Chronic Abdominal Wall Pain: A Common Yet Overlooked Etiology of Chronic Abdominal Pain

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Learning Objectives: On completion of this article, you should be able to (1) detail the diagnostic work-up of a patient with suspected abdominal wall pain, (2) exhibit how to perform the Carnett's maneuver to assess for abdominal wall pain, and (3) develop a management plan for a patient with abdominal wall pain.

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Abstract

Chronic abdominal wall pain is a common, yet often overlooked, cause of chronic abdominal pain in both the outpatient and inpatient settings. This disorder most commonly affects middle-aged adults and is more prevalent in women than in men. In chronic abdominal wall pain, the pain occurs due to entrapment of the cutaneous branches of the sensory nerves that supply the abdominal wall. Although the diagnosis of chronic abdominal wall pain can be made using patient history, physical examination, and response to a trigger point injection, patients often undergo extensive and exhaustive laboratory, imaging, and procedural work-up before being diagnosed with this condition, given it is often overlooked. Carnett's sign is a specialized physical examination technique that can help support the fact that the abdominal pain originates from the abdominal wall rather than from the abdominal viscera. The mainstay of treatment consists of reassurance, activity modification, over-the-counter analgesic agent, and trigger point injection. In rare cases, treatment with chemical neurolysis or surgical neurectomy may be required.

 ■ Mayo Clin Proc. 2019;94(1):139-144

Chronic abdominal pain (CAP) is a commonly encountered condition across medicine and gastroenterology. Chronic abdominal pain encompasses a broad differential diagnosis, including both organic and functional disorders. Frequently, the underlying etiology is not immediately evident and patients undergo an extensive and exhaustive diagnostic work-up that involves laboratory, imaging, endoscopic, and surgical evaluation. The ensuing thorough work-up, while sometimes medically paramount, is often unnecessary and can lead to considerable health care costs and increase patient morbidity and mortality. Chronic abdominal wall pain (CAWP), often referred to as anterior cutaneous nerve entrapment syndrome, is a common cause of CAP that is often underrecognized and mistaken for visceral abdominal pain.[1] The diagnosis of CAWP is largely based on clinical history and physical examination. Early recognition of this condition allows physicians to offer reassurance and therapeutic interventions to patients while avoiding costly and potentially harmful diagnostic endeavors.

EPIDEMIOLOGY

Although the exact prevalence of CAWP is not known, it is estimated that this condition occurs in 1 in 1800 individuals in the general population.[1] More specifically, CAWP is the underlying diagnosis in 2% of all patients presenting to the emergency department with abdominal pain and in 10% of all patients with CAP in the outpatient setting.[1,2] Despite its widespread prevalence, physicians may not suspect or consider this diagnosis and often prescribe acid suppression therapy for dyspepsia or gastroesophageal reflux disease instead.[3] Chronic abdominal wall pain can affect patients of all ages, but most commonly presents in the fifth and sixth decades of life and is 4 times more prevalent in women than in men.[3] Comorbid disorders commonly seen in patients with CAWP include obesity (38.1%), gastroesophageal reflux disease (27.1%), irritable bowel syndrome (21.8%), and fibromyalgia (9.9%).[3] The pain is localized to the right upper quadrant in 40% of cases, while pain superior to the umbilicus represents the second most common location.[3]

PATHOGENESIS

Chronic abdominal wall pain occurs because of the entrapment of the cutaneous branches of sensory nerves that supply the abdominal wall.[4] The pain is often localized in nature, as it is mediated by A delta nociceptors; in contrast, visceral pain is diffuse and involves C-type nociceptors.[5] Cutaneous branches of the T7 through T12 nerve roots extend anteriorly from the spine toward the rectus sheath through a fibrous ring in the posterior sheath of the rectus abdominus.[4] These cutaneous nerves travel in a neurovascular bundle surrounded by a collection of fat that serves to reduce friction and allow seamless sliding of the nerve.[4] However, pain can occur if this fat is disrupted, herniated, or compressed. Mechanical abnormalities such as tissue edema, fibrosis, or scarring can result in entrapment of the nerves as they pass through the fibrous ring.[2] In particular, patients with a history of abdominal surgery are at higher risk of developing CAWP because of mechanical scarring and compression. Moreover, pregnancy and oral contraceptives may be risk factors for CAWP because of hormone-induced fluid retention or redistribution in the abdominal wall that may lead to nerve entrapment at sites of previous abdominal operations.[6,7]

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of CAP is vast, as abdominal pain can originate from various visceral and parietal pain sources. A carefully elicited patient history and detailed physical examination remain of the utmost importance in narrowing the differential diagnosis and guiding additional diagnostic testing. Chronic abdominal wall pain has several characteristic clinical features, as outlined below, that help differentiate it from other etiologies of CAP. Two key clinical features of CAWP are that it is typically well-localized and positional in nature. Other conditions that can present similarly to CAWP include abdominal wall hernias, abdominal wall endometriosis, slipping rib syndrome, thoracic radiculopathy,

Mayo Clin Proc. ■ January 2019;94(1):139-144 ■ https://doi.org/10.1016/j.mayocp.2018.09.018
www.mayoclinicproceedings.org

postherpetic neuralgia, and iliocostal impingement syndrome.

Hernias and endometriosis of the abdominal wall can also present with localized pain and tenderness to palpation. However, these disorders can be differentiated from CAWP that is secondary to anterior cutaneous nerve entrapment, as patients with hernias or endometriosis of the abdominal wall typically exhibit a palpable mass or fullness on abdominal examination.[8] Slipping rib syndrome occurs because of hypermobility of ribs 8 through 12 and should be suspected in patients with upper abdominal pain that has a positional component and a positive hooking maneuver on examination.[9] The hooking maneuver consists of the clinician placing his fingers in the subcostal area and pulling anteriorly with pain or clicking indicating a positive test result.[9] Patients with thoracic spinal canal or foraminal disease are at risk of thoracic radiculopathy that can result in referred abdominal pain if the T7 through T12 nerve roots are involved.[8,10] Patients with diabetes can also develop spontaneous thoracic radiculopathy. Iliocostal impingement syndrome, also known as iliocostal friction syndrome, classically occurs in patients with kyphosis and osteoporosis when there is contact between the inferior ribs and the ilium, which can lead to abdominal, flank, or back pain.[11] Those with postherpetic neuralgia will often recall an active case of shingles, but even if that is not the case, tenderness tends to follow dermatomal segments and is superficial, with notable allodynia.

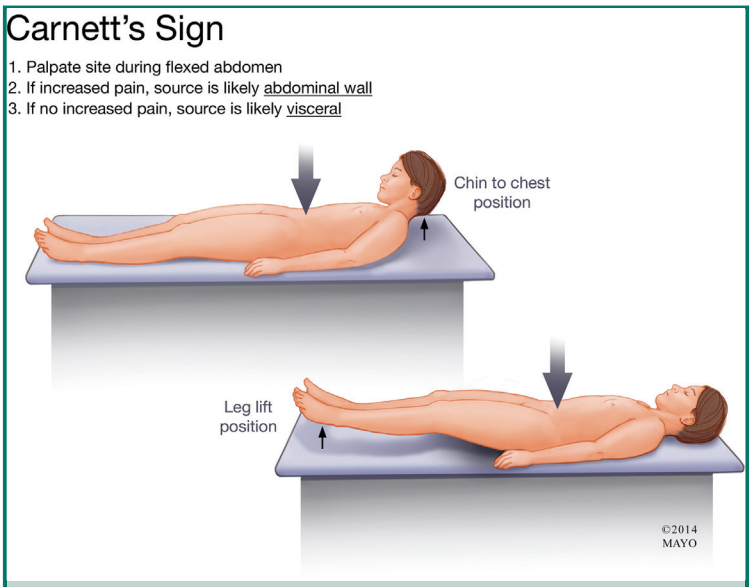
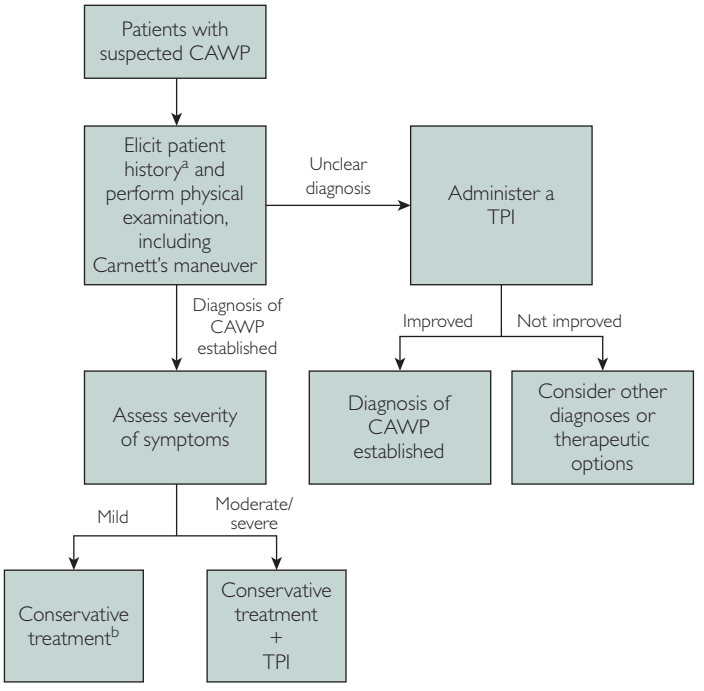


FIGURE 1. Presence of Carnett's sign can be used to diagnose chronic abdominal wall pain. Used with permission of Mayo Foundation for Medical Education and Research. All rights reserved.

DIAGNOSIS

As outlined above, the evaluation of patients with CAP begins with eliciting a comprehensive history. The patient history should include the chronicity, onset, description, and intensity of symptoms along with exacerbating and alleviating factors. Patients with CAWP classically present with chronic, sharp pain that is localized to a focal part of the abdomen.[2] The pain worsens with actions that tense the abdominal muscles, such as standing, sitting, or coughing, and may improve in the supine position. Patients should be asked about their medical history, as patients with CAWP often tend to have a history of abdominal surgeries, and the pain may be localized near a scar. The social history should focus on patient work description and recreational activities to identify any potentially reversible lifestyle triggers. An exhaustive review of systems should be performed to identify any alarm symptoms, such as fever, unintentional weight loss, dysphagia, persistent vomiting, sudden change in bowel habits, hematemesis, melena, hematochezia, and a family history of gastrointestinal cancers or diseases (such as inflammatory bowel disease or celiac disease). Patients with alarm features are more likely to have an organic disorder of the digestive tract rather than CAWP.

The next step in the evaluation of such patients is to perform a thorough physical examination, including a detailed abdominal examination. A rectal examination may also be necessary, depending on the patient history. Patients with CAWP are typically able to point to the area of maximal tenderness with 1 finger. The presence of a positive Carnett's sign can be assessed using a 2-step examination technique and should be done in all patients suspected of having



[a]Patient history should assess for alarm symptoms including fever, unintentional weight loss, dysphagia, persistent vomiting, sudden change in bowel habits, hematemesis, melena, hematochezia, and a family history of gastrointestinal cancers or disorders.
[b]Conservative treatment consists of reassurance, lifestyle modification, and physical therapy.

FIGURE 2. Diagnostic and treatment algorithm for patients with chronic abdominal wall pain (CAWP). TPI = trigger point injection.

CAWP (Figure 1). The clinician first identifies and palpates the area of maximal tenderness while the patient is in a resting supine position (step 1). The patient is then asked to raise both legs off the examination table or raise their head and shoulders off the bed so as to tense the abdominal muscles while the clinician palpates the abdomen (step 2). The Carnett's maneuver is considered positive when palpation of the abdomen in the tense position elicits the same or more tenderness as the resting position. The patient is then allowed to relax the abdominal musculature, and tenderness typically lessens. The positive and negative likelihood ratios of Carnett's sign for CAWP are 2.62 and 0.23, respectively.[12]

It may be reasonable to perform basic laboratory tests in patients presenting with nonspecific CAP, including complete blood count, electrolyte panel, creatinine level, calcium level, liver biochemistries, lipase level, C-reactive protein level, and thyroid-stimulating hormone level. However, any laboratory and/or imaging tests should be guided by patient history and physical examination. Patients with alarm symptoms should undergo further testing to rule out organic causes of their symptoms. In patients in whom the diagnosis remains unclear but CAWP seems likely, a trigger point injection (TPI) can help confirm the diagnosis of CAWP, as some patients have immediate relief of their symptoms after injection with an anesthetic agent.[13] For that reason, a TPI has both diagnostic and therapeutic benefits. Therefore, the diagnosis of CAWP can be made when a patient presents with well-localized pain over a small part of the abdomen, exhibits a positive Carnett's sign, and has a good response to a TPI.

TREATMENT

The mainstay of treatment of CAWP consists of reassurance, activity modification, physical therapy, and pain relief. A diagnostic and treatment algorithm for patients with CAWP is outlined in Figure 2. The first and perhaps most important step in the management of patients with CAWP is to provide reassurance that although symptoms can be quite painful and disabling, they are typically nonprogressive and have no long-term health sequelae. Activity modification involves eliminating potential triggers for the abdominal pain, such as vigorous exercises that tense the abdominal muscles or lifting excessive weights. An abdominal binder may be helpful in patients in whom applying gentle hand pressure to the abdomen provides relief. Physical therapy can increase the strength, mobility, and flexibility of abdominal muscles and help decrease the intensity of pain.[14] Reassurance and activity modification can often help allay patient concerns and suffice as the sole treatment in those with mild symptoms.[2]

For patients with moderate to severe symptoms, pain relief is typically achieved with a TPI using an anesthetic agent with or without a glucocorticoid. The clinical

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response is better with combination therapy than with an anesthetic agent alone.[15] A commonly used combination consists of 2 mL of 1% lidocaine and 0.5 mL of betamethasone administered to the site of maximal tenderness. Before referring patients for TPI, physicians should review patient allergies to ensure that the patient does not have an allergy to the medications present in the TPI. A comparison between pain relief with a saline injection and that with an anesthetic agent revealed that the latter was superior, arguing against a placebo response.[16] Pain relief with a TPI can begin within a few hours because of lidocaine, but may take several days to achieve full effect with the corticosteroid. Patients with partial relief of symptoms or recurrent symptoms after complete remission following 1 TPI could be offered a second injection 1 month after the first. Approximately a quarter to one-third of patients have lasting relief after a single TPI and one-half to three-fourths have sustained, long-term, partial or complete response after multiple TPIs.[15,17,18]

Ultrasound-guided TPI can be more costly than blind TPI, but may offer improved accuracy of injection and decreased risk of injecting into the peritoneal cavity. A TPI may be difficult to perform in obese patients, and a longer TPI needle may be required in these cases.[19] In addition, the use of ultrasound guidance in obese patients may help ensure that the depth of needle insertion is adequate. Although TPIs are generally considered a low-risk procedure and antiplatelet agents, including aspirin and clopidogrel, do not need to be discontinued for the procedure, careful consideration should be given if the patient is receiving dual antiplatelet therapy.[20] Shared assessment and risk stratification should be performed regarding anticoagulation management with warfarin or direct oral anticoagulants before the procedure.[20] The depth of needle insertion may affect the risk of bleeding and should also be taken into consideration.

Other adjunctive treatment alternatives to TPIs may include the use of heating pads and lidocaine patches. Systemic therapy may include nonopioid analgesic agents (acetaminophen and nonsteroidal anti-inflammatory drugs), antiepileptic agents (gabapentin and pregabalin), and low-dose tricyclic antidepressants (amitriptyline), although these confer limited benefit given the underlying disease pathogenesis.[21]

Notably, if patients fail to respond after the above interventions, other etiologies of CAWP should be considered and evaluated. Some patients may exhibit a positive Carnett's sign, but may not respond to treatment with a TPI.[18] Other patients with CAWP may have symptoms that are responsive, but recur despite treatment with multiple TPIs. In patients with refractory symptoms despite treatment with 3 TPIs administered to the same site in 1 year, chemical neurolysis with aqueous phenol or surgical treatment with neurectomy can be considered.[22,23]

CONCLUSION

Chronic abdominal wall pain is a common, yet often overlooked cause of CAP in adults. In most cases, the diagnosis can be made on the basis of patient history and physical examination. However, a large number of patients undergo extensive laboratory, imaging, and procedural testing with negative results before being diagnosed with CAWP. The Carnett's maneuver should be performed in all patients suspected of having CAWP, as it can help distinguish between CAWP and intra-abdominal pain. The mainstay of treatment consists of reassurance, activity modification, physical therapy, and pain relief with a TPI.

Abbreviations and Acronyms: **CAP** = chronic abdominal pain; **CAWP** = chronic abdominal wall pain; **TPI** = trigger point injection

Potential Competing Interests: Dr Oxentenko serves on the Board of Trustees for the American College of Gastroenterology, but receives no financial compensation for that role. The other authors report no competing interests.

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