Rare Types of Relation Between the Sciatic Nerve and the Piriformis Muscle

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The relation of the sciatic nerve to the piriformis muscle has already been studied statistically by many workers such as Adachi, Koganei et al, Miura, Yamagishi, Igarashi, Beaton, Kushida, Hashimoto et al, Sugiyama, Kobata, Hayama and Outi. As well known in the statistical data reported previously by these workers on this subject, the relation of the sciatic nerve to the piriformis muscle can be classified into three types as follows: 1. The sciatic nerve from the pelvis passes through the infrapiriformis foramen just below the piriformis muscle. 2. The peroneal portion of the sciatic nerve goes through the piriformis. 3. The peroneal portion of the sciatic nerve from the pelvis passes through the suprapiriformis foramen above the upper border of the piriformis muscle. Beaton has suggested a probability that the sciatic nerve may pass out of the pelvic cavity through the suprapiriformis foramen above the upper border of the piriformis. With regard to cases in Item 3, 38 cases have been reported to date, as shown in the table. We had an opportunity to observe 5 cases of the third type in three cadavers in the dissecting-room materials. We hope that this paper will contribute to the clarification of the problem concerning the relation between the sciatic nerve and the piriformis muscle.

Table 1. The data reported by previous workers on the relation of the sciatic nerve to the piriformis muscle, on which the common peroneal nerve passes out of the pelvis through the suprapiriformis foramen.

Adachi (1900)	2 Cases
Koganei et al (1903)	1 Case
Adachi (1910)	6 Cases
Miura (1932)	1 Case
Yamagishi (1934)	1 Case
Igarashi (1935)	3 Cases
Beaton et al (1937)	4 Cases
Kushida (1940)	1 Case
Hashimoto et al (1942)	14 Cases
Sugiyama (1943)	2 Cases
Kobata (1949)	2 Cases
Outi (1951)	1 Case
Total	38 Cases

Observations

Figs. 1, 3, 5, 7 and 9 are diagrams showing a dissection of the nerves in the gluteal region. Especially, Figs. 1, 3 and Figs. 5, 7 show the bilateral existence of the cases. As shown in Figs. 1, 3, 5, 7 and 9, in all cases the common peroneal nerve, the superior gluteal nerve and the inferior gluteal nerve pass out of the pelvis through the great sciatic foramen above the upper border of the piriformis muscle. The posterior femoral cutaneous nerve passes out of the pelvis through the great sciatic foramen partly above the upper border of the piriformis and partly below the piriformis muscle.

In Figs. 2, 4, 6, 8 and 10, the relation between the sacral plexus and the piriformis muscle is diagrammatically shown from the ventral side of the pelvis, as illustrated in Figs. 1, 3, 5, 7 and 9.

As clear in these figures, the common peroneal nerve derives from the dorsal branches of the anterior primary rami of the fourth and fifth lumbar and the first and second sacral nerves; (in Figs. 6 and 8, of the fifth lumbar and the first and second sacral nerves).

The superior gluteal nerve receives fibers from the dorsal divisions of the fourth and fifth lumbar and the first sacral nerves; (in Fig. 6, of the fifth lumbar and the first sacral nerves, and in Fig. 8, of the fourth and fifth lumbar and the first and second

sacral nerves).

The inferior gluteal nerve is formed by fibers from the dorsal divisions of the fifth lumbar and the first and second sacral nerves.

The dorsal portion of the posterior femoral cutaneous nerve stems from the dorsal branches of the anterior primary rami of the first and second sacral nerves; (in Fig. 8, of the second sacral nerve only), and the ventral portion of the posterior femoral cutaneous nerve receives fibers from the ventral branches of the anterior primary rami of the second and third sacral nerves; (in Figs. 6 and 8, of the second, third and fourth sacral nerves).

The tibial nerve is formed by fibers from the anterior divisions of the fourth and fifth lumbar and the first, second and third sacral nerves; and Figs. 6 and 8 show that the nerve is organized by fibers from the fifth lumbar and the first, second, third and fourth sacral nerves.

As can be seen in these figures, the nerves stemming from the dorsal divisions of the sacral plexus pass behind the piriformis muscle through the suprapiriformis foramen, and the nerves from the ventral divisions of the sacral plexus run over the ventral surface of the piriformis muscle and pass out of the pelvis at the lower border of the piriformis.

In our cases, the piriformis muscle arises from the front of the sacrum between the second and the fourth anterior sacral foraminae, separating the sacral plexus into the derivatives of the ventral and dorsal divisions of the nerves.

Recently, Outi studied this subject and stated, that in the cases where the common peroneal nerve leaves the pelvic cavity by perforating the piriformis, the other fibers from the dorsal divisions of the sacral plexus also pass out of the pelvis by piercing the piriformis.

Judging from our observations and Outi's communications, it is highly probable, that the relation of the branches of the sacral plexus to the piriformis is similar to that of the branches of the lumbar plexus to the psoas muscle, and the fibers from the dorsal divisions which form the sacral plexus either perforate the piriformis or pass above the upper border of the piriformis. But contrary to the suggestion of Beaton et al the fibers from the ventral divisions which form the plexus will not pass out of the pelvis by running through the great sciatic foramen above the upper border of the piriformis.

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Fig. 1. A dissection of the nerves in the gluteal region. Dorsal view of the left side. 65-year old male.

Fig. 2. A diagram showing the relation of the sacral plexus to the piriformis. The derivatives of the ventral divisions of the nerves are blackened, those of the dorsal divisions are shaded with dots. Ventral view of the sacral plexus depicted in Figure 1.

Fig. 3. A dissection of the nerves in the gluteal region. Dorsal view of the right side. 65-year old male.

Fig. 4. A diagram showing the relation of the sacral plexus to the piriformis. The derivatives of the ventral divisions of the nerves are blackened, those of the dorsal divisions are shaded with dots. Ventral view of the sacral plexus depicted in Figure 3.

Fig. 5. A dissection of the nerves in the gluteal region. The gluteal muscles removed. Dorsal view of the left side. 52-year old male.

Fig. 6. Diagram of the relation of the sacral plexus to the piriformis. The ventral divisions and the nerves are blackened, the dorsal divisions and the nerves are shaded with dots. Ventral view of the sacral plexus depicted in Figure 5.

Fig. 7. A dissection of the nerves in the gluteal region. The gluteal muscles removed. 52-year-old male. Dorsal view of the right side.

Fig. 8. Diagram of the relation of the sacral plexus to the piriformis. The ventral divisions and the nerves are blackened, the dorsal divisions and the nerves are shaded with dots. Ventral view of the plexus depicted in Figure 7.

Fig. 9. A dissection of the nerves in the gluteal region. The gluteal muscles cut off. Dorsal view of the right side. About 35-year old female.

Fig. 10. The derivatives of the ventral divisions of the nerves are blackened, those of the dorsal divisions are shaded with dots. Ventral view of the case depicted in Figure 9.