Clinical Case Report

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A rare case of deep cerebral venous thrombosis secondary to traumatic epidural hematoma

Case report

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Abstract

Rationale: Deep cerebral venous thrombosis (DCVT) is a rare disease, but always results in poor prognosis.

Patient concerns: We reported a 79-year-old female with coma after traumatic brain injury (TBI).

Diagnosis: The epidural hematoma was first diagnosed on non-contrast computerized tomography (CT). The hypodense areas in bilateral thalami and basal ganglia on reexamination CT highly indicated the suspicion of DCVT. Finally, the appearance of thrombosis of the vein of Galen on the computed tomography venography (CTA) and digital subtraction angiography (DSA) confirmed the diagnosis.

Interventions: The patients received surgery to remove the epidural hematoma. After that, she was treated with oral anticoagulation agent (low molecular weight heparin (LMWH), 180 Axal U/kg 24 h) for 4 weeks, shifted by oral warfarin (2.5 mg qd) for 4 weeks.

Outcomes: The hypodense areas in bilateral thalami and basal ganglia have been largely reversed. At the time of 6 months after surgery, the patient could take care of herself.

Lessons: If the CT shows hypodense areas in bilateral thalami and basal ganglia, a diagnosis of DCVT should be suspected once the patients could not recover from the treatment of primary diseases.

Abbreviations: CT = computerized tomography, CTA = computed tomography venography, CTV = computerized tomography venography, DCVT = Deep cerebral venous thrombosis, DSA = digital subtraction angiography, GCS = Glasgow Coma Score, LMWH = low molecular weight heparin, TBI = traumatic brain injury.

Keywords: anticoagulation, DCVT, hematoma, thrombosis

1. Introduction

Cerebral venous thrombosis is a rare disease, accounting for nearly 0.5% of all strokes.[1] The most common venous sinuses to be afflicted are lateral, cavernous, and superior sagittal sinuses.[2] Deep cerebral veins are far less to be involved, but the DCVT always results in poorer prognosis than other cerebral sinus thrombosis.[3] However, DCVT is extremely difficult to be diagnosed due to its nonspecific clinical symptoms and unconspicuous imaging signs.[4]

We documented a patient with both DCVT and epidural hematoma who was successfully treated with surgery, followed by low molecular heparin and warfarin.

2. Ethical review

This case report was approved by the clinical ethics committee of the Second Affiliated Hospital of Zhejiang University School of Medicine and the Fourth Affiliated Hospital of Zhejiang University School of Medicine. Besides, the patient has provided informed consent for publication of the case.

3. Case report

A 79-year-old female was admitted to our hospital with coma due to TBI. The physical examination revealed a deep coma state of consciousness. The Glasgow Coma Score (GCS) was 5. The diameter of the right pupil was 3.5 mm and the light reflex was lost. The diameter of the left pupil was 2.5 mm, with a blunt light reflex. The other physical findings were unremarkable. Laboratory findings, including complete blood count and biochemical profiles, were all within normal limits, except for the elevated D-dimer (6540 μg/L; normal<200). Preoperative noncontrast-enhanced brain CT revealed a large hyperdense epidural hematoma in right temporal region and ill-demarcated hypodense areas in bilateral thalami and basal ganglia (Fig. 1A). First, she received the surgery to remove the epidural hematoma. After surgery, GCS of this patient went up to 8. However, 2 days after surgery, GCS went back to 6. Then we conducted a noncontrast-enhanced brain CT (Fig. 1B) on the second day after surgery,

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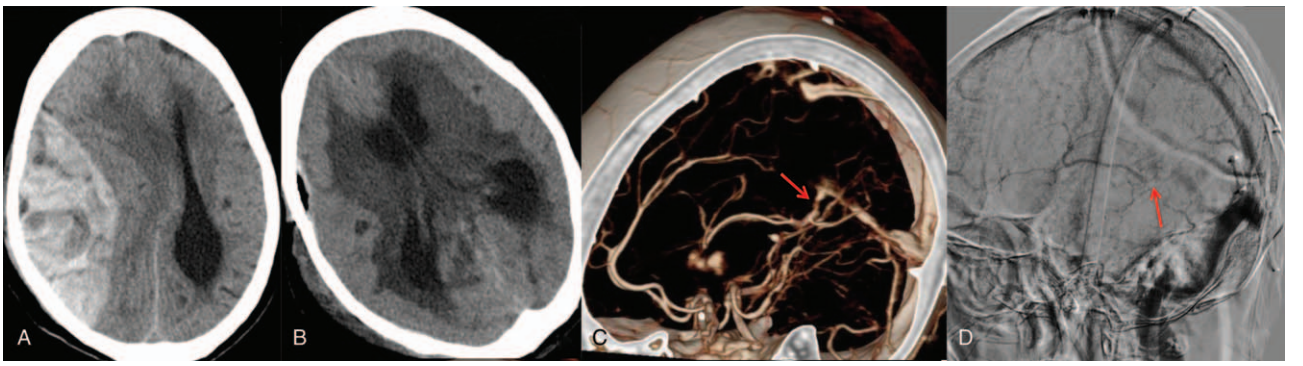

Figure 1. The preoperative imagings of the patient. (A) Preoperative CT revealed a large hyperdense epidural hematoma and ill-demarcated hypodense areas in bilateral thalami and basal ganglia; (B) CT postoperative CT showed the hematoma has been successfully removed, but the hypodense areas in bilateral thalami and basal ganglia were more clearly showed on the image; (C) CTA revealed the thrombosis of vein of Galen; (D) DSA showed the thrombosis of vein of Galen. CT = computed tomography, CTA = computed tomography venography.

which indicated that the hematoma has been successfully removed, but the hypodense areas in bilateral thalami and basal ganglia were more clearly showed on the image. Therefore, the diagnosis of DCVT was highly suspected. Finally, the appearance of thrombosis of the vein of Galen on the CTA and DSA (Fig. 1C and D) confirmed the diagnosis. Then she was treated with oral anticoagulation agent (low molecular weight heparin (LMWH), 180 Axal U/kg 24 hours) for 4 weeks, shifted by oral warfarin (2.5 mg qd) for 4 weeks. After the treatments, brain CTA revealed recanalization of the vein of Galen (Fig. 2A and B). Besides, the GCS of the patient went up to 12. We conducted a noncontrast-enhanced brain CT (Fig. 2C) 1 month after surgery, which indicated that the hypodense areas in bilateral thalami and basal ganglia have been largely reversed. At the time of 6 months after surgery, the patient could take care of herself.

4. Discussion

The documents of cerebral venous thrombosis could be traced decades ago.[5,6] Cerebral venous thrombosis is always thought to be a rare condition with poor prognosis. It was reported that the prevalence of cerebral venous thrombosis is 5 per 1 million.[7] However, deep cerebral veins are far less to be involved, but the DCVT always results in poorer prognosis than other cerebral sinus thrombosis.[3] The common deep veins to be involved in the thrombosis are the internal cerebral vein, the vein of Galen or straight sinus.[8]

There were varied causes that could lead to cerebral venous thrombosis, including pregnancy, puerperium, abortion, oral contraceptives, infections, and brain neoplasms. Some rare risks, like TBI or surgery, could also lead to cerebral venous thrombosis.[9]

Deep cerebral veins drain the blood from deep white matter, thalami, and basal ganglia into bilateral internal cerebral veins, which run posteriorly and join the vein of Galen. The vein of Galen finally converges to form the straight sinus. So, the patients suffered from DCVT could be manifested with headache, numbness, weakness, alteration of consciousness or other neuropsychological presentations.[10–12]

However, the accurate diagnosis of DCVT is always difficult due to its nonspecific clinical findings and low incidence. By far, no consistent standard for diagnosing DCVT has been applied. The CT and computerized tomography venography (CTV) were used as the first option for the patients suspected of DCVT. In this

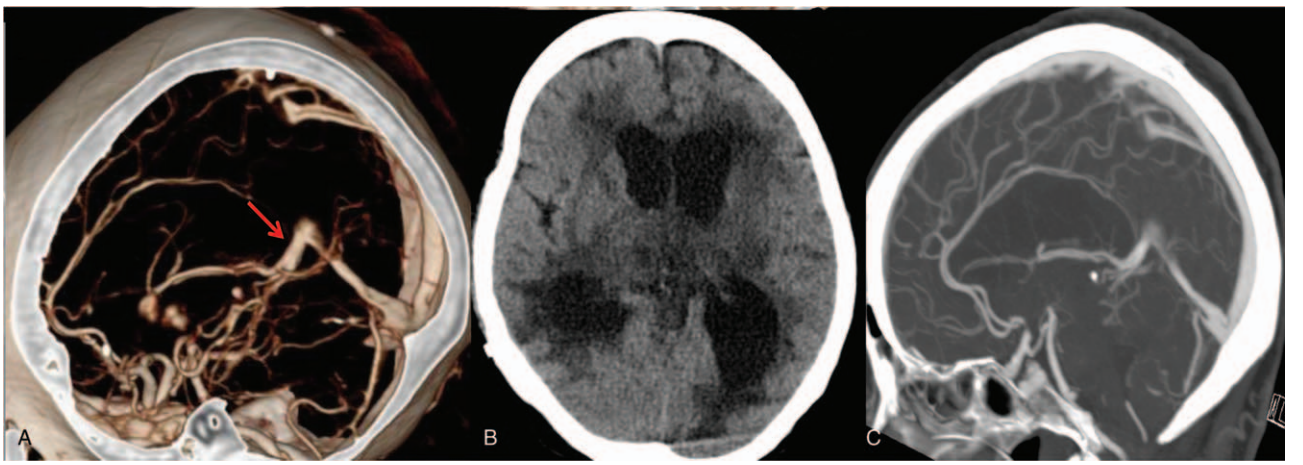

Figure 2. The postoperative imagings of the patient. (A, B) CTA revealed recanalization of vein of Galen after the treatments; (C) noncontrast CT 1 month after operation showed that the hypodense areas in bilateral thalami and basal ganglia have been largely reversed. CT = computed tomography, CTA = computed tomography venography.

case, brain CT images showed hypodense areas in bilateral thalami and basal ganglia. However, many studies reported the low diagnostic accuracy of CT in diagnosing the DVCT.[13] Recently, MRI and MRV have been demonstrated by many studies to own high level of diagnostic accuracy. In addition, DSA, which is recognized as "golden standard" in diagnosing cerebral venous thrombosis, could provide an intuitionistic image of the venous system. But the invasive procedures and high expense limit its generalization in many hospitals.[14,15] In general, there is no consensus on the standard reference for diagnosing DVCT. A combination of several techniques with clinical symptoms should be applied to the patients highly suspected of DCVT. For the reported case, we conducted CTA and DSA once DCVT was under suspicion and accurate diagnosis was obtained finally.

Once the definite diagnosis of DCVT has been made, timely and proper treatments could significantly ameliorate the outcomes of the patients. Currently, the first-line treatment around the world for the DCVT is anticoagulation with intravenous unfractionated heparin. Heparin may arrest the thrombotic process and was reported to reduce the mortality and morbidity.[16] The heparin is always followed by oral anticoagulation with warfarin for 3 to 6 months or longer, with target international normalized ratio of 2.5, to prevent recurrent thrombosis.[17,18] The reduction of hypodense areas in the bilateral thalami and basal ganglia of this case and her consciousness recovery verified the efficacy of the treatments. However, for some critical cerebral sinus thrombosis patients, especially when the thrombi are refractory to the regular anticoagulation with heparin or LMWH, many studies have confirmed the safety and efficacy of endovascular treatment.[19] Endovascular treatment, a more aggressive intervention, may exhibit its advantages in treating these critical patients with cerebral sinus thrombosis. It includes the techniques of local chemical thrombolysis, mechanical thrombectomy and stenting. Proper operation of these methods could promptly recanalize occluded venous sinus, restore blood flow and prevent some serious complications. However, as an invasive procedure, endovascular treatment could also cause damages to the tissues, like vessel dissection or intracranial hemorrhage. In addition, after adequate anticoagulation and endovascular treatment, some patients may still be suffered from life-threatening complications. Then palliative therapy, such as decompressive craniectomy, could prolong the life for these patients in a certain degree.[20,21]

This case was first admitted with the diagnosis of epidural hematoma. There were many similar cases reported to be diagnosed with a combination of DVCT and some more direct complications, such as subarachnoid hemorrhage, TBI or subdural hematoma.[9,22] So, the diagnosis of DCVT should be suspected once the patients could not recover from the treatment of primary diseases.

Author contributions

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