Radionuclide cisternography in cerebrospinal fluid leak: christmas tree or railroad pattern

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ABSTRACT

We report a case of lumbar cerebrospinal fluid leaks after spinal anesthesia demonstrated by radionuclide cisternography using Tc-99m DTPA showing “Christmas tree” or “railroad pattern”.

Key Words: radionuclide cisternography, cerebrospinal fluid leaks, christmas tree, railroad pattern

Cerebrospinal fluid leaks are know to occur under several conditions: spontaneous or primary and secondary causes as LP performed for contrast myelography, spinal surgery, Fracture of the thoracic spine, spinal stab wounds, inappropriate spinal puncture during epidural anesthesia, traumatic lumbar meningocoele, and bronchopleural subarachnoid fistula due to bronchogenic carcinoma (1).

Radionuclide cisternography has been used for the detecting of CSF leaks for many years. It can be used to elucidate localisation of CSF leaks, to guide the level of the injection of autologous blood patch and to evaluate the effects of the treatment (6-7). Due to its advantage of visualizing the whole spinal cord, radionuclide cisternography could be preferred to other imaging modalities like magnetic resonance imaging (MRI) and CT.

Figure 1. A fifteen years old male was admitted to emergency department with a postural pressure like headache (appearing while sitting and standing, dissapearing while lying down) at his temples and forehead, dizziness and lumbar pain. He had a pileonidal sinus excision under spinal anesthesia 4 days ago. His physical examination and laboratory findings were normal. At his neurologic examination he had stiff neck, positive Kernig’s sign and nystagmus whilst looking at his temples. He underwent lumbar puncture (LP) and the opening pressure was not measurable. The protein level of the cerebrospinal fluid (CSF) was mildly elevated [58mg/dl (N:15-45 mg/dl)], no erythrocytes and no leukocytes were seen. Other biochemical parameters and microbiological findings of the CSF were unremarkable. Cranial computed tomography (CT) findings were normal and the CSF leak was suspected. The patient then proceeded to radionuclide cisternography. Radionuclide cisternography was performed following a low level LP (pressure was 18 mmHg) and 111 MBq (3 mCi) 99m-Tc DTPA was injected intrathecally into the lumbar subarachnoid space. Spinal cord and cranial images were obtained at 1, 4 and 24 hours after injection. A low-energy high-resolution collimator was used. The characteristic radionuclide cisternographic signs of CSF leak was described as direct and indirect at early and late images. As a direct sign, scintigraphy showed activity on both sides of paraspinal lumbar area, “christmas tree” or “railroad pattern”, which is suggestive of a CSF leak outside the subarachnoid space (arrows). The indirect sign, slow CSF circulation to the cerebral convexities and early appearance of kidneys (white arrows; note also the right ectopic pelvic kidney) and urinary bladder (bold arrow), indicating the abnormally fast uptake of the radionuclide into the bloodstream (1-5). The diagnosis of CSF leak is made on clinical symptoms, LP findings and radionuclide cisternography. The patient was advised for bed rest, hydration and caffein and he is currently symptom free for the last five months.
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References