

Acupuncture Pain Management for Patients with Cystic Fibrosis: A Pilot Study

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Abstract: Cystic fibrosis is the most commonly occurring genetic disorder among Caucasians. The purpose of this study was to evaluate the effects of acupuncture for pain management in patients with cystic fibrosis; clinical data was obtained regarding the integration of acupuncture into the management of pain in patients with cystic fibrosis. Visual analog scales were used for pain measurement. Acupuncture was found to be effective in decreasing pain complaints in patients with cystic fibrosis. No side effects or complications were reported in relation to the acupuncture treatment. Acupuncture is effective for managing symptoms and illnesses associated with cystic fibrosis. Further randomized controlled trials will be necessary to evaluate additional efficacy in pain management and the improvement of the quality of life of patients with cystic fibrosis.

Keywords: Pain Management; Cystic Fibrosis; Acupuncture.

Introduction

Cystic fibrosis is one of the most commonly inherited autosomal recessive disorders among Caucasians. It has an incidence of about one in 2500. The disease also occurs in high incidence among Hispanics, with a rate of one in 9500. It is very uncommon in native Africans and native Asians. Cystic fibrosis is a multi-system genetic disease in which defective chloride transport across membranes causes dehydrated secretions. This leads to tenacious mucus in

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the lungs, to mucus plugs in the pancreas, and to the characteristically high sweat chloride levels. Intelligence and cognitive function are generally normal. A survey in 1995 reported that 35% of young adults with cystic fibrosis worked full-time and almost 90% had completed a high school education.

Today, more than 25,000 Americans have cystic fibrosis, with approximately 850 cases newly diagnosed each year. Some individuals have severe pulmonary and/or gastrointestinal disease, whereas others have relatively mild disease with presentation during adolescence and young adulthood. Outcomes range from early death from pulmonary complications to mild atypical disease in the second and third decades and a rare normal length of life. The median survival increased from 18 years in 1976 to 30.1 years in 1995. Survival has improved, thus far, due to aggressive management of pulmonary, pancreatic and intestinal complications. Despite advances in treatment, however, there is currently no cure for cystic fibrosis.

Patients with cystic fibrosis experience numerous respiratory, musculoskeletal and gastrointestinal complications. With the improved survival rates, chronic pain becomes a common problem in patients with the disorder (Lin and Stevens, 1996; Ravilly *et al.*, 1996). In the United States, the use of acupuncture as a complementary therapeutic modality in the treatment of the pain and various illnesses associated with cystic fibrosis is becoming more widely accepted. This study reports our experience integrating acupuncture as a complementary medical therapy in pain management for patients with cystic fibrosis.

Methods

This report was approved by the Institutional Review Board. Between 1999 and 2003, patients with cystic fibrosis who were experiencing both acute and chronic pain were referred to our study for acupuncture treatments. A written informed consent from each patient or legal guardian was obtained prior to the initial treatment. The treatments were based on Traditional Chinese Medical diagnosis. Each patient received weekly acupuncture treatments. The patients' 0–10 visual analog pain scales (VAS) were recorded immediately before and after each treatment by a member of the staff, other than the acupuncturist. The patients were asked about the duration of the effectiveness of acupuncture therapy at each follow-up visit. A paired t-test was utilized for statistical analysis.

Results

Thirty patients with cystic fibrosis were included in this study. There were nine male patients and 21 females. The patients' ages ranged from 12 to 44 years, the average age was 26.7 ± 7.5 (mean \pm SD) years of age.

Patients diagnosed with cystic fibrosis were referred for acupuncture treatments either because they had not improved with conventional therapies or because the patient or the patient's family requested it. The chief pain complaints (Fig.1) at the initial consultations included chest pain (38%), back pain (21%), headache (21%), abdominal pain (17%) and limb pain (3%). For each patient, the mean VAS scores before and after the acupuncture

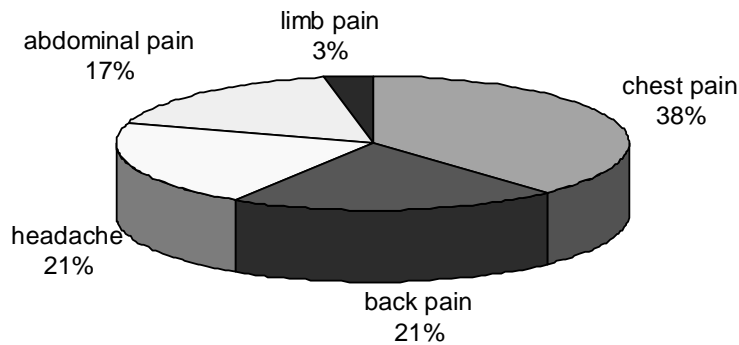


Figure 1. Chief pain complaints in patients with cystic fibrosis.

treatment were averaged. Statistical analysis was performed among the 30 paired VAS scores. The average VAS pain score were 5.95 ± 1.4 and 2.8 ± 1.0 immediately before and after the treatments, respectively. The acupuncture treatments significantly reduced the pain scores by 3.2 ± 1.1 ($p < 0.05$). The average duration of the acupuncture effect was 3.0 ± 1.1 days. There was no difference noted in the VAS pain score response between male and female. No side effects or complications were reported.

Discussion

Cystic fibrosis is the most common life-threatening, inherited disease among Caucasians in North America. It is postulated that the disorder is caused by a mutation of a single gene on the long arm of chromosome 7. The disease is characterized by chronic obstructive pulmonary disease with proximal bronchiectasis often resulting in respiratory failure, exocrine pancreatic insufficiency with mal-digestion, and increased sweat chloride concentration. Other clinical features include meconium ileus at birth, liver fibrosis and male infertility.

In recent years, complementary and alternative therapies have been commonly utilized to combat the symptoms of cystic fibrosis, and have received considerable attention by the public and by health care providers (Eisenberg *et al.*, 1998). In the pediatric population, acupuncture is one of the most frequently used alternative therapies (Spiegelblatt *et al.*, 1994). A recent study revealed that the use of acupuncture is not limited to children with life-threatening illness, but is commonly used by children (Friedman *et al.*, 1997; Lin and Bioteau, 2004). Acupuncture can be very effective, when incorporated into the care of pediatric patients (Lin, 2001). We reported our experience in utilizing acupuncture for pain and symptom management in patients with cystic fibrosis.

The traditional treatment for patients with cystic fibrosis is to improve pulmonary, gastrointestinal and pancreatic outcomes. Pulmonary treatment generally focuses on physical therapy to decrease obstruction of the airways, antibiotics to decrease colonization by bacteria, and medications to decrease the inflammatory cascade and resulting tissue damage. Gastrointestinal and pancreatic treatments include high protein-high energy diets, pancreatic

enzymes and fat-soluble vitamins. Therapeutic regimens for patients with cystic fibrosis have slowly evolved over the past four decades, resulting in a steady improvement in the medium survival.

Nearly half the patients with cystic fibrosis will grow to be adults (Ramsey, 1996). Inevitably, as these patients with chronic diseases age, the pain and suffering associated with the disease increases. Chronic pain is a common problem for patients with cystic fibrosis (Ravilly *et al.*, 1996). Upper respiratory tract impairment is involved in virtually all patients with cystic fibrosis, with the radiologic evidence of pan sinusitis. Lower respiratory tract involvement is also common, and is the primary cause of death in patients with cystic fibrosis, accounting for more than 90% of the morbidity and mortality. Chest pain is another common primary concern in patients with cystic fibrosis. The pain is caused by splinting of the chest wall muscles from prolonged reactive airway disease, hypercarbia and chronic hypoxia. Chest pain can also be caused by acute or chronic lung infection and pleurisy. In 10% of patients with cystic fibrosis, the lungs can rupture, leading to the pneumothorax, which can also cause chest pain. Furthermore, a high prevalence of low bone mineral density in patients with cystic fibrosis can increase risk of rib fracture. Chest pain can further compromise the sputum clearance and lead to impairment of the exacerbation of pulmonary diseases. The severity of the lung disease is the key to the length and quality of life.

As noted, 90% of patients with cystic fibrosis die from pulmonary complications. Depending on the underlying causes of the chest pain, acupuncture can be integrated as part of these patients' therapy. Lung transplantation is currently the definitive treatment for many patients with end stage lung disease (Lillehei and Mayer, 1999). There are patients in our study receiving acupuncture while awaiting lung transplants. The accompanying chest pain can be caused by phlegm obstruction, obstruction of Qi in the chest, stagnation of blood in the heart, or obstruction of Yang in the chest. The appropriate acupuncture treatment for these patients includes the use of point PC-6 (Nei Guan), the connecting point of the pericardium and confluence point of the Yin-linking vessels. Acupuncture at this point treats chest pain by promoting blood circulation and dispersing the Qi in the chest. LU-7 (Lieque) is also a connecting point and can open the chest and help the lung to disperse the Qi. CV-17 (Tan Zhong) is the gathering point for the Qi and removes the stagnation of Qi in the chest. LR-3 (Tan Zhong) is the source point which promotes liver-Qi circulation and regulates the function of liver.

Back pain in patients with cystic fibrosis is primarily musculoskeletal in origin. Frequent coughing can cause muscle splinting and musculoskeletal pain syndromes. Osteoporosis (Hecker and Aris, 2004) and compression fractures can occur in patients with malnutrition and mal-absorption syndromes. If pain is also distributed through several dermatomes of the lower extremities, the pain may be due to lumbar disc protrusion or to widespread spondylosis changes of the lumbar spine. The etiology of low back pain includes blockage of the channels by wind, cold and damp, resulting in obstruction or stagnation of the circulation of Qi. Congenital weakness or prolonged illnesses can also cause the deficiency of kidney essence. The acupuncture treatments include LI-4 (He Gu) and TE-5 (Wai Guan) dispels cold, eliminate damp and relieve external symptoms. GB-20 (Fen Chi) dispels wind and relieves external invasion as well as relieving the upper back pain. BL-40 (Wei Zhong) dispels damp and

promotes the free flow of Qi in the channels, which eases the lower back pain. BL-23 (Shen Shu), the back transporting point, KI-3 (Tai Xi), the source point and KI-10 (Yin Gu) tonify the kidney for patients with deficiency of kidney essence.

Headaches are a common complaint in patients with cystic fibrosis. The headache may be secondary to sinusitis, hypercarbia and/or hypoxia. One of our patients was referred for consultation of headache, and prior to acupuncture treatment, we obtained the patient's arterial carbon dioxide level. The result was 114 mmHg. In this patient, the acute onset of headache was probably caused by invasion of exogenous pathogen, of which wind is the most common cause. Dysfunction of the liver Qi is another common cause for headache due to endogenous factors. Chronic illnesses related to deficiencies of the Qi and blood, or of kidney essence, can cause headaches. The acupuncture treatment for these patients includes LI-4 (He Gu), the source point of the large intestine channel, which regulates Qi circulation and relieves headache. GB-20 (Feng Chi) dispels wind and regulates the Qi circulation. This point can be used to treat headaches caused by wind invasion. TE-5 (Wai Guan), the connecting point of the triple burner channel, regulates Qi circulation and also relieves headaches. Ah Shi points promote the circulation of Qi on the head and can also relieve headaches. Sp-6 (San Yin Qiao) promotes the circulation of Qi and eliminates damp.

Pancreatic damage in patients with cystic fibrosis is characterized by widespread loss of acinar cells with fatty replacement and interstitial fibrosis. Cystic fibrosis-related pancreatic disease varies from complete loss of exocrine and endocrine function to nearly normal pancreatic function. About 90% of the patients with cystic fibrosis show exocrine pancreatic insufficiency and mal-absorption (Witt, 2003).

Liver disease accounts for all non-pulmonary causes of mortality in patients with cystic fibrosis. Liver disease is characterized by focal biliary fibrosis. Clinically significant liver disease develops in 2%–5% of the patients with cystic fibrosis, resulting in chronic gastrointestinal dysmotility and abdominal pain. Exogenous pathogenic factors, i.e. cold, heat or damp, are the most common factors that cause abdominal pain, and can be related to the primary essence deficiency. Acupuncture treatment for patients with cystic fibrosis-related liver disease consists with BL-20 (Pi Shu), BL-21 (Wei Shu), BL-23 (Shen Shu), St-36 (Zu Shan Li), Sp-6 (San Yin Jiao), PC-6 (Nei Guan) and LR-3 (Tai Chung).

There are also promising results supporting the efficacy of acupuncture in adult post-operative and chemotherapy nausea and vomiting, and in post-operative dental pain. Other circumstances, such as addiction, stroke rehabilitation, headache, menstrual cramps, tennis elbow, fibromyalgia, myofascial pain, osteoarthritis, low back pain, carpal tunnel syndrome and asthma, have also been treated with acupuncture as a useful adjunct treatment, as an acceptable alternative, or when included in a comprehensive management program (NIH Consensus Conference, 1998). Our report suggests that acupuncture can significantly reduce patients' pain and may be successfully incorporated into pain management practices.

There are some limitations of this paper. There was no control to track the results in those patients who did not continue on for follow-up. As cystic fibrosis is a complex disease, further prospective randomized studies are needed to evaluate the short- and long-term effects of acupuncture therapy, the changes the requirements for pain medication, and the patients' general well-being and daily activity levels related to their response to acupuncture treatment.

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References

- Eisenberg, D., R. Davis and S.L. Ettner. Trends in alternative medicine use in the United States, 1990–1997: results of a follow-up national survey. *JAMA* 280: 1569–1575, 1998.
- Friedman, T., W. Slayton, L.S. Allen, B.H. Pollock, M. Dumont-Driscoll, P. Metha and J. Graham-Pole. Use of alternative therapies for children with cancer. *Pediatrics* 100(6): e1, 1997.
- Hecker, T.M. and R.M. Aris. Management of osteoporosis in adults with cystic fibrosis. *Drugs* 64(2): 133–147, 2004.
- Lillehei, C.W. and J.E. Mayer, Jr. Pediatric lung transplantation and lessons from Green Surgery. *Ann. Thorac. Surg.* 68(3 Suppl.): S25–27, 1999.
- Lin, Y. Acupuncture as an adjunctive treatment for chronic pain in children: patients' perspective. *Anesth. Analg.* 92(2s): 262, 2001.
- Lin, Y. and A. Bioteau. The use of alternative medicine in pediatric pre-operative patients. *J. Clin. Anesthesiol.* 16(1): 4–6, 2004.
- Lin, Y. and S. Stevens. Pain management in patients with cystic fibrosis. *International Association Study of Pain (IASP)*, Vancouver, 1996.
- NIH Consensus Conference. Acupuncture. *JAMA* 280(17): 1518–1524, 1998.
- Ramsey, B. Management of pulmonary disease in patients with cystic fibrosis. *N. Engl. J. Med.* 335(3): 179–188, 1996.
- Ravilly, S., W. Robinson, S. Suresh, M.E. Wohl and C.B. Berde. Chronic pain in cystic fibrosis. *Pediatrics* 98(4): 741–747, 1996.
- Spigelblatt, L., G. Laine-Ammara, B. Pless and A. Guyver. The use of alternative medicine by children. *Pediatrics* 94(6): 811–814, 1994.
- Witt, H. Chronic pancreatitis and cystic fibrosis. *Gut* 52(Suppl. II): ii31–ii41, 2003.

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