

## CASE REPORT

# Treatment of Posttraumatic Abdominal Autonomic Neuropathy Manifesting as Functional Dyspepsia and Chronic Constipation: An Integrative East-West Approach

以功能性消化不良和慢性便秘为临床表现的外伤后腹部自主神经病变的治疗：一个东西方结合策略

Tratamiento de la neuropatía autonómica abdominal postraumática que se manifiesta como dispepsia funcional y estreñimiento crónico: Enfoque integrador este-oeste

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## ABSTRACT

A 52-year-old male with a history of spinal cord injury and cauda equina syndrome resulting in neurogenic bladder presented with chronic constipation and functional dyspepsia that was refractory to medical management. He was treated with an integrative East-West approach including acupuncture, trigger point injections, and Tui Na massage. Both his pain and constipation improved after a series of treatments, and this improvement was largely sustained at 2-year follow-up.

This patient's symptoms are consistent with damage to the visceral parasympathetic nervous system. Interestingly, many studies evaluating the mechanisms of acupuncture point to restoration of parasympathetic tone as a mechanism of action. In this article, we describe a case of complex functional gastrointestinal disorders associated with posttraumatic autonomic neuropathy that was refractory to pharmacotherapy and was

successfully treated with an integrative East-West approach

## 摘要

一名 52 岁男性因慢性便秘和功能性消化不良且经内科治疗无效来诊，患者存在脊髓损伤及马尾神经综合征继发神经源性膀胱病史。我们采用东西方结合策略对患者进行了治疗，其中包括针灸、激痛点注射和推拿按摩。一系列治疗之后，患者的疼痛和便秘均得以缓解，且大部分效果维持到了 2 年随访时。该患者的症状符合内脏副交感神经系统受损的诊断。有趣的是，很多针灸机制研究指出，副交感神经张力的修复是针灸的作用机制之一。本文描述了一例复杂的功能性胃肠疾病，该病继发于外伤后自主神经病变且对药物治疗无效，但经东西方结合治疗后成功缓解。

## SINOPSIS

Un varón de 52 años de edad, con antecedentes de lesiones de la

médula espinal y síndrome de cauda equina que dio lugar a vejiga neurogénica se presentó con estreñimiento crónico y dispepsia funcional que eran refractarios al tratamiento médico. Fue tratado con un enfoque integrador este-oeste, que incluyó acupuntura, inyecciones en los puntos gatillo y masaje tuina. Tanto el dolor como el estreñimiento mejoraron después de una serie de tratamientos y esta mejoría se mantuvo en gran medida en el seguimiento a 2 años.

Los síntomas de este paciente son coherentes con daño en el sistema nervioso parasimpático visceral. Es interesante saber que muchos estudios en los que se evalúan los mecanismos de la acupuntura señalan el tono parasimpático como un mecanismo de acción. En este artículo, se describe un caso de trastornos gastrointestinales funcionales complejos asociados a neuropatía autonómica postraumática que era refractario a la farmacoterapia y fue tratado con éxito con un enfoque integrador este-oeste.

## INTRODUCTION

Functional gastrointestinal disorders including functional dyspepsia (FD), chronic constipation, and irritable bowel syndrome (IBS) account for up to 41% of office consultations with gastroenterologists in the United States.<sup>1,2</sup> Specific symptoms and triggers can vary among these disorders, but a common theme is that psychological stress often exacerbates the symptoms.<sup>3-6</sup> The autonomic nervous system (ANS) is part of the systemic stress response and consistent with this, minor imbalances of the ANS are associated with

functional gastrointestinal disorders.<sup>7-9</sup> Moreover, frank autonomic neuropathies are affiliated with the most severe manifestations of these conditions, such as diabetic gastroparesis or adynamic ileus and chronic constipation following spinal cord injury.<sup>10</sup> This suggests that targeted treatment of the autonomic nervous system may be helpful for patients with functional gastrointestinal disorders.

Unfortunately, pharmacological options for autonomic modulation remain limited. Pro-motility agents are not entirely effective, and their use is further limit-

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ed by cost and side effect profile.<sup>11</sup> Tricyclic antidepressants can be effective for IBS and FD, but this effect seems independent of autonomic tone.<sup>12</sup>

Increasingly, these patients seek integrative and holistic therapies when conventional treatments fail.<sup>13</sup> Acupuncture is one such therapy that has shown efficacy for the treatment of FD and IBS,<sup>14-16</sup> and animal models of autonomic denervation suggest restoration of parasympathetic tone as a mechanism of action.<sup>17</sup> Other soft-tissue manipulations including massage and trigger point injections may also improve parasympathetic tone in healthy subjects.<sup>18</sup> However, there is little data guiding the use of these treatments for the more severe autonomic neuropathies such as with spinal cord injury. The presented case is a unique example of traumatic autonomic neuropathy following spinal cord injury presenting as both chronic constipation and functional dyspepsia that was relieved successfully with a combination of these therapies.

### PRESENTING CONCERNS AND DIAGNOSTIC ASSESSMENT

A 52-year-old male with hypothyroidism was referred to an integrative medical practice for chronic constipation and functional dyspepsia. The patient was in his usual state of health until a motor vehicle accident in 1991, which resulted in damage to lumbar level 3 to 4. He developed cauda equina syndrome with saddle anesthesia, lost the urge to defecate, and became unable to urinate. Despite spinal surgery, these bowel and bladder deficits persisted. An ileal conduit with catheterizable stoma was created for the bladder, but during the patient's hospitalization, he remained unable to stool without manual disimpaction. He was ultimately discharged with over-the-counter laxatives, but he never recovered the ability to defecate spontaneously. Instead he would have to strain to produce hard dark brown balls of stool every 2 or 3 days. The straining was so severe that he would occasionally pass drops of blood or develop pain radiating to his right testicle. He tried several different therapies including senna, psyllium, fiber, prune juice, papayas, and increased hydration and exercise. These would soften the stools and increase bowel frequency but also cause episodes of fecal incontinence due to his lack of sensation. Colonoscopy in 2006 demonstrated melanosis coli, moderate internal hemorrhoids, and unremarkable ileocecal anastomosis. He was eventually up-titrated on a regimen of polyethylene glycol, which allowed him to maintain daily soft stools at the expense of unpredictable episodes of fecal incontinence and persistent feelings of incomplete evacuation. As such, he remained motivated to find a better solution.

Over the year prior to presentation, he developed a new postprandial burning epigastric pain that he described as an 8 out of 10 on the pain scale. The pain was associated with reflux and abdominal distention but not nausea. Coffee, alcohol, and tomato would exacerbate the pain, but avoiding these did not prevent

the pain from occurring. Interestingly, psychosocial stressors seemed to exacerbate both the abdominal pain and constipation. He was initially diagnosed with gastroesophageal reflux disease and started on omeprazole, which was up-titrated to twice per day without relieving the pain. Lifestyle modifications including eating small frequent meals and sleeping at an elevated angle also were not helpful. Endoscopy in 2012 was unremarkable with biopsies negative for *Helicobacter pylori*. Computerized tomography of the abdomen was also unremarkable except for a large amount of retained stool. Given these findings he was diagnosed with functional dyspepsia and referred for an integrative treatment approach.

### CLINICAL FINDINGS

The patient's past medical history also included hypothyroidism, which was treated with levothyroxine. His other surgical history included a rod placement for spinal stabilization following his accident, appendectomy, and a stomal revision surgery. His complete medication list at consultation was omeprazole, levothyroxine, polyethylene glycol, and vitamin D.

Physical examination of the abdomen was remarkable for a large infraumbilical scar related to his injury as well as an ostomy site for self-catheterization in the right lower quadrant. There was no tenderness to palpation and there was no hepatomegaly. Bowel sounds were present. Rectal exam was notable for mildly decreased anal sphincter tone and stool in the vault. Musculoskeletal exam was notable for palpable trigger points of the upper back and neck regions specific to the trapezius and suboccipital muscle groups.

### THERAPEUTIC FOCUS AND ASSESSMENT

The patient was initially evaluated by the consulting physician, a dual-trained medical doctor who holds a master of science degree in traditional Oriental medicine with additional fellowship training in East-West medicine. A combination of acupuncture and trigger-point injections was recommended and delivered by this provider for the initial 4 treatments (Figure). On the fifth visit, his care was transitioned to include another licensed acupuncturist, Chinese-trained with more than 20 years of experience in the United States, in order to add Tui Na massage to his acupuncture treatment. Trigger point injections for these subsequent visits were administered by the same initial consulting physician.

Tui Na massage is a traditional Chinese medicine (TCM)-informed physical manipulation that is widely used in combination with acupuncture treatment worldwide. Although the specifics often vary, in this case it involved a hand-rolling movement onto the neck and shoulder region for approximately 5 minutes.

Acupuncture was then performed using 34-gauge needles inserted into abdominal acupoints Stomach-25, Ren-6, and Ren-12, as well as Stomach-36. Additional points were considered and included based on TCM

Date	Treatment Provided		
	Acupuncture	Trigger Point Injection	Tui Na Massage
7/12/2012	+	+	—
7/31/2012	+	+	—
8/13/2012	+	+	—
8/27/2012	+	+	—
10/17/2012	+	+	+
11/5/2012	+	+	+
11/14/2012	+	+	+
12/12/2012	+	+	+
12/27/2012	+	+	+
1/22/2013	+	+	+
2/12/2013	+	+	+
2/24/2013	+	+	+

**Figure** Treatment timeline.

principles. The needles remained in place for 25 minutes and were then removed.

Trigger points were identified by palpation of tender areas of taut muscle bands of the bilateral trapezius, cervical, and suboccipital musculature. After disinfecting the site with an alcohol swab, a 25-gauge needle was inserted with an attempt to illicit a twitch response (as described by Travell and Simons). Next, 0.2 mL of 1% lidocaine solution was injected into the area and pressure was applied for several seconds after removal of the needle. Injections were performed at each visit in 4 to 6 palpable trigger points found on examination.

#### FOLLOW-UP AND OUTCOMES

After 3 visits the patient experienced moderate improvement of his abdominal pain and returned to daily bowel movements without straining. At the following visit, he reported a dramatic worsening of his symptoms for 2 days after the hospitalization of a family member. He then missed his appointments for the next 2 months and returned to our clinic with recurrence of his presenting symptoms and 8-level pain. Tui Na massage was added to the treatment regimen at this time.

His abdominal pain and constipation continued to improve, although periods of stress would intermittently cause a worsening of symptoms. After 5 additional treatments, his abdominal pain resolved and his bowel movements normalized to become a daily occurrence without straining. He also noticed that he recovered the urge to defecate and felt that he was able to completely evacuate his bowels after the treatments. He was able to discontinue omeprazole at this point and subsequently tapered off his polyethylene glycol.

He sustained this improvement for 3 to 5 months following 12 total treatments. At follow-up 2 years later, he reported the gradual recurrence of hard dry stools occurring every 1 to 2 days with minimal strain required for defecation. He returned to using polyethylene glycol on an as-needed basis for severe constipa-

tion. His epigastric pain was now felt to be simple acid reflux that was triggered by food and stress and relieved by antacids, with maximum pain level reaching a 4 to 5 on a scale of 10.

#### DISCUSSION

This patient presented with a complex gastrointestinal disorder characterized by abdominal pain and constipation that failed to adequately respond to medical therapy. His symptoms improved with a combination approach including acupuncture, trigger point injections and Tui Na massage. The association between this improvement and the intervention is strengthened by the relapse of symptoms after 2 months of missed appointments, as well as the gradual return of some symptoms after the treatment completion. Many of the studies evaluating the mechanisms of acupuncture and soft tissue manipulation point to autonomic modulation as a mechanism of action. This patient's history of neurogenic bowel and bladder following a cauda equina syndrome from a motor vehicle accident-related spinal cord injury suggests a defect in his visceral parasympathetic nervous system. As such, it may be possible to explain this patient's improvement in terms of restoration of parasympathetic tone.

Soft tissue dysfunction such as neck tension has been associated with low parasympathetic tone as measured by heart rate variability (HRV),<sup>20</sup> and physical massage to release neck and shoulder muscle tension has been demonstrated to increase HRV.<sup>21</sup> Another method of treating soft tissue dysfunction is with acupuncture, the insertion of small needles that are manipulated and/or kept in place for a period of time. Consistent with the above findings, acupuncture of a specific point within the trapezius (Gall Bladder-21) was found to similarly change HRV in a pattern suggestive of increased parasympathetic tone.<sup>22</sup> Another study<sup>23</sup> used pupil size to demonstrate an increase in parasympathetic tone following manual and electro-

magnetic acupuncture stimulation of the lower aspect of the trapezius muscle. These findings suggest that trapezius tension may correlate with autonomic balance and may help explain how acupuncture and Tui Na massage of the neck and shoulders could have been helpful for this patient.

Myofascial dysfunction in this patient was treated with direct needling of active trigger points.<sup>24</sup> Needling methods can differ from “dry needling” to the injection of medications such as corticosteroids or botulinum toxin. The superiority of these substances over dry needling is under question,<sup>25</sup> so lidocaine was used on this patient as this has been demonstrated to reduce post-injection soreness<sup>26</sup> when compared with dry needling. An exploration of the relationship between trigger point injections of the neck and shoulder region and autonomic modulation may be a fruitful direction for future research.

Acupuncture has been studied in patients with IBS, a subset of functional gastrointestinal disorders. The use of 4 specific acupoints located on the abdomen (Stomach-25, Ren-6, and Ren-12) were associated with a significant improvement in daily abdominal pain/discomfort, intestinal gas, bloating and stool consistency in a randomized, sham-placebo controlled trial of acupuncture in 29 IBS patients.<sup>14</sup> Another study that included HRV measurements found a significant improvement in global quality of life both with sham and true acupuncture treatment; however, only true acupuncture was associated with significant increases in parasympathetic tone.<sup>16</sup>

Acupuncture theory classically points to the use of a specific point named Zusanli (or Stomach-36) for gastrointestinal disturbances. Electro-acupuncture of this point in animal models has been found in studies to increase lower esophageal sphincter pressure,<sup>27</sup> restore gastric accommodation after vagotomy,<sup>28</sup> increase the frequency of intestinal<sup>29</sup> and colonic<sup>30</sup> movement, increase activity of the sacral parasympathetic pathway,<sup>31</sup> and reduce visceral hypersensitivity.<sup>32</sup> In humans, acupuncture stimulation of this point was found to influence the limbic-paralimbic system and the homeostatic afferent processing network of patients with functional dyspepsia compared with healthy subjects, as measured by functional magnetic resonance imaging.<sup>33</sup>

These findings suggest a physiological effect of acupuncture stimulation of these specific points and taken together may help to explain how the complete acupuncture treatment may have been effective. In a recent Cochrane review summarizing acupuncture for functional dyspepsia, 4 studies found no difference in efficacy between acupuncture and medications (cisapride, domperidone, and itopride) for functional dyspepsia.<sup>15</sup> This finding is clinically significant if these medications are effective, but safety concerns limit their use. Three sham-controlled studies were evaluated and collectively demonstrated a significant positive effect of acupuncture over control. Although

these results are promising, low study quality prompted the authors to express caution before drawing any robust conclusions.

Collectively, these studies support the concept of using soft tissue stimulation to modulate autonomic balance, gastrointestinal motility, and visceral hypersensitivity. The combination of acupuncture in the points described, Tui Na massage of the neck and shoulder, and trigger point injections in key locations achieved the desired clinical effect of symptom reduction in this patient. This combination approach should therefore be considered for patients with challenging gastrointestinal disorders. Future research investigating the autonomic effects of combination therapies such as these would be helpful in devising optimal therapeutic regimens.

## PATIENT PERSPECTIVE

*About a year ago, I was attending doctors to help me with a chronic pain I have had for the longest [time] in my upper stomach. I was losing weight, and every time I would eat my stomach would hurt. I was afraid to eat; it was painful. After visiting a couple of gastroenterology doctors, nothing seemed to solve the problem . . . I can say this treatment slowly but surely has eased the pain.*

## INFORMED CONSENT

The patient provided verbal informed consent on 3 occasions and submitted a written testimonial.

## REFERENCES

1. Takahashi T. Acupuncture for functional gastrointestinal disorders. *J Gastroenterol*. 2006 May;41(5):408-17.
2. Chang L. Review article: epidemiology and quality of life in functional gastrointestinal disorders. *Aliment Pharmacol Ther*. 2004 Nov;20 Suppl 7:31-9.
3. Mayer EA. The neurobiology of stress and gastrointestinal disease. *Gut*. 2000 Dec;47(6):861-9.
4. Mönnikes H, Tebbe JJ, Hildebrandt M, et al. Role of stress in functional gastrointestinal disorders. Evidence for stress-induced alterations in gastrointestinal motility and sensitivity. *Dig Dis*. 2001;19(3):201-11.
5. Devanarayana NM, Mettananda S, Liyanarachchi C, et al. Abdominal pain-predominant functional gastrointestinal diseases in children and adolescents: prevalence, symptomatology, and association with emotional stress. *J Pediatr Gastroenterol Nutr*. 2011 Dec;53(6):659-65.
6. Murray CD, Flynn J, Ratcliffe L, Jacyna MR, Kamm MA, Emmanuel AV. Effect of acute physical and psychological stress on gut autonomic innervation in irritable bowel syndrome. *Gastroenterology*. 2004 Dec;127(6):1695-703.
7. Lorena SL, Figueiredo MJ, Almeida JR, Mesquita MA. Autonomic function in patients with functional dyspepsia assessed by 24-hour heart rate variability. *Dig Dis Sci*. 2002 Jan;47(1):27-31.
8. Heitkemper M, Burr RL, Jarrett M, Hertig V, Lustyk MK, Bond EF. Evidence for autonomic nervous system imbalance in women with irritable bowel syndrome. *Dig Dis Sci*. 1998 Sep;43(9):2093-8.
9. Jarrett M, Heitkemper M, Czyzewski D, Zeltzer L, Shulman RJ. Autonomic nervous system function in young children with functional abdominal pain or irritable bowel syndrome. *J Pain*. 2012 May;13(5):477-84.
10. Benarroch EE. Gastrointestinal dysmotility. In: *Autonomic neurology*. Oxford: Oxford University Press; 2014:163-4.
11. Aggarwal A, Bhatt M. Commonly used gastrointestinal drugs. In: Biller J, Ferro JM, editors. *Handbook of clinical neurology*. Volume 120. Philadelphia, PA: Elsevier; 2014:633-43.
12. Thoua NM, Murray CD, Winchester WJ, et al. Amitriptyline modifies the visceral hypersensitivity response to acute stress in the irritable bowel syndrome. *Aliment Pharmacol Ther*. 2009 Mar 1;29(5):552-60.
13. Tillisch K. Complementary and alternative medicine for functional gastrointestinal disorders. *Gut*. 2006 May;55(5):593-6.



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14. Anastasi JK, McMahon DJ, Kim GH. Symptom management for irritable bowel syndrome: a pilot randomized controlled trial of acupuncture/moxibustion. *Gastroenterol Nurs*. 2009 Jul-Aug;32(4):243-55.
15. Lan L, Zeng F, Liu GJ, et al. Acupuncture for functional dyspepsia. *Cochrane Database Syst Rev*. 2014 Oct 13;10:CD008487.
16. Schneider A, Enck P, Streitberger K, et al. Acupuncture treatment in irritable bowel syndrome. *Gut*. 2006 May;55(5):649-54.
17. Ouyang H, Xing J, Chen J. Electroacupuncture restores impaired gastric accommodation in vagotomized dogs. *Dig Dis Sci*. 2004 Sep;49(9):1418-24.
18. Delaney JP, Leong KS, Watkins A, Brodie D. The short-term effects of myofascial trigger point massage therapy on cardiac autonomic tone in healthy subjects. *J Adv Nurs*. 2002 Feb;37(4):364-71.
19. Travell JG, Simons DG. Myofascial pain and dysfunction: the trigger point manual. Volume 2. Philadelphia, PA: Lippincott Williams & Wilkins; 1992.
20. Hallman DM, Lyskov E. Autonomic regulation, physical activity and perceived stress in subjects with musculoskeletal pain: 24-hour ambulatory monitoring. *Int J Psychophysiol*. 2012 Dec;86(3):276-82.
21. Delaney JP, Leong KS, Watkins A, Brodie D. The short-term effects of myofascial trigger point massage therapy on cardiac autonomic tone in healthy subjects. *J Adv Nurs*. 2002 Feb;37(4):364-71.
22. Sakai S, Hori E, Umeno K, Kitabayashi N, Ono T, Nishijo H. Specific acupuncture sensation correlates with EEGs and autonomic changes in human subjects. *Auton Neurosci*. 2007;133(2):158-69.
23. Kim SB, Choi WH, Liu WX, Lee NR, Shin TM, Lee YH. Use of pupil size to determine the effect of electromagnetic acupuncture on activation level of the autonomic nervous system. *J Acupunct Meridian Stud*. 2014;7(3):122-32.
24. Han SC, Harrison P. Myofascial pain syndrome and trigger-point management. *Reg Anesth*. 1997 Jan-Feb;22(1):89-101.
25. Graboski CL, Gray DS, Burnham RS. Botulinum toxin A versus bupivacaine trigger point injections for the treatment of myofascial pain syndrome: A randomised double blind crossover study. *Pain*. 2005 Nov;118(1-2):170-5.
26. Hong CZ. Lidocaine injection versus dry needling to myofascial trigger point. The importance of the local twitch response. *Am J Phys Med Rehabil*. 1994 Jul-Aug;73(4):256-63.
27. Zou D, Chen WH, Iwakiri K, Rigda R, Tippet M, Holloway RH. Inhibition of transient lower esophageal sphincter relaxations by electrical acupoint stimulation. *Am J Physiol Gastrointest Liver Physiol*. 2005 Aug;289(2):G197-201.
28. Ouyang H, Xing J, Chen J. Electroacupuncture restores impaired gastric accommodation in vagotomized dogs. *Dig Dis Sci*. 2004b;49:1418-24.
29. Choi M, Jung J, Seo M, et al. Ultrasonographic observation of intestinal mobility of dogs after acupunctural stimulation on acupoints ST-36 and BL-27. *J Vet Sci*. 2001 Dec;2(3):221-6.
30. Iwa M, Nakade Y, Pappas TN, Takahashi T. Electroacupuncture elicits dual effects: stimulation of delayed gastric emptying and inhibition of accelerated colonic transit induced by restraint stress in rats. *Dig Dis Sci*. 2006 Aug;51(8):1493-500.
31. Iwa M, Matsushima M, Nakade Y, Pappas TN, Fujimiya M, Takahashi T. Electroacupuncture at ST-36 accelerates colonic motility and transit in freely moving conscious rats. *Am J Physiol Gastrointest Liver Physiol*. 2006 Feb;290(2):G285-92.
32. Xu GY, Winston JH, Chen JD. Electroacupuncture attenuates visceral hyperalgesia and inhibits the enhanced excitability of colon specific sensory neurons in a rat model of irritable bowel syndrome. *Neurogastroenterol Motil*. 2009 Dec;21(12):1302-e125.
33. Li Z, Zeng F, Yang Y, et al. Different cerebral responses to puncturing at ST36 among patients with functional dyspepsia and healthy subjects. *Forsch Komplementmed*. 2014;21(2):99-104.