Additional Nerve Supply of Gluteus Maximus by Common Peroneal Nerve

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ABSTRACT

During routine dissection, variation of sciatic nerve was discovered bilaterally. Sciatic nerve emerged from the pelvis through greater sciatic foramen. On both sides, it divided into common peroneal nerve and tibial nerve. Common peroneal nerve pierced the piriformis muscle with resultant splitting of the muscle into two parts. Tibial nerve emerged at the lower border of muscle, thus two divisions of sciatic nerve were separated by the inferior belly of the piriformis muscle. On the left side common peroneal nerve from its medial edge gave branches which innervated gluteus maximus muscle from its deeper aspect. On the right side both common peroneal nerve and tibial nerve gave branches to gluteus maximus muscle. In addition, bilaterally gluteus maximus was innervated by inferior gluteal nerve.

KEY WORDS: CPN (common peroneal nerve), gluteus maximus muscle, innervation, SN (sciatic nerve), TN (tibial nerve)

INTRODUCTION:

Sciatic nerve enters the gluteal region from the pelvic cavity by passing inferior to the piriformis muscle. The nerve then divides into tibial (TN) and the common peroneal nerves (CPN) in the lower part of the back of the thigh. Gluteus maximus muscle is normally innervated by the inferior gluteal nerve which is the sole motor innervation of the muscle.

CASE REPORT:

During routine cadaveric dissection of gluteal region variation of SN was discovered bilaterally in a 72-year-old embalmed male cadaver. Gluteus muscle was cut vertically in its middle and then the muscle was reflected medially and laterally.

LEFT SIDE (FIGURE 1):

Sciatic nerve emerged from the pelvis as a compact bundle through infra-piriformic compartment of the greater sciatic foramen. After running a short course of 0.5cm, it divided into thinner CPN and thicker TN. The CPN pierced the piriformis muscle from its deeper surface with resultant splitting of the muscle belly into two parts. Tibial nerve descended deep to the piriformis muscle and emerged at its lower border; the two divisions of common peroneal were separated by the inferior belly of the piriformis muscle. Another feature observed was that the CPN from its medial edge gave a branch which further divided into three sub branches which innervated gluteus maximus muscle from its deeper aspect. This nerve supplied more than upper two third of the muscle. These branches were not accompanied by any vessels. Inferior gluteal nerve left the pelvic cavity in a typical manner accompanied by inferior gluteal vessels below the piriforms and supplied nearly less than lower one third of the gluteus maximus muscle. Inferior gluteal nerve was thinner than the branches of CPN supplying gluteus maximus.

RIGHT SIDE (FIGURE 2):

Like the left side, immediately after exit from greater sciatic foramen, SN showed early division in the gluteal region. Common peroneal nerve pierced the piriformis muscle and divided the latter into two parts and the TN descended deep to piriformis. The
CPN gave two branches which were supplying the maximus muscle. Tibial nerve also gave two branches which too innervated the gluteus maximus muscle. Inferior gluteal nerve was supplying the lower one fourth of the muscle.

Figure 1: Left dissected gluteal region showing CPN emerging through the substance of the piriformis with resultant splitting of the muscle. TN descending deep to piriformis. CPN giving branches to gluteus maximus. Inferior gluteal nerve giving branches to lower part of gluteus maximus.

Figure 2: Right dissected gluteal region showing CPN emerging through the substance of the piriformis with resultant splitting of the muscle. TN descending deep to piriformis. CPN giving branches to gluteus maximus. TN giving two branches to gluteus maximus. Inferior gluteal nerve giving branches to lower part of gluteus maximus.

Abbreviations used CPN - common peroneal nerve; TN - tibial nerve; IGN - inferior gluteal nerve; GM - gluteus maximus; PM - piriformis muscle; Br 1 - branches; Vs - vessels; SGN - superior gluteal nerve.
gluteus maximus muscle. Tibial nerve also gave two branches which innervated the gluteus maximus muscle.

Inferior gluteal nerve was supplying lower one fourth of the muscle. No muscular branches of CPN and TN were accompanied by any vessel.

DISCUSSION:

Many variants of relationships of Sciatic nerve (SN) with the piriformis have been described in the literature. Incidence passage of CPN through the piriformis muscle and of exit of TN at the inferior margin of the muscle have been reported to be 12-20%. The unusual feature of present case is innervation of gluteus maximus muscle by CPN and TN. Couple of articles, published recently have mentioned such variation. Bhattacharya et al reported a case of early division of the left SN in the pelvis and passage of CPN between two piriformis muscles but unlike our case two divisions of SN reunited into a single trunk in the gluteal region and abnormality of CPN emerged between two heads of piriformis to supply gluteus maximus.. Sumalatha et al found a case, with innervations of gluteus muscle from both TN and CPN parts of SN but unlike our case it was marked by the absence of inferior gluteal nerve. Unlike these two cases, we found the variations bilaterally. Common feature in all these cases of atypical innervations of gluteus maximus by CPN is the early division of Sciatic nerve and passage of Common peroneal nerve through the piriformis muscle.

Many authors[3-7] observed that the CPN palsy, although rare, is a serious complication of total hip arthroplasty which can cause permanent functional impairment and disability. Laceration, ischemia, compression, traction, denaturation due to heat, and a combination of these are the mechanisms responsible for neurological injury. In such cases of innervations of gluteus maximus by CPN, besides the typical features of CPN injury, weakness of gluteus maximus muscle an important antigravity muscle will further add to disability. Person will find difficulty in standing up from sitting posture. In children infra gluteal intramuscular drug injection is one of causes of SN injury.[8] Such cases may present with additional features of gluteus maximus muscle weakness. In literature there is no mention of gluteus muscle weakness or paralysis following injury of CPN in the gluteal region. It seems innervation of this muscle by CPN is quite rare.

Another possible consequence of such anomaly is compression of SN or its part by piriformis muscle leading to piriformis syndrome. Compression by piriformis muscle may arise due to its spasms resulting from overuse especially in persons involved in sports or physical exercise that require excessive use of gluteal muscles, injury or hip problems thus triggering pressure on the CPN with resultant leg pain or numbness. Identification of the additional bellies of piriformis is necessary for adequate decompression of sciatic nerve in such cases. Tenotomy of the piriformis muscle with such unrecognized cases of CPN passage through the piriformis muscle may result in CPN damage.[9,10] Posterior approach to hip joint sometimes piriformis muscle needed to be divided.

In such cases knowledge of such variations would prevent inadvertent injury to the nerve.

REFERENCES:

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