

## CASE REPORT

# Abdominal wall Type-I complex regional pain syndrome treated effectively with peripheral nerve field stimulation: a case report

Linqiu Zhou\*, Henry Chou, and Eric Holder

Department of Rehabilitation, Sidney Kimmel Medical College, Thomas Jefferson University, Philadelphia, PA, USA

\*Correspondence address. Professional Pain Associates, 730 North Broad Street, Suite 205, Woodbury, NJ 08096, USA. Tel: 856-202-5331; Fax: 856-202-5638; E-mail: linzhoumd@yahoo.com

## Abstract

Chronic abdominal wall pain is a well-documented complication of abdominal surgery. However, abdominal wall complex regional pain syndrome (CRPS) is a rare medical condition. We present a case of abdominal wall CRPS and its treatment with peripheral nerve field stimulation (PNfS). A 34-year-old female presented with right periumbilical pain for 2 years. She developed burning, sharp and stabbing pain with allodynia (extremely sensitive to wind and light touch) and erythema or pallor 2 weeks after an exploratory appendectomy. The extensive evaluation ruled out the underlining pathology. After she failed conservative therapies, she underwent a 7-day trial of thoracic spinal cord stimulation (SCS) and abdominal wall PNfS. Thoracic SCS failed to provide pain relief; however, PNfS provided significant relief (>90%) of burning sensation. It has now been 5 years since the PNfS was implanted and she continues to demonstrate substantial pain relief.

## INTRODUCTION

Common causes of chronic abdominal wall pain (CAWP) after abdominal surgery include adhesions, infection, hernia, hematoma, endometriosis and nerve entrapment. There are few case reports of abdominal complex regional pain syndrome (CRPS) and there is no case report of the peripheral nerve field stimulation (PNfS) for this type pain [1]. We report a case of abdominal CRPS type I after exploratory laparotomy, and its successful treatment with PNfS.

## CASE REPORT

A 34-year-old female presented with chronic burning, sharp, stabbing pain of her right periumbilical area for 2 years. She developed the insidious onset of severe sharp stabbing and

burning periumbilical pain localized at the upper right margin of the surgical site associated with skin color (redness or pallor) and temperature changes and swelling 2 weeks after the exploratory laparotomy and appendectomy 2 years ago. The pain was exacerbated by light touch including clothing, showering and wind. She denied any sign of infection and symptom associating with eating or bowel movements.

Prior to presenting, she underwent an extensive diagnostic workup including abdominal magnetic resonance imaging, computed tomography and ultrasound studies, which failed to reveal any underlining pathology to explain her persistent symptoms. She had previously undergone evaluation by general surgery, neurology, physiatrist, and psychiatry and pain specialist. She trialed numerous conservative management regimens without success, which included abdominal trigger point injections, oral medications (non-steroidal anti-inflammatory drugs,

Received: November 13, 2016. Accepted: December 9, 2016

Published by Oxford University Press and JSCR Publishing Ltd. All rights reserved. © The Author 2017.

This is an Open Access article. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)

antidepressants, anticonvulsants, opioids, anxiolytics, muscle relaxants and topical medications), physical therapy (desensitization, transcutaneous electrical nerve stimulation), psychological therapies (cognitive behavioral, relaxation therapies) and acupuncture.

During the initial evaluation, she described constant burning, stabbing pain of her right abdomen that was 7-8/10 on Numeric Rating Scale. Physical examination revealed an abdominal midline and right periumbilical surgical scar extending 1 inch above and 4 inches below the umbilicus. Her pain was localized at the right of the incision within an area of six by eight square inches. The skin within this region appeared swollen, erythema and was extremely sensitive to light touch (allodynia). There was no palpable mass such as neuroma, scar malformation or incisional hernia. Carnett's test was negative [2, 3]. She was diagnosed with CAWP secondary to abdominal CRPS type I.

Anatomically, her symptoms were localized at the T9, T10 and T11 dermatomal distribution. The right T9, T10 and T11 transforaminal epidural injections were unsuccessful in providing any pain relief, indicating that her pain was not radicular in origin. Subsequently, a right celiac ganglion injection failed to provide pain relief, meaning that her pain was unlikely of visceral origin.

After she passed psychological evaluation, she underwent thoracic spinal cord stimulation (SCS) and PNfS trials simultaneously. The SCS lead was inserted at the T5-T7 level and the PNfS lead was inserted into the subcutaneous tissue of the painful right periumbilical area. During the 7 days trial, the patient was instructed to alternate the use of the SCS and the PNfS. The paresthesia resulted from thoracic SCS covered the painful area, but it did not provide significant pain relief. The PNfS proved >90% of pain reduction. Ultimately after the trial, she decided to pursue permanent PNfS implantation with two leads (Fig. 1). She has been followed up regularly for the last 5 years since the permanent PNfS implantation without complication. The PNfS has continued to provide >60% of pain reduction and improve her quality of life.

## DISCUSSION

CAWP is a relatively common complaint in the post abdominal surgery patients. The incidence of CAWP varies between 15%

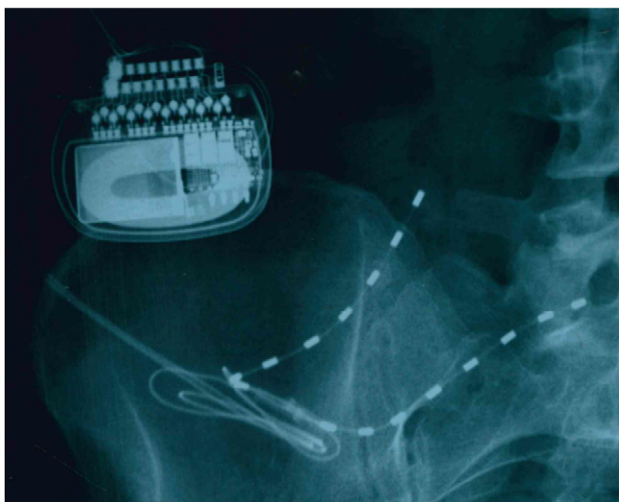


Figure 1: Abdominal PNfS.

and 30% after minor and major abdominal or pelvic procedures [4, 5]. CAWP often results from cutaneous nerve compression/entrapment or myofascial irritation [2, 3], in addition to localized endometriosis, hematoma or hernias. By the definition, CAWP is not progressive and without evidence of visceral disease [2, 3]. Pain originating from the abdominal wall is not made better or worse with food, nor altered by bowel movements and it is unchanged or increased when patient tenses the abdominal wall muscles by lifting upper trunk off the examining table (positive Carnett's sign) [2, 3]. A tender trigger point in the abdominal wall is one of common causes of CAWP, which can be relieved by trigger point injection with local anesthetics [2, 3].

In this case, the patient presented with burning pain, allodynia, and edema and alter skin color (redness or pallor). Carnett's sign was negative and trigger point injection failed to provide pain relief. Likewise, right transforaminal epidural injections at T9, T10 and T11 and celiac ganglion injection did not provide any pain relief. Her cumulative diagnostic workup indicated that her pain met the diagnostic criteria for CRPS.

According to the International Association for the Study of Pain, the diagnostic criteria for CRPS include the following [6]. (i) The presence of an initiating noxious event or cause of immobilization. (ii) Continuing pain, allodynia or hyperalgesia disproportionate to the inciting event. (iii) Evidence of edema, changes in skin blood flow or abnormal sudomotor activity in the area of pain. (iv) Exclusion of the existence of any condition that would otherwise account for the degree of pain and dysfunction. CRPS is subdivided into CRPS type I and CRPS type II. CRPS-I is diagnosed when there is no obvious nerve injury. CRPS occurs commonly in the extremities, but it is very rare in the trunk. A rare case report of abdominal CRPS was reported [1]. In our case, the patient presented with typical signs of CRPS including edema, alter skin color and allodynia after her surgery. After careful evaluations, she was found that her pain was not the result of mechanical factors such as surgical scar/adhesions, neuroma.

To the best of our knowledge, PNfS has not been documented for the treatment of abdominal CRPS. PNfS has been used for chronic pain with a promising outcome notably in three cases of chronic abdominal pain [7-9]. In this case, she experienced >90% pain reduction from the PNfS therapy during the trial of SCS versus PNfS. In the 5-year follow-up period, after permanent PNfS implantation, she continues to receive >60% of pain relief without any PNfS-related complications.

## CONFLICT OF INTEREST STATEMENT

None declared.

## FUNDING

There is no any financial support for this study.

## REFERENCES

1. Munisamy R, Uppalu H, Raghavendra R, Venkata NPS, Harshita S, Janarthanam SV. Type-I complex regional pain syndrome of umbilical port site: an unforeseen complication of laparoscopic surgery. *J Minim Access Surg* 2012;8: 50-3.

2. Suleimam S, Johnston DE. The abdominal wall: an overlooked source of pain. *Am Fam Physician* 2001;**64**:431–8.
3. Grover M. Chronic abdominal wall pain: a missed diagnosis <https://www.med.unc.edu/ibs/files/educational-gi-handouts/Chronic%20Abdominal%20Pain.pdf>
4. Gupta A, Gandhi K, Viscusi ER. Persistent postsurgical pain syndromes. *TechReg Anesth Pain Manag* 2011;**15**: 140–6.
5. Simanski CJ, Althaus A, Hoederath S, Kreutz KW, Hoederath P, Lefering R, et al. Incidence of chronic postsurgical pain (CPSP) after general surgery. *Pain Med* 2014; **15**:1222–9.
6. Merskey H, Bogduk N. *Classification of Chronic Pain: Descriptions of Chronic Pain Syndromes and Definition of Pain Terms*. 2nd ed. Seattle: IASP Press, 1994;P40–43.
7. Verrills P, Vivian D, Mitchell B, Barnard A. Peripheral nerve field stimulation for chronic pain: 100 cases and review of the literature. *Pain Med* 2011;**12**:1395–405.
8. Cairns KD, McRoberts WP, Deer T. Peripheral nerve stimulation for the treatment of truncal pain. *Prog Neurol Surg* 2011; **24**:58–69.
9. Paicius RM, Bernstein CA, Lempert-Cohen C. Peripheral nerve field stimulation in chronic abdominal pain. *Pain Physician* 2006;**9**:261–6.