



## Case Report

# Treatment of Cervical Myelopathy with Acupotomy Combined with Korean Medicine Treatments: Two Clinical Cases



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## ABSTRACT

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The degenerative spinal cord disease cervical spondylotic myelopathy (CSM), and cervical myelopathy caused by trauma, can result in debilitating symptoms affecting quality of life. This study used acupotomy and other Korean medicine treatments (acupuncture, herbal medicine, and physical therapy) to improve the symptoms of CSM and cervical myelopathy. The visual analog scale, the modified Japanese Orthopaedic Association scale (mJOA scale), the Nurick grading system, and the American Spinal Injury Association impairment scale were used as the evaluation criteria to determine the effectiveness of treatment. The functional status of both patients improved from mild to moderate, with improved gait, local sensation, and level of pain. The degree of spinal cord injury remained the same. The findings of this study suggest that combined Korean medicine treatments including acupotomy may be helpful in the treatment of CSM and cervical myelopathy.

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## Introduction

Cervical spondylotic myelopathy (CSM) is a common, age related degenerative spinal cord disease which causes a combination of changes such as mechanical spinal cord compression due to degenerative changes in the cervical spine, and herniation of the intervertebral disc, ossification of the posterior ligament, ischemic damage due to blood circulation disorders in the spinal cord, and trauma [1]. CSM is a chronic disease that progresses slowly and is without an effective cure. In addition, CSM is becoming a public health concern as the morbidity rate increases with age and the population is aging [2]. Causes of cervical myelopathy include spinal trauma (for example, a road traffic accident), stenosis, infection, and cancer. Treatment goals are to manage and relieve symptoms of CSM and cervical myelopathy. Chief complaints include gait disturbance, and hand movement and sensory disorders, which cause discomfort in daily life. In severe cases, permanent sequelae may remain, thus an accurate diagnosis and treatment are required. Based on the degree of injury, CSM

and cervical myelopathy can be treated either conservatively or surgically. If symptoms are severe, surgical treatments such as central-separated laminectomy, interbody fusion, and osteotomy, are considered [3,4]. Conservative treatments include drug therapy, injection therapy, and physical therapy, amongst others [5]. Conservative treatment is more effective than surgical treatment in patients with mild symptoms [3,4].

Recently, Korean medicine treatments including acupuncture, moxibustion, and acupotomy have been studied for the treatment of various spinal diseases [2,5-7]. Acupotomy has been used to restore soft tissue damage, and the original dynamic state of abnormal lesions of the body by removing adhesions, nodules, and scars [5]. However, reviews report that there are only a few studies using combined Korean medicine treatment including acupotomy for the cervical region [6,7]. Therefore, this report describes the results for 2 patients 1 with CSM and 1 with cervical myelopathy, who were treated with combined Korean medicine including acupotomy.

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## Case Report

### Case 1

#### Patient

48-year-old female

#### Chief complaints

Neck pain  
Bilateral upper extremity numbness  
Reduced upper and lower extremity muscle strength

#### Onset date

Early October 2019

#### Present illness

In early October 2019, the patient experienced sudden neck pain, bilateral upper extremity numbness, and bilateral upper and lower extremity weakness. On October 15<sup>th</sup>, she was diagnosed with CSM at a hospital in Seoul. A cervical and lumbar spine magnetic resonance image (MRI) showed extrusion at C4-5, and protrusion at C3-4 (Fig. 1). Surgery was recommended however, the patient refused surgery and opted for Korean medicine treatment at the Department of Acupuncture at Daegu Korean Medicine Hospital of Daegu Haany University on October 31<sup>st</sup>, 2019.

#### Medical history

Arrhythmia  
Lumbar spinal stenosis

#### MRI

Refer to Fig. 1.

### Case 2

#### Patient

60-year-old male

#### Chief complaints

Neck pain  
Lower back pain  
Distal arm, hand, and left lower extremity numbness

#### Onset date

December 25<sup>th</sup>, 2019

#### Present illness

On December 25<sup>th</sup>, 2019, the patient had a traffic accident. Consequently, he experienced neck and lower back pain, and right upper and left lower extremity numbness. He was admitted to the Department of Acupuncture at Daegu Korean Medicine Hospital of Daegu Haany University on December 26<sup>th</sup>, 2019. On January 3<sup>rd</sup>, 2020, he was diagnosed with cervical myelopathy at C5-6 and a c-spine MRI showed protrusion at C3-4 and C5-6 at the Department of Radiology in Daegu (Fig. 2).

#### Medical history

Lumbar stenosis at L4-5  
Bulging at L3-4 and L5-S1  
Protrusion at C5-6  
Bulging at C3-5

#### MRI

Refer to Fig. 2.

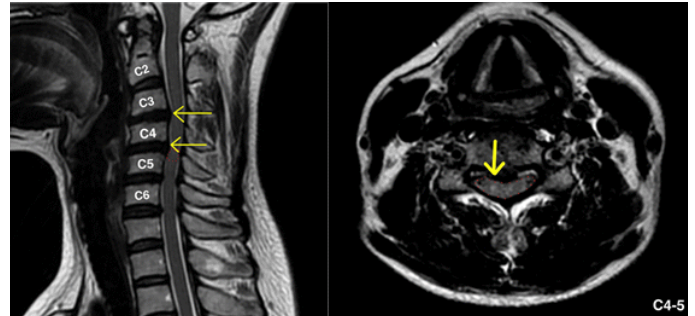


Fig. 1. C-spine MRI of Case 1.

A T2-weighted image of a C-spine MRI scan performed on October 15<sup>th</sup>, 2019. The image on the left is the sagittal view and the discs of cervical vertebrae are herniated in the C3-4 and C4-5 areas, compressing the spinal cord (a yellow arrow indicates the herniation of the discs, and a red dot border indicates a high signal). The image on the right is the axial view of the C4-5 area, and the spinal cord was marked using high-shaded features.

Red dot border, spinal cord; high shade, yellow arrow.  
MRI, magnetic resonance image.

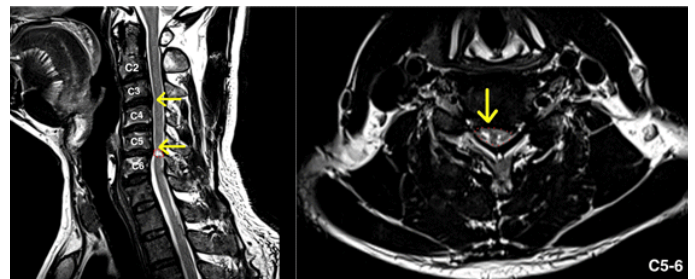


Fig. 2. C-spine MRI of Case 2

A T2-weighted image of a C-spine MRI scan performed on January 3<sup>rd</sup>, 2020. The image on the left, the sagittal view, shows the discs of cervical vertebrae herniated in the C3-4 and C5-6 areas, compressing the spinal cord, and shows high signal findings on the spinal cord at the height of C5-6. A yellow arrow indicates the herniation of the discs, and a red dot border indicates a high signal. The image on the right is the axial view of the C5-6 area. The spinal cord shows high signal findings.

Red dot border, spinal cord; high shade, yellow arrow.  
MRI, magnetic resonance image.

## Methods

The 2 patients presented at the Department of Acupuncture at Daegu Korean Medicine Hospital of Daegu Haany University between October 31<sup>st</sup>, 2019, and May 2<sup>nd</sup>, 2020, who were diagnosed with myelopathy, among patients who received outpatient treatment and inpatient treatment. The patients gave informed consent (i.e., the treatment was explained and the patient agreed to be involved in the study). The Institutional Review Board of the hospital approved this study (IRB no.: DHUMC-D-20016-AMD-01).

### Methods of treatment

#### ① Acupotomy treatment

##### 1. Treatment duration and frequency

In Case 1, acupotomy treatment was administered between October 31<sup>st</sup>, 2019, and February 12<sup>th</sup>, 2020. She received treatment once during hospitalization (November 30<sup>th</sup>, 2019, to December 6<sup>th</sup>, 2019), and 9 times during outpatient treatment (October 31<sup>st</sup>, 2019, to February 12<sup>th</sup>, 2020).

In Case 2, the patient received 10 acupotomy treatments between January 3<sup>rd</sup>, 2020 to May 2<sup>nd</sup>, 2020. He received treatment once during hospitalization (December 26<sup>th</sup>, 2019, to January 16<sup>th</sup>, 2020), and 9 times during outpatient treatment (January 17<sup>th</sup>, 2020 to May 2<sup>nd</sup>, 2020).

The treatment was performed for each patient every 1 or 2 weeks, 10 times each.

2. Treatment tools

A 7-cm sterilized needle made of stainless steel (Dongbang Medical, Korea) was used. The stagnation is cylindrical and 1 mm in diameter, with a flat blade attached to the tip of the needle. The tip of the blade used was either 0.5 mm or 0.8 mm.

3. Treatment sites [6]

There were 9 primary treatment sites (①-⑨) selected (Fig. 3) which followed the acupotomy points of the cervical region [6]. Depending on the patients' condition and site of pain (with a tenderness score of 5) additional treatment sites were used (⑩-⑭) (Fig. 3).

4. Operation method [5,6]

After sterilizing the treatment site with povidone-iodine and alcohol, the acupotomy needle was inserted towards the facet joint. The blade tip of the needle was held parallel to the articular surface of the facet joint and handled up/down to incise the adhesions surrounding the facet joint capsule.

② Other Korean medicine treatments

1. Acupuncture

Acupuncture treatments were performed on the days the patient did not receive acupotomy during hospitalization, and for the duration of outpatient care. For acupuncture treatment 0.20 × 30 mm disposable sterilized needle made of stainless steel (Dongbang Medical, Korea) were used, and left in place for 15 minutes. During hospitalization, acupuncture was performed twice a day (morning and afternoon) and once a day for outpatient treatment.

Acupuncture was performed by choosing the acupoints between BL10 · BL11 · SI9 · SI11 · SI12 · SI13 · SI14 · SI15 · GB20 and GB21, including sites of pain with tenderness, and the aim was to trigger local muscle reactions at a depth of 1.0-3.0 mm.

2. Herbal medicine

During the hospitalization period, herbal medicine was administrated orally using 3 packs per day (approximately 120 cc per pack) after meals. The herbal medicine included Mangeumtang gamibang (mainly consist of Lindera aggregate 16 g, Angelica sinensis 12 g, Cinnamomum 12 g, Atractylodes lancea 12 g, Bombyx mori L. 8 g, Aralia continentalis 6 g per day) for Case 1.

Case 2 received Oyaksoonkisan gamibang(mainly consist of Lindera aggregate 12 g, Angelica sinensis 12 g, Angelica dahurica 6 g, Poncirus trifoliata 6 g, Aralia continentalis 6 g per day).

3. Physical therapy

Interferential current therapy, microwave therapy, dry cupping treatment, and percutaneous transdermal muscle thermotherapy (hot pack) were applied to the points of pain in the lumbar or cervical region.

Evaluation criteria

The visual analog scale (VAS) [8], the modified Japanese Orthopaedic Association scale (mJOA) [9], and the Nurick grading system [10] were used to evaluate the patients' symptoms and treatment results. The American Spinal Injury Association (ASIA) impairment scale [11] was also used in Case 2 where a road traffic accident had occurred. All evaluation criteria were checked after every treatment.

① VAS

The questionnaire using the VAS [8] was performed before and after the treatment, with 0 as the painless state and 10 as the most severe pain, and the patient indicated their level of pain accordingly.

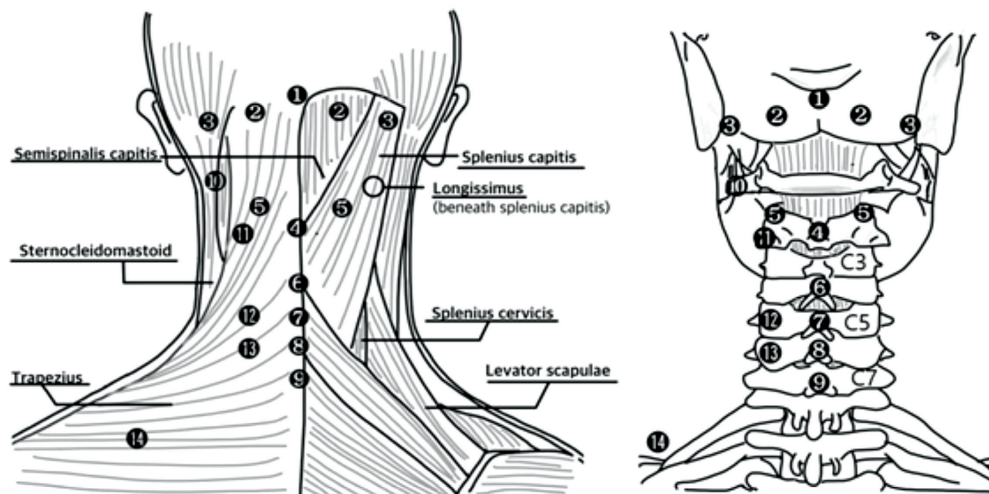


Fig. 3. Acupotomy sites. ① Upper site of GV16 ② 2-2.5 cm side down of external occipital protuberance (GB20) ③ 4.5-5 cm side down of external occipital protuberance (GB12) ④ Origin of trapezius muscle, insertion of nuchal ligament (GV16) ⑤ Facet joint, side of C2 spinous process (BL10) ⑥ C4 spinous process ⑦ C5 spinous process ⑧ C6 spinous process ⑨ C7 spinous process (GV14) ⑩ C1(the atlas) transverse process ⑪ C2(the axis) transverse process ⑫ 2cm side to the C5 spinous process ⑬ 2cm side to the C6 spinous process ⑭ the middle of the upper trapezius.

### ② mJOA scale

The mJOA scale is a method for evaluating the functional status in patients with CSM [9]. It evaluates the upper and lower extremity muscle strength, upper limb sensory abnormality, and urination abnormality. After evaluating the severity of symptoms in each item, it is summarized and classified in 3 stages: mild as a mJOA from 15 to 17, moderate as a mJOA from 12 to 14, and severe as a mJOA from 0 to 11.

### ③ The Nurick grading system [10]

Nurick devised this system to evaluate the clinical symptoms in patients with spinal cord disease [9]. The clinical symptoms were evaluated in 6 grades from 0 to 5 by applying the classification method. Where 0 indicated signs or symptoms of spinal cord disease and 5 indicated chair bound or bedridden.

### ④ ASIA impairment scale [11]

The ASIA functional impairment scale is a diagnostic tool used to verify the degree of spinal cord injury as established by the American Spinal Injury Association. It can evaluate motor and sensory damage in patients with spinal cord injury [11]. The sensory test results are expressed as 1: intact, 2: impaired, 3: absent, and NT: not testable. The motor test results are expressed as 5: normal, 4: full range of motion to resist gravity and tester's force, 3: full range of motion from gravity removal position, 2: slight joint range of movement from gravity removal position, 1: only muscle

contraction, 0: no muscle contraction, and NT: not testable. The 5 categories A -E indicate degrees of impairment; A = complete; B = sensory incomplete (complete impairment in motor function of the sacral segments [S4-5]); C = motor incomplete, muscle Grade < 3 (Grades 0 -2); D = motor incomplete, muscle Grade > 3; and E = normal.

## Results

Case 1 showed gradual improvement in the VAS score, the mJOA scale score, and the Nurick grading system score (Table 1; Fig. 4). Pain and discomfort in daily life gradually improved from a VAS score 6 to a VAS score 3 after the 7<sup>th</sup> treatment, and to VAS score 2 after the 9<sup>th</sup> treatment, and no re-exacerbation of pain occurred. The mJOA scale began to change after the 4<sup>th</sup> treatment, when it was within the moderate range of the mJOA scale, and at the 8<sup>th</sup> treatment it was within the mild range of functional status. Changes in the Nurick grading system for difficulty in walking showed improvement in gait from Grade 2 (slight difficulty in walking which did not prevent full-time employment) to Grade 1 (signs of spinal cord disease but no difficulty in walking) after the 6<sup>th</sup> treatment. Improvement in walking was maintained during Treatment 6 to Treatment 10). She initially complained of a deteriorating upper and lower limb muscle strength, it also improved almost normally, especially in the lower extremity and the grasping power increased 22 kg/11 kg to 22 kg/19 kg (Table 2).

Case 2 showed overall improvement in VAS scores, and the mJOA scale score improved and was maintained from Treatment 8 to Treatment 10. Pain and discomfort in daily life gradually improved, reflected in a reduction from VAS score 6 to VAS score 4 after the 6<sup>th</sup> treatment. After the 8<sup>th</sup> treatment, there was a re-exacerbation, but after the 10<sup>th</sup> treatment, it improved and maintained at a VAS score 3 compared with the first treatment. The mJOA scale showed a change in sensory dysfunction in gait evaluation items, and the values improved from 14 (moderate) to 15 (mild) which was maintained after the 8<sup>th</sup> treatment. He had no motor loss and motor change, which was reflected in the Nurick grade not changing. The ASIA impairment scale showed C5 neurological sensory loss, but gradually the range and degree of impairment was reduced, and there was almost no sensory loss after the 10<sup>th</sup> treatment (Table 3; Fig. 5). The ASIA impairment scale did not change from a D, but the score did improve from Day 102 to Day 108.

In both cases, the patients felt pain, redness, and swelling at the insertion sites during the acupotomy procedure, but this improved and there were no further complaints, or mention of other side effects.

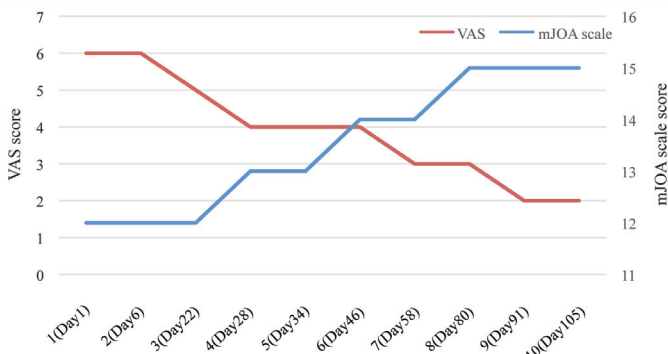


Fig. 4. The VAS score and the mJOA scale score changes over 10 acupotomy treatments (105 days) in Case 1. VAS, visual analog scale; mJOA, modified Japanese Orthopaedic Association scale.

Table 1. VAS, mJOA Scale, and the Nurick Grading System Score Changes in Case 1.

Number of treatments	1	2	3	4	5	6	7	8	9	10
Days after treatment	1	6	22	28	34	46	58	80	91	105
VAS score	6	6	5	4	4	4	3	3	2	2
mJOA scale score	12	12	12	13	13	14	14	15	15	15
Nurick grading system score	2	2	2	2	2	1	1	1	1	1

VAS, visual analog scale; mJOA, modified Japanese Orthopaedic Association scale.



Table 2. Muscle Power Changes in Case 1.

Body part	Action	Muscle power after treatment Day 1				Muscle power after treatment Day 105			
		Right		Left		Right		Left	
Shoulder	Flexion/extension	5	5	4	4	5	5	5	4
	Abduction/adduction	5	5	4	4	5	5	5	4
Elbow	Flexion/extension	5	5	4	4	5	5	5	5
Wrist	Dorsal flexion/plantar flexion	5	5	4	4	5	5	5	5
Finger	Flexion/extension	5	5	4	4	5	5	5	5
Grasp power		22 g		11 kg		22 kg		19 kg	
Hip	Flexion/extension	5	5	4	4	5	5	5	5
	Abduction/adduction	5	5	4	4	5	5	5	5
Knee	Flexion/extension	5	5	4	4	5	5	5	5
Ankle	Dorsal flexion/plantar flexion	5	5	4	4	5	5	5	5
Toe	Flexion/extension	5	5	4	4	5	5	5	5

Table 3. VAS, mJOA Scale, and the Nurick Grading System, ASIA Impairment Scale Score Changes in Case 2.

Number of treatments	1	2	3	4	5	6	7	8	9	10
Days after treatment	1	15	29	42	54	68	82	96	110	121
VAS score	6	6	6	5	5	4	4	5	4	3
mJOA scale score	14	14	14	14	14	14	14	15	15	15
Nurick grading system score	1	1	1	1	1	1	1	1	1	1
ASIA impairment scale	D	D	D	D	D	D	D	D	D	D

VAS, visual analog scale; mJOA, modified Japanese Orthopaedic Association scale; ASIA, the American Spinal Injury Association.

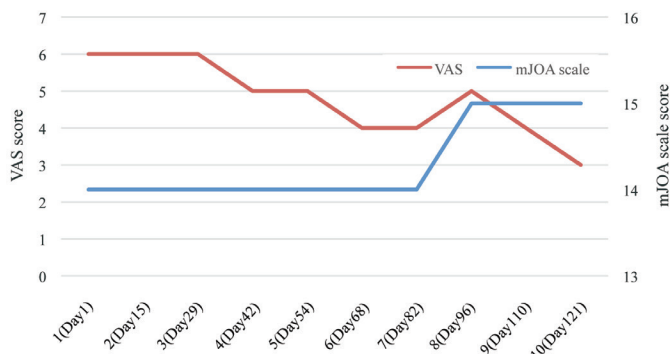


Fig. 5. VAS, mJOA scale score changes over 10 acupotomy treatments in Case 2. VAS, visual analog scale; mJOA, modified Japanese Orthopaedic Association scale.

### Discussion

CSM belongs to a category of spondylosis, which refers to age related spinal degeneration and its surrounding structures [1,12]. CSM is caused by a combination of factors such as mechanical spinal cord compression due to degenerative changes in the cervical spine, degeneration, and herniation of the intervertebral disc, ossification of the posterior ligament, ischemic damage due to blood circulation disorders in the spinal cord, and trauma [12-14]. CSM causes pain and motor and sensory deficits in the area corresponding to the affected spinal cord segment. Symptoms of motor deficits include loss of fine motor skills affecting activities such as writing or buttoning, steps imbalance, and instability when performing movements such as climbing stairs. Symptoms of sensory deficits include loss of pain, temperature, sense of vibration, decrease in 2-point senses, tingling, and paresthesia [1].

In severe cases, the urination sphincter may be affected showing symptoms such as urinary urgency, urination, frequent urination, and incontinence [1,12]. A cause of cervical myelopathy not related to age is spinal trauma (for example, a road traffic accident). Based on the degree of injury, CSM and cervical myelopathy can be treated either conservatively or surgically. If symptoms are severe, surgical treatments such as central-separated laminectomy, interbody fusion, and osteotomy are considered [4]. When symptoms are mild, conservative treatment has been reported to be more effective, and less risky than surgical treatments [3,4]. Conservative treatment of CSM and cervical myelopathy include drug therapy, injection therapy, and physical therapy, among others [3]. Korean medicine treatment includes herbal medicine, acupuncture, moxibustion, pharmacopuncture, traction, and acupotomy [7]. Of which, acupotomy has been studied since 2006, with studies reported in 2007, 2014, 2017, and 2018 [5,7]. Of these 5 studies, 4 were conducted in China and 1 was conducted in Korea where only 1 case was reported [5].

Since its first introduction in China in 1987, acupotomy has been used to treat patients with pain caused by various diseases [5]. The treatment mechanism is to recover the original dynamic state by removing the adhesions of the tissue, and the recovered tissue can freely change its position in the body during activity. Consequently, the pain is removed and function is restored [6].

In Case 1, the primary treatment sites were C4-5 (⑥, ⑦) and the additional treatment sites were the transverse processes of both C5-6 (⑫, ⑬). Improvement was observed and persisted. After 8 weeks of treatment, the patients perceived pain level was a VAS score 2 compared with a VAS score 5-6 before the treatment. The patient's lower extremity muscle strength also increased, reducing discomfort during walking by 30%. The improvement in symptoms was maintained even after 16 weeks of treatment.

In Case 2, the primary treatment sites were C5-6 spinous processes (⑥, ⑦, ⑧), and the additional treatment sites were C2-4 transverse processes (⑪, ⑫). In this case, overall during the treatment period, there was improvement in the level of pain and discomfort in daily life. However, there was a deterioration in the numbness and discomfort in the hands but by the end of the treatment period, there was improved sensation on the deteriorated side up to 90%.

In both cases, they did not complain of side effects such as dizziness, fainting, and shortness of breath except for slight pain, redness, and swelling in the insertion site during the procedure. Given that acupotomy treatment is more invasive than other Korean medicine treatments, sufficient explanation, and guidance the pain to expect, and side effects (including the risk of pneumothorax) to the patient is needed before the procedure [6].

For both cases, the superficial ligament, interspinous ligament, posterior joint, stenosis, and surrounding soft tissue adhesions were resolved with acupotomy. After acupotomy, both patients experienced an improvement in symptoms and overall reduced discomfort. The duration of treatment was not the same.

In the treatment of CSM and cervical myelopathy, acupotomy was performed selecting the protuberance of 1.0 cm acupotomy to 1.5 cm outside of the cervical spinous process as the acupuncture area, and the cervical nuchal ligament, trapezius, and cervical erecting muscles were used as the treatment sites [5,7]. Further studies are warranted to select, and treat the site according to symptoms and causes, and to prove the effect of acupotomy

treatment alone. In this study, the improvement of symptoms was observed at the treatment sites according to 9 primary and 5 additional designated treatment sites for acupotomy, and selecting the treatment sites based on the spine level.

This study was limited because it did not focus only on acupotomy, but rather a combination of acupuncture, herbal medicine, physical therapy, and acupotomy. Therefore, the precise effect of acupotomy was not determined. To derive more objective results, acupotomy needs to be used exclusively as the conservative treatment [5-7]. Furthermore, studies for acupotomy that are appropriately adjusted variables and randomized controlled clinical trials are necessary for conducting high-quality research.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

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