Surgical and anatomical landmarks for the perineal branch of the posterior femoral cutaneous nerve: implications in perineal pain syndromes

Laboratory investigation

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Object. The perineal branch of the posterior femoral cutaneous nerve (PBPFCN) has received little attention in the literature. Because perineal pain syndromes can be disabling and pudendal nerve surgical decompression/block is often not efficacious, an anatomical study of this cutaneous nerve of the perineum seemed warranted.

Methods. The authors dissected 20 adult cadavers (40 sides) to identify the branching pattern and landmarks for the PBPFCN.

Results. This branch arose directly from the posterior femoral cutaneous nerve in 55% of sides and from the inferior cluneal nerve in 30% of sides. It was absent in 15% of sides. On average, the nerve coursed 4 cm inferior to the termination of the sacrotuberous ligament onto the ischial tuberosity. No PBPFCN was found to pierce the sacrotuberous ligament. The PBPFCN provided 2–3 branches to the medial thigh that continued on to the scrotum and labia major. In general, 2 small ascending branches were identified. In males, one ascending branch traveled inferior to the corpora cavernosum and anterior to the spermatic cord to cross the midline. The other ascending branch traveled to skin at the junction of the perineum and adductor tendon. A single descending branch, approximately 2 mm in diameter, traveled to the inferior scrotum anterior to the testicle in the male specimens and the lower labia majora in the female specimens. Communications between the PBPFCN and the perineal branch of the pudendal nerve were common.

Conclusions. Entrapment of the PBPFCN may be the cause of some forms of the perineal pain syndrome. Specific knowledge of the PBPFCN may assist surgeons in releasing and anesthetizing this cutaneous nerve of the perineum. (DOI: 10.3171/2008.11.JNS081248)

Key Words: anatomy • perineum • pain • thigh • skin • cadaver

NEUROSURGEONS are often confronted with the need to treat various pain syndromes including carpal tunnel syndrome, meralgia paresthetica, and greater occipital nerve entrapment. Perineal pain syndrome may fall into this category and, although rare, can be very disabling. Therefore, for effective treatment, knowledge of the structures that are potentially entrapped in perineal pain syndrome is necessary.

The perineum is separated from the pelvic cavity by the pelvic diaphragm and is bordered by the pubic sym-

Abbreviations used in this paper: PFCN = posterior femoral cutaneous nerve; PBPFCN = perineal branch of the PFCN.
Perineal innervation

Entrapment of the pudendal nerve. The pudendal nerve also consists of a perineal branch and the dorsal nerve of the penis/clitoris.

The PFCN arises from the ventral rami of S1–S3/S4 and consists exclusively of cutaneous nerve fibers and may exist from 1 to 3 nerves. After reaching the subgluteal area, the PFCN gives rise to the inferior cluneal and perineal branches. The inferior cluneal branch provides cutaneous innervation to the inferior buttock whereas the perineal branch innervates the lateral perineum, the proximal medial thigh, the posterolateral aspect of the scrotum/labium majus, and a portion of the penis/clitoris.

The anatomy and clinical significance of the perineal branch of the PFCN is poorly characterized in the medical and surgical literature. A mounting body of evidence has demonstrated the involvement of the pudendal nerve in pain syndromes involving the perineum but the role of the PBPFNC in pudendal neuralgia has yet to be elucidated. The pelvis and perineum are complex anatomical areas and a greater understanding of their regional anatomy has led to improvements in medical and surgical therapies for conditions affecting them. Because perineal pain can be life altering, additional anatomical knowledge of its innervation is warranted. To the best of our knowledge, no studies, to date, have been performed to localize the PBPFNC.

Methods

Twenty adult formalin-fixed cadavers (40 sides) in the prone position underwent dissection of the PFCN and its perineal branches. The cadavers were 55 to 98 years of age at death (mean 78 years). There were 11 male and 9 female specimens. The gluteus maximus was removed on all sides. No specimen had signs of previous surgical scars to the region dissected. Measurements of the nerve branches and distances between the nerve and surrounding landmarks were made with calipers and rulers (Figs. 1–3).

Results

The PBPFNC was absent on 6 sides (15%; 4 left and 2 right). When identified, this branch arose from the PFCN (22 sides [55%]) or inferior cluneal nerve (12 sides [30%]).

![Fig. 1. Schematic drawing illustrating the cutaneous innervation of the perineal region. n. = nerve.](image-url)
On average, the nerve coursed 4 cm (range 3–5.5 cm) inferior to the termination of the sacrotuberous ligament onto the ischial tuberosity (Figs. 1–3). No PBPFCN was found to pierce the sacrotuberous ligament.

The PBPFCN provided 2–3 branches to the medial thigh that continued on to the scrotum or labia majora. Of these, 2 were ascending branches approximately 1 mm in diameter. In males, one traveled inferior to the corpora cavernosum and anterior to the spermatic cord to cross the midline. In females, this branch traveled to the upper aspect of the labia majora but did not cross the midline. The more superior of these ascending branches traveled to the skin at the junction of the perineum and adductor longus tendon. A single descending branch (~ 2 mm in diameter) traveled to the inferior scrotum anterior to the testicle in males and to the lower labia majora in females. Communications between the PBPFCN and the perineal branch of the pudendal nerve were common, specifically between the ascending branches of this former nerve.

**Discussion**

The course of the pudendal nerve and the PBPFCN from the sacral plexus to the perineum has implications in terms of functional entrapment syndromes and iatrogenic injuries following invasive interventions. The pudendal nerve and the PFCN leave the pelvis through the greater sciatic foramen after passing through the infra-piriform canal. The pudendal nerve then passes around the ischial spine, between the sacrospinous and sacrotuberous ligaments, and enters the perineum through the pudendal canal. The PBPFCN, instead of following the pudendal nerve, passes inferior to the ischial tuberosity to gain access to the superficial fascia of the perineum. Goddard has stated that this nerve curves around the tuberosity and ascends in a direction parallel to the ramus of the ischium and pubic bone to the scrotum, where it communicates with the superficial perineal nerve and divides into an internal and external branch. The internal branch passes down upon the inner side of the testis to the scrotum and the external branch to its outer side, and both terminate in the skin of the under-border of the penis. Interestingly, in 1900, Cushing proposed that the pain felt following ligation of the veins at the lower pole of the testicle may be conveyed by branches of the PFCN. Interestingly, some surgeons have blocked the PFCN concomitantly with pudendal nerve blocks.

Anatomically, the PBPFCN (inferior pudendal nerve, pudendal longus inferior, or long pudendal nerve or nerve of Soemmering [1755–1830]) winds around the ischial tuberosity to perforate the deep layer of the superficial fascia an inch external to the tuberosity to pass forward and inward to the scrotum in males and integument of the inner and upper part of the thigh in females to the labia majora. This origin from the PFCN and then the distribution to the perineal skin has been highlighted in a case report by Iyer and Shields, who noted that an injection injury into the gluteal region resulted in right-sided thigh...
and scrotum pain. Arnoldussen and Korten\(^1\) reported on compression neuropathies against the ischial tuberosity of the PFCN.

We found that the PBPFMCN was on average located 4 cm inferior to the ischial tuberosity, and this would be the best location at which to inject an anesthetic to block this nerve. Interestingly, Bergman et al.\(^3\) have stated that the PBPFMCN may pierce the sacrotuberous ligament. Therefore, one could envision compression of this nerve at this location as has been described for the pudendal nerve at this same site.

**Conclusions**

Because perineal pain syndromes can be disabling, additional anatomical information regarding the nerves potentially involved in pain generation may be useful in the development of new treatment strategies. Our hopes are that the data presented herein may be useful in such circumstances.

**Disclaimer**

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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