

Board Review Questions in Emergency Medicine

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Questions (Answers start on page 50)

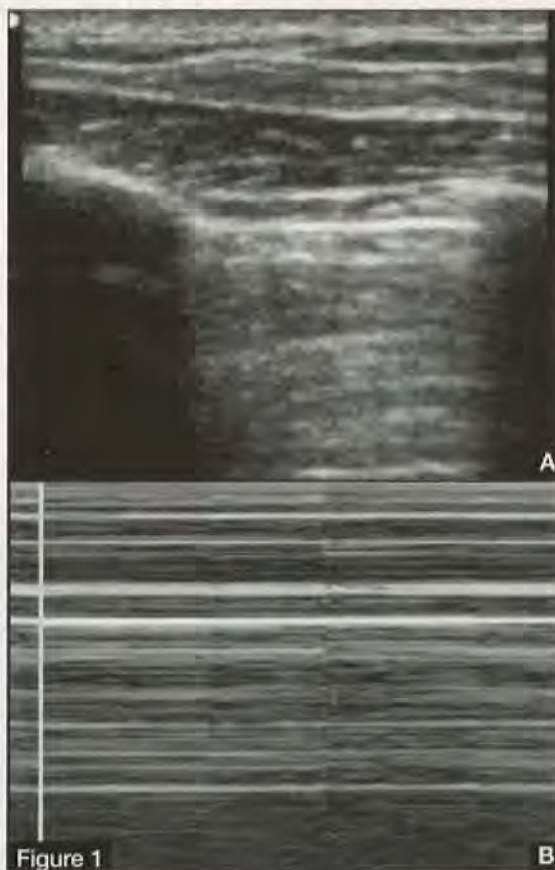
► **1.** A 17-year-old teenaged boy presents with flushed skin, dilated pupils, dry mouth, agitation, confusion, and urinary retention. Vital signs are: heart rate, 115 beats/min; blood pressure (BP), 140/90 mm Hg; temperature, 99°F; respiratory rate, 18 breaths/min. His medical history is unremarkable. Which of the following substances is not likely to be the cause for the patient's symptoms?

- A. Jimson weed
- B. Ecstasy (methylenedioxymethamphetamine)
- C. Diphenhydramine
- D. *Amanita muscaria*
- E. Benztropine mesylate (Cogentin)

► **2.** A 29-year-old woman presents to the emergency department after having a 5-minute generalized tonic-clonic seizure. She is postictal and unable to provide a history. Vital signs are: temperature, 98.6°F; pulse, 112 beats/min; BP, 160/105 mm Hg; respiratory rate, 14 breaths/min; oxygen saturation, 97%. Primary examination reveals that her pupils are equal and are reactive to light. She moves her extremities purposefully to stimulation. Her husband states the patient is generally healthy and had an uncomplicated pregnancy that resulted in a vaginal delivery 2 weeks ago. What would be the first-line treatment for her condition?

- A. Lorazepam (Ativan)
- B. Magnesium
- C. Phenytoin (Dilantin)
- D. Labetalol HCl (Trandate)

► **3.** You are evaluating a 28-year-old man whose chief complaint is left-sided chest pain that began while he was lifting weights at the gym this morning. Vital signs are: temperature, 99.5°F; heart rate, 101 beats/min; BP, 129/77 mm Hg; respiratory rate, 28 breaths/min; oxygen saturation, 94% on room air. Examination shows his trachea is midline, and no jugular venous distention is evident. Cardiopulmonary examination is remarkable for diminished breath sounds on the left side. Deep inspiration exacerbates his chest pain. You perform a bedside thoracic ultrasound while the patient is waiting for the chest x-ray you ordered. You place the linear transducer in the midclavicular line over the left third inter-



costal space, and obtain B-mode (Figure 1A) and M-mode (Figure 1B) images. Both lung sliding and comet-tail artifact are absent on the B-mode image. The M-mode images of the left chest differ significantly from the right chest. What is the diagnosis?

- A. Pulmonary embolus
- B. Pneumothorax
- C. Musculoskeletal strain
- D. Myocardial infarction (MI)
- E. Foreign body aspiration

► **4.** A 75-year-old man is brought to the emergency department by his family because of mental status changes associated with fever. He had a prodromal illness consisting of cough, congestion, and myalgias. The family is

concerned about West Nile virus infection, which they heard about on the evening news. Which of these statements regarding West Nile virus is NOT true?

- A. Mosquitoes serve as the primary amplifying hosts
- B. West Nile virus infection has been transmitted through blood transfusions
- C. Less than 1% of patients develop severe neurologic disease
- D. Advanced age is the most important risk factor for death
- E. Treatment for West Nile virus encephalitis is mainly supportive

► 5. A 6-year-old, asymptomatic, previously healthy girl presents 2 hours after ingesting 4 of her mother's captopril (Capoten) tablets. What is the appropriate treatment?

- A. Discharge the patient home if she is stable after 4 hours of observation
- B. Admit the patient to the intensive care unit to monitor for hemodynamic instability
- C. Administer intravenous (IV) hydration, and evaluate renal function
- D. Initiate gastric lavage
- E. Admit the patient, and notify social services to evaluate for possible child abuse or neglect

► 6. Which of these statements concerning primary coronary angioplasty and fibrinolytic therapy for patients with acute MI with ST-segment elevation is NOT true?

- A. Primary angioplasty is superior to fibrinolysis for patients who are admitted to hospitals with angioplasty facilities
- B. For patients who arrive at a hospital that does not have an invasive treatment center, onsite fibrinolysis is superior to transfer and primary angioplasty, as long as the transfer takes 1 hour or less
- C. Patients who receive angioplasty have a reduced rate of reinfarction when compared with those who receive fibrinolytic therapy
- D. The benefit of primary angioplasty depends on the volume of procedures performed and the level of expertise of the physician

► 7. An 89-year-old man presents with abdominal pain that has been increasing over the past 24 hours. He has a history of seasonal allergies and has been using increasing doses of diphenhydramine HCl (Benadryl) for symptomatic relief. The patient's BP is 210/98 mm Hg, and his heart rate is 102 beats/min. His abdomen is distended and diffusely tender to palpation. The transabdominal bedside ultrasound reveals the diagnosis (Figure 4). What should you do next?

- A. Perform a paracentesis

- B. Call for an emergent vascular consult
- C. Administer IV labetalol (Normodyne)
- D. Insert a Foley catheter
- E. Order a computed tomography (CT) scan of the abdomen and pelvis



Figure 4

► 8. A 75-year-old woman taking warfarin sodium (Coumadin) long-term for atrial fibrillation presents 12 hours after tripping and falling. She is currently asymptomatic and denies loss of consciousness, headache, or vomiting. Physical examination is unremarkable, except for a small, nonbleeding abrasion on her forehead. CT of the head shows no acute traumatic lesions. The international normalized ratio (INR) is elevated, at 6.5. What is the next step in management?

- A. Omit warfarin dose and administer 1 mg vitamin K subcutaneously
- B. 24-hour INR check; administer 1 mg vitamin K orally
- C. Omit 1-2 warfarin doses; administer 1 mg vitamin K subcutaneously; 24-hour INR check
- D. Omit 1-2 warfarin doses; administer 1 mg vitamin K orally; 24-hour INR check
- E. Stop warfarin therapy altogether

► 9. A 50-year-old, right-handed woman comes to the emergency department after being stung on her right middle finger by her pet lionfish. She is experiencing severe pain in that finger. Examination reveals fusiform swelling and mild erythema of the distal half of the finger. What is the most appropriate next step?

- A. Obtain radiographs to evaluate for a retained spine
- B. Consult a hand surgeon for extraction of a possible retained spine

- C. Administer a nonsteroidal antiinflammatory drug
- D. Soak the finger in hot water
- E. Apply acetic acid to inactivate the toxin

► **10.** A 16-year-old teenaged boy presents to your emergency department because of a 2-hour acute right inguinal pain. He says that he had similar pain earlier in the day that resolved spontaneously. He has not had any fever or urinary symptoms but did have nausea and vomiting. He denies any antecedent trauma or sexual activity. Physical examination reveals a swollen, tender, right hemiscrotum. All the following statements are correct, except:

- A. This is a classic presentation of testicular torsion
- B. Scrotal support and antibiotics are not indicated
- C. Absence of a cremasteric reflex is typical to his condition
- D. Color Doppler ultrasound is the initial diagnostic test of choice
- E. Manual detorsion of the testicle is the definitive treatment

► **11.** A 35-year-old man is brought in by emergency medical services (EMS) after he was found unresponsive outside of a downtown bar. Witnesses told EMS workers that he had been involved in a large bar brawl minutes before EMS arrived. In the ambulance bay, the patient goes into pulseless electrical activity, as shown on the monitor. As your team attempts to secure his airway and establish IV access, you perform a quick parasternal cardiac ultrasound (Figure 5). What is the next best step in this patient's management?

- A. Place bilateral chest tubes
- B. Administer 5 mg epinephrine down the endotracheal tube
- C. Emergent thoracotomy
- D. Order a CT scan of his chest
- E. Perform an emergent pericardiocentesis



► **12.** A 25-year-old man with a known history of bipolar disorder and substance abuse presents with mild

lethargy after ingesting an unknown amount of lithium. His BP is 110/70 mm Hg; pulse, 108 beats/min; temperature, 97.8°F; and lithium level, 2.5 mEq/L (therapeutic range, 0.6-1.2 mEq/L). What would be the most appropriate next step?

- A. Administer activated charcoal
- B. Initiate whole-bowel irrigation
- C. Determine the time and amount of ingestion
- D. Arrange for urgent hemodialysis
- E. Initiate forced saline diuresis

► **13.** A young woman presents to your emergency department complaining of pain after "twisting" her knee in a basketball game. Which statement about the Ottawa Knee Rules is not correct?

- A. Radiographs are required for patients with acute knee injuries who are 55 years or older
- B. Radiographs are required for patients with knee injuries who cannot bear weight on the affected leg, either immediately after injury or in the emergency department
- C. Radiographs are required for patients with tenderness to palpation of the tibial plateau
- D. The Ottawa Knee Rules have been validated prospectively in children aged 5 to 16 years
- E. The Ottawa Knee Rules are 100% sensitive for detecting clinically significant fractures in adults with acute knee injuries

► **14.** An 18-month-old girl presents obtunded, with poor respiratory effort, after she fell on her head. A large ecchymosis is seen in the right temporal region. The child was difficult to intubate and experienced hypoxic episodes with 60% oxygen saturation, but the capnometer shows sustained color change, and you notice tube fogging after placement. Despite attaching a breathing mask, you are unable to raise the oxygen saturation above 86% with a good waveform. Other vital signs are stable, but diminished breath sounds are evident on the left. What is the next step in management?

- A. Needle decompression of left chest
- B. Replace existing endotracheal tube
- C. Change placement of the pulse oximeter
- D. Check tube positioning

► **15.** You are evaluating an 8-year-old girl for complaints of a pruritic rash that has progressed during the past 2 days. The lesions consist of a vesicular eruption on an erythematous base. The rash was preceded by a few days of cough and sore throat. The child has a history of renal transplantation and is taking high-dose immunosuppressive therapy. Other than a low-grade fever, she appears well. All the following statements about this

Continued

patient's condition are correct, except:

- A. Immunocompromised patients manifest a shorter incubation and longer infectivity period than other patients
- B. Complications include encephalitis, pneumonia, hepatitis, and bacterial superinfection of skin lesions
- C. The patient should be started on IV acyclovir, and varicella-zoster immune globulin should be administered
- D. The diagnosis can be confirmed with tissue cultures, direct fluorescent antibody testing, Tzanck smears, and polymerase chain reaction (PCR) testing

► **16.** A 16-year-old girl presents with right shoulder pain and nausea for the past 2 days. She thinks that she injured her shoulder when she was lifting heavy boxes last week. She has been taking ibuprofen, without much relief. On further questioning, she reports mild, intermittent, crampy lower abdominal pain for the past few days. She denies fever, dysuria, vaginal bleeding, or discharge. She is sexually active and thinks that her last menstrual period was 4 or 5 weeks ago. She is not taking any medications.

Vital signs are: BP, 105/70 mm Hg; heart rate, 97 beats/min; respiratory rate, 20 breaths/min. Physical examination findings are unremarkable, except for mild tenderness in the right lower quadrant, but no rebound or guarding. Her right shoulder examination is normal.



Figure 6

During preparations for a pelvic examination, the patient becomes hypotensive and tachycardic. A quick bedside ultrasound is performed (Figure 6). What is the most likely diagnosis?

- A. Right rotator cuff injury
- B. Ruptured ovarian cyst
- C. Appendicitis
- D. Ruptured ectopic pregnancy
- E. Renal colic

► **17.** A 69-year-old woman is brought to your emergency department after having pulseless ventricular tachycardia arrest. Defibrillation in the prehospital setting resulted in the return of spontaneous circulation. Her vital signs are stable on arrival, but she remains comatose. Which of the following statements about initiating therapeutic hypothermia for this patient is not true?

- A. Therapeutic hypothermia is a Class IIa recommendation in the unconscious adult who exhibits a return of spontaneous circulation after ventricular fibrillation and pulseless ventricular tachycardia cardiac arrest
- B. Therapeutic hypothermia works by decreasing metabolic demands
- C. Modalities for cooling the patient include cooling blankets, ice packs, iced saline gastric lavage, cooled IV fluids, and endovascular cooling catheters
- D. Patients treated with traditional normothermia have a higher rate of sepsis
- E. Target temperature is 32°C-34°C for 12-24 hours

► **18.** A 45-year-old man with a history of hypertension comes to the emergency department agitated and combative after smoking cocaine. Vital signs are: BP, 240/120 mm Hg; pulse, 110 beats/min; temperature, 99.2°F; respiratory rate, 24 breaths/min. Among the following IV therapies, which one would be the most appropriate for initial control of his hypertension?

- A. Lorazepam
- B. Metoprolol (Lopressor)
- C. Verapamil HCl
- D. Furosemide
- E. Labetalol

► **19.** You have been evaluating a 42-year-old woman who is complaining of leg cramps that began after she underwent liposuction 3 days ago. During your evaluation, she suddenly becomes diaphoretic and dyspneic and starts complaining of sharp pleuritic chest pain. What bedside ultrasound finding would arouse suspicion for a large, acute pulmonary embolus?

- A. Increased diastolic diameter of the right ventricle
- B. Increased diastolic diameter of the left ventricle

- C. Decreased diastolic diameter of the right ventricle
- D. Increased aortic root diameter
- E. Rightward bowing of the septum

► **20.** A 26-year-old man presents to your emergency department with an acute onset of severe, left-sided pleuritic chest pain of 3 hours' duration. His vital signs, including respiratory rate and oxygen saturation, are normal. The patient does not appear to be in acute

distress. The patient denies antecedent trauma but acknowledges a remote history of a "collapsed lung." Chest radiography reveals a small pneumothorax. Which of the following strategies would be appropriate in this case?

- A. Emergent chest tube placement
- B. Discharge home after a period of observation
- C. Evaluation by a thoracic surgeon
- D. Allow travel by air without restrictions

Answers

1—B. Exposure to any of these agents, except Ecstasy, can cause symptoms consistent with an anticholinergic toxidrome. Ecstasy is an amphetamine analog that activates the sympathetic nervous system via the release of catecholamines and serotonin. Clinical manifestations associated with its use include euphoria, agitation, vomiting, tachycardia, seizures, bruxisms, and hypertension. Dry mouth, dry skin, and urinary retention, as seen in this patient, are not common reactions to Ecstasy use. The plants *A. muscaria* and jimson weed have anticholinergic effects.

Sources

Albertson T. Amphetamines. In: Olson KR, Becker CE, Benowitz NL, et al, eds. *Poisoning and Drug Overdose*. 5th ed. Norwalk, Conn: Appleton and Lange; 2007:73-76.

Shannon M. Methylenedioxymethamphetamine (MDMA, "Ecstasy"). *Pediatr Emerg Care*. 2000;16:377-380.

2—B. This patient is suffering from late postpartum eclampsia, defined as seizure activity that occurs more than 48 hours after delivery and is associated with hypertension and proteinuria. Eclamptic seizures have been reported to occur up to 23 days postpartum. As many as 66% of women with late postpartum eclampsia are asymptomatic before seizure onset. Magnesium is the treatment of choice; it resolves seizures in 95% of cases. Lorazepam does not have a role in the initial treatment but may be used for refractory seizures. Phenytoin is not indicated in eclamptic patients. Hypertension usually resolves with the initiation of magnesium therapy. For refractory cases, hydralazine HCl (Apresoline) or labetalol HCl have proven efficacy.

Sources

Hirshfeld-Cytron J, Lam C, Karumanchi SA, et al. Late postpartum eclampsia: examples and review. *Obstet Gynecol Surv*. 2006;61:471-480.

Martin J, Sidman R. Late postpartum eclampsia: a common presentation of an uncommon diagnosis. *J Emerg Med*. 2003;25:387-390.

Sibai BM, Schneider JM, Morrison JC, et al. The late postpartum eclampsia controversy. *Obstet Gynecol*. 1980;55:74-78.

3—B. A pneumothorax occurs when air is trapped between the parietal and visceral pleurae. A primary spontaneous pneumothorax can occur in healthy people, without underlying lung disease and in the absence of trauma or iatrogenic insult. Spontaneous pneumothoraces tend to



Figure 2—B-mode ultrasound of a normal lung showing comet-tail artifacts. C = comet tail; P-V= parietal-vascular pleurae; Rev = reverberation artifact.



Figure 3—Normal lung with the seashore pattern, as depicted on M-mode ultrasound. P-V= parietal-vascular pleurae.

be more common in young, tall males, and can be easily visualized on bedside thoracic ultrasound. During respiration, the normal gliding of the parietal pleura against the visceral pleura appears as lung sliding on ultrasound. Apposition of the parietal and visceral pleurae produces the hyperechoic artifact known as comet tails, as visualized on the B-mode ultrasound (Figure 2).

In M-mode ultrasound, a normal lung will demonstrate the seashore pattern (Figure 3, page 50). In contrast, with a pneumothorax, the stratosphere sign is present on the M-mode ultrasound, as seen in Figure 1B (page 44).

Sources

Tayal VS, Kendall JL. Trauma. In: Cosby KS, Kendall JL. *Practical Guide to Emergency Ultrasound*. Philadelphia, Pa: Lippincott Williams & Wilkins; 2006:43-88.

Wu TS. Probing further: ultrasound evaluation of pneumothoraces. *Practical Summaries in Acute Care*. 2007;11:1-12.

4—A. West Nile virus is a single-stranded RNA virus of the family *Flaviviridae*, which also includes several other viruses associated with human encephalitis, such as the St. Louis encephalitis and Japanese encephalitis viruses. West Nile virus infection is supported by a bird-mosquito-to-bird cycle, with birds serving as the primary amplifying hosts and mosquitoes as the vector of transmission to humans. Nearly all human West Nile virus infections have resulted from mosquito bites, but viral transmission has been documented from red blood cell, fresh-frozen plasma, and platelet transfusions, as well as from organ donation. Most infected individuals remain asymptomatic. Approximately 20% of those infected develop West Nile fever, a mild febrile illness lasting 3 to 6 days. Symptoms include malaise, anorexia, upper respiratory tract symptoms, vomiting, headache, myalgia, and rash. Less than 1% of infected patients develop severe neurologic disease, such as encephalitis or acute flaccid paralysis, a polioli-like syndrome. Diagnosis is best made by detecting specific immunoglobulin M antibody in serum or in cerebrospinal fluid samples. Case-fatality rates range from 4% to 18% during outbreaks but are as high as 15% to 29% among patients older than 70, making advanced age the most important risk factor for death. Treatment is supportive. To date, ribavirin (eg, Copegus, Rebetron, Ribaspheres), interferon, gamma globulin, and steroids have not shown treatment efficacy. Human vaccine studies are underway, but the most effective treatment is still protection against mosquito bites in endemic areas.

Sources

Chowers MY, Lang R, Nassar F, et al. Clinical characteristics of the West Nile fever outbreak, Israel, 2000. *Emerg Infect Dis*. 2001;7:675-678.

Mostashari F, Bunning ML, Kitsutani PT, et al. Epidemic West Nile encephalitis, New York, 1999: results of a household-based seroepidemiological survey. *Lancet*. 2001;358:261-264.

Pepperell C, Rau N, Krajden S, et al. West Nile virus infection in 2002: morbidity and mortality among patients admitted to hospital in south-central Ontario. *CMAJ*. 2003;168:1399-1405.

Sejvar JJ, Haddad MB, Tierney BC, et al. Neurologic manifestations and outcome of West Nile virus infection. *JAMA*. 2003;290:511-515.

Tsai TF, Popovici F, Cernescu C, et al. West Nile encephalitis epidemic in southeastern Romania. *Lancet*. 1998;352:767-771.

5—E. Angiotensin-converting-enzyme inhibitor overdoses are generally well tolerated. Admission to the intensive care unit is not warranted based on this clinical presentation. However, the age of this patient should

arouse your suspicion for abuse or neglect. Epidemiologically, unintentional ingestions in infants younger than 6 months and in children between the ages of 5 and adolescence are rare. You should consider that the child might have been intentionally given the drug, and thus you have the legal obligation to report it as a suspicious incident. Local child protective services can decide whether it is safe to release the child back to her parents' custody. In unclear situations, the child can be admitted for "observation" to allow time for proper evaluation.

Source

Dempsey D. Special considerations in pediatric patients. In: Olson KR, Becker CE, Benowitz NL, et al, eds. *Poisoning and Drug Overdose*. 5th ed. Norwalk, Conn: Appleton and Lange; 2007:57-65.

6—B. Primary angioplasty is considered superior to fibrinolysis for patients with ST-segment elevation MI who are admitted to hospitals that have angioplasty facilities. It has been well documented that the benefit of primary angioplasty depends on the volume of procedures performed and the physician's experience, with high-volume facilities (600 to 1600 angioplasty procedures annually) having higher survival rates. A large Danish study showed that transferring patients to an invasive treatment center was superior to onsite fibrinolysis, provided that the transfer took less than 2 hours. Although transfer was shown to be safe and effective within that time, there were insufficient data to make conclusions about outcomes when longer transfer times are involved, because most transfers were efficiently performed in this study.

Sources

Andersen HR, Nielsen TT, Rasmussen K, et al. A comparison of coronary angioplasty with fibrinolytic therapy in acute myocardial infarction. *N Engl J Med*. 2003;349:733-742.

Grines CL, Browne KF, Marco J, et al. A comparison of immediate angioplasty with thrombolytic therapy for acute myocardial infarction. *N Engl J Med*. 1993;328:673-679.

7—D. The transabdominal ultrasound shows a distended bladder (Figure 4, page 45) likely secondary to urinary retention exacerbated by escalating antihistamine doses. Placement of a urinary catheter will provide the patient with immediate relief. Many ultrasound machines offer automated calculators for simple volume measurement based on bladder length, width, and height. Following the rapid, large-volume drainage of a distended bladder, physicians should monitor for postobstructive diuresis, hemorrhage, and electrolyte disturbances.

Sources

Swadron S, Mandavia D. Renal. In: Ma OJ, Mateer JR. *Emergency Ultrasound*. New York, NY: McGraw-Hill; 2003:207-215.

Wolfson AB, Harwood-Nuss A. *Renal and Urologic Emergencies*. New York, NY: Churchill Livingstone; 1986:187-188.

8—D. This question illustrates the common clinical scenario of an asymptomatic patient with supratherapeutic warfarin levels. The American College of Chest Physi-

cians' guidelines for INRs greater than 5 but less than 9 in patients without significant bleeding include omitting the next 1 or 2 doses of warfarin and more frequent INR checks. In patients with an increased risk of bleeding, oral vitamin K can be considered. In a prospective, randomized, controlled trial of asymptomatic patients with supratherapeutic INRs, however, 1 mg of oral vitamin K was found to lower INR levels more rapidly than 1 mg of subcutaneous vitamin K. Hence, oral vitamin K is the correct approach.

Sources

Ansell J, Hirsh J, Poller L, et al. The pharmacology and management of the vitamin K antagonists. *Chest*. 2004;126(suppl 3):204S-233S.
Crowther MA, Douketis JD, Schnurr T, et al. Oral vitamin K lowers the international normalized ratio more rapidly than subcutaneous vitamin K in the treatment of warfarin-associated coagulopathy. *Ann Intern Med*. 2002;137:251-254.

9—D. Lionfish belong to the *Scorpaenidae* family. Exposure to these saltwater fish is increasing, because of the popularity of home aquariums. The venom from this creature is injected into the victim via glands along the dorsal spines. Envenomation causes immediate and severe pain. Erythema, swelling, and ecchymosis may ensue. The venom is heat labile. Studies have demonstrated immediate pain relief in up to 94% of victims after the affected area is immersed in hot water (45°C). Radiographs may be warranted after the pain is controlled to evaluate for retained spines. Surgical management is rarely indicated, except to remove spines or debride infected wounds.

Sources

Kizer KW, McKinney HE, Auerbach PS. *Scorpaenidae* envenomation. A five-year poison center experience. *JAMA*. 1985;253:807-810.
Vetrano SJ, Lebowitz JB, Marcus S. Lionfish envenomation. *J Emerg Med*. 2002;23:379-382.

10—E. This case illustrates a common presentation of testicular torsion—acute onset of testicular pain. A classic sign is an elevated testicle, with a horizontal lie; however, this may be difficult to detect because of swelling. Absence of a cremasteric reflex is highly associated with, but not pathognomonic of, torsion. With the exception of very rare cases, the presence of a cremasteric reflex essentially excludes testicular torsion. If torsion is suspected, manual detorsion with parenteral analgesia should be attempted. However, successful detorsion is only a temporizing measure until definitive operative repair. Color Doppler ultrasound is the initial diagnostic test of choice, with sensitivities ranging from 89% to 100%. Torsion will be indicated by a lack of blood flow to the affected testicle. Urologic consultation should precede diagnostic testing when there is high suspicion for torsion. Scrotal support and antibiotic therapy are indicated in epididymo-orchitis, not in testicular torsion.

Sources

Baker LA, Sigman D, Mathews RI, et al. An analysis of clinical outcomes using color Doppler testicular ultrasound for testicular torsion. *Pediatrics*. 2000;105:604-607.
Kahler J, Harwood-Nuss AL. Selected urologic problems. In: Marx J, Hockberger R, Walls R, eds. *Rosen's Emergency Medicine*. Vol 2. 6th ed. Philadelphia, Pa: Mosby; 2006:1594-1595.
Ringdahl E, Teague L. Testicular torsion. *Am Fam Physician*. 2006;74:1739-1743.
Weber DM, Rosslein R, Fliegel C. Color Doppler sonography in the diagnosis of acute scrotum in boys. *Eur J Pediatr Surg*. 2000;10:235-241.

11—E. It is often difficult to accurately assess for pulses or auscultate for heart sounds during an emergent resuscitation. Bedside transthoracic ultrasonography is very useful in the assessment of cardiac activity, cardiac wall motion, ventricle size, and presence or absence of pericardial effusion. In a patient presenting with pulseless electrical activity after blunt trauma, bedside ultrasound may reveal pericardial tamponade as the cause. The ultrasound image obtained in this case demonstrates a large pericardial effusion causing right ventricular diastolic collapse in real-time scanning (Figure 5, below). Emergent pericardiocentesis should be performed at the bedside, with simultaneous fluid resuscitation and cardiothoracic surgery consultation.

Source

Lu LH, Choi WM, Wu HR, et al. Blunt cardiac rupture with prehospital pulseless electrical activity: a rare successful experience. *J Trauma*. 2005;59:1489-1491.

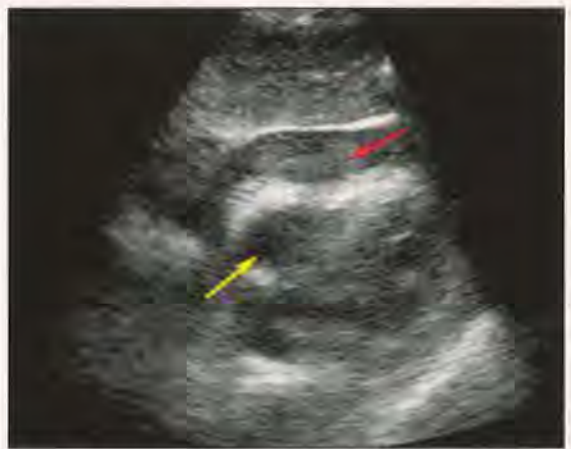


Figure 5—Ultrasound showing large pericardial effusion (red arrow) and right ventricle (yellow arrow).

12—C. Lithium is poorly absorbed by charcoal. Saline or forced diuresis does not enhance lithium elimination unless the patient is volume or sodium depleted. Whole-bowel irrigation and hemodialysis may be of benefit in preventing the absorption and enhancing the elimination of lithium. However, the benefit of whole-bowel irrigation may depend on the time of ingestion and whether the product was sustained-release (ie, Lithobid). Although lithium is absorbed within 8 hours, it has a 2-

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compartment volume of distribution (Vd). In the early phase, the Vd is approximately 0.5 L/kg; subsequently, it slowly redistributes to a 1 L/kg Vd. Consequently, a single level does not correlate with symptoms and will not reveal the level of potential toxicity. It is essential to determine the time of ingestion and whether the ingestion is chronic, acute, or acute on chronic use (ie, acute overdose by someone who is chronically taking lithium). Although the lithium cation is amenable to hemodialysis, the exact indications for initiating it are still controversial. Although hemodialysis may reduce the serum half-life of lithium, it has not been shown to alter patient outcomes after intoxication.

Sources

Eyer F, Pfaf R, Felgenhauer N, et al. Lithium poisoning: pharmacokinetics and clearance during different therapeutic measures. *J Clin Psychopharmacol*. 2006;26:325-330.
Scharman EJ. Methods used to decrease lithium absorption or enhance elimination. *J Toxicol Clin Toxicol*. 1997;35:601-608.

13—C. Studies in adults with acute knee injuries have shown that the Ottawa Knee Rules are 100% sensitive for detecting clinically significant fractures. Accordingly: radiography is required only for patients who have acute knee injuries in the presence of at least 1 of the following:

- (1) age, 55 years or older
- (2) tenderness to palpation at head of fibula
- (3) isolated tenderness of the patella
- (4) inability to flex the knee to 90°
- (5) inability to bear weight immediately or to bear weight and transfer from leg to leg in the emergency department.

The Ottawa Knee Rules have 100% sensitivity in children aged 2 to 16 years, but small study populations and the difficulty of examining knees in younger age-groups have led to the recommendation to use these rules only in youngsters between 5 and 16 years old.

Sources

Bullock B, Neto G, Plint A, et al. Validation of the Ottawa Knee Rule in children: a multicenter study. *Ann Emerg Med*. 2003;42:48-55.
Stiell IG, Greenberg GH, Wells GA, et al. Prospective validation of a decision rule for the use of radiography in acute knee injuries. *JAMA*. 1996;275:611-615.

14—D. This clinical scenario most likely represents a right mainstem intubation, with complete atelectasis of the left lung. This phenomenon frequently occurs in children, with the shorter length of the pediatric trachea, high position of the larynx, and operator anxiety all being important contributing factors. The difficult nature of this intubation would certainly add to operator anxiety. Tube positioning should be checked and the tube pulled back if it is found to be too deep. Tracheal tube depth in centimeters, as measured from the tip of the tube to the upper incisors, is estimated in children using the formula—(age in

years/2) + 12. Replacing the tube should not initially be considered, as the intubation was difficult, and tracheal positioning of the current tube is confirmed by capnometry. Pneumothorax is in the differential for postintubation hypoxia; however, this patient does not exhibit any signs of a tension pneumothorax that would mandate needle decompression. Chest radiography can be obtained after tube measurement to help delineate a pneumothorax from right mainstem intubation with atelectasis. Changing the placement of the pulse oximeter is not indicated when the waveform is believable.

Source

McGill JW, Clinton JE. Tracheal intubation. In: Roberts JR, Hedges JR. *Clinical Procedures in Emergency Medicine*. 3rd ed. Philadelphia, Pa: WB Saunders; 1998:15-44.

15—C. Primary varicella infection (chickenpox) can be devastating in an immunocompromised host, because of a shorter incubation time and longer periods of vesicular eruption. Immunocompromised patients remain contagious during the entire period of new eruptions. Disseminated varicella infections can result in severe pneumonia, encephalitis, hepatitis, arthritis, thrombocytopenia, meningitis, or secondary skin infections. In general, diagnosis is based on the clinical findings; however, in atypical cases, laboratory confirmation is available. Direct fluorescent antibody and PCR testing are the most sensitive diagnostic modalities. Initial treatment includes IV acyclovir and supportive care. Varicella-zoster immune globulin has shown efficacy in susceptible patients who have been exposed to varicella, but it is not effective in established disease.

Source

Varicella-zoster infections. In: Pickering LK, ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, Ill: American Academy of Pediatrics; 2003:672-686.

16—D. Women with ectopic pregnancies classically report delayed menses, abdominal pain, and vaginal bleeding. However, all these features need not be present. Shoulder pain secondary to diaphragmatic irritation indicates free fluid in the pelvis from a ruptured ectopic pregnancy. Referred shoulder pain is typically described as “knife-like” or “stabbing” and can be differentiated from musculoskeletal pain by the absence of tenderness to palpation and full range of motion without pain. With significant hemorrhage, fluid will be visible in the pouch of Douglas and in Morison’s pouch (Figure 6, page 55) on transabdominal ultrasound. In all women of childbearing age, hemodynamic instability, coupled with abdominal pain and free fluid on ultrasound, should arouse suspicion for a ruptured ectopic pregnancy.

Sources

Houry DS, Abbott JT. Acute complications of pregnancy. In: Marx J, Hockberger R, Walls R, eds. *Rosen’s Emergency Medicine*. Vol 3. 6th ed. Philadelphia, Pa: Mosby; 2006:2739-2761.

Nordenholz K, Abbott J, Bailitz J. First trimester pregnancy. In: Cosby KS, Kendall JL. *Practical Guide to Emergency Ultrasound*. Philadelphia, Pa: Lippincott Williams & Wilkins; 2006:123-160.

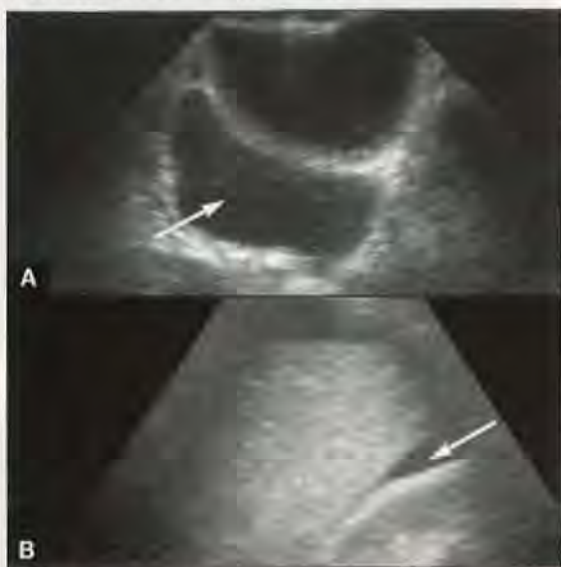


Figure 6—Transabdominal ultrasound showing fluid in (A) the pouch of Douglas (arrow) and (B) Morison's pouch (arrow).

17—D. In a recent study published by the Hypothermia After Cardiac Arrest Study Group, patients treated with hypothermia had an increased rate of sepsis, but the difference was not statistically significant. The 2005 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care recommend therapeutic hypothermia for survivors of ventricular fibrillation/ventricular tachycardia arrest (Class IIa recommendation) and asystolic/pulseless electrical activity (Class IIb recommendation). The guidelines suggest maintaining core body temperature between 32°C and 34°C for 12 to 24 hours. Hypothermia is thought to decrease metabolic demands and inflammatory mediators.

Sources
ECC Committee, Subcommittees and Task Forces of the American Heart Association. 2005 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*. 2005;112(suppl 24):IV1-IV203.
Hypothermia after Cardiac Arrest Study Group. Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. *N Engl J Med*. 2002;346:549-556.

18—A. Cocaine induces constriction of coronary, cerebral, ophthalmic, pulmonary, mesenteric, and musculoskeletal vascular beds. Hypertension and tachycardia are common hemodynamic effects with cocaine exposure and rarely require specific treatment. Treatments aimed at controlling agitation will often lead to the resolution of abnormal hemodynamic effects. Treatment aimed at the central effects of cocaine, such as benzodiazepines, will often lower BP. The use of beta-blockers

has been shown to result in significant hypertension from unopposed alpha effects. Although labetalol has both alpha- and beta-blocking effects, its beta-blocking effects predominate. Studies of calcium channel blockers have demonstrated contradictory effects.

Sources

Bhangoo P, Parfitt A, Wu T. Best evidence topic report. Cocaine induced myocardial ischaemia: nitrates versus benzodiazepines. *Emerg Med J*. 2006;23:568-569.
Sen A, Fairbairn T, Levy F. Best evidence topic report. Beta-blockers in cocaine induced acute coronary syndrome. *Emerg Med J*. 2006;23:401-402.
Vargas R, Gillis RA, Ramwell PW. Propranolol promotes cocaine-induced spasm of porcine coronary artery. *J Pharmacol Exp Ther*. 1991;257:644-646.

19—A. With large pulmonary embolisms, cardiovascular strain may be evident on transthoracic ultrasound. As the right side of the heart contracts against a large clot in the pulmonary vasculature, ultrasound may demonstrate an increased diastolic diameter of the right ventricle, right ventricular hypokinesis, tricuspid regurgitation, or abnormal septal motion and bowing toward the left. The normal right-to-left-ventricle ratio in a standard, apical 4-chamber view is less than 0.5. Greater ratios should prompt consideration of right-heart strain secondary to a massive pulmonary embolism, emphysema, primary pulmonary hypertension, or right ventricular infarct.

Sources

Fang BR, Chiang CW, Lee YS. Echocardiographic detection of reversible right ventricular strain in patients with acute pulmonary embolism: report of 2 cases. *Cardiology*. 1996;87:279-282.
Madan A, Schwartz C. Echocardiographic visualization of acute pulmonary embolus and thrombolysis in the ED. *Am J Emerg Med*. 2004;22:294-300.

20—C. This patient has sustained his second primary pneumothorax. After 2 spontaneous pneumothoraces, the recurrence rate is 60% to 75%. He should be evaluated by a thoracic surgeon for consideration of procedures, such as thoracoscopy, thoracotomy, or chemical pleurodesis, that can help prevent a third pneumothorax. The patient displays no evidence of a tension pneumothorax or clinical instability, and therefore tube thoracostomy can be delayed. Clinically stable patients with a first primary pneumothorax can be safely discharged home after a period of observation, if they are given appropriate follow-up instructions, which would include returning for reevaluation within 2 days and no air travel until 14 days after radiographic resolution of the pneumothorax. ■

Sources

Baumann MH, Strange C, Heffner JE, et al. Management of spontaneous pneumothorax. *Chest*. 2001;119:590-602.
Cook CH, Melvin WS, Groner JJ, et al. A cost-effective thoracoscopic treatment strategy for pediatric spontaneous pneumothorax. *Surg Endosc*. 1999;13:1208-1210.
Sawada S, Watanabe Y, Moriyama S. Video-assisted thoracoscopic surgery for primary spontaneous pneumothorax. *Chest*. 2005;127:2226-2230.