Dozens of Red Blood Cells in Cerebrospinal Fluid as a Diagnostic Clue to Spontaneous Vertebral Artery Dissection Mimicking Meningitis: Report of Two Cases

Dear Editor,

A 49-year-old man without a prior medical or trauma history presented with acute right temporal headache, nausea, and fever (38.0°C) that had first appeared 2 days previously. His symptom of neck stiffness prompted the application of the standard diagnostic workup for meningitis. Contrast-enhanced brain CT produced normal findings. A lumbar puncture (LP) at the L4-5 interspace revealed colorless cerebrospinal fluid (CSF) with an opening pressure of 80 mmH2O. The first tube of CSF samples was found to contain 15 red blood cells (RBCs)/mm\(^3\), 2 white blood cells (WBCs)/mm\(^3\), a normal sugar level (62.4 mg/dL), and a mildly increased protein level (56.2 mg/dL). The RBC count did not decrease in the fifth tube (25/mm\(^3\)). On the second hospital day, his fever spontaneously subsided. Repeat LP performed at the L3-4 interspace revealed no significant change in the cell counts (1 WBCs/mm\(^3\) and 21 RBCs/mm\(^3\)), suggesting a non-traumatic tap. We subsequently performed contrast-enhanced brain MRI and magnetic resonance angiography (MRA), which showed dissection with complete occlusion of the right intradural vertebral artery (Fig. 1). However, there was no hemorrhage in the susceptibility-weighted image. Conservative treatment resulted in his symptoms resolving within 7 days.

In the second case, a 42-year-old woman had experienced an acute right temporal headache and nausea for 7 days. She was a migraineur with a history of hypertension and current smoking. One day before admission she developed fever (38.0°C) with chills, which prompted her to visit the hospital. Her brain CT findings were normal, and the LP opening pressure was 90 mmH2O. The CSF findings revealed 17 WBCs/mm\(^3\), 39 RBCs/mm\(^3\), a normal sugar level (51.2 mg/dL), and a slightly increased protein level (59.8 mg/dL) in the first tube. The cell counts were similar in the fifth tube (15 WBCs/mm\(^3\) and 45 RBCs/mm\(^3\)). A dissecting aneurysm with stenotic segments in the right intradural vertebral artery was confirmed in brain MRI and MRA (Fig. 1). No hemorrhage was present in the susceptibility-weighted image. On the second hospital day her fever resolved spontaneously. Serological and molecular tests for cytomegalovirus, Epstein-Barr virus, herpes simplex virus, enterovirus, and varicella zoster viruses in the CSF and blood produced negative findings. Coil embolization was conducted to prevent a further bleeding complication (Fig. 1). Her symptoms disappeared within several days.

These two cases are unique in that they mimicked meningitis, which initially led us to perform brain CT and LP. The LPs were not considered traumatic since the RBC counts did not decrease in the sequential samples. Furthermore, in the first case, the LP repeated at a higher interspace level consistently showed an abnormal RBC count, confirming a non-traumatic tap. Accordingly, intracranial angiography was performed based on suspicion of RBC leaking into the subarachnoid space.

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Received January 22, 2019
Revised February 17, 2019
Accepted February 18, 2019

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The RBC counts in our cases were much lower than those found in previous studies of aneurysmal subarachnoid hemorrhage.\(^2\) It therefore seems that only a small amount of blood oozed into the subarachnoid space through the damaged adventitia wall of a false lumen, and hence there was no imaging evidence of hemorrhage. Nonetheless, this seems to have caused a mild but detectable neuroinflammatory response, which manifested as transient fever, mild CSF pleocytosis, and hyperproteinorrhachia.\(^3\)

On the other hand, the possibility of coexistent meningitis might have been considered, particularly in the second case because of the increased WBC count relative to the RBC count. In addition, there is previous evidence of an association between arterial dissection and viral meningitis, which suggested infection-associated injury of the arterial wall.\(^4\) However, in the case, serological and molecular tests for viruses were all negative, and only transient fever appeared after a 6-day nonfebrile unilateral headache. Therefore, the probability of viral meningitis seemed to be relatively low.

These cases strongly suggest that even several dozen counts of RBC in a CSF analysis need to be carefully differentiated from a result of a traumatic tap. Brain angiography should then be performed if this is judged to be necessary.

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**Conflicts of Interest**

The authors have no potential conflicts of interest to disclose.

**Acknowledgements**

This study was supported by the Soonchunhyang University Research Fund.

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