

## Case Series

# MISDIAGNOSING ABDOMINAL MYOFASCIAL PAIN SYNDROME AS ANTERIOR CUTANEOUS NERVE ENTRAPMENT SYNDROME: ARE WE FAILING PATIENTS WITH NONSPECIFIC ABDOMINAL PAIN?

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**Background:** Chronic abdominal wall pain (CAWP) is often undiagnosed and results in significant health care use as well as patient suffering. There are two main types: abdominal myofascial pain syndrome (AMPS) and anterior cutaneous nerve entrapment syndrome (ACNES). Although the 2 conditions share clinical similarities, they have subtly distinct unique features.

**Objectives:** To highlight the current practice, elucidate the characteristics of the 2 types of CAWP, and direct the spotlight on abdominal myofascial pain.

**Study Design:** Prospective case series.

**Setting:** Tertiary pain medicine clinic in a university hospital.

**Methods:** As a part of a prospective audit of management of chronic abdominal pain, patients completed brief pain inventory-short form questionnaires at baseline and at 3 months post-trigger point treatment.

**Results:** All 3 patients were misdiagnosed with

ACNES. Patient 1 was attending the emergency department once every 5 days prior to being correctly diagnosed with AMPS. Following trigger point treatment, there was a significant reduction in emergency department attendance. Patient 2, with a 10-year history of lower abdominal pain that resulted in severe disability, was able to mobilize following trigger point treatment. Patient 3, with a high opioid use (360 mg per day), was able to discontinue opioids following ultrasound-guided trigger point injection with depot steroids.

**Limitations:** Open label case series in a small cohort.

**Conclusions:** AMPS is as common as the various visceral inflammatory diseases. Lack of awareness, ignoring its existence, and misdiagnosing it may not benefit patients with chronic abdominal pain.

**Key words:** Chronic abdominal wall pain, abdominal myofascial pain syndrome, anterior cutaneous nerve entrapment syndrome, viscerosomatic convergence

Chronic abdominal wall pain (CAWP) is often undiagnosed and results in significant health care utilization as well as patient suffering (1-3). There are 2 main types of CAWP: abdominal myofascial pain syndrome (AMPS) and anterior cutaneous nerve

entrapment syndrome (ACNES) (2,3). Although the 2 conditions share clinical similarities, they have subtly distinct unique features. Current literature appears to focus on ACNES to the extent that AMPS is considered a rare cause of CAWP (2,4). As a result, physicians, including pain medicine specialists, regularly diagnose ACNES in patients with features of abdominal wall pain (3). The authors believe that AMPS is often misdiagnosed as ACNES leading to treatment failures. A report of 3 patients is presented in which a misdiagnosis of ACNES resulted in significant distress, suffering, and health care utilization. The aim of this report is to highlight current practice, elucidate and contrast the characteristics of the 2 conditions, and direct the spotlight on AMPS. The

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patients provided written consent for participation in the audit, for telephone review, for the use of the de-identified data for analysis, and publication in a peer-reviewed journal.

## **CASE DESCRIPTION**

### **Case 1**

A 17-year-old female patient presented to our pain medicine clinic with a one-year history of right lower abdominal pain. She was previously treated at 3 specialist pain medicine centers in the region. As the patient had suffered a bout of appendicitis 6 months earlier, the initial diagnosis was visceral abdominal pain (appendicitis). The patient underwent a laparoscopic appendectomy. As the abdominal pain persisted, the patient was diagnosed with post-surgical adhesions and underwent a diagnostic laparoscopy. Minimal adhesions were noted and excised. The pain persisted resulting in increasing distress and loss of function. In the absence of any apparent clinical signs, the patient was diagnosed with functional abdominal pain syndrome (FAPS) (5). A trial of amitriptyline and counselling failed to provide any benefit. The patient was referred to a second pain medicine clinic. The patient was diagnosed with CAWP secondary to ACNES. Treatments included transdermal lidocaine 5% plaster and a posterior transversus abdominis plane block with depot steroids. As the patient failed to respond to both interventions, she was seen at a third pain medicine clinic. The diagnosis was reaffirmed as ACNES and the patient underwent an ultrasound-guided depot steroid injection to the anterior cutaneous nerves. The patient reported transient relief that lasted for 4 days. Subsequently, the patient underwent continuous radiofrequency (CRF) denervation of the anterior cutaneous nerves. CRF produced a marginal improvement in the symptoms for 4 weeks. However, the patient was experiencing a flare up once a week resulting in a visit to the emergency department or home visit by paramedics primarily for systemic morphine. The patient had to discontinue schooling. The patient was barred from receiving intravenous morphine at the local emergency department following a diagnosis of opioid dependence. The patient and her parents were at the end of their tether when the patient was referred to our center. Clinical features and physical examination revealed the presence of tender trigger

points in the rectus abdominis muscle (RAM). Medications included gabapentin 1.2 g, amitriptyline 25 mg, acetaminophen 4 g, sustained release morphine tablet 20 mg, and liquid oral morphine 30 mg per day.

The patient underwent ultrasound-guided trigger point injection with depot steroids. Needle sign and myofascial twitch was elicited. Triggers were identified in zones 1-3 (rectus abdominis) and zone 4 (internal oblique muscle). The patient reported minimal change for the first 2 weeks following the trigger point treatment resulting in 2 further visits to the emergency department. Subsequently, the patient reported complete pain relief for 10 weeks. The patient was able to resume her studies. There was significant improvement in function as well as mood. The patient completed the Brief Pain Inventory-short form (BPI) and the Hospital Anxiety Depression Scale (HADS) at baseline and at 3 months post-treatment. The pain recurred 13 weeks post-treatment. Trigger point treatment with depot steroids was repeated. The patient reported 60% benefit at 12-week follow-up (Table 1) and was able to discontinue gabapentin and amitriptyline. Oral morphine consumption was reduced to 10 mg per day.

### **Case 2**

A 45-year-old female patient was referred to our pain medicine clinic with a 9-year history of lower abdomen pain. The pain began when she was lifting heavy books from the floor. Over a period of 10 years, the patient was seen in 5 specialist pain medicine centers, including the authors' center, as well as numerous other specialists including gastroenterologists, neurologist, gastrointestinal surgeons, and clinical psychologists. Diagnosis included bilateral ilioinguinal neuralgia, symphysis pubis dysfunction (SPD), and FAPS. Failed treatments included multiple pharmacological agents, lidocaine plasters, symphysis pubis fixation, ilioinguinal nerve blocks, and diagnostic laparoscopy. Management included attending a pain management program.

The patient was diagnosed with bilateral ACNES at the fifth pain medicine center and underwent 3 courses of ultrasound-guided depot steroid injection for ACNES. The first set provided 30% relief for 4 weeks, whereas the remaining 2 failed to provide any relief.

Table 1. Outcomes following successful trigger point treatment.

	<b>Worst Pain in 24 Hours Baseline</b>	<b>Worst Pain in 24 Hours 3 months</b>	<b>BPI Pain Intensity Baseline</b>	<b>BPI Pain Intensity 3 months</b>	<b>BPI Pain Interference Baseline</b>	<b>BPI Pain Interference 3 Months</b>	<b>HADS (A, D) Baseline</b>	<b>HADS (A, D) 3 months</b>
Case 1	10	4	27/40	10/40	49/70	20/70	5, 7	3, 0
Case 2	9	3	31/40	9/40	67/70	36/70	13, 14	3, 12
Case 3	9	0	23/40	0/40	38/70	0/70	8, 11	1, 6

Abbreviations: A, anxiety; D, depression.

The poorly controlled symptoms caused severe functional limitation in the previously fit individual. The patient was unable to walk for more than a few yards and started using a wheelchair for mobility. Medications included gabapentin 2.7 g per day and tramadol 800 mg per day. The pain was felt near the midline on both sides of the lower abdomen. Examination revealed tender trigger points in the lower end of the RAM. Sensory examination to fine touch and pinprick was normal. Carnett’s sign was positive.

The patient received ultrasound-guided trigger point injection with depot steroids. Trigger points (positive needle sign and myofascial twitch) were identified in zones 1-3 (RAM) and zone 4 (medial half of the oblique muscles) on both sides of the lower abdomen (3). The patient completed the BPI and the HADS at baseline and at 3 months post-treatment. The patient reported 60% relief at 12 weeks telephone follow-up. The patient managed to improve her walking distance significantly and reduced the dose of tramadol (500 mg per day).

**Case 3**

A 54-year-old male patient was referred to the pain medicine clinic with pain on the right side of the lower abdomen and groin lasting 7 years. The patient was initially treated as having testicular pain by the urologists and had undergone excision of an epididymal cyst in the right testes. As the pain persisted post-surgery, he was referred to the pain clinic. Following an initial diagnosis of genitofemoral neuralgia, the patient underwent 3 diagnostic genitofemoral nerve blocks with depot steroid. The first landmark-guided nerve block provided relief for 2 weeks. Thereafter, the patient underwent 2 further ultrasound-guided nerve blocks that failed to provide any relief. The patient was referred to one of the authors (G.N.). The

patient was on 360 mg per day of morphine. Despite the pain and high dose opioids, the patient remained in full-time gainful employment in the construction industry. Clinical examination revealed tender points in the lateral border of the rectus abdominis. The patient underwent ultrasound-guided anterior cutaneous nerve block with steroids that failed to provide any relief. The patient had trialed various medications including 5% lidocaine plaster, gabapentinoids, and tricyclic agents without any benefit. The patient was reviewed in the follow-up clinic. Subsequent detailed history and examination revealed a history of visceral inflammation in the recent past (appendicitis) and tender points in the mid and medial aspect of the RAM. Thereafter, the patient underwent ultrasound-guided trigger point injection with depot steroids. Pathognomonic myofascial twitch response was noted in zone 2 (Fig. 1). The patient reported complete absence of pain for 5 months and was able to discontinue opioids at the 6-month clinic review. Outcomes following trigger point treatment are presented in Table 1.

**DISCUSSION**

Chronic abdominal pain can cause severe distress, functional impairment, and health care utilization (1-3). Three common subsets include visceral abdominal pain syndrome (VAPS), CAWP, and FAPS (2-5). Rare causes include adult abdominal migraine, thoracic radiculopathy, and rectus hematoma (2,6). VAPS can be correctly diagnosed with imaging, biochemistry, endoscopic techniques, and or diagnostic laparoscopy. FAPS is a diagnosis by exclusion (5).

CAWP includes 2 distinct conditions: ACNES and AMPS (2-4). ACNES occur when the anterior cutaneous nerve becomes entrapped in the fascial tissue at the lateral border of the RAM. ACNES dominate

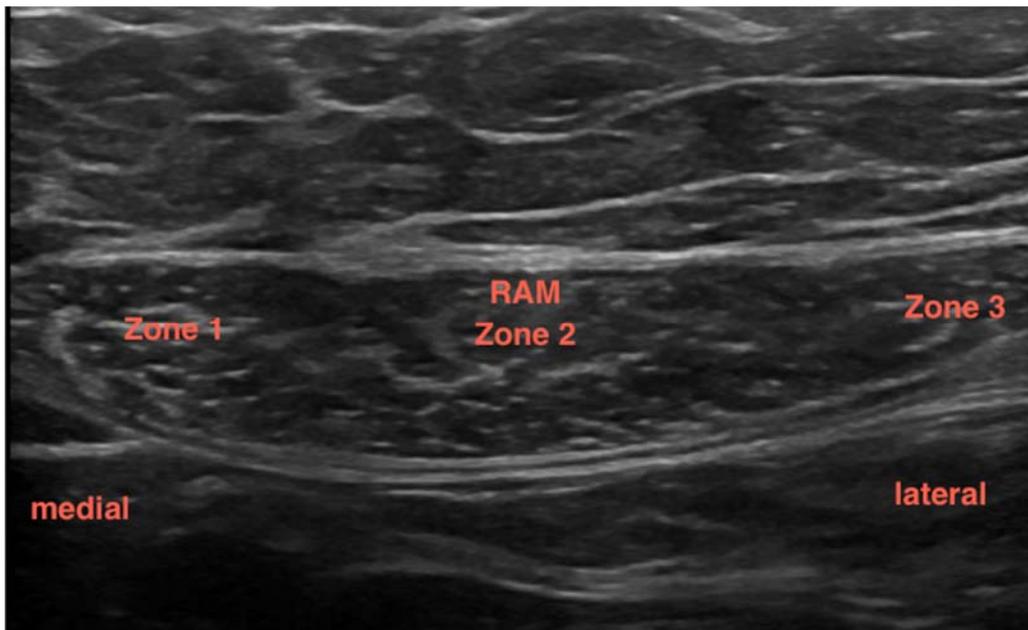


Fig. 1. Zone 1 (medial third), zone 2 (mid third), and zone 3 (lateral third) of the RAM on ultrasound scanning.

current literature as the most common cause of CAWP (2,4,7). As a result, specialists have relegated myofascial pain as a rare cause of persistent abdominal pain (2,4).

AMPS develop as a result of trigger points in the abdominal musculature that causes muscle dysfunction and pain. It can have a significant impact on the quality of life (8). Abdominal myofascial pain differs from myofascial pain in other muscles in its causation (3). Trigger points are postulated to develop as a result of trauma and repetitive stress (9,10). AMPS secondary to trauma is uncommon and this may be the reason for labelling AMPS as a rare cause of chronic abdominal pain (3). However, the predominant cause of AMPS is viscerosomatic convergence (VSC) (3,8,10-13). VSC describes the convergence of somatic and visceral inputs onto the central nervous system neurones. The resultant central and peripheral sensitization causes the pain generator to move from the viscera to the overlying abdominal musculature (3,10-13). Therefore, AMPS due to VSC is likely to be as common as the underlying visceral inflammation. The inflammatory conditions include oesophagitis, gastritis, pancreatitis, cholecystitis,

endometriosis, cystitis, pyelonephritis, and inflammatory bowel disease (3,13). Many experts in the scientific community continue to perpetuate the belief that CAWP is synonymous with ACNES (4,14-17). As a result, patients move from pillar to post to obtain a diagnosis and relief from a condition that can cause significant dysfunction (8).

The authors present 3 cases. The first is an adolescent female patient with localized pain in the right lower abdomen. The patient was diagnosed with VAPS, FAPS, and ACNES at 3 different pain medicine clinics. AMPS was not considered despite the diagnoses mentioned earlier being ruled out following several failed interventions. The patient used significant health care resources with many avoidable emergency department attendance (once every 5 days for over 6 months) and had to give up schooling. A diagnosis of AMPS and subsequent trigger point treatment provided almost complete pain relief for 10 weeks, significantly reduced emergency department attendance, and enabled the patient to recommence her studies.

The second patient had a history of a traumatic event

(sudden sharp pain in the lower abdomen while lifting heavy books from the floor) preceding the onset of symptoms. Trigger points are postulated to develop as a result of trauma and repetitive stress to the musculature. Despite this well-known hypothesis, diagnosis over a 10-year period included SPD requiring surgery (surgical fixation), ilioinguinal neuralgia, FAPS, and ACNES at 5 different specialist centers. An active, gainfully employed individual was confined to a wheelchair owing to the severity of symptoms. Ultrasound-guided trigger point treatment provided 60% relief lasting 12 weeks. The patient's functional ability and mood improved (Table 1).

One of the authors (G.N.) initially misdiagnosed the third patient with ACNES. However, following a thorough review, AMPS was correctly diagnosed. The patient managed to wean down high dose opioid medication following ultrasound-guided trigger point treatment.

In the present series, the first and third patients developed AMPS secondary to VSC, whereas the second patient had trauma as a potential initiating event. The authors hold a prospective database of over 200 patients with AMPS with many cases mir-

roring the experience mentioned earlier of a failed diagnosis and sustained suffering over a protracted duration (3,8). Centred on practice-based evidence, the authors elaborate the salient features of the 2 conditions (ACNES, AMPS) and provide some tips to enable correct diagnosis (Table 2).

Figure 1 shows the RAM divided into 3 zones (3). Zone 3 (lateral end of the RAM) is the accepted site for treatment in ACNES (15). Myofascial trigger points can develop in zones 1-3 in RAM, zone 4 (medial half of oblique muscles, Fig. 2), or zone 5 (lateral half of oblique muscles and the quadratus lumborum muscle) (3). Two signs indicate the presence of trigger points in the affected muscle: myofascial twitch that is visible on ultrasound scanning and needle sign (3). Injecting zone 3 alone will not provide durable relief in AMPS.

**CONCLUSIONS**

AMPS is a clinical entity with a sound pathophysiological foundation. Lack of awareness or ignoring its existence may not benefit patients. Clinical diagnosis is straightforward and can be confirmed by a simple technique: ultrasound-guided trigger

Table 2. Distinguishing features of ACNES and AMPS.

	<b>ACNES (14-16)</b>	<b>AMPS (3)</b>
Pathology	Entrapped anterior cutaneous nerve in the lateral border of the RAM	Trigger points developing in any of the abdominal wall muscles including RAM, EO, IO, TA, and QL muscles
Causation	Mechanically induced irritation Ischemia	Underlying visceral inflammation Trauma (uncommon)
History of visceral inflammation	Absent	Usually present
Localization	Localized	Often radiates: referred pain to the flank, back, groin, and leg (referred pain)
Site of pain	1. Lateral border of rectus 2. Usually unilateral	1. Anywhere in the abdomen 2. Can be bilateral
Carnett's sign	Positive	Positive
Overlying sensory changes	Often present	Usually absent Presence may indicate on going visceral inflammation
Initial diagnosis	Clinical	Clinical
Diagnosis confirmed	Ultrasound-guided injection of LA + depot steroids to the lateral border of rectus (zone 3) (15)	Ultrasound-guided trigger point injection to the affected muscle (zones 1-5, QL)
Pathognomonic signs on ultrasound-guided injection	None	Myofascial twitch visible on ultrasound Needle sign

Abbreviations: EO, external oblique; IO, internal oblique; LA, local anesthetic; QL, quadratus lumborum; RA, rectus abdominis; TA, transversus abdominis.

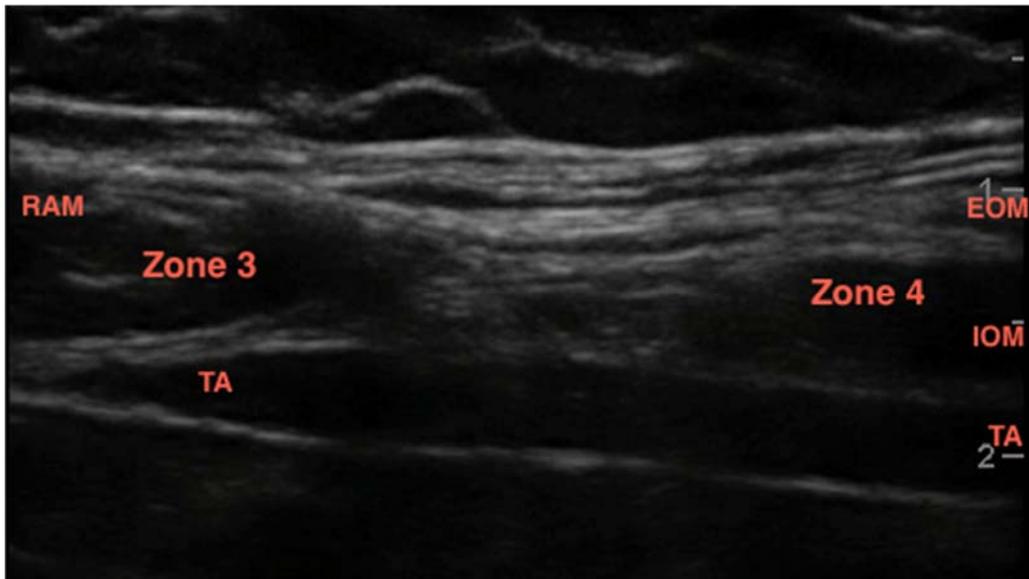


Fig. 2. Zone 3 in the RAM and zone 4 in the medial part of the external oblique (EOM), internal oblique (IOM), and transversus abdominis (TA) muscles.

point injection with a mixture of depot steroids and a local anesthetic agent. Although current trigger point treatments (trigger point injection with steroids, pulsed radiofrequency treatment) provide relief lasting for 3-6 months, they hold significant value to both the

patient and the physician (3,8). Further unnecessary investigations including invasive surgery can be avoided and the patient can commence on the road to acceptance and recovery.

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