Exploratory laparoscopy is often used in women with chronic pelvic and abdominal pain, but negative findings are often reported. This article describes how better physical exams and diagnosis can often eliminate an unnecessary surgery.

About 35% of women with chronic abdominal pain will have no apparent pathology laparoscopically. Unfortunately, many physicians consider laparoscopy the ultimate or definitive diagnostic evaluation of pelvic pain and, when the findings are negative, may make one or more of the following statements to their patients:
1. There is nothing wrong.
2. The pain is in your head and you should see a psychiatrist or psychologist.
3. You should have a neurolytic procedure, such as uterine nerve transection or presacral neurectomy.
4. The only thing that is left to do is hysterectomy.
5. Nothing can be done and you must learn to live with the pain. ¹ (Howard)

The care of women will be improved if diagnostic techniques are used which can reduce the frequency of negative laparoscopies. One very useful technique for reducing negative laparoscopies is to utilize techniques developed for the diagnosis of causes of rectus abdominus pain.

Rectus abdominus pain or rectus syndrome is somatic pain originating from the rectus abdominus musculature of the abdomen. The first clear description of abdominal wall pain originating from structures other than the viscera was provided in 1919 by Cyriax.² (Cyriax) He was convinced that in a number of cases “the diagnosis of referred pain of visceral disease is erroneous.” He thought that such pains could be mimicked by lesions that affected the vertebra, ribs, or other associated muscles, or that they were the result of direct irritation of nerves in the intercostal spaces. By identifying conditions such as alterations in the normal vertebral curves, minor subluxation of vertebral, and pressure on the peripheral portions of the intercostal nerves, he was able to employ various mechanical treatments to correct the abnormalities and relieve his patients’ symptoms.¹,²

Despite Cyriax’s work, little attention was paid to the identification of parietal lesions until the observations of Carnett in 1926.³ Carnett recognized the diagnostic problems posed by abdominal wall lesions and maintained that abdominal pain could be caused by neuralgia affecting one or more of the lower six intercostal nerves. To distinguish this condition from intraabdominal diseases, he developed a simple test that, when positive, localized the origin of symptoms to the parities rather than the viscera. (Fig 1)

**Figure 1: Carnett’s test.** Carnett’s test is used to differentiate symptoms originating from the parities from those arising from the viscera. The abdomen of the supine patient is palpated to elicit the area of tenderness. Then, with the palpating finger still located over the tender spot, the patient is asked to contract the abdominal muscles by raising the head from the examining table. Once the muscles are tensed, pressure is reapplied and the patient is asked if the pain has altered. If the cause of the symptoms is intraabdominal, the tense muscles now protect the viscera and the tenderness should be diminished. On the other hand, if the source resides in the abdominal wall, the pain will be at least as severe or, perhaps, increased.
**Fig. 1 Carnett’s Test**
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When the Carnett test is positive, the pain is generally from the parities and when it is negative pain is from the viscera. False positives, however, can occur with inflammation in the adjacent parietal peritoneum. If there is a positive test and local anesthetic is injected and the pain is abolished, the pain is generally of abdominal wall origin, however.⁴,⁵,⁶

Abdominal wall pain can occur from hernias, nerve entrapment syndrome, irritation of intercostal nerve roots, anterior cutaneous nerve entrapment, rib-tip syndrome, myofascial pain and trigger points, or rectus sheath hematomas.⁴,⁵,⁶
Iatrogenic Peripheral Nerve Injuries
A prior surgical procedure is one of the commonest causes of abdominal wall pain. Where the incision directly involves a cutaneous nerve, subsequent entrapment of that nerve may occur either in a suture or in later scar formation. The ilioinguinal and iliohypogastric nerves are particularly at risk in lower abdominal incisions. In addition to Carnett’s test, the following triad is diagnostic: (a) burning or shooting pains in the area supplied by the nerve; (b) impaired sensory function in the distribution of the nerve; and (c) relief of pain by infiltration with local anesthetic. Once recognized, treatment may be by local injection of steroids, local anesthetics or 5% phenol. Accurate placement of the injection is of paramount importance and may be improved by the use of a nerve stimulator. Should these measures fail, then exploration of the scar should be considered. The involved nerve is traced laterally to where it leaves the retroperitoneum and is then sectioned. The subsequent neuroma that forms generally produces no pain at this point. Cryoablation has also bee used as a technique to reduce the pain from iatrogenic nerve injuries.

Abdominal Cutaneous Nerve Entrapment
A nerve entrapment syndrome may occur without prior surgical damage. Well-localized areas of abdominal tenderness may occur lying along the lateral margin of the rectus muscle. Such areas are produced at sites where the anterior cutaneous branch of an intercostal nerve passes through the rectus muscle to pierce the anterior sheath; in this position it may become intermittently compressed, producing pain that may mimic the pain normally associated with conditions such as biliary or renal colic. Patients suffering from this syndrome will obtain relief from the local anesthetic injection. A resection of the relevant nerve as it emerges from the rectus muscle may be necessary.

Hernias
The majority of abdominal wall hernias are apparent on clinical examination, with the presence of a lump with an expansile cough impulse serving to make the diagnosis. However, some hernias elude detection, either because they are small or because the patient is obese. In cases where the diagnosis is suspected but clinically unconfirmed, additional investigation using radiography or ultrasonography may be helpful. Herniography, in which contrast medium is introduced into the peritoneal cavity, has been successfully used to reveal previously unsuspected inguinal hernias in patients with groin pain of uncertain origin and to detect impalpable interparietal lesions such as Spigelian hernias. By traction of associated nerve, hernias may cause pain along a nerve distribution.

It is important to note that there are multiple forms of hernias for which the patient needs to be evaluated. The hernias of the pelvic wall include: sciatic hernia; obturator hernia; perineal hernia. The groin hernias include: direct inguinal hernia; indirect inguinal hernia; femoral hernia; sports hernia. The hernias of the abdominal wall include: epigastric hernias; umbilical hernias; spigelian hernias; and incisional hernias. The support hernias are also important, such as vault prolapse, enterocele, cystocele, rectocele and uterine decensus, all of which can create problems with pain.

Myofascial Pain Syndromes
This group of syndromes is now well-described but continues to go unrecognized and remains poorly understood. The syndromes arise from the presence of trigger points in muscle or fascia. Such points are usually the result of antecedent trauma, and activity within them produces pain that may occur, for example, during muscle contraction. Diagnosis relies on finding the trigger spot, either by palpation or by eliciting certain physical signs such as a taut band if muscle fibers or localized twitch response when the involved part of the muscle is pinched. Treatment again rests on the acute injection of local anesthetic solution into the affected area. In some patients, several such areas may be present and require treatment.

The Rib Tip Syndrome
This syndrome, characterized by pain along the costal margin, is generated by the hypermobility of the eighth, ninth and tenth ribs. These ribs do not articulate with the sternum, but instead are bound to each other by a thin band of fibrous tissue. Should this fibrous attachment be divided, the rib may ride up and irritate the intercostal nerve to produce pain. The patient may be aware of a snapping or clicking sensation as the ribs move relative to one another, and the clinician can reproduce the
symptoms by hooking his or her fingers under the costal margin and pulling upwards. Relief can be provided by anesthetizing the relevant intercostal nerve with local anesthetic; but if symptoms persist, rib tip resection may be necessary.\textsuperscript{14}

**Abdominal Pain of Spinal Origin**

The complex arrangement of musculoskeletal structures that make up the vertebral column, along with the close that these bear to the nerve roots, can produce a variety of neurologic symptoms. When the normal anatomy is disturbed in such a way that the roots of the intercostal nerves are irritated, abdominal pain may result. In some cases the spinal origin of the pain will be made obvious by additional symptoms and signs, but in many patients with only minor degenerative disease the true etiology may escape identification. The diagnosis may be suspected by finding that the pain is aggravated by certain postures, by eliciting tenderness at the site of the pain which is increased by muscle contraction, and by observing posterior intercostal tenderness in the regions of the vertebral transverse processes. Intercostal nerve blocks have rendered pain-free 67\% of those patients who had confirmed diagnosis of pain of spinal origin.\textsuperscript{6,15}

**Spontaneous Rectus Sheath Hematoma**

Spontaneous rectus sheath hematoma is a condition resulting from rupture of the epigastric vessels. The patient usually presents suddenly with well-localized abdominal pain associated with a tender nonpulsatile abdominal mass, usually in the lower abdomen. There is frequently a plausible precipitating factor such as local trauma, a bout of coughing, or anticoagulant therapy. The diagnosis can be confirmed on ultrasound examination and a conservative approach to treatment can be adopted provided that the hematoma does not enlarge.\textsuperscript{16,17}

**Management and Treatment**

Once an area of abdominal wall pain tenderness has been identified, its position is localized as accurately as possible with a single fingertip.\textsuperscript{18} Provided that the clinical picture suggests no other course of action, the tender spot is injected with a mixture of 1 mL 1\% lignocaine and 25 mg hydrocortisone acetate using a 21-gauge needle. To start with, a small bleb is raised in the overlying the tender spot. The needle is then inserted, and its point is moved around the tissues until the patient complains of pain similar to the original symptom. The injection is made into that point and into the immediately surrounding area. Eighty percent of correctly diagnosed patients are completely or partially relieved of their pain by this treatment. Prolonged relief of pain is provided for 67\% of patients using an intercostal nerve block. Fifty-six percent of patients with parietal pain treated with local injections of 5\% aqueous phenol are pain-free or improved at follow-up 3.5 years after treatment.\textsuperscript{19} In one study, treatment of abdominal wall trigger points was performed by placing a 22-gauge, 1.5 in. needle through the skin at the trigger point and slowly penetrating the fat pad until the needle tip reproduced the same sharp pain. The abdominal wall trigger points were found in fatty tissues above the fascia or along the margins of the abdominal wall scar tissue. Injection of 3 to 5 mL of 0.25\% bupivacaine stimulated sharp and at times severe pain followed by relief. All trigger points were blocked beginning with the most tender points up to a total dose of 50 mL. Additional trigger points of the vulva, vagina, cervix and paracervical tissues were injected. Using these techniques a total of 89\% of patients with abdominal-pelvic pain syndrome reported relief or improvement in pain such that no further therapy was required.\textsuperscript{20} The efficacy of injecting the parities to relieve chronic abdominal symptoms has been well-documented.\textsuperscript{21}

It is important that the pain therapist become familiar with the Carnett test as a way to evaluate the abdominal wall in order to prevent unproductive surgical interventions and also to guide the us in the appropriate direction for evaluation of the patient with abdominal and pelvic wall pain.

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