CASE REPORTS

An unusual bifurcation of sciatic nerve deep to Piriformis: Case report with review of literature

Samaranayake UMJE, Mathangasinghe Y, Abarna K, Muthuthamby MM, Wetthasinghe TK

1Department of Anatomy, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka, 2Department of Physiology, Faculty of Medicine, Wayamba University of Sri Lanka

Introduction

Sciatic nerve, the thickest nerve in the body, is formed in the pelvis from the sacral plexus. It is comprised of both anterior and posterior divisions of fourth lumbar to third sacral spinal nerves [1]. Having left the pelvis through the greater sciatic foramen, it courses beneath the piriformis and enters the gluteal region. Then it travels over the gamelli, obturator internus and quadratus femoris and descends vertically midway between greater trochanter and ischial tuberosity [1].

During its course in the posterior compartment of the thigh, it divides into tibial and common peroneal nerves. This division is observed to occur usually a hands breath above the knee joint [1]. However, numerous variations have been reported with regard to its course and divisions. Clinical consequences such as entrapment syndromes and failure of regional nerve blocks are known to be associated with variant courses and divisions [2, 3]. Bilateral division of the sciatic nerve deep to the piriformis muscle and a variant course of its common peroneal branch seen on a cadaver is discussed.

Case presentation

Routine dissection was performed on a self-donated cadaver in the dissection laboratory of the Department of Anatomy, Faculty of Medicine, University of Colombo. The deceased was a 62-year-old man. The cadaver was preserved using Phenoxethanol as the main preservative. An incision was made along the iliac crest and extended along the dorsal midline in the gluteal region. Piriformis was exposed by dividing gluteus maximus and gluteus medius. It was observed that the sciatic nerve was divided into tibial and common peroneal branches within the true pelvis bilaterally (Figure 1). Having coursed deep to the piriformis, both tibial and common peroneal nerves emerged into the gluteal region inferior to the lower border of piriformis. Piriformis was undivided. Both nerves crossed superior and inferior gamelli, obturator internus and quadratus femoris as they coursed towards posterior thigh. No associated anomalies were found on the cadaver on subsequent dissections.

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Discussion

Sciatic nerve, the largest branch of the lumbosacral plexus demonstrates numerous variations in its anatomical course and has gained interest of many researchers. These dissimilarities in the course of nerve could occur with sciatic nerve dividing before or after exiting the pelvis (Table 1). In our cadaveric specimen we observed a division before the nerve exit the pelvis deep to the piriformis muscle. Sciatic nerve division commonly occurred after exiting the pelvis than within [4-7]. Guvencer et al., however observed in a 25 specimen study that the prevalence of intrapelvic and extrapelvic divisions of sciatic nerve was almost similar accounting for 48% and 52% respectively [8].

Furthermore, in our study we observed division of sciatic nerve into common peroneal and tibial branches. Although majority of the studies include bifurcation of the nerve similar to our findings, there were cases of trifurcations as well [4, 9, 10]. These reported trifurcations frequently were extrapelvic divisions [4, 9, 10]. In a study done by Anbumani et. al., four fifths of cadavers that had sciatic nerve variations were bilateral, while one fifth was unilateral [11]. In our dissection the variation was present bilaterally. In some instances the high divisions in sciatic nerve components rejoined in the mid-thigh [12] which was not observed in our case.

In its intrapelvic path sciatic nerve holds a neighboring relationship with piriformis. In 1937 Beaton and Anson's first described six ways of how the sciatic nerve can emerge in relation to piriformis muscle (Figure 2) [13]. These are: undivided nerve below undivided piriformis muscle (type A), division below and between the piriformis divisions (type B), divisions above and below the undivided piriformis (type C), undivided nerve between divided piriformis (type D), divisions above and between the piriformis divisions (type E) and undivided nerve above the undivided piriformis (type F) [13]. However, Beaton and Anson did not observe variation types E and F in their study.

Site at which the sciatic nerve divides near piriformis is surgically important when treating piriformis syndrome [2]. In majority of cases sciatic nerve followed a typical anatomical course or “a normal course” appearing undivided below undivided piriformis in 83.1% of individuals, while 16.9% had deviations from the said presentation [14]. Second commonest presentation was presence of one division through the piriformis and one component below the muscle [8, 13, 15]. Guvencer et. al., reported common peroneal nerve emerging above piriformis with tibial nerve emerging below piriformis in 8% out of 24% of high sciatic nerve divisions [8]. The various study findings in relation to Beaton and Anson classification is summarized in Table 2. According to these classifications, when there is a division of the sciatic nerve in the gluteal region, the common peroneal nerve usually pierces piriformis or emerges above the muscle to run superficial to the piriformis. Nevertheless, in our case we observed that both tibial and peroneal components divided deep to piriformis, and the common peroneal nerve continued to course deep to the muscle...
accompanying the tibial nerve, to emerge below the lower border of the piriformis. To our knowledge this anatomical variation is a very rare presentation and is a deviation from the Beaton and Anson's classification.

**Conclusion**

Bilateral division of the sciatic nerve deep to the piriformis muscle is usually associated with the peroneal nerve coursing superficial to the muscle. However, a rare variant course of the common peroneal branch deep to the muscle in a case of a sciatic nerve division in the gluteal region is reported in this case.

Dr Yasith Mathangasinghe, Lecturer, Faculty of Medicine, University of Colombo.
yasith@anat.cmb.ac.lk

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**References**


12. Aparna, G., *High division of sciatic nerve with an associated variation in the origin of superior and inferior...*


Tables

Table 1

<table>
<thead>
<tr>
<th>Name of researchers</th>
<th>Level of division</th>
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<tbody>
<tr>
<td></td>
<td>Before exiting pelvis</td>
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<tr>
<td>Lewis et al.,[16]</td>
<td>11.8% (12/102)</td>
</tr>
<tr>
<td>Guvencer et al[8]</td>
<td>48.0% (24/50)</td>
</tr>
<tr>
<td>Kotian et al.[17]</td>
<td>53.3% (32/60)</td>
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<tr>
<td>Pokomy D et al.[18]</td>
<td>20.9% (19/91)</td>
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Table 2: Anatomical variations associated with high division of sciatic nerve

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<tbody>
<tr>
<td>A – Undivided nerve below undivided piriformis</td>
<td>84.2%</td>
<td>89% (90/102)</td>
<td>88% (1329/1510)</td>
<td>79.1% (72/91)</td>
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</tr>
<tr>
<td>B – Divided nerve below and between piriformis divisions</td>
<td>11.7%</td>
<td>8.8% (9/102)</td>
<td>11% (166/1510)</td>
<td>14.3% (13/91)</td>
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<td>C – Divided nerve above and below undivided piriformis</td>
<td>3.3%</td>
<td>2.9% (3/102)</td>
<td>0.86% (13/1510)</td>
<td>4.4% (4/91)</td>
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<tr>
<td>D – Undivided nerve between divided piriformis</td>
<td>0.8%</td>
<td>0%</td>
<td>0.13% (2/1510)</td>
<td>2.2% (2/91)</td>
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<tr>
<td>E – Divided nerve above and between the piriformis divisions</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>F – Undivided nerve above the undivided piriformis</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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Figures

Figure 1: Cadaveric dissection showing the bifurcated sciatic nerve emerging below the piriformis.

Figure 2: Anatomical variations of division and course of the sciatic nerve with relation to piriformis. This classification was originally described by Beaton and Anson [13].