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QUESTION 1

A 53-year-old White female, with a history of systemic lupus erythematosus (SLE), hypertension, and peripheral vascular disease, is admitted to the hospital for chest pain and dyspnea. Her cardiac enzymes were positive for acute MI. She subsequently undergoes a cardiac catheterization and stenting of the right coronary artery. Her postcardiac catheterization course is unremarkable, and she is discharged home 3 days later with adequate blood pressure control. Five days later, she is brought to the ER by her husband for abdominal pain and nausea. Her medications consist of aspirin, metoprolol, and prednisone. On physical examination, her blood pressure is 190/95 and her heart rate is 85 bpm. In general, she appears nauseated but is in no acute distress. Her cardiac examination reveals a regular rate and rhythm without murmur or rub. Her lung fields are clear bilaterally. The abdominal examination is positive for diffuse discomfort, without guarding or rebound, and normoactive bowel sounds; her stool is positive for occult blood. Her lower extremities have trace edema bilaterally with 2+ distal pulses; moreover, she has a reddish-blue discoloration on both her lower extremities. You retrieve her records from prior hospitalization. The patient\\'s laboratory results are as follows:

Blood	5 Days prior	Now	Urine
Sodium	140	135	
Potassium	4.4	5.2	Na^+: 35
Chloride	106	113	Creatinine: 45
CO_2	24	20	Specific gravity: 1.012
BUN	15	52	Protein: trace
Creatinine	1.6	3.5	RBCs: 1–3
Glucose	80	115	WBCs: 10–12
Uric acid	6.0	5.8	+ Eosinophils
Amylase	90	205	No cellular casts
WBC	8000	12,000	
Hgb	13.5	12.1	
Platelets (PLT)	400,000	370,000	
% Eosinophils	1%	15%	

Which of the following tests is helpful in distinguishing volume depletion as a possible cause of acute renal failure?

A. kidney ultrasound

B. calculation of the fractional excretion of sodium

C. estimation of the glomerular filtration rate

D. examination of the urine sediment under microscopy

E. calculation of the anion gap

Correct Answer: B Section: (none)

Explanation:

This patient has atheroembolic disease, most likely from the dislodging of arterial plaque during or after the cardiac catheterization, with subsequent kidney embolization. The findings in her history and physical examination that would suggest this are the presence of significant hypertension, abdominal pain, the redblue rash on her extremities (livedo reticularis), and eosinophilia with urinary eosinophils. Furthermore, the time course of the development of acute renal

failure is suggestive of atheroembolic disease. The typical time course for contrast nephropathy is of an immediate onset, usually with subsequent recovery. However, in patients with atheroembolic disease, the kidney failure can occur much later after the procedure. Contrast nephropathy is not associated with the laboratory abnormalities and physical examination findings seen in this case. Interstitial nephritis is unlikely, as is a lupus nephritis flare, given her classic presentation for emboli. Calculation of the fractional excretion of sodium (FeNa) is helpful in differentiating between "prerenal" causes (FeNa 1%). A kidney ultrasound is helpful in determining the presence of urinary tract obstruction. Neither the anion gap nor calculation of glomerular filtration rate is helpful in determining if volume depletion is a possible etiology of acute renal failure. Examination of urine sediment would be helpful in determining the presence of a glomerular etiology of acute renal failure, not a prerenal etiology. Demerol and metabolites can accumulate in patients with depressed kidney function, leading to increased levels and, potentially, convulsions. NSAIDs should be avoided in patients with acute kidney failure, as these drugs are potential nephrotoxins and could prevent a recovery of kidney function. Ketorolac, indomethacin, and ibuprofen are all NSAIDs. Therefore, morphine is the best option of those given.WBC casts are suggestive of pyelonephritis. High levels of proteinuria are significant for the diagnosis of nephrotic syndrome, but not lupus nephritis specifically. Urine eosinophils are usually seen in patients with acute interstitial nephritis or atheroembolic disease. Lupus nephritis is usually associated with depressed serum complement levels. Of these tests, RBC casts are the most suggestive of glomerulonephritis.

QUESTION 2

A 13-year-old boy is brought into the emergency room with a laceration of his right arm. According to his parents, he received the injury when he fell on the ground while playing at the family farm about 1 hour ago. He has no known history of any medical problems. His parents say that they haven\\'t brought him to the doctor in years. On questioning, they report that he only received one of his "baby shots" and they are not sure which one that was. On examination, he is healthy appearing. He is appropriately apprehensive but calm and consolable. His right arm has a 5 cm linear laceration with visible soil particles in and about the wound. The remainder of his examination is unremarkable. You carefully clean and irrigate the wound and then primarily repair the laceration with sutures.

What immediate tetanus prophylaxis would be optimal in this case?

A. IM injection of adult Td vaccine only

B. IM injection of both adult Td vaccine and tetanus immune globulin (TIG)

C. IM injection of Tdap only

D. IM injection of TIG only

E. IM injection of both Tdap and TIG

Correct Answer: E Section: (none)

Explanation: Explanations: The disease tetanus is caused by an exotoxin produced by the anaerobic, gram-positive bacterium C. tetani. The spores of C. tetani are endemic in soil, particularly in agricultural areas. They can also be found in the intestines and feces of many animals. Human infection usually is the result of the introduction of the spores through a wound, such as a puncture or laceration. The spores can then germinate and toxins are released. Tetanus is characterized by unopposed muscle contractions and spasms. Autonomic nervous system manifestations, seizures, and difficulty swallowing may occur. Recovery may take months, but the disease is often fatal. In the developed world, most cases of tetanus occur in those who either were never vaccinated or who completed a primary vaccine series but have not had a booster in the preceding 10 years. The currently available vaccine is a toxoid which consists of a formaldehyde-treated toxin. It is available as a single antigen vaccine, combined with diphtheria (pediatric DT or adult Td) or combined with both diphtheria and acellular pertussis vaccine (DTaP). Whenever possible, tetanus toxoid should be given in combination with diphtheria toxoid to provide periodic boosting for both antigens. There is little reason to use single antigen tetanus toxoid alone. Management of a potentially contaminated wound initially involves local wound

care. Necrotic tissue should be debrided, foreign material removed, and the wound irrigated. The need for active and/or passive immunization against tetanus depends on the wound and the patient\\'s history of immunization. A person who has completed a primary series of three or more doses of tetanus toxoid vaccine will not require passive immunization with TIG, but may require a booster of dT or Tdap. For a clean, minor wound, a Td or Tdap booster would be indicated if it has been more than 10 years since the patient\\'s most recent booster. For all other wounds, a booster would be indicated if it has been 5 years since the most recent booster. In a person who has not completed a primary series, who is completely unimmunized, or in whom the vaccine status is unknown, initiating passive immunization with Td or Tdap is indicated for all wounds. If the wound is clean and minor then TIG would not be recommended. For all other wounds, both Td and TIG would be indicated, as the initial doses of Td/Tdap may not produce immunity and TIG can provide immediate, temporary immunity. Antibiotic prophylaxis against tetanus is not useful. As noted in explanation 9 (above), Tdap is recommended as a substitute for a single Td dose in order to address the increasing rates of pertussis being encountered in the population. As the patient in question 32 has no history of having completed a primary vaccine series and has a contaminated wound, the optimal management would be to provide both Tdap and TIG. If Tdap were not available, then utilizing Td and TIG would be an acceptable substitute, with a dose of Tdap to be given as part of his "catchup" series in the future.

QUESTION 3

A 68-year-old White male, with a history of hypertension, an 80 pack-year history of tobacco use and emphysema, is brought into the ER because of 4 days of progressive confusion and lethargy. His wife notes that he takes amlodipine for his hypertension. He does not use over-the-counter (OTC) medications, alcohol, or drugs. Furthermore, she indicates that he has unintentionally lost approximately 30 lbs in the last 6 months. His physical examination shows that he is afebrile with a blood pressure of 142/85, heart rate of 92 (no orthostatic changes), and a room-air O2 saturation of 91%. He is 70 kg. The patient appears cachectic. He is arousable but lethargic and unable to follow any commands. His mucous membranes are moist, heart rate regular without murmurs or a S3/S4 gallop, and extremities without any edema. His pulmonary examination shows mildly diminished breath sounds in the right lower lobe with wheezing bilaterally. The patient is unable to follow commands during neurologic examination but moves all his extremities spontaneously. Laboratory results are as follows:

Blood Sodium: 109 Potassium: 3.8 Chloride: 103 CO2: 33 BUN: 17 Creatinine: 1.1 Glucose: 95 Urine osmolality: 600 Plasma osmolality: 229 White blood cell (WBC): 8000 Hgb: 15.8 Hematocrit (HCT): 45.3 Platelets: 410 Arterial blood gas: pH 7.36/pCO2 60/pO2 285 A chest x-ray (CXR) reveals a large right hilar mass.

Which of the following provides the best explanation for this patient\\'s hyponatremia?

A. inappropriate high level of antidiuretic hormone

B. increased water intake (psychogenic polydipsia)

C. volume depletion due to decreased oral intake over the last week

D. the use of a thiazide for the treatment of hypertension E. decreased expression of renal collecting duct "water channels"

Correct Answer: A Section: (none)

Explanation:

The patient has hypotonic hyponatremia, which can lead to increased water shifting into the brain, resulting in cerebral edema. This patient has nothing in history or physical examination to suggest a stroke or the presence of sepsis as the etiology of his altered mental status. Central pontine myelinolysis is a potentially devastating neurologic complication that can result from the treatment of hyponatremia, not hyponatremia itself. While respiratory acidosis could potentially contribute to this patient\\'s change in mental status, cerebral edema due to hypotonicity is the most likely etiology. The

patient\\'s laboratory studies indicate a low plasma osmolality with an inappropriately increased urine osmolality. With this degree of hypotonicity, the urine should be maximally dilute (osmolality of