

# Feasibility of Real-Time Ultrasound for Pudendal Nerve Block in Patients with Chronic Perineal Pain

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**Background and Objectives:** Compared with conventional fluoroscopic-guided pudendal nerve block, ultrasonography has potential advantages for visualizing anatomical landmarks such as the internal pudendal artery and nerve, the sacrospinous and sacrotuberous ligaments, and local anesthetic spread. We examined the clinical utility of performing pudendal nerve block under real-time ultrasound guidance.

**Methods:** Seventeen patients were studied. With the patient lying prone, a 2 to 5 MHz curved array ultrasound probe was placed at the level of the ischial spine to capture the transverse view of the ischial spine, the sacrospinous and sacrotuberous ligaments (SSL and STL), the internal pudendal artery (confirmed with color Doppler), and the pudendal nerve. A 22-gauge needle was advanced under real-time ultrasound guidance to reach the pudendal nerve in the plane between the STL and SSL. Following confirmation of spread of dextrose 5% solution in the interligamentous plane, a mixture of 5 mL 0.25% bupivacaine with 1:200,000 epinephrine and 40 mg Depo-Medrol (Pharmacia & Upjohn, Kalamazoo, MI) was injected. Assessment included the ease of identification of anatomical structures and local anesthetic spread with ultrasound, and the degree of sensory block in the perineum.

**Results:** The ischial spine, SSL, STL, internal pudendal artery, and pudendal nerve were easily identifiable with ultrasound in the majority of patients. Local anesthetic spread was seen as a hypoechoic collection around the nerve and expanding between the STL and SSL. All patients developed perineal sensory block following the procedure.

**Conclusions:** Pudendal nerve block at the ischial spine level can be reliably performed under real-time ultrasound guidance. *Reg Anesth Pain Med* 2008;33:139-145.

**Key Words:** Pudendal neuralgia, Pudendal nerve, Ultrasound.

**P**udendal neuralgia commonly presents as chronic debilitating pain in the perineal area, classically exacerbated by sitting and partially relieved by standing or lying down.<sup>1</sup> It is mainly caused by pudendal nerve entrapment, which can occur along its path,

either in between the sacrotuberous and sacrospinous ligaments (Fig 1),<sup>2</sup> or through Alcock's canal.<sup>3</sup> Pudendal nerve block is crucial to the diagnosis and treatment of pudendal neuralgia.

Knowledge of pudendal nerve anatomy is essential for understanding the technique of pudendal nerve block. The pudendal nerve is formed from the anterior rami of the second, third, and fourth sacral nerves (S2, S3, and S4) emerging from the anterior sacral foramina. Accompanied by the internal pudendal artery, the pudendal nerve exits the pelvis through the greater sciatic notch, traveling posterior to the sacrospinous ligament, and abutting the attachment of the latter to the ischial spine. At this level, the nerve is situated between the sacrospinous and sacrotuberous ligaments (interligamentous plane), medial to the pudendal artery.<sup>1,4-7</sup> The nerve then swings anteriorly to enter the pelvis

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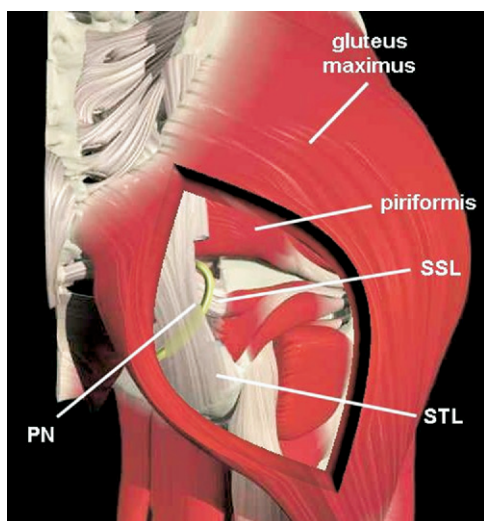
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**Fig 1.** Illustrative anatomy of the pudendal nerve (PN) at the level of ischial spine. The gluteus maximus muscle was split, and part of the sacrotuberous ligament (STL) at the ischial spine level was removed, to show the passage of pudendal nerve in the interligamentous plane. SSL, sacrospinous ligament.

through the lesser sciatic notch and Alcock's canal,<sup>8,9</sup> which is the fascia tunnel formed by the duplication of internal obturator muscles, under the plane of the levator ani muscle, on the lateral wall of the ischiorectal fossa.<sup>10,11</sup> The pudendal nerve subsequently gives off 3 terminal branches: the dorsal nerve of the penis (clitoris), the inferior rectal nerve, and the perineal nerve, providing the sensory branches to the skin of penis (clitoris), perianal area, and the posterior surface of scrotum or labia majora. It also innervates the external anal sphincter (inferior rectal nerve) and deep muscles of the urogenital triangle (perineal nerve).<sup>4,7,12</sup>

Conventional fluoroscopic-guided technique for pudendal nerve block has gained popularity in clinical practice because of the ease of landmark recognition.<sup>13,14</sup> The needle is placed adjacent to the tip of the ischial spine. However, the pudendal nerve is situated in the plane between the sacrospinous and sacrotuberous ligaments (interligamentous plane), which cannot be visualized by fluoroscopy. An approach to the interligamentous plane using computerized tomography (CT) scan has been described, which is also the only approach described that allows blocking the pudendal nerve in Alcock's canal.<sup>5</sup> However, CT scan is not readily accessible by physicians, other than radiologists. Furthermore, this technique is performed without real-time visual control and carries the risks of unintended puncture of adjacent vessels, and exposure to radiation.

Kovacs et al.<sup>15</sup> first described an ultrasound-guided technique for localization of the pudendal nerve in volunteers. However, this study did not involve an actual ultrasound-guided needle placement for nerve block, and subsequently no information regarding clinical outcome was available.

We propose that the use of ultrasonographic guidance for pudendal nerve block at the level of the ischial spine is feasible. Ultrasonography may allow direct visualization of the anatomical landmarks in close relationship with the pudendal nerve, such as the ischial spine, internal pudendal artery, and the sacrospinous and sacrotuberous ligaments. Furthermore, the spread of the injected solution can possibly be detected with real-time ultrasound.<sup>16</sup> Ultrasonography also eliminates the risk of radiation associated with fluoroscopy. Therefore, ultrasonography may improve the precision and safety of the technique and minimize complications. This study was designed to examine the feasibility of performing pudendal nerve block under real-time ultrasound guidance.

## Methods

The study was approved by our local Institutional Review Board and written informed consent was obtained from all patients. The procedure was performed in the operating room, with patients lying in the prone position.

This prospective case series consists of 17 pudendal nerve blocks performed under real-time ultrasound guidance as the primary imaging technique. Patients with a clinical diagnosis of pudendal nerve entrapment who presented mainly with perineal pain were studied. A low frequency 2 to 5 MHz curved array ultrasound probe, and a Philips HDI 5000 unit (Bothell, WA) with color flow Doppler and image-capturing capabilities, were used.

After skin preparation with povidone-iodine, and sterile probe preparation within a transparent plastic sheath, scanning was performed in transverse planes to visualize the ischium forming the lateral border of the sciatic notch. By moving the ultrasound probe in a cephalad-caudal direction, the ischium appeared as a progressively lengthening hyperechoic line and was widest at the ischial spine level. The ischial spine was further confirmed with visualization of the pudendal artery, and the sacrospinous and sacrotuberous ligaments (Figs 2 and 3). The sacrospinous ligament appeared as a hyperechoic line in continuity with the ischial spine, with lower echogenicity than bone. Similarly, the sacrotuberous ligament was seen on ultrasound image as a light hyperechoic line deep to the gluteus maximus muscle and appeared parallel and superior to

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