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Rare Case of Bilateral High Division of Sciatic Nerve with Bilateral Bifid "Divided" Piriformis and Unusual Perforating Branches of Profunda Femoris Vessels Crossing Posterior to the Nerve

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Abstract: This is a very rare case of bilateral high division of sciatic nerve of a 49 years old male Sudanese cadaver, with bilateral divided piriformis muscle(superior larger and inferior smaller). In this case the Sciatic nerve is divided into Ttibial and Common fibular nerves within the pelvis, and comes out into gluteal region, on both sides common fibular nerve pass between two heads of divided piriformis and tibial nerve bellow the inferior piriformis. But what is very rare not bilateral high division of sciatic nerve but two nerves tibial nerve and common fibular nerve united again at the middle of quadratus femoris muscle bilaterally and continue as a common sciatic nerve and then divided a gain at the middle of popleteal fossa. Another very rare variation which is perforating Bramches of profunda femoris vessel crossing on the posterior surface of middle part of common sciatic nerve. To our knowledge there's no literature describing this kind of variation.
Keywords: piriformis muscle, Common fibular nerves, case report

INTRODUCTION

The Sciatic nerve is a largest branch of lumbosacral plexus , so it is a largest and a longest nerve in the body. After leaving the pelvis through greater sciatic foramine usually bellow piriformis and inter to the gluteal region . In the gluteal region medial to it there are superior gluteal vessels and nerve and inferior pudendal vessels and nerve [1].

Then inter the posterior aspect of the thigh and subsequently divided into two terminal branches; Common fibular and tibial nerves usually at superior angle of popleteal fossa [2-4].

Common fibular and tibial nerves have a both motor and sensory components. Sciatic nerve may divided at any site from it's origin from the plexus to the Lower part of the popleteal fossa [1].

Sciatic nerve supply muscles of posterior aspect of the thigh, all muscles below the knee joint "muscles of the 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 [5].

Also the Sciatic nerve has a wide range of variation in it's origin, exit from pelvic cavity, relation to piriformis, course and termination, sometimes it divided high in pelvis into two terminal branches and leave the pelvis through different ways.

High division of Sciatic nerve usually unilateral or bilateral mostly, leading to compression of nerve by nearby structures resulting in piriformis syndrome, coccygodynia and incomplete block during popleteal block anesthesia and have a clinical importance in etiology and pathogensis of non-discogenic sciatica [6].

CASE REPORT

During routine dissection of cadaver for teaching purpose in our institute, it was found that 49 years old male Sudanese cadaver have a bilateral high division of sciatic nerve, the division of sciatic nerve into two terminal branches; Tibial nerve and common fibular nerve within pelvic cavity bilaterally, and there is divided piriformis muscle bilaterally (piriformis muscle have two parts, superior which is larger and inferior which is a smaller) which is very unusual.

On both sides the common fibular nerve pass between two heads "parts" of piriformis muscle and

tibial nerve bellow divided piriformis muscle, then this two banches united again at the middle of the quadratus femoris muscle and continue again as a single nerve " Sciatic nerve ", enclosed by epineural sheath and took a normal course of normal sciatic nerve on the posterior thigh then divided again at the middle of popleteal fossa into common fibular nerve and tibial nerve again which is very unusual

Another unusual variation in this case that the perforating branches of profunda femoris vessels cross on the posterior surface of nerve at the level of middle 1/3 of the thigh .

All above variations make this case is very rare case of bilateral high division of Sciatic nerve and bilateral divided piriformis muscle.

According to our knowledge there's no literature describing this type of variation.

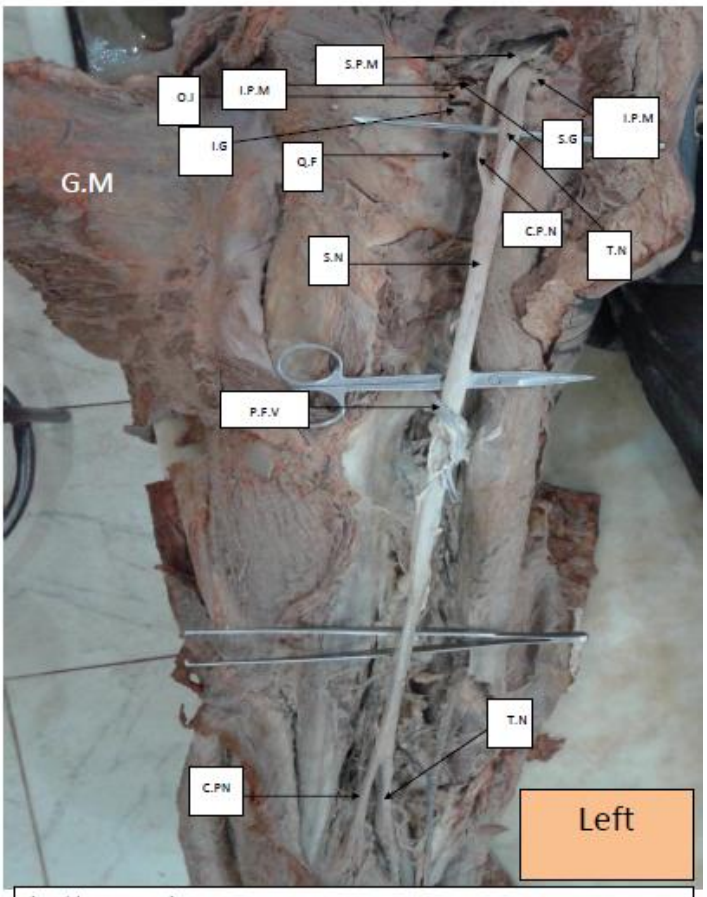

Figure (1) left gluteal region:
S.P.M: Superior Piriformis Muscle – S.G.: Superior Gemillus Muscle – C.P.N: Common Peroneal Nerve
I.P.N: Inferior Piriformis Muscle- I.G: Inferior Gemillus Muscle- T.N.: Tibial Nerve – O.I: Obturator Internus
S.N: Sciatic Nerve – Q.F: Quadratus Femoris

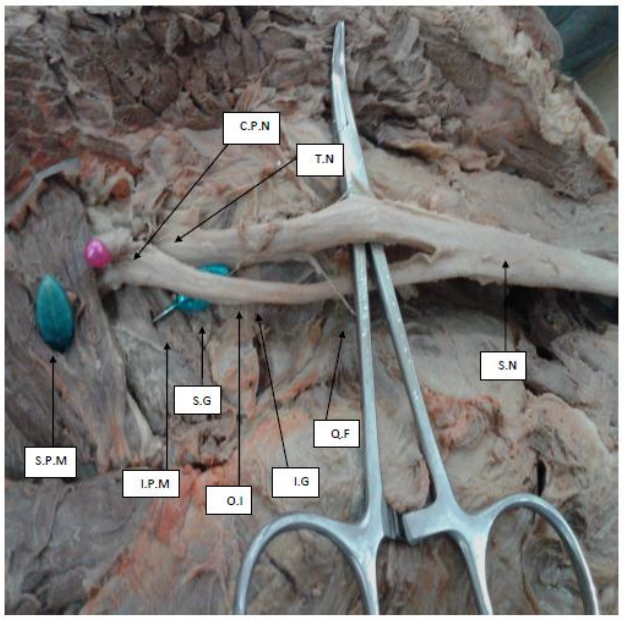

Figure (2) gluteal region:
S.P.M: Superior Piriformis Muscle – S.G.: Superior Gemillus Muscle – C.P.N: Common Peroneal Nerve
I.P.N: Inferior Piriformis Muscle- I.G: Inferior Gemillus Muscle- T.N.: Tibial Nerve – O.I: Obturator Internus
S.N: Sciatic Nerve – Q.F: Quadratus Femoris

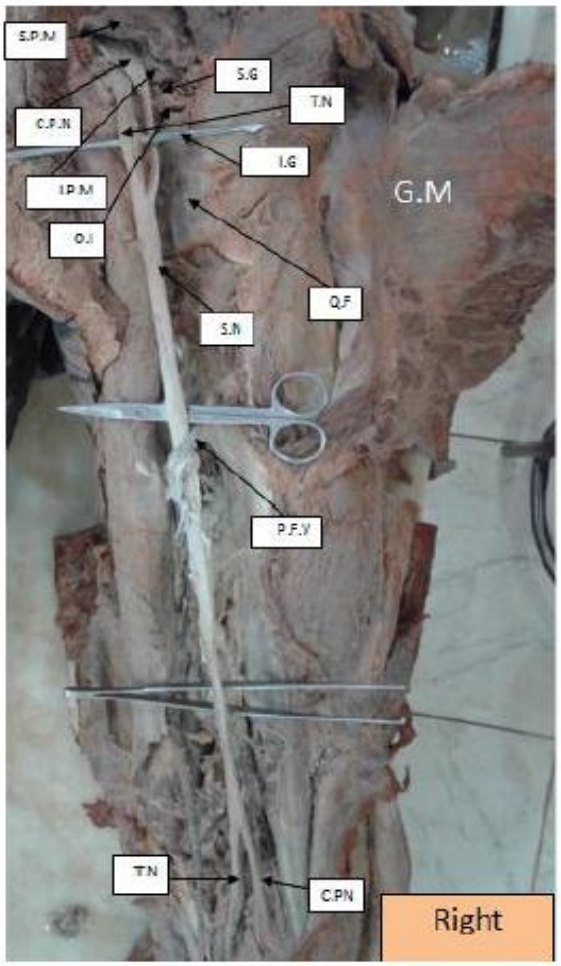

Figure (3) Right gluteal region:
S.P.M: Superior Piriformis Muscle – S.G: Superior Gemillus Muscle – C.P.N: Common Peroneal Nerve
I.P.N: Inferior Piriformis Muscle- I.G: Inferior Gemillus Muscle- T.N.: Tibial Nerve – O.I: Obturator Internus
S.N: Sciatic Nerve – Q.F: Quadratus Femoris

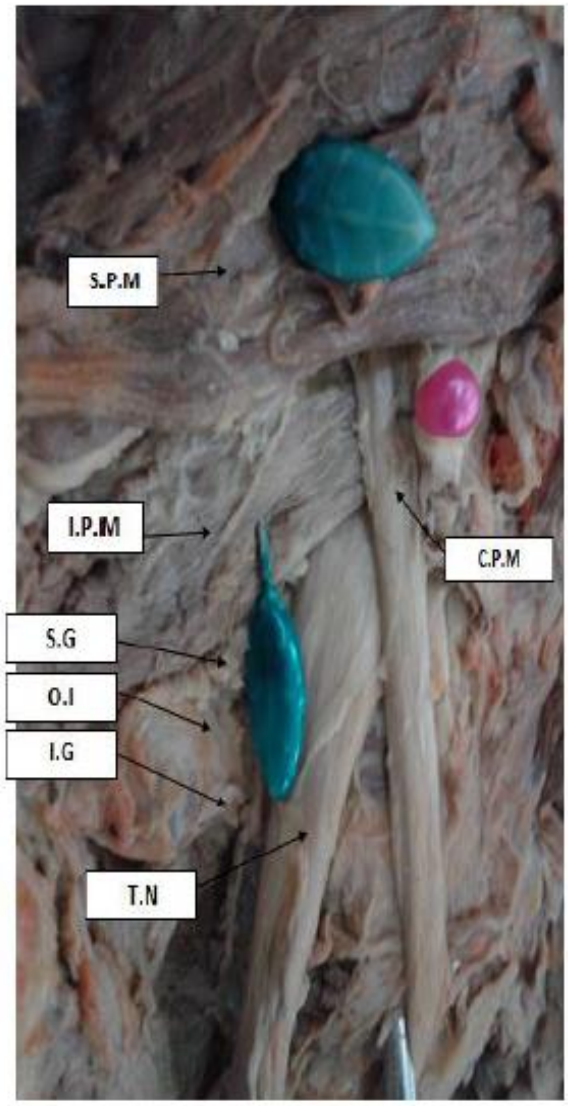

Figure (4) Gluteal region:
S.P.M: Superior Piriformis Muscle – S.G.: Superior Gemillus Muscle – C.P.N: Common Peroneal Nerve
I.P.N: Inferior Piriformis Muscle- I.G: Inferior Gemillus Muscle- T.N.: Tibial Nerve – O.I: Obturator Internus

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, but termination and it's course shows a lot of variations.

High division of sciatic nerve may result in sciatic nerve injury during deep intramuscular injection at glueteal region, during surgery for hip replacement by posterior approach and piriformis syndrome [7].

Pirifomis syndrome is one of the causes of the non-discogenic sciatica, which occurs usually as a result of compression of sciatic nerve by abnormal piriformis like divided piriformis as in our case, the type of variation may reflect the clinical presentation of piriformis syndrome for example; compression of undivided sciatic nerve between the two heads, common fibular nerve between, tibial nerve bellow or between heads may cause different clinical pictures [8].

There are different types of higher division of sciatic nerve usually bilateral and if unilateral other side will always remains normal [6].

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* [6]. Which classified all variations under 6 types as follows:

Type 1: Undivided nerve bellow undivided muscle
Type 2: Division of nerve between and Bellow undivided muscle

Type 3: Division above and bellow undivided muscle
Type 4: Undivided nerve between heads
Type 5: Division between and above two heads
Type 6: Undivided nerve above Undivided muscle

Our case is not belong to this classification as it doesn't mention common fibular nerve passing between two heads of divided piriformis.

We need another classification or modification of above one to include nerves between and bellow the divided piriformis.

Classification is very important for surgeons, physicians and orthopaedicians as it's help them in assessing the cause and site of compression of the Sciatic nerve [7].

Machado *et al*. studied 100 gluteal ragions but didn't find even asingle 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 piriforims [12]. Shailish Patel *et al*, studied 86 gluteal ragions but didn't find a case of divided piriforims [6].

Sabnis *et al*, studied 70 cadavers but didn't find a case of divided piriforims [13]. Mangistue Desalegn *et al* studied 36 gluteal ragions but didn't find a case of divided piriforims [5].

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 bellow the divided piriformis [7]. But in our case there's bilateral divided piriformis.

Demiryurek *et al* described a case of bilateral divided piriformis as in our case [14]. A case of bilateral high division of Sciatic nerve reported by Mas *et al* with tibial nerve passing under superior gemillus [15], unlike in our case where the common fibular nerve between two heads of divided piriformis. 8

Papado Poulos *et al* mention that the incidence of piriformis syndrome due to abnormal piriformis muscle is six times higher in female than mal [16] e which 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.

In our cases there's bilateral higher division sciatic nerve with bilateral divided piriformis muscle " with two heads", and common fibular nerve between two heads and tibial nerve bellow two heads then common fibular nerve and tibial nerve united again at the level of the middle of quadratus femoris to become a single nerve, and took a normal course of Sciatic nerve then divided again at the middle of popleteal fossa. According to our knowledge there's no literature reporting this type of variations.

What is a very rare in our case is that perforating branches of profunda femoris vessel crossing posterior surface of the midpoint of Sciatic nerve . This make our case is very rare , according to our knowledge there's no literature reporting this type of variations. Combination of all above bilateral divided piriformis and bilateral high division and unitation then division at popleteal fossa and perforating branches of profunda femoris vessel crossing posterior surface of the mid point of Sciatic nerve make our case is very unique and most interest among Sciatic nerve variation.

CONCLUSION

Anatomical knowledge about variations of sciatic nerve in exit from pelvis and division into two terminal branches is of great importance. Specially variation in gluteal region which is very importance for surgeons and orthopaedicians as it's area of common surgical manipulation. Knowledge of this variations help a surgeons and orthopaedicians to avoid injury to Sciatic nerve during hip and gluteal surgery. Abnormal course and division may cause neuropathy, non discogenic sciatica and piriformis syndrome.

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