

Definitive Diagnosis of Cerebrospinal Fluid Leak Into the Pleural Space Using ^{111}In -DTPA Cisternography

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Abstract: A 58-year-old woman with a calcified disk extrusion causing severe spinal stenosis underwent T8 to T9 discectomy and spinal fusion. A postoperative pseudomeningocele was treated with lumbar drain and fibrin glue. Performed for persistent right pleural effusion, CT myelogram failed to show communication between the cerebrospinal fluid (CSF) and pleural space—even on 2-hour delayed images. Subsequent ^{111}In -DTPA cisternogram clearly demonstrated CSF leakage into the right pleural space at 2 hours, and surgical repair yielded good results. Radionuclide cisternography is a highly useful method to detect CSF leak, especially when it is occult on CT yet suspected clinically.

Key Words: radionuclide cisternography, CT myelography, cerebrospinal fluid leak, pleural-dural fistula

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FIGURE 1. The patient is a 58-year-old woman with a history of calcified disk extrusion at T8 to T9 causing severe central canal stenosis, who underwent right thoracotomy, disk removal, and T8 to T9 anterior spinal fusion. Intraoperatively, the disk was found to erode the dura; this was repaired primarily, and lumbar drain was placed. A follow-up CT myelogram 2 days later showed no cerebrospinal fluid (CSF) leak, and the drain was removed. Two months later, she underwent T7 to T10 spinal fusion for a split vertebral body fracture. Subsequently, she developed a right pleural effusion.



FIGURE 2. CT myelogram 4 months after initial surgery showed a T8 to T9 pseudomeningocele, which was treated with fibrin sealant dural patch and lumbar drain. Follow-up CT myelogram showed decreased pseudomeningocele with no discernible communication with right pleural effusion—even on 2-hour delayed imaging with the patient in the right lateral decubitus position. The drain was removed.

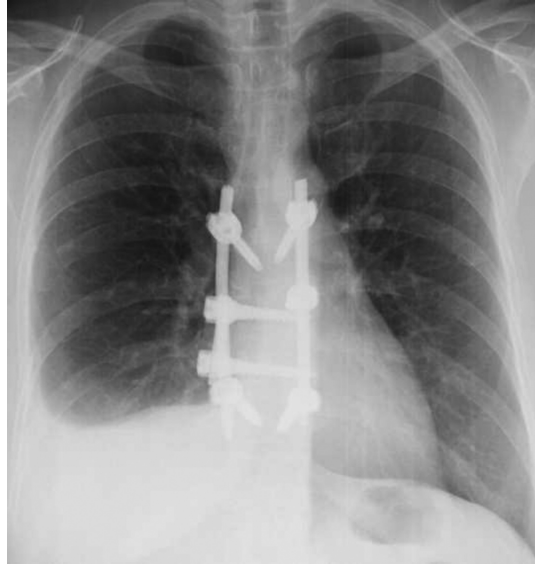


FIGURE 3. She continued to complain of headache and tiredness, and a persistent right pleural effusion was noted.

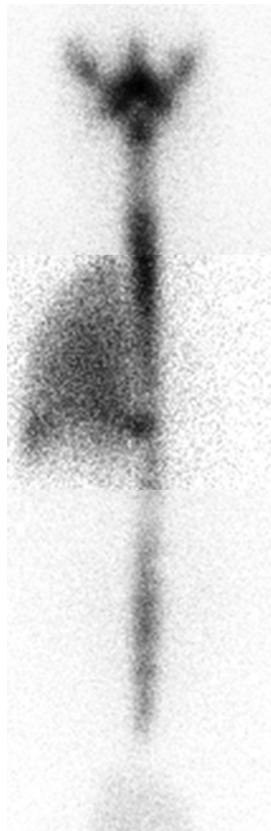


FIGURE 4. Seven months after initial presentation, she underwent intrathecal lumbar injection of 0.49 mCi ^{111}In -DTPA, followed by immediate and 2-hour and 3-hour delayed images and ^{57}Co transmission images of the chest. Images showed tracer activity distributed throughout the spinal canal with a small right paraspinal focus consistent with pseudomeningocele, and also within the entire right pleural space.

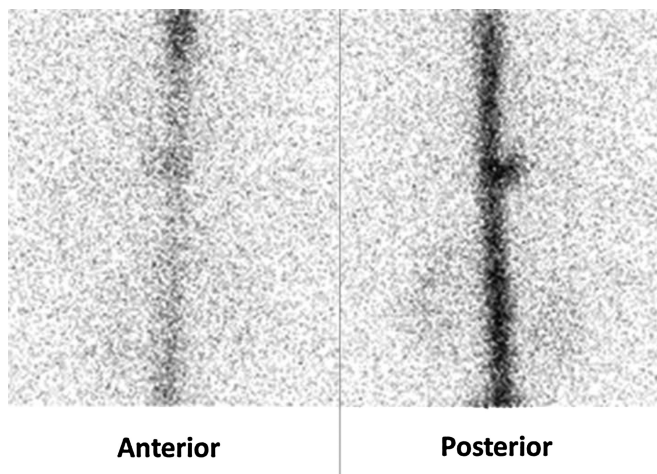


FIGURE 5. Surgical repair of dural defect was then performed using a small amount of bone and pleura. Follow-up ^{111}In cisternogram demonstrated resolution of CSF leakage into the right pleural space, and the patient did well. Pleural-dural fistula is a rare complication of thoracic spinal surgery.¹⁻⁴ It likely begins as a pseudomeningocele in which the arachnoid membrane herniates through an iatrogenic dural defect; then, an arachnoid defect and persistent communication follow.⁵ The use of radionuclide cisternography (RC) to visualize CSF leakage into the pleural space was first reported in 1989 in trauma patients⁶ and specifically in the postdiskectomy setting in 2001.⁷ Radionuclide cisternography, historically performed with either $^{111}\text{In-DTPA}$, $^{99\text{m}}\text{Tc-DTPA}$, or $^{99\text{m}}\text{Tc}$ albumin,⁸⁻¹⁰ has been studied extensively in the setting of spontaneous intracranial hypotension, where small leaks, such as ruptured perineural cysts, are a likely cause.¹¹ Although RC has been of utility in that setting, especially when taking delayed convexity ascent and early bladder activity into account, it is considered inferior to CT in identifying the site of leakage.¹² Radionuclide cisternography may verify the closure of lumbar CSF leaks after epidural blood patching in patients with recurrent symptoms of intracranial hypotension and complicated course and was reported to be positive when MRI was negative.^{13,14} This leak may have been too slow or intermittent to detect on CT. Our report suggests that when a postoperative pleural-dural fistula is suspected clinically and radiographically, RC should be the test of choice.