Teaching NeuroImages:

Leptomeningeal and pachymeningeal enhancement in a patient with spontaneous CSF leak

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Figure Neuroimaging findings

(A) T1-weighted gadolinium-enhanced MRI scans show smooth enhancement of both the leptomeninges (pia-arachnoid, arrows) and the pachymeninges (dura-arachnoid, arrowheads) before treatment (left and center) and resolution of the leptomeninges but not the pachymeninges (arrowheads) after antibiotic therapy while the underlying CSF leak remained untreated (right). (B) CT scan reveals an osseous defect at the sphenoid roof (arrows), indicating the site of the CSF leak. Note soft tissue opacification within the right sphenoid sinus. (C) Radionuclide cisternography demonstrates CSF leak into the right nasal cavity (lateral view, arrow), and an absence of radioactivity over the cerebral convexities consistent with intracranial hypotension due to CSF rhinorrhea. Note that the large blob reflects CSF over the spinal cord and brainstem and in the cisterns and ventricles.

A 35-year-old man presented with fever, headache, and vomiting. Lumbar puncture showed low pressure (50 mm H₂O), raised levels of protein (4.96 g/L) and white cell count (2,500; 85% polymorphs), and a glucose level of 1.61 mmol/L. MRI demonstrated diffuse leptomeningeal and pachymeningeal enhancement (figure, A), suggesting meningitis and intracranial hypotension due to spontaneous skull base CSF leaks, which were confirmed by CSF culture finding of *Streptococcus pneumoniae*, CT (figure, B), and radionuclide cisternography (figure, C). Pachymeningeal enhancement without leptomeningeal involvement is a well-known MRI feature of intracranial hypotension due to CSF leaks.¹ Unlike spinal CSF leaks, skull base CSF leaks frequently cause infectious meningitis, which generally presents as leptomeningeal enhancement.²

This recognition is important because diagnosis and treatment strategies of the 2 types of CSF leak are different.

AUTHOR CONTRIBUTIONS

Dr. Tan: drafting/revising the manuscript, study concept or design, analysis or interpretation of data, acquisition of data. Dr. X.-S. Yang: study concept or design, analysis or interpretation of data, acquisition of data. Dr. Huang: analysis or interpretation of data, acquisition of data. Dr. Shen: analysis or interpretation of data. Dr. Q.-D. Yang: drafting/revising the manuscript, analysis or interpretation of data, study supervision.

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