Integrating Acupuncture for the Management of Costochondritis in Adolescents

Katerina Lin, BA, and Cynthia Tung, MD, MPH

ABSTRACT

Background: Costochondritis is a common condition involving inflammation of the costochondral or chondrosternal joints. Conventional management of costochondritis includes pain medications, but these do not provide full recovery in all patients. There is limited information on adjunctive acupuncture for pediatric costochondritis.

Cases: This article describes the use of acupuncture in the management of costochondritis in adolescent patients. A retrospective chart review was conducted for 3 patients who received acupuncture treatment for costochondritis at a tertiary pediatric medical center. Patient demographics, Numerical Rating Scale, and the Brief Pain Inventory were recorded.

Results: All patients demonstrated satisfactory symptomatic reduction following acupuncture treatment.

Conclusions: Integrating acupuncture with conventional medicine appeared to reduce the costochondritis symptoms in the adolescent patients.

Keywords: acupuncture, costochondritis, pediatric pain, pediatrics

INTRODUCTION

COSTOCHONDRITIS, A COMMON musculoskeletal condition, produces sharp, stabbing pain located along the costochondral or chondrosternal joints.^{1,2} Local pressure on nonenlarged costochondral or chondrosternal junctions may elicit pain,³ which can worsen with deep breathing.⁴ Chest pain can interfere with daily life activities in pediatric patients: Among children admitted to the emergency department for chest pain, 30% had to stay out of school and 31% woke from sleep.⁵ More than two-thirds of adolescents with general chest pain restrict their physical activities, and more than 40% miss school.³ There is no definitive treatment for costochondritis symptoms, and most available pharmacologic therapies carry potential side-effects. Treatments include acetaminophen, nonsteroidal anti-inflammatory medications, and analgesics,² but these modalities do not always provide complete recovery.

A prior study has suggested that acupuncture may aid recovery from costochondritis in the adult population. Among 106 adults who received acupuncture treatment for

costochondritis, 97% had complete pain relief; 36% required one acupuncture treatment, and 56% had their pain relieved in 2–3 treatments.⁶ There is limited information, however, on acupuncture for pediatric costochondritis. This report describes the integration of acupuncture in the management of costochondritis in pediatric patients.

CASES

A retrospective review of 3 pediatric patients was performed. Patient demographics and the Brief Pain Inventory, which includes the Numerical Rating Scale (NRS), were recorded.

Written consent for acupuncture was obtained prior to treatment. Pediatric anesthesiologists and pain specialists trained in acupuncture medicine provided acupuncture treatment at a tertiary pediatric medical center. An administrative associate collected the NRS and Brief Pain Inventory data. Patients were recommended for at least 6

Medical Acupuncture Service, Department of Anesthesiology, Perioperative and Pain Medicine, Boston Children's Hospital, Harvard Medical School, Boston, MA.

weekly acupuncture sessions. Additional sessions were scheduled if the patients desired. All patients continued to receive conventional medical therapies in conjunction with acupuncture treatment.

The acupuncture treatment protocol was based on Traditional Chinese Medicine (TCM). Disposable sterile SEIR-IN® acupuncture needles (Shizuoka-shi, Shizuoka, Japan) with a tube size No. 02×30 mm were inserted to a depth of 5–10 mm. The needles were manually manipulated to achieve De Qi and were kept in place for 15 minutes. Low-frequency 2-Hz electrostimulation, using an ITO Physiotherapy and Rehabilitation IC-1107+ device (Toyotama-Minami, Nerimaku, Tokyo, Japan), was performed at ST 36. Glass valve cups were used to apply cupping. *Gua sha* was performed at *Back Shu* points.

Case I

A 14-year-old ballet dancer was diagnosed with costochondritis by her primary care and sports medicine physicians. She presented with a 3-month history of persistent anterior chest-wall pain associated with costochondritis. She noticed the pain when she was dancing and reported it as sharp and stabbing in nature. She had no direct traumatic inciting event, although she took modern dance classes and was participating in rehearsals that required her to carry a heavy prop. Her pain was localized over her sternum, sometimes radiating laterally, and extending along her anterior chest wall and abdomen. She reported having an average pain score of 8 of 10 on the NRS, and her pain was exacerbated by deep inspiration and movement of her upper body. Despite an extensive period of rest, the patient did not experience any symptom resolution. She missed more than 2 months of school, ballet classes, and rehearsals for a major ballet performance.

The patient's medications included 75 mg of pregabalin twice daily, Lidoderm® patches, diclofenac patches, oral diclofenac, cyclobenzaprine, ibuprofen, naproxen, omeprazole, and acetaminophen with codeine. She had no significant relief and continued to report pain and discomfort despite being on these medications.

On examination, the patient had tenderness on palpation over the costochondral junction; this was most pronounced along the inferior portion, xiphoid, and pectoralis. Her pulmonary and cardiovascular evaluations were negative.

Plain radiographs of the chest and magnetic resonance imaging (MRI) were normal. Imaging studies of the chest were negative for pneumothorax, bony pathology, or lung pathology. Significant serologic workup was negative for rheumatic or autoimmune processes, including lupus, which could have contributed to her symptoms. She was negative for Lyme disease and infectious mononucleosis. Sports medicine specialists ruled out stress injury and apophysitis in the growth center within the sternum.

The patient received weekly sessions of acupuncture treatment. Primary acupuncture points used for treatment of her costochondritis included the following bilateral points: TE 8; LI 4; ST 36; BL 18; BL 19; LR 3; and SP 6; as well as *Yin-Tang*, GV 20, and CV 18. At her second session, she reported that her average pain score decreased to 6 of 10 on the NRS. She noted reduction of her pain symptoms for 2–3 days after acupuncture treatment; however, the pain gradually returned and hindered her general activity as well as her normal work, including going to school. At the third session, she felt that her anterior chest pain was improving; her pain score decreased to 5 of 10 on the NRS. The pain interfered less with her normal daily activities. At the fourth session, she felt minimal discomfort, reported continued reduction of her pain symptoms, and had an average of 4–5 of 10 on the NRS. She resumed her regular activities slowly as she could tolerate them. She expressed happiness that she was able to return to the activities she enjoyed and that she no longer used Lidoderm patches. At the fifth visit, she was able to start ballet classes 2 times per week and, during the next week, planned to attend ballet classes 3 times. She began attending half-days at school and did a trial period of a full day of school. At the sixth session, she reported an average of 1–3 of 10 on the NRS and stopped taking diclofenac.

By the end of eight sessions, her average pain score was 3 of 10 on the NRS. She noted continued resolution of her anterior chest-wall pain. She was able to partake in ballet classes 4 times per week and was in school full-time. She had anterior chest wall pain infrequently unless she did something active such as carrying groceries into the house. This pain did not last for hours and was very short-lived, unlike her previous pain. In addition, she no longer took medications regularly. She noticed significant reduction in her chest-wall pain since the start of her acupuncture treatments.

Case II

A 17-year-old high-level competitive swimmer was referred from the sports medicine clinic with a chief complaint of anterior chest pain and a diagnosis of costochondritis. Her pain had started 5 months prior and was an average NRS of 4 of 10. The pain was intermittent and worsened with exercise. The patient was a senior in high school who swam for 22 hours per week and participated in dry-land exercises. She planned to swim at a Division I university. She had a history of shortness of breath that lessened with albuterol, although the albuterol did not reduce her chest pain. She denied having any abdominal pain, radiating discomfort, or pain in the upper or lower extremities. She used ibuprofen at 1200 mg per day with no reduction of her pain. No other medications were helpful for easing her discomfort. She and her family hoped to find a way to alleviate her symptoms as soon as possible.

The patient had reproducible chest pain on anterior posterior compression just above the sternoxiphoid junction. She

had no pain on lateral squeeze of the chest. When taking deep breaths, she did not feel she could expand her chest any further and experienced mild chest pain. Her electrocardiogram, echocardiogram, stress test, pulmonary function test, and vocal cord function test results were unremarkable.

Weekly acupuncture treatments were offered to this patient. The acupuncture points utilized for Case II included the bilateral points of TE 8, GB 34, LI 4, ST 36, TE 5, and LR 3, as well as *Ashi* points and CV 14. After the first acupuncture session, she reported a reduction of her symptoms and felt she was doing well with her pain control. At the second session, she was able to work in a local country club and was graduating from high school at that time. By the third session, she noted that she could continue working at the country club for the summer and that her pain score was 0 of 10 on the NRS. At the fourth visit, her average pain score was 1 of 10 on the NRS, and she felt that her pain was well managed. She had no discomfort and expressed that she was doing very well, except for 1 day during a double shift at her job. On the fifth visit, her average pain score was 1 of 10 on the NRS. At the sixth acupuncture session, her average pain score was 0 of 10 on the NRS. In a recent swimming competition, she was able to participate fully in the event.

Case III

A 17-year-old fencer came to the Medical Acupuncture Service for consultation for his costochondritis. He was participating in fencing 4 times per week, devoting more than 7 hours weekly to the sport. Three months prior, he had woken up with pain in his right chest-wall after fencing practice 1 day. He had had a sinus infection when he started having the chest-wall discomfort but was not breathing or coughing excessively. There was no history of trauma, discoloration, swelling, or infection on the right side of the chest. The pain occurred with lifting, rotating to the right and left, breathing deeply, and coughing. It was an average of 7 of 10 on the NRS, was sharp in nature, and worsened when he fenced or increased his activity. Since his pain had started, he was unable to fence except for 1 day. Although he took time off from fencing, he did not recover from his pain. The patient used 600 mg of ibuprofen every 8 hours and other nonsteroidal anti-inflammatory medications. He received physical therapy, including applied ice, heat, and electrical stimulation. Heat and resting helped to ease some of his discomfort.

On examination, the patient had pain and tenderness on palpation over the mid sternum and right costochondral margin. There was no swelling or bruising. His chest X-ray and chest MRI were normal. There was no abnormal edema to suggest injury along the right costosternal margin in the patient's area of pain. His Lyme titers were negative.

The patient was referred by sports medicine specialists for acupuncture treatment. The primary acupuncture points included bilaterally: LI 4; ST 36; TE 5; BL 22; LR 3; BL 57;

TE 8; LI 11; GB 34; and BL 23; in addition to *Ashi* points. At the third session, he reported a decrease in pain score, with an average of 4 of 10 on the NRS; however, the pain continued to interfere with his general activity. At the fourth session, his discomfort was lessening, and he had an average pain score of 2 of 10 on the NRS. The previous acupuncture treatments were helpful for easing his pain symptoms, which no longer impeded his general activity. At the sixth acupuncture session, his average pain score was 3 of 10 on the NRS. He did not have sensitivity or tenderness over the right anterior sternal border or right costochondral junction. He felt that his pain condition was much improved compared to before acupuncture treatment and was pleased with his progress.

RESULTS

These 3 adolescent patients with costochondritis had been utilizing conventional therapies but had continued to suffer from chest pain. At the conclusion of 6–8 sessions of acupuncture treatment, the patients' average pain scores were reduced from 8 to 3 of 10 on the NRS for Case I; from 4 to 0 of 10 on the NRS for Case II; and from 7 to 3 of 10 on the NRS for Case III (Table 1). The mean decrease in average pain score for the 3 patients was 4.3 ± 0.3 on the NRS (mean $\pm$ standard error of the mean). After acupuncture treatment, the patients had decreased pain-related symptoms and resumed regular activities, school, and exercise. All patients did not experience adverse events.

DISCUSSION

Chest pain is a common issue among adolescents, particularly athletes.⁷ Sports often cause the musculoskeletal system to undergo stress that can lead to pain.⁸ Costochondritis can interfere with athletes' performance and limit their ability to participate in sports activities.⁷ In addition to functional impairment, chest pain contributes to absences from school and higher usage of medical services.⁹ Acupuncture may be a promising therapy for easing pain-related symptoms in these patients.

According to TCM, the etiology of costochondritis includes Blood Stasis with sharp pain, Damp Heat with a burning sensation, and Liver Blood Deficiency with

TABLE 1. CHANGES IN NRS PAIN SCORES

Case	NRS Pain Score		
	Baseline	Post-treatment	Change
I	8	3	5
II	4	0	4
III	7	3	4

NRS, Numerical Rating Scale.

continuous discomfort.¹⁰ Acupuncture treatment points were selected according to TCM theories.

The rationale for the acupuncture point selection is the following, as adapted from Ellis¹¹: TE 8 opens the channels and facilitates the connecting vessels, thereby relieving pain. LI 4 was utilized because it opens the channels and hastens the connecting vessels to facilitate energy flow. LI 11 harmonizes the Qi and Blood. BL 19, *Dan Shu*, dispels Damp Heat. *San Jiao Shu*, or BL 22, is the associated *Shu* point of the Triple Burner. BL 23, the Kidney *Shu*, was chosen because it strengthens the transformative action of Qi; this point also supplements the Kidney, strengthens the lumbar and spine areas, and dispels Water Damp. BL 57, *Cheng Shan*, soothes the sinews and cools the Blood. CV 14, *Ju Que*, was utilized as it disperses congealed Phlegm in the chest. CV 18, *Yu Tang*, loosens the chest and rectifies Qi. *Yin-Tang*, M-HN3 point, or Hall of Impression, was used to quicken the Collaterals and quiet the Spirit.¹¹

The following rationales were adapted from Sun¹⁰: GB 34 is the Gathering point for the tendons and muscle. SP 6 is the Controlling point of all three passages—Spleen, Kidney, and Liver—and eliminates Damp. GV 20, the junction of the Governing Vessel and Bladder channel, facilitates the flow of Yang-Qi. LI 11, the Sea Point, was used because it promotes the circulation of Qi and Blood. LR 3 is the Source and Stream point of the Liver channel, and it regulates the circulation of Qi. ST 36, the Stream point of the Stomach, stimulates the Spleen and Stomach, and it tonifies and promotes Qi. TE 5, the Connecting point, was selected to balance the Collateral and alleviate pain. BL 18, Liver *Shu*, disperses Stasis, regulates the Liver Qi, and removes Qi Stagnation in the Liver.¹⁰

There were limitations to this case series. All patients received conventional Western therapy in addition to acupuncture, so the current authors cannot definitively attribute the patients' symptomatic reduction to acupuncture treatment alone. This was a retrospective study; therefore, it was not possible to assign and compare outcomes between treatment and control groups. The small sample size warrants further testing on a larger group of adolescent patients.

CONCLUSIONS

Costochondritis is a debilitating condition in the pediatric/adolescent population that can greatly hinder quality of life and involvement in daily activities, sports, and school. With respect to the 3 adolescent patients with prolonged costochondritis that did not resolve with conventional therapy, all 3 reported symptomatic reduction with the ad-

dition of acupuncture. Future prospective clinical studies are necessary to determine the potential therapeutic benefits of integrating acupuncture with conventional medical treatment in pediatric/adolescent patients.

AUTHOR DISCLOSURE STATEMENT

No competing financial interests exist.

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Address correspondence to:
 Katerina Lin, BA
 Medical Acupuncture Service
 Department of Anesthesiology
 Perioperative and Pain Medicine
 Boston Children's Hospital
 Harvard Medical School
 300 Longwood Avenue
 Boston, MA 02115

E-mail: katerina.lin@childrens.harvard.edu