A Real Pain in the Neck: Osteopathic Treatment of Central Cord Syndrome

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Introduction

- Acute Traumatic Central cord syndrome (ATCCS) is the most common subtype of incomplete spinal cord injury(4).
- ATCCS is characterized by upper extremity greater than lower extremity weakness with the hands most affected, bladder dysregulation and loss of sensation in the lower portion of the body with sacral sparing (2). Recovery is highly variable.
- Despite its prevalence, the management of ATCCS is an ongoing topic of controversy (2, 3).
- Perfusion of the spinal cord is a critical part of initial management.
- Osteopathic Manipulative Treatment (OMT) with a focus on venous and lymphatic was used safely in a patient with ATCCS and may optimize patient recovery.

Case RL

CC: Neck pain, weakness
HPI: 71 year-old African-American male brought to the St Barnabas hospital ED by EMS after a fall backwards. At time of this admission he was intoxicated and confused but complaining of neck pain. MRI on admission seen in Fig. 1. Of note, he had been seen two weeks prior in the ED for neck pain after an assault where he lost consciousness. At this prior visit he had no neurologic findings on exam and imaging remarkable only for CT spine showing multilevel spinal stenosis.

PE:
Vitals: T:94F, HR 40s SBP 70mmHg
Gen: Alert but intoxicated
Head: superficial laceration posterior head
Neuro: Complete paresis of hands and wrists and bilateral lower extremities, with weakness in proximal upper extremities. No anal wink. Loss of rectal sensation and sharp/dull sensation and proprioception in bilateral lower extremities.

Past Medical History: Diabetes mellitus, hypertension, hyperlipidemia.

Past Surgical History: Fluoroscopic treatment of epidural lipoma of the lumbar spine

Social History: Lives with fianceé, former smoker, active heavy drinker. Works at transition housing for adolescent boys.

Management was conservative initially, with cervical collar and a goal MAP of 85mmHg to maintain cord perfusion.

OMT Initial Consult

OMT service was consulted on HD#2. Patient had neck pain when he laid flat radiating to his legs. He denied sensation below the lower ribs and was unable to tell if he needed to void or stool. No paresthesias.

Pertinent Physical Exam
Vitals: BP 146/62, HR 72 bpm, RR17 bpm,
HEENT: Small laceration repair posterior scalp 1.5cm length clean and dry. C-collar in place.
Extremities: feet cool to the touch.
Neuro: Grip strength 4/5 bilaterally, elbow flexion 4/5 on right, 5/5 on left, brisk 2+/4 deep tendon reflex at patella, biceps, brachioradialis bilaterally, 1+ beat clonus at achilles tendon bilaterally. Absent sensation to light touch from costal margin downward, and no proprioceptive sense at great toes bilaterally.

Pertinent OSE HD#2

Body	Finding
Head	Severe SBS compression with absent PRM, congestion around posterior cranial fossa and CCJ, b/l OA extension
Cervical	CT RSB L, exam limited by C-collar
Thoracic	T5 ESBR L, T5-12 rigid spinous processes with reduced compliance and flattening of kyphosis
Lumbar	flattening of lumbar lordosis
Lower Ext	reduced PRM amplitude, R hip externally rotated
Upper Ext	R clavicle depressed
Abdomen	posterior diaphragm inhaled

Intervention
OMT employed Balanced Ligamentous Tension (BLT) in all areas, in addition to Myofascial release (MFR) in the diaphragm and pelvis, and Balanced Membranous Tension (BMT) at the head.

Visit Course

The patient was seen by the osteopathic team daily for the next two days. At the time of his third osteopathic visit, pt had improved neck and upper back pain. He had regained feeling in his lower abdomen related to constipation.

Pertinent Physical exam HD#5:
Neuro: Grip strength 4+/5 on right, 4/5 on left 'Ok sign' 4/5 on left, 3/5 right, 4+/5 wrist extension on left, 4/5 fatigues on right. Deep tendon reflexes 2/4 at the bilateral lower extremities and R upper extremity, clonus resolved. Left biceps 2+/4 and brisk. Diminished sensation to light touch and temperature in bilateral lower extremities and abdomen, improved.
Intervention
Osteopathic manual treatment performed on the patient addressed pertinent findings on the OSE utilizing BLT, MFR and BMT.

Pertinent OSE HD#5

Body Area	Finding
Head	Improved SBS compression with PRM palpable, amplitude and rate low., Severe R condylar compression, more apparent than prior
Cervical	C2 FSBR R severe, C7 FSBR R, C-collar in place
Thoracic	T1-2 RSR, T4-5 Rot L, T 5-12 rigid spinous processes, PVM hypertonic -improved
Lumbar	L2 F SBRL – lordosis improved
Sacrum	L SI restriction
Lower Ext	PRM improved R>L, R hip externally rotated
Upper Ext	R clavicle depressed
Abdomen	posterior diaphragm inhaled- improved

Figure 1:
An MRI of C spine obtained on Hospital Day (HD)#1 showing discogenic disease with multilevel disc bulging and spinal canal stenosis, worse at C4-5 level along with caudal migration of extruded disc material along the ventral thecal sac.

Outcome

Patient was making motor and sensory gains prior to surgery. On hospital day #10 he under went C4-5 and C5-6 Anterior Cervical Diskectomy and Spinal Fusion by the neurosurgical team. Immediately post-op the patient had worsening of his motor and sensory function on exam and new dysphagia, a repeat MRI obtained on Post-operative day#3 showed worsening of posterior disc herniations at C4-5 and C5-6 with effacement of the arachnoid spaces and flattening of the spinal cord at C4-5 level. He continued to be seen regularly by the OMT service and was eventually discharged HD#27 to an inpatient rehab facility. At the time of this draft the patient has not been seen in follow up post-discharge.

Discussion

The strategy of maintained cord perfusion is widely accepted in management of ATCCS, however standard practice is to simply focus on maintaining arterial perfusion. Animal studies have shown that the combination of blood pressure augmentation with CSF drainage worked synergistically to preserve cord blood flow (1). However, there are currently no treatment options for improving local drainage.
Optimization of OMT to improve lymphatic and venous return from the spinal cord may provide a release of interstitial pressure at the site of injury further improving cord perfusion.
In this case, OMT with a focus on PRM restoration and lymphatic drainage was correlated with improvements in patients pain, sensation, and strength.

Unfortunately, patient had worsening spinal cord edema post-operatively and neurologic recovery plateaued, underscoring the importance of venous and lymphatic return in ATCCS recovery.

Limitations of this study include lack of standardized assessment with American Spinal Injury Association Impairment scale, and lack of long-term follow up.

Conclusion

OMT was safely used in a patient with ATCCS in the acute hospitalized setting.

The use of OMT as a tool in optimizing the arterial perfusion via drainage of the spinal cord in ATCCS merits further exploration.

Future studies would benefit from adhering to ASIA standardized neurologic exams and a prospective study model.

Due to the slow healing process of the CNS, future studies would need to have longitudinal follow up,

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