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CASE REPORT

Diagnosis and Treatment of Abdominal Cutaneous Nerve Entrapment Syndrome Using Ultrasonography

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Abdominal cutaneous nerve entrapment syndrome is one of the abdominal wall-origin pain that develops in anterior cutaneous branches of 7th to 12th thoracic nerves passing through fibrous ring in rectus abdominis. Number of this condition has been misdiagnosed to visceral dysfunctions; therefore, delayed diagnosis leads to waste of cost and time. Injection of local anesthetics is a kind of useful technique for the purpose of the confirmed diagnosis with treatment in abdominal wall pain. Recently, the accuracy and safety of local anesthetics injection to muscle or nerve are significantly improved than the past times since ultrasound has been accepted as a substantial device in clinical area. Here, we report a case of abdominal cutaneous nerve syndrome, treated by ultrasound-guided nerve block accompanied with medical treatment.

Keywords: Abdominal wall; Nerve entrapments; Ultrasonography

INTRODUCTION

Abdominal cutaneous nerve entrapment (ACNE) is one of frequent problem in pain clinics. Although etiology of ACNE is uncertain yet, it can be diagnosed base on present symptoms, past history, physical examinations, and diagnostic injection of local anesthetics. Unfortunately, many cases of abdominal wall pain are often confused with painful symptoms that originated from internal organs. These situation leads to unnecessary testing for evaluation of internal organs. It increases cost and induces waste of medical resource; moreover, the most crucial issue is that patients should endure their pain for a long time without any sort of effective intervention [1]. In this reason, early differential diagnosis of ACNE is essential for improvement of patient's quality of life with proper management.

Injection of local anesthetics such as trigger point injection has used for treatment of ACNE by pain physicians. Nowadays, ultrasound has generalized in procedures of pain management; therefore, it allows improving of safety issue. Some literatures about ultrasound-guided nerve block have published for last several years, so it considered effective and safe intervention for treatment of ACNE in these days [2]. Here, we report a case of treatment of ACNE by nerve block using ultrasound.

CASE REPORT

A 50-year-old female patient visited pain clinic of Soonchunhyang University Bucheon Hospital with lower abdominal pain that persisted a month. Her height was 143 cm and weight was 43 kg. She was a housewife. She had no medical history; however, she had a surgical history of total abdominal hysterectomy due to vaginal bleeding five years ago.

Her pain occurred spontaneously a month ago, and there was no specific trauma history. Her symptom was neuropathic pain that limited in the right lower abdomen, and did not spread to other site of the abdomen. The characteristics of pain were stab-

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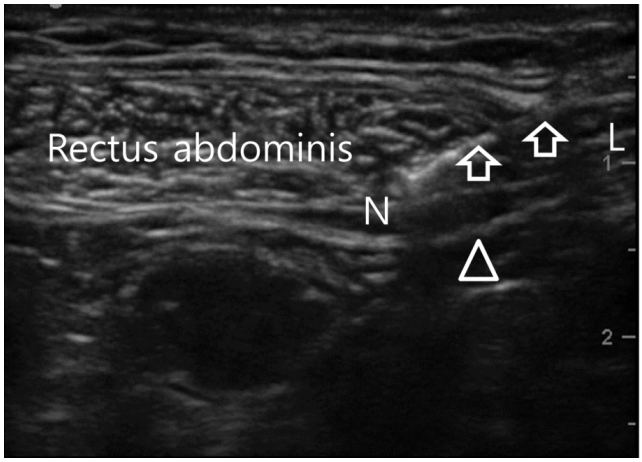

Fig. 1. Needle (upward arrows), peritoneum (arrow's head), linea semilunaris (L), and targeted nerve (N).

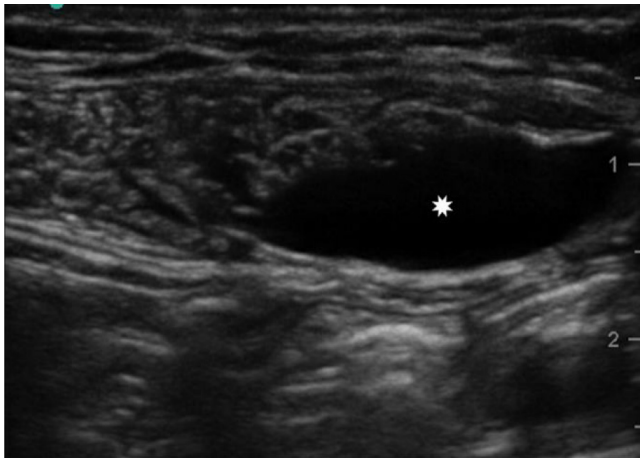

Fig. 2. Local anesthetics spread at the target area (white star).

bing that aggravated when sitting or lying and relieved when standing. Pain intensity in numeric rating scale was 5. The characteristics and the intensity of the pain were not related with the food intake. Before a month, she visited a gynecologist to rule out possibility of complication with previous surgery. The gynecologist could not find any problem with the operation. And then, she admitted to the gastrointestinal internal medicine department for three days. Abdominal ultrasound and computer tomography were performed since irritable bowel syndrome, gastritis, and gastroesophageal reflux syndrome were suspicious during her admission. Routine laboratory tests and simple chest and abdominal X-ray were also checked. There was no any specific abnormal finding in these examinations. She was on medication—ultracet (acetaminophen 325 mg and tramadol hydrochloride 37.5 mg) and cimetropium bromide. But these medications had no effect on her pain. After that, she referred to pain clinic for to find the cause of her symptom.

In physical examination, the maximal tenderness point was revealed on right lower abdominal region locating on the right side 4 to 5 cm below her umbilicus. Carnett's sign was seen in supine position. So ultrasound exam was done to differential diagnosis of her symptom, there were not any sign of other disease that caused the pain such as Carnett's sign including rectus sheath hematoma or hernia, and the gynecological problem such as endometriosis was already ruled out by previous gynecological examination. These findings suggested a possibility of abdominal cutaneous nerve entrapment most likely.

We persuaded her to receive ultrasound-guided abdominal cutaneous nerve block for the differential diagnosis and symptomatic treatment. Ultrasound (SonoSite S-Nerve ultrasound system; SonoSite, Bothell, WA, USA) guided abdominal cutaneous nerve block was performed. The patient was placed in supine position. When her lower abdomen was exposed for procedure, the scar of previous surgery was seen on just above pubic symphysis and thought low transverse incision. Skin was prepared with 2% of chlorhexidine. In sterile conditions, the transducer (SonoSite MicroMaxx HFL38 Transducer, SonoSite) was placed on the midline of lower abdomen. After identification of linea alba—the medial border of rectus abdominis, transducer was moved from midline to right side. When rectus abdominis was visualized, the transducer was moved more laterally to find linea semilunaris. The 25-gauge, 38-mm needle was advanced to approximately 0.5–1 cm medial side to the hyperechoic semilunaris where abdominal cutaneous nerve exists (Fig. 1). We injected 10 mL of 0.4% of mepivacaine (Fig. 2), and gabapentin 100 mg and pelubiprofen 30 mg are admitted to have three times a day.

Her pain disappeared for three days, but it recurred afterwards. Ultrasound guided abdominal cutaneous nerve block performed with 10 mL of 0.4% of mepivacaine with 10 mg of triamcinolone after a week from previous injection. Gabapentin was increased to 200 mg. After seven days, her pain was almost relieved; however, a few breakthrough pain remained at night. Therefore, abdominal cutaneous nerve block performed again and medication was prescribed—ultracet instead of pelubiprofen. A week later, she visited pain clinic for the last time. Finally, pain intensity accomplished to Numeric Rating Scale 0-1 and maintained.

DISCUSSION

In this case, the patient was middle-aged female without suspicious previous factor such as trauma and recent invasive procedure. In fact, gynecologist and gastroenterologist already assured that there was no abnormality in her internal organs. Her clinical presentation and positive finding in Carnett's test could be ground for suspecting ACNE. Consequently, we decided to perform ultrasound-guided nerve block as not only diagnostic tool but also symptomatic treatment.

ACNE is caused by entrapment of anterior cutaneous branches of the 7th to 12th thoracic nerves in abdominal muscles [3]. Applegate [4] had described ACNE at first in 1972, about 10% to 30% of patients with abdominal pain are considered to abnormality originating from abdominal wall, not internal organs [5]. According to a recent study, its incidence is estimated to be 1:18,000 [2]. But this condition still remains as a strange concept to a lot of physician even now, about after three decades from the first report. So patients with ACNE may be misdiagnosed to digestive system diseases or functional bowel disorder. In this case, one of the impressions was irritable bowel syndrome, too [6].

The cause of ACNE is unclear yet. Trauma, surgery, and pregnancy were suggested that they were influencing factors to trigger ACNE in previous cases [7,8]. There are a few reports describing ACNE that occurred in young healthy male patient without any specific history related with his abdomen. Otherwise, in this case, middle-aged female patient received previous gynecological surgery five years ago; however, her symptom started before a month. She did not experience any symptom that could relate to previous operation for last five years. Whether her previous surgery triggered nerve entrapment is unclear, but it was quite a long time from the surgery to occur her painful symptom. Based on this reason, this case may not relate with previous gynecological surgery. After first blockade, the intensity of her pain was significantly decreased; however, the effect of blockade was temporary. So we confirmed the effect of nerve block for her symptom and repeated the abdominal cutaneous nerve bock again. Meanwhile, we had to consider of the possibility of the oral analgesics. But patient's symptom relieved for a while by nerve block before oral analgesics was increased.

For the diagnostic purpose, it was possible to block the targeted nerve with smaller volume of local anesthetics than what we used [3]. But the purpose of this nerve procedure was not the only diagnostic purpose, but also the therapeutic purpose, and there were no exact consensus of the volume of local anesthetics for ACNE yet. So 10 mL of the local anesthetics was chosen.

In this case, Carnett's sign was positive at her tender point. It was first described by Carnett [9] in 1926. Since then, Carnett's test has been considered a useful diagnostic examination for differentiating abdominal wall pain from intra-abdominal wall pain [10]. It has a sensitivity of 81% and a specificity of 88%. Considering abdominal wall pain cannot be distinguished from visceral pain by imaging examination or laboratory tests, the importance of Carnett's test should be further emphasized. If primary physicians perform physical examination more aggressively, early diagnosis of abdominal wall pain may also increase. Even though several previous literatures had described the diagnostic value of Carnett's test, this examination has been relatively overlooked by quite number of physicians.

ACNE can be confirmed and treated by injection of local anesthetics to tender point or entrapped nerve [11]. Trigger point injection, radiofrequency neuromodulation, epidural local anesthetic injection, and surgical treatment were described in previous cases. While these techniques showed the usefulness, nowadays, ultrasound allows the exact injection to the entrapped nerve. It also improves accuracy of procedure and prognosis. In this case, symptom was successfully relieved by three times of ultrasound-guided nerve block. Although pain was relieved more and more each time a procedure, the proper frequency and interval of this technique have never been described yet.

Benefits of local anesthetics injection using ultrasound compared with blind technique had been described in ACNE in a previous study [12]. Otherwise, ultrasound allows diagnosis and treatment in the physician's office immediately without delaying for the preparation. Ultrasound-guided nerve block, an essential diagnostic method as well as the effective treatment in patients with abdominal wall pain, prevents waste of medical resource and patient's time. And then, it saves the cost by reducing unnecessary evaluation of the internal organs [1]. Thus it can improve prognosis by providing proper treatment with early diagnosis.

In conclusion, ACNE is not rare condition in pain clinic recently. Nevertheless, only few patients can be diagnosed to pain originating from abdominal wall in early stage. History taking and physical examinations should be done first in patients with abdominal pain, and ultrasound-guided nerve block also considered preferentially when abdominal wall pain is suspected in physical examinations.

REFERENCES

1. Costanza CD, Longstreth GF, Liu AL. Chronic abdominal wall pain: clinical features, health care costs, and long-term outcome. Clin Gastroenterol Hepatol 2004;2:395-9.
2. Van Assen T, Brouns JA, Scheltinga MR, Roumen RM. Incidence of abdominal pain due to the anterior cutaneous nerve entrapment syndrome in an emergency department. Scand J Trauma Resusc Emerg Med 2015;23:19.
3. Clarke S, Kanakarajan S. Abdominal cutaneous nerve entrapment syndrome. Contin Educ Anaesth Crit Care Pain 2014 May 17 [Epub]. https://doi.org/10.1093/bjaceaccp/mku016.
4. Applegate WV. Abdominal cutaneous nerve entrapment syndrome. Surgery 1972;71:118-24.
5. Srinivasan R, Greenbaum DS. Chronic abdominal wall pain: a frequently overlooked problem: practical approach to diagnosis and management. Am J Gastroenterol 2002;97:824-30.
6. Van Assen T, de Jager-Kievit JW, Scheltinga MR, Roumen RM. Chronic abdominal wall pain misdiagnosed as functional abdominal pain. J Am Board Fam Med 2013;26:738-44.
7. Dougan C, Campbell P, Sirivastava D. PM.73 case report: abdominal cutaneous nerve entrapment syndrome in the pregnant patient. Arch Dis Child Fetal Neonatal Ed 2013;98(Suppl 1):A45-6.
8. Ivens D, Wojciechowski M, Vaneerdeweg W, Vercauteren M, Ramet J. Abdominal cutaneous nerve entrapment syndrome after blunt abdominal trauma in an 11-year-old girl. J Pediatr Surg 2008;43:E19-21.
9. Carnett JB. Intercostal neuralgia as a cause of abdominal pain and tenderness. Surg Gynecol Obstet 1926;42:625-32.
10. Thomson H, Francis DM. Abdominal-wall tenderness: a useful sign in the acute abdomen. Lancet 1977;2:1053-4.
11. Park JW, Kim JH, Shin YC, Jeong SH, Choe YK, Kim YJ, et al. The rectus abdominis syndrome. J Korean Pain Soc 2000;13:123-5.
12. Hong MJ, Kim YD, Seo DH. Successful treatment of abdominal cutaneous entrapment syndrome using ultrasound guided injection. Korean J Pain 2013;26:291-4.