

ANATOMICAL VARIATION OF THE SCIATIC NERVE IN RELATION WITH PIRIFORMIS: A CASE STUDY

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ABSTRACT

Variations in the anatomy of any body structure can be identified only during imaging investigations, surgical processes, autopsy, or dissections. These variations might play role in various pathologies and sometimes they do not cause any pathology in human beings. Variation of the Sciatic nerve about the Piriformis is already described for years in anatomical texts as Beaton and Anson classification system. This variation plays important role in pathology with Piriformis syndrome and Sciatica. Piriformis syndrome is a condition that resembles Sciatica and causes severe low backache due to the compression of the Sciatic nerve. In this study, we observed the type D relation of the Sciatic nerve and Piriformis in the right gluteal region during routine dissection. For the surgical interventions and diagnosis of diseases and to prevent any injury during surgeries, understanding different anatomical variations is very important and dissection is one of the different tools for this understanding.

Keywords: Sciatic Nerve, Piriformis Muscle, Anatomical Variation

INTRODUCTION

The sciatic nerve is the largest nerve of the human body, arising as the continuation of the upper band of sacral plexus from the ventral rami of L4-S3 which

measures the diameter of 2cm^[1]. This Sciatic nerve arises in the pelvis and emerges out most laterally in the gluteal region via the greater sciatic foramen

inferior to Piriformis muscle and descends between the greater trochanter and ischial tuberosity to the posterior of the thigh where it divides into tibial nerve and common peroneal nerve. The tibial nerve is derived from the ventral (preaxial) division of anterior rami and the Common Peroneal nerve is derived from the dorsal (postaxial) division of anterior rami [2]. The sciatic nerve does not innervate any structure in the gluteal region, it innervates the muscle of the posterior compartment, hip joint with capsule, tibial and common peroneal nerve innervated muscles of the leg and sole [2]. Piriformis is a pear-shaped muscle that originates from 3 digitations from the anterior surface of the sacrum, capsule of the Sacroiliac joint, and some part of the Sacrotuberous ligament. The muscle reaches the gluteal region by passing through the greater Sciatic foramen and gets inserted at the upper border of the greater trochanter as a round tendon Piriformis [1]. This muscle provides a reference point for the various structures passing through the greater sciatic foramen. That's why Piriformis is considered as the key muscle of the gluteal region [2]. Low backache is so common a symptom we get in different conditions with various pathologies. Sciatic nerve compression throughout its course is one of the major causes of low backache. Similarly, Piriformis syndrome is also a painful

condition that seems like Sciatica and is responsible for 6% of low backache [3,4]. This kind of nerve compression is due to any trauma, inflammation, degenerative changes of muscle, and any anatomical variation of the Piriformis muscle [5,6]. Commonly Sciatic nerve passes below to Piriformis through greater Sciatic foramen but in some cases, we found variation. Beaton and Anson were the first to classify the relation of Sciatic nerve and Piriformis along with the anatomical variation in 1937 under six different categories and many other researchers and surgeons use its classification to explain their findings.

The anatomical relationship between the Sciatic nerve and Piriformis muscle categorized by Beaton and Anson is as follows:

Type A – undivided nerve below the undivided muscle

Type B – divisions of the nerve between (common peroneal nerve) and below (tibial nerve) undivided muscle

Type C – divisions above (common peroneal nerve) and below (tibial nerve) undivided muscle.

Type D – undivided nerve between heads of the muscle

Type E – divisions between (tibial nerve) and above (common peroneal nerve) heads

Type F- undivided nerve above undivided muscle [7,8].

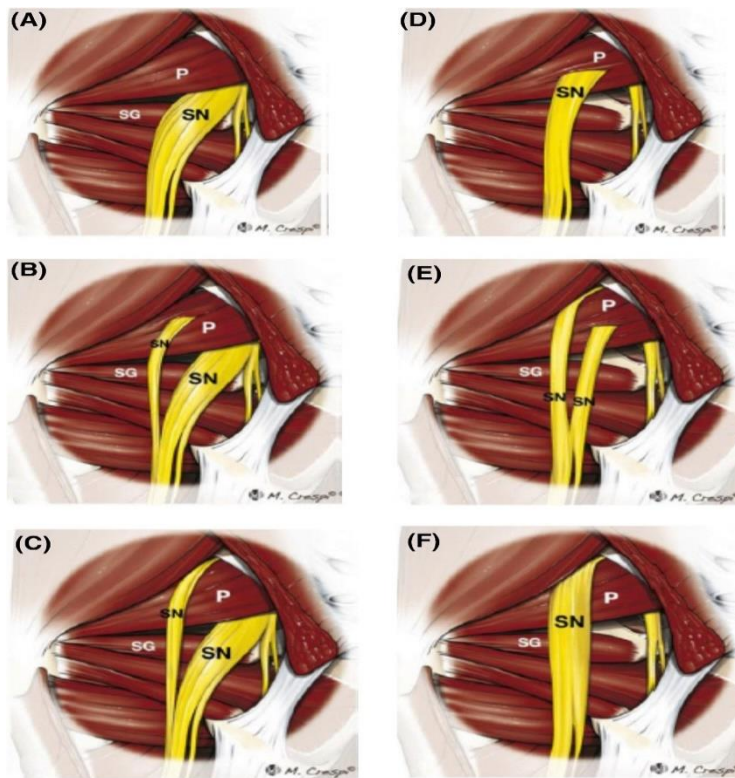


Figure 1 Anatomical variation in the relation between Sciatic nerve and Piriformis muscle as explained by Beaton and Anson. Diagram demonstrates six different variations in the relation between the Sciatic nerve and Piriformis muscle

- a. undivided nerve below undivided Piriformis muscle (most common)
 - b. divisions of the nerve between (common peroneal nerve) and below (tibial nerve) undivided Piriformis muscle
 - c. divisions above (common peroneal nerve) and below (tibial nerve) undivided muscle.
 - d. undivided nerve between the heads of the muscle
 - e. divisions between (tibial nerve) and above (common peroneal nerve) heads
 - f. undivided nerve above the undivided muscle
- (P – Piriformis muscle, SN – Sciatic nerve, SG – Superior Gemellus)

Method

The present study was conducted on an embalmed female cadaver aged about 69 yrs. in the Dept of Sharir Rachana, National Institute of Ayurveda, Jaipur. During the routine dissection of the gluteal region, we have separated the skin, superficial fascia, and deep fascia and retracted Gluteus Maximus and Gluteus Medius to expose Piriformis muscle and trace various vessels and nerves for its course on both the sides of gluteal regions. We found a variation in the relationship between the Sciatic nerve and Piriformis muscle in the right gluteal region, and it was carefully observed and photographed.

Result

In this study during routine dissection of a female cadaver aged about 69 yrs. we observed the atypical appearance of the Sciatic nerve, Piriformis, and their anatomical relationship in the right gluteal region resembling type D according to Beaton and Anson classification; undivided nerve pass between the heads of the muscle. However, in the left gluteal region type A presentation, the undivided nerve is below the undivided muscle. This is the most common and typical anatomical relationship between the Sciatic nerve and Piriformis muscle.

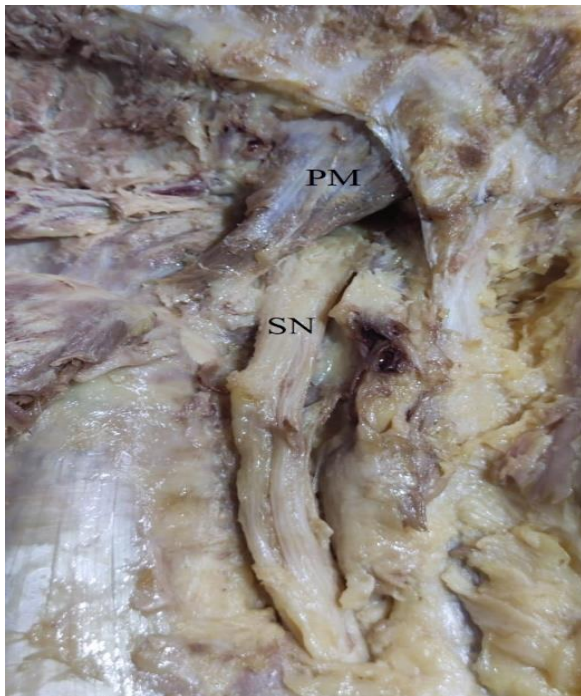


Figure 2: Left Gluteal region showing anatomical

Relation between Sciatic nerve Piriformis muscle variation in relation between Sciatic nerve & Piriformis (Type 1 presentation according to Beaton & Anson) muscle

DISCUSSION

Compression of Sciatic nerve due to Piriformis muscle in infra piriformis canal atypically painful neuromuscular causing condition like Sciatica resulting into chronic pain, tingling sensation and numbness in the gluteal region and along the pathway of Sciatic nerve in leg and foot^[9]. Piriformis syndrome seems to be the cause of Sciatica in 6-8% population while spinal degenerative disc disorders and spinal radiculopathies also cause Sciatica^[10]. The variation in the anatomical relationship between the Sciatic nerve, Piriformis muscle, and their variable relationship can lead to entrapment & compression of the nerve, resulting in Piriformis syndrome^[11]. For the differential diagnosis of Piriformis syndrome with other causes of Sciatica

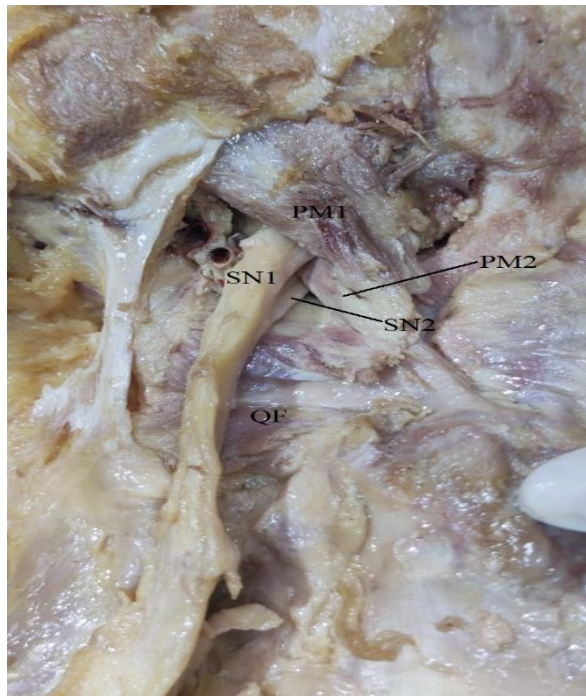


Figure 3: Right Gluteal region showing anatomical

(Type 4 presentation according to Beaton & Anson) (PM – Piriformis muscle, SN- Sciatic Nerve) (PM1 & PM2 - 2 divisions of Piriformis muscle, SN1 & SN2 – 2 divisions of Sciatic nerve, QF – Quadratus femoris)

FAIR (flexion-adduction-internal rotation) test & Freiberg test are conducted passively. It is found that pain reduces while performing these tests. This indicates the non-discogenic cause of Sciatica suggesting Piriformis syndrome^[12]. Cognizance of these anatomical variations is relevant both in diagnosis and treatment (surgery) of the gluteal region as if remain unknown this may cause injury or damage to the Sciatic nerve accidentally. Due to altered anatomy patients may suffer from pain while performing specific activities such as prolonged sitting, bike riding, and placing valet in the back pockets of men. Thus, knowledge of anatomical variations of the Piriformis muscle and Sciatic nerve is helpful in the proper perception of the pathology of the condition and also directed towards proper treatment whether it is surgery, injections, or exercise to relieve the patient from pain.

CONCLUSION

The learning of anatomical variations about Piriformis syndrome and the Sciatic nerve is important for medical practitioners as if remain unaware it may cause injury to the Sciatic nerve during surgical intervention. This case study furnishes more awareness about one of the causes of Sciatic nerve compression and explains the attempts of unsuccessful Sciatic nerve block while giving local anesthesia in the popliteal region.

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