Anterior cutaneous nerve entrapment syndrome in children

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Abstract

Question I frequently see adolescents with recurrent abdominal pain in my family medicine clinic. While the diagnosis frequently is a benign condition such as constipation, I recently heard that after 2 years of recurrent pain, an adolescent was diagnosed with anterior cutaneous nerve entrapment syndrome (ACNES). How is this condition diagnosed? What is the recommended treatment?

Answer Anterior cutaneous nerve entrapment syndrome, first described almost 100 years ago, is caused by entrapment of the anterior branch of the abdominal cutaneous nerve as it pierces the anterior rectus abdominis muscle fascia. The limited awareness of the condition in North America results in misdiagnosis and delayed diagnosis. Carnett sign—in which pain worsens when using a "hook-shaped" finger to palpate a purposefully tense abdominal wall—helps to confirm if pain originates from the abdominal viscera or from the abdominal wall. Acetaminophen and nonsteroidal anti-inflammatory drugs were not found to be effective, but ultrasound-guided local anesthetic injections seem to be an effective and safe treatment for ACNES, resulting in relief of pain in most adolescents. For those with ACNES and ongoing pain, surgical cutaneous neurectomy by a pediatric surgeon should be considered.

Recurrent chronic abdominal pain is common among children and adolescents, and diagnosis may be challenging.[1] Abdominal pain may disrupt daily routines for patients and their families[2] and impact their quality of life.[1] The pathology leading to acute and chronic abdominal pain in children, especially pain in the abdominal wall, may be difficult to classify.[3] Common reasons for severe pain include gastroenteritis, constipation, and systemic viral illness. More severe illnesses needing immediate attention are appendicitis, intussusception, cholecystitis, pancreatitis, testicular or ovarian pain (torsion), entrapped (incarcerated) hernias, and chronic appendicitis.[4,5]

Forgotten diagnosis

One diagnosis frequently overlooked in both adults and adolescents is anterior cutaneous nerve entrapment syndrome (ACNES), first described almost 100 years ago.[6] In this condition, considered by some to be "the forgotten diagnosis,"[7] the anterior branch of the abdominal cutaneous nerve, coming from intercostal nerves T7 to T12, is entrapped as it pierces the anterior rectus abdominis muscle fascia and anatomically turns 90°.[8] When these nerves are compressed, they are subjected to ischemia or irritation resulting in pain that is usually aggravated by abdominal muscle contraction.[9] While adults can rather specifically point to pain over the anatomic point at which the nerve is compressed,[9] children do not usually provide a clear description of the location of pain.

The diagnosis of ACNES is not well recognized in North America, and available publications suggest incidence among adults of between 2% of patients presenting with acute abdominal pain to an emergency department in the Netherlands,[10] 10% of adult patients with chronic idiopathic abdominal pain seen in gastroenterologic practices,[11] and up to 10% to 30% of patients with chronic abdominal wall pain.[12] Some case reports of children 9 to 16 years of age have documented the condition in several countries,[13,14] and among 48 adolescents with ACNES at Boston Children's Hospital in Massachusetts, 9 required surgery.[15]

The limited awareness of the condition results in misdiagnosis of conditions in which pain arises from a visceral source, often resulting in unnecessary diagnostic testing, ongoing pain, and considerable cost.[11] Some children were considered to have functional abdominal pain[16] or mental health–related conditions that resulted in delays in definitive diagnosis.[9]

While reported to be associated with previous surgeries and adhesions, most pediatric patients with the condition do not have a history of surgery. In some, ACNES seems to be associated with sporting events antecedent to onset of pain,[15] but by far most patients do not report any trauma to the abdominal wall.

Characterization of the pain in children may vary, but frequently children will report sharp stabbing pain that increases with use of the abdominal muscles, as well as some dysesthesia. They may also report dull pain that is aggravated when standing or walking and alleviated when lying down. Carnett sign[17] helps to confirm if pain originates from the abdominal viscera or from the abdominal wall.[18] To test the sign the child is placed in a supine position and raises the head and shoulders,[19] and the clinician deeply palpates with a "hook-shaped" finger the area of nerve entrapment, in the lateral aspect of the rectus abdominis muscle. Some clinicians will ask the patient to first raise their legs when palpating the lower part of the abdomen, and then ask the patient to raise their head when palpating the upper part of their abdomen, to differentiate between pain originating from

intercostal nerves T10 to T12 and T7 to T10, respectively. If Carnett sign is positive, pain worsens and the abdominal wall tenses upon palpation.

Treatment for ACNES

Managing pain in children with ACNES is important in order to provide relief and may also help confirm the diagnosis. In adults, acetaminophen and nonsteroidal anti-inflammatory drugs were not effective.[20] If administering a dose of a local anesthetic in the rectus abdominis sheath at the location of the point of maximal tenderness results in a considerable reduction of pain, a diagnosis of ACNES is highly probable.[11,18]

Ultrasound-guided local anesthetic injection seems to be an effective and safe treatment for ACNES.[21] Almost one-third of adult patients from the Netherlands who received local anesthetic injection (1% lidocaine) reported relief of pain, but half eventually needed a surgical procedure (neurectomy).[22] Full resolution of symptoms with local anesthesia alone was documented in 3 children.[18] Ultrasound-guided injections of local anesthetic or steroids should be considered, and findings do not seem to be influenced by subcutaneous tissue thickness.[23]

For those not finding relief after local anesthetic injections, surgical cutaneous neurectomy is the procedure of choice.[24,25] One systematic review of 6 studies with 224 pediatric patients reported that local injections of an anesthetic agent into the trigger point were effective in 38% to 87% of children and for anterior neurectomy in 86% to 100%.[26]

Conclusion

For adolescents with recurrent episodes of abdominal pain, the primary provider should contemplate ACNES in the differential diagnosis, consider asking while taking the medical history about the specific location of pain, and evaluate for Carnett sign as part of the physical examination. Incorporating Carnett sign into routine abdominal examination may help avoid delay in diagnosis of ACNES. For those with suspected ACNES, appropriate ultrasound-guided local anesthetic injection or a referral to a pain service or a pediatric surgeon should be considered.

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Competing interests
None declared

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