



CASE REPORT

The clinical observation of muscle energy techniques and ligamentous articular strain in 2 cases of cervical disc herniation with thoracic outlet syndrome



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Abstract This case report presents two successful treatment outcomes of cervical disc herniation (CDH) with thoracic outlet syndrome (TOS) treated using manual therapy technique of the muscle energy technique (MET), ligamentous articular strain (LAS) and additional herbal medicine intake, acupuncture and pharmacopuncture sessions. Significant improvements were reported in the outcome measures at admission and at discharge for Visual Analogue Scale (VAS) and Neck Disability Index (NDI) scores and physical examinations followed by approximately three weeks of hospital admission. The successful outcomes suggest that integrative conservative management focused on muscle energy techniques (MET) and ligamentous articular strain (LAS) are effective in contributing to the conservative management of cervical disc herniation (CDH) with thoracic outlet syndrome (TOS). © 2014 Elsevier Ltd. All rights reserved.

Introduction

Thoracic outlet syndrome (TOS) is a relatively rare condition prevalent in 8% of the general

population^{1,2} whereas cervical disc herniation (CDH), a leading medical concern in the adult population,^{3–5} has a prevalence of over 3.3 cases per 1000.⁶ In CDH, neurological symptoms typically present concurrently with TOS,² making diagnosis difficult and demands both objective and subjective examinations.^{7–9} CDH causes structural anomalies and medical imaging is often beneficial

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in establishing the diagnosis. TOS is defined as a complex condition involving the compression of either neurological or vascular elements passing through the thoracic outlet. The subclavian vein, artery and lower part of the brachial plexus are often involved^{10–13} manifesting symptoms including pain, numbness and other related symptoms.¹⁰ These symptoms are often aggravated by movement of the shoulder, cervical spine and head or by raising the upper limbs.¹⁰

Anatomically, the subclavian artery, subclavian vein and the lower part of brachial plexus travel through the thoracic outlet¹⁴ and different clinical signs are observed depending on the affected site. Neurogenic TOS mostly presents with neurological symptoms, such as paraesthesia, weakness in the upper extremities, and pain. In cases where vascular elements are involved, symptoms of pallor, paraesthesia and coldness are often present due to arterial ischaemia in arterial TOS, and swollen upper extremities and cyanosis due to subclavian vein obstruction are observed in venous TOS.¹⁵

The overlapping signs and symptoms of CDH and TOS lead to issues with the differential diagnosis in

many cases, as well as issues with the selection of treatment approaches. No reports have been presented on the effect of Muscle Energy Technique (MET)¹⁶ and LAS (Ligamentous Articular Strain)¹⁷ for the treatment of CDH with associated TOS. The two cases in the present paper had previously undergone injection therapies, medications and other medical treatments for their CDH with associated TOS. Although no improvement was reported with these medical approaches, significant improvement was observed with manual therapy using MET and LAS. This case report presents two cases of the management of CDH with TOS using these two techniques.

Clinical history

Case 1

A 49-year-old female presented complaining of posterior cervical pain with right arm pain and numbness (Fig. 1) following an accident that

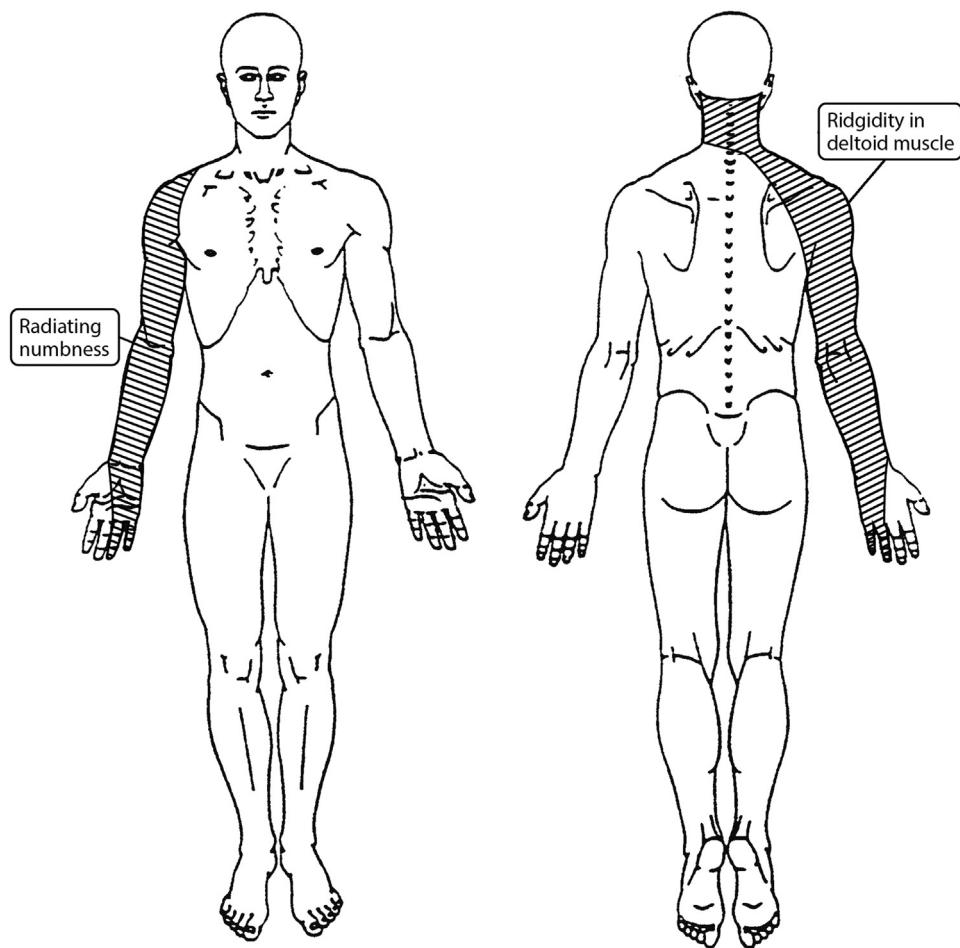


Fig. 1 Body chart – case 1.

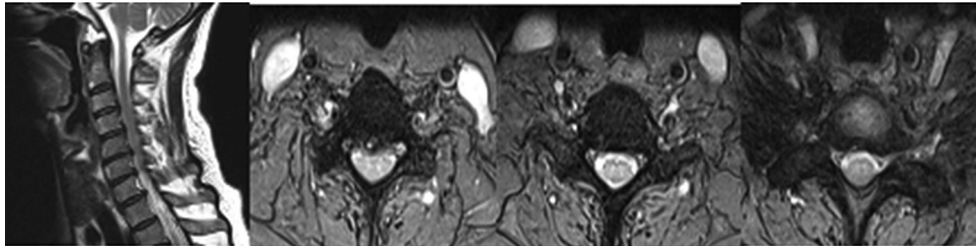


Fig. 2 C-spine MRI: C3/4/5/6/7 HVD & stenosis.

involved bumping into a glass door which occurred 10 months prior to her initial visit. The cervical spine x-ray, CT and MRI scans revealed CDH with stenosis at C3/C4, C4/C5, C5/C6 and C6/C7 (Fig. 2). She was hospitalised at a local hospital for 3 days where she received traction therapy, injections, medications and nerve block injection therapy. Some improvements were observed initially but the pain remained. The patient was subsequently admitted to Jaseng Hospital of Korean Medicine³⁶ for 21 days. At admission, the patient reported a VAS score of 10 and a NDI score of 30. Cervical spine range of motion (ROM) testing revealed restrictions in right lateral bending of 20° (normal >45). She complained that her pain was worse at night and indicated on the NDI that she was averaging 4 h of sleep per night. Positive findings in all three physical examinations were reported (Spurling test, Adson's test and Roos test). Cervical spine x-ray (Fig. 3) revealed a narrowing of the disc space, posterior marginal spurring and degenerative endplate change at C4/5, C5/6 and C6/7. At discharge, the patient reported a VAS score of 2 and a NDI score of 21. Normal c-spine ROM and negatives in all physical examinations were reported. At discharge, she reported

significant reduction in pain and her sleep was no longer affected. The c-spine ROM was reported as normal and all physical examinations reported negative.

Case 2

A 35-year-old male patient presented with posterior cervical pain left arm numbness and pain (Fig. 4) which was worse at night. The symptoms were initially triggered spontaneously from daily life, three months prior to his first visit to a local hospital. C-spine MRI revealed CDH and he received physiotherapy for 20 days, three times at the hospital. Then he was hospitalised and received 3 sessions of nerve block injection therapy and traction therapies. The pain remained and he was admitted to Jaseng Hospital of Korean Medicine³⁶ and received the treatment for 24 days.

At admission, the patient reported a VAS score of 10 and a NDI score of 30. C-spine ROM reported a limitation in left lateral bending of 35° (normal <45°). A positive Spurling test, Roos test and a positive on the left side in Adson's test were also reported. C-spine x-ray (Fig. 5) revealed straightening of the c-spine. The c-spine MRI scan (Fig. 6)

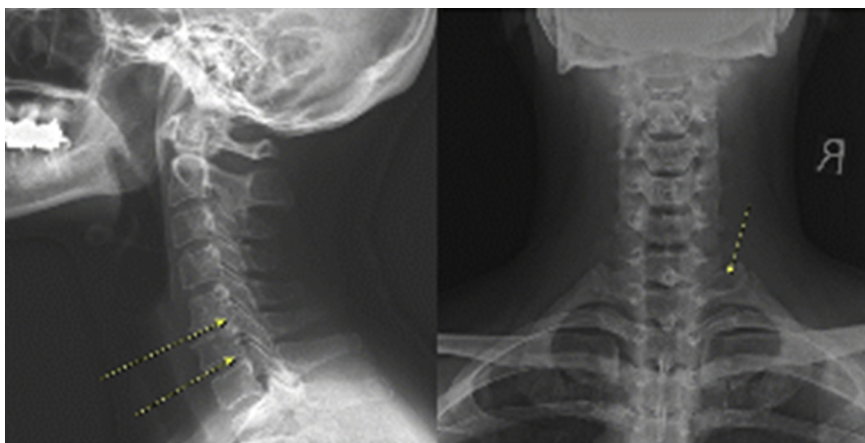


Fig. 3 C-spine x-ray (lateral): disc space narrowing, posterior marginal spurring and degenerative endplate change at C4/5, C5/6 and C6/7.

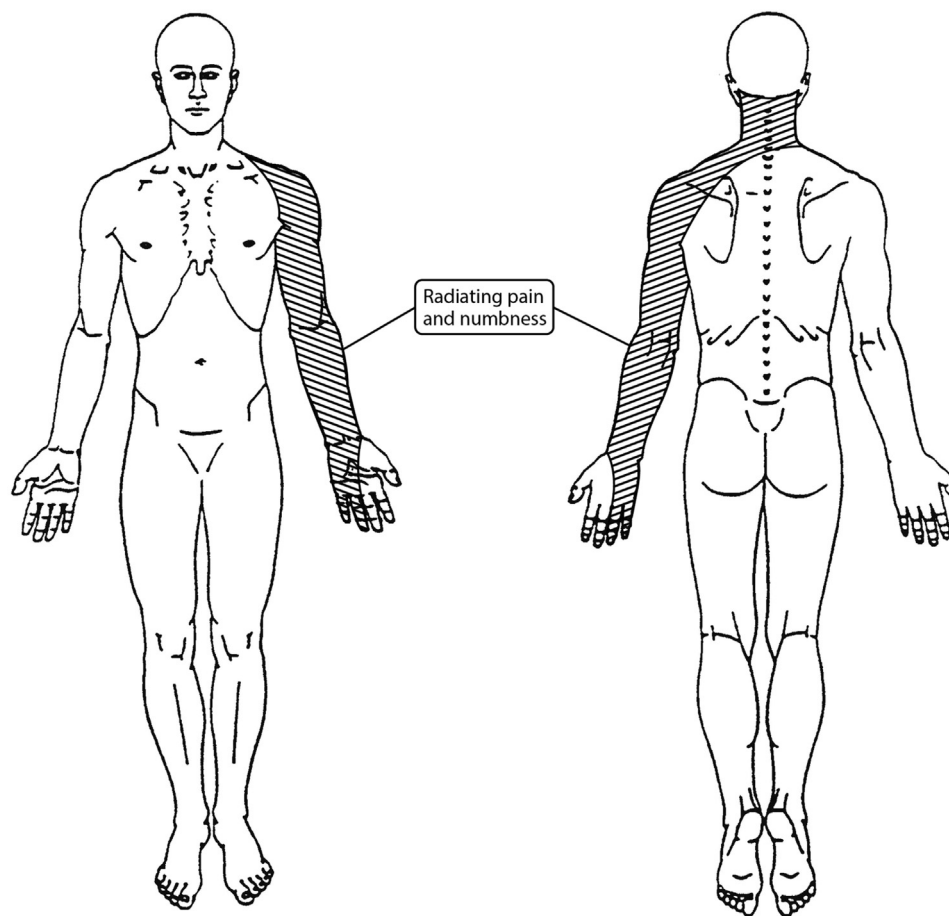


Fig. 4 Body chart – case 2.

revealed disc herniations at C-2/3, C3/4, C4/5 and C5. At discharge, the patient's VAS score was 2 and the NDI score was 27. Negatives were reported in all three physical examinations (Spurling test, Adson's test, and Roos test).

Examinations

There are no definitive guidelines for the diagnosis of TOS and as such, a combination of both physical examination and diagnostic imaging may be

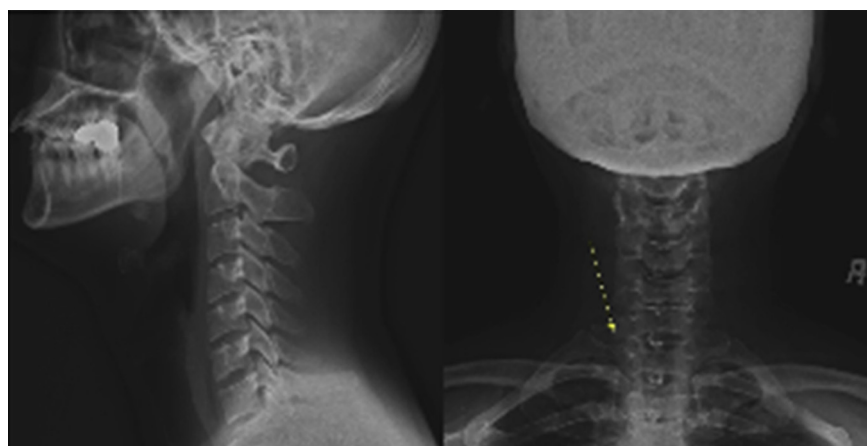


Fig. 5 C-spine x-ray (lateral): straightening in c-spine.

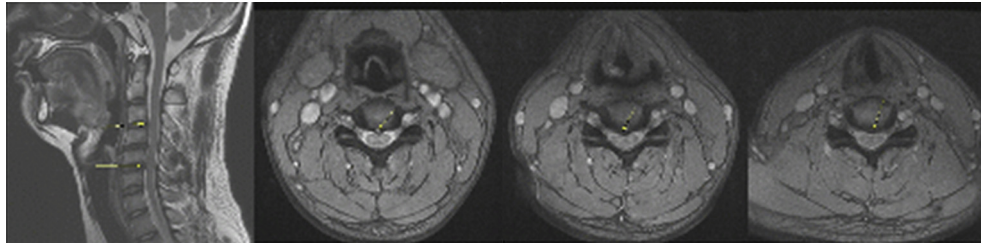


Fig. 6 C-spine MRI: C2/3, C3/4, C4/5 and C5/6 mild central disc protrusion.

required.¹⁸ In the two cases, the physical examination included Spurling's test, Adson's test, and Roos test. All tests were positive in both patients at admission¹⁹ and negative responses at discharge. Spurling's test involves a combination of cervical rotation and flexion with compression and a positive response is generally suggestive of CDH.^{2,20} Positive responses with both Adson's test and Roos test are suggestive of TOS.^{15,21} Adson's test² requires the rotation and extension of the cervical spine towards dysfunctional side while the assessor laterally rotates, abducts and extends the patient's shoulder monitoring the patient's radial pulse. Positive indication was observed with the changes in the pulse. Roos test required the patient to open and close both hands repeatedly with the arms positioned in abduction and extension for 30 s–3 min. Aggravation of the existing symptoms was observed in both cases presented here therefore both tests were considered positive.²

Outcome measurements

The Visual Analogue Scale (VAS)^{22,23} and Neck Disability Index (NDI)²⁴ were administered both at admission and discharge to measure the degree of pain and evaluate functional changes. The VAS is the most commonly used self-report subjective scale for measuring the degree of pain experienced by a patient.^{22–24} VAS scores range from 0 to 10, with 0 being no pain and 10 being the severest.²² The NDI assesses the impact of cervical spine pain on a number of activities of daily living.^{25,26}

Treatments

Manual therapy

The two cases that are the subject of the current report presented at the Jaseng Hospital in Korea. The hospital provides both western and Korean medical services. Patients are offered a standardised treatment package that consists of manual

therapy, and additional Korean medicine treatments on a regular basis. Upon the diagnosis of a patient's condition, the treatment approach is specifically tailored for the patient.

Both patients received manual therapy sessions every two or three days a week for approximately 20 minutes per session. MET and LAS were performed as the main techniques with additional treatments including herbal medicine, acupuncture and pharmacopuncture. MET and LAS were applied specifically targeting the scalene muscles, ascended first rib and the cervical vertebrae. The following techniques were repeated throughout the entirety of the patient's hospital stay.

Muscle energy technique (MET)

MET is a manual therapy technique¹⁶ that has been practiced by many physicians in different clinical fields, and is often used for treating muscle weakness and shortening, restricted joint range of motion, and other related problems.²⁸ MET requires accuracy and precision in the diagnostic process, and is based on a biomechanical system that assesses restriction of functional movement.²⁸

MET for the treatment of neck related symptoms was performed targeting the scalene muscles and it was repeated for 3–5 times at each session until no further increase in range of motion (ROM) were observed.²⁹

Ligamentous articular strain (LAS)

Ligamentous Articular Strain (LAS) is an osteopathic manipulative technique intended to restore normal functional and physiological movement of the tissues.¹⁷ LAS targets the somatic dysfunction utilising compression or decompression of the joints and fascia to achieve this balance.²⁴

To assess and treat the ascended first rib, the outer surface of the patient's cervical vertebrae and the costal surface of the first rib were palpated using the tips of both thumbs. Constant pressure was applied to the first rib until a sense of 'giving way' was achieved.³⁰

For the cervical spine, the practitioners hands were placed under the both sides of the patient's base of the skull for support. The middle fingers were removed by approximately 0.5 inches and were placed on the patient's cervical dysfunctional site so that the tips of the fingers remained in contact with the area while moving the operator's fingers to the anterior and superior direction. Finally, the hands were bent slightly to pull the fingers towards the thumbs. Constant pressure was applied on the contact areas of the fingers until full relaxation was achieved.³⁰

To address the anterior cervical fascia and the scalene muscle, the tips of both thumbs were placed on the patient's lateral side of supraclavicular fossa and pressed downwards towards the patient's legs. Constant pressure was applied and once the tissue had released, the thumbs were pulled outwards, towards acromioclavicular joint. Due to the sensitivity of this area, only minimal pressure is required to release the muscle. The release of the anterior cervical fascia also contributes to the release of the scalene muscle.³⁰

Other treatments

Herbal medicine

120 ml of Chungpa-jeon (named GCSB-5) in decoction form was prescribed and taken three times daily. Chungpa-jeon is traditionally indicated for spinal disorders for the effects of anti-inflammatory³¹ and nerve protection.³²

Acupuncture

Acupuncture treatment was conducted daily on the local area to relieve tension in the muscles, and ligaments in the anterior and posterior neck and shoulder area. The selected acupoints were LI18, LI17, SI17, SI16, TE16, GB20, GB21, LI16, ST12, TE15. LI18 is between the anterior and posterior parts of the sternocleidomastoid muscle (SCM), at the level of the superior border of the thyroid cartilage, and LI17 is directly inferior to LI18, just posterior to the SCM. SI17 is posterior to the mandibular angle, in the depression directly anterior to the SCM, and SI16 is posterior to the SCM, at the level of the superior border of the thyroid cartilage. TE16 is posterior to the mandibular angle, in the depression directly posterior to the SCM. GB20 and GB21 are in the posterior neck and shoulder region; GB20 is inferior to the occiput, and between the origins of the SCM and trapezius, and GB21 is at the midpoint between the C7 spinous process and the lateral end

of the acromion. LI16 is located in the depression between the acromial end of the clavicle and scapular spine, lateral to the suprascapular fossa. ST12 is situated in the depression superior to the clavicle, and TE15. TE15 is in the posterior scapular region, directly superior to the superior scapular angle.³³

Pharmacopuncture

2 cc of Hwangryunhaedok-tang (HRHD-T) pharmacopuncture³⁴ was injected on the same selected acupuncture points three times daily. HRHD-T pharmacopuncture is used as an anti-inflammatory.³⁵

Discussion

In both cases that are the subject of the current paper, CDH was confirmed by MRI scans. The common symptom across these two cases was interrupted sleep due to pain and numbness in the arm and hand. Neurological symptoms in CDH are frequently related to the neurological dysfunction around the central spinal structures, whereas in TOS, the symptoms are typically produced by compression of neurovascular structures in the periphery. Furthermore, TOS often causes the pain and numbness to continue throughout the night and day³⁸ and 'relaxation symptoms' are manifested when the compressed soft tissues are released.³⁹ Differentiating between CDH and TOS is difficult using the clinical history alone, and there are cases where CDH and TOS have concurrently occurred. Thus, careful consideration of the incidence of both CDH and TOS is required when the clinical symptoms are present in the upper extremities.

The two cases were diagnosed with CDH prior to their admission to Jaseng hospital of Korean Medicine. They both received standard medical treatments for CDH (nerve block therapy, medications, injections etc.) but no improvement was observed. We were able to speculate that TOS could be the cause of the presenting complaints due to the lack of response to the standard medical interventions, rather than identifying TOS according to the patients' clinical signs and symptoms. Orthopaedic examination suggested a diagnosis of TOS, and significant improvement was achieved through application of MET and LAS for the treatment of this condition.

MET and LAS were considered to be effective treatments for these two cases. MET was used to release the shortened scalene muscle to obtain

balance and relieve pain. The LAS³⁰ was specifically used to release the ascended first rib back and to release anterior cervical fascia. In the first case, a total of 11 sessions of MET and LAS were conducted once every two days for 21 days. In case 2, a total of 12 sessions of MET and LAS were conducted once every 2 days for 24 days. The interventions resulted in significant improvements in the VAS, NDI and in the three orthopaedic tests for TOS.

This report investigates only two successful treatment cases of CDH with TOS. Given this, as well as the use of other interventions, it is difficult to draw conclusions as to the effectiveness of MET and LAS. However the successful outcome presented here suggests that non-surgical approaches for CDH with TOS are worthwhile pursuing, because patients often respond to conservative treatments well enough to achieve significant improvement.⁴⁰

Conclusion

Surgical approaches in the treatment of spinal disorders, particularly with symptoms in the upper extremities, are frequently observed in many practices. As a result, there are a number of published reports available discussing the surgical indications and approaches for cervical disc herniations, persistent cervical spine pain and persistent neurological changes in the upper extremity. There are however, few reports on the outcomes achieved through manual therapy approaches for the treatment of CDH with TOS. Further research is required into this area and the current case reports suggest that manual therapy may be a useful treatment approach when these conditions occur concurrently.

Conflict of interest

None declared.

Ethical approval

None declared.

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