CASE REPORT

Syringomyelia and Arnold-Chiari malformation associated with neck pain and left arm radiculopathy treated with spinal manipulation

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SUMMARY

An 18-year-old female patient presented with left dominant neck pain after a motor vehicle collision. Her cervical spine MRI revealed syringomyelia with associated Type I Arnold-Chiari malformation. Some researchers have reported that these might be considered contraindications to spinal manipulation. Nevertheless, her benign and functional clinical examination suggested otherwise and she underwent four manipulative treatments in 2 weeks. By the end of the treatment plan and after 1-month follow-up, she was asymptomatic, no adverse effects were noted and her outcome assessment score decreased from 56% to 0%. This case illustrates that spinal manipulation may be a useful adjunctive treatment procedure for spinal pain, even in the presence of syringomyelia and Chiari malformation, which may not necessarily be a contraindication to spinal manipulation, when performed by a skilled and well-trained physician.

BACKGROUND

Neck pain with radiculopathy is one of the most common causes of visits to spine specialists and is often caused by mechanical dysfunctions of the cervical spine such as disc herniation, spinal stenosis and degenerative disc disease. Occasionally, this disorder can be caused by other conditions such as tumours, fracture, sarcoidosis, syringomyelia and other types of compression or damage to the cervical nerve roots.¹ Current research supports spinal manipulation as an intervention in acute cervical pain and radiculopathy² but rarely recommends it in cases of associated syringomyelia and Arnold-Chiari malformation.³ Syringomyelia is a rare condition where a cyst-like structure is found in the spinal cord, usually trauma-induced, and is commonly associated with Arnold-Chiari malformation.⁴ The mechanisms of this association are poorly understood, and there is little guidance regarding appropriate conservative management of this disorder with spinal manipulation, physical medicine or other adjunctive modalities.⁴⁻⁵ According to the National Institute of Neurological Disorders and Stroke⁶ (NINDS) treatment is usually surgical, especially in the associated presence of Chiari malformation, and is intended to provide more space at the base of the skull and upper neck, resulting in the primary cyst becoming smaller. Nevertheless, surgical treatment only provides stabilisation of symptoms or modest improvement. In other cases where symptoms are moderate neck pain, scapulothoracic

pain, headaches and occasional radiculopathy without neurological signs, treatment is ineffective and difficult; therefore it is important to differentially diagnose the pain generator, seek appropriate treatment and consider spinal manipulation as an important adjunctive tool.⁷⁻⁹ The purpose of this study is to report successful results with the utilisation of spinal manipulation in a case of neck pain and radiculopathy with associated syringomyelia and Arnold-Chiari malformation. It is also important to enhance the awareness of clinicians regarding the utilisation of spinal manipulation in the management of cases of neck pain with associated syringomyelia and Chiari malformation, with no neurological deficits; this procedure may be utilised and is not necessarily a contraindication to treatment.

CASE PRESENTATION

An 18-year-old female patient presented with left-sided cervicgia and bilateral upper trapezius muscle tightness with referring pain down her left arm to her hand, and tingling of the fourth and fifth digits. She had been in a motor vehicle accident 3 months previously. An orthopaedic surgeon, a shoulder specialist, who ordered a cervical spine MRI and referred her to a physical therapy (PT) programme, had initially seen her a few days after the accident. She only went for two visits of PT because of an increase in pain. Eventually, she sought treatment at our clinic and was initially evaluated by our physician assistant who diagnosed her with left-sided cervical radiculopathy and referred her to our manual medicine spine specialist. The specialist examination revealed a benign and functional musculoskeletal system with no negative neurological findings, and suggested musculoskeletal mechanical dysfunctions of the cervicothoracic spine. On review of the MRI of the cervical spine, the specialists noticed a small fluid-like compartment at the C7 spine level, measuring over 2 cm (figures 1 and 2). There was also the presence of cerebellar herniation with a shallow occipital fossa. The specialist contacted the radiologist who confirmed the radiographic findings, suggestive of syringomyelia at the C7 spine level with associated Arnold-Chiari Type I malformation (figures 1 and 2). There was no evidence of degenerative disease, spinal cord mass or stenosis. Our surgical specialists also confirmed the findings, but due to lack of neurological compromise, there was no need for surgical intervention. Clinical examination was

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Figure 1 Sagittal cervical spine MRI demonstrating cerebellar herniation with shallow posterior occipital fossa and fluid-like syrinx at the C7 spine level.

unremarkable and not suggestive of any contraindications to spinal manipulation. There were no systemic symptoms, nor neurological focal deficits. Therefore, without the presence of these factors, there was no need for immediate concern; a clinical diagnosis of cervical radiculopathy associated with syringomyelia and Arnold-Chiari malformation was given.

DIFFERENTIAL DIAGNOSIS

This was a case of a young female patient with cervical radiculopathy as well as associated syringomyelia and Arnold-Chiari Type I malformation. In cases such as this, it is prudent to consider differential diagnoses related to neurological findings, such as spinal and brain tumours, fractures and nerve root compression. Such factors should warrant immediate re-evaluation and consideration of additional studies.¹⁰

Figure 2 Transverse cervical spine MRI demonstrating enlarged fluid-like compartment around C7 spine level with central location in the spinal cord measuring circa 2 cm.

TREATMENT

Treatment of this disorder is usually surgical, especially in the associated presence of Chiari malformation, and the main goal of surgery is to provide more space at the base of the skull and upper neck, resulting in the primary cyst becoming smaller. However, surgical treatment only provides stabilisation of symptoms or modest improvement.⁶ In less significant cases where symptoms are usually moderate neck pain, scapulothoracic pain, headaches and occasional radiculopathy without neurological signs, treatment is ineffective and difficult; therefore it is important to differentially diagnose the pain generator, seek appropriate treatment and consider spinal manipulation as an important adjunctive tool.^{5 7-9} If there are no significant findings on clinical examination, other rehabilitative modalities, such as physiotherapy, manual medicine, exercises including the McKenzie method, etc, should be considered to reinforce spinal stabilisation musculature and help with pain relief through manual therapy modalities.¹⁰ The treatment programme used in this case study emphasises spinal manipulation as the exclusive treatment modality. Spinal manipulation was used to promote separation between joint surfaces, enhance smooth gliding, promote joint gapping, elongate joint spaces, and stimulate mechanoreceptors and reduce pain pathways. The patient underwent four treatment visits, twice a week, where spinal manipulation was exclusively performed.

OUTCOME AND FOLLOW-UP

At the end of the 4-week treatment plan, the patient was asymptomatic with complete resolution of mechanical and neurological symptoms. The patient was re-evaluated by a spine specialist, who acknowledged maximal medical improvement and complete resolution of the initial symptoms with no necessity for additional treatment, medication, or spinal surgery.

DISCUSSION

Current research supports spinal manipulation as an intervention in acute cervical pain and radiculopathy,² but rarely recommends it in cases of associated syringomyelia and Arnold-Chiari malformation.³ Surgical treatment is recommended in most cases, yet only provides stabilisation of symptoms or modest improvement.⁶ In a case in which the patient presents with a lack of neurological symptoms but substantial mechanical musculoskeletal symptoms, allopathic treatment is usually limited to a wait and see approach, or pharmacological management, if necessary.^{4 5} In our case, using spinal manipulation in a case of neck pain and radiculopathy with associated syringomyelia and Arnold-Chiari malformation had a successful outcome, showing that similar treatment should be considered and not necessarily contraindicated in such cases. Spinal pain syndromes are a consistent factor in patients suffering from syringomyelia, especially if symptoms are not promptly and properly treated. Pain management is usually only managed allopathically, with gabapentin, pregabalin and opioids. Facet injections are not indicated and radiation is rarely used.^{11 12} Furthermore, it is important to enhance the awareness of clinicians regarding the utilisation of spinal manipulation in the management of cases of syringomyelia and Chiari malformation, with no neurological deficits; therefore, more important than understanding the significance of this outcome is to improve education on the appropriate clinical examination for considering this new treatment model. Although this report is only of one case, the method should be considered, as it is far less aggressive and does not carry the risk of possible disability that can be caused by surgery. Spinal

manipulation and adjunctive therapies can be useful for neck and cervical radiculitis symptoms even when comorbidities or other disorders are present; more important is to consider appropriate diagnosis and clinical examination for each individual case.

Learning points

- Spinal manipulation may be an effective non-surgical option for non-pharmacological pain management of musculoskeletal pain associated with cervical radiculitis and neck pain in the presence of Arnold-Chiari malformation and/or syringomyelia.
- It is critical to recognise the importance of a comprehensive clinical examination and diagnostic studies in the practice of integrative spine and pain management care, and the significance of improved coordination of care.
- It is crucial to consider differential diagnoses related to neck pain, especially in the presence of systemic symptoms, which warrant additional studies and co-management with a specialist.
- Although syringomyelia and Arnold-Chiari malformation are considered a relative to absolute contraindication for it, spinal manipulation can be considered on a case by case basis after studying the clinical symptoms, clinical examination findings and diagnostic studies. In our case study, as no significant findings were indicative of caution or concern, spinal manipulation was a useful and successful new treatment option.

Competing interests None.

Patient consent Obtained.

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REFERENCES

- 1 Wainner RS, Gill H. Diagnosis and nonoperative management of cervical radiculopathy. *J Orthop Sports Phys Ther* 2000;30:728–44.
- 2 Bronfort G, Evans R, Anderson AV, et al. Spinal manipulation, medication, or home exercise with advice for acute and subacute neck pain: a randomized trial. *Ann Intern Med* 2012;156(1 Pt 1):1–10.
- 3 2005 World Health Organization Guidelines on Basic Training and Safety in Chiropractic.
- 4 Vanaclocha V. Syringomyelia. *Neurocirugia* 1996;21:115–30.
- 5 Murphy DR. Post-traumatic syringomyelia: absolute contraindication to manipulation? A report of two cases. *J Neuromusculoskel Syst* 2000;8:54–8.
- 6 National Institute of Neurological Disorders and Stroke, 2014.
- 7 Worth DR, Milanese S. Chiari Malformation Type I, presenting as scapulothoracic pain: a case report. *Man Ther*. 2012;17:172–4.
- 8 Murphy DR, Goldstein D, Katz M. Chiropractic adjustment to the cervical spine and the Arnold Chiari malformation. *J Manipulative Physiol Ther* 1993;16:550–5.
- 9 Blum C, Cuthbert S. Symptomatic Arnold-Chiari malformation and cranial nerve dysfunction: a case study of applied kinesiology cranial evaluation and treatment. *J Manipulative Physiol Ther* 2005;28:1–6.
- 10 Haas JW, Harrison DE, Harrison DD, et al. Conservative treatment of a patient with syringomyelia using chiropractic biophysics protocols. *J Manipulative Physiol Ther* 2001;28:452–7.
- 11 Lin JW, Lin MS, Tseng CH, et al. Idiopathic Syringomyelia: case report and review of the literature. *Acta Neurochir Suppl* 2006;99:117–20.
- 12 ChanLucchetta M, Cagnin A, Calderone M, et al. Syringomyelia associated with Chiari I malformation. *Neurol Sci* 2009;19.

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