Thoracic outlet syndrome overlapped by carpal tunnel syndrome treated with traditional Chinese medicine – a case report

Ju-Tzu Li, Sivarama Prasad Vinjamury, Wen-Shuo Wu

Abstract

Thoracic outlet syndrome (TOS) is caused by compression of the brachial plexus, subclavian artery or vein as they exit the chest. Carpal tunnel syndrome (CTS) is caused by compression of the median nerve in the carpal tunnel. We report a 35-year-old woman of thoracic outlet syndrome overlapped by carpal tunnel syndrome, treated with traditional Chinese medicine (TCM) including acupuncture, herbal medicine and tui-na massage. This patient was initially diagnosed with thoracic outlet syndrome and presented with excruciating pain and numbness in right shoulder, arm and fingers, and positive elevated arm stress test (EAST). Her pain decreased from 10 to 3.5 on a 0 to10 verbal pain scale after four treatment sessions. During the treatment period, she developed carpal tunnel syndrome, which was confirmed by electrophysiology studies. At the end of 17 treatment sessions, her pain scale continued to remain at 3.5. We suggest that traditional Chinese medicine be considered an alternative therapy for thoracic outlet syndrome and carpal tunnel syndrome.

Key words: thoracic outlet syndrome, carpal tunnel syndrome, traditional Chinese medicine

Introduction

Thoracic outlet syndrome (TOS) is also known as “cervical rib syndrome” “scalenus anticus syndrome”, or “hyperabduction syndrome”. It is caused by chronic
compression of brachial plexus, artery or/and vein when they travel through the interscalene triangle space, the costoclavicular space, or the subpectoral space\(^1\). TOS usually occurs among young and middle-aged adults and the prevalence rate is three times greater in females than in males. Compression of the thoracic outlet space may be caused by a fibrous band, a cervical rib, cervical arthritis spurs or the pathological changes of scalene muscles, pectoral muscle, and the costoclavicular space\(^2-5\) TOS may be also induced by a superimposed injury that causes chronic muscle spasm, or occupation-related trauma. TOS is manifested by shoulder pain and numbness in the arm and fingers on the affected side. Carpal tunnel syndrome (CTS) is another entrapment neuropathy, caused by compression of median nerve between the carpal ligament and the surrounding structures. CTS typically shows such symptoms as pain, numbness and tingling, originating in the hand and radiating up to the arm.

Conventional therapies for TOS or CTS include analgesics, physical therapy, exercise program and surgical decompression in some intractable cases\(^6\). Patients who have poor response to conventional therapy may seek alternative therapy. Traditional Chinese medicine is one of the options. Traditional Chinese medicine (TCM) has been practiced in China for more than 3,000 years and becomes more popular worldwide. Cases of TOS or CTS are not unusual in acupuncture clinic. However, the cases of TOS overlapped with CTS treated by traditional Chinese medicine are rarely reported. In this article, we report a case history to demonstrate a traditional Chinese medicine approach to a case of TOS overlapped with CTS.

**Case Report**

**Patient’s history**

A 35 –year-old housewife and mother of three children presented with history of right-sided shoulder tightness, arm pain, and hand numbness and tingling for seven years. The clinical manifestations started with shoulder pain, and then radiated down the arm and fingers. The patient reported a history of involvement in a car accident 10 years ago, but did not report any other significant past history of illness. She was diagnosed with thoracic outlet syndrome (TOS) by an orthopedist three years ago; while no abnormal findings were identified on her neck MRI and X-ray. No electrophysiological studies were performed at that time. In last three months, her right-sided arm pain and numbness, and tingling of the fingers (all five fingers) had intensified even without arm or hand movement. The pain was achy and persistent. It aggravated at night, and interfered with her daily activities such as driving, holding the handset or children, and doing heavy work. She rated her nightly pain
at 10 on a verbal pain scale of 0-10 (0 being the least and 10 being the worst), but denied hand swelling, weakness or coldness of hands. Her sleep was severely deprived because she woke up almost every 30 minutes due to the pain and numbness. She was taking 800 mg of Ibuprofen at bedtime every day on a regular basis, but it did not help her much. She did not receive any treatment other than analgesics for her recent flare-up. Because of the intractable pain, her orthopedist recommended surgical decompression. The patient was hesitant to surgery and hence came to our health center to seek acupuncture treatment.

Physical examination

On examination, the patient had negative findings on her general physical examination. Her neuromuscular examination revealed intact muscle strengths over both upper extremities including the abduction and adduction of the fourth and fifth fingers. No muscle atrophy was noticed and full range of motion on the abduction of right shoulder was present. Deep tendon reflexes showed 1+ on bilateral tendons of biceps and triceps. Diminished sensation over the entire right arm and hand was found. On the provocative tests, her “white-hand sign” (a test for venous form of thoracic outlet syndrome, described by Selmonosky)\(^{(7)}\), performed by having the patient to raise both arms with 180° abduction of shoulders for three minutes, was negative (absence of pallor on the palm of the affected side). Her elevated arm stress test (EAST: a test for thoracic outlet syndrome, described by Roos)\(^{(2)}\), performed by asking the patient to keep both arms in 90° abduction-external rotation position and then open and close the hands slowly over a 3-minute period, was positive (tingling and numbness felt on the affected side within five seconds). She has tenderness on the right supraclavical area. Phalen’s test or Tinel test was not performed on her first visit. Examination of the patient from a TCM point of view revealed that her pulse was “thready” and “wiry” (細數脈) on the right wrist and “slippery” (滑脈) on the left wrist. Her tongue was slightly tooth-marked, purplish in color and had a thin-white coat.

Diagnosis and pattern identification

Based on the history and physical findings, the patient was diagnosed with thoracic outlet syndrome and identified as the pattern of “qi stagnation and blood stasis” (氣滯血瘀). Therefore, the principle of treatment emphasizes on promoting the circulation of qi and blood to relieve pain by removing the blockage.

Treatment

The treatment methods included the combination of acupuncture, tui-na massage and herbal medicine. Acupuncture treatment was scheduled twice a week. Acupuncture
points were selected based on the local tender points (a-shi points 阿是穴) and meridians theory. The Seirin® acupuncture needles were inserted on the acupuncture points (shown below), manipulated manually until “de-qi”得氣 (acupuncture needle sensation) was obtained, and then retained in place for 20 minutes with manual manipulation after the insertion and before their removal. The same acupuncture treatment was continued for all subsequent sessions until the end. However, from the thirteenth visit onwards, additional acupuncture points were added when the patient was diagnosed and presented with CTS. Besides, herbal medication and Tui-Na massage were added from the second visit onwards. Herbal medicine was administered as powder in capsules from the second visit onwards. Tui-na massage was performed on neck, right shoulder, arm and forearm with Golden Sunshine® herbal cream (active ingredients: menthol and wintergreen oil) for 10 minutes after acupuncture.

Outcome measures

Improvement of symptoms was measured using the following outcome measures: verbal pain scale, use of pain medication, and EAST. Data regarding the verbal pain scale and pain medication use were collected before the treatment on each session. EAST was performed at baseline, at the end of the fourth week (the sixth session), tenth week, 16th week (the last session) and five weeks after the last treatment session (follow-up).

Results

On the first treatment session (June 3), acupuncture points of Yin Tong (印堂), right sided Lu1 (中府), Lu2 (雲門), LI14 (臂臑), LI10 (手三里), LI4(合谷), and SJ5 (外關) were needled. On the second session (June 6), the acupuncture points of right-sided GB12 (完骨), GB 20 (風池), SI11 (天宗), SI9 (肩貞), SI10 (腎俞), LI10(手三里), LI4 (合谷), LI 11 (曲池) and tender points of thoracic Hua Tuo Jia Ji (華陀夾脊) were used. The patient was also advised the herbal formulas: one capsule of Shen Tong Zhu Yu Tang (Cnidium and Chiang-huo Combination 身痛逐瘀湯), one capsule of Chai Hu Shu Gan Tang (Bupleurum & Cyperus Combination 柴胡疏肝湯), and two capsules of Juan Bi Tang (Chiang-huo and Curcuma Combination 蠲痹湯) twice daily.

During the third session (June 13), same acupuncture treatment was given. But, the herbal prescription was changed to two capsules of Tong Qiao Huo Xue Tang (Persica and Cnidium Combination 通竅活血湯) twice daily and Juan Bi Tang (Chiang-huo and Curcuma Combination 蠲痹湯) was continued due to no improvement in pain. On the fourth session, she reported improvement in her pain and stated that the pain dropped from 10 to 5 on a scale of 0-10. After that, her pain...
continued to improve. On the sixth session (July 1), her verbal pain scale reduced further to 3.5 and no pain medication was taken after the fifth session. Although, there was improvement on EAST, it was still positive (tingling starting at 2 min 10 sec). The patient’s pain scores remained the same until the tenth session.

On the eighth session (July 15) the patient reported that her electrophysiologic tests (nerve conduction test and electromyelography) performed on the previous day showed a mild degree median neuropathy at both wrists. The test was scheduled before she started the acupuncture treatment. The test results indicated a mild degree median neuropathy at both wrists. Neither lower trunk/medial cord brachial plexopathy nor denervation abnormality was detected. Hence, she was diagnosed with CTS for the first time based on these test results. Phalen’s test and Tinel’s test were performed to confirm CTS in our clinic, but both tests were negative on that day. Therefore, the earlier treatments were continued and no special emphasis was made on CTS treatment at that moment.

On the tenth session (August 5), the patient reported that her pain increased (5 on the verbal pain scale). Her EAST was positive with tingling in the fingers starting at 45 seconds, which was considered an aggravation of TOS. No specific aggravating factor could be identified other than heavy work, carrying her children more often, intense lower abdominal cramps and low energy associated with her menstrual period. Accordingly, the herbal prescription was modified to three capsules of Xue Fu Zhu Yu Tang (Persica & Carthamus Combination 血府逐瘀湯) and one capsule of Ba Zhen Tang (Tang-kuei and Ginseng Eight Combination 八珍湯) twice a day. There was no change in the acupuncture treatment.

On the thirteenth session (September 2), the patient stated that the tingling sensation mainly went to the first four fingers of right hand, especially the right thumb. It was considered that CTS overlapped with TOS at this point. Phalen’s test was performed bilaterally and was positive only on the right side. Hence, additional acupuncture points (right-sided Ba Xie 八邪) were added to the earlier treatment. The herbal prescription was reverted to three capsules of Tong Qiao Huo Xue Tang (Persica and Cnidium Combination 通竅活血湯) and one capsule of Juan Bi Tang (Chiang-huo and Curcuma Combination 華痹湯) three times a day. This treatment was continued until the seventeenth (the last) treatment session (September 26), on which the verbal pain scale decreased to 3.5 on a 0-10 scale without use of any pain medication. Her EAST was still positive but improved compared to the tenth session (tingling starting at 2 min 50 sec versus 45 sec). During the entire treatment period, the patient did not
receive any other conventional or alternative treatment except Ibuprofen and two chiropractic treatments for neck pain and tightness between the thirteenth (September 2) and the fourteenth sessions (September 9). No adverse events were reported during the entire treatment course. The patient’s changes in verbal pain scale and average daily pain medication (Ibuprofen) use during the treatment course were graphed in figure 1. Her results of EAST (the time when symptoms start is represented in seconds) were graphed in figure 2. The more time the EAST, the better the symptoms.

On her follow-up visit (November 1), six weeks after her last treatment, the patient reported that her arm pain remained constant at 3.5 on a 0 to 10 verbal pain scale. She did not take any pain medication since her last treatment. However, she received acupuncture treatment thrice in between for her leg pain from another acupuncturist since the last treatment with us. On this follow-up visit, her EAST was still positive (at 2 min 30 sec). Her right-sided Phalen’s test was still positive.

Discussion

A. Differential Diagnosis

Carpal tunnel syndrome (CTS) may be confused with thoracic outlet syndrome (TOS) because both syndrome cause pain and numbness in the arm, forearm and fingers. The diagnosis of TOS is based on the history and
positive provocative tests (e.g. EAST). CTS is diagnosed by clinical symptoms, provocative tests (e.g. Phalen’s test and Tinel test) and electrophysiological tests. In the differentiation, TOS is characterized by the pain on the neck, shoulder and arm, numbness over the fingers 4 & 5 (the ulnar nerve distribution with dermatomes of C8-T1) or the entire arm (the brachial plexus) with aggravation by arm elevation; whereas CTS is featured with the pain on the wrist and volar forearm, and numbness over the first three fingers (the median nerve distribution) with aggravation by sustained grasp or pinch. In TOS, compression of brachial plexus is positional and often intermittent, so a negative result on electrophysiological tests can not rule out TOS\(^2\). However, in CTS, the electrophysiological tests are usually positive. Other pathologies, such as cervical disc disease, cubital tunnel syndrome, or shoulder pathology, can mimic thoracic outlet syndrome. They should be considered in the differential diagnosis. In our case, an intitial diagnosis of TOS was made based on the symptoms and clinical testing. It is not clear how CTS developed during the treatment period in this patient.

**B. Clinical course**

At the end of the course of treatments, the patient’s EAST was still positive regardless of the symptomatic improvement as indicated by the reduced pain scale and no use of pain...
medication. Similar finding was reported by Imai et al in their case report of TOS\(^{(22)}\), in which the patient’s pain scale was reduced from 8.5 to 0 after 5-week treatment with acupuncture and moxibustion(灸), but the EAST was still positive. It was also noticed that our case had no improvement until the fourth treatment session (two weeks after start of the treatment). However, the improvement was steady throughout after it started improving except a flare-up in between.

Some case reports of thoracic outlet syndrome (TOS) treated with acupuncture and/or Chinese herbal medicine also reported similar findings. In a case report of TOS treated with acupuncture, improvement was found 10 days after the daily treatment\(^{(8)}\). In an observational study of TOS treated with osteopathic manipulation, massage, ultra-shortwave, laser and ultrasound. 12 out of 20 patients started to improve after five treatment sessions\(^{(9)}\). But, some other cases with TOS treated with acupuncture or herbs started to improve one or two days after the treatment\(^{(10,11)}\). The reason for a delayed or quick response is not clear.

C. Traditional Chinese medicine theory and possible mechanism

During the treatment course, this patient was treated with acupuncture, herbal medicine and tui-na massage. It is hard to determine which intervention or combination contributed to the efficacy or if the pain relief is a spontaneous remission. It is interesting to note that a change in the patient’s herbal prescription to Xue Fu Zhu Yu Tang (Persica & Carthamus Combination血府逐瘀湯) and Ba Zhen Tang (Tang-kuei and Ginseng Eight Combination八珍湯), which were used for blood-moving and qi and blood tonifying to address her dysmenorrhea and low energy, affected her improvement in pain. Although Xue Fu Zhu Yu Tang (Persica & Carthamus Combination血府逐瘀湯) belongs to the “blood moving” category of herbal formulas, this could be due to the fact that Tong Qiao Huo Xue Tang (Persica and Cnidium Combination通竅活血湯), also a blood-moving formula, is usually more specific to the blood stasis in the head and neck\(^{(12)}\). Juan Bi Tang (Chiang-huo and Curcuma Combination蠲痹湯) is focusing on upper extremities\(^{(13)}\). The animal or clinical studies on these formulas are limited. In an animal study, “Hwaotang”, a traditional Korean herbal formulation, consisting of same herbs in Tong Qiao Huo Xue Tang (Persica and Cnidium Combination通竅活血湯) and Juan Bi Tang (Chiang-huo and Curcuma Combination蠲痹湯) except one ingredient, is used to treat shoulder and arm pain and showed anti-inflammatory effects by inhibition of neutrophil functions and prostaglandin E2 production\(^{(14)}\). Further research is needed to clarify the mechanism of synergetic action of
the ingredients of these formulas.

Acupuncture is a potentially effective treatment in treating the pain caused by neuromusculoskeletal disorders (15). Some experimental studies revealed that the release of endogenous opioids (for example, endorphins and enkephalins) was implicated in the analgesic effects of acupuncture (16). It was thought that acupuncture may reduce tissue inflammation and promote repair of tissues (17). These effects may contribute to the improvement of symptoms in TOS and CTS. Moreover, acupuncture is reported to be a safe therapy, which carries minimal risk if applied by a competent practitioner (18,19).

D. Prognosis

The recurrence of symptoms in TOS or CTS is common even after a year or two of no symptoms. Conservative treatment can be re-implanted and usually symptoms would be relieved once again (6). But, for intractable cases with TOS, such as ours, surgery may be considered (5). According to a survey (20), the success rate of the surgery for TOS was reported to be 65% on an average. Fifteen percent of the patients did not experience any significant symptomatic relief after surgery. Recurrence rate after the surgery was approximately 5-10%, most likely caused by the scar tissue in the surgical area (21). The improvement rate of re-operation on patients in whom the first operation failed was only 15%-17% (22). Therefore, alternative treatments that are safe and effective might be better options to treat such conditions.

Conclusion

The promising result in this case indicates that the acupuncture and traditional Chinese medicine (TCM) may be considered as one of the options to treat such cases as it may be beneficial to these patients. Nevertheless, the complex interventions make it challenging to associate the improvement in symptoms to any specific modality. Future studies with large sample sizes and a control group will be required to identify an association between TCM treatment and a positive result in TOS and CTS.

References


胸廓出口症候群合併腕管症候群之中醫治療—病例報告

李如慈  Sivarama Prasad Vinjamury  巫文碩

摘要

胸廓出口症候群是由於臂叢神經、鎖骨下動脈、或靜脈、行經胸廓時，受到壓迫所引起。腕管症候群是由於正中神經在腕部受到壓迫所造成。我們報告一個三十五歲女性病例，診斷為胸廓出口症候群合併腕管症候群，用中醫（包括針灸、中藥、和推拿）治療的過程及療效評估。此病人剛開始被診斷為胸廓出口症候群，臨床上以右肩，右臂，右手手指疼痛麻木為表現，舉臂試驗為陽性。病人的疼痛指數在四次治療後，從治療前的10分，減至3.5分。治療過程中，病人又出現腕管症候群的症狀，後經神經生理學檢查證實此診斷。在十七次的治療後，病人的疼痛指數維持在3.5分。我們建議，中醫療法可以作為治療胸廓出口症候群或腕管症候群在西醫療法之外的替代療法。

關鍵詞：胸廓出口症候群、腕管症候群、中醫