**Oncologic Emergencies Questions**

**Lauren Pommert, MD, MS**

1. A 14-year-old boy presents with cough, shortness of breath, and difficulty lying down. His face and neck swell when his arms are raised. Chest x-ray reveals a large mediastinal mass. A tissue diagnosis is desired. A biopsy is performed with local anesthesia because the anesthesiologist thinks that the patient has a very high general anesthesia risk.

Which of the following findings does *not* make general anesthesia unsafe?

A. Tumor diameter greater than 45% of transthoracic diameter

B. Tracheal cross-sectional area less than 50% of predicted

C. Peak expiratory flow rate less than 50% of predicted

D. A malignancy of hematopoietic origin

E. A large pericardial effusion

**Explanation**

There are no standard criteria to predict the severity of superior vena cava syndrome (SVCS). Several studies have evaluated anesthesia complication risks. Great vessel and tracheal compression with increasing respiratory symptoms and signs are predictive of anesthesia complications. SVCS results most often from an anterior mediastinal mass that can be caused by Hodgkin or non-Hodgkin lymphoma, T-cell lymphoblastic leukemia, sarcomas, and germ cell tumors. It is usually not caused by neuroblastoma, which can present as a posterior mediastinal mass.

1. A 14-year-old boy of Middle Eastern descent presents with a history of fever, abdominal distension, and decreased urine output. His serum creatinine is 1.5 mg/dL, serum uric acid is 13 mg/dL, and serum LDH is 900 U/L. You suspect Burkitt lymphoma and would like to request computed tomography of his abdomen with intravenous contrast. However, his renal function precludes obtaining the study. You institute intravenous hydration and plan to administer rasburicase to rapidly bring down his serum uric acid.

Before administering rasburicase, which of the following tests should be considered?

A. Thiopurine s-methyltransferase status

B. Pyruvate kinase status

C. Uridine diphosphate glucuronosyltransferase 1 isoform A1 status

D. Glucose-6-phosphate dehydrogenase status

E. Adenosine deaminase status

**Explanation**

Rasburicase is contraindicated in patients with known G6PD deficiency because it can cause severe hemolytic anemia.

1. A 13-year-old boy presents to the emergency department with complaints of headache and visual changes. History reveals progressive dyspnea on exertion, generalized fatigue, and increased bruising. His labs are significant for a WBC of 350,000/mcL, of which 80% are reported to be blasts and appear to be myeloblasts without the presence of Auer rods. His hemoglobin is 7.2 g/dL, and his platelets are 18,000/mcL. A CT scan of the head shows a small intracerebral hemorrhage. His coags are normal.

Which of the following is the most appropriate therapy?

1. Start induction chemotherapy.
2. Perform emergent leukapheresis followed the next day by induction chemotherapy.
3. Perform emergent leukapheresis plus hydroxyurea.
4. Provide emergent cranial radiation plus hydroxyurea followed the next day by induction chemotherapy.
5. Provide emergent cranial radiation plus emergent leukapheresis and hydroxyurea followed the next day by induction chemotherapy.

**Explanation**

Patients with acute myeloid leukemia who present with hyperleukocytosis have a life-threatening illness. The primary risk of hyperleukocytosis is leukostasis associated with leukocyte thrombi and aggregates within the vasculature. The immediate objective is to reduce peripheral blast count rapidly to prevent infarction and hemorrhage. This is most quickly done with leukapheresis and should especially be considered in patients with clinical signs and symptoms of leukostasis.

Hydroxyurea is often also included as treatment for leukocytosis until it is safe to initiate systemic chemotherapy with the hope that it will decrease the rate of rise in blast percentage. Cranial radiation is not warranted in this setting and may increase risk of cerebral hemorrhage.

1. When reviewing the chemistry panel of a newly diagnosed patient with acute lymphoblastic leukemia who is lethargic, complaining of flank pain, and experiencing nausea and vomiting, which of the following would you expect to see?
2. Potassium 4.5 mmol/L, phosphorus 8 mg/dL, uric acid 7 mg/dL, calcium 9.0 mg/dL, BUN 12 mg/dL, BUN 12 mg/dL
3. Potassium 6.5 mmol/L, phosphorus 8 mg/dL, uric acid 9 mg/dL, calcium 10 mg/dL, BUN 14 mg/dL
4. Potassium 4 mmol/L, phosphorus 9 mg/dL, uric acid 10 mg/dL, calcium 10 mg/dL, BUN 10 mg/dL
5. Potassium 7 mmol/L, phosphorus 12 mg/dL, uric acid 10 mg/dL, calcium 7 mg/dL, BUN 25 mg/dL

**Explanation**

Tumor lysis syndrome (TLS) is common in newly diagnosed leukemia patients after initiation of therapy. Laboratory results consistent with TLS include hyperkalemia, hyperphosphatemia, hyperuricemia, and hypocalcemia. These patients may also have kidney injury evidenced by elevated BUN and/or creatinine.

1. A 17-year-old boy presents to the emergency department (ED) with progressive cough, which improved after a recent steroid course from his pediatrician but has worsened again. He reports shortness of breath with exertion and difficulty with deep inspiration. His chest x-ray demonstrates a large mediastinal mass and a left pleural effusion. Labs are unremarkable. Vital signs are significant for tachypnea and tachycardia with normal oxygen saturations. The ED calls you to give you a heads up about the patient and let you know they have ordered a chest CT. They are planning to give him lorazepam (Ativan) prior to the scan because of his increasing distress, which they are attributing to anxiety. You go down to the ED to see the patient first and find him sitting up in bed in the tripod position.

What is your recommendation for next steps for diagnostic evaluation?

1. Obtain chest CT to obtain more information about the location of the mass and relationship to the mediastinal structures. Give lorazepam prior to help with anxiety.
2. Cancel the chest CT because of concern for impending respiratory failure, provide oxygen support, admit to the PICU, and arrange for diagnostic pleuracentesis and ECHO
3. Cancel chest CT and arrange for diagnostic biopsy of the mass tomorrow under general anesthesia. Admit to the PICU tonight.
4. Obtain chest CT to obtain more information about the location of the mass and relationship to the mediastinal structures but instruct them not to give lorazepam.
5. Admit to the PICU. Sedate and intubate for airway protection prior to the CT.

**Explanation**

This patient has a large mediastinal mass and signs of impending respiratory failure (tachypnea, tachycardia, and sitting in the tripod position for comfort). You should recognize that putting this patient in the supine position to obtain a chest CT may exacerbate respiratory symptoms. Chest CT is not necessary for diagnostic purposes and should not be performed in patients with tenuous respiratory status. Likewise, patients should not receive anxiolytics, general anesthesia, or be electively intubated for airway protection because of the associated loss of respiratory smooth muscle tone and decrease in respiratory support, which leads to airway collapse that extends beyond where an endotracheal tube can reach.

1. The emergency department calls to alert you of a 16-year-old patient with very high risk B-cell acute lymphoblastic leukemia currently in delayed intensification with fever of 38.6 ˚C. His labs are significant for a total WBC 1.1 x103 uL, differential with 5% neutrophils (ANC 55 x103 uL) and 95% lymphocytes, hemoglobin 7.4 g/dL. and platelets 30 cells/mcL. He is tachycardic and tachypneic with normal blood pressure, bounding pulses, capillary refill of 4 seconds, and normal mental status. He denies mucositis, abdominal pain, or other associated symptoms. The ED has obtained blood cultures from his central line and have maintenance intravenous fluids (IVF) running. Overall, they report that he looks well and say that he is asking to go home. They are seeking recommendations regarding further management. What would you recommend?
	1. Give a dose of ceftriaxone and arrange for follow up in clinic tomorrow morning to reassess.
	2. Start ceftriaxone and give IVF bolus over 30 minutes. Plan to admit to the hospital for close monitoring.
	3. Start cefepime and admit to the hospital for close monitoring. Continue maintenance IVF.
	4. Start cefepime and give a push/pull bolus of IVF now. Reassess vital signs and perfusion after the bolus. Order packed red blood cells. Admit to the hospital for close monitoring.

**Explanation**

This patient with acute lymphoblastic leukemia is in a high-risk phase of therapy and presents to the emergency department with a neutropenic fever and vitals/physical exam findings concerning for sepsis (tachycardia, tachypnea, and decreased perfusion). He requires rapid antibiotic delivery using an antipseudomonal cephalosporin and fluid resuscitation. In the setting of sepsis, intravenous fluids (IVF) should be given rapidly, not over 30 minutes to 1 hour. Packed red blood cells are also an excellent source of fluid for resuscitation and should be considered in all patients who have low hemoglobin and are receiving boluses of IVF due to the dilutional effect. He must be admitted for close monitoring because of high risk of compensation in the setting of neutropenic sepsis.

1. A 3-year-old patient with standard-risk acute lymphoblastic leukemia currently in maintenance therapy was admitted for neutropenic fever without associated sepsis. She has been clinically stable on cefepime for the past 72 hours. Her blood cultures have remained negative, she has been afebrile since admission, and her absolute neutrophil count is now 310 x103 uL. What is her next step in management?
	1. Discharge and discontinue antibiotics.
	2. Discharge home and arrange home health administration of full course of current IV antibiotics.
	3. Remain hospitalized and expand antibiotic coverage to include vancomycin.
	4. Remain hospitalized and continue full course of current IV antibiotics.

**Explanation**

Criteria for discontinuation of antibiotics and discharge for low-risk oncology patients with uncomplicated neutropenic fever include (1) negative blood cultures for 48 to 72 hours, (2) afebrile for 24 hours, and (3) signs of hematologic recovery as evidenced by rising ANC.

1. A 17-year-old girl with history of localized Ewing sarcoma who has been off therapy for 2 years presents to the emergency department with complaints of midline lumbar back pain for the past 2 weeks, now with “leg heaviness” and dysuria. Urinary analysis is consistent with infection. Her bladder feels distended on exam and has 630 mL per bladder scan. Review of systems also reveals new onset constipation, and the exam is concerning for decreased reflexes in bilateral lower legs. Which of the following options indicate the best course of action?
	1. Order an outpatient spinal MRI and send home with a prescription for dexamethasone.
	2. Start dexamethasone, order a spinal CT, and admit to the hospital to start chemotherapy.
	3. Start dexamethasone, order a spinal MRI, and admit to the hospital to start chemotherapy.
	4. Start dexamethasone, order a spinal MRI, consult neurosurgery for possible surgical decompression and radiation oncology for possible emergent radiation, and admit to the hospital.
	5. Start dexamethasone and ask neurosurgery to take her to the operating room for surgical decompression without spinal imaging.

**Explanation**

Signs of spinal cord compression include back pain, radicular pain, weakness, sensory abnormalities, paresis, and urinary and/or stool incontinence/retention. Recognizing these symptoms and starting treatment immediately minimizes long-term neurologic dysfunction. The imaging modality of choice to evaluate for spinal cord compression is MRI. Treatment approaches for spinal cord compression include dexamethasone, surgical decompression, radiation, and chemotherapy. Neurosurgery should be involved early.