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Introduction

- The abdominal examination in patients with chronic pain may often prove to be difficult. Pain can be referred from another organ system such as the gastrointestinal, genitourinary, as well as the gynecologic tracts in addition to presenting with visceral, somatic, or neuropathic pain. While the etiology of abdominal pain can be overwhelming, a careful history and systematic physical examination may aid in narrowing down the diagnosis. Red flags that should raise particular concern include fever, weight loss or anorexia, jaundice, edema, blood in urine or stool, abdominal mass, or pain that awakens the patient at night.

Physical Examination

- Examination should start with assessment of the patient's vital signs as well as examination of the eyes and skin for signs of jaundice. This

is followed by auscultation and percussion of the chest and abdomen for bowel sounds. Careful palpation of the abdomen should be done for any signs of masses, tenderness, and peritoneal signs. Rectal and pelvic examination by appropriate personnel should be included if suspicion arises for presence of occult blood or involvement of the gynecologic tract.

- Another potential cause of abdominal pain may include thoracic radiculopathy or radiculitis. The physical examination is not a reliable way to make this diagnosis although patients may present with localized paraspinal tenderness and sensory disturbance in a dermatomal pattern. The thoracic region does not lend itself to isolated muscle testing and physical examination is more helpful to rule out myelopathy secondary to a thoracic disc herniation [1].

Potential Sources of Abdominal Pain Due to Nerve Entrapments

Abdominal pain can be difficult to diagnosis and treat and by the time most patients end up in a pain clinic they have often undergone exhausting tests, imaging, treatments, and sometimes diagnostic abdominal surgeries. Between 10 and 30 % of patients with chronic abdominal pain will have chronic abdominal wall pain [2].

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- *Anterior abdominal cutaneous nerves (AACN)* arise from the nerve trunks of T7–T12. They pass anteriorly and inferiorly between the transversus abdominis and internal oblique muscles. These nerves give rise to the lateral and anterior cutaneous branches which can be affected in entrapment neuropathies. Typically the entrapment occurs at the level of the muscular foramen of the rectus abdominis muscle. Carnett's test is a maneuver that can help differentiate abdominal wall pain from visceral pain and indicates AACN entrapment. The test is performed with the patient supine and the patient is then asked to lift their head and shoulders off of the table and tense the abdominal wall muscles. Typically, intra-abdominal pain improves with this movement and abdominal wall pain worsens. Further, palpation of the abdomen during this maneuver with the location of a point of maximal tenderness indicates the level at which the nerve is affected. The treatment for such neuropathies includes transversus abdominis plane blocks or AACN nerve injections (see Chap. 87).
- *Ilioinguinal and iliohypogastric nerves* arise from the L1 and T12-L1 nerve roots respectively. These nerves arise from the lateral border of the psoas major muscle while coursing around the abdominal wall and penetrating the transverse abdominal and internal oblique muscles to innervate the hypogastric and inguinal region. The iliohypogastric nerve supplies sensation to the posterolateral gluteal skin and suprapubic skin while the ilioinguinal nerve supplies sensation over the penile root and upper scrotum in males and the skin covering the mons pubis and labia majora in females.
- *Genitofemoral nerve* is formed by the L1 and L2 nerve roots and often penetrates the psoas major muscle in which it then divides into the genital and femoral branch. The genital branch is partially responsible for the cremasteric reflex and also supplies sensation to the skin of the scrotum in males and mons pubis and labia majora in females. The femoral branch supplies sensation to the anterior aspect of the femoral triangle. Groin pain in the genitofem-

oral distribution with neuropathic pain may be an indication for nerve blockade.

- The ilioinguinal, iliohypogastric, and genitofemoral nerves are collectively known as the “border” nerves because these nerves supply the skin between the abdomen and thigh. These nerves are at risk of injury from lower abdominal incisions due to appendectomy, inguinal herniorrhaphy, or laparoscopic surgery. Patients may present with neuropathic pain in addition to groin pain that may extend to the scrotum or testes in men and to the labia in women.

Questions

1. Which nerve roots supply the genitofemoral nerve? L1 and L2 nerve roots
2. A patient is planning to undergo an inguinal herniorrhaphy, which nerve blocks would be most beneficial? Ilioinguinal and iliohypogastric nerve blocks
3. The ilioinguinal nerve can be found between which muscle planes? Internal oblique and transversus abdominus muscles

References

1. O'Connor RC, Andary MT, Russo RB, DeLano M. Thoracic radiculopathy. *Physical medicine and rehabilitation clinics of North America*. 2002;13(3):623–44.
2. Srinivasan R, Greenbaum DS. Chronic abdominal wall pain: a frequently overlooked problem. Practical approach to diagnosis and management. *AM J Gastroenterol*. 2009;97:824–30.

Suggested Reading

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