Case report

Post-myelography paraplegia in a woman with thoracic stenosis

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Context: Myelography is a commonly performed diagnostic test used to assess spine pathology. Complications are unusual and usually self-limited. We report a rare case of transient paraplegia following myelography in a woman with thoracic stenosis.

Findings: A 51-year-old woman, 20 months status post-thoracic laminectomy, presented with progressive lower extremity weakness. The patient underwent myelography and post-myelography CT, and became paraplegic after the lumbar injection. Intravenous steroids were administered and a lumbar puncture was performed. The patient's neurologic function returned to baseline over the next 96 hours.

Conclusion and clinical relevance: Myelography is generally a safe procedure, but on rare occasions serious complications can arise. Therapeutic maneuvers may be helpful in reversing neurologic deficit.

Keywords: Myelopathy complication, Diagnostic imaging, Paraparesis, Paraplegia, Spinal stenosis, Thoracic vertebrae, Ossification of the posterior longitudinal ligament, Laminectomy

Introduction

Transient post-procedure paraplegia is a rare but recognized complication following myelography; it has also been documented following lumbar puncture (LP). The common factor in the documented cases is thoracic vascular malformations or thoracic stenosis due to disc prolapse (rather than diffuse thoracic stenosis or ossification of the posterior longitudinal ligament (OPLL)). The neurologic dysfunction may be related to creating a pressure gradient across the stenotic segment or changing cerebral spinal fluid (CSF) flow dynamics. In prior cases, when the stenosis was due to a herniated thoracic disc, symptoms improved with surgical decompression. We present the first published case documenting improvement in post-LP paraplegia with the use of intravenous (IV) steroids and LP rather than surgical decompression.

Case report

A 51-year-old woman presented with OPLL and significant stenosis of the cervical, thoracic, and lumbar spine. She had a history of multiple decompressive procedures,

including a posterior cervical fusion/laminectomy, a lumbar laminectomy, and most recently, a T6–T10 laminectomy 20 months prior. She reported improvement after surgery with physical and occupational therapy, and has had baseline urinary urgency. She was ambulatory with mild lower extremity rigidity and weakness (4/5 in the right and 4+/5 in the left), for which she was taking baclofen. She had hypertension and diabetes mellitus.

The patient was seen in clinic for follow-up and was scheduled for a computerized tomography (CT)/myelogram for persistent lower extremity spasticity and mild weakness. CT/myelogram was preferred over conventional magnetic resonance imaging (MRI) due to scarring from previous surgery, as well as the possibility of artifact from posterior hardware. She reported having four prior myelograms. After the third myelogram, she reported transient bilateral lower extremity weakness that spontaneously resolved after 4–5 hours.

The patient underwent a CT/myelogram of the cervical, thoracic, and lumbar spine with LP at the L2–L3 level under fluoroscopy in the prone position. After gaining access, minimal CSF egressed prior to the injection of 15 ml Isovue[®]-300 (iopamidol) contrast. She tolerated the procedure well, but reported having a

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transient warm sensation in her mid-back. CT/myelography showed significant thoracic stenosis in the T6–T10 region (Figs. 1 and 2).

After CT scans were performed, the patient was examined and found to have paraplegia. Because the patient had reported a similar episode of weakness post-myelogram 3 years ago with gradual spontaneous resolution of symptoms, we opted to admit the patient, start corticosteroids, and perform an LP.

She was admitted 4 hours post-myelogram. MRI of the thoracic and lumbar spine was performed and showed no evidence of hematoma, but there was a signal change in the spinal cord at the level of thoracic stenosis, mainly at T6–T7. On examination, she had paraplegia with sensory level at T7. Bilateral ankle clonus, extensor plantars, and hypertonia were present in both lower extremities. Rectal tone and anal wink were intact. She was kept supine and started on baclofen and 4 mg Decadron® IV.

Figure 1 Sagittal thoracic post-myelogram CT shows severe stenosis from T6 to T10. Previous laminectomy is noted.

Figure 2 Axial post-myelogram CT at T7 shows severe stenosis.

Eight hours after the CT/myelogram, an LP was done; opening pressures were 15 cmH₂O; 15 ml of CSF was drained. The LP was performed to drain CSF to decrease the pressure within the spinal canal, in an effort to aid neurologic recovery. Over the 6 hours following the tap, she began to regain motor strength and show improvement in her sensory examination. By 48 hours post-myelogram, she was almost back to baseline and was ambulating. By day 6 post-myelogram, sensation was intact in the left lower extremity and there was mild hypoesthesia in the right lower extremity. Motor performance was 4/5 right lower extremity and 4+/5 left lower extremity. She underwent uneventful T6–T10 laminectomy 6 days later, and was transferred to a rehabilitation center 5 days after surgery.

Discussion

Post-myelography paraplegia is a rare complication, with only a few case reports in the literature. The common factor in these cases is thoracic stenosis due to disc prolapse (rather than diffuse thoracic stenosis or OPLL). Creating a pressure gradient across a severely stenotic thoracic segment may increase the cord compression. Alternatively, a thoracic spinal cord already compromised by stenosis may be at increased risk from a small insult, such as the placement of a few milliliters of contrast dye.

Prior cases of post-myelography paraplegia have been reported with severe stenosis caused by thoracic disc herniation; these patients developed paraplegia following

myelography and ultimately had surgical decompression and discectomy resulting in full recovery.^{1,2}

Other studies postulated that changing CSF dynamics/pressures across a narrowed segment of the cord may alter the blood flow to a compressed cord segment. Takeuchi *et al.*³ reported paraplegia caused by a thoracic arachnoid cyst compression, which became clinically symptomatic, a lumbar laminectomy for mild stenosis. A similar pattern is evident upon a review of cases of paraplegia following lumbar cisternal puncture with no contrast injection.^{4,5} These deficits were likely due to occult thoracic stenosis due to mass lesions, including osteochondroma and chloroma leukemic deposit. Thoracic vascular malformations may also cause worsening of symptoms after myelography due to pressure dynamics, even when no hemorrhage is evident.^{6,7}

A similar case was reported by Bain *et al.*⁸ when a patient developed paraplegia after iopamidol myelography (performed for radicular lower extremity symptoms) with a myelopathic clinical picture, and dissociated sensory loss and sacral sparing. Follow-up showed slow and incomplete recovery at 4 months, followed by sudden and spontaneous worsening and complete paraplegia with complete T11 sensory level. This pattern suggested an underlying vascular mechanism, although thoracic and lumbar MRI was negative. Noda *et al.*⁹ reported on a patient who developed transient paraplegia with T10 sensory level after an iohexol myelogram was performed for mild cervical stenosis. MRI imaging of the entire spine was negative. EMG results indicated a likely polyradiculopathy with F-wave abnormality. The patient sustained a gradual but slow improvement over 2 months. It was thought that a possible neurotoxic effect had caused the neurologic deterioration, although the rapid onset of symptoms may attest otherwise.

Metrizamide was another water-soluble contrast used in the past, with complications similar to those of iohexol and iopamidol.¹⁰ In addition to lower extremity weakness, there are reports of transient quadriplegia with permanent paraplegia,¹¹ areflexia,¹² and transient areflexia.¹³

It is possible that lumbar cisternograms and myelography predispose to a pressure gradient change that affects CSF flow across stenotic segments, especially in the thoracic cord rather than cervical cord, and/or

alter blood flow dynamics with an underlying vascular malformation leading to the clinical presentation.

Conclusion

This is the first published case showing improvement with the use of IV steroids and LP rather than surgical decompression. We preferred nonsurgical methods due to the patient's previous history of transient neurologic loss and subsequent recovery. We recommend avoiding significant volume changes within the thecal sac and carefully evaluating patients with suspected thoracic stenosis.

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