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General Medicine

FATAL CEREBRAL VENOUS SINUS THROMBOSIS REVEALING B-CELL ACUTE LYMPHOBLASTIC LEUKAEMIA DURING FIRST-TRIMESTER PREGNANCY: A CASE REPORT

KEY WORDS: Cerebral Venous Sinus Thrombosis, Acute Lymphoblastic Leukemia, B-Cell ALL, Pregnancy, Maternal Mortality, Hypercoagulable State.

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ABSTRACT

Cerebral venous sinus thrombosis (CVST) is an uncommon but potentially fatal neurological emergency accounting for approximately 0.5–1% of all strokes. Pregnancy is a recognized hypercoagulable state and an established risk factor for CVST. Acute lymphoblastic leukemia (ALL) is also associated with thrombotic complications, although CVST as the initial manifestation of previously undiagnosed ALL is exceedingly rare. A 28-year-old woman at 6 weeks of gestation presented with headache, nausea, vomiting, and loose stools. Laboratory evaluation revealed marked leukocytosis with atypical lymphoid cells. She subsequently developed acute neurological deficits and generalized seizures. MRI with MR venography demonstrated extensive CVST with cortical vein involvement and hemorrhagic transformation. Bone marrow examination confirmed B-cell acute lymphoblastic leukemia. Despite anticoagulation, intensive care support, and multidisciplinary management, progressive neurological deterioration culminated in brain death and fatal cardiac arrest. CVST may rarely represent the first manifestation of B-cell acute lymphoblastic leukemia during pregnancy. Early recognition of atypical causes of CVST in young pregnant women with unexplained leukocytosis may facilitate prompt diagnosis and management.

INTRODUCTION

Cerebral venous sinus thrombosis (CVST) is a rare cerebrovascular disorder characterized by thrombosis of the intracranial venous sinuses and cerebral veins. It predominantly affects young adults and women of childbearing age. Pregnancy and the puerperium are recognized risk factors because of physiological changes resulting in a hypercoagulable state. Clinical manifestations are highly variable and include headache, focal neurological deficits, seizures, and altered sensorium. Acute lymphoblastic leukemia (ALL) is a hematological malignancy arising from precursor lymphoid cells. Thrombotic complications are more commonly reported during chemotherapy, particularly with L-asparaginase therapy. CVST preceding the diagnosis of ALL is exceedingly uncommon. The coexistence of pregnancy, leukemia-associated hypercoagulability, and cerebral venous thrombosis creates a unique and potentially fatal clinical scenario. We report a case of extensive CVST with hemorrhagic conversion as the presenting manifestation of previously undiagnosed B-cell ALL in a woman during the first trimester of pregnancy, resulting in maternal mortality.

Case Presentation

A 28-year-old gravida 2 para 1 woman at approximately six weeks of gestation presented with a 15-day history of generalized headache and a 3-day history of nausea, vomiting, and loose stools. She had no significant past medical history apart from a previous lower-segment cesarean section and cholecystectomy. Initial examination revealed stable vital signs and no focal neurological deficits. Laboratory investigations demonstrated marked leukocytosis with total leukocyte counts ranging from 40,000 to 47,000/μL. Peripheral smear showed lymphocytosis with approximately 50% atypical cells, raising suspicion of an underlying hematological malignancy. Within 24 hours of admission, the patient developed acute right-sided weakness, facial asymmetry, and generalized tonic-clonic seizures. MRI brain with MR venography revealed extensive cerebral venous sinus thrombosis involving multiple venous sinuses with associated cortical vein thrombosis and hemorrhagic transformation. The patient was transferred to the intensive care unit and treated with low-molecular-weight heparin, levetiracetam, lacosamide, osmotherapy, broad-spectrum antibiotics, and supportive care. Despite aggressive treatment, she experienced recurrent seizures and progressive decline in neurological status requiring mechanical ventilation. Bone marrow aspiration and biopsy performed during hospitalization confirmed B-cell acute lymphoblastic leukemia. Subsequent imaging demonstrated progression of cerebral edema and worsening neurological injury. Her course was complicated by acute kidney injury, shock requiring vasopressor support, persistent fever, and eventual loss of brainstem reflexes. Repeat electroencephalography showed an isoelectric tracing consistent with brain death. On the seventh hospital day, the patient developed ventricular fibrillation followed by cardiac arrest. Despite advanced cardiac life support measures, return of spontaneous circulation could not be achieved, and she was declared deceased.

DISCUSSION

This case demonstrates the devastating consequences of combined prothrombotic risk factors including early pregnancy and previously undiagnosed B-cell acute lymphoblastic leukemia. Pregnancy promotes thrombosis through increased coagulation factors, reduced fibrinolytic activity, and venous stasis. Leukemia contributes further through leukostasis, endothelial injury, cytokine-mediated activation of coagulation pathways, and hyperviscosity. The convergence of these mechanisms likely precipitated extensive cerebral venous thrombosis in our patient. Although CVST is well recognized during pregnancy, it rarely serves as the presenting manifestation of ALL. Most reports of CVST in ALL occur during chemotherapy, particularly following exposure to L-asparaginase. Cases occurring before leukemia diagnosis are exceptionally uncommon. The diagnosis of CVST requires a high index of suspicion. Persistent headache accompanied by neurological deficits, seizures, or unexplained leukocytosis should prompt urgent neuroimaging with MR venography. Early anticoagulation remains the cornerstone of treatment even in the presence of hemorrhagic venous infarction. Despite adherence to current management recommendations, our patient experienced relentless neurological deterioration, emphasizing the aggressive nature of CVST when associated with extensive thrombosis and underlying hematological malignancy.

CONCLUSION

CVST may rarely be the first manifestation of previously undiagnosed B-cell acute lymphoblastic leukemia during pregnancy. This case highlights the importance of considering occult hematological malignancy in pregnant patients presenting with severe headache, neurological deficits, and unexplained leukocytosis. Prompt multidisciplinary evaluation involving neurologists, hematologists, intensivists, and obstetricians is essential; however,

outcomes may remain poor in the presence of extensive thrombosis and hemorrhagic cerebral injury.

REFERENCES

1. Stam J. Thrombosis of the cerebral veins and sinuses. N Engl J Med. 2005;352(17):1791–1798.
2. Saposnik G, Barinagarrementeria F, Brown RD Jr, et al. Diagnosis and management of cerebral venousthrombosis. Stroke. 2011;42(4):1158–1192.
3. Ferro JM, Bousser MG, Canhão P, et al. Cerebral venous thrombosis. Nat Rev Dis Primers. 2016;2:16067.
4. Devasagayam S, Wyatt B, Leyden J, et al. Cerebral venous sinus thrombosis incidence is higher thanpreviously thought. Stroke. 2016;47(9):2180–2182.
5. Liu J, Yang C, Zhang Z, Li Y. Cerebral venous sinus thrombosis in a young child with acute lymphoblasticleukemia: a case report and literature review. J Int Med Res. 2021;49(1).
6. Sherief LM, Zakaria M, Soliman BK, et al. Cerebral sinuses thrombosis prior to the diagnosis of acutelymphoblastic leukemia: a case report. SAGE Open Med Case Rep. 2022;10.
10. Torere BE, Weigold J, Aiwuyo HO, et al. Diagnostic and therapeutic challenges of concurrent intracranialhemorrhage and cerebral venous thrombosis in a patient with acute lymphoblastic leukemia. Cureus. 2023;15(4):e37482.