Self-administered electroacupuncture provides symptomatic relief in a patient with sphincter of Oddi dysfunction: a patient’s report

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ABSTRACT
A 46-year-old woman with differentially diagnosed sphincter of Oddi dysfunction (SOD) type III is described. After two and a half years of managing the condition with a conventional medical/pharmacological approach, the patient’s symptoms worsened and she sought complementary approaches, starting traditional acupuncture treatment before receiving training from a practitioner of Western medical acupuncture to self-administer electroacupuncture. The frequency and intensity of severe night-time pain attacks reduced and, additionally, self-administered manual acupuncture during pain attacks resulted in quick, lasting, complete symptomatic pain resolution. This is the first published case report using electroacupuncture in the clinical management of this condition. It shows patient-administered electroacupuncture as a low-risk well-tolerated procedure which provided effective pain relief and reduced the frequency and severity of pain attacks. Self-administered acupuncture could be considered as a potential complementary medical approach for patients with SOD type III before resorting to endoscopic SO manometry and sphincterotomy which carry significant associated risks of pancreatitis.

CASE HISTORY
A 46-year-old woman had a two and a half-year history of episodic increasingly frequent severe biliary-type pain attacks. She had also suffered from less severe daily pain, arising soon after laparoscopic cholecystectomy in 2009. She was formally diagnosed as having SOD type III by a gastroenterologist. Her only other chronic health condition is well-controlled mild asthma.

The sphincter of Oddi (SO) is a muscular valve at the end of the common bile duct. Usually closed, it opens after a meal, modulated by both neural and hormonal pathways, to control the flow of bile and pancreatic juices into the second part of the duodenum.1 SOD is an uncommon benign non-calculous disorder characterised by a pathophysiological spasmed sphincter obstructing the flow of bile and/or pancreatic juice into the duodenum which presents clinically as recurrent episodes of biliary-type pain or pancreatitis.1 About 1–1.5% of post-cholecystectomy patients experience this as a complication months to years after their surgery, but it can also develop in patients with an intact biliary tract and gallbladder.2 Characteristically, pain episodes are severe and episodic, ranging from only 3–4 pain incidents in a year to runs of pain occurrences over a number of weeks, sometimes followed by pain-free intervals lasting for several months.1 SOD is divided into types I–III which essentially categorise the certainty of sphincter pathophysiology. SOD type III is defined by clear recurrent biliary-type pain symptoms, type II with some additional abnormal biochemistry and/or radiological signs and type I is defined by...
all of the above plus specific endoscopic manometric findings of dilated common bile duct diameter measurements. For SOD severe pain episodes, opiates are the recommended analgesia, given parenterally for speed of delivery; smooth muscle relaxants and calcium antagonists are ineffective for severe pain attacks. Amitriptyline is often used as analgesia if daily pain is present. Endoscopic sphincterotomy for patients with manometrically-confirmed high basal sphincter tone provides the majority of treated patients with excellent long-term symptom relief. However, both SO manometry and sphincterotomy are associated with a significant risk of pancreatitis, as well as perforation and bleeding.

The patient effectively managed daily pain with amitriptyline (30 mg nocte) and hyoscyamine butylbromide (10 mg three times daily) and was almost completely pain-free during waking hours. Night-time attacks were almost always followed by migrainous headaches with nausea, vomiting and marked exhaustion, and resulted in her spending at least 1 day in bed. The patient used oxycodone (20 mg), metoclopramide (10 mg) and orodispersible rizatriptan (20 mg) for symptomatic relief.

Between October 2009 and November 2011 the patient experienced 19 severe nocturnal pain attacks at irregular frequency. In December 2011 there was a nocturnal pain attack substantially more severe than previously experienced and an ambulance was called. An ECG excluded cardiac causes, the pain reduced with oxycodone and hospitalisation was avoided. The patient felt emotionally traumatised by this experience and sought other management approaches for her condition. A GP acquaintance who practised Western medical acupuncture suggested acupuncture in addition to her current medication. She commenced acupuncture with a local traditional Chinese medicine (TCM) practitioner in January 2012 due to lack of Western medical practitioners locally. After only two treatments, however, she experienced two further night-time attacks 1 week apart and lost confidence in acupuncture. The GP acupuncturist offered to teach her self-administered acupuncture. By March 2012 the patient was suffering near-weekly nocturnal attacks and accepted the offer. The patient lives hundreds of miles away from the GP acupuncturist so could not visit for frequent treatment. Self-administered acupuncture would have to commence before establishing whether the treatment would be effective.

Based on a Korean paper showing SO relaxation in sedated patients by needling GB34 as well as neuro-anatomical considerations and ease of point location for self-needling, an initial plan was devised to teach self-needling of three different acupuncture points: LR3, GB34 and ST25.

During training on three consecutive days the GP taught the patient to safely insert 0.18×30 mm acupuncture needles with guide tubes into points LR3, GB34 and ST25 bilaterally and to stimulate them manually with fine twisting. Additional training was given on use of an EA machine to stimulate the needles electrically. To overcome hesitation when inserting needles, the GP advised the patient to deeply inhale and then exhale sharply through pursed lips while tapping the needle through the guide tube. The patient returned home with needles, a sharps box and adhesive tape (for fixing EA cables to the skin) and planned weekly sessions of acupuncture.

The GP recommended three possible easy-to-use EA machines as he believed electrical stimulation to be more efficacious and easier than manual. His recommendations were based on a combination of cost and ease of use.

After returning home the patient experienced SOD-type gastric pain of the type occasionally experienced in daytime. After manual manipulation of needles in points GB34 and LR3 for around 20 min the pain abated. She had not thought of needling during daytime break-through pain and this experience increased her confidence in needling.

"Woke 02:00, felt quite annoyed, attack with pain, but not terrible. Did just GB34 again, stayed in bed, worked a treat. Back to sleep. Up in the morning and off to work. Victory! I feel like I have beaten this sucker! Now I do have huge expectation that I will just be able to shut down or switch off attacks with only a wee bit of GB34. Job’s a good ’un."


Box 1 Extract from patient’s acupuncture diary for 1 September 2012:

"Twenty weeks since last attack (don’t count mild one on 14th August). It feels so different when the last attack is many weeks in the past. Saw Dr XX (gastrointestinal consultant) on 8th August and he was happy to hear of my progress with acupuncture. Our next appointment is 1 year away. I am really hoping to break my 6 month record of no attacks that went from Nov 2010 to May 2011. It feels really different knowing that I have another solution too, one that means the pain will go, I won’t have a drug trip while trying to go back to sleep and I’ll be fine in the morning. I don’t have complete faith that it will always work that well, but I am very hopeful both of reducing the attacks and dealing with them when they occur."

Box 2 Extract from patient’s acupuncture diary for 6 September 2012:

"Woke 02:00, felt quite annoyed, attack with pain, but not terrible. Did just GB34 again, stayed in bed, worked a treat. Back to sleep. Up in the morning and off to work. Victory! I feel like I have beaten this sucker! Now I do have huge expectation that I will just be able to shut down or switch off attacks with only a wee bit of GB34. Job’s a good ’un."

Clinical observation
Soon after, the patient experienced a night-time attack with moderate pain. She manually needled GB34 bilaterally instead of taking oxycodone and the pain abated after 25 min. She went straight back to sleep and woke feeling fine in the morning before going to work as normal.

Later in April 2012 the patient consulted a gastrointestinal specialist with whom she had previously discussed SO manometry and sphincterotomy. The consultant considered that her condition was worsening and that further intervention was appropriate, and prescribed glyceryl trinitrate aerosol spray as possibly both a therapeutic and a diagnostic tool to take during her next nocturnal pain attack. During the next night-time attack, in April 2012, the patient found the glyceryl trinitrate aerosol spray did not relieve the pain. Thirty minutes later she manually needled LR3 and GB34 bilaterally, which gave complete pain relief after about 20 min. She went back to sleep, woke feeling fine in the morning and went to work. Use of self-needling to immediately relieve pain attacks had not been anticipated.

The patient purchased an EA machine, model AS SUPER 4 Digital Schwa-Medico, chosen because of its high levels of flexibility of operating parameters, since the treatment was not yet proven and it might have been necessary to experiment.

With further guidance via email and video call, the patient began approximately weekly preventive EA treatments using paired LR3 and GB34 (bilaterally) and ST25. The EA machine was programmed to 10 Hz/15 Hz, 60 μs pulse width for 30 min. The underlying assumption was that, as these EA frequencies have been shown in experimental studies to increase visceral blood flow, they might be helpful for SOD too.9 10

The patient found self-needling of ST25 difficult and, as pain attacks had become less frequent and less severe using only LR3 and GB34, she ceased using this point.

Other minor problems encountered were occasional minor local bruising or minimal bleeding after needling, for which she was advised to apply local pressure for longer after removing the needles, which resolved these issues.

In September 2012 the patient experienced daytime pain during a working group. She rolled up her trousers discreetly, needled GB34 bilaterally, put her legs up under the table and continued to work as the pain subsided.

By May 2013 the patient had reduced her dose and then stopped taking hyoscine-butylbromide with no recurrence of daily pain. The last use of oxycodone was 25 March 2012 and she no longer required metoclopramide or rizotriptan.

The patient conducts acupuncture on her bed, ensuring that the session is warm and comfortable, usually with a book and a hot drink (see figure 1A,B).

Table 1 in the online appendix is the patient’s list of pain attacks showing increased frequency of pain attacks during February to April 2012, followed by decreased frequency and severity of night-time pain episodes after commencement of regular preventive EA. Dates of every self-administered acupuncture session to June 2013 are shown in table 2 in the online appendix.

The possibility of overtreatment and reduction in efficacy of acupuncture was considered, but colleagues of the GP suggested there was no such risk. However, since the treatment sessions do carry a cost in terms of use of time, the patient reduced treatment frequency to every 2 weeks and sometimes longer if travel interfered.

Figure 2 shows the frequency of severe night-time pain attacks, mild night-time pain episodes (after

Figure 1 (A, B) The patient needling at LR3 and GB34 ready for electroacupuncture in a weekly preventive session conducted in her own bedroom.
starting acupuncture), doses of 30 mg dihydrocodeine, 10 mg oxycodone, treatments of self-administered preventive acupuncture and acupuncture for analgesia.

**DISCUSSION**

A group of Korean gastroenterologists published an article in a peer-reviewed American gastroenterology journal, demonstrating that low-frequency EA at GB34 right side resulted in fast reversible inhibition of SO contractions as well as temporary reduction of blood cholecystokinin (CCK) levels in humans.\(^8\) GB34 is a TCM point traditionally used for hepatobiliary disorders.\(^{11}\) In the Korean study (n=17), GB34 appeared to be point-specific as there was no discernible effect on SO pressure or CCK levels in the control group with EA at a point 5 cm away from GB34.\(^8\) Researching the neuroanatomy of SO revealed that the nerve supply to the extrahepatic bile duct is from extrinsic and intrinsic nerves. The extrinsic nerves are mainly from the hepatic plexus. The posterior hepatic plexus contains preganglionic parasympathetic fibers from branches of the vagus nerve and postganglionic sympathetic fibers that arise from the right coeliac plexus. The anterior hepatic plexus contains postganglionic fibers from the left coeliac and preganglionic fibers from the left vagus. The intrinsic nerve supply is mainly from neural connection from surrounding organs such as the duodenum, stomach and gallbladder. This complex neural supply is important in controlling sphincter motility.\(^{12}\) Lee et al had not shown pain relief but direct effects on SO by needling GB34 on the right.\(^8\) Given that the SO has right and left coeliac plexus nerve input, bilateral GB34 needling was chosen for the patient in this case.

The segmental level of the autonomic sympathetic innervation of the small intestine (including the duodenum) is T9–T10 and, of the liver and gallbladder, T7–T9; the parasympathetic innervation is mediated by the vagus nerve.\(^{13}\) The segmental (dermatome, myotome and sclerotome) correlation of GB34 is L5—that is, there is no direct segmental correspondence to either the small intestine or the liver/gallbladder autonomic innervation—whereas ST25 (lateral of the umbilicus) corresponds segmentally to T10, which one could postulate might be good for the sympathetic stimulation of the small intestine.

ST36 is a point close to GB34 which is a major point for achieving central effects, and segmentally this point corresponds to L4/L5. In order to stimulate on a segmental level with an effect on the hepatobiliary system, more cranial stomach meridian points like ST19 to ST21 might be good choices. ST36, LR2 and LR3 (between the first and second metatarsals) are all points traditionally used in TCM for liver complaints, with LR3 well-known as a major point for central effects and abdominal problems.\(^{14}\)

There is a 330 year history of documented cases of self-acupuncture going back to Willem ten Rhijne’s case in 1683,\(^{15}\) and self-acupuncture has been promoted—with the provision of clear guidelines—by senior members of the British Medical Acupuncture Society, notably Campbell and Hopwood,\(^{16}\) Filshie and Hester,\(^{17}\) Cummings\(^{18}\) and Dyer et al.\(^{19}\)

Adequate training and follow-up patient coaching for self-administration of manual acupuncture and EA is essential to give the patient confidence to persist through minor setbacks. A good rapport with a trusted practitioner is essential so the patient can approach the practitioner if needing reassurance or further guidance. Patients’ motivation and ability to learn acupuncture and persist with a regular programme is important if full benefits of treatment are to be achieved.

An EA machine costs £100–400 and needles cost £2–8 for 100 needles. The economic cost of hospital treatment and sick leave due to severe biliary pain episodes is considerably higher than that for most patients with SOD. In addition, the emotional cost and negative effect on her career of unpredictable debilitating attacks far outweighed the financial cost of EA equipment and time investment for acupuncture treatments. The patient considered the near-weekly severe night-time pain attacks of February and March 2012 to be an unsustainable situation and would likely have taken steps to progress toward risky SO

![Figure 2](http://aim.bmj.com/)

**Figure 2** Occurrences of night-time pain episodes (severe and mild), doses of 30 mg dihydrocodeine, 10 mg oxycodone, self-acupuncture, preventative and for analgesia during day-time or night-time pain.
manometry and sphincterotomy as the only other solution had she not improved after starting regular self-administered EA.

CONCLUSIONS

This case report illustrates a highly-motivated patient who learned to self-administer manual acupuncture and EA safely and effectively to prevent and treat pain attacks caused by SOD type III. Treatment over a period of 16 months at the time of writing has resulted in a very substantial reduction in the frequency and severity of night-time pain attacks. An essential requirement was the patient's thorough specific training and follow-up support and encouragement from a suitably experienced practitioner of acupuncture.

Correctly self-administered manual acupuncture and EA is potentially an effective approach and could be considered as a management solution for patients with SOD type III before resorting to endoscopic SO manometry and sphincterotomy, which carry associated risks of pancreatitis and therefore a subsequent risk of death.

This case study provides evidence that could support a proposal for a multi-patient trial of self-administered acupuncture for management of SOD type III symptoms.

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Contributors WAW contributed medical and acupuncture expertise, acupuncture literature review and is the physician in the case report. HCC contributed sphincter of Oddi dysfunction literature review, data and patient history and is the patient in the case report.

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