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A RARE ANATOMICAL VARIATION IN THE ORIGIN AND DISTRIBUTION OF POSTERIOR CUTANEOUS NERVE OF THIGH

Clinical Anatomy

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ABSTRACT

Background: The posterior cutaneous nerve of the thigh (PCNT) arises independently from the sacral plexus (S1-S3). It supplies sensory innervation to the posterior region of the thigh and the gluteal region and the upper part of the centre of the calf. Variations related to it are reported minimally in literature. **Case Presentation:** During routine dissection classes of Anatomy, we found an unusual origin of PCNT. It was arising from sciatic nerve as a trifurcation along with the common peroneal nerve (CPN) and the tibial nerve (TN) at the superior angle of the popliteal fossa. The thickness of PCNT is less than the CPN and the TN. Running laterally over the biceps femoris muscle, at the level of the knee joint, it is divided into multiple branches, all of them being cutaneous and supplying the upper 1/3rd of midcalf. The sural nerve and the sural communicating nerve were normal in their origin and distribution. We could not observe PCNT in the gluteal region emerging from the greater sciatic foramen, travelling below the piriformis along with inferior gluteal vessels while being medial to the sciatic nerve. **Conclusion:** The knowledge of the cutaneous supply and its variation is important for all clinician, like- physician, surgeon, anaesthesiologist etc. These variations are considerable because most of the times, they are falsely diagnosed. This case report helps to comprehend the skills useful for nerve grafting, imaging techniques that improve early diagnosis and recovery of the same.

KEYWORDS

Posterior Cutaneous Nerve of Thigh, Sciatic Nerve, Piriformis

INTRODUCTION

Gluteal region with an abundance of neurovascular structure has various motor and sensory supply. Piriformis muscle, having direct relation to the nerves and vessels in its upper and lower border, is considered as the key muscle of this area. Among them, posterior cutaneous nerve of thigh (PCNT) that arises from the sacral plexus of ventral rami of S1-S3[1], leaves pelvis through the greater sciatic foramen, below the piriformis muscle. It runs medial to the sciatic nerve, passing inferior to the gluteus maximus. It descends and reaches the posterior region of the thigh to lie superficially on the biceps femoris[2]. It then reaches the upper part of the popliteal fossa, piercing the deep fascia in the middle of the fossa. It supplies the back of the thigh, lower posterior quadrant of thigh and terminates after piercing, to supply the upper 1/3rd of the back of the calf[3].

We reported variation in the origin of PCNT that will be useful in further intervention and analysing the applied aspect of the same.

Figure 1.1 : A Cadaveric Picture of the Back of the Gluteal and Lower Limb Region

Case Report

We observed an anomalous origin of PCNT in the left lower extremity of a 68-year-old female cadaver at the Department of Anatomy, Shri Shankaracharya Institute of Medical Sciences, Bhilai, Chattisgarh. During routine dissection classes of the back of the thigh for MBBS first-year students, an anatomical variation was found in the left lower limb. The PCNT was not found below the level of piriformis along with the other structures. However, when the sciatic nerve was followed, just above the superior angle of the popliteal fossa, a nerve PCNT was found to arise. It had considerable thickening along with the common peroneal nerve (CPN) and tibial nerve (TN). Then, it travelled over the lower part of the biceps femoris and pierced the fascia to provide various cutaneous branches. The remaining nerves like sural nerve, sural communicating nerve were normal in their origin and distribution. The branches of PCNT were cutaneous and supplied the upper half of the middle of the calf. However, we are unable to comment on the cutaneous branches on the back of the thigh. The finding was documented photographically. On the right lower limb, all nerves were normal anatomically.

DISCUSSION

Standard anatomy texts have shown the origin of the PCNT from the sacral plexus (S1-S3 nerve roots). In this case, we find that the PCNT arises from the sciatic nerve just proximal to the popliteal fossa. Such variations are rarely reported in literature. Bansal et al. (2024) rightly noted that such cases may be underreported because of the limited focus on the posterior thigh during routine cadaveric dissection.

However, such deviations are of critical importance as the origin of the PCNT can affect the nerve's course therefore altering its branching. This may result in wrongly diagnosed injuries.

Noted in the work of Murinova et al. (2016)[7], anatomical variations like these might help us understand the pain in the region of the posterior thigh, which yet has been a debatable topic.

During the development of an embryo, the peripheral nerves start their formation around the 4th to 6th week of the gestation period. The sciatic nerve and the PCNT are formed as axonal projections from the roots of the lumbosacral plexus[6]. Variation in the origin may have been due to the merging or migration of the axonal fibres. The axons forming the PCNT may have merged with the sciatic trunk during the development instead of separately branching out, as is being observed in this case.

Natsis et al. (2013) noted the importance of recognizing the variations in cutaneous nerves as it can bring about serious implications during surgical planning. Any entrapment of the nerve can be misdiagnosed resulting in ineffective treatments. Regional anaesthesia during lower limb surgery may be ineffective when the desired nerve is blocked but because of the variation in its normal course, it may not bring about the desired result.

Such variation of the posterior cutaneous nerve of the thigh is rare and no other cases have been so far reported to support the origin of this

nerve from the sciatic nerve. However, a case report found in Rio de Janeiro, Brazil[4] stated that the posterior cutaneous nerve of the thigh was found to be anastomose with the sciatic nerve. The sciatic nerve was found to anastomose with the posterior cutaneous nerve of the thigh below the piriformis muscle.

Another study done in Punjab[5], found the posterior cutaneous nerve of thigh emerging from three roots, the third emerging from the nerve to obturator internus.

Thus, such variations, once proved with further cadaveric dissections, need to be implemented as they are important for clinical anatomical studies.

Clinical Implications

When these variations are regarded and thoroughly studied, we see a better efficiency of the anaesthesia given. Ignoring these variations can lead to the failure in blockage of PCNT resulting in incomplete analgesia.

Patients coming with posterior thigh pain may be misdiagnosed if the variations in the origin of the PCNT is not considered.

As the PCNT is the branch of the common peroneal nerve in this case, surgeons can minimize errors when performing lower limb surgeries.

Thus, documenting such variations can be helpful for further research and better anatomical understanding.

CONCLUSION

Thus, this case report highlights anatomical variation where the posterior cutaneous nerve of the thigh was found to be a branch of the sciatic nerve. This variation can imply clinical aspects as mentioned above.

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