Osteopathic Evaluation and Post-Surgical Rehabilitation Approach in a Patient With Myelopathy and Tetraparesis Related to Cervical Ependymoma: A Case Report

CASE REPORT

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Abstract

Neck pain with associated upper limb symptomatology presents commonly in primary care, musculoskeletal specialty, and osteopathic manipulative medicine (OMM) clinics. Thorough evaluation to determine the presence of red flags prior to providing treatment is a prerequisite for OMM providers.

In the present case report, a 48-year-old right-hand-dominant woman with chronic neck pain and weakness in the left arm was found to have cervical myelopathy due to intramedullary ependymoma. Urgent surgical consultation facilitated appropriate spinal decompression followed by in-patient rehabilitation.

To the author's knowledge, this is the first case reported involving the use of osteopathic manipulative treatment (OMT) in the sub-acute rehabilitation phase following spinal cord tumor surgical decompression.

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Background

Cervical myelopathy, or compression or injury of the spinal cord, may be suspected in patients presenting with paresthesias in the upper and/or lower limbs; changes in gait or balance; and loss of agility with their hands; bowel or bladder retention or incontinence; or sexual dysfunction.[1,2] Up to 50% of patients with myelopathy will not present with neck pain, which can lead to a delay in diagnosis.[3]

Classic findings include weakness, spasticity, and gait abnormalities. Differential diagnosis includes degenerative (spondylitic) changes of the spine, epidural abscess, syringomyelia, multiple sclerosis, amyotrophic lateral sclerosis, intracranial pathology, and spinal cord tumors.[2,3]

Optimal management of spinal cord ependymomas involves total surgical resection when possible but can carry a significant risk of morbidity.[4,5] An alternate to surgical resection is surgical decompression. Radiation therapy may also be used as an adjuvant, and less frequently, treatment may involve observation.[4,5]

Postoperative outcomes vary with some improved or no change with their pre-operative status and some with increased neurologic deficits consistent with spinal cord injury.[5] Studies point to pre-operative neurologic status as a significant prognostic factor in the postoperative neurologic status.[5]

This case examines how the use of a routine, pre-OMT neurologic screening examination can effectively identify patients who have concerning neurologic conditions such as cervical myelopathy. In addition, this case demonstrates how OMT can be utilized to facilitate the postoperative rehabilitation of patients who have cervical myelopathy.

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Report of Case

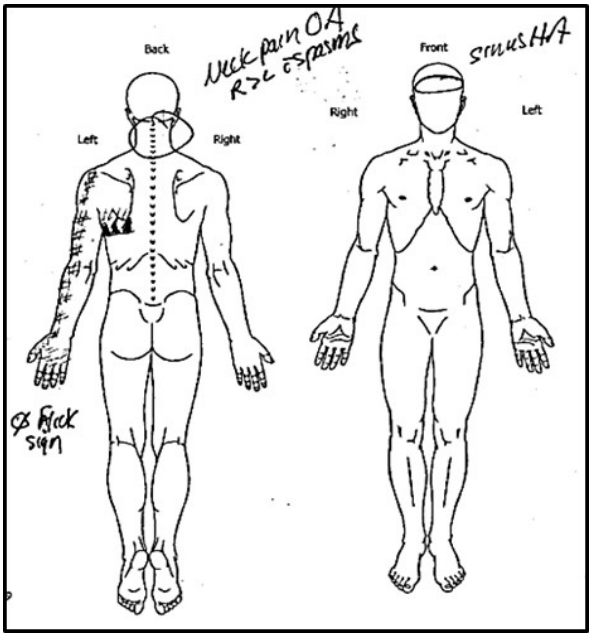
History

A 48-year-old right-hand-dominant woman with osteoarthritis of the neck and prior diagnosis of fibromyalgia presented to the OMM clinic with a 5-year history of neck pain and weakness in the left arm. She rated this pain a 4 out of 10 on a pain scale, where 0 is no pain at all and 10 is worst pain imaginable. She described the pain as dull, aching, and throbbing with pressure located on the left greater than right side of the neck and at the back side of the left arm by the axilla *(see Figure 1)*. She reported pain was present most of the time, and in addition, there was a feeling of weakness and fatigue in the entire arm *(see Figure 1)*.

The patient denied nocturnal paresthesias, and flick sign was absent. Aggravation of symptoms came with standing, walking, exercising, or lifting. She reported relief when lying on her right side or back. She reported no injury to explain her symptoms.

Functional impairments included difficulty with dressing in a swimsuit for water aerobics. The patient avoided biking, walking for exercise, and yard work. She works as a legal secretary and required assistance with lifting heavy files. She modified house chores to only using the right hand to lift or clean. She modified her sleep habits by lying on her right side or back to reduce pain. She modified her dress habits as she could not snap her bra on her back, and it was harder to put on her clothes. It also was harder to wash her hair with her left arm. When asked her goal for our encounter, she stated she was seeking proper diagnosis and pain relief.

Figure 1. *Pain diagram on initial visit intake form. (Handwriting at top was physician's (DL) notes) Legend: Symbols indicate type of symptoms. ▲ ▲ ▲ = aching; /// = stabbing; ### = weakness.*



Medical history was significant for depression and sinus headaches. The patient reported overactive bladder and feeling light-headed with orthostatic postural change, possibly related to low blood sugar episodes. She denied trauma to the cervical spine or head with no history of concussion, whiplash, or other motor vehicle collisions.

Physical Examination

On physical examination, the patient's blood pressure was 120/70 mm/HG; pulse was 84 beats per minute; respirations were 16 per minute; height was 69 inches; and weight was 275 lbs.

Upon cognitive examination, the patient was alert, oriented, and in no acute distress. She followed commands without difficulty. Mood and affect were appropriate, and she was well groomed. Language was normal in fluency, content, context, intelligibility, and response latency. Cranial nerves were grossly intact, including extraocular muscles full without evidence of nystagmus. Head was normocephalic and atraumatic. Gait was mildly slow but without assistive devices and no ataxia or imbalance was appreciated.

A modified American Spinal Cord Injury Association (ASIA) neurologic examination[6] revealed Hoffman's sign positive in the bilateral upper limbs. Plantar response (Babinski) was downgoing on the right and upgoing on the left. Clonus in the ankle was 3 beats on the right and 3 to 4 beats on the left. Deep tendon reflexes were 1/4 in the right upper limb, absent (0/4) in the left biceps and brachioradialis, and 2+/4 in the left triceps. Lower limb revealed 3/4 reflexes in the bilateral patella and left Achilles, with 2+/4 right Achilles response.

Sensation was abnormal, with decreased light touch in the C4 dermatome on the left, decreased pinprick in the left C4, bilateral C5 and C6, right C8, and right T1. Pinprick was also decreased in the right L2, L4, L5, and S2; and increased in the right S2 dermatomes.

Motor exam revealed profound weakness in all left upper limb muscles assessed, including 3/5 strength in elbow flexion (C5), elbow extension (C7), and wrist extension (C6). Weakness also was noted in left hip flexors (4/5), otherwise full strength in the lower limbs. The patient did have reduced range of motion of the left shoulder with active abduction limited to 90 degrees, which restricted internal rotation with extension and limited her ability to reach for her bra. Examination revealed atrophy of the left forearm

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and fasciculations in the left deltoid region. Further structural exam was limited on initial visit due to time constraints.

On the day of the initial visit, plain films of the cervical spine obtained in the office revealed slight anterior displacement of C5 relative to C6 with flexion without instability on flexion and extension views. No other bony abnormalities were found.

Diagnosis

Based on the profound left upper extremity motor weakness, sensory loss, and hyper- and hyporeflexia in the upper and lower limbs, the impression was a possible upper motor neuron lesion syndrome involving the cervical spine or brain.

Magnetic resonance imaging of the cervical spine was performed 4 days after the initial visit. It showed a large intramedullary nonenhancing mass within the cervical spine extending from C2 to C7 with a low-grade neoplasm suspected *(see Figure 2)*. A syrinx (syringomyelia) was felt to be less likely based on signal patterns. MRI of the brain was without any gross deficits.

Five days after the initial visit, the patient was seen in consultation by a local neurosurgeon. The intramedullary tumor was diagnosed as an ependymoma from the foramen magnum to C7, causing cervical myelopathy and tetraparesis. Considering the size and type of tumor, the patient was referred to the Mayo Clinic in Rochester, Minnesota, for definitive treatment. Within 1 month of diagnosis, she had undergone cervical decompressive laminectomy and autograft fusion.

Figure 2. *Sagittal MRI demonstrating intramedullary tumor from C2 to C7.*

Follow-up Treatment

The patient returned approximately 7 months later after transitioning from inpatient rehabilitation in Rochester to a local skilled nursing facility. Postoperatively, she developed increased weakness, especially in the left upper and lower limb. Owing to her difficulty with walking related to weakness and increased tone in the left lower limb, she utilized an ankle foot orthosis and a walker for short distance ambulation. She utilized a power chair for long distance community mobility. Her walking was impaired due to increased tone in her ankle plantar-flexor muscles.

On the osteopathic structural exam, counterstrain tender points were addressed in the patient's left soleus, tibialis anterior, semimembranosus and semitendinosus. Oral baclofen was increased to 20mg 3 times per day for better management of the spasticity in her lower limb.

Through the rehabilitation process, the patient also described symptoms of neck pain, restricted motion, and headache. Considering the patient's cervical tumor and myelopathy status post–cervi-

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cal fusion, indirect approaches were utilized to resolve both myofascial strains and articular restrictions and to reduce the hypertonicity related to her upper motor neuron spasticity. Somatic dysfunction of the occipitoatlantal joint was addressed with indirect myofascial release; posterior cervical muscle tension was addressed with facilitated positional release; upper trapezius, levator scapula, and sternocleidomastoid tender points were addressed with counterstrain; and cervical segmental and thoracic inlet dysfunctions were addressed with Still principles.[7]

Persistent neuropathic pain remained a challenge throughout the patient's recovery. The burning in the left upper quarter became more focal to the upper arm and upper thoracic region approximately 8 and a half months after surgery *(see Figure 3)*. Weakness of the left arm persisted as well as neuropathic pain and spasticity in the distal lower limbs. Gabapentin was prescribed at 900 mg 3 times a day, to maximum effect, while attempting to minimize side effects.

With a goal of addressing the patient's rehabilitation needs as comprehensively as possible, OMT was utilized where appropriate, and the persistent spasticity was monitored closely. The patient was referred for aquatic therapy for both an acute knee pain issue as well as her impaired ambulation. The patient also was referred to a clinical psychologist for depression and to help her adjust to her disability.

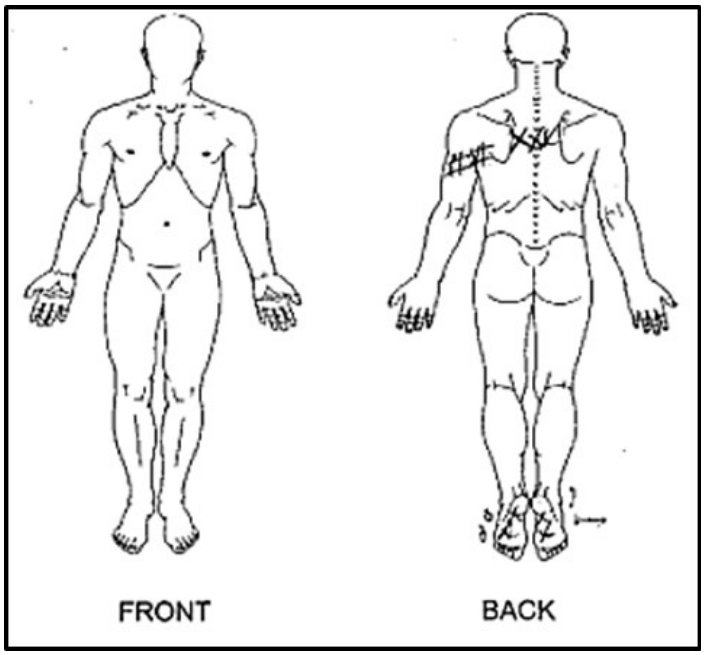
Discussion

As osteopathic physicians, we are uniquely positioned to help identify and treat patients with similar myelopathic conditions. Many patients seek us out for musculoskeletal and/or neurological concerns. We may be considered on the front-line of primary care and specialist evaluations of these patients.

Patients presenting with cervical myelopathy can be readily identified with a neurologic screening exam.[6] This type of exam, which can be expanded or contracted based on specific patient presentation and findings, should be a prerequisite for evaluation prior to OMT. A neurologic screening exam is necessary for timely surgical planning. In addition, identifying significant neurological conditions can prevent potentially catastrophic outcomes from inappropriate application of any type of manual treatment (osteopathic, chiropractic, physical therapy mobilization, massage, etc.) that may be sought by the patient.

In this case, postoperative rehabilitation efforts were comprehensively optimized with a combination of OMT, medication management, physical therapy, and clinical psychology to best help the patient maximally recover her function and quality of life.

Figure 3. *Pain diagram on followup, approximately 8 and a half months following cervical spine surgery. Legend: ▲ ▲ ▲ = aching; /// = stabbing; # # # = weakness; o o o = pins and needles; X X X = burning.*



With the inherent focus on structure and function, OMT can be utilized to facilitate the postoperative rehabilitation of patients with myelopathy. Along with the conventional interdisciplinary team approach to neurological rehabilitation, OMT can assist patients to adapt, compensate, and continue to optimize their functional recovery. Somatic dysfunctions amenable to treatment include articular restrictions, myofascial strains (Jones' points), and fascial distortions among others. OMT can be provided to reduce the patient's structural and neurologic dysfunction.

Conclusion

The current case demonstrates the importance of a thorough evaluation for a patient presenting to an OMM clinic. By obtaining a thorough history and appropriately applying a standardized neurologic examination during the initial pre-OMT evaluation, red flag findings were identified. This 48-year-old female with 5 years of neck pain and weakness in the left arm was diagnosed with a cervical ependymoma from C7 to the foramen magnum. The timely diagnostic work-up expedited early referral for definitive surgical treatment.

In addition, the case presents an example of applying OMM techniques safely and effectively during the rehabilitation phase fol-

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lowing the patient's cervical spine surgery. Osteopathic structural examination (OSE) can reveal somatic dysfunctions of primary neurologic etiology, or secondary compensatory dysfunction related to the altered function (eg, gait and mobility impairments and the effect on the musculoskeletal system).

To determine the full effect of OMT on patients recovering from spinal cord injuries, more studies are needed. It is this author's experience that the combined use of OMT with other standard rehabilitation efforts provides a highly individualized treatment approach to best maximize functional recovery.

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