**ORIGINAL ARTICLE**

# Anatomy of the pudendal nerve in clinically important areas: a pictorial essay and narrative review

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## Abstract

**Purpose** The pudendal nerve is an anatomical structure arising from the ventral branches of the spinal roots S2–S4. Its complex course may be affected by surrounding structures. This may result in irritation or entrapment of the nerve with subsequent clinical symptoms. Aim of this study is to review the anatomy of the pudendal nerve and to provide detailed photographic documentation of the areas with most frequent clinical impact which are essential for surgical approach.

**Methods** Major medical databases were searched to identify all anatomical studies investigating pudendal nerve and its variability, and possible clinical outcome of these variants. Extracted data consisted of morphometric parameters, arrangement of the pudendal nerve at the level of roots, formation of pudendal nerve, position according to sacrospinal and sacrotuberal ligaments and its terminal branches. One female cadaver hemipelvis was dissected with common variability of separate course of inferior rectal nerve. During dissection photodocumentation was made to record course of pudendal nerve with focus on areas with recorded pathologies and areas exposed to iatrogenic damage during surgical procedures.

**Results** Narrative review was done to provide background for photodocumentation. Unique photos of course of the pudendal nerve was made in areas with great clinical significance.

**Conclusion** Knowledge of anatomical variations and course of the pudendal nerve is important for examinations and surgical interventions. Surgically exposed areas may become a site for iatrogenic damage of pudendal nerve; therefore, unique picture was made to clarify topographic relations.

**Keywords** Anatomical variation · Entrapment · Pudendal nerve · Pudendal neuralgia · Sacrospinous ligament · Sacrotuberous ligament

## Introduction

The standard course of the pudendal nerve is as follows. It is an anatomical structure arising from the ventral branches of the spinal roots S2–S4. It contains sensory and motor fibers

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that innervate the muscles of the perineum and structures affecting fecal and urinary continence including external genitals, anal sphincter, and anus [2, 27].

After forming from the spinal roots, the pudendal nerve is directed to the infrapiriform foramen, through which it leaves the pelvic area together with internal pudendal artery and vein. It then wraps around the sacrospinous ligament and through the lesser sciatic foramen, it enters back into the lesser pelvis, now already under the levator ani muscle. This rotation directs the nerve into the ischioanal fossa and it proceeds before the ischial tuberosity ventrocaudally in the duplication of the obturator fascia in the structure of so-called Alcock canal [34]. In the Alcock canal, one of the terminal branches of the pudendal nerve arises, namely the inferior rectal nerve. After the Alcock canal, one of terminal branches of pudendal nerve, dorsal penile nerve/ clitoridal nerve, runs above the urogenital diaphragm and runs along the inferior ramus of the pubic bone and under

the symphysis to the clitoris in a female or on the dorsum penis in a male. Other final branches spread below urogenital diaphragm within superficial perineal space. The final branches of the nerve are the perineal nerves, which innervate muscles of the perineum and the scrotum or labia majora, the inferior rectal nerve, and dorsal nerve of penis/clitoris [4, 10]. Terminal branches arise in various distances form the pudendal nerve. This, in connection with the relationship to surrounding tissues, can have a major impact on a nerve function in the event of irritation, compression or other possible pathology [37].

According to different anatomical areas, the course of the nerve can be divided into a course through the gluteal region, the course through the Alcock canal, and through the perineal region. However, clinically more significant is the division depending on its relationship to the sacrospinous ligament, where the course of the nerve can be divided into the course before the sacrospinous ligament, interligamentary part, part in the Alcock canal and the course of the terminal branches [17, 37]. Some authors mention the area around the falciform process, which is a continuation of the posterior edge of the sacrotuberous ligament going to ischial ramus, as predisposing to the entrapment of the pudendal nerve [14, 25, 39]. All these places topographically predispose to the narrowing and possible entrapment of pudendal nerve or its branches resulting into pudendal neuralgia [45].

Nantes criteria were defined to help with the diagnosis of pudendal neuralgia. Pudendal neuralgia is a painful neuropathic condition involving the dermatome of the pudendal nerve. This syndrome is essentially clinical. According to Nantes criteria, the patient must exhibit all five of the inclusion criteria. Inclusion criteria are pain in the area innervated by the pudendal nerve extending from anus to clitoris, pain is more severe when sitting, pain does not awake the patient from sleep, pain with no objective impairment, pain relieved by diagnostic pudendal block. Exclusion criteria are pain located exclusively in the coccygeal, gluteal, pubic or hypogastric area, pruritus, exclusively paroxysmal pain, abnormalities on any imagining test (MRI, CT, and others) that might explain the pain. These criteria do not cover all clinical situations as the expression of pain is eminently variable as it is often associated with multiple, perplexing functional symptoms [18, 19].

Up to this date, all anatomical studies dealing with the pudendal nerve described only short sections of the course of the nerve. To our knowledge, there is no comprehensive article dealing with the pudendal nerve and its course including terminal branches, although its damage can lead to clinically significant disorders. Recently, it has become clear that knowledge of this nerve may be neglected, and problems related to damage to pudendal nerve and its branches can significantly decrease patient's quality of life. For this reason, this study aims to provide narrative review of pudendal

with photos of areas which are exposed during and where pudendal nerve may be damaged during various surgical procedures.

## Methods

Following databases were searched to identify all suitable studies: PubMed, Medline. Various combination of the following search terms were used: "anatomy", "anatomical variation", "pudendal nerve", "entrapment", "pudendal neuralgia", "Alcock canal", "inferior rectal nerve", "dorsal clitoridal nerve", "dorsal penile nerve", "anal sphincter", "sacrospinal ligament", "sacrotuberous ligament", "innervation". No restriction on date or language was applied. Additional studies were located through review of the reference list of the above articles and through personal searches. We found over 3000 studies and chose to include 46 of them in this review. The articles were chosen because of their relevance to the purpose of the review based on the authors' clinical and research experience in treatment of pudendal neuralgia, pelvic organ prolapse surgery, and other pelvic disorders.

Detailed dissection of sacral plexus, pudendal nerve, and its terminal branches was performed on one female cadaver embalmed hemipelvis of unknown age without any know pelvic disorder in patient's history. Surrounding tissues were dissected and key structures were identified. Whole course of pudendal nerve was documented during and after dissection. Relationship of the pudendal nerve to the key structures for the surgeries was documented.

## Results

### Forming of the pudendal nerve and lumbosacral plexus

According to the textbooks, the pudendal nerve arises from the spinal roots of S2–S4 [4]. However, this is not always the case. If the main part of pudendal nerve is formed from another root of the sacral plexus, the additive fibers from the other branches may differ. The interconnection of the lumbar and sacral plexuses occurs in 91.8% of cases [26] (Fig. 1).

This agrees with Bergman who did not find the connection in 7.4% of cases [3]. These variabilities are probably due to deviations from normal development in the 8th week of pregnancy [35]. Additive fibers from S1 are described by Shafik in 25%. However, the study contains a small number of dissected cadavers [43].

Knowledge of the anatomy of the lumbosacral plexus is especially important for regional anesthesia. Damage in the area of plexus roots is encountered mainly in connection

**(A)**

**(B)**
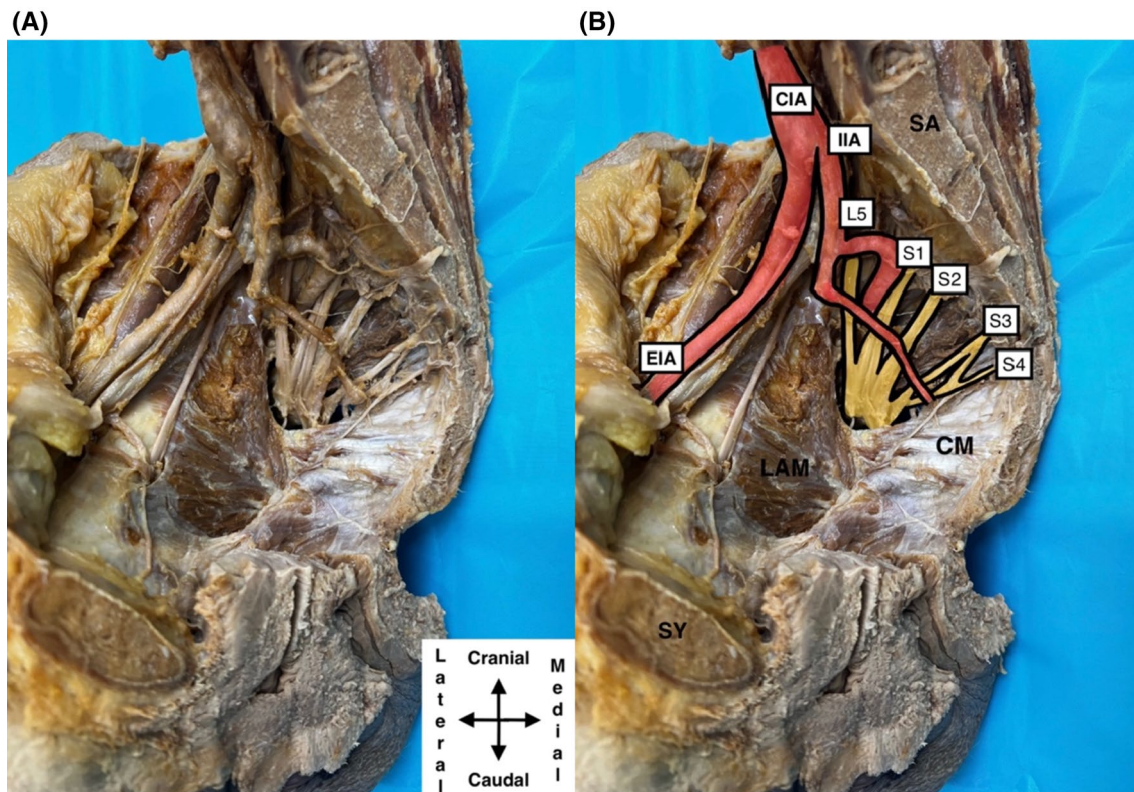


**Fig. 1** Dissected hemipelvis from front view with visible dissected pelvic floor—coccygeus and levator ani, sacral plexus, part of internal iliac artery and external iliac artery. **A** Native picture, **B** yellow highlighted sacral plexus with branches for lumbar plexus forming lumbosacral plexus. From top to bottom L5, S1, S2, S3, and S4. *EIA* external iliac artery, *CIA* common iliac artery, *IIA* internal iliac artery, *SA* sacrum, *SY* symphysis, *LAM* levator ani, *CM* coccygeus (color figure online)

with perforating or non-perforating trauma of the abdominal wall, tumors of the abdominal wall, with pathologies of blood vessels (aneurysms, hemorrhages, hematomas) or during radical abdominal operations [13].

## Pudendal nerve trunking

After the formation of the pudendal nerve itself, its subsequent course can be divided into a total of 5 variants. Type I is formed by a separate trunk and it is described in 56%. Type II formed by two trunks appearing in 11%. Type III can be described as a two trunk, one of which the inferior rectal nerve passing through the sacrospinous ligament (11%) is formed. Type IV (9.5%) is two trunked, formed similarly to the previous one, with the difference that the inferior rectal nerve does not pass through the sacrospinous ligament. Type V is three trunked, appearing in 12.3%. In total, the pudendal nerve consists of one trunk in 56%, two trunks in 31.5% and three trunks in 12.3%. [24].

Other studies on the same topic describe similar results. Gruber et al. describes 40.8% of nerves formed from multiple trunks [11] and Maldando gives 38% of nerves formed by more than 1 trunk, although it is based on only 26 hemipelves on which anatomical dissection was performed [25].

Different topography is described by Pirro et al. on a sample of 40 hemipelvis, which gives only 3 basic types of pudendal trunks. Type I consisting of one root in 72.5%, type II from two roots in 25% and type II from three roots in 2.5% of cases [36].

## Passage through the infrapiriform foramen

Infrapiriform foramen is a topographic area at the base of the gluteal region. Borders of the infrapiriform foramen are cranially piriformis muscle, laterally greater sciatic foramen, medially sacrotuberal ligament, and inferior border corresponds to sacrospinal ligament. It transmits sciatic nerve running laterally and medially located inferior gluteal nerve, posterior femoral cutaneous nerve and pudendal nerve, which is located most medially of all the described structures. Together with these structures, the inferior gluteal vessels and the internal pudendal vessels take place. No significant anatomical variability is described.

As a separate cause of clinical symptoms, pathology was not detected in this area in any of the total of 145

operated nerves by transgluteal access. Entrapment of the pudendal nerve occurs in this region only together with entrapment in the interligamentous region (8.7%), in combination with entrapment in the Alcock canal (13%) or with entrapment in all three zones, i.e., in the section before the sacrospinal ligament, interligamentously and in the Alcock canal (5.8%). Nerve pathology was diagnosed based on impaired mobility of the nerve in the area. Eventually, a visible nerve damage was evident [37]. Very rarely cases are described when the infrapiriform foramen was affected by intramuscular injection and the pudendal nerve was damaged, with the subsequent development of a full infrapiriform syndrome resulting in dysuria and weakening of the sphincter [32].

The place where we apply the anesthetic for pudendal block is the entrance of the nerve to the lesser sciatic foramen. It can be used in obstetrics, but also in urology for prostate biopsy or to treat catheter-related bladder discomfort [7, 35]. Pudendal block can also be combined with other nerve blocks, such as periprostatic block during transrectal biopsy of the prostate, with a greater anesthetic efficiency [22].

## Passage of the nerve around sacrospinal ligament

From the infrapiriform foramen, the pudendal nerve runs toward the ischial spine. It wraps around the sacrospinous ligament, not around the ischial spine, as written in many anatomical textbooks.

The course around the sacrospinal ligament, together with the entry into the Alcock canal, is the most common place where the entrapment of the nerve can occur. According to the published studies, the entrapment of the nerve arises in this area in up to 70% of total entrapment of pudendal nerve [38]. The nerve here runs in 80% of cases posterior to the sacrospinous ligament and medial to ischial spine at an average distance of $0.6 \pm 0.4$ cm (average $\pm$ SD) (range 0.2–1.6 cm) (Fig. 2).

For the remaining 20%, the pudendal nerve runs laterally from the top of the ischial spine at an average distance
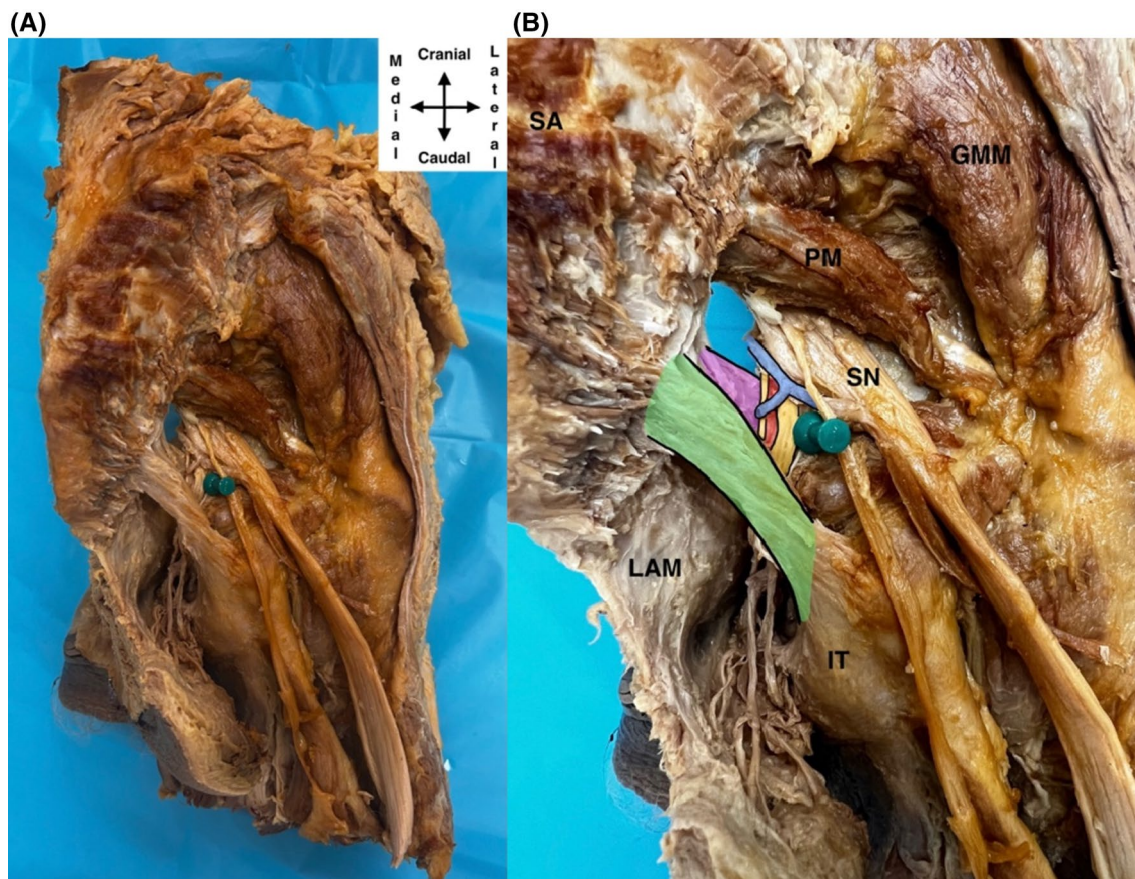


**Fig. 2** Course of pudendal nerve around sacrospinous ligament from dorsal view. **A** Native picture, **B** with highlighted structures: pin—end of ischial spine, green—sacrotuberous ligament, purple—sacrospinous ligament, blue—internal pudendal vein, red—internal puden-dal artery, yellow—pudendal nerve with inferior rectal nerve running separately medially to internal pudendal artery. *LAM* levator ani, *IT* ischial tuberosity, *SN* sciatic nerve, *PM* piriformis muscle, *GMM* gluteal medial muscle (color figure online)

of $0.4 \pm 0.05$ cm (average $\pm$ SD) (range 0.3–0.4 cm) [20]. The position of the pudendal nerve during the course around the sacrospinous ligament relative to the pudendal artery is mostly medial (90%), but it can also be located laterally from the vessel in 10% [36].

Anatomical variability is often accompanied by clinical symptoms arising from the entrapment of the nerve. Of the 145 operated PN nerves on a sample of 100 patients meeting the Nantes criteria, the course of the pudendal nerve through the sacrospinous ligament was found in 2% of the cases and through the sacrotuberal ligament in 3% of the cases during transgluteal access to the nerve. The thickness of the ligament and the position of the pudendal nerve to the internal pudendal artery also play a significant role, because it can also cause compression of the nerve [37].

Outside of the ligaments themselves, entrapment can be caused also by the variable course of nerve structures. The inferior rectal nerve, which independently arises from S4 up to 40%, and the levator ani nerve can have a topographically variable course in the area of ischial spine [24]. This should be considered when planning surgical interventions. Nerves run medially from the spine and to prevent their damage during surgical procedures, such as the hinges of the vaginal stump during descent, it is recommended to perform the procedure at a distance of more than $2.5 \pm 0.7$ cm (average $\pm$ SD) from the ischial spine. However, only 1/3 of the ligament closer to the sacrum is considered to be a zone that is completely outside the course of the pudendal nerve [20, 37]. Other authors recommend establishing a stitch at a distance of 1 to 2 fingers from iliac spine [31, 38] (Fig. 3). A failure to respect this knowledge can result in complications of fixation behind the sacrospinous ligament, in the sense of bleeding or damage of the pudendal nerve or its branch, in which subsequent symptoms are described up to 15%.

During the course around the sacrospinous ligament, Maldando described in some cases a fixation of the nerve to the ligament, when there was no movement of the nerve when attempting traction. This fact probably indicates a place that is entrapped [25]. Fixation of the nerve to surrounding structures corresponds with the finding that in 145 patients with clinical symptoms diagnosed as pudendal neuralgia meeting the Nantes criteria [19], changes were noted
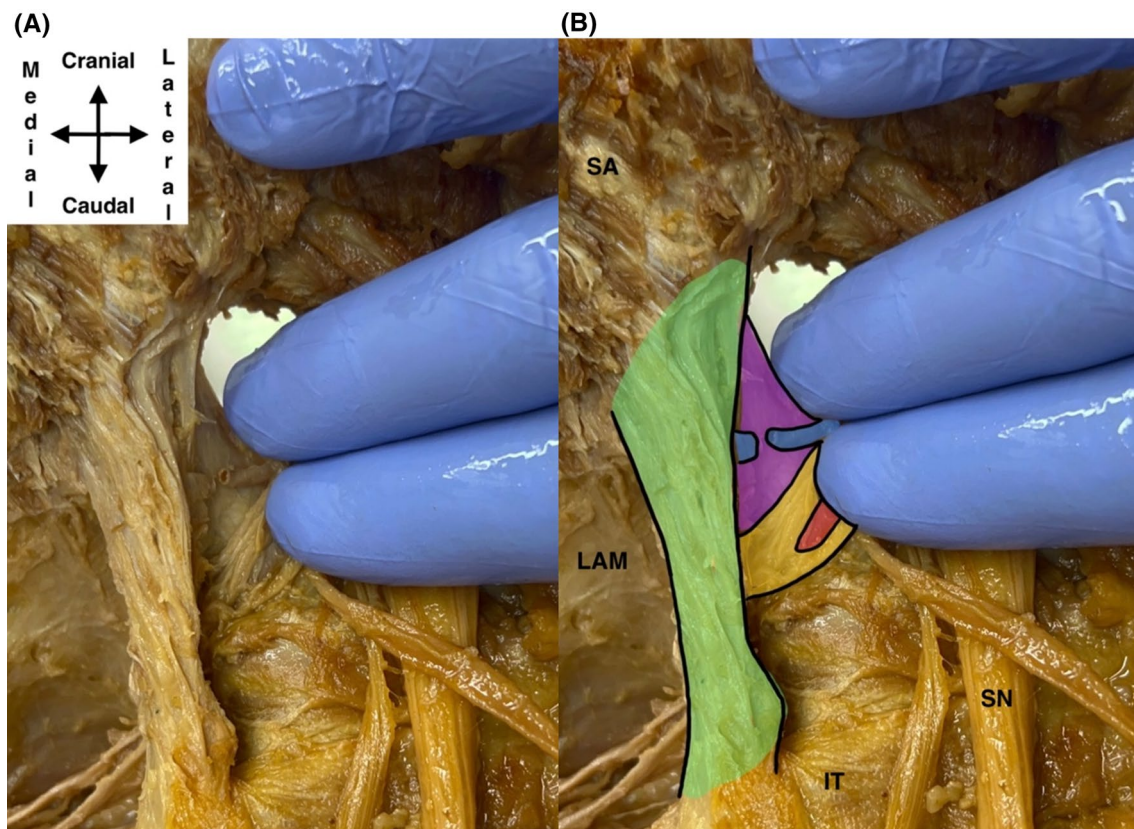


Fig. 3 Demonstration of the free-nerve zone. Distance of at least 1.5–2 cm, or 2 fingers as shown in the picture, should be respected during surgical procedures to prevent injury of pudendal nerve. A Native picture, B with highlighted structures: pin—end of ischial spine, green—sacrotuberous ligament, purple—sacrospinous ligament, blue—internal pudendal vein, red—internal pudendal artery, yellow—pudendal nerve with inferior rectal nerve running separately medially to internal pudendal artery. *SA* sacrum, *LAM* levator ani, *IT* ischial tuberosity, *SN* sciatic nerve (color figure online)

in terms of the impossibility of movement of the nerve due to its fixation to the surrounding structures. After the nerve was released from the surrounding structures, the symptoms subsided, which confirms this theory [4].

Thanks to minimally invasive surgery, we are able to safely access the sacrospinous ligament laparoscopically. In some cases of pudendal neuralgia, entrapment syndrome, and some cases of chronic pelvic pain, a surgical approach consisting of severing the sacrospinous ligament and releasing the nerve is the best treatment option. This approach can be proposed after the failure of conservative treatment [12]. It can also be performed robotically [8].

## Alcock canal

It is a topographic structure formed by a duplication of the obturator internus muscle fascia (Fig. 4).

This fascia can be divided into an upper and lower part due to the position of tendinous arch of levator ani. The Alcock canal is located below the tendinous arch dorsally at the site of the distal attachment of the sacrospinal ligament. The fascia is attached to the sacrospinal ligament and the falciform process of the sacrotuberal ligament, forming a triangular entrance to the Alcock canal. The average channel length is 16 mm in an adult [42].

The falciform processus is a continuation of the posterior edge of the sacrotuberous ligament going to the ischial ramus. It is one of the structures forming the entrance to the Alcock canal. A total of 3 different anatomical variants of this structure have been described. Type I (69%), when the processus ran to and along the ischiopubic ramus and merged with the obturator fascia. Type II (18%), when it ran along the ischial ramus and merged with the obturator fascia. Subsequently, it proceeded to the ischioanal fossa. Medial boundary of the falciform processus additionally merged with the anococcygeal ligament and thus formed the membrane. Type 3 (13%) was the absence of a falciform processus [23].

According to some authors, the area of the falciform processus may be a predisposing site to the entrapment of the pudendal nerve [14, 25, 39].
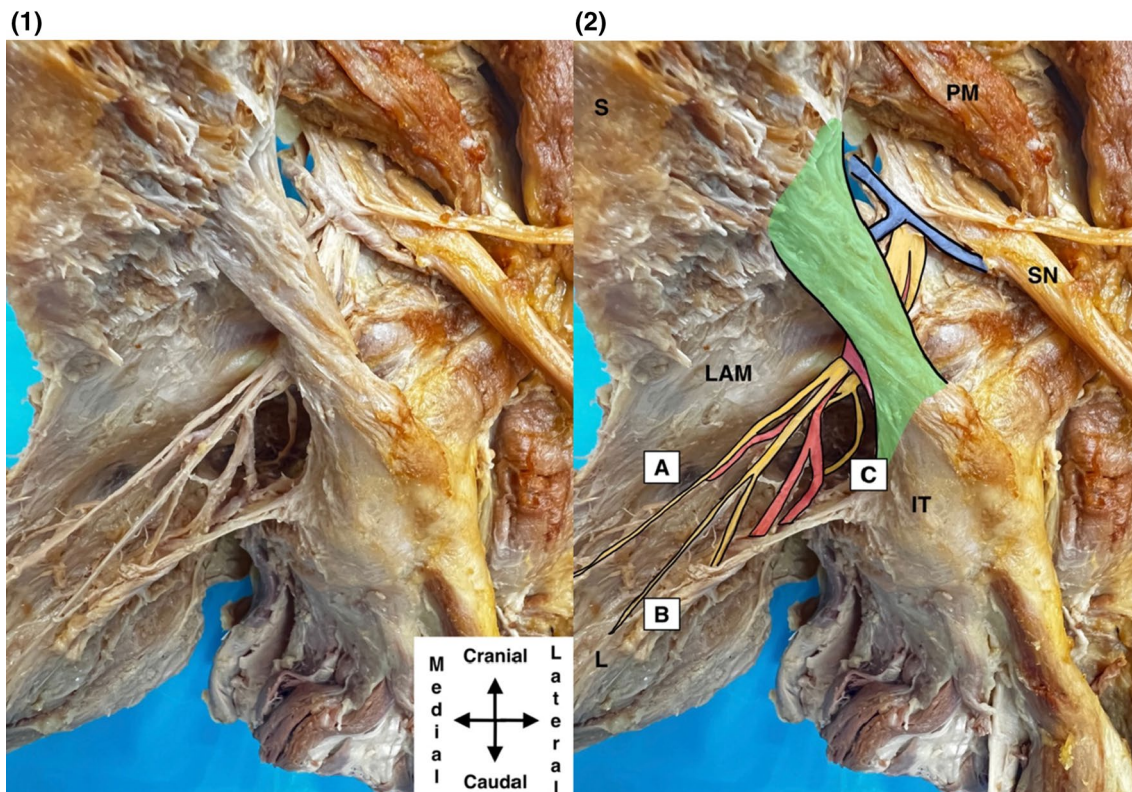
## Branches of the pudendal nerve (Fig. 5)

## The inferior rectal nerve (Fig. 6)

The inferior rectal nerve is the final branch of the pudendal nerve that arises from the pudendal nerve in the Alcock canal. Subsequently, it runs through the ischioanal fossa to the external anal sphincter, which it innervates. It also innervates the surrounding skin and the lower third of the anal canal. Variabilities of the inferior rectal nerve are very common. In the Alcock canal, the inferior rectal nerve arises in 42.3–78%; in the remaining cases, it arises before or after the canal. The limitation of this study is a small sample of cadavers [28, 29, 32]. The inferior rectal nerve arises from S4 separately from pudendal nerve in 7.5–20.5%. In this case, it has independent course from a pudendal nerve [24, 40]. In case of separated arising from S4, the passage of the inferior rectal nerve through the sacrospinous ligamentum was described in 53.33% about 1 cm from ischial spine. This variability may predispose to entrapment [24]. In the remaining cases, the inferior rectal nerve runs behind the ligament.
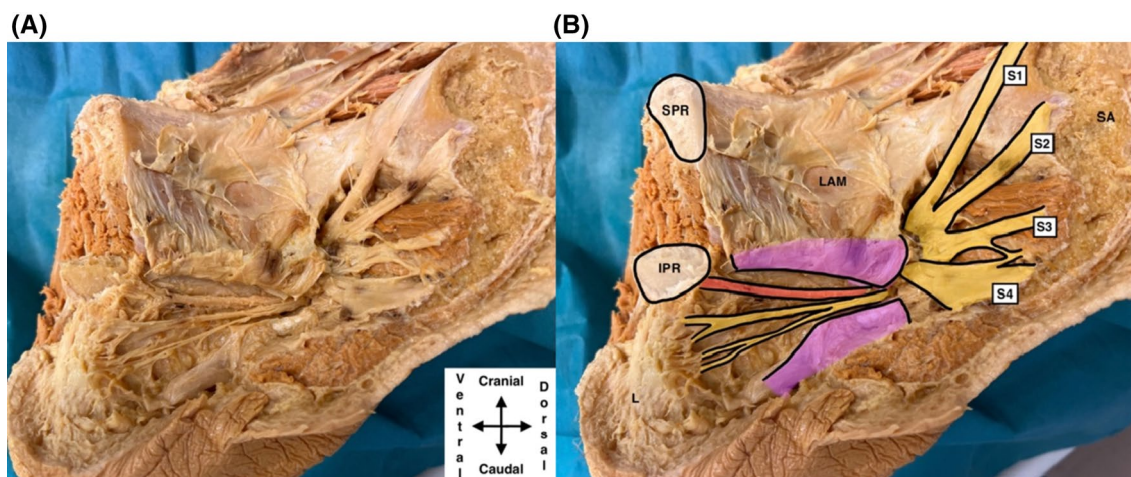


**Fig. 4** Course of pudendal nerve through the Alcock canal. **A** Native picture, **B** with highlighted structures: pink—reversed m. levator ani uncovering Alcock canal, red—internal pudendal artery, yellow— pudendal nerve. *SPR* superior pubic ramus, *IPR* inferior pubic ramus, *LAM* levator ani (color figure online)

**Fig. 5** Course of pudendal nerve from dorsal view. (1) Native picture, (2) with highlighted structures: blue—internal pudendal vein, red—internal pudendal artery, yellow—pudendal nerve and its terminal branches, (A) inferior rectal nerve, (B) perineal branches, (C) dorsal clitoridal nerve, green—sacrotuberous ligament, *S* sacrum, *PM* piriformis, *SN* sciatic nerve, *LAM* levator ani, *IT* ischial tuberosity (color figure online)

In case of entrapment of inferior rectal nerve, the external anal sphincter is not affected due to the existence of interconnecting nerve branches from the second-sided nerve. These ensure a sufficient function of the anal sphincter even with the unilateral nerve damage [44].

External anal sphincter is innervated not only by the inferior rectal nerve but in various percentages also by the perineal nerve or from the branches directly from S4. Generally speaking, the anal sphincter is innervated by three branches—anterior (femoroperineal ramus, lateral perineal ramus or anterior sphincteral nerve), middle (accessory anal nerve), and posterior branch (accessory sphincteral nerve) in varying proportions. The anterior branch contains 91% of the nerve fibers from pudendal nerve and 9% from inferior rectal nerve, the middle branch has 95.5% of the inferior rectal nerve and 4.5% fibers are from pudendal nerve, and the posterior branch has 69% of inferior rectal nerve and 31% of fibers from perineal branches. It can be said that the anal sphincter is innervated separately from the inferior rectal nerve (in 60%) or a triple innervation of the sphincter is present, i.e., the combination of the inferior rectal nerve, branches from S4 and the perineal nerve (in 29%) or in 11% either from the inferior rectal nerve or a branch of the perineal nerve. Somatotopically, the ventral part of the sphincter is innervated from the root S2, the center from S3, and the posterior part from S4 [6].

## Dorsal nerve of penis/clitoris (Fig. 7)

It is one of the final branches of the pudendal nerve which plays a key role in sensation of external genitals and normal erectile function. It arises from the pudendal nerve in the infrapiriform foramen and runs along the margin of the inferior pubic ramus between the deep and superficial transverse perineal muscles and inferior fascia of urogenital diaphragm. On the rami of the pubic bone, the inferior rectal nerve runs in the pubic sulcus [41], when in the male, there is only a nerve in the groove and in the female, there is also artery of clitoris, which crosses the nerve at the level of the lower edge of the pubic body and reaches its medial side. In a female, it is a short nerve going to the suspensory ligament of clitoris which ends in the clitoris. In a male, it perforates through the inferior fascia of urogenital diaphragm and then runs to the corpus cavernosum penis, which it supplies with its branch. The main part of the nerve then runs together with the dorsal
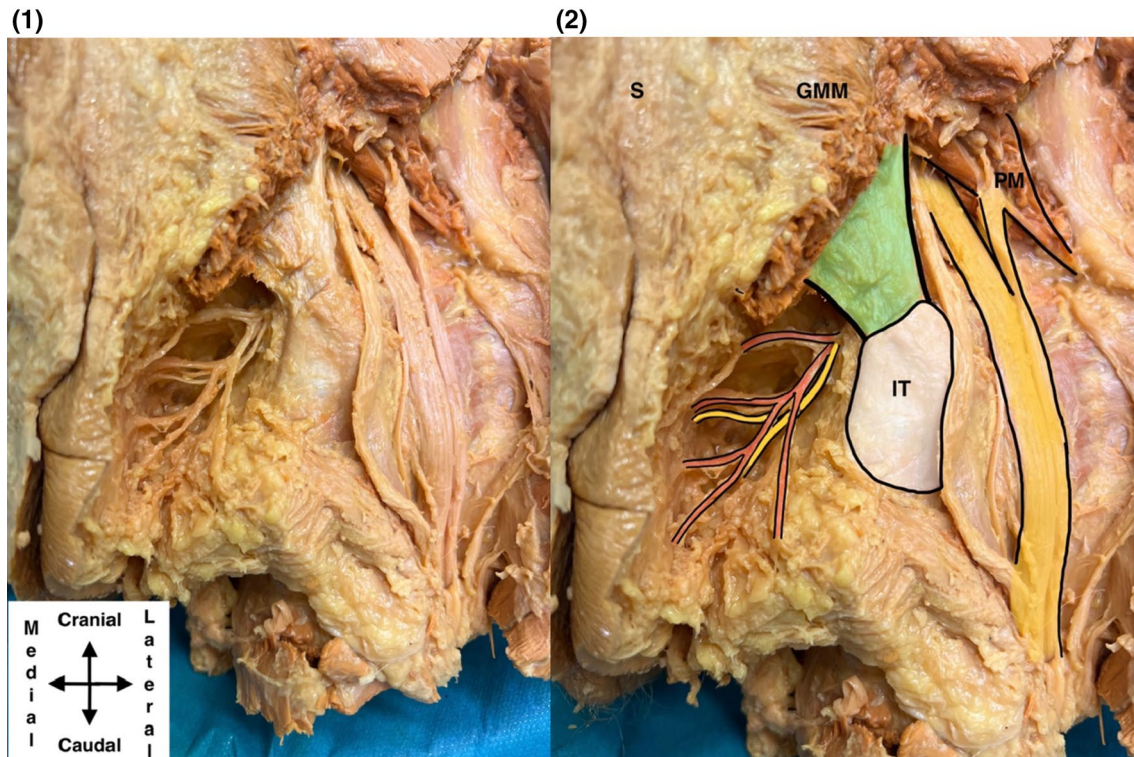
**Fig. 6** Dissected inferior rectal nerve dorsal view. (1) Native picture, (2) with highlighted structures, red—inferior rectal artery, yellow—inferior rectal nerve, green—sacrotuberous ligament, *S* sacrum, *PM* piriformis, *SN* sciatic nerve, *IT* ischial tuberosity, *GMM* gluteus maximus (color figure online)

artery of penis/dorsal artery of clitoridis along the dorsal side of the penis to the glans penis, which it innervates. The pubic sulcus is a predisposing site for pudendal neuralgia as confirmed by clinical and clinical-anatomical studies [15, 21, 29].

Thanks to the development of microsurgery and dissection techniques, new reconstruction methods are emerging. The preservation of the neurovascular bundle and thus the gentle preparation of the dorsal nerve of the clitoris is part of the clitoridoplasty, which replaced the original amputation of clitoris. This surgical technique can be used in the case of clitoral hypertrophy, which may appear as a symptom of an endocrine disease (adrenal and ovarian tumors, hyperprolactomia, hypothyroidism, Cushing's syndrome), malignant diseases (sarcomas, hemangiomas, neurofibromas) or cysts, or it may be an idiopathic condition [46].

In contrast, men can be injured, when intramedullary rami screw is applied to pelvic and acetabular fractures. This is due to a sharper pelvic angle, which increases the likelihood of pudendal nerve injury, since the screw exits lateral to the pubic tubercle [16]. Nerve damage should also be considered in gender reassignment surgeries, during the preparation of the nerve on the erectile bodies [1], in the reconstruction of the posterior urethra, hypospadia, revascularization surgery of erectile dysfunction in women or, more often, in the

treatment of stress incontinence during the introduction of transobturator tape [41].

## Perineal nerves (Fig. 8)

These are ending branches typically divided into the superficial (posterior scrotal/posterior labial nerve) and muscular nerve branch. The superficial branch then passes through the lower fascia of the urogenital diaphragm and heads toward the posterior part of the scrotum or labia majora. Very often, communications with the inferior rectal nerve and with the perineal branch of the femoral cutaneous nerve are present. The deep branch innervates the deep and superficial transverse perineal muscle, bulbospongiosus muscle, ischiocavernous muscle, sphincter urethrae muscle and anterior part of the external sphincter (Fig. 8).

Anatomical variability is known when perineal nerves arise in a separate distance from the sacral root and head toward the base of the urogenital diaphragm [5]. However, it always runs behind the sacrospinous ligament and heads into the pudendal canal.

Perineal branches are usually interrupted in radical surgeries such as pelvic exenteration for malignant lesions. This subsequently leads to the loss of skin sensation in the external genitalia, but it can also lead to dyspareunia, vulvar pain,
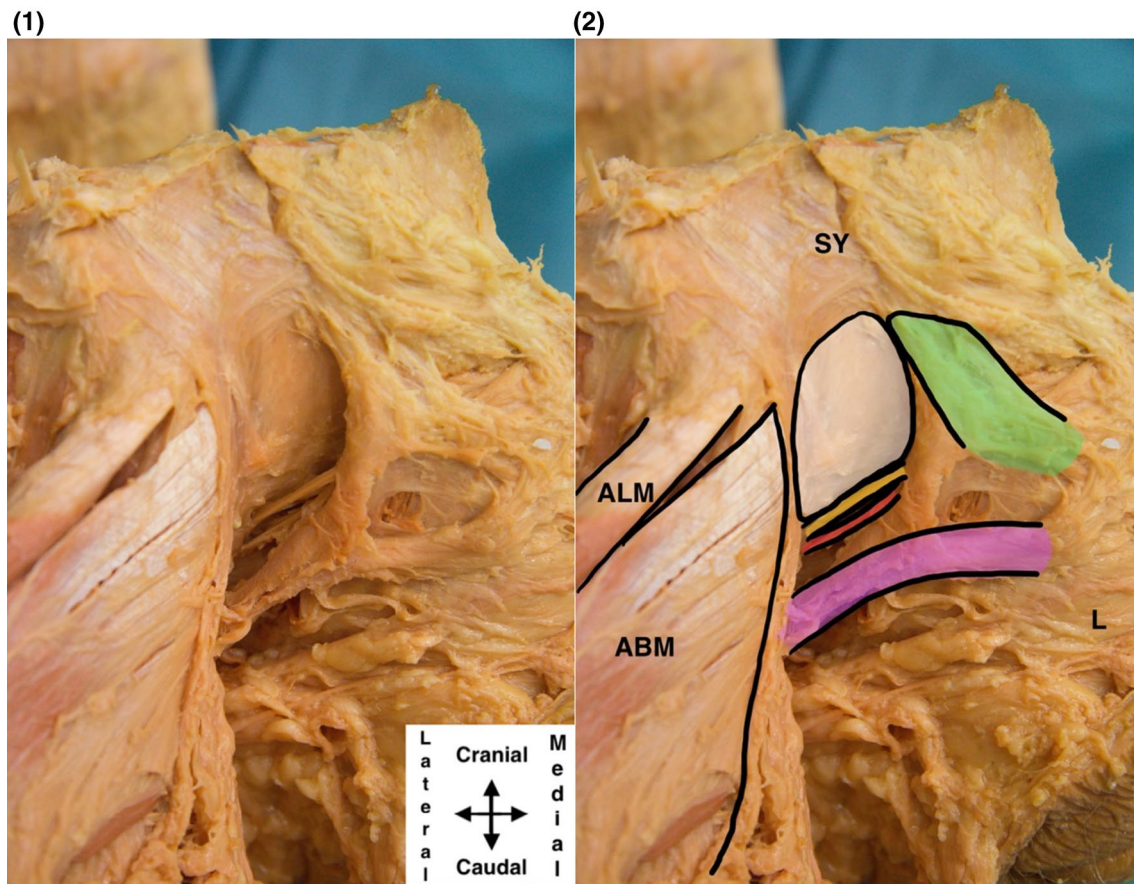
**Fig. 7** Dissected dorsal nerve of clitoridis. (1) Native picture, (2) with highlighted structures, green—lig. suspensorium clitoridis, yellow—dorsal nerve of clitoridis in place where is in contact with infe-rior margin of pubic bone, red—artery of clitoris, white—pubic bone, purple—right crus of clitoris l. dx., *SY* symphysis, *ALM* adductor lon-gus, *ABM* adductor brevis, *L* labia (color figure online)

and sexual dysfunction [9]. Nerve damage may also occur during deliveries. It is usually associated with birth injuries and episiotomies, which can result in sexual dysfunction, dyspareunia, or vaginal dryness [30]. The direction of episi-otomy does not affect the frequency of perineal nerve dam-age and subsequent clinical complaints [30].

Pudendal neuralgia in the meaning of vulvodynia, or pain in the external genital area, can be surgically solved with transgluteal approach [33] or anterior approach, when the innervation of the perineum from the perineal branches is selectively interrupted [5].

## Discussion

The pudendal nerve is a structure with a great anatomical variability due to its formation from the anterior branches of several spinal roots, but also due to its course through the pelvis. Some of the surrounding structures, which are in a close proximity to the nerve, predispose to the narrowing, which can result in irritation or entrapment of the nerve with subsequent clinical symptoms. Thanks to common variabil-ity and different lateral anatomy, the predominant unilateral nerve entrapment can be explained.

These symptoms usually have the character of difficulties causing discomfort or pain. Due to the difficulty of diagno-sis and the low awareness of the professional public about pudendalgia (or Alcock syndrome), it is common for symp-toms to last for several years and thus significantly affect the quality of life.

Due to the complex course of the nerve and a poor acces-sibility in the lesser pelvis, it is difficult to describe in detail the course of the pudendal nerve. Most studies that focused on the anatomy of the pudendal nerve are limited by the number of studied cadavers and all studies focus only on a short section of the nerve, usually at the site of the alleged narrowing [28, 29, 32, 43]. To evaluate further the anatomy of the pudendal nerve, further research and a larger sample of patients or cadavers are needed. The knowledge gained could significantly influence the approach and treatment of pudendal neuralgia, which is a significantly underdiagnosed group of diseases.
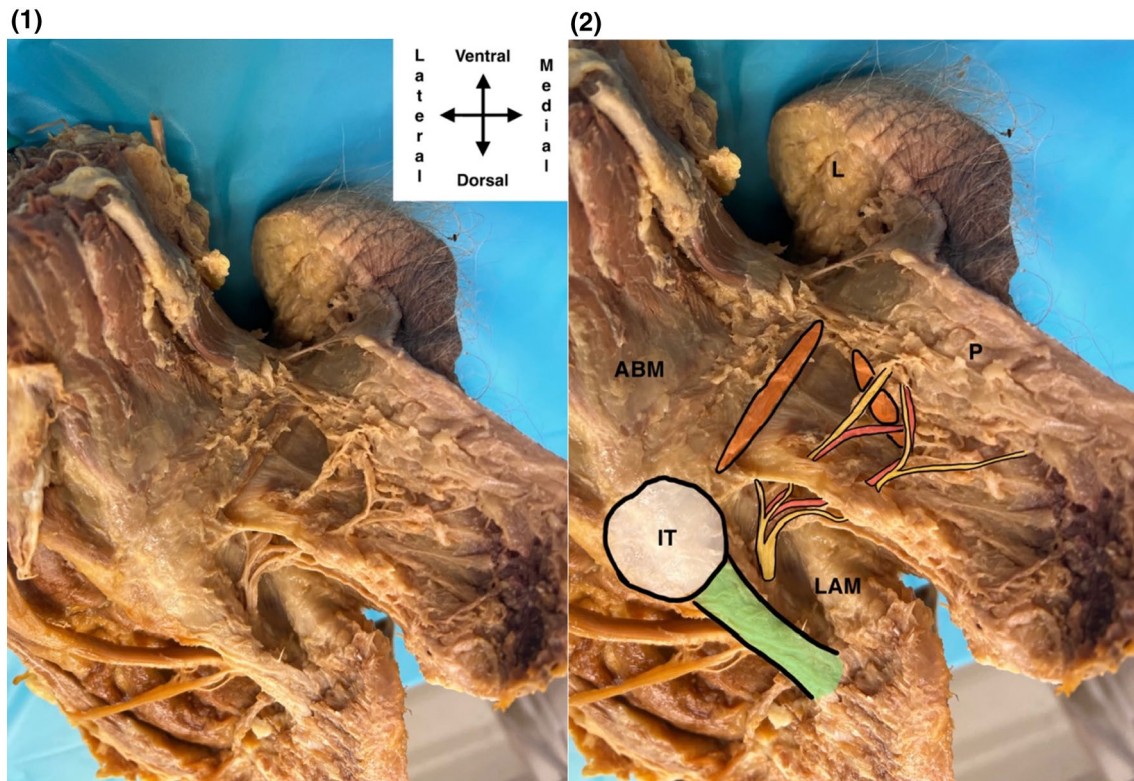
**Fig. 8** Dissected perineal branches of pudendal nerve. (1) Native picture, (2) with highlighted structures, green—sacrotuberous ligament, white (IT)—ischial tuberosity, yellow—perineal nerves, red—aa. perineales, orange—ischiocavernosus muscle laterally and bulbospongiosus medially. *ABM* adductor brevis, *P* perineum, *L* labia, *LAM* levator ani (color figure online)

## Declarations

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