Observational Study

Application of acupuncture in the emergency department for patients with ileus

A pilot prospective cohort clinical study

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Abstract

Acupuncture can be conveniently used for pain control in patients with a variety of conditions, and it has obvious effects on various acute pains. In 2018, we implemented a program for emergency treatment with Chinese medicine to promote the integration of Chinese and Western medicine at the Emergency Department (ED). Ileus is a common cause of abdominal pain among patients in the ED, and it is an indication for emergency treatment with Chinese medicine. This study investigated the efficacy of acupuncture as a traditional Chinese medicine (TCM)-based treatment method for the treatment of patients with ileus in the ED. We analyzed data of patients with ileus, who visited ED between January and December 2019, and compared the length of ED stay between the Western medicine group and the Western medicine plus acupuncture group. Furthermore, pain intensity was measured by a visual analogue scale before and after acupuncture. We found that the length of ED stay was 10.8 hours lesser in the Western medicine plus acupuncture group than in the Western medicine group ($P = .04$), and the visual analogue scale score decreased by 2.0 on average from before to after acupuncture treatment ($P = .02$). Acupuncture treatment was effective and rapid in relieving the symptoms and discomfort in patients with ileus and in reducing their length of stay in the ED.

Abbreviations: ED = emergency department, LOS = length of stay, TCM = traditional Chinese medicine, VAS = visual analogue scale.

Keywords: acupuncture, emergency department, ileus, integration of Chinese and Western medicine

1. Introduction

In 2018, the Ministry of Health and Welfare approved the “Pilot Program for Emergency Treatment with Chinese Medicine” to promote the integration of Chinese and Western medicine in major hospitals. This program aimed to help relieve pain and improve symptoms quickly with a Chinese medicine-based intervention to reduce the length of emergency department (ED) stay and even decrease the probability of hospitalization. Moreover, it can reduce the number of repeated emergency room visits, thereby reducing the congestion and burden of EDs and promoting effective utilization of social medical resources.[1]

Acupuncture for pain care has been practiced in traditional Chinese medicine (TCM) for many years. In particular, the World Health Organization proposed 43 indications for acupuncture in 1979 and expanded the number of indications to 64 in 1996.[2] Acupuncture has a wide range of indications and is easy to administer. Because of the unique administration methods, acupuncture dramatically reduces the risk of interaction between Chinese and Western medicine, and it can decrease the frequency of pain medication and achieve rapid pain relief. These are the advantages of using acupuncture in the ED.

Pain is the most common complaint among patients visiting the ED. Lin et al reported that acupuncture for pain relief[3,4] and suggested the existence of a complex mechanism by which acupuncture elicits a pain relief effect. Some studies indicate that the pain-relief mechanism may involve endorphin[5,6] (endogenous opioids) and serotonin release,[7,8] anti-inflammatory mechanisms,[9–11] and effects on the immune system.[12,13] Several studies have shown that acupuncture is more effective and faster in relieving acute pain than are pain medications; furthermore, it is associated with better tolerance and stress, anxiety and nausea relief and with a lower incidence of side effects of constipation, nausea, and addiction than are some narcotic analgesics.[14]

S-HS and P-FL contributed equally to this work.

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All authors have read and agreed to the published version of the manuscript.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Acupuncture has demonstrated a good efficacy against conditions such as dizziness and headache,[15] primary dysmenorrhea,[16] trigeminal neuralgia,[17] dental pain,[18] acute lower back pain,[19] and stroke sequelae.[20] Therefore, the Program for Emergency Treatment with Chinese Medicine, which was officially implemented in 2018, has nine primary indications, including dizziness, acute abdomen pain (ileus), chest tightness (chest pain and palpitations), soft tissue pain, menstrual pain, migraine, cancer pain, bone and joint-related pain, and brain stroke. After eliminating emergency and critical conditions, TCM-based interventions can provide faster symptom relief, shorten the length of patients' stay in the ED, reduce the number of repeated emergency visits, lower the mortality rate, and reduce emergency crowding.

Accumulating evidence suggests that acupuncture can play a role in emergency treatment and interventional treatment. Acupuncture for various acute pain conditions in ED,[21] acute lower back pain,[22] and vertigo[23] and acupuncture, and auricular acupuncture for various acute pains in pediatric patients in ED[24] have all been effective. Therefore, a large amount of literature is available on the use of acupuncture for specific diseases in the ED, and it has been demonstrated from the perspective of empirical medicine that when vital signs are stable and critical conditions have been excluded, TCM interventions have sound adjuvant effects, and acupuncture is very safe and feasible.

Acute abdominal pain accounts for about 10–15% of emergency cases.[25] Ileus is a common condition that causes acute abdominal pain, and it is defined clinically as a partial or complete failure of the intestinal contents to pass through the intestine to the anus.[26,27] In terms of ileus, the correct diagnosis of ileus is made after clarifying the cause of abdominal pain through detailed medical history and physical examination, together with imaging. In life-threatening emergencies such as volvulus, decompression and resuscitation should be performed as soon as possible within 8 hours before intestinal necrosis. Surgical treatment is required when intestinal necrosis, intestinal perforation, or peritonitis occurs. If critical illnesses are excluded, the primary treatment for immobile ileus caused by peristaltic failure of the gastrointestinal tract is decompression with a nasogastric tube, fasting, nutrition and caloric supplementation by drip, and correction of electrolyte imbalance, as well as the use of neostigmine and other medications to promote peristalsis.[28] In the latter case, acupuncture can activate and stimulate the parasympathetic nerves and induce gastrointestinal peristalsis and intestinal motility.

This study aimed to evaluate the efficacy of TCM-based acupuncture interventions and analyzed the length of ED stay and pain index in patients who visit ED with acute ileus. As far as we know, this is the first study to evaluate the medical efficacy of acupuncture in patients who visit ED with ileus, and it is expected to serve as a reference for the treatment of acute abdominal pain using Chinese medicine in an emergency setting.

2. Methods

2.1. Patient analysis and research flowchart

This study included patients diagnosed with ileus in the ED of Hualien Tzu Chi Hospital from January to December 2019. Patients with ileus aged ≥ 20 years who were diagnosed and treated in the ED were included (N = 619). We excluded patients who continued hospitalization (N = 84), who did not stay in the ED for treatment (N = 44), who were discharged against medical advice (N = 31), who returned to the ED/outpatient clinic within 3 days with a complaint of abdominal pain (N = 25), and who had gastrointestinal cancer (N = 22). The patients were distinguished into two groups: Western medicine group and Western medicine plus acupuncture group. After applying the exclusion criteria, these groups included 16 and 6 patients, respectively (Fig. 1). The Western medicine plus acupuncture group included patients who had undergone emergency treatment with Western medicine and had been admitted

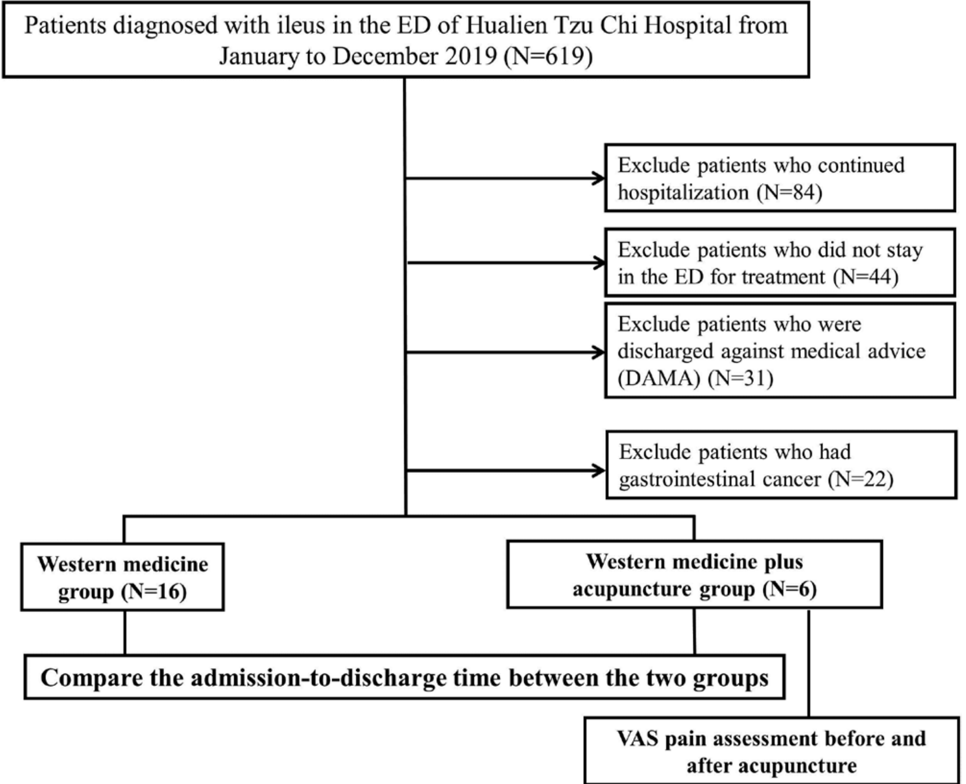

Figure 1. Data analysis process used in this study. The study was approved by the Medical Ethics Review Board of Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan (Registration number: IRB111-009-B).

to the waiting room. After the emergency physician assessed and explained the condition, the family or the patient provided consent for the administration of acupuncture treatment. Subsequently, a TCM consultation was conducted, during which a TCM Department's on-call physician went to the emergency room to explain acupuncture-related matters and precautions. All procedures followed the guidelines of "Emergency Service Procedure" and "Pilot Program for Emergency Treatment with Chinese Medicine" of the Ministry of Health and Welfare. After four consultations and pain score assessment using a visual analog scale (VAS) by TCM practitioners, acupuncture was performed, and the VAS score was assessed again after 15 minutes of acupuncture. Data on the length of ED stay and the pain index before and after acupuncture treatment were acquired from the Health Information System of the Hualien Tzu Chi Hospital.

2.2. Emergency treatment with TCM acupuncture

In accordance with the "Pilot Program for Emergency Treatment with Chinese Medicine" of the Ministry of Health and Welfare, TCM practitioners administered 1–3 treatment sessions during the emergency visit, with each session lasting for 15 minute, and the treatment acupoints were Hegu, Zhigou, Zusanli, Fenglong, etc., which were modified according to the patient's condition.

2.3. Evaluation of the length of stay (LOS) in the ED

LOS, for patients treated in the ED, was defined as the admission-to-discharge time, and it was referred to as LOSw in the Western medicine group and as LOSw + a in the Western medicine plus acupuncture group.

2.4. Pain assessment

Patients with Ileus were asked to record pain scores digitally via laptop computer or computer, used similar evaluate instruments and pain values were record by the same TCM practitioners. All procedures followed the guidelines of VAS working instruction of the Hualien Tzu Chi Hospital. The pain was assessed before and after acupuncture on a scale of 0 to 10 points using the VAS, with 0 representing not painful and 10 representing very painful. In the Western medicine plus acupuncture group, the pain scores before and after acupuncture were referred to as VAS1 score and VAS2 score, respectively.

2.5. Statistical methods

The Chi-square test was used to analyze differences in sex, age, past chronic medical history, and blood pressure and heart rate at admission. The independent *t*-test was used to compare the LOS and the VAS score; $P < .05$ was considered to indicate a significant difference.

3. Results

3.1. Participants and baseline characteristics

Our analysis revealed that there was no significant difference in the sex distribution between the Western medicine group and Western medicine plus acupuncture group. With regard to underlying chronic diseases, there were no significant differences in the rates of hypertension and diabetes mellitus between the two groups (Table 1). Age, systolic blood pressure, diastolic blood pressure, and heart rate at admission were not significantly different between the Western medicine group and Western medicine plus acupuncture group ($P = .43$, .41, .12, and .16). Meanwhile, average treatment session was present in the Table 2.

3.2. Comparison of LOS and VAS between groups

The mean of LOSw + a was 10.8 hours shorter than LOSw ($P = .04$) (Table 3). With regard to pain assessment we observed a mean decrease of 2.0 ($P = .02$) from VAS1 (before acupuncture) to VAS2 (after acupuncture) in the Western medicine plus acupuncture group (Table 4).

Table 1

Differences in the distribution of sex, diabetes, and hypertension between the Western medicine group and Western medicine plus acupuncture group.

	Western medicine group	Western medicine plus acupuncture group	*P*-value
	N = 16	N = 6	
Gender			
Male	12	3	
Female	4	3	.62
Hypertension			
Yes	5	1	.63
Diabetes			
Yes	2	0	.83

Table 2

Comparison of age, blood pressure, heart rate, and treatment sessions between the Western medicine group and Western medicine plus acupuncture group.

	Western medicine group	Western medicine plus acupuncture group	*P*-value
	Mean	Mean	
Age	63.6	65.2	.43
DBP	144.3	146.5	.41
SBP	90.1	85.3	.12
HR	86.9	81.5	.16

DBP = diastolic blood pressure, HR = heart rate, SBP = systolic blood pressure.

Table 3

Comparison of the length of stay between the Western medicine group and Western medicine plus acupuncture group.

	LOSw	LOSw + a	*P*-value
N	16	6	
Mean	36.52	25.72	.04*

*$P < .05$ indicates a significant difference.

LOSw = length of stay in the Western medicine group, LOSw + a = length of stay in the Western medicine plus acupuncture group.

Table 4

Comparison of the VAS scores before and after acupuncture in the Western medicine plus acupuncture group.

N = 6	VAS1	VAS2	*P*-value
Mean	4.4	2.4	.02*

*$P < .05$ indicates a significant difference.

VAS1 = VAS score before acupuncture, VAS2 = VAS score after acupuncture.

4. Discussion

Emergency crowding has always been an issue for major and minor hospitals in Taiwan and worldwide. Therefore, identifying methods for accelerating patient flow in the ED has become a critical topic.[29,30] In the input-throughput-output conceptual model commonly used to analyze the causes of emergency crowding in the ED, LOS is a significant indicator of emergency throughput.[29,31] In the emergency room, patients with abdominal pain who are evaluated for small bowel obstruction and do not have peritoneal signs, which are more dangerous and require urgent surgical management, are observed for 24 to 48 hours. During this time, they are administered conservative Western treatments such as intravenous fluid support and nasogastric tube placement for decompression or suctioning.[32–34] Patients could not discharge until they have stable vital signs, can eat, defecate, pass gas, and have no abdominal pain or bloody stools.[32,34] The findings of this study suggest that in cases of ileus, administration of acupuncture as an intervention with conventional Western medicine reduces the LOS of patients in the ED more significantly than does Western medicine alone, and this indicates that the combination of Chinese and Western medicine resulted in faster relief of symptoms and stabilization of patients with ileus. The shortened LOS also showed that the combination of Chinese and Western medicine could improve the emergency throughput in patients with ileus, and theoretically, it can also positively contribute to the overall emergency patient flow and improve emergency crowding.

For patients with ileus, abdominal pain is one of the most uncomfortable symptoms. Some studies have revealed that acupuncture can relieve abdominal pain caused by ileus.[35–37] The current study results corroborate this finding, and the VAS scores of the patients who underwent acupuncture in this study were significantly lower after acupuncture than before, indicating that the addition of acupuncture to conventional Western medical treatment could effectively alleviate patient discomfort. In addition, there was no adverse event during the whole process of administering the acupuncture, which also demonstrated that acupuncture is a safe and feasible intervention. The main site of the ileus is the small intestine. A total of 20% to 30% of ileus cases are caused by postoperative adhesions,[38] with adhesions, hernias, and tumors together accounting for 90% of causes of small bowel obstruction.[39] Large bowel obstruction accounts for only about one-fourth of ileus cases[40]: the most common cause of large bowel obstruction is cancer, which accounts for approximately 60% of cases,[41–47] and the second most common cause is volvulus, which accounts for 15% to 20% of cases.[48] Consequently, ileus is primarily caused by cancer and adhesions. This study intended to investigate uncomplicated ileus with fewer causes, such as postoperative adhesions leading to further ileus, slow peristalsis due to functional obstruction, or simple causes of fecalith, hernias, and gallstones. To reduce the variables of waiting time for hospitalization, this study excluded patients who had to be hospitalized for inpatient treatment, and therefore, the sample size was relatively small. In this retrospective study, data were collected from patients for three days until discharge from the hospital, and the patients' ileus status was not followed up thereafter.

In the future, the following aspects can be further investigated: Exploration into other ways to enhance the therapeutic effect: The Chinese medicine intervention used in this study was pure acupoint treatment, which can be combined with a broader range of treatment methods such as Chinese scientific medicine or auricular therapy in the future. It has been proven that auricular acupuncture is effective for pain control,[49] and if discharged from the hospital, it can be brought back with the patient and can be used to stimulate the acupoints for a certain period to continue the therapeutic effect. This study showed that Chinese acupuncture can effectively relieve the symptoms of ileus in the emergency room. Its efficacy against other eight major conditions put forward in the program for emergency treatment with Chinese medicine, namely dizziness, chest tightness (chest pain and palpitations), soft tissue pain, menstrual pain, migraine, cancer pain, bone and joint-related pain, and brain stroke, can be evaluated later on. The efficacy assessment in this study was based on decreases in LOS and VAS scores. Future works may explore the time to maintain efficacy and patient satisfaction after emergency treatment. In the case of cancer-induced ileus, progression of cancer can affect the local structure and pain score, and considering that cancer is chronic and requires long-term observation and follow-up treatment, the effect of Chinese medicine treatment for cancer-induced ileus may investigate separately in the future.

There were several limitations to our study. First, this is not a blinded, randomized controlled trial. Second, detailed information about acupuncture manipulation, was not provided in this study. Third, the treatment limited to manual acupuncture, electroacupuncture, auricular acupuncture, scalp acupuncture and moxibustion did not obtain. Double-blinded, randomized controlled trials should be conducted to investigate with a more comprehensive case collection and a more significant number of patients enrolled.

5. Conclusion

This pilot prospective cohort clinical study was conducted on patients who were diagnosed with and treated for ileus in the ED of Hualien Tzu Chi Hospital from January to December 2019. The LOS in the hospital and the VAS scale before and after acupuncture was present. The results showed that acupuncture reduced significantly LOS and was beneficial in relieving pain. This study provides an example for treating ileus patients, combination of Western and Chinese medicine in the ED.

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