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## Case Report

# Spinal epidural venous engorgement—Potential imaging confounder after diagnostic lumbar puncture ☆☆☆

Khaled Gharaibeh, MD\*, Hira Pervez, MD, Mustafa Al-Chalabi, DO, Ajaz Sheikh, MD, Naeem Mahfooz, MD

Department of Neurology, University of Toledo, 2130 W Central Ave, Toledo, OH 43606, USA

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## ABSTRACT

Intracranial hypotension is a result of low Cerebrospinal fluid (CSF) pressure caused by either spontaneous or postoperative leakage. The classic presentation of spontaneous intracranial hypotension is acute orthostatic headache, but the diagnosis can sometimes be challenging as some patients may present with atypical initial presentations including cervical pain as well as cervical radiculopathy secondary to cervical spine venous engorgement. We described a 42-year-old female patient who presented initially with neuropathic pain symptoms as well as weakness involving both lower extremities for which she underwent diagnostic lumbar puncture with concern regarding demyelinating neuropathy. However, subsequently she developed postural headache as well as severe cervical pain which was attributed to cervical epidural venous engorgement in setting of intracranial hypotension based on cervical spine magnetic resonance imaging (MRI) findings. She was managed conservatively, and repeated cervical spine MRI 3 days later showed prominent improvement in the imaging findings. Spinal epidural venous engorgement can occur secondary to intracranial hypotension (mainly post lumbar puncture), and can present clinically with neck pain or even symptoms of radiculopathy. Since the findings can mimic more serious conditions, it is extremely important to consider this condition in the differential diagnosis of an enhancing epidural collection in the cervical spine, particularly when intracranial hypotension is suspected.

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\* Corresponding author.

E-mail address: [Khaled.Gharaibeh@utoledo.edu](mailto:Khaled.Gharaibeh@utoledo.edu) (K. Gharaibeh).

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## Introduction

Spinal epidural venous engorgement should be considered as one of the differential in the setting of intracranial hypotension. Although the engorged venous plexus can resemble a mass, appropriate clinical approach along with certain imaging features should be considered to avoid misdiagnosis or mistreatment. We present a case of cervical-spinal epidural venous engorgement in setting of intracranial hypotension secondary to lumbar puncture, which improved with conservative treatment and was found to be unrelated to patient's initial symptoms of peripheral neuropathy.

## Case report

A 42-year-old woman with medical history significant for Barrett's esophagus, erosive gastritis, and surgical history significant for gastric sleeve surgery, presented with symptoms of progressively worsening bilateral upper and lower extremity weakness and burning sensation. She initially reported both weakness and numbness involving distal lower extremities for 1 year prior to initial presentation which had progressed proximally up to both knees, and more recently she had started to notice similar symptoms involving both hands.

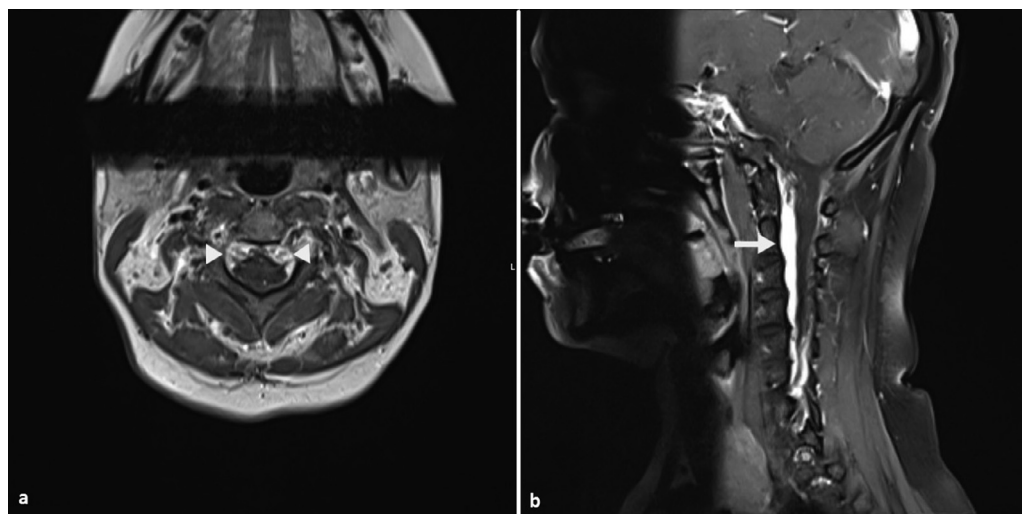
Physical examination revealed decreased perception for different sensory modalities, including light touch, pinprick, proprioception, and vibration, in all 4 extremities. Sensory loss was prominent distally, and there was no evidence of sensory ataxia. There also was evidence of muscle weakness, with muscle MRC strength of 4/5 distally in both lower extremities. She was diffusely hyporeflexic 1+/4 in both upper and lower extremities, symmetrically.

As a part of neuropathy work, up to rule out demyelinating neuropathy, lumbar puncture was performed, which showed normal cell count, normal protein level as well as negative meningitis panel. However, 6 hours postprocedure, the patient developed positional headache as well neck pain with no evidence of fever or meningeal signs. Magnetic resonance imaging (MRI) of the cervical spine with and without contrast showed a 76 mm long and 8 mm thick ventral enhancing process seen on both T1 and T1 with contrast extending from the odontoid process up to the inferior C5 level suspicious for epidural abscess versus hematoma (Fig. 1A). In addition, given sudden onset of symptoms, brain MRI was performed, which showed diffuse pachymeningeal enhancement suggestive of intracranial hypotension (Fig. 1B). The patient was managed conservatively with bedrest and intravenous fluids. Eventually, a repeat cervical spine MRI with contrast 2 days later showed smooth anterior epidural enhancement suggestive of prominent venous plexus (Fig. 2).

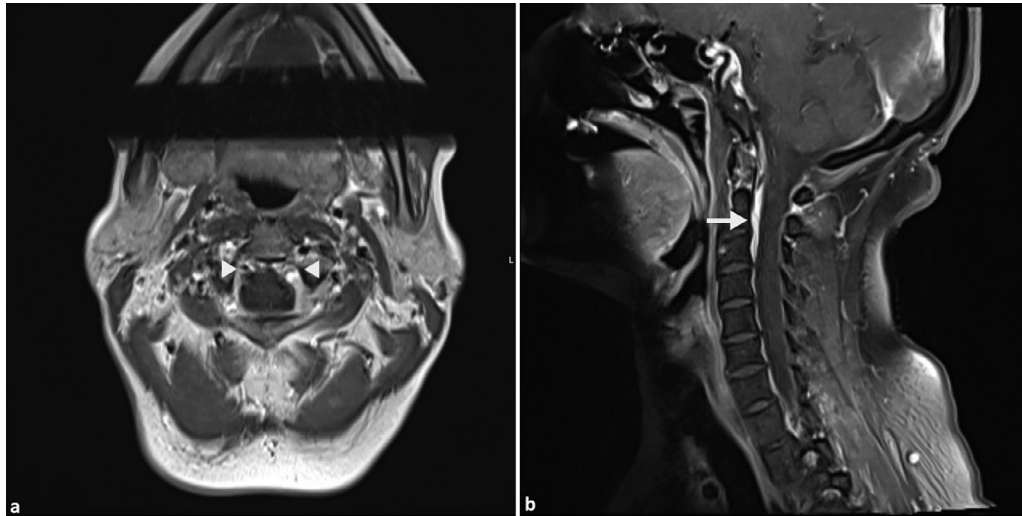
The serum neuropathy panel came back showing low vitamin B6 level at 13.3 nmol/L, and low copper level 65  $\mu$ g/dL which were attributed to nutritional deficiencies in the setting of gastric sleeve surgery. Nerve conduction study showed electrophysiologic evidence for an axonal sensorimotor neuropathy involving the extremities, which was affecting the legs more than arms. The patient was started on vitamin and mineral replacements. At 3-month follow-up, the vitamin B6 and copper levels were normalized, and there was a significant improvement in the neuropathy symptoms (Fig. 3).

## Discussion

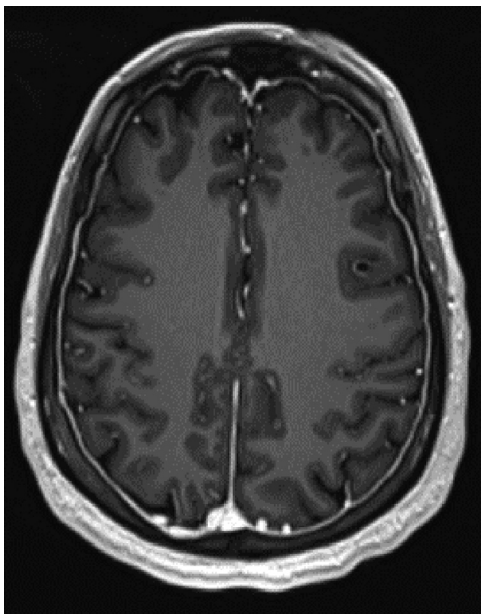
The cervical spine venous system consists of a pair of epidural veins that anastomose with each other in the midline be-



**Fig. 1** – Cervical spine MRI T1 with contrast (A) axial section showing intensely enhancing process at the ventral aspect of cervical spine cord at level of C2 (arrow heads). (B) Sagittal demonstrates the enhancing process at the ventral aspect of the canal extending from the odontoid process through the inferior C5 level (arrow). The process also appears to extend along the posterior aspect of the clivus.



**Fig. 2 – Follow-up cervical spine MRI T1 with contrast 2 days later. (A) Axial section showing near resolution of the enhancing process (arrow heads). (B) Cervical spine MRI with contrast showing smooth anterior epidural enhancement most likely represents prominent venous plexus (arrow).**



**Fig. 3 – Axial section of brain MRI with contrast showing diffuse dural enhancement.**

hind each vertebral body, connected superiorly to suboccipital plexus, supero-laterally to extra vertebral veins, anteriorly to the condyloid vein, and finally drains into the subclavian vein as a single unit [1]. It helps to maintain and regulate extra and intracranial pressures. The above-mentioned anatomy can lead to the postprocedural venous engorgement as seen in our patient.

Spontaneous or iatrogenic intracranial hypotension can present with a myriad of symptoms including positional headache, diplopia, myelopathy and symptoms of radiculopathy most often due to venous congestion [2,3]. This case demonstrates incidental post lumbar puncture cervical spine

venous engorgement on radiological imaging, with headache and cervical pain entirely different than the patient's initial presenting symptoms. To the best of our knowledge, only 2 reports exist in the literature on engorgement of the cervical epidural venous plexus associated with intracranial hypotension, devoid of radicular symptoms similar to our patient. Clarot et al. [1] reported a case of post LP intracranial hypotension with positive Romberg sign, though no relationship to epidural venous engorgement was demonstrated, particularly given the temporary dilation and the anterior location of the venous system with no abnormal cord signal. Shinauer et al. [4] described a patient very similar to our patient who presented with cervical pain 1-week post LP MRI showed an anterior epidural mass that was thought to represent an epidural abscess. At surgery, the epidural "mass" was found to be due to an engorged anterior epidural venous plexus. The need to identify and differentiate benign imaging findings can aid in reducing morbidity and unnecessary surgical procedures thereafter.

In contrast to lumbar venous drainage using the posterior epidural vein, the cervical counterpart is the sole venous system for intracranial drainage. It is seen that underlying pathological processes such as vascular malformations or an obstructive lesion in the jugular vein can in turn lead to enlarged and engorged cervical epidural veins [5]. However, still it should be suspected in setting of intracranial hypotension mainly after lumbar puncture.

## Conclusion

Our case underlines the importance of being able to recognize imaging findings of cervical venous engorgement secondary to iatrogenic intracranial hypotension from the lumbar puncture. It is important to realize that these patients may experience nonspecific symptoms like headache, and cervical pain,

raising suspicions for more ominous complications like infectious meningitis and epidural hematoma, which makes knowing, and being able to differentiate this entity all the more important.

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### Patient consent

A statement of informed consent was granted by the patient.

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