PICTORIAL MEDICINE

Posterior reversible encephalopathy syndrome with bevacizumab

Case history

A 63-year-old woman underwent rectosigmoid colectomy and total mesorectal resection for rectosigmoid carcinoma. Pathology showed that the tumour had infiltrated the subserosa and there were four regional metastatic lymph nodes. She was diagnosed with pathological Dukes C disease. Her postoperative carcinoembryonic antigen remained high. Restaging positron emission tomography–computed tomographic scan showed a solitary liver metastatic lesion at segment 7. She was treated with partial hepatectomy and 'pseudo-adjuvant' chemo-targeted therapy with oxaliplatin, folinic acid, and 5-fluorouracil concurrent with bevacizumab every 2 weeks. Treatment was uneventful until 2 days after the 10th cycle, when she presented with acute onset of headache, drowsiness, and visual disturbance. Her vital signs were stable and she was afebrile, with no focal neurological signs in the limbs. Magnetic resonance imaging (MRI) of the brain showed multiple symmetrical T2-weighted signal abnormalities in the subcortical white matter in the posteroinferior parietotemporal lobes (Fig). The radiological finding was suspicious of posterior reversible encephalopathy syndrome (PRES). The patient had a complete spontaneous clinical recovery with supportive measures within 1 week, and a diagnosis of PRES was established. Chemo-targeted therapy was withdrawn.

Discussion

Posterior reversible encephalopathy syndrome describes a neurological syndrome with presenting symptoms ranging from headache, altered mental status, seizures, and visual loss to loss of consciousness. The term describes a potentially reversible imaging appearance and symptomatology that is shared by a diverse array of causes. The mechanism is not entirely understood but is thought to be related to a hyperperfusion state, with blood-brain barrier breakthrough, extravasation of fluid potentially containing blood or macromolecules, and resulting cortical or subcortical oedema. Alternatively, vasospasm may precipitate the reversible oedema, leading to cytotoxic oedema if left untreated.

The typical imaging findings of PRES are most apparent as hyperintensity on fluid attenuation inversion recovery images in the parieto-occipital and posterior frontal cortical and subcortical white

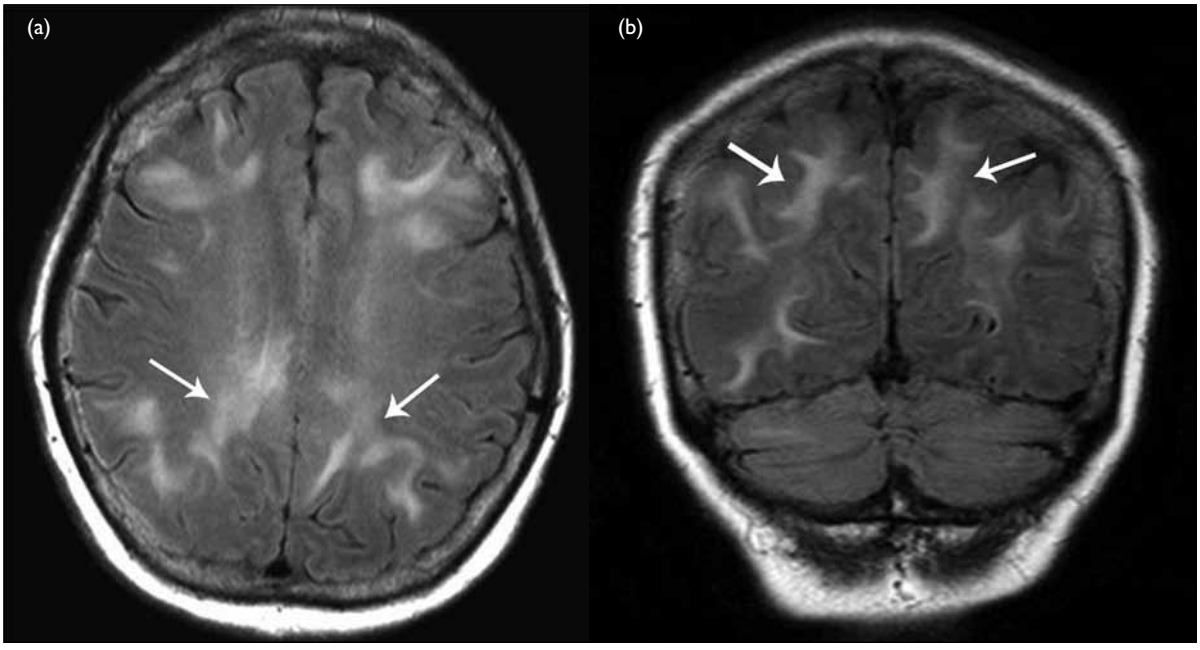

FIG. Magnetic resonance images of the brain showing multiple symmetrical T2-weighted signal abnormalities in the subcortical white matter (arrows) in the posteroinferior parietotemporal lobes: (a) transverse plane and (b) coronal plane

matter; less commonly, the brainstem, basal ganglia, and cerebellum are involved.[1] Classic computed tomography findings are bilateral symmetric low attenuation in the posterior parietal and occipital lobes, whereas MRI demonstrates hyperintensity on T2-weighted images in the same distribution. Atypical imaging appearances include contrast enhancement, haemorrhage, and restricted diffusion on MRI. Since PRES is often unsuspected by clinicians, radiologists may be the first to suggest the diagnosis.

The condition has been reported to be associated with the anti–vascular endothelial growth factor monoclonal antibody bevacizumab, which decreases tumour perfusion, vascular density, and interstitial fluid pressure.[2,3] The drug improves survival and the rate of tumour regression in patients with colorectal carcinoma. However, bevacizumab-based combination chemotherapy is associated with a risk of grade-3 hypertension in up to 16% of patients, possibly secondary to vasospasm. Severe hypertensive encephalopathy leads to PRES and vasogenic oedema of the posterior cerebral white matter, induced by endothelial dysfunction and a disrupted blood-brain barrier. It is speculated that bevacizumab could induce vasospasm, leading to PRES without causing significant hypertension. It is important to differentiate this syndrome from acute cerebral ischaemia or thromboembolic phenomena, which are also associated with bevacizumab.

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