

Nerve-Entrapment Syndromes From Lower Abdominal Surgery

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Patients with a complaint of lower abdominal pain and a history of lower abdominal surgery, particularly inguinal herniorrhaphy, appendectomy, and procedures incorporating a Pfannenstiel incision, should have nerve entrapment considered in the differential diagnosis. Careful history and physical examination in conjunction with selected use of the ilioinguinal-iliohypogastric nerve block can confirm the diagnosis of nerve entrapment and preclude an unnecessary workup of these patients. Of the patients with nerve entrapment, most will experience complete relief of symptoms following serial injections and require no further treatment. The remainder will experience only temporary relief and require surgical interruption of the nerve involved. In those patients who obtain no relief from the nerve block, further workup for a source of their pain is warranted. Most of these patients were found to have a subclinical recurrence of an inguinal hernia.

Nerve entrapment is a recognized complication of such common lower abdominal surgery as inguinal herniorrhaphy, appendectomy, and procedures incorporating a Pfannenstiel incision such as cesarean section and abdominal hysterectomy.

A patient who develops lower abdominal pain at a time remote from an episode of lower abdominal surgery is likely to consider this pain unrelated to the surgery and consult his primary care physician first. Unless nerve entrapment is considered in the differential diagnosis, the patient may be subjected to a costly and invasive workup that will fail to identify both the source of pain and a treatment that will effect relief.

The purpose of this paper is to discuss the presentation of nerve-entrapment syndromes and to describe an easy approach to their early identification, diagnosis, and treatment by the primary care physician.

PRESENTATION

The symptoms of nerve entrapment may begin in the immediate postoperative period, within the first year fol-

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lowing surgery, or many years after the surgery was performed.

Early on, the patient will complain of intermittent sharp twinges that radiate from the incision site into the distribution of the nerve involved (Figure 1). These twinges are initially exacerbated by activity and relieved with rest; however, in time they can progress into a constant, dull, burning, gnawing pain.¹⁻³

Patients who have suffered these symptoms for a long time often appear distraught, with complaints out of proportion to the physical findings and a demeanor that suggests that the patient is neurotic. This classical group of findings should alert the clinician to the possibility of nerve entrapment.

A subset of patients may present with evidence on the physical examination of disuse atrophy in muscle groups they have favored or other organic changes due to the avoidance of those maneuvers that exacerbate the pain, but this finding is rare.³

ANATOMY AND PATHOPHYSIOLOGY

Generally, there are three nerves associated with nerve-entrapment syndromes from lower abdominal surgery; the ilioinguinal, the iliohypogastric, and the genitofemoral nerves.

Nerve entrapment is believed to be the result of nerve injury, be it the incision of a nerve with neuroma for-

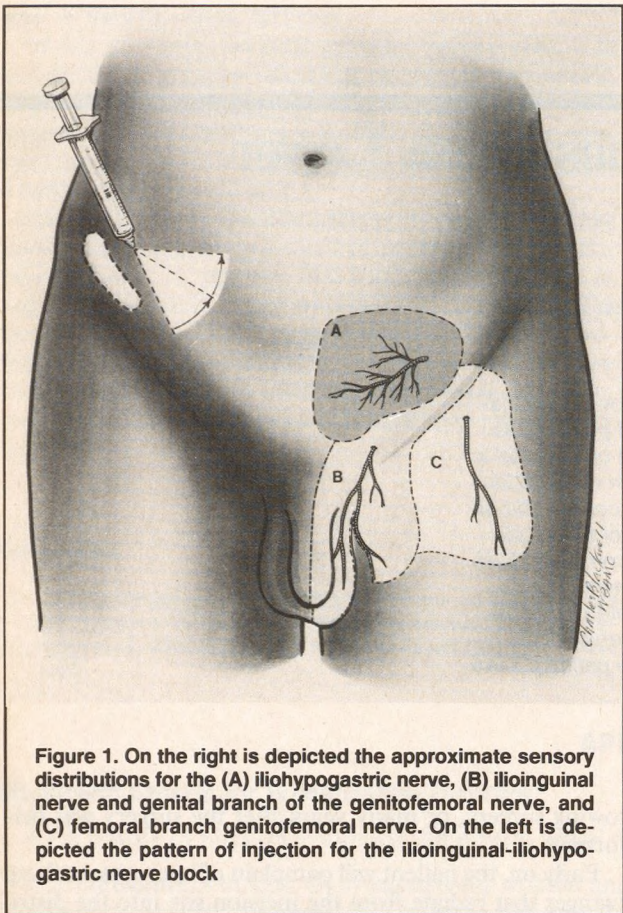


Figure 1. On the right is depicted the approximate sensory distributions for the (A) iliohypogastric nerve, (B) ilioinguinal nerve and genital branch of the genitofemoral nerve, and (C) femoral branch genitofemoral nerve. On the left is depicted the pattern of injection for the ilioinguinal-iliohypogastric nerve block

mation, the incorporation of a nerve by suture in a closure, or the tethering of a nerve in the scar of healing.

The ilioinguinal and iliohypogastric nerves arise from a common trunk. They pierce through the transverse muscle of the abdomen as separate nerves at a point medial and inferior to the anterior superior iliac spine and then run a parallel course within the internal oblique muscle in an inferomedial direction.

The ilioinguinal nerve runs laterally and joins the spermatic cord in the man and the round ligament in the woman at the internal ring. It travels with this structure through the inguinal canal, out the external ring, and into the subcutaneous tissue, where it provides sensation to the skin in the inguinal region, the upper inner aspect of the thigh, and the hemiscrotum in the man or the labium in the woman.²⁻⁵

Entrapment of the ilioinguinal nerve following herniorrhaphy is the most common and well described of all the nerve-entrapment syndromes. In a medical center practice one may expect to see 12 cases per year, of which two to three will require surgical intervention.

The iliohypogastric nerve runs medially and pierces through the external oblique aponeurosis at the medial crus of the external ring, where it enters the subcutaneous

tissue to provide sensation to the skin overlying the pubis.^{4,5}

Entrapment of the iliohypogastric nerve has only been recently described as a complication of the Pfannenstiel incision.^{6,7} It was identified in nine patients over a 15-month period in a medical center practice. Four of the nine patients treated required surgical intervention.⁶ Entrapment of this nerve may be recognized as a more common entity now that it has been described.

Entrapment of the ilioinguinal and iliohypogastric nerves following other procedures that entail low transverse muscle-splitting incisions, such as appendectomy and oophrectomy, are less common. Approximately two cases of this per year can be expected in a medical center practice.⁷

The genitofemoral nerve divides on the anterior surface of the psoas muscle into two branches. The genital branch joins the spermatic cord in the man and the round ligament in the woman at the internal ring and runs along the posterior surface of this structure ultimately to provide sensation to the upper inner aspect of the thigh, the hemiscrotum in the man, or the labium in the woman. The femoral branch passes under the inguinal ligament with the external iliac artery and becomes encased in the femoral sheath (lying anterior and lateral to the artery). It ultimately provides sensation to the skin of the anterior proximal thigh.^{4,5}

Entrapment of the genitofemoral nerve is very rare and is usually associated with an adhesive or inflammatory process over the psoas muscle as might occur following rupture of a retrocecal appendix, a right colon mobilization, or an ileocectomy. Case reports implicating local injury to individual nerve fibers have been reported but are rarer still.¹

DIAGNOSIS AND TREATMENT

Patients who present with a complaint of lower abdominal pain and a history of surgery are questioned to determine the characteristics of the pain and its distribution. They are examined for evidence of hernia in the incision site, and in the patients with previous inguinal herniorrhaphy, for recurrence. If no hernia is identified, an ilioinguinal-iliohypogastric nerve block is performed.

If the block relieves the symptoms, then the entrapment of one of these two nerves is implicated. The patients are followed weekly and are reinjected if the symptoms recur. The majority of patients are cured with one or up to three nerve blocks. Patients who have recurrent symptoms after three injections are considered for surgical nerve interruption.

If the block does not relieve the symptoms, then a workup to identify another source is warranted. At William Beaumont Army Medical Center, four such patients were found on reexploration to have incarceration of preperitoneal fat in a small subclinical recurrent hernia.

The diagnosis of genitofemoral nerve entrapment should be a diagnosis of exclusion. Patients with an appropriate history who receive no relief with the ilioinguinal-iliohypogastric nerve block on two attempts and on workup have no other identifiable source for the pain should be considered for surgical interruption of both branches of the nerve where they overlie the psoas muscle.¹

METHOD OF INJECTION

The ilioinguinal-iliohypogastric nerve block is a simple office procedure that can be performed in under five minutes using a standard 8-cm, 25-gauge spinal needle and a 2:1 mixture of 0.5 percent bupivacaine and 1.0 percent lidocaine without epinephrine.

The patient lies supine exposed from the umbilicus to the upper thigh. The skin is prepared with alcohol, and the needle is inserted and guided with a gloved hand beneath the external oblique aponeurosis at a point 3 cm medial and 3 cm inferior to the anterior superior iliac spine, where 1 mL of the anesthetic is injected. Then the needle is advanced inferomedially toward the pubic tubercle. On withdrawal, 3 mL of the anesthetic is injected with steady pressure. Without being removed, the needle is redirected and another 3 mL is injected on withdrawal. This sequence is repeated until in three or more passes a fan-shaped distribution of the anesthetic has been accomplished (Figure 1). The patient should experience immediate relief of symptoms if the injection is successful.

COMMENT

The symptom progression seen in patients with nerve-entrapment syndromes resembles the response pattern of pain receptor fibers subjected to chronic stimulation.

Unlike other sensory receptors, pain receptors are non-adaptive to continuous or repeated stimulation and can even lower their threshold for excitation when continuously stimulated. This characteristic results in an increase in their sensitivity, termed *hyperalgesia*. Until the stimulus is removed, the cascade of transmissions from the receptor continues, and the perceived intensity of the pain increases.⁸⁻¹⁰

The phenomenon of permanent or even long-term cure following injection of anesthetic is not well understood. It is possible by the above model to hypothesize that the nerve block allows the threshold of stimulation to reset to its original level at a time when the ongoing stimulation is subliminal to this level. In this way, though the stimulation is still present, it does not trigger the conduction of a pain impulse.

References

1. Harms BA, DeHaas DR, Starling JR: Diagnosis and management of genitofemoral neuralgia. *Arch Surg* 1984; 119:339-341
2. Nyhus LM, Condon RE: *Hernia*. Philadelphia, JB Lippincott, 1978, pp 36-37, 267-268
3. Koppel HP, Thompson WA, Postel AH: Entrapment neuropathy of the ilioinguinal nerve. *N Engl J Med* 1986; 266:16-19
4. Gray H, Goss C (eds): *Anatomy of the Human Body*. Philadelphia, Lea & Febiger, 1976, p 986
5. McVay CB: *Anson and McVay Surgical Anatomy*. Philadelphia, WB Saunders, 1984
6. Sippo WC, Burghardt A, Gomez AC: Nerve entrapment following Pfannenstiel incision. *Am J Obstet Gynecol* 1987; 157:420
7. Grosz CR: Iliohypogastric nerve injury. *Am J Surg* 1981; 142:628
8. Mountcastle VB: *Medical Physiology*, ed 13. St Louis, CV Mosby, 1974, pp 351-354
9. Guyton AC: *Textbook of Medical Physiology*. Philadelphia, WB Saunders, 1976, pp 665-668
10. Sola AE: Myofascial trigger point therapy. *Res Staff Physician*, August 1981, pp 38-45