Reversible cerebral vasoconstriction syndrome promptly diagnosed with magnetic resonance imaging including magnetic resonance angiography during immunosuppressive therapy in a 16-year-old girl with refractory cytopenia of childhood

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Abstract

Reversible cerebral vasoconstriction syndrome (RCVS) is a syndrome characterized by severe headache with segmental vasoconstriction of the cerebral arteries that resolves within 12 weeks. A 16-year-old girl with refractory cytopenia of childhood, who was receiving the immunosuppressant cyclosporine, developed severe headache and was diagnosed with RCVS using magnetic resonance imaging, including magnetic resonance angiography (MRA). MRA is a non-invasive and very effective technique for diagnosing RCVS. MRA should be performed at the onset of severe headache during immunosuppressant administration for children with hematological disorders and may prevent sequelae such as posterior reversible encephalopathy syndrome or ischemic attack.

Case Report

A 13-year-old girl visited our hospital with a 3-day history of fever and abdominal pain. Blood examinations revealed pancytopenia, and she was admitted to our hospital. Bone marrow findings showed hypoplasia and dysplasia of more than 10% of myeloid lineage. G-bandning of marrow cells revealed a 46,XX karyotype in all of the 10 cells analyzable, and fluorescencexen situ hybridization detected neither monosomy 7 nor trisomy 8. Based on these findings, RCC (a subtype of myelodysplastic syndrome) was diagnosed. Because cytopenia was not severe, she was observed in our outpatient clinic without treatment. After observation for 41 months, at 16 years old, the cytopenia worsened to the point of dependency on blood transfusion and the patient was admitted to our hospital for IST. From day 2 of hospitalization, IST was performed using rabbit antithymocyte globulin (Thymoglobulin; Sanofi K.K., Tokyo, Japan) at 3.5 mg/kg/day (for 5 days), cyclosporine A (CsA) started at 6 mg/kg/day and adjusted to the range of 100-200 mg/mL (for 180 days), and methylprednisolone at 2 mg/kg (full dose for 7 days, tapered down for 3 weeks, then suspended). On day 13 of hospitalization, throbbing headache arose in the left frontal to posterior region of the head. This headache was not severe at onset but gradually worsened over 4 days to 7/10 on the numeric rating scale, leading to sleep disturbance. On day 17 of hospitalization, MRI was performed on day 26 of hospitalization (Figure 1). T1- and T2-weighted imaging, fluid-attenuated inversion recovery imaging, and diffusion-weighted imaging as other MRI techniques revealed no abnormalities of the brain. On day 18 of hospitalization, CsA was suspended and administration of the calcium blocker lomerizine was started at 10 mg/day. Headache promptly improved, resolving by day 23 of hospitalization (5 days after starting lomerizine administration). On day 26 of hospitalization showed regression of vasoconstriction (Figure 2). CsA was restarted on day 57 of hospitalization (day 44 after onset of headache) with continuation of lomerizine, because of the need for this agent in the treatment of RCC. No recurrence of headache has been seen for one year after discharge.

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Discussion

We promptly diagnosed and successfully treated RCVS during IST in this 16-year-old girl with RCC using MRI, including MRA. Imaging modalities used in the management of RCVS include transcranial Doppler ultrasonography, non-contrast computed tomography (CT), CT angiography, MRA, vessel wall imaging, and catheter angiography.² Cerebral angiography is the standard criterion for the detection of cerebral vasoconstriction, but noninvasive techniques such as MRA are increasingly being used in clinical practice. MRA is an effective technique for diagnosing and monitoring the evolution of RCVS-related vasoconstriction.¹⁴ We used MRI including MRA for screening our patient with severe headache, and MRA revealed segmental vasoconstriction as a beaded appearance of the left internal carotid artery, leading to a diagnosis of RCVS, but T1- and T2-weighted, fluid-attenuated inversion recovery imaging, and diffusion-weighted imaging revealed no abnormalities. MRA is in relatively widespread use and is a non-invasive modality, which is useful in screening for headache. However, when PRES is suspected as a cause of headache, MRA is not generally performed for screening, because PRES can be diagnosed by MRI sequences without MRA. As a result, some cases of RCVS may be misdiagnosed as PRES not complicated with PRES.

RCVS is closely related to PRES and ischemic stroke. Ducros and colleagues reported that 9.38% of patients with RCVS had PRES-like lesions.¹⁵ Chen and colleagues found that vasoconstrictions are important determinants for PRES and ischemic stroke.¹⁴ Timely diagnosis and appropriate treatment for RCVS may prevent the onset of these clinical problems.

Reports of RCVS in children with hematological disease are very rare. A PubMed search for cases of RCVS in children with hematological diseases, using the search terms reversible cerebral vasoconstriction syndrome [Title/Abstract], and children [Title/Abstract] or pediatric [Title/Abstract], yielded only one report of RCVS.¹⁶ However, some cases of RCVS may go unrecognized, considering the relationship between RCVS and PRES. Surveys of cases from multiple centers are needed to clarify the actual incidence of RCVS in children with hematological disease.

Conclusions

MRA should be included in diagnostic modalities for severe headache during administration of causative medicines such as calcineurin inhibitors, for the purpose of prompt diagnosis and treatment of RCVS.

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