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# Cervical Disc Herniation with Myelopathy Following Cervical Tuina Manipulation

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Complications following cervical manipulation can be classified as cerebrovascular or noncerebrovascular complications. The former complications occur more frequently, and they are usually due to vertebral artery occlusion, damage or thrombus formation. The latter include spinal cord or nerve root injuries and have seldom been reported. Herniation of the cervical disc with myelopathy following manipulation is rare. However, we have encountered two patients who developed cervical disc herniation with myelopathy secondary to cervical tuina manipulation for nuchalgia at the bone setting facilities. One of the patients suffered from shooting pain during manipulation and developed tetraparesis two days later. An MRI examination revealed herniation of the intervertebral disc at the C4-5 level. Another patient suffered from right hemiplegia immediately after manipulation and was initially diagnosed with a cerebrovascular accident. Tetraplegia developed a few days later and an MRI study demonstrated herniation of the intervertebral disc at the C3-4 and C4-5 levels with prominent cord compression. Both patients underwent cervical discectomy with bone fusion and received rehabilitation therapy after the operation. They satisfactorily improved and could ambulate with a nearly normal gait without requiring an assistive device. The risk of cervical disc herniation with myelopathy following cervical manipulation cannot be overemphasized because an early diagnosis and timely intervention are vital. While skillful techniques and appropriate force need to be applied to the neck during manipulation, the same care must be taken to reduce the risk of complications following manipulation. ( *Tw J Phys Med Rehabil* 2016; 44(2): 111 - 119 )

**Key Words:** tuina manipulation, cervical disc herniation, cervical myelopathy, rehabilitation

## INTRODUCTION

Cervical manipulation has been widely used to treat headaches, neck pain, and stiffness.<sup>[1]</sup> Previous literature has revealed that manipulation-induced complications are

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mainly due to acute vascular incidents, which then lead to cerebellar or brainstem infarcts.<sup>[2]</sup> Other neurological complications, such as myelopathy or radiculopathy, following cervical manipulation have only been sporadically reported.<sup>[3-8]</sup> Among these cases, cervical disc herniation with myelopathy has seldom been mentioned, and its mechanism(s) remain controversial.<sup>[9]</sup> We report two cases of cervical disc herniation accompanied by myelopathy following tuina manipulation at the bone setting facilities; we discuss the possible mechanisms leading to the complications induced by cervical manipulation and whether the complications could have been prevented.<sup>[8]</sup>

## CASE REPORT

### Case 1

A 32-year-old woman suffered from two weeks of neck pain. She had no previous history of neck trauma. The patient underwent cervical manipulation two days prior to admission, and a sudden onset of severe neck pain during manipulation was noted. Within twenty-four hours after cervical manipulation, she experienced numbness and abnormal sensations, such as electrical shocks, in all four limbs during neck extension. In addition, increased urinary frequency and urgency occurred thereafter. On hospital admission, a physical examination revealed tetraparesis (muscle power grade 3 in four limbs by the manual muscle test) and an increase in the deep tendon reflex. Positive Babinski's signs were found bilaterally. The cranial nerve examination was normal. Neck extension and right side rotation induced shooting pain in all limbs, and the neurological deficits progressed to urinary retention and tetraplegia within 48 hours. Radiographs of the cervical spine revealed negative findings. However, a magnetic resonance imaging (MRI) study revealed herniation of the intervertebral disc with cord compression at the C4-5 level (Figure 1A & 1B). A C4-5 discectomy with bone fusion was performed to relieve the compression, and improvement of the muscle weakness was noted two days later. The patient participated in a rehabilitation program that included muscle strengthening exercise and ambulation training. The patient was almost completely

recovered within one month. When the patient was discharged, she could independently ambulate without the help of any assistive device and she had a nearly normal gait pattern. Her bladder function returned to normal.

### Case 2

A 55-year-old woman suffered from neck pain for two months. She underwent cervical manipulation, but right-sided weakness and urinary incontinence developed immediately after the manipulation. She was sent to the hospital and diagnosed with a cerebrovascular accident. Brain CT showed negative findings. Tetraplegia (muscle power grade 1 in four limbs) developed a few days later. Radiographs of the cervical spine revealed cervical spondylosis. An MRI study disclosed herniation of the intervertebral discs with prominent cord compression at the C3-4 and C4-5 levels (Figure 2A, 2B & 2C). The patient underwent C3-4 and C4-5 discectomy with bone fusion. The muscle strength of all four extremities gradually improved, and continent voiding was regained three weeks later. She could ambulate with a walker after undergoing rehabilitation training for three months. One month later, she could ambulate without an assistive device and could independently perform daily activities.

## DISCUSSION

Cervical disc herniation with myelopathy induced by cervical manipulation is a rare condition.<sup>[4-7]</sup> It occurs less often than lumbar disc herniation because the posterior longitudinal ligament in the cervical spine is three to five times thicker and more developed than in either the thoracic or lumbar spine.<sup>[10]</sup> Trauma or sudden strains are important causes of symptomatic cervical disc herniation, particularly in patients with symptoms that are present for less than one month.<sup>[11, 12]</sup> In this report, the two presented patients did not have any neurological deficits before manipulation. Case one experienced severe neck pain during manipulation, which was followed by numbness, an electric shock sensation, and urinary complications; the other case initially presented with right-sided weakness soon after the manipulation and she developed progressive weakness in all four limbs a few days later. Because of the temporal association between the manipulation and subsequent muscle weakness, these

cases of herniated cervical disc with myelopathy were considered directly related to the cervical manipulation.

Manipulation-induced spinal cord injuries are often attributed to a pre-existing disease of the spine, such as degenerative changes, osteomyelitis, tumor or ankylosing spondylitis; however, they may also occur in patients who lack pre-existing disease.<sup>[4-7]</sup> We summarize the various conditions associated with myelopathy following cervical manipulation in Table 1.<sup>[13-26]</sup> Tuina manipulation first consists of soft tissue relaxation with massage and acupressure techniques, which is followed by high velocity thrust and small amplitude bone setting techniques to restore the displaced spinal joint. According to the applied techniques, the manipulation can also involve rotation, traction or a combination of both.<sup>[27]</sup> Therefore, the limit of extensibility of the annular fibers may be exceeded during manipulation if a disproportionate force with incorrect direction is applied. In cases with pre-existing disk degeneration, there is an increased risk of symptomatic disc herniation.<sup>[8]</sup> In Case 2, the presence of degenerative changes is a contributing factor to the cervical disc herniation with resultant myelopathy following manipulation.<sup>[13]</sup>

The causes of complications following manipulation may include misdiagnosis; the application of excessive forces; improper technique; preexisting vascular or bony abnormalities at the occipito-cervical junction; the presence of a herniated nucleus pulposus; and ignoring contraindications for manipulation, such as the presence of a tumor, infection, cervical myelopathy, intracranial hypertension, meningitis, vertebrobasilar insufficiency syndrome, severe osteoporosis, ankylosing spondylitis, rheumatoid arthritis, connective tissue disease, recent surgery, or anticoagulant therapy.<sup>[8,28]</sup> Therefore, a detailed pre-manipulative assessment should be performed before treatment, including a combination of assessing the patient history and performing a comprehensive physical examination of active and passive cervical spine range of motion with upper cervical instability tests. Several factors, such as the rate and direction of force application, target of force, relative structural movement and position of the patients should be considered to determine an appropriate and safe technique.<sup>[29]</sup>

Because there are multiple approaches to

manipulation, ranging from gross and forceful rotation of the spine to the relatively gentle low-amplitude thrust technique,<sup>[9]</sup> the practitioner must be well-trained in the anatomy, techniques and mechanisms of manipulation.<sup>[30]</sup> The use of a precise force and proper technique need to be monitored scientifically to decrease the incidence of complications. When more forceful manipulation is contraindicated, soft tissue mobilizing techniques can also be considered. In contrast to low back pain treatment, mobilization is favored over manipulation in treating neck pain to reduce iatrogenic complications.<sup>[28]</sup> If prolonged therapy becomes necessary, reevaluation after six to eight weeks is suggested because a laxity of ligaments may result from repeated stretching of the joints.

The limitation of this report is that neither reported case underwent imaging studies before receiving the manipulation at the bone setting facilities. Additionally, we did not have access to the methods of manipulation and we were unable to rule out the possibility of pre-existing cervical disc bulge or herniation before manipulation. In case one, MRI showed high signal over C4/5 central disc herniation, which favored an acute onset of disc herniation following manipulation. In case two, in addition to disc herniation at the C3/4 level, there might be a pre-existing degenerative disc with extrusion at the C4/5 level, which was aggravated by cervical manipulation and resulted in cord compression. Since cervical manipulation may aggravate preexisting cervical disc herniation, the presence of a herniated disc is considered a relative contraindication to cervical spinal manipulation.<sup>[11]</sup> In the acute phase of cervical disc herniation with neurological deficits, cervical manipulation of the affected segment should be absolutely contraindicated; otherwise, there might be a high risk of massive disc prolapse or rupture with cord compression.<sup>[8,12]</sup>

The example of these two patients reminds us that it is essential to perform a detailed evaluation and obtain a correct diagnosis before cervical manipulation is attempted. The risk of cervical disc herniation with myelopathy following spinal manipulation cannot be overemphasized because an early diagnosis and timely intervention are vital. Extensively screening for contraindications, carefully monitoring patients during manipulation and promptly diagnosing any complications

are mandatory to ensuring complete neurological recovery.  
Case 1.



Figure 1A. Sagittal T1WI MRI shows disc extrusion at the cervical C4/5 level (arrow).

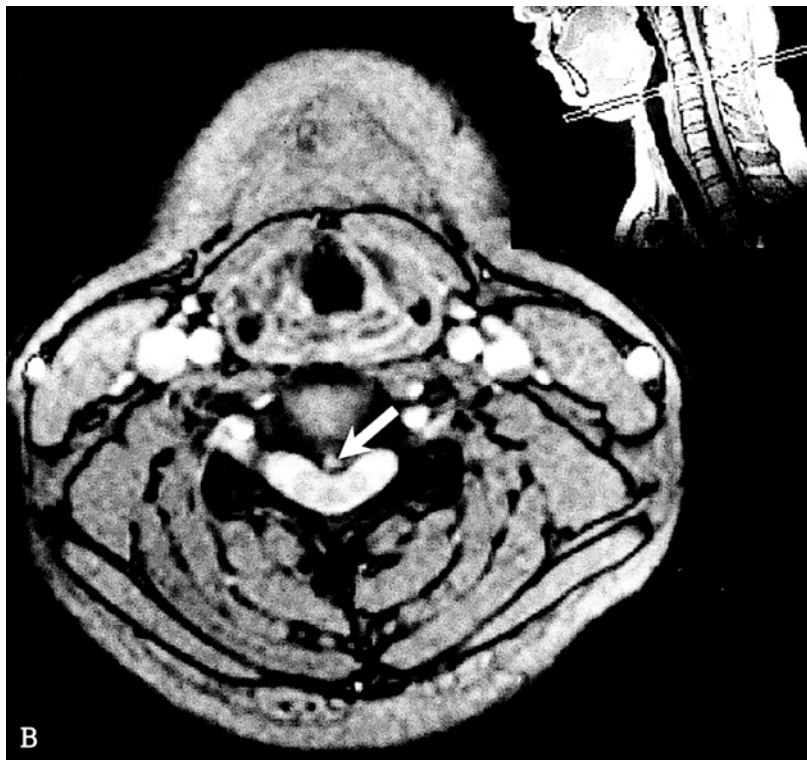


Figure 1B. Axial T2WI MRI confirmed C4/5 small central disc herniation (arrow).

Case 2.



Figure 2A. Sagittal T1WI MRI shows C3/4 (arrow) and C4/5 (arrowhead) discs extrusion compressing the cord.

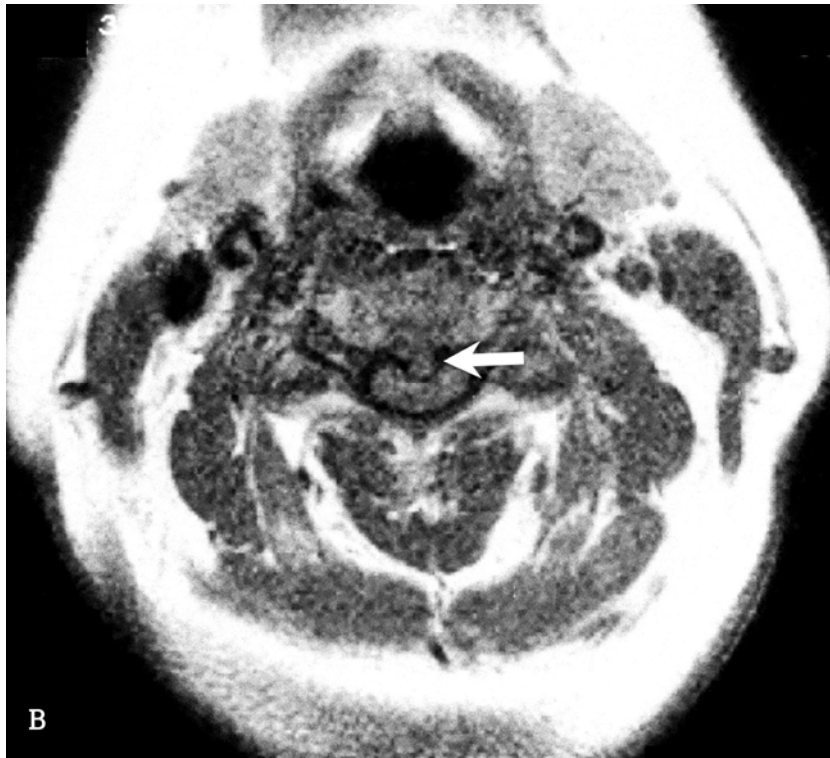


Figure 2B. Axial T1WI MRI shows C3/4 central disc extrusion impinging upon the cord (arrow).

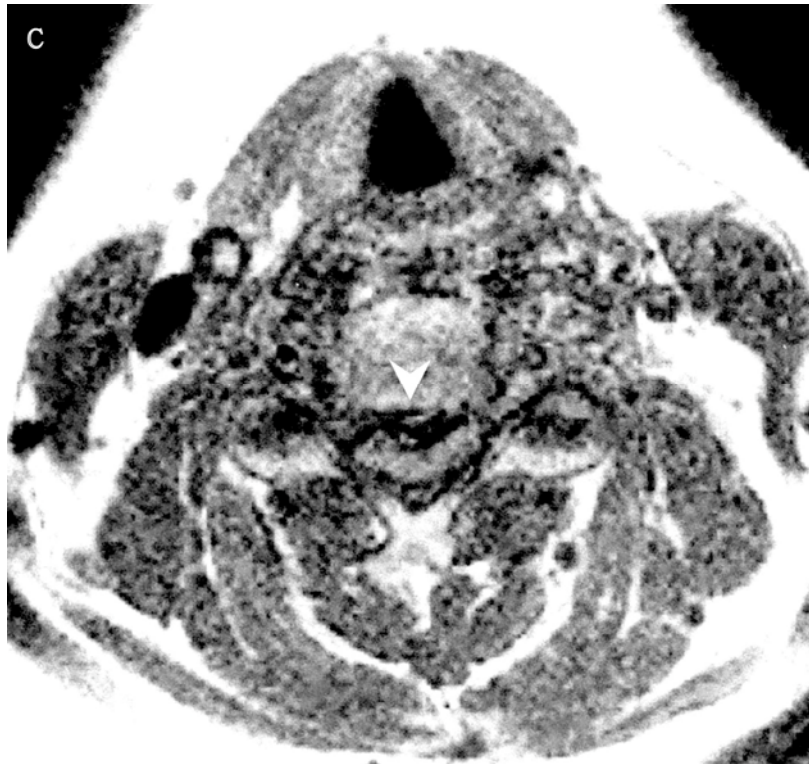


Figure 2C. Axial T1WI MRI confirms C4/5 disc extrusion effacing right side of the thecal sac and cord (arrowhead).

Table 1. Cases of Myelopathy Reported in Association with Cervical Manipulation

Complication	Preexisting disease	No. of reported cases	Reference(s)
Fracture-dislocation	Ankylosing spondylitis	5	14,15
	Osteomyelitis	3	3,16
	Carcinoma of the bronchus	1	5
	None	2	3,15
Cord compression	Tumor		
	Multiple myeloma	1	17
	Astrocytoma	1	18
	Meningioma	1	19
	Neurilemmoma	1	20
	Neurofibroma	1	21
	Spinal stenosis with OPLL※	6	5,13,20,22,23,26
Others	1	24	
Intraspinal hemorrhage	Multiple sclerosis	1	3
	None	4	4,16,25
Spinal cord infarct	None	1	26
Cervical disk herniation	None	5	4,5,6,7

※ OPLL: Ossification of the Posterior Longitudinal Ligament

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## REFERENCES

1. Refshauge KM, Parry S, Shirley D, et al. Professional responsibility in relation to cervical spine manipulation. *Aust J Physiother* 2002;48:171-9.
2. Klougart N, Leboeuf-Yde C, Rasmussen LR. Safety in chiropractic practice, Part I; The occurrence of cerebrovascular accidents after manipulation to the neck in Denmark from 1978-1988. *J Manipulative Physiol Ther* 1996;19:371-7.
3. Kewalramani LS, Kewalramani DL, Krebs M, et al. Myelopathy following cervical spine manipulation. *Am J Phys Med* 1982;61:165-75.
4. Talluri SK, Talluri J, Besur S, et al. Catastrophic complication of chiropractic manipulation: a report of quadriparesis. *Am J Med* 2009;122:e3-4.
5. Tseng SH, Lin SM, Chen Y, et al. Ruptured cervical disc after spinal manipulation therapy: report of two cases. *Spine (Phila Pa 1975)* 2002;27:E80-2.
6. Destee A, Lesoin F, Di Paola F, et al. Intradural herniated cervical disc associated with chiropractic spinal manipulation. *J Neurol Neurosurg Psychiatry* 1989;52:1113.
7. Davis C. Osteopathic manipulation resulting in damage to spinal cord. *Br Med J (Clin Res Ed)* 1985;291:1540-1.
8. Malone DG, Baldwin NG, Tomecek FJ, et al. Complications of cervical spine manipulation therapy: 5-year retrospective study in a single-group practice. *Neurosurg Focus* 2002;13:1-8.
9. LaBan MM, Taylor RS. Manipulation: an objective analysis of the literature. *Orthop Clin North Am* 1992;23:451-9.
10. Hosek RS, Schram SB, Silverman H, et al. Cervical manipulation. *JAMA* 1981;245:922.
11. Oppenheim JS, Spitzer DE, Segal DH. Nonvascular complications following spinal manipulation. *Spine J* 2005;5:660-6.
12. Ernst E. Manipulation of the cervical spine: a systematic review of case reports of serious adverse events, 1995-2001. *Med J Aust.* 2002;176:376-80.
13. Murphy DR. Herniated disc with radiculopathy following cervical manipulation: nonsurgical management. *Spine J* 2006;6:459-63.
14. Schmidley JW, Koch T. The noncerebrovascular complications of chiropractic manipulation. *Neurology* 1984;34:684-5.
15. Blaine ES: Manipulative (chiropractic) dislocations of the atlas. *JAMA* 1925;85:1356-9.
16. Lidder S, Lang KJ, Masterson S, et al. Acute spinal epidural haematoma causing cord compression after chiropractic neck manipulation: an under-recognised serious hazard? *J R Army Med Corps* 2010;156:255-7.
17. Lewis M, Grundy D. Vertebral osteomyelitis following manipulation of spondylitic necks--a possible risk. *Paraplegia* 1992;30:788-90.
18. 劉耀宗、陳悅樺、梁秋萍等：不當推拿引起的頸部脊髓病變：病例報告。中華民國復健醫學會雜誌 1992；20：205-7。
19. Livingston MC. Spinal manipulation causing injury. A three-year study. *Clin Orthop Relat Res* 1971;81:82-6.
20. Stopford JS. The arteries of the pons and medulla oblongata. *J Anat Physiol* 1916;50:131-64.
21. Misra UK, Kalita J, Khandelwal D. Consequences of neck manipulation performed by a non-professional. *Spinal cord* 2001;39:112-3.
22. Chakraverty J, Curtis O, Hughes T, et al. Spinal cord injury following chiropractic manipulation to the neck. *Acta Radiol* 2011;52:1125-7.
23. Padua L, Padua R, LoMonaco M, et al. Radiculomedullary complications of cervical spinal manipulation. *Spinal cord* 1996;34:488-92.
24. Lipper MH, Goldstein JH, Do HM. Brown-Séquard syndrome of the cervical spinal cord after chiropractic manipulation. *AJNR Am J Neuroradiol* 1998;19:1349-52.
25. Tseng SH, Chen Y, Lin SM, et al. Cervical epidural



- hematoma after spinal manipulation therapy: case report. *J Trauma* 2002;52:585-6.
26. Lanska DJ, Lanska MJ, Fenstermaker R, et al. Thoracic disk herniation associated with chiropractic spinal manipulation. *Arch Neurol* 1987;44:996-7.
27. Lin JH, Chiu TT, Hu J. Chinese manipulation for mechanical neck pain: a systematic review. *Clin Rehabil.* 2012;26:963-73.
28. Bronfort G, Haas M, Evans RL, et al. Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis. *Spine J* 2004;4:335-56.
29. Mintken PE, Derosa C, Little T, et al. A model for standardizing manipulation terminology in physical therapy practice. *J Man Manip Ther* 2008;16:50-6.
30. Powell FC, Hanigan WC, Olivero WC. A risk/benefit analysis of spinal manipulation therapy for relief of lumbar or cervical pain. *Neurosurgery* 1993;33:73-8.

## 頸椎徒手推拿後併發頸椎椎間盤突出及脊髓病變

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頸椎徒手治療所導致的併發症可分為腦血管及非腦血管兩類併發症，前者較常發生，主要原因為椎動脈阻塞、血管壁損傷或血栓所致。後者的併發症包括脊髓或神經根損傷，較少文獻曾報導此類併發症。脊椎徒手治療後併發頸椎椎間盤突出及頸脊髓損傷極少發生，本文報導兩例此類案例。第一位案例於徒手推拿過程中突感由頸部向下延伸之刺痛，隔兩天發生四肢輕癱之症狀，核磁共振掃描顯示頸椎第四與第五節椎間盤突出。第二位案例於徒手推拿後馬上發生右側肢體偏癱，最初被診斷為腦血管中風，但數天後病情進展到四肢輕癱，核磁共振掃描顯示頸椎第三與第四節和第四與第五節椎間盤突出合併脊髓壓迫。兩位患者都接受頸椎間盤切除與骨融合手術，並且於術後進行復健治療，其運動功能皆恢復至不須輔具可獨立行走，步態也接近正常。雖然脊椎徒手治療後發生頸椎椎間盤突出合併脊髓壓迫的文獻報導不多，但仍應重視其發生之可能性，因為早期的診斷和及時的介入對於預後相當重要。實行脊椎徒手治療除了需注意技術的正確熟練與力道之外，建議於整個治療過程及治療後仍需注意病人的症狀變化，給予適時的評估與治療以降低併發症。（台灣復健醫誌 2016；44(2)：111 - 119）

**關鍵詞：**徒手推拿(tuina manipulation)，頸椎椎間盤突出(cervical disc herniation)，頸脊髓病變(cervical myelopathy)，復健(rehabilitation)

