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Ependymoma of the Cauda Equina Presenting with Subarachnoid Hemorrhage

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Summary: A 16-year-old girl had an ependymoma at the L2 and L3 level that bled into the dural sac, presenting clinically as intracranial subarachnoid hemorrhage. MR depicted the tumor and hemorrhage on both T1- and T2*-weighted images. The blood in the dural sac appeared hyperintense on the T1-weighted images.

Index terms: Ependymoma; Spinal cord, hemorrhage; Spinal cord, magnetic resonance; Cauda equina

Tumors and vascular malformations in the spinal canal are well recognized as sources of subarachnoid hemorrhage (SAH) (1–3). Magnetic resonance (MR) investigation of the spinal canal is indicated when the source of SAH is not found intracranially and especially when the patient has neck or back pain, radiculopathy, or myelopathy (3). We report a case of cauda equina tumor that presented with signs and symptoms of SAH.

Case Report

A 16-year-old girl was admitted to another hospital with severe headache, vomiting, and neck stiffness. A lumbar puncture was done and bloody cerebrospinal fluid (CSF) was found. Because the computed tomography (CT) scan disclosed no blood in the intracranial subarachnoid space, the bloody CSF was attributed to a traumatic tap and she was treated for meningitis, whereupon her symptoms were relieved. On admission to our hospital 10 months later, the patient had recurrence of the same symptoms of severe headache, vomiting, and neck stiffness. In addition, she also suffered from pain in the sacral region. Physical examination showed that the patient had clear consciousness and neck stiffness. Kernig sign and Brudzinski sign were positive. Because the motor control and sensation of both legs were normal, the sacral pain was explained as a manifestation of SAH. Two lumbar punctures were made in the L4-L5 and L5-S1 levels, respectively, and both contained fresh blood in the CSF. The diagnosis of SAH was made; carotid angiography was considered for the possibility of intracranial aneurysm or arteriovenous malformation. However, because the CT scan that was done on the same day was again negative with no evidence of blood in the intracranial subarachnoid space, and the patient had marked sacral pain, MR of the lumbosacral region was recommended as the next diagnostic procedure. The MR was performed 4 days later, and it revealed a tumor mass at L2 and L3 that contained irregular areas of hyperintensity and hypointensity in the inferior part of the tumor on T1-weighted and gradient-echo T2*-weighted images, suggesting tumor bleeding (Figs. 1A and 1B). There was also high signal intensity in the dural sac below the tumor on T1-weighted images, suggesting blood in the CSF of the lower dural sac (Fig. 1A).

A laminectomy was performed. A tumor mass, arising from the filum terminale, L2-L3 level, was found and bloody CSF in the dural sac below the tumor was seen. Pathologic diagnosis of the tumor revealed myxopapillary ependymoma; bleeding within the tumor was found microscopically.

Discussion

After SAH, four-vessel angiography is negative in 5%–30% of patients (1, 2). However, in most of those patients whose initial angiogram is normal, especially in those cases in which SAH is not clearly detected by CT scan, positive findings are found in only a small minority on repeat carotid angiography. Recently, Chalif et al reported a case of SAH that had a normal four-vessel angiography, but in which spinal MR found a tumor at the C1-C2 level, which was confirmed at surgery as the source of the SAH (3). In our case, although it was initially suspected that the patient had an intracranial SAH, the immediate CT scan showed no evidence of blood in the subarachnoid space, so we did not perform a carotid angiography. Instead, based on the symptom of pain in the sacral region, we chose to do...
Fig. 1. A, T1-weighted image, 483/20/2 (TR/TE/excitations). There is a tumor mass in L2-L3 level. The heterogeneous hyperintensity in the inferior part of the tumor reflects hemorrhage (arrow) and the existence of intracellular hemoglobin. Notice that the dural sac below L3 appears hyperintense (arrowhead), indicating much blood mixed with CSF.

B, gradient-echo T2*-weighted image, 400/18/10° (TR/TE/flip angle). The tumor hemorrhage becomes hypointensive (arrow). The dural sac below L3 is hyperintensive and cannot be distinguished from normal CSF.

an MR of the lumbar spine. A bleeding tumor at the L2-L3 level was diagnosed and the patient was referred to the surgeon for corrective surgery.

In our case, MR was performed 4 days after the manifestation of symptoms. The hemorrhage in the tumor showed heterogeneous hyperintensity on T1-weighted images and hypointensity in gradient-echo T2*-weighted images. In our case, the blood in the dural sac caused by the tumor showed hyperintensity in T1-weighted images, indicating a shortened T1 time of the blood mixed with CSF (4). On gradient-echo T2*-weighted imaging, the signal intensity was also high, indicating a long T2 relaxation time and possibly reflecting a high protein content in the CSF (5).

In conclusion, we feel that when a patient has signs and symptoms of SAH, without a detectable intracranial source of the bleeding, the bleeding possibly originates from the spine, especially when the patient has specific symptoms related to the spine, such as radicular pain, myelopathy, or back pain. MR is a good modality for finding the bleeder, and even blood mixed in the CSF of the dural sac.

References