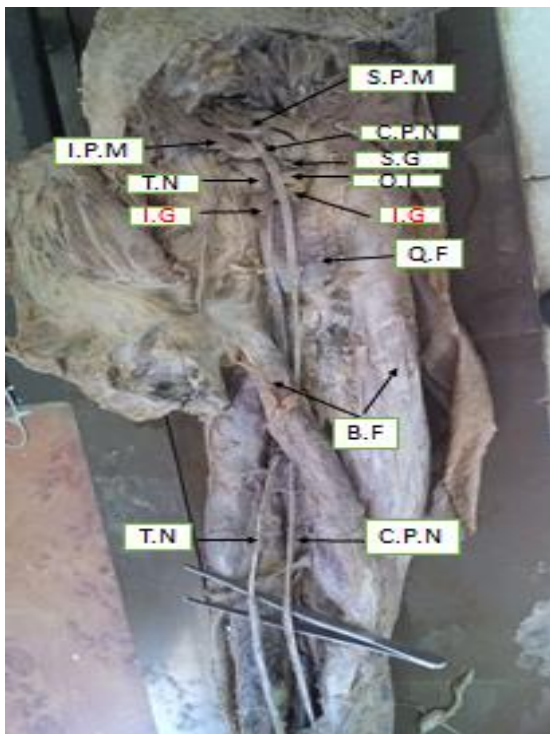


Fig (1) left gluteal region:
S.P.M: Superior Piriformis Muscle – **S.G.:** Superior Gemillus Muscle – **C.P.N:** Common Peroneal Nerve
I.P.N: Inferior Piriformis Muscle- **I.G:** Inferior Gemillus Muscle- **T.N.:** Tibial Nerve – **O.I:** Obturator Internus
– **Q.F:** Quadratus Femoris
B.F: biceps femoris muscle

Fig (2) left gluteal region:
S.P.M: Superior Piriformis Muscle – **S.G.:** Superior Gemillus Muscle – **C.P.N:** Common Peroneal Nerve
I.P.N: Inferior Piriformis Muscle- **I.G:** Inferior Gemillus Muscle- **T.N.:** Tibial Nerve – **O.I:** Obturator Internus
– **Q.F:** Quadratus Femoris

DISCUSSION

Sciatic nerve is a common nerve in the body that shows wide range of variations. These variations commonly termed in form of high division and it's relation to piriformis muscle, but termination and its course shows a lot of variations.

High division of sciatic nerve may result in sciatic nerve injury during deep intramuscular injection at gluteal region, during surgery for hip replacement by posterior approach and piriformis syndrome [8]. Piriformis syndrome is one of the causes of the non-disco genic sciatica, which occurs usually as a result of compression of sciatic nerve by abnormal piriformis like divided piriformis as in our case. There are different types of higher division of sciatic nerve usually bilateral and if unilateral other side will always remain normal [7].

The classifications of high division of sciatic nerve were attempted by large numbers of authors, but

all these classifications not suit for our case as it's not mention divided piriformis.

The best known classification is by Beaton and Anson's [9] as cited by Shailesh Patel *et al.*; [7]. Which classified all variations under 6 types as follows?

- Type 1: Undivided nerve bellows undivided muscle
- Type 2: Division of nerve between and Bellow undivided muscle
- Type 3: Division above and below undivided muscle
- Type 4: Undivided nerve between heads
- Type 5: Division between and above two heads
- Type 6: Undivided nerve above undivided muscle

According to this classification our case is could be type 2 for right side ,the left side is not belong to this classification as it doesn't mention common fibular nerve passing between two heads of

divided piriformis and tibial nerve below two heads of divided piriformismuscle. We need another classification or modification of above one to include nerves between the divided piriformis and below the inferior gemillus muscle. Classification is very important for surgeons, physicians and orthopaedicians as its help them in assessing the cause and site of compression of the Sciatic nerve [8].

Machado *et al.*; studied 100 gluteal regions but didn't find even a single divided piriformis [10]. Also Ugrenovic *et al.*; Studied 200 gluteal regions but didn't find even a single divided piriformis muscle [11]. A.D. Shewale studied 45 cadavers but didn't find a case of divided piriformis [12]. Shailish Patel *et al.*; studied 86 gluteal regions but didn't find a case of divided piriformis [7]. Sabnis *et al.*; studied 70 cadavers but didn't find a case of divided piriformis [13]. Mangistue Desalegn *et al.*; studied 36 gluteal ragions but didn't find a case of divided piriformis [6]. Yusuf *et al.*; reported a case of bilateral high division of sciatic nerve with unilateral left divided piriformis muscle, common fibular nerve pass between two heads and

tibial nerve below the divided piriformis [8], which is consistent with our case But in our case the tibial nerve pass below the inferior gemillus muscleand emerge from its inferior border. Demiryurek *et al.*; described a case of bilateral divided piriformis butour case is unilateral [14]. A case of bilateral high division of Sciatic nerve reported by Mas *et al.*; with tibial nerve passing under superior gemillus [15], but in our case thetibial nerve passing under the inferior gemillus and unilateral.PapadoPoulos et al mention that the incidence of piriformis syndrome due to abnormal piriformis muscle is six times higher in female than male[16] hich is inconsistent with our case as our case as it's a male. Jawish *et al.*; [17] found a single case of divided piriformis among 26 cases selected from 3550 cases complaining of sciatica.

Unilateral divided piriformis with (superior and inferior equal parts), bilateral high division of sciatic nerve, and abnormal passage of tibial nerve below the inferiorgemillus muscle, make our case is very unique and most interest among sciatic nerve variations.

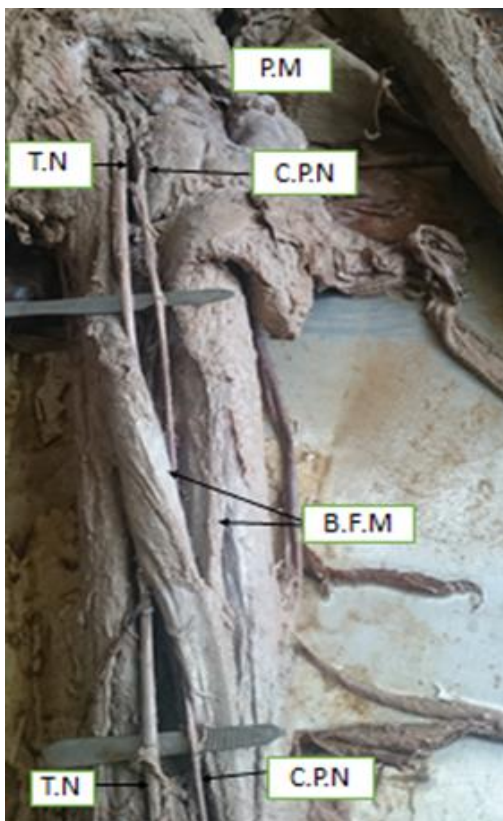


Fig 3: right gluteal region:
P.M: Piriformis Muscle – C.P.N: Common Peroneal Nerve
T.N.: Tibial Nerve

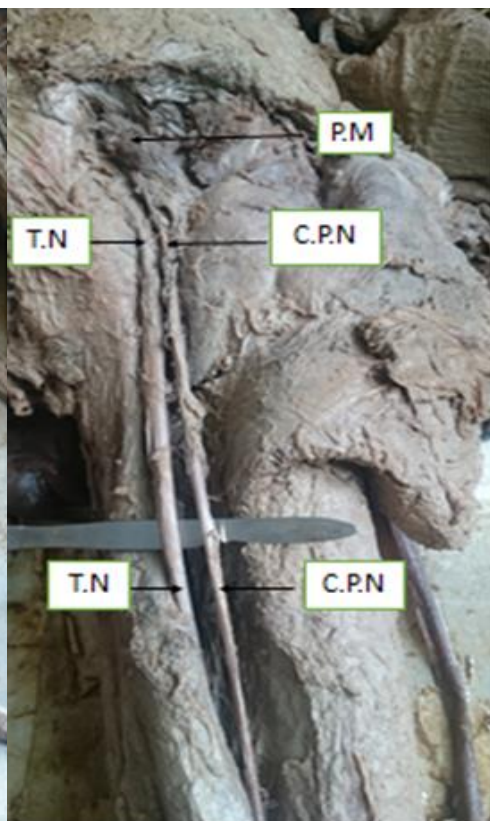


Fig 4: right gluteal region:
P.M: Piriformis Muscle – C.P.N: Common Peroneal Nerve
T.N.: Tibial Nerve
B.F.M: biceps femoris muscle

CONCLUSION

Variation of sciatic nerve in the gluteal region is very importance for surgeons and orthopaedicians as its area of common surgical manipulation. Anatomical knowledge about variations of sciatic nerve in exit from pelvis and division into two terminal branches is of great importance. Knowledge of these variations helps a surgeons and orthopaedicians to avoid injury to Sciatic nerve during hip and gluteal surgery. Abnormal course and division may cause neuropathy, non-disco genic sciatica and piriformis syndrome.

CONFLICT OF INTEREST

There is no conflict of interest in this study

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