Cerebral Venous Thrombosis Associated with Micro-Abscesses: Case Report

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Abstract We present a case that is most likely Lemierre's syndrome. A 19-year-old man presented to us with common-cold-like symptoms, which he had had for 2 days, such as slight fever, general malaise, anorexia, sore throat, and headache. Eight days after the onset of these symptoms, he died of brain herniation due to cerebral venous thrombosis associated with micro-abscesses detected in pathological examination.

Keywords Lemierre's syndrome • Cerebral venous thrombosis • Micro-abscesses

Introduction

Many risk factors of cerebral venous thrombosis (CVT) have been reported, such as thrombophilia, malignancy, inflammatory systemic disorders, pregnancy, infection, and drug use, and the death rate of CVT at discharge is approximately 4 % [1]. In the manuscript, we report a patient who died of brain herniation due to CVT associated with micro-abscesses detected in a pathological examination.

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Case Report

A previously healthy 19-year-old man initially presented to our emergency room with a 2-day history of sore throat, general malaise, anorexia, headache, and slight fever. His temperature was 37.4 °C. He was diagnosed with a viral illness and discharged home with symptomatic treatment because signs of pharyngitis were seen without enlargement of the tonsils. On the next day, he presented to our neurosurgical department with persistent headache and anorexia. He denied habitual use of any drugs, although he had a medical history of bronchial asthma and of allergy to cold remedies and foods such as eggplant, cucumber, Yamato potato, and kiwi.

At the time of that second examination, his Glasgow Coma Scale (GCS) score was 15, and he had no neurological deficit. His temperature was 36.8 °C, pulse 60 bpm, blood pressure 110/60 mmHg, and pulse oximetry 99 % on room air. A stiff neck was not recognized. The rest of the physical examination was unremarkable. Blood test results revealed a C-reactive protein (CRP) level of 1.6 mg/dL and a white blood cell (WBC) count of 10,600/μL. The rest of the blood test results, including renal and liver function, were unremarkable. His chest radiograph and electrocardiograph findings were normal. No abnormal findings were found on computed tomography (CT) of the head. We diagnosed his illness as a viral infection and continued symptomatic treatment after his hospitalization.

On the next day of his hospitalization, he became febrile (38.5 °C) with neurological deterioration. His GCS score was nine points: scores for visual, verbal, and motor functions were one, two, and six points respectively. Repeated CT of the head showed a low-density lesion, including a small high-density area indicating hemorrhage in the left parietal lobe (Fig. 1a). CT with contrast medium showed cortical venous congestion indicating cerebral venous thrombosis (CVT) (Fig. 1b). Blood test results revealed a C-reactive protein (CRP) level of 5.4 mg/dL and a white blood cell (WBC) count of 16,800/μL. A lumbar puncture was performed, revealing that the cerebrospinal

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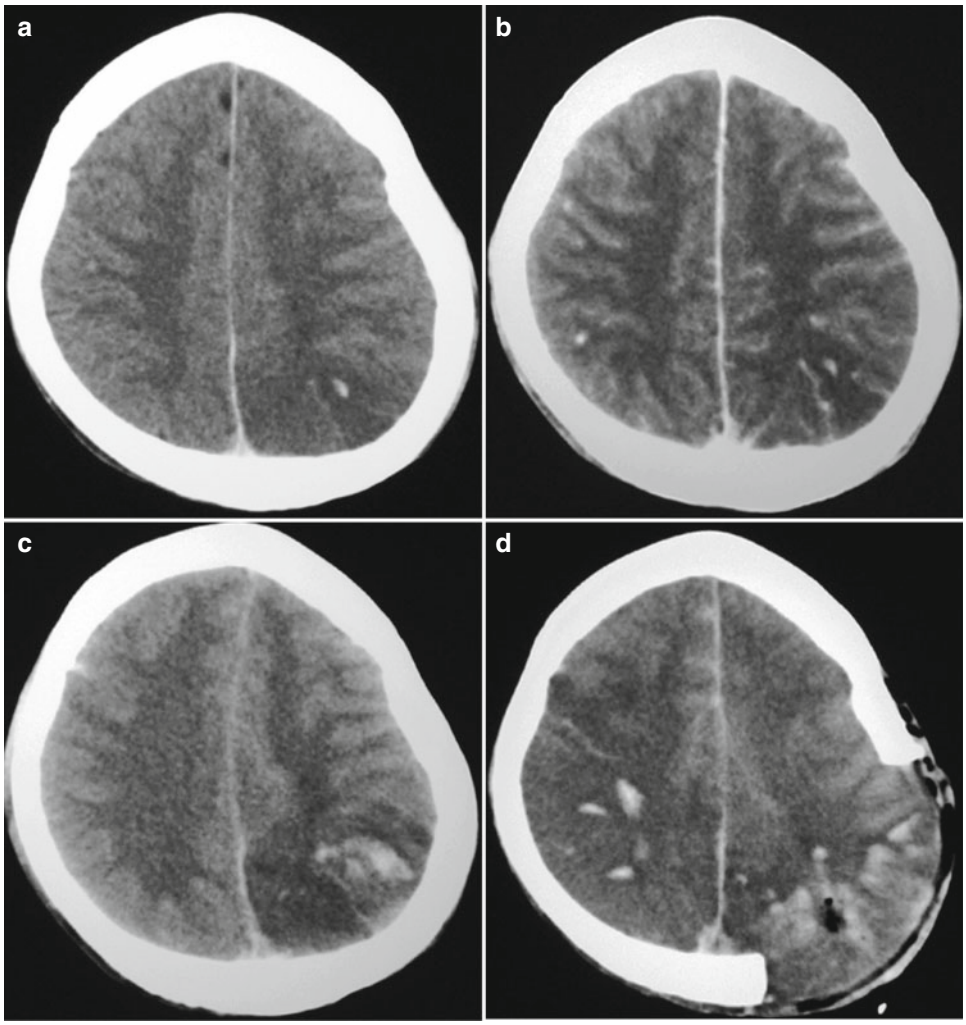

Fig. 1 (**a**) Repeated CT of the head showing a low-density lesion including a small high-density area indicating hemorrhage in the left parietal lobe. (**b**) CT with contrast medium showing cortical venous congestion indicating cerebral venous thrombosis. (**c**) Repeated CT showing midline shift due to the progression of brain edema and hemorrhage. (**d**) Repeated CT showing the swelling of the right cerebral hemisphere

fluid (CSF) contained 14 WBCs/μL (five neutrophils), total protein of 185 mg/dL, and glucose of 75 mg/dL. We made a diagnosis of CVT caused by viral meningitis and started administration of acyclovir, steroid, and hypertonic diuretic. We did not start anticoagulant therapy because the patient's prothrombin time was 17.1 s (normal values, 11.0–12.5 s) and we had found a hemorrhage in the cerebral lesion. CSF culture later proved to be negative. Repeated CT, which was performed 12 h later because anisocoria of the enlarged left pupil had been found, showed impending brain herniation due to the progression of the brain edema and hemorrhage (Fig. 1c). Emergency external decompression and evacuation of hematoma and damaged brain were performed. The brain was disrupted by the hematoma and swelled up remarkably owing to the congestion of the cortical veins occluded with thrombus (Fig. 2). Although the anisocoria disappeared immediately after the surgery, his right pupil was enlarged 5 h later, because of the swelling of the right cerebral hemisphere (Fig. 1d). We recommended a contralateral external decompression to save his life, even though his functional prognosis would be poor, but his family did not

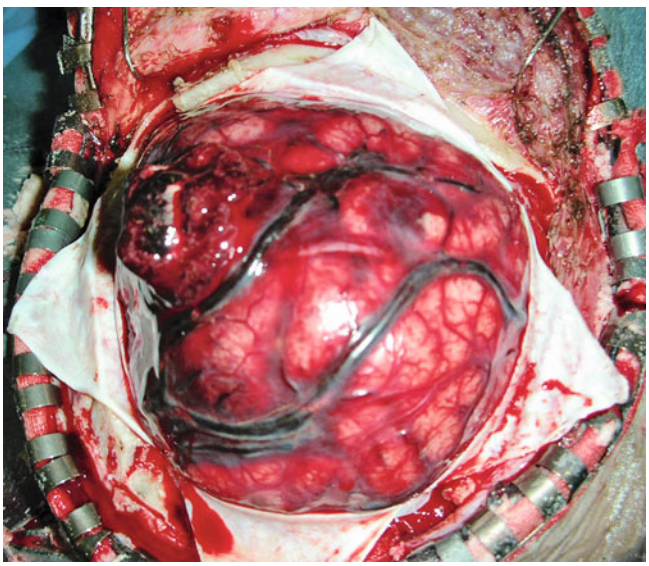

Fig. 2 Perioperative photograph showing hematoma disrupting the brain and a remarkably swollen brain due to congestion of the cortical veins occluded with thrombus

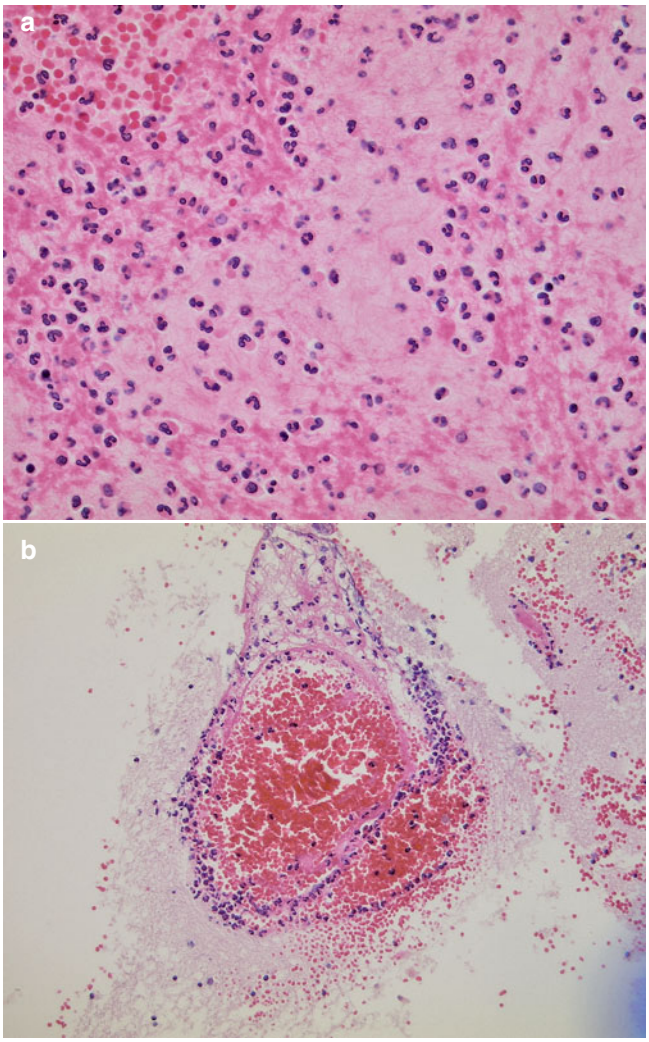

Fig. 3 Photomicrographs of a brain sample. (**a**) Hematoxylin and eosin staining (×400) showing a large number of neutrophils in the hematoma. (**b**) Hematoxylin and eosin staining (×100) showing infiltration of neutrophils into the venous walls and Virchow–Robin spaces, which were considered micro-abscesses

grant permission for this. He died of brain herniation on the seventh hospital day in spite of life support.

The surgical specimens were examined pathologically. A large number of neutrophils were found in the hematoma (Fig. 3a) and infiltration of neutrophils into the venous walls and Virchow–Robin spaces, which were considered micro-abscesses, was found. Eosinophils were not found, and fibrinoid necrosis of the venous walls was unremarkable (Fig. 3b).

Conclusion

Infiltration of neutrophils into the vessel walls suggested anti-neutrophil cytoplasmic antibody (ANCA)-associated vasculitis or bacterial vasculitis.

In the present case, however, renal dysfunction, which suggests ANCA-associated nephritis, was negative and fibrinoid necrosis, which is a characteristic of ANCA-associated vasculitides, was not found pathologically [2].

Sinusitis, otitis media, and mastoiditis can be the primary sources of intracranial bacterial infection [3, 4]. In the present case, however, there were no findings of sinusitis, otitis media, or mastoiditis in CT on admission.

Infiltration of neutrophils into Virchow–Robin spaces indicated bacterial meningitis [5]. However, a stiff neck was not recognized, and the CSF test and culture were negative. In addition, a large number of neutrophils were found in the hematoma, whereas they were not seen in the cerebral tissue. This suggested that neutrophils infiltrated the Virchow–Robin spaces from veins.

Lemierre's syndrome, first reported by Dr. Andre Lemierre in 1936, is caused by an acute oropharyngeal infection with secondary septic thrombophlebitis of the internal jugular vein (IJV) and frequent metastatic infections such as abscesses. The disease progresses in several stages. The first stage is the primary infection, which is usually pharyngitis. This is followed by local invasion of the lateral pharyngeal space, resulting in septic thrombophlebitis of the IJV, and finally the occurrence of metastatic complications. A sore throat is the most common symptom during the primary infection. During invasion of the lateral pharyngeal space, a swollen and/or tender neck is the most common finding [6]. In addition to the lungs, the brain has been reported to be a site of metastatic infection [7]. Lemierre's syndrome occurs most often in adolescents and young adults (aged 15–30 years), and *Fusobacterium* pharyngitis occurs predominantly in the same age group [8].

The advent of beta-lactam antibiotics has reduced the incidence of Lemierre's syndrome to 0.8–1.5 cases per one million persons/year, leading it to be called a "forgotten disease" [9], although mortality is still estimated at 8–15 %, despite antibiotic therapy [10]. In the present case, a sore throat was a typical initial symptom that is found in 82.5 % of patients, but a swollen and/or tender neck, which was the most common finding (52.2 % of patients) during invasion of the lateral pharyngeal space and IJV septic thrombophlebitis, was absent [6]. However, the pathological findings mentioned above indicated hematogenous metastatic infection of some kind of bacteria, which were not identified in this case.

To our knowledge, the literature shows 15 cases in which the interval from initial symptoms to central nervous system complications were described [11–25]. The average interval was 10 days, while the interval from sore throat to neurological deterioration in our patient was only 3 days. Although Lemierre's syndrome has been called a "forgotten disease" in the antibiotic era, it remains a life-threatening disease especially since the 1990s, because of restrictions on the use of antibiotics for viral pharyngitis [26].

Conflict of Interest We declare that we have no conflict of interest.

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