Pudendal Nerve

38

G. Bellingham and Philip Peng

Contents

General Considerations

The anatomical course of the pudendal nerve has been the subject of numerous investigations, and studies continue to report novel anatomic variations. These studies challenge the originally held belief of the pudendal nerve as a singular nerve with a consistent pathway through the pelvis. In contrast, nerve anatomy can be complex with several well-described variations. Knowledge of these variances can aid in the appropriate management of patients requiring intervention through nerve blockade or surgery.

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Indication (Patient Selection)

Surgical and Obstetric Anesthesia and Analgesia

Pudendal nerve blockade can be used to confer analgesia and surgical anesthesia for pelvic surgical procedures involving structures innervated by the pudendal nerve. Surgical and obstetric procedures that have evaluated the use of pudendal nerve blockade are summarized in Table 38.1.

Pudendal Neuralgia

Pudendal neuralgia is an uncommon cause of perineal pain that may result from compression of the nerve or its trunks along its course through the pelvis. The use of pudendal

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nerve blockade may assist in facilitating a diagnosis of pudendal neuralgia or to confer periods of analgesia as a treatment option.

To assist in the identification of the subset of pudendal neuralgia-pudendal entrapment neuropathy (PNE), the Nantes criteria have been proposed which list clinical inclusion and exclusion criteria. Essential criteria include (1) pain in the anatomical territory of the pudendal nerve, (2) symptoms worsened by sitting, (3) patient not woken at night by pain, (4) no objective sensory loss on clinical examination, and (5) positive anesthetic pudendal nerve block.

Pudendal nerve blockade may satisfy the last essential Nantes criterion if the pain is relieved for the duration of the local anesthetic. However, as described in the original article, a positive diagnostic block may not be specific for pudendal neuralgia, as alternative causes of the perineal pain will be anesthetized if they are situated within the nerve's territory.

Table 38.1 Indications for pudendal nerve block

Surgical procedures	Obstetric anesthesia or analgesia
Hemorrhoidectomy Penile prosthesis surgery Hypospadias repair Circumcision Prostate biopsy Placement of prostate HDR brachytherapy Suburethral tape placement Colpoperineorrhaphy Transvaginal pelvic reconstructive surgery	Augment analgesia when sacral sparing occurs during epidural catheter use Instrumented deliveries Episiotomies Repair of perineal tears McDonald cerclage

Functional Anatomy

The ventral rami of S2, S3, and S4 commonly form the pudendal nerve, yet contributions from S1 and S5 nerve roots have been documented. Contributing nerve roots may either combine to form a single pudendal nerve or form between 2 and 3 "trunks," which may or may not combine to form the pudendal nerve and its terminal branches (inferior rectal, perineal, and dorsal branches).

Once formed, the pudendal nerve and its trunks briefly exit the pelvis to enter the gluteal region, beneath the piriformis muscle via the infrapiriform notch (Figs. 38.1 and 38.2).

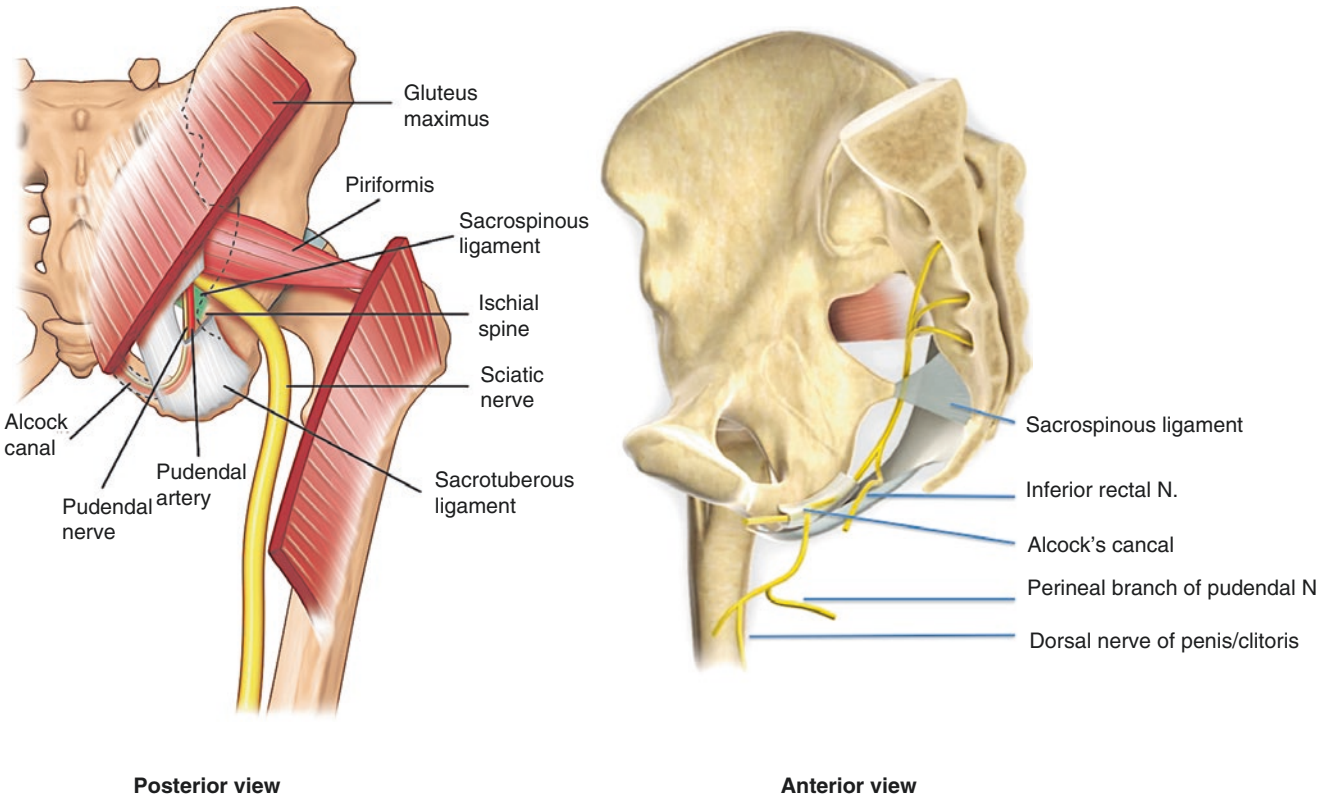

Fig. 38.1 Left: posterior view of the pelvis showing the piriformis muscle and the neurovascular bundle deep to it. The pudendal nerve and artery run between the sacrospinous and sacrotuberous ligaments. Right: anterior view of the pelvis showing the pudendal nerve arising from S2 to S4 and exiting the pelvis to enter the gluteal region through the greater sciatic foramen. The nerve gives rise to the inferior rectal nerve, the perineal nerve, and the dorsal nerve of the penis or clitoris. The inferior rectal nerve branches from the pudendal nerve prior to Alcock's canal. *N* nerve. (Reproduced with permission from Philip Peng Educational Series)

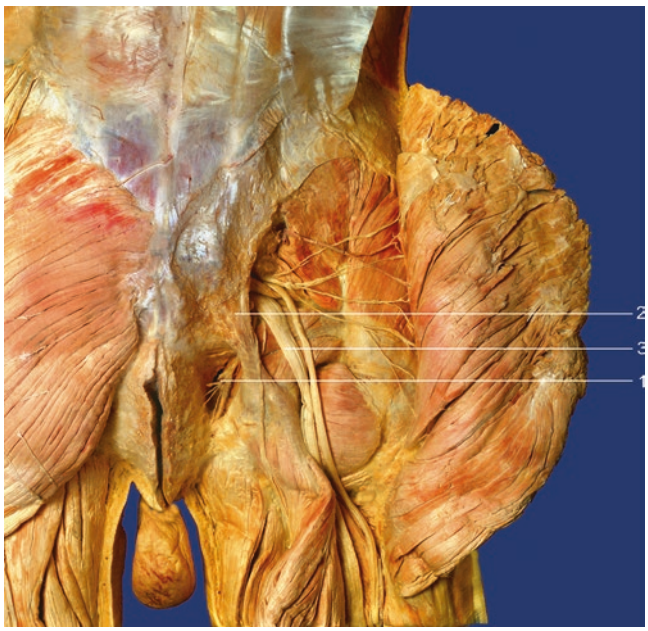

Fig. 38.2 Anatomic specimen. (1) Pudendal nerve and pudendal vessels in the ischiorectal fossa, (2) sacrotuberous ligament, (3) sciatic nerve. (Reproduced with permission from Dr. Danilo Jankovic)

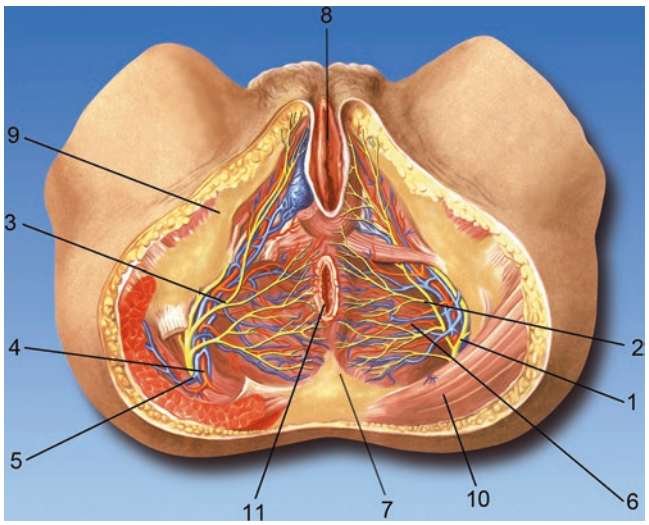

Fig. 38.3 Anatomy of the perineum (1). Pudendal nerve, (2) inferior rectal nerves, (3) perineal nerves, (4) internal pudendal artery, (5) internal pudendal veins, (6) inferior rectal artery, (7) ischiorectal fossa, (8) vaginal orifice, (9) ischial tuberosity, (10) gluteus maximus muscle, (11) anus. (Reproduced with permission from Dr. Danilo Jankovic)

The nerve then courses between the sacrospinous and sacrotuberous ligaments, adjacent to the ischial spine. At this point, the nerve may cross over the posterior aspect of either the sacrospinous ligament or the ischial spine. Anatomical study has revealed that the nerve crosses the sacrospinous ligament in 80% of cases, while in 15% of cases, it crosses the ischial spine. Remaining variations contained multitrunked nerves crossing both the ischial spine and sacrospinous ligament.

The relationship of the pudendal artery to the nerve has also been examined from anatomical study. In 80% of cases, the pudendal nerve lies medial to the artery, while in 10% of cases, the nerve lies lateral to the artery. Remaining anatomical relationships observed include having the artery lie between two trunks, and in 7.5% of cases, the artery crossed the nerve.

After passing at the level of the ischial spine, the nerve reenters the pelvis through the lesser sciatic foramen to continue its course anteriorly through a fascial tunnel formed along the medial border of the obturator internus muscle known as Alcock's canal (Fig. 38.1). Alcock's canal lies medial to the obturator internus muscle and is formed by a splitting of the muscle's fascia into a medial and lateral layer. The medial layer covers the pudendal neurovascular bundle and fuses below with obturator fascia. The lateral layer is continuous with the obturator fascia. The length of the canal has been measured from 1.4 to 1.8 cm in adults, ending at a distance of 2 to 3 cm from the inferior border of the symphysis pubis.

The pudendal nerve divides into three branches: the inferior rectal branch, the perineal branch, and the dorsal nerve of the penis/clitoris (Figs. 38.1 and 38.3).

The inferior rectal branch descends to occupy the lower half of the ischiorectal fossa. It subdivides into cutaneous branches that supply sensory innervation to the anal canal and the skin around the anus. Sensory innervation may include the skin of the scrotum. The inferior rectal branch provides the main motor innervation to the external anal sphincter, and investigations have also documented occasional motor innervation to the levator ani muscle as well, through an "accessory rectal nerve." The inferior rectal branch can pierce through the sacrospinous ligament as it proceeds to the ischiorectal fossa, which can be a possible site of entrapment.

The perineal branch of the pudendal nerve divides into superficial and deep branches. The superficial branch provides sensory innervation through the posterior scrotal/posterior labial nerve, which contributes to the innervation of the posterior aspect of the scrotum or labia majora. This branch may join the sensory branches of the inferior rectal branch. The deep branch supplies motor innervation to the muscles of the pelvic floor and the deep perineal pouch. The external urethral sphincter receives voluntary innervation from this branch. Other muscles that receive motor innervation include the transverse perinei, bulbospongiosus, and ischiocavernosus muscles. Motor innervation has also been

reported to include the anterior part of the external anal sphincter and the levator ani muscle.

The dorsal nerve of the penis or clitoris is the final branch of the pudendal nerve. This branch pierces through the superior fascia of the urogenital diaphragm once it reaches the inferior pubic ramus. Beyond this point, the nerve travels in a pouch that is defined by the crus of the penis/clitoris anteriorly and inferiorly. The branch may then pierce either the inferior fascia of the urogenital diaphragm or pierce above the inferior transverse pubic ligament. Once exited the pelvis at this point, the nerve travels anterior to the pubic bone in a groove known as the "sulcus nervi dorsalis penis/clitoris." It then deflects ventrally to innervate the penis or clitoris.

Technique

Transvaginal Technique

The pudendal nerve can be blocked transvaginally through a "blind" technique using the ischial spine as an anatomic landmark (Fig. 38.4). The distal end of an introducer kit is used to guide the needle toward the pudendal nerve, which allows for infiltrating needles to be advanced 1.0 to 1.5 cm beyond their distal openings. Introducers described in the literature include the Iowa trumpet or Kobak needle and needle guide.

The introducer is first placed against the vaginal mucosa, inferior to the ischial spine. In obstetrical anesthesia literature, the guide is to be held parallel to the delivery table. The needle is advanced into the vaginal mucosa, and 1 mL of local anesthetic is infiltrated. The needle is then advanced further until contact is made with the sacrospinous ligament, where another 3 mL of local anesthetic is injected. Care should be taken at this point to first aspirate for blood to help exclude intravascular injection prior as the pudendal vessels will be in close proximity. The needle is then passed through the ligament into the loose areolar tissue posterior to it, where another 3 mL of local anesthetic is deposited prior to aspiration. These steps are then repeated, but with the introducer placed superior to the ischial spine so as to ensure adequate spread around the pudendal nerve.

Transperineal Technique

This approach has been described in the literature together with the use of nerve stimulation and has mainly focused on providing analgesia either for perineal surgical procedures or for management of pudendal neuralgia.

The techniques described commonly include stimulation of the pudendal nerve adjacent to the ischial spine to elicit a contraction of the external anal sphincter and perineal muscles. The ischial spine can be localized by palpation of the ischial spine by inserting a finger through the vagina or rectum. Once this anatomic landmark is identified, a needle is guided to this point through the skin overlying the ischiorectal fossa (Fig. 38.5). The skin entry point can vary between descriptions. However, maintaining anal sphincter and perineal muscle contraction while diminishing the stimulating current to 0.5–0.6 mA is typically used to optimize the final needle tip position.

It should be noted that anal sphincter contraction alone might not be sufficient for a satisfactory pudendal nerve block, as this may indicate that only the inferior rectal nerve

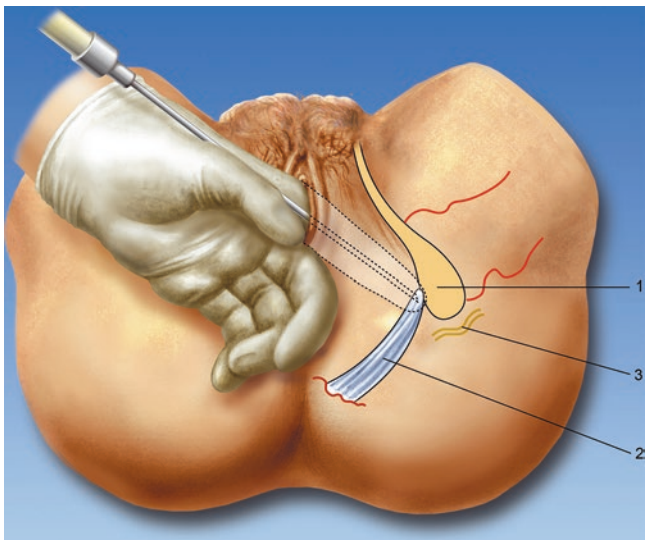

Fig. 38.4 Transvaginal access. (1) Ischial spine, (2) sacrospinous ligament, (3) pudendal nerve. (Reproduced with permission from Dr. Danilo Jankovic)

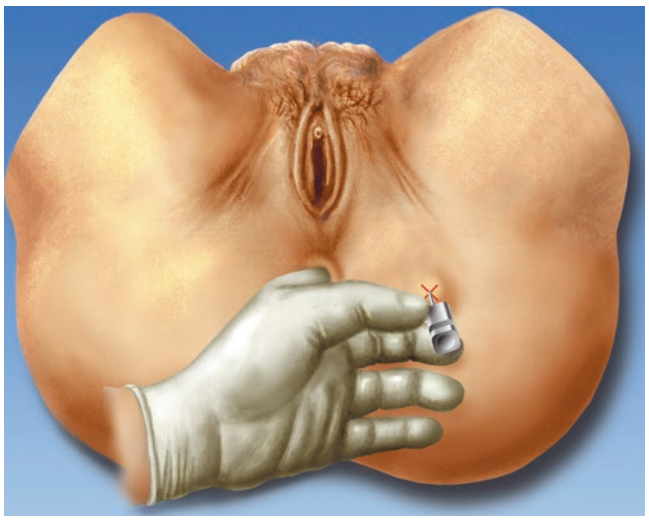

Fig. 38.5 Transperineal access. Rectal palpation of the ischial spine with the index finger. The needle is introduced into the ischiorectal fossa. (Reproduced with permission from Dr. Danilo Jankovic)

branch is being stimulated. Contraction of the pelvic floor muscles is more desirable as it indicates that the perineal branch is also being stimulated, signifying that the pudendal nerve itself, rather than individual branches, is being contacted.

Transgluteal Approach

Fluoroscopy-Guided

Blockade of the nerve is accomplished by targeting the nerve within the gluteal region as it courses adjacent to the ischial spine (Fig. 38.6).

Patients are placed in a prone position. A fluoroscope is then positioned over the targeted side of blockade to obtain an oblique view 5–20° to the side to be blocked. This view exposes the ischial spine more clearly, avoiding the overlapping with the pelvic brim. Once the ischial spine is identified, a skin entry point on the buttock is marked at the tip of the ischial spine. After skin infiltration with local anesthetic is achieved, a spinal needle can be advanced, coaxial to the fluoroscopic beam, until it contacts the bony surface of the spine. Once satisfied, 1 mL of contrast medium can be injected to confirm appropriate soft tissue spread. Once complete, injection of the chosen solution can take place.

Contrast spread patterns described include spread in an irregular or round pattern at the tip of the ischial spine. Additionally, spread can occur along the ipsilateral obturator internus muscle, sacrotuberous ligament, or sacrospinous ligament. Investigators have not described any particular correlation between pattern of spread and success of sensory blockade.

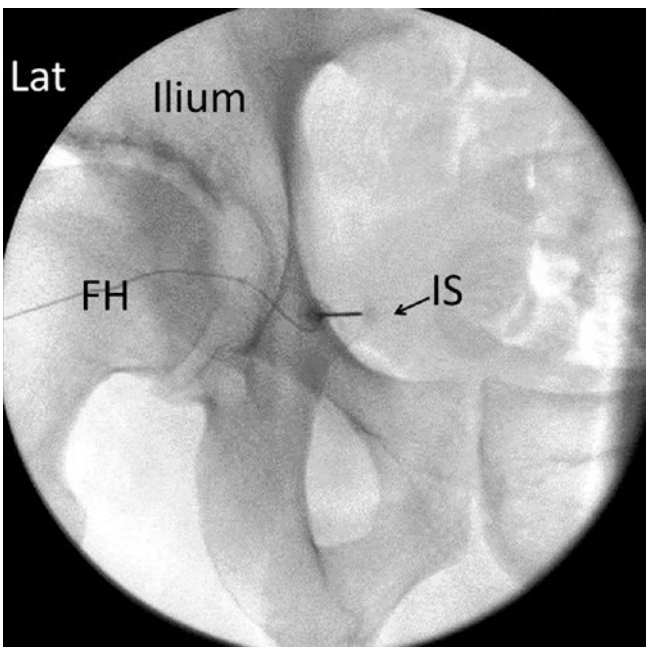

Fig. 38.6 Fluoroscopy-guided pudendal nerve block. *FH* femoral head, *Lat* lateral, *IS* tip of the ischial spine. (Reproduced with permission from Philip Peng Educational Series)

Ultrasound-Guided

The use of an ultrasound-guided approach to block the pudendal nerve has been described in the literature. The use of ultrasound allows for the visualization of soft tissues, needle advancement, and live spread of injectate around the target structures. The use of ultrasound guidance has been described for blockade of the pudendal nerve at the level of the ischial spine as well as at Alcock's canal.

Level of the Ischial Spine

Patients are placed in a prone position, and a curvilinear transducer with a low frequency (2–5 MHz) is required because of greater tissue depths. The transducer is first positioned over the ilium at the level of the posterior superior iliac spine (PSIS). The ilium appears as a straight, hyperechoic line descending laterally (Fig. 38.7). As scanning continues caudally to the level of greater sciatic notch, the hyperechoic line of the ilium starts to regress from the medial aspect of the screen. The lateral aspect of the ultrasound screen transitions to a curved hyperechoic line revealing the posterior aspect of the acetabulum. At this point, two muscular layers can be identified: the gluteus maximus and the piriformis muscles.

Moving the probe in the caudal direction to the ischial spine reveals four changes in the sonographic image: the transition of curved posterior portion of the acetabulum to the straight ischial spine, disappearance of the piriformis muscle, appearance of a dense hyperechoic line extending medially from the ischial spine, and appearance of the pudendal artery. The most likely location of the pudendal nerve is medial to this artery, and careful scanning may reveal its fascicular structure.

Once the anatomy is identified as best possible, a needle is advanced medial to the probe at a steep angle, using an in-plane approach. Owing to the steep angle of needle advancement, the needle insertion point should be 2 cm away from the probe. Movement of the tissues or spread of injectate may be used to act as surrogate markers for locating the needle tip position.

The needle will pierce through the sacrotuberous ligament, which may provide sturdy resistance to advancement. One may feel a "pop" sensation as the needle passes through. At this juncture, injection can begin under direct ultrasound visualization. Ideally, the spread of the injectate is medial to the pudendal artery and is contained between the sacrotuberous and sacrospinous ligaments. If the injectate does not follow this pattern, the needle can be repositioned. There is no

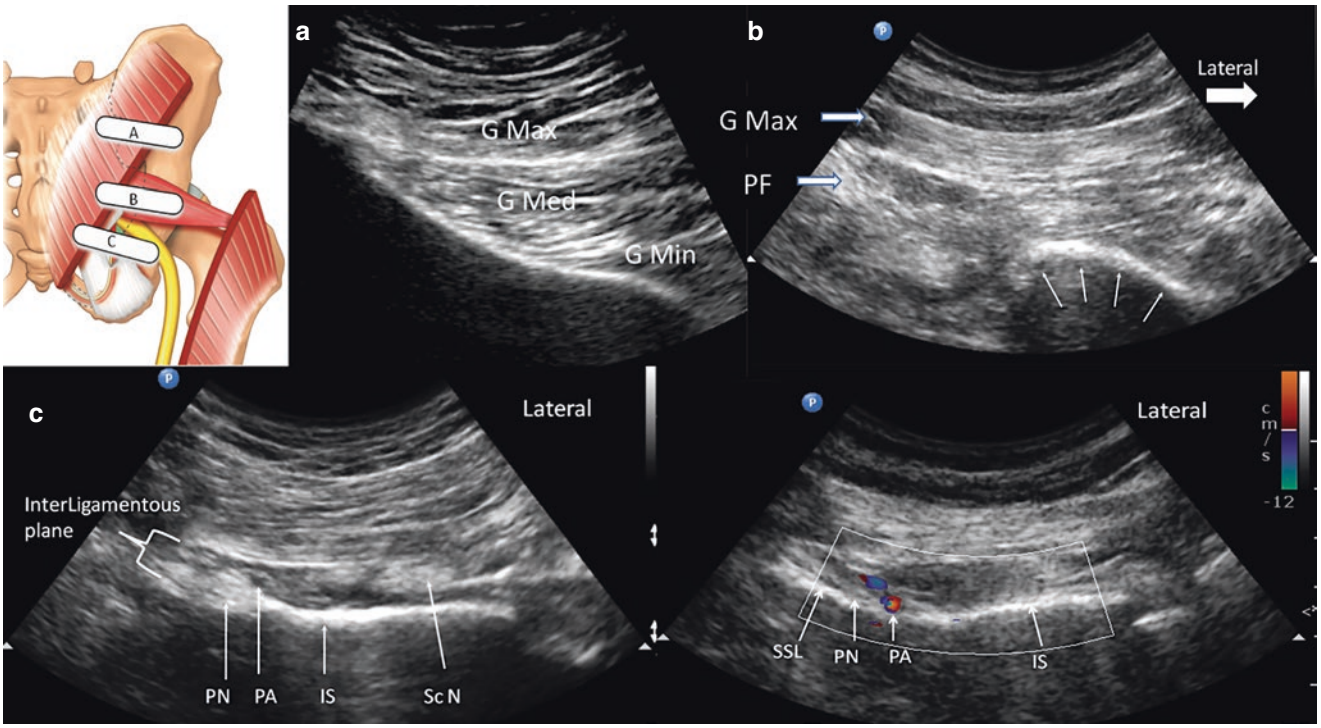

Fig. 38.7 Upper panel. Left: three positions of the ultrasound probe (**a**–**c**). Middle: sonography corresponding to position A, which shows the ilium at the level of the posterior superior iliac spine. Right: sonography corresponding to position B, which is at the level of the greater sciatic notch (arrows). Lower panel. Left: sonography corresponding to position C, which is at the level of the ischial spine. Right: same sonography with Doppler scan. *G Max* gluteus maximus, *G Med* gluteus medius, *G Min* gluteus minimus, *PF* piriformis, *ScN* sciatic nerve, *IS* ischial spine, *PN* pudendal nerve, *PA* pudendal artery, *SSL* sacrospinous ligament. (Reproduced with permission from Philip Peng Educational Series)

investigation on the optimal injectate. The authors preferred plain bupivacaine (to avoid jeopardizing circulation to the entrapped nerve) and steroid, e.g., 4-mL 0.25% bupivacaine and 40-mg Depomedrol®.

Alcock's Canal

Recent publications have reported the use of ultrasound to inject the pudendal nerve at the entrance of Alcock's canal. This technique has been described in anatomical studies and a limited case series of three patients diagnosed with pudendal neuralgia.

This method is an extension of the ultrasound technique used to identify the pudendal nerve at the level of the ischial spine. When the ultrasound probe is shifted caudally from this level, the scanning continues to the lesser sciatic notch. At this level, the straight, hyperechoic line of the ischial spine transitions in morphology to a smooth and rounded morphology indicative of the ischium at the level of the lesser sciatic notch. The soft tissue of the obturator internus tendon can be seen emerging from within the pelvis, wrapping around this bony landmark to extend laterally toward the greater trochanter of the femur.

Moving the probe further inferiorly, the pudendal nerve, artery, and vein can be visualized inside the proximal aspect Alcock's canal, lying superficial and medial to the obturator internus muscle. This neurovascular bundle can be identified by finding the pulsatile pudendal artery with the hyperechoic pudendal nerve laterally situated (Fig. 38.8). The artery can be further highlighted using color Doppler.

The injection technique has been described as advancing a needle to the pudendal nerve using an in-plane approach. A medial-to-lateral approach is recommended to avoid needle contact with the ischial tuberosity and to reduce the risk of rectal perforation.

Using this ultrasound-guided technique, Bendtsen et al. reported that in two study cadavers, all four pudendal nerves were successfully targeted three patients obtained pain relief with bilateral injections. Soucy et al. reported 81% accuracy targeting pudendal nerves at Alcock's canal in cadaveric specimens.

Equipment and Solutions

Reports describing the use of pudendal nerve blockade have tremendous variability in the types and volumes of injectates used. Needle types are also inconsistent but typically depend on the type of guidance employed to perform the block (e.g., transvaginal with introducer, ultrasound, or MRN).

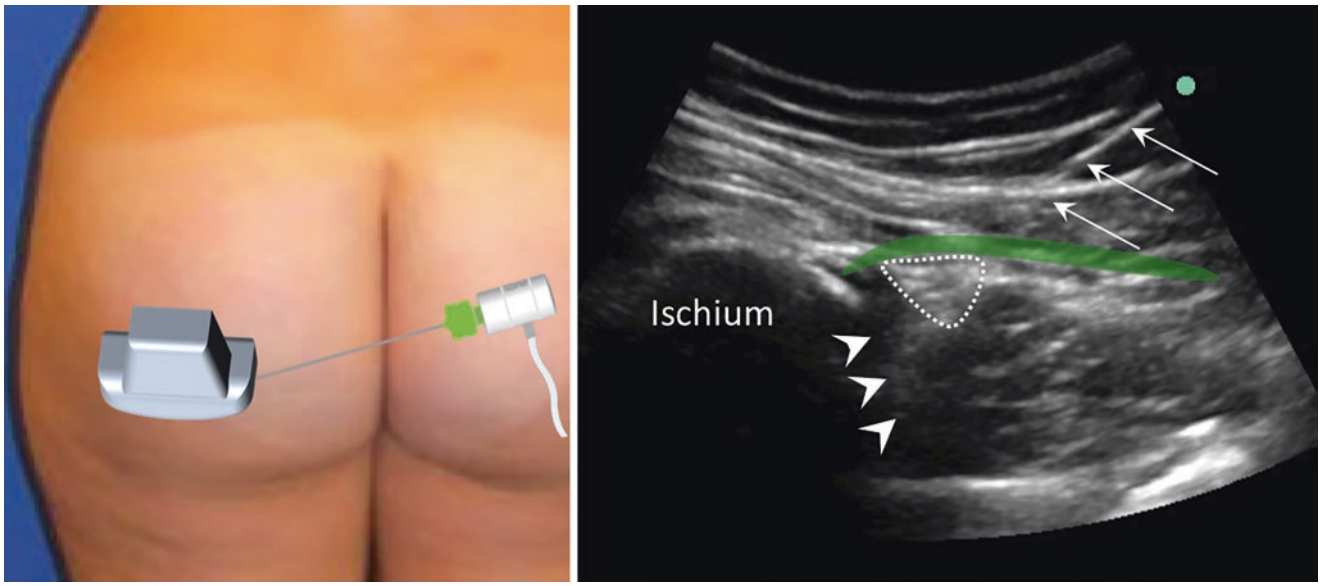

Fig. 38.8 Left: position of the probe and needle injection. Right: corresponding sonography. The obturator internus is seen as an hypoechoic structure medial to the ischium as indicated by arrowheads, and the pudendal neurovascular bundle at the entrance of the Alcock's canal is outlined in dotted line. The sacrotuberous ligament is shaded in green color, and the needle is indicated by arrows. (Reproduced with permission from Philip Peng Educational Series)

Table 38.2 Needle types and injectate for different approaches

Approach	Indication	Needle gauge and type	Injectate
Transvaginal	Obstetrical analgesia Obstetrical analgesia Obstetrical analgesia Obstetrical analgesia	22-gauge, 150-mm needle via tubular introducer Not specified Not specified Not specified	9-mL 1% lidocaine 20-mL 1% lidocaine 20-mL 1% mepivacaine 5-mL 2% prilocaine
Transperineal	Colpoperineorrhaphy Episiotomy analgesia Chronic pelvic pain and anorectal surgery Transrectal ultrasound-guided prostate biopsy	100-mm stimulating needle 100-mm stimulating needle 22-gauge, 100-mm stimulating needle 22-gauge spinal needle	10-mL 0.25% bupivacaine 15-mL 0.75% ropivacaine 5-mL 0.25% bupivacaine 10-mL 1% prilocaine
Transgluteal fluoroscopy	Chronic perineal pain	25-gauge, 3.5″ spinal needle	3-mL 0.38% ropivacaine and 20-mg triamcinolone
Transgluteal ultrasound	Pudendal neuralgia	22-gauge, 120-mm insulated stimulating needle	5-mL, 0.25% bupivacaine in 1:200,000 epinephrine and 40 mg methylprednisolone

Table 38.2 provides a survey of needle types and injectates used to perform pudendal nerve blocks according to the approach used.

Complications

When performing pudendal nerve blockade for obstetrical anesthesia, the most frequently reported complication has been block failure. When used during the second stage of labor, failure rates of the block have ranged from 10 to 50% in the literature. This may be due to failure of the local anesthetic to reach the nerve or improper timing of the block placement. If the block is placed as the fetal head is crowning, nerve blockade may not be effective in time for an episiotomy, and may only be fully established in time for the repair.

Other more common complications can include unintended blockade of adjacent nerves. If pudendal nerve blockade is performed at the ischial spine, local anesthetic spread to the sciatic nerve may lead to sensory and motor blockade of the lower limb. Depending on the patient setting, this could lead to delays in ambulation, risk of falls, or delayed discharge from hospital or clinic. A randomized controlled study comparing fluoroscopic- and ultrasound-guided pudendal nerve blockade through a transgluteal approach revealed an incidence of sciatic nerve sensory loss in 7/23 fluoroscopy-guided procedures and 3/23 ultrasound-guided procedures. Motor weakness in the form of foot drop was noted in two patients for each group.

The posterior femoral cutaneous nerve is another nerve near the pudendal nerve at the level of the ischial spine that also provides sensory innervation to the perineum. If a pudendal nerve blockade is being used to assist in the diagnosis of a pelvic pain syndrome, local anesthetic spread to the posterior femoral cutaneous nerve may lead to false-positive results.

The pudendal nerve provides motor innervation to the urethral sphincter and external anal sphincter, and loss of muscle tone may lead to temporary incontinence of bladder or bowel function. In the study comparing fluoroscopic- to ultrasound-guided techniques of pudendal nerve blockade, only 1 patient of 23 experienced bladder incontinence with bilateral pudendal nerve blockade. Although this may be an infrequent occurrence, patients should be made aware of this possibility.

Practitioners and patients should also be made aware of the uncommon, yet serious complications that are possible through pudendal nerve blockade. When used for labor analgesia, cases of fetal distress and neonatal local anesthetic toxicity have been documented. Presentations of the neonates with local anesthetic toxicity have included hypotonia, apnea, bradycardia, cyanosis, prolonged QT interval, and seizure activity. Factors that may increase the risk of this event include fetal ion trapping in the presence of acidosis and increased local anesthetic vascular uptake from the perineum during labor.

Introduction of infection after transvaginal blocks for labor analgesia has been reported due to seeding of bacteria into soft tissues from vaginal mucosa. This can lead to serious morbidity and mortality, with two deaths having been reported in the literature. Abscess formation has been reported posterior to the hip joint, into the gluteal musculature, or the retropsoal space. Of note, authors of these reports have highlighted the risk of delays in diagnosis as the clinical presentation can be initially confused with normal postpartum pain from sacroiliac joint strain or trochanteric bursitis.

The formation of significant hematoma after pudendal artery puncture has also been described in the literature in conjunction with infection. After blind infiltration for labor analgesia, an infected retroperitoneal hematoma along the iliac and psoas muscles has been reported, which extended from the midpelvis to the infrarenal fossa. Infection rather than blood loss was the principal concern in this case, however.

Practical Tips

An important anatomical landmark for performing a pudendal nerve block is the ischial spine. This is a common location for nerve infiltration for obstetrical, perioperative, and chronic pain purposes. Knowledge of anatomy at this location is important to perform effective nerve blocks and to avoid complications.

In most cases, the pudendal nerve crosses the sacrospinous ligament, rather than crossing over the ischial spine, and lies medial to the pudendal artery. It is important to recall that the nerve may lie lateral to the artery in some cases (approximately 1 in 10) or exist as trunks lying medially and laterally to the artery. These variations could account for a failed or partial block.

The authors suggest injecting medial to the pudendal vessel at the level of the ischial spine. If there is a prominent vessel lateral to the ischial spine, it is likely the inferior gluteal artery instead of the pudendal artery. Care should be taken to perform a color Doppler scan in this area to avoid mistaking these vessels.

If the injection is performed under ultrasound, attention should be paid to spread of the injectate laterally. When one witnesses lateral spread beyond the ischial spine, injection should be stopped to prevent the spread to the sciatic nerve given its proximity.

The authors recommend a systematic approach to ultrasound scanning for anatomical landmarks to facilitate pudendal nerve blocks through a transgluteal approach. This is best accomplished by first scanning for the iliac crest since it is easily recognized as a single hyperechoic line. Scanning then continues caudally toward the greater sciatic notch and then to the ischial spine.

Since the plane of greater sciatic notch is laterally oriented, the probe should ideally be tilted medially, so that the ultrasound beam is directed toward the notch. This allows for better visualization of the greater sciatic notch and its contents and the changes in sonoanatomy as scanning continues caudally.

Due to the stiffness of the sacrotuberous and sacrospinous ligaments, care should be taken not to overshoot the placement of the needle tip. This may occur if initial resistance to needle advancement is met with a “give way” of the needle once it passes through the ligament. If this occurs, the needle should be pulled back or carefully imaged to ensure proper placement between the ligaments.

Literature Review

Perioperative Pain Control

There have been a number of investigations evaluating the utility of this block for hemorrhoidectomy, as the postoperative pain of this procedure can be very severe. Pudendal nerve blockade has been found to confer substantial benefits for pain control over other types of analgesia, such as neuraxial blocks, general anesthesia, or nonspecific local anesthetic infiltration to the soft tissues of the perineum. In

additional, the use of this block is associated with reduced length of patient stay in hospital, reduced oral analgesic consumption, and improved patient satisfaction over other methods of analgesia.

Urinary retention after hemorrhoidectomy is a common and undesirable side effect of anal surgery, as well as with neuraxial anesthetic techniques. The use of pudendal nerve blockade has been shown to significantly reduce this particular postoperative complication.

The evaluation of benefits of pudendal nerve blockade has also been investigated for urological procedures such as penile prosthesis surgery, hypospadias repair and circumcision in pediatric population, prostate biopsy, and placement of prostate HDR brachytherapy. The use of pudendal nerve blockade has been described for gynecologic surgical procedures such as placement of suburethral tape and colpoperineorrhaphy. Pudendal nerve blockade, however, has not proven useful to reduce pain after transvaginal pelvic reconstructive surgery.

Obstetrical Practice

The use of pudendal nerve blockade during labor has typically been reserved for the second stage of labor. During this stage, pain is experienced in the perineum and becomes somatic, innervated by the S2 to S4 nerve roots and the pudendal nerves.

Pudendal nerve block was likely used prior to the introduction of epidural anesthesia techniques. However, it can still be employed when neuraxial techniques are contraindicated or if sacral sparring occurs during epidural catheter use. This nerve block has been described for facilitating instrumented deliveries, episiotomies, repair of perineal tears, and McDonald cerclages for incompetent cervices.

The literature examining the effectiveness of local anesthetic infiltration during the second stage of labor has primarily focused on the use of paracervical blocks. However, pudendal nerve infiltration has been evaluated in several studies. There have been two studies that have directly compared the effectiveness of a single-shot spinal anesthetic to pudendal nerve blockade during the second stage of delivery. The investigation by Pace et al. sought to compare the effectiveness of these interventions for women requesting analgesia during advanced labor, defined as cervical dilation greater than 7 cm. The investigation by Hutchins compared these two techniques for instrumental delivery. In both studies, the neuraxial technique demonstrated superiority to pudendal nerve blockade for degree of analgesia and patient satisfaction.

Although neuraxial techniques for labor analgesia may offer superior pain relief compared to the use of pudendal blockade alone, concern for prolonging the second stage of labor has been raised when epidural analgesia is used. Increased dosing of epidural analgesia with local anesthetic during the second stage of labor can lead to increased weakness of abdominal muscles, thereby diminishing forces required to facilitate a delivery.

Xu et al. sought to determine if the use of pudendal nerve blockade during the second stage of labor reduced supplemental epidural dosing, thereby helping to prevent a prolonged second stage of labor in nulliparous women. Pudendal nerve blockade was performed using ultrasound guidance, and the study was conducted as a prospective, double-blind, randomized controlled trial. The group receiving the pudendal nerve block required significantly less hourly bupivacaine boluses through their epidural catheter and reduced the length of the second stage of labor by 33.8 min.

Pudendal Neuralgia

Pudendal nerve blocks have been employed for patients suffering from pudendal neuralgia and have failed conservative techniques. Targets for nerve infiltration are possible sites of entrapment such as at the level of the ischial spine between the sacrospinous and sacrotuberous ligaments or Alcock's canal.

Studies have investigated the effectiveness of pudendal nerve infiltration for relief of this chronic pain syndrome but have been heterogeneous in methodology. For example, variations exist in the chosen technique to perform the block (e.g., CT guidance or landmark-guided infiltration), single or repeated injections, choice of outcome measures, or duration of follow-up.

Investigations have also had considerable variability in the way in which patients are diagnosed and included to study this condition. For example, some investigations adhere to the Nantes criteria to establish the diagnosis of pudendal neuralgia, while others only presume a diagnosis of the condition without taking any confirmatory steps for patient study inclusion. These are considerable limitations when attempting to make conclusions about effectiveness of this block from the literature.

Despite these challenges, a recent systematic review of the literature has attempted to extract some generalizations for the effectiveness of interventions for drug-resistant pudendal neuralgia. For nerve infiltration, an immediate improvement in pain intensity is achieved in 77% to 82% of patients. Data analysis further revealed that improvement in pain intensity is experienced in 62% of patients at 3 months and 6.8% to 12.2% of patients at 1-year, post-procedure. Functional outcome measures were not reported in this review.

Notably, there has been one randomized controlled trial evaluating the role of the addition of steroid to pudendal

nerve blockade via CT guidance for pudendal neuralgia. Injections were performed at the sacrospinous ligament and Alcock's canal as two possible sites of entrapment. Study participants had to meet the first four of the Nantes criteria to be included in the study (the fifth criteria being a positive response to pudendal nerve block which was being evaluated). Patients were randomized to three groups: (a) 1% lidocaine only, (b) 1% lidocaine followed by injection of corticosteroids using 20 mg of methylprednisolone per injection site, and (c) same procedure as group B with the addition of large volume of normal saline to evaluate benefits of hydrodissection. A total of 201 patients were included in the study. The primary endpoint of the study was pain intensity score at 3 months. Patients were defined as responders with at least a 30-point improvement on a100-point visual analogue scale of mean maximum pain over a 2-week period. At 3 months, 11.8% of patients in Arm A were responders, while 14.3% were responders in Arms B and C. The study concluded that there is no benefit to the addition of corticosteroids to the block for pudendal neuralgia, and no significant effect is produced using hydrodissection.

Suggested Reading

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