Clinical Case Report

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Intraventricular hemorrhage caused by intracranial venous sinus thrombosis

Case report

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Abstract

Intraventricular hemorrhage (IVH) may occur as an isolated event from primary ventricular bleeding or as a complication of brain hemorrhage from another etiology. It is associated with high mortality and morbidity. The underlying risk factors include hypertension and aneurysms, among others. However, not all the exact etiologies are known. In this study, a case of a 24-year-old man who suffered from a headache and a decline in memory has been reported. A brain computed tomography scan suggested the diagnosis of spontaneous intraventricular hemorrhage. However, brain magnetic resonance imaging, magnetic resonance venography, and other tests eventually confirmed cerebral venous sinus thrombosis.

Cerebral venous sinus thrombosis may be one of the causes of intraventricular hemorrhage and should be considered for unexplained intraventricular hemorrhage.

Abbreviations: CT = computed tomography, CTA = computed tomographic angiography, CVST = cerebral venous sinus thrombosis, IVH = intraventricular hemorrhage, MRI = magnetic resonance imaging, MRV = magnetic resonance venography.

Keywords: intracranial venous sinus thrombosis, intraventricular hemorrhage, thalamic infarction

1. Introduction

Spontaneous intraventricular hemorrhage (IVH) was first defined by Sanders in 1881 as the flooding of the ventricle with blood in the absence of any rupture or laceration in the ventricular wall.[1] This type of hemorrhage primarily occurs in neonates, especially in preterm and low-birth-weight infants. However, the occurrence in adults is infrequent, only comprising ~3.1% of all intracranial hemorrhages.[2] Graeb et al[3] were the first researchers to publish a computed tomography (CT) scan-based series of IVH images. The determination of the etiology of IVH was made possible through brain CT. Excluding post-traumatic causes, the known etiologies of IVH are as follows: aneurysmal ruptures (33.3%), spontaneous hypertensive hematomas (25.5%), idiopathies (23.5%), ruptured arteriovenous malformations (9.8%), hypocoagulative states (5.9%), and brain metastases (1.9%). However, the cause of 23.5% of all IVH occurrences is unknown.[3] Wu et al[4] reported that among 29 neonates of at least 36 weeks' gestation with intraventricular hemorrhage, 9 (31%) had cerebral sinovenous thrombosis. But it is rarely reported in adult as we know.

In this study, a case of cerebral venous sinus thrombosis (CVST) with an initial manifestation of spontaneous IVH with bilateral thalamic infarction was reported.

2. Patient

A previously healthy 24-year-old Chinese male suffered a sudden, spontaneous, and continuous headache with vomiting. Two days later, the patient suddenly developed slowed mental faculties, such as difficulty in finding words, slowed speech, and difficultly in handling daily affairs. A brain CT scan on the 7th day (Fig. 1) showed IVH, with high-density regions near the vein of Galen and symmetrical thalamic low-density regions.

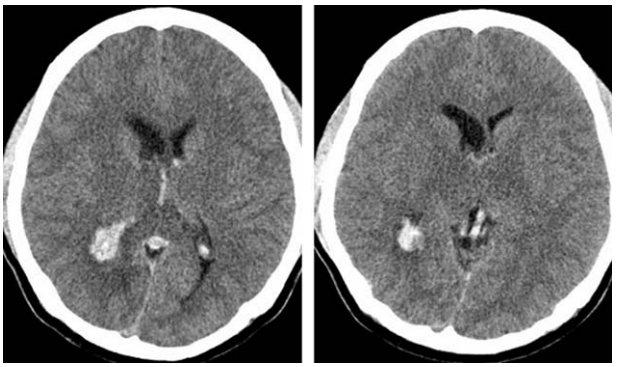

Figure 1. Computed tomography scan showed intraventricular hemorrhage, high density of the vein of Galen, and symmetrical thalamic low densities.

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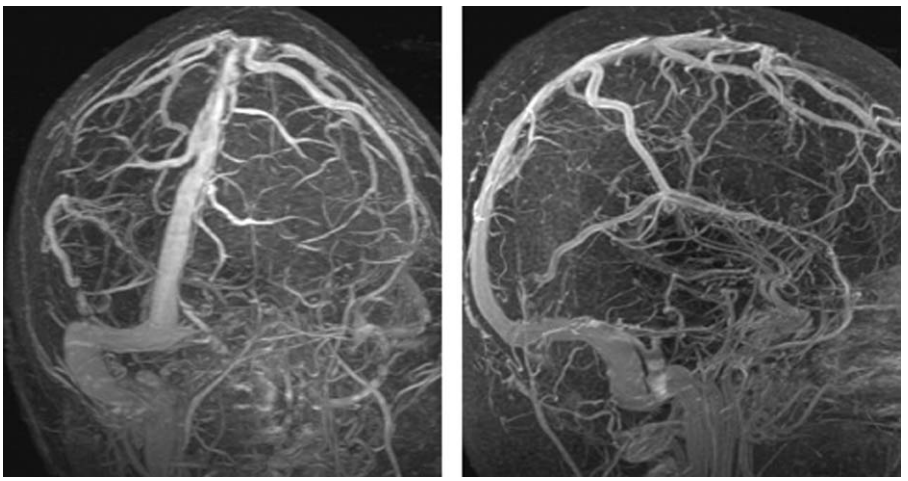

Figure 2. Magnetic resonance venography scan showed no flow in the inferior sagittal sinus, the vein of Galen, straight sinus, left transverse sinus, and left sigmoid sinus, suggesting intracranial venous sinus thrombosis.

Upon the initial physical examination, the patient was slightly confused but can otherwise answer questions and follow commands. The remainder of his physical examination remained normal. A lumbar puncture showed an opening pressure of 200 mm H_2O, elevated protein content, a red blood cell count of 1150, and no lymphocytes. Additional tests, including a complete blood count, erythrocyte sedimentation rate, serum homocysteine, antinuclear antibody, antineutrophil cytoplasmic antibodies, anticardiolipin antibody, prothrombin time, partial thromboplastin time, and D-dimer, were all normal. A magnetic resonance venography (MRV) scan (Fig. 2) showed no flow in the inferior sagittal sinus, the vein of Galen, straight sinus, left transverse sinus, and left sigmoid sinus, which suggests CVST. Computed tomographic angiography (CTA) showed no aneurysms and no vascular malformations. Brain magnetic resonance imaging (MRI) confirmed the presence of bilateral thalamic and corpus callosum infarctions.

The patient was subsequently diagnosed with CVST based on his history, clinical signs, and laboratory examinations and was then treated with a low-molecular-weight heparin calcium injection, followed with warfarin tablets. The patient recovered gradually. Two months later, an MRV showed that the sagittal sinus, great cerebral vein, and straight sinus appeared to have been partly recanalized compared with the previous scan.

This study was approved by the human research ethics committee of Second Affiliated Hospital, School of Medicine, Zhejiang University.

3. Discussion

We speculated that for this patient, the first symptom of a headache was caused by IVH. CVST may also certainly cause headache. The headache of CVST is typically described as diffuse and often progresses in severity over days to weeks because of increasing intracranial pressure. Nonetheless, considering that the opening pressure of the patient was not significant and the sudden onset of his headache, we believe that the headache was caused by the IVH. No clinically relevant symptoms had been previously observed in the patient based on his health history. Thus, the onset on CVST remains unknown. According to previous reports, headache presents as the initial and predominant symptom in ~90% of all CVST cases.[5] In addition, headache may be the only symptom observed, but additional symptoms, such as nausea, vomiting, seizures, reduced consciousness or confusional states, and neurological deficits, can be associated.[5] However, ~10% of patients with CVST do not suffer headache.

A multicenter cohort of subjects with CVST from the united states have found that ~33% of patients develop intraparenchymal hemorrhages and 34% develop infarcts.[6] Several cases of bilateral thalamic infarction resulting from CVST have been reported in the earlier literature.[7,8,9] Intraventricular bleeding has not been commonly described in association with CVST in adult. This case highlights CVST should be considered for unknown causes of IVH. The subependymal veins drain from the deeper subcortical structures, such as internal and external capsule, the basal ganglia, and the dorsal part of the diencephalon, to the vein of Galen, which curves around the posterior surface of the splenium of the corpus callosum before terminating at the confluence of sinuses.[10] The drainage vessels of the straight sinus and vein of Galen are mainly located in the deep white matter and in the superficial veins of the brain ventricle. Poor drainage of the vein of Galen and the straight sinus can cause an arterial venous block, resulting in bilateral thalamic infarction. Similarly, poor drainage can result in increased pressure in the veins of the ventricular surface, causing the rupture of the small blood vessels which lead to IVH. The treatment is completely different between IVH attributed to CVST and to other causes, such as hypertension and aneurysm. So, it is important to identify the IVH is caused by CVST or other reasons.

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