Case Report

Posterior cord syndrome associated with postoperative seroma: The case to perform a complete neurologic exam

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Context: Posterior cord syndrome (PCS) is the least common incomplete spinal cord injury. Findings of posterior cord syndrome include loss of proprioception and vibration, which are not routinely tested with the American Spinal Cord Injury Association's International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) exam and can easily be missed. Seromas may develop after spinal instrumentation and can cause cord compression.

Findings: This case describes a unique presentation of posterior cord syndrome following a large seroma formation after laminectomy. A patient developed ataxia with functional decline following posterior laminectomy. Examination revealed loss of vibration and proprioception in the extremities with preservation of strength. Imaging of the cervical spine demonstrated a large fluid collection at the laminectomy site causing cord compression. The fluid collection was thought to represent a seroma based on clinical presentation, imaging, and laboratory testing. The patient was admitted to inpatient rehabilitation with improvement in function allowing discharge to home.

Conclusion/clinical relevance: Seromas are a complication following cervical instrumentation that can cause compression of the adjacent spinal cord resulting in functional decline. The seroma, in this case, led to the loss of vibration and proprioception with resultant ataxia, signs that are not routinely identified on ISNCSCI exam; therefore, this highlights the need to broaden the neurological examination when evaluating a patient with spinal cord injury who has experienced a neurological setback.

Keywords: Posterior cord syndrome, Seroma, Spinal cord injury, Posterior cervical laminectomy, Dorsal column dysfunction

Introduction

Posterior cord syndrome (PCS) is the least common incomplete spinal cord injury syndrome, with an incidence of less than 1%.^{1,2} Injury to the posterior columns results in vibration and proprioception loss with preservation of muscle strength, pain sensation, and temperature sensation. PCS has been omitted from the most recent version of the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) due to the rarity of this syndrome. We present a case of neurological deficits consistent with PCS following anterior discectomy and posterior laminectomy.

Case description

A 71-year-old male drummer with a past medical history of remote C1–C2 posterior cervical fusion, prostate cancer, and mild intermittent urinary retention presented with worsening neck pain, subjective upper extremity weakness, and clumsiness that affected his ability to drum. Physical exam revealed 4 out of 5 strength in right elbow flexion and 4 out of 5 strength in left elbow extension and left wrist extension, with remainder of upper extremity having full strength on manual muscle testing. Manual muscle testing of lower extremities revealed full strength, with exception of 4 out of 5 strength in bilateral knee flexion. He was without dysmetria but did have clonus in ankles bilaterally. Magnetic resonance image (MRI) of the cervical spine without contrast demonstrated a moderate to

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severe canal narrowing at C4–C5 with deformity of the cord and severe bilateral foraminal narrowing. The patient underwent elective C4–C5 posterior laminectomy and C4–C5 anterior cervical discectomy and fusion. The patient tolerated the procedure well and was discharged home on postoperative day (POD) 2 after the surgical drain was removed. Prior to discharge, he was able to maintain sitting balance without support and only required upper extremity support to maintain standing balance.

On POD 3, the patient was readmitted with worsening urinary incontinence, ataxia, falls, and a decline in function. Whereas he was independent with activities of daily living (ADLs) and ambulated with a rollator at baseline, he now endorsed inability to ambulate or perform basic ADLs due to marked loss of balance. The patient denied cervical drainage, headache, nystagmus, and nausea. Physical exam revealed a healing cervical incision with no drainage and Valsalva maneuver did not elicit a leak from the incision. Using the ISNCSCI he was deemed to have a C2 ASIA D spinal cord injury. Muscle strength was unchanged from his preoperative baseline; there was a complete loss of proprioception in bilateral lower extremities, impaired proprioception in bilateral hands, and loss of vibration in bilateral great toes and fingers. Despite the assistance

Figure 1 Sagittal non-contrast T2-weighted magnetic resonance image of the cervical spinal cord obtained on postoperative day 3 after patient was readmitted for ataxia, falls, and a decline in function. The image demonstrates intact hardware with satisfactory alignment. A large fluid collection is observed along the laminectomy site, extending from C2 to C6 levels and measuring 7 cm by 4 cm, causing cord compression.

of two people, the patient was unable to stand due to marked limb ataxia and poor trunk control, which represented a significant change from his examination prior to discharge. MRI of the cervical spine demonstrated intact hardware with satisfactory alignment. A large fluid collection was observed along the laminectomy site, extending from C2 to C6 levels and measuring 7 cm by 4 cm, causing cord compression (Figure 1). The collection was aspirated for serosanguinous fluid with sterile cultures. Based on clinical presentation, imaging appearance, and fluid data, the fluid collection was thought to represent a seroma. The patient was started on steroids per recommendation of the neurosurgery team in an attempt to prevent spinal cord edema. Patient was then transferred to acute inpatient rehabilitation. Over a course of five weeks, the patient participated in at least two hours of therapy per day. His rehabilitation program consisted of occupational and physical therapy focused on mobility and transfers, with strategies for improving proprioception during ambulation that included the use of ankle weights and also video feedback.

At the time of discharge, the patient achieved independence with performing self-catheterizations three times daily and remained continent. He was independent for all ADLs, instrumental ADLs, and squat-pivot transfers. Due to residual balance and coordination impairments, the patient required supervision to negotiate stairs and ambulate with a rollator and he returned home with supervision provided by a friend.

Discussion and conclusion

We present a unique case where a seroma formation following dorsal cervical laminectomy resulted in spinal cord compression with loss of balance and falls several days after surgery.

The patient was initially evaluated using the ISNCSCI examination.³ This is a framework of classifying spinal cord injuries and documenting neurological changes using two sensory examinations (pinprick and light touch) and a motor examination. This examination was not markedly different and could not account for the change in the patient's function. Only when his senses of proprioception and vibration were tested was a cause for his functional change determined.

The posterior column transmits the sensations of vibration, position sense, deep pressure and two-point discrimination. Loss of vibration and proprioception below the level of the lesion are hallmarks of posterior cord syndrome which are not routinely tested during the standard ISNCSCI examination.⁴ Therefore disorders that are limited to the posterior column can

easily be missed or overlooked when performing the standard ISNCSCI examination. Dorsal column pathology resulting in posterior cord syndrome causes sensory ataxia and unstable gait, which can have a huge impact on function. Though this patient's motor examination remained stable, his functional impairments changed significantly from his preoperative baseline. His balance deficits resulted in an inability to stand and remain in his home. With rehabilitation, he was able to return to baseline function and return home.

Posterior cord syndrome can result from vascular ischemia to the posterior circulation of the spinal cord, intrinsic cord disease, and external compression by a space-occupying lesion within the posterior spinal canal.^{5–8} Intraspinal space-occupying conditions, such as extramedullary tumors, spondylosis, and epidural abscess, are reported causes of cord compression; however, a seroma causing a mass effect with cord effacement and compression is exceedingly rare.^{9,10} Seromas following surgical procedures are well-known conditions that are generally considered benign and self-limiting. The incidence of postoperative seromas is unknown because most patients do not get routine imaging studies. Sterile seromas form as a result of trauma-induced inflammation resulting in increased capillary permeability and leakage in the dead space resulting from the surgical procedure.¹¹ Signs associated with seromas include pain, bulging mass at the incision site, and signs that refer to the dorsal column as described here.¹² Cases of seroma accumulation have been attributed to the use of recombinant human bone morphogenetic protein-2 (rhBMP-2) which was not used in this patient.^{10,13–15} A few cases of seroma formation following multilevel laminectomy without the use of rhBMP-2 have been reported.^{10,12} In these cases, patients presented with localized pain, without associated neurological symptoms.

To our knowledge, this is the first description of extrinsic cord compression caused by a postoperative seroma formation that resulted in spinal cord related symptoms in humans. The identification of the injury could not be made with the standard ISNCSCI examination. This case highlights the need to broaden the neurological examination when evaluating a patient with spinal cord injury following laminectomy who have experienced a neurological setback or who is not progressing in rehabilitation as well as one would expect.

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