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Pelvic denervation procedures: A current reappraisal

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Abstract

The introduction of minimally invasive techniques over recent years has led to the resurgence of pelvic denervation procedures such as presacral neurectomy and uterine nerve ablation being performed for women with dysmenorrhea and pelvic pain. Women who have failed medical therapy with persistent and debilitating symptoms may certainly benefit from these procedures. However, presacral neurectomy and uterine nerve ablation are distinct procedures that require appropriate patient selection in order to optimize pain relief. Whereas presacral neurectomy may be effective for both primary dysmenorrhea and endometriosis-related pelvic pain, the role of uterine nerve ablation should be reserved for patients with primary dysmenorrhea only, as evidenced by several randomized trials.

1. Introduction

Historically, pelvic denervation procedures such as presacral neurectomy (PSN) and uterine nerve ablation (UNA) were performed as fertility-sparing surgical interventions for women with intractable pelvic pain and dysmenorrhea. PSN was first described over 100 years ago by Jaboulay in France and Ruggi in Italy in 1899. UNA via transection of the uterosacral ligaments was later pioneered by Doyle in 1955 [1]. The popularity of these procedures reached its peak in the 1960s, until the advent of effective medical therapies. With the introduction of oral contraceptive pills and non-steroidal anti-inflammatory drugs (NSAIDs), many women experienced significant pain relief and the need for these procedures sharply declined in the ensuing decades. However, approximately 20% to 25% of patients do not respond to medical therapy [2,3]. Pelvic denervation procedures remain a reasonable option for women whose symptoms are refractory to medical management and who do not want a hysterectomy.

Using minimally invasive techniques, both PSN and UNA can be performed safely and efficiently via the laparoscopic approach. Feste published the first case series of laparoscopic uterine nerve ablation (LUNA) in 1985 [4]. Perez subsequently reported the first case series of laparoscopic presacral neurectomy (LPSN) in 1990 [5]. With renewed interest in pelvic denervation procedures in recent years, we will review the anatomic principles, surgical techniques, and evidence for efficacy for the treatment of pelvic pain and dysmenorrhea relevant to PSN and UNA.

2. Neuroanatomy of pelvic pain

Most pain impulses from the upper vagina, cervix, uterus, inner third of fallopian tubes, and broad ligament travel through a predetermined pathway. Pain impulses from these sites enter

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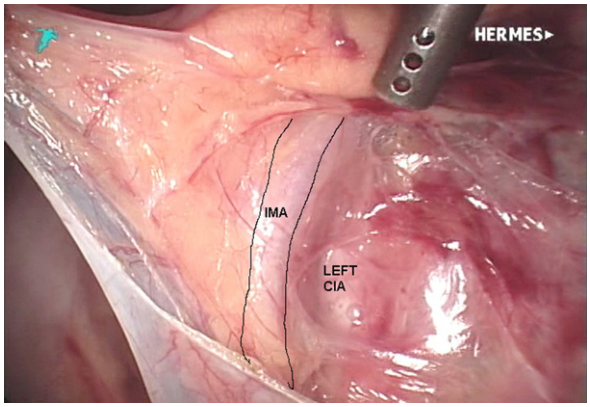

Figure 1 Left border of presacral neurectomy dissection. Abbreviations: IMA, inferior mesenteric artery; LEFT CIA, left common iliac artery.

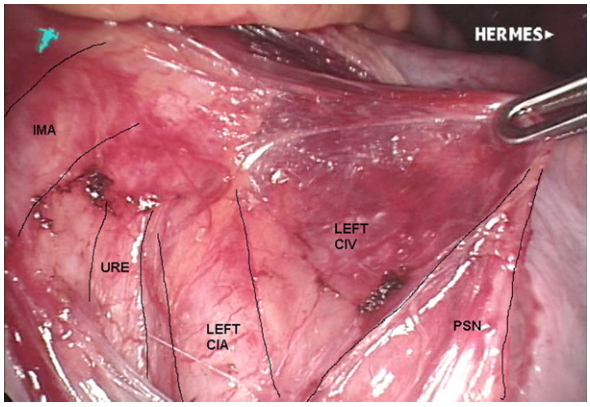

Figure 2 Relationship of inferior mesenteric artery and surrounding structures with retraction of peritoneal edge. Abbreviations: IMA, inferior mesenteric artery; URE, ureter; LEFT CIA, left common iliac artery; LEFT CIV, left common iliac vein; PSN, presacral nerve.

the right and left pelvic plexus, travel through the hypogastric nerves which unite to become the superior hypogastric plexus, and enter the spinal cord via the sympathetic chain. An alternate pain impulse pathway travels through the parasympathetic fibers of the pelvic plexus. Sensory impulses from the ovary and outer two-thirds of fallopian tubes travel along the ovarian vessels, eventually bypassing the superior hypogastric plexus. Many pain impulses from the upper rectum, sigmoid colon, bladder dome, and lower ureter share a similar pathway to the midline pelvic structures and ultimately join the superior hypogastric plexus.

3. Surgical technique: Laparoscopic uterine nerve ablation

UNA is accomplished by coagulating the uterosacral ligament with either unipolar or bipolar energy, followed by transection or excision of the uterosacral ligament, approximately 0.5 cm from its insertion to the posterior cervix. Modification of this technique using a CO_2 laser can also be performed. By staying close to the cervix, the risk of injury to the ascending branch of the uterine artery and the ureter can be potentially reduced. The ureter is situated approximately 1–1.5 cm lateral to the uterosacral ligament and can easily be injured without proper identification, especially if the anatomy is distorted by endometriosis or fibrosis. Another potential structure at risk for injury is the rectum, particularly in the setting of cul-de-sac obliteration associated with endometriosis.

4. Surgical technique: Laparoscopic presacral neurectomy

For the advanced laparoscopic surgeon performing PSN, a thorough understanding of the presacral vascular anatomy and anatomic landmarks of the procedure is mandatory. A vertical peritoneal incision is made between the sacral promontory and the aortic bifurcation. One must ensure that the peritoneum is elevated and retracted laterally to avoid injury to the underlying vasculature. The first cord-like structure parallel to the left peritoneal edge is the rectal branch of the inferior mesenteric artery (IMA). The IMA is perhaps the most important anatomic landmark for PSN. Since it crosses over both the left common iliac vein (LCIV) and artery (LCIA), it serves as the left border of the dissection (Fig. 1). Occasionally, the left ureter can be seen under and lateral to the IMA. Additional dissection lateral to the IMA is not necessary. When the left edge of the peritoneal incision is reflected laterally, the IMA remains attached to the peritoneum (Fig. 2). Dissection between the IMA and the peritoneum usually results in bleeding which will obscure the rest of the dissection. Rather, by developing the avascular space between the IMA and LCIV, the border of the LCIV, which is essentially a midline structure, can be defined in relation to the sacrum (Figs. 3 and 4).

The presacral nerve, or superior hypogastric plexus, typically exists as a plexus of nerve fibers. It is a single trunk in 20% of anatomic dissections. The presacral nerve lies to the left of midline in approximately 75% of patients, and is observed as a midline structure in 25%; it is not typically found to the right of midline [6].

The dissection on the right side is relatively easier. The right common iliac artery (RCIA) and ureter are anatomic landmarks for the dissection on the right side. The right

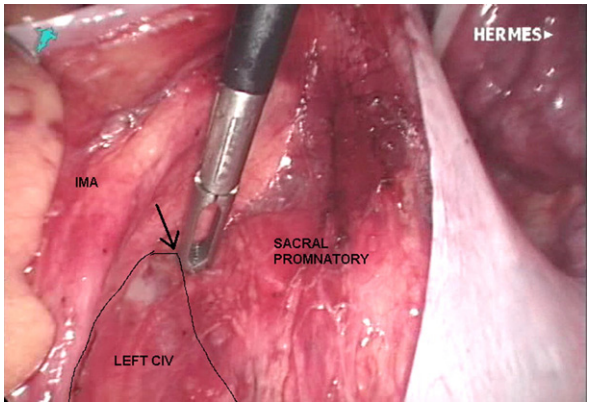

Figure 3 Entry into avascular space (arrow) between inferior mesenteric artery and left common iliac vein. Abbreviations: IMA, inferior mesenteric artery; LEFT CIV, left common iliac vein.