Case Report

Cerebral venous sinus thrombosis and subdural hematoma in a female patient with systemic lupus erythematosus: a case report and literature review

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Abstract: Cerebral venous sinus thrombosis (CVST) and subdural hematoma (SDH) are extremely rare in patients with systemic lupus erythematosus (SLE), and when conditions are severe, it can endanger the life of the patients. We report a case of a 44-year-old woman who was admitted to our hospital due to multiple paroxysmal headaches, dizziness, and seizures for 20 days. In the past 2 years, she had severe thrombocytopenia. Her brain computed tomography (CT) and magnetic resonance venography (MRV) demonstrated CVST and a SDH near the right parietal occipital lobe and left temporal parietal lobe. After admission, she was eventually diagnosed with SLE based on the seizures, thrombocytopenia, positive antinuclear antibodies, and anti-ds DNA antibodies. After treatment, the patient's headaches and symptoms completely disappeared, and the myodynamia of the left limbs improved to grade 4. Her platelet count rose to 199×10^9/L. The second brain MRV and MRI demonstrated partial reopening of the right superior sagittal sinus, transverse sinus, and sigmoid sinus, and the improvement of bilaterally SDH, which revealed that the treatment with an anticoagulant, pulse methylprednisolone therapy, and intravenous gamma globulin was effective. We summarized possible mechanisms in this case, which can improve our understanding of CVST and SDH in SLE. And we consider that such patients should be treated as soon as possible, and the outcome can be good.

Keywords: Central venous sinus thrombosis (CVST); subdural hematoma (SDH); systematic lupus erythematosus (SLE); pulse methylprednisolone therapy

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Introduction

Systemic lupus erythematosus (SLE) is a heterogeneous multisystem autoimmune disease that culminates in destructive tissue injury to multiple organ systems, including the nervous system (1). Neuropsychiatric SLE (NPSLE) is defined as per symptoms described in a previous study (2), involving both the central and peripheral nervous systems (3). The reported prevalence of NPSLE ranges from 14% to over 80% in adults and 22–95% in children (4). Cerebral venous sinus thrombosis (CVST) is a rare clinical manifestation in NPSLE, which has a reported incidence of 0.36% (5). Besides, subdural hematoma (SDH) is a rare form of bleeding in patients with SLE. Thus, CVST and SDH are quite rare complications of SLE, and their clinical consequences include high mortality and difficult clinical management. In this study, we report an extremely rare case of both CVST and SDH in a female patient with SLE.

We present the study in accordance with the CARE reporting checklist. Available at http://dx.doi.org/10.21037/apm-20-2285.

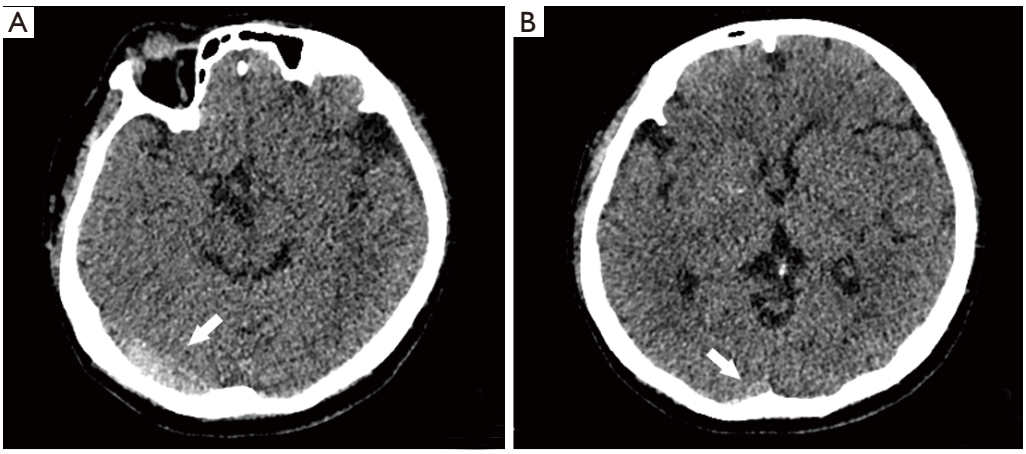

Figure 1 CT before treatment demonstrated high-density areas in the right transverse sinus (A, arrow) and superior sagittal sinus (B, arrow).

Case presentation

A 44-year-old woman presented to our hospital due to multiple paroxysmal headaches, dizziness, and seizures for 20 days. Two years prior to admission, a routine blood examination revealed thrombocytopenia (TP) (platelets 55×10^9 cells/L), but no treatment was prescribed.

Upon admission, the patient's vital signs were as follows: body temperature, 36.5 ℃; blood pressure, 136/83 mmHg; and pulse rate, 92 beats/min. The physical examination was conducted while the patient was conscious. The myodynamia of the limbs was roughly grade 3 and grade 5, on the left and right limbs, respectively. The left Chaddock and Babinski signs were positive, and the pupillary reflexes were normal. Hematological examination revealed severe TP (platelets 40×10^9 cells/L), mild anemia (hemoglobin, 77 g/L) and hypoalbuminemia (albumin 30.8 g/L). Coagulation factors, fibrinogen, urinalysis, and renal function index were normal. Given the hematological abnormalities, a bone marrow biopsy was performed after obtaining written informed consent from the patient's family, which showed active bone marrow hyperplasia, reduced mega nucleus-producing platelet ratio, and visible platelet clusters with no evidence of hematological malignancy.

Brain computed tomography (CT) demonstrated high-density areas in the right superior sagittal sinus and transverse sinus (arrow), leading to a suspected diagnosis of CVST (*Figure 1A,B*). The fluid-attenuated inversion recovery showed a SDH near the right parietal occipital lobe and left temporal parietal lobe (*Figure 2A,B*). Further, the brain magnetic resonance venography (MRV) indicated occlusion of the right superior sagittal sinus, transverse sinus, and sigmoid sinus (*Figure 2C*), confirming the diagnosis of CVST. Additionally, multiple venous thromboses were located in her right upper limb and left lower limb by ultrasonography. Thus, low-molecular-weight heparin calcium (10,000 units/day) was subcutaneously injected for 2 weeks.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

Final diagnosis

Rheumatology tests were conducted, since the patient did not present with a history of fever, infection, or contraceptive pill use. The results were positive for antinuclear antibodies [1:3,200, granular pattern (normal, <1:100)], anti-ds-DNA [1:100 (normal, <1:10)], and anti-Sm antibodies. She tested negative for antiphospholipid antibody (aPL), anti-β2 glycoprotein antibody, and lupus anticoagulant (LA). The activity of C3 was reduced [37.9 (normal, 63.5–149%)]. She was diagnosed with SLE as she met four of the criteria described by the 2012 Systemic Lupus International Collaborating Clinics [SLICC (6)]. These included seizures, TP, positive antinuclear antibodies, and anti-ds DNA antibodies. The SLE disease activity index (SLEDAI) score was 24, indicating very high disease activity.

Treatment

Pulse methylprednisolone therapy of 1 g was administered

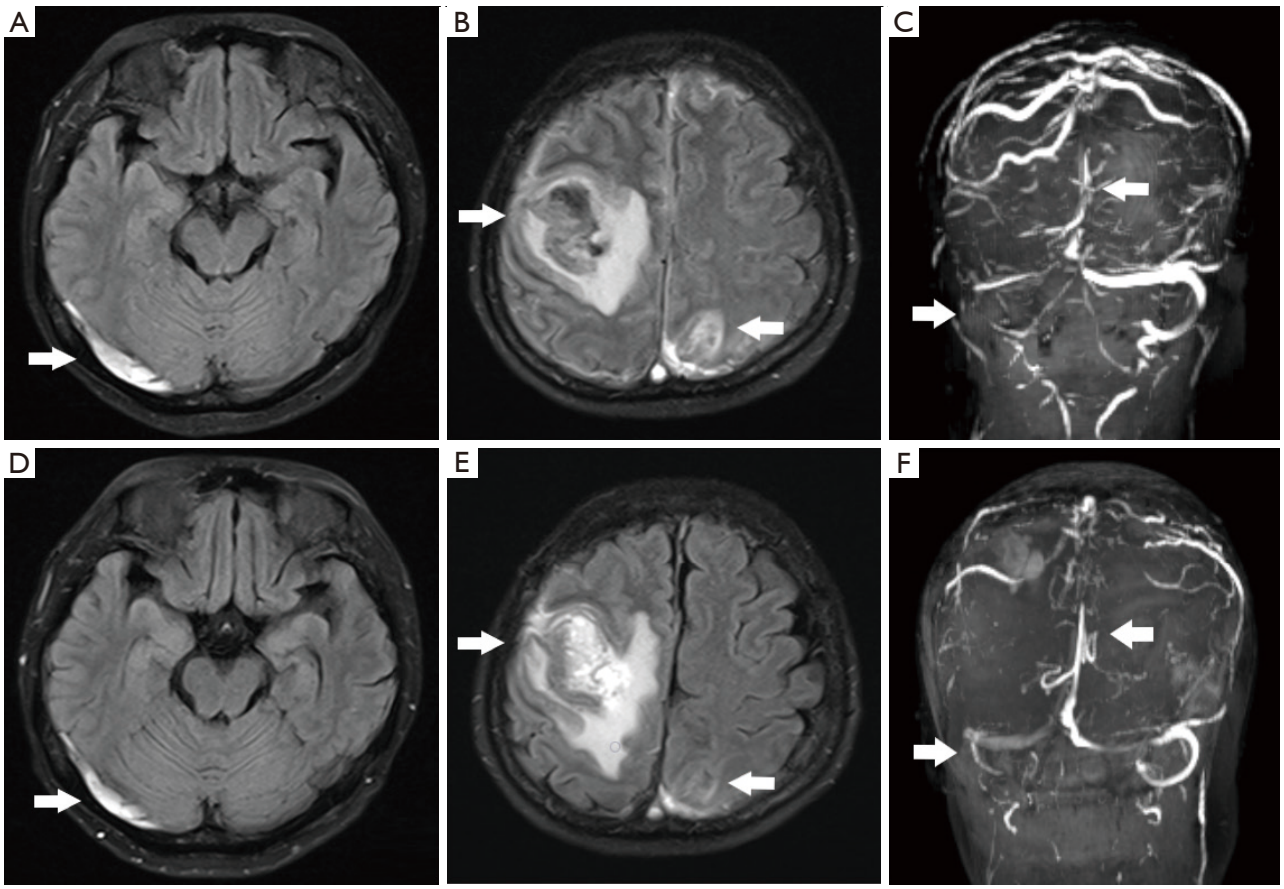

Figure 2 Flair before treatment performed subdural hematoma near the right parietal occipital lobe (A, arrow) and left temporal parietal lobe (B, arrow). MRV showed the occlusion of right superior sagittal sinus, transverse sinus, and sigmoid sinus (C, arrow). Repeat MRV after treatment showed partial reopening of the right superior sagittal sinus, transverse sinus and sigmoid sinus and the improvement of bilaterally subdural hematoma (D,E,F). MRV, magnetic resonance venography.

for 3 days, after which the dose was reduced to 80 mg/day. Additionally, heparin sodium was subcutaneous injected at 5,000 IU, twice a day. She also received intravenous gamma globulin for 5 days, and an oral maintenance therapy with hydroxychloroquine 0.4 g/day. The patient experienced no discomfort during the treatment.

Outcome and follow-up

Her platelet count rose to 96×10^9/L on day 2 of treatment and reached 199×10^9/L on day 6. After two weeks of treatment, the patient's headaches and symptoms completely disappeared, and the myodynamia of the left limbs improved to grade 4. The MRV was obtained again, demonstrating partial reopening of the right superior sagittal sinus, transverse sinus, and sigmoid sinus, and the improvement of bilaterally SDH (*Figure 2D,E,F*), thus indicating that the treatment was effective. She was discharged on oral maintenance therapy with prednisolone acetate 40 mg/day, tacrolimus 2 mg/day, and hydroxychloroquine 0.4 g/day. A summary of the timeline is shown in *Figure 3*.

Discussion

Our patient was diagnosed with SLE based on seizures, TP, positive antinuclear antibodies, and anti-ds DNA antibodies. When minor neuropsychiatric symptoms are excluded, central nervous system disease can be conservatively estimated to occur in >20% of SLE patients (7). CVST is rare in SLE patients, with an incidence of approximately 0.36% (5). However, CVST with SDH in SLE is even rarer. There is only one case report of a patient with SLE

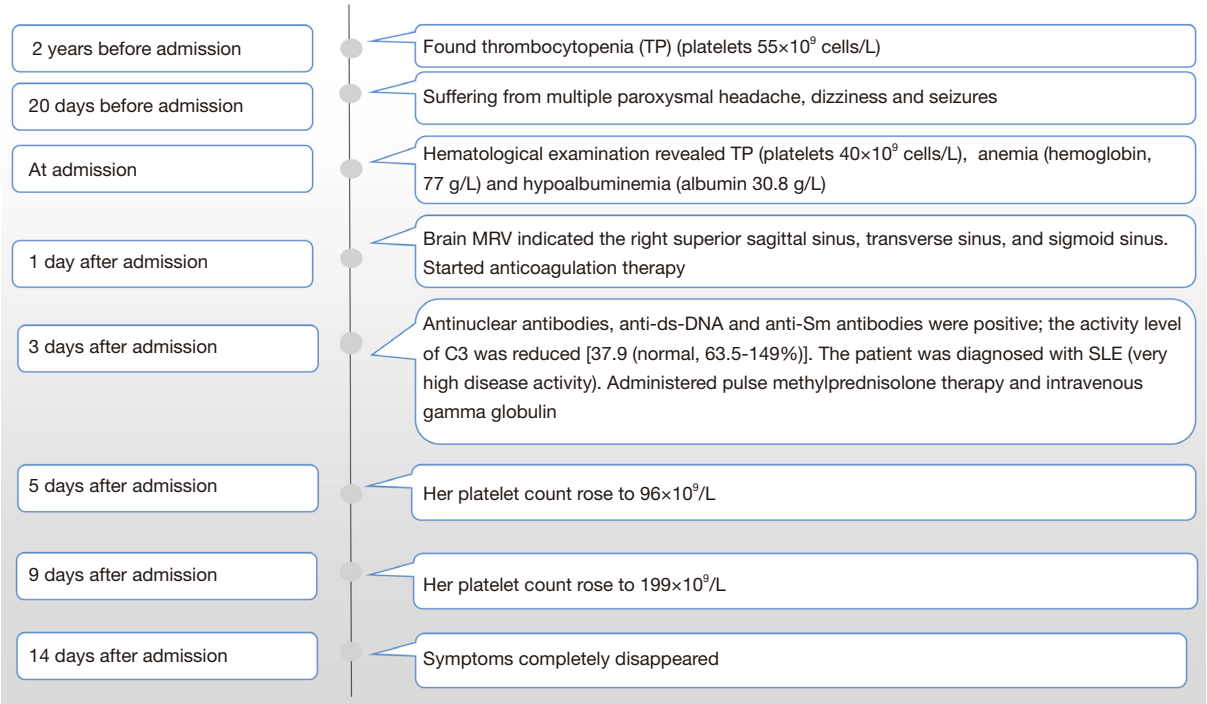

Figure 3 Timeline of case history and management. TP, thrombocytopenia; MRV, magnetic resonance venography.

who had CVST and SDH reported in literature (8). Both the previous patient and this patient had high SLE activity and reported negative for anticardiolipin antibodies. A key difference between the studies was that our patient's renal function was normal.

There are several mechanisms related to the occurrence of CVST in SLE. The thrombotic risk is strongly related to the presence of antiphospholipid antibodies (aPL) and LA (9). Other factors, such as defective fibrinolysis, altered antithrombin III function, hyperfibrinogenemia (10), or coagulation changes may also have a role (9). In addition, some minor factors related to CVST in SLE include infections of the middle ear, facial skin, or intracalvarium. In our case, there was venous thrombosis in the limbs, which illustrated the existence of a hypercoagulable state. Although the aPL and LA were negative, the patient had high SLE activity and low activity level of C3. The treatment with immunosuppressants and anticoagulants was significantly effective, demonstrating that immune complex-induced vasculitis may lead to the occurrence of CVST (11), and play a dominant role in the pathogenesis of CVST. It is noteworthy that our CVST patient also had SDH. The occurrence of SDH is mainly attributed to the rupture of bridging veins resulting from high backpressure by the obstructed thrombosed vein (12). In SLE patients, high SLE activity can cause local vasculitis and lead to small vascular rupture (13).

Additionally, our patient developed severe TP 2 years ago without any other symptoms. TP is a common hematological disorder in SLE; its prevalence is estimated to range from 10–40% (14). Wang *et al.* (5) reported that the incidence of TP in SLE patients with CVST was 58.8%, which is higher than in SLE patients without CVST (23.5%). In addition to immune-mediated damage in SLE, an increasing number of platelets are consumed in the progression of venous thrombosis. Therefore, the risk of SDH after CVST is increased. In the future, TP should be considered in the treatment of SLE and CVST. The possible mechanisms in this case are summarized in *Figure 4*.

The goals of treatment in SLE are to maintain the lowest degree of activity using immunomodulators and immunosuppression, to avoid known triggers, and to prevent and treat comorbidities (15). There is currently no gold standard or guideline for the treatment of SLE patients with complications, it is usually based on experts' experience, which is mostly documented in case reports. The treatment of SLE patients with CVST should include four aims: removal of precipitating factors, administration

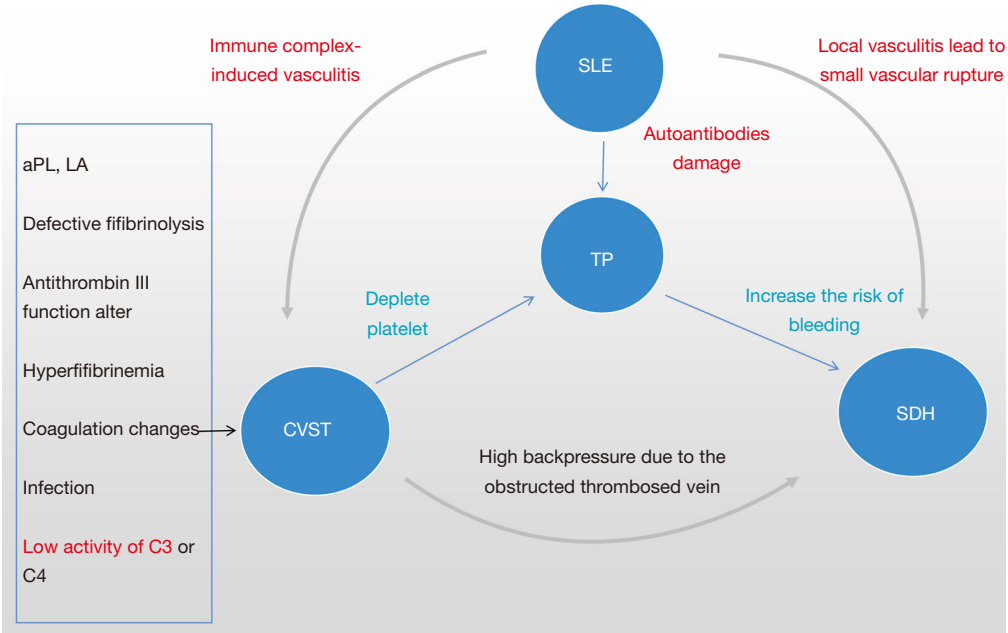

Figure 4 Schematic diagram of pathogenesis. SLE, systemic lupus erythematosus; TP, thrombocytopenia; CVST, cerebral venous sinus thrombosis; SDH, subdural hematoma.

of antithrombotic therapy, lowering of intracranial hemorrhage, and relieving neurological symptoms (5,16,17). It is worth noting that when a patient has TP, we should be cautious about the use of anticoagulants and be wary of bleeding tendencies.

The lack of subsequent checks on the dynamic evolution via MRI and MRV was a limitation in this study. The patient refused to participate in the review due to the necessary long-distance travel.

Conclusions

We present a case of SLE with CVST and SDH in a 44-year-old woman, along with multiple paroxysmal headaches, dizziness, and seizures. CVST and SDH are quite rare and serious complications of SLE. If the treatment is improper, the prognosis is severely poor. The patient responded well to the anticoagulant, pulse methylprednisolone therapy, and intravenous gamma globulin. Thus, for such patients, the primary disease and complications should be identified as early as possible, and intervention and treatment should be made as soon as possible.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at http://dx.doi.org/10.21037/apm-20-2285

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at: http://dx.doi.org/10.21037/apm-20-2285). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in

accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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