CASE STUDY

A 13-year-old boy had fever, fatigue, and breathlessness for two weeks before presenting to the Emergency Department. He also had painless lymphadenopathy on both sides of his neck, axilla, and groin. Four hours before presentation to the Emergency Department, he developed drooping of the right upper eyelid. There was complete ptosis and no associated diplopia. The pupil of the right eye was dilated and nonreactive. The extraocular movements and pupil of the left eye were normal. There was no headache, vomiting, or seizures. Two hours after presentation the patient developed sudden-onset complete weakness of the left side of his body along with left upper motor neuron facial palsy. With a clinical diagnosis of acute cerebrovascular accident, an urgent non-contrast computed tomography scan of the head was performed. It showed multiple hemorrhages, one of which was located in the ventral midbrain on the right side (Figure 1), possibly explaining the contralateral hemiplegia and ipsilateral ocular motor palsy.

Investigations revealed hyperleukocytosis (454,000/µL), hemoglobin of 9.2 g/dL, and thrombocytopenia (42,000/µL), with greater than 99% lymphoblasts and many degenerated cells seen in the peripheral smear examination (Figures 2 and 3). Prothrombin time and activated partial thromboplastin time were 13 seconds and 37 seconds, respectively (reference value 12 seconds and 35 seconds, respectively). Fibrinogen concentration was 2.5 g/L, and there was no laboratory finding to suggest disseminated intravascular coagulation. Renal and liver functions were normal. Serum lactate dehydrogenase was elevated (9 times the upper limit of the reference value). Serum potassium was 6 mmol/L, but there were no accompanying electrocardiographic abnormalities of hyperkalemia. Serum calcium was 9.3 mg/dL, whereas serum uric acid was elevated to 11.4 mg/dL.

We diagnosed acute leukemia, probably acute lymphoblastic leukemia (ALL), on the basis of peripheral blood film. Tumor lysis syndrome was suspected and the patient was hydrated well. Emergency leukapheresis was planned in view of hyperleukocytosis and breathlessness. But before we obtained additional samples for flow cytometry to confirm the diagnosis and before the initiation of leukapheresis, the patient developed seizures, after which he became comatose and died. Clinical course suggested a possible fatal intracranial hemorrhage as the preterminal event.

DISCUSSION

Neurologic manifestations in patients with leukemia can have multiple etiologies, depending on whether the time of presentation is pre- or post-chemotherapy. In prechemotherapy, intracranial hemorrhage and leukemic infiltration are the important causes of neurologic symptoms, whereas in postchemotherapy, infections are the most important cause.1,2 In children with ALL, neurologic manifestations can occur in up to 9% of cases, and in those patients with ALL with extreme leukocytosis (total leukemia blood cell count > 400,000/µL), 2% can have intracranial hemorrhage.3 In patients with acute leukemia, intracranial hemorrhage portends a poor prognosis, with a mortality rate approaching 19.7% in the first 72 hours and 32.7% at 30 days.4 Acute nonlymphoblastic leukemias present more commonly with intracranial hemorrhage than ALL and are more frequently fatal early in the course of the disease (7% in acute myeloblastic leukemia vs 1% in ALL in one series).5,6

Brain stem strokes or cerebrovascular accidents are relatively uncommon, particularly in children. Midbrain strokes commonly result from ischemia or hemorrhage as in any other cerebrovascular territory. Though both
Hyperleukocytosis (usually defined as a white blood cell count > 100,000/µL) generally results in leukostasis, wherein intravascular accumulation of leukemic or nonleukemic white blood cells results in various clinical manifestations, particularly respiratory distress and neurologic disturbances. Hyperleukocytosis is a medical emergency; its management includes supportive care (hydration, prevention, and treatment of tumor lysis syndrome) and urgent cytoreductive therapy. Cytoreduction may be achieved by hydroxyurea, leukapheresis, or conventional chemotherapy. Despite such aggressive measures, mortality remains high in these patients, especially in those with intracranial hemorrhage. Though leukapheresis may reduce circulating lymphoblast cells, thereby effectively controlling leukostasis in cerebral circulation, it has not been consistently shown to improve outcomes. The approach in patients with thrombocytopenia and leukostasis who are at risk of intracranial bleeding should be to identify the type of leukemia as early as possible. Provision of leukapheresis, platelet transfusion, and cytoreductive agents, along with appropriate chemotherapy, may improve outcomes.

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

References


PubMed Search Terms

Image Diagnosis: Weber Syndrome: A Rare Presentation of Acute Leukemia—A Case Report and Review of the Literature


Waterworks

The physics of a man’s circulation are the physics of the waterworks of the town in which he lives, but once out of gear, you cannot apply the same rules for the repair of the one as of the other.

— Aequanimitas, with Other Addresses, Sir William Osler, MD, 1849-1919, physician, clinician, pathologist, teacher, diagnostician, bibliophile, historian, classicist, essayist, conversationalist, organizer, manager, and author