

## Trauma: Review Questions

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### QUESTIONS

Choose the single best answer for each question.

1. A 26-year-old man with no known medical problems was a restrained front seat passenger involved in a motor vehicle crash. There was no airbag deployment. He lost consciousness for approximately 3 to 5 minutes. Initial vital signs are: blood pressure, 112/66 mm Hg; heart rate, 115 bpm; respiratory rate, 21 breaths/min; temperature, 98.2°F; and pulse oximetry, 98% on 2 L of oxygen. Fingerstick glucose is 210 mg/dL. His airway is patent, he is breathing spontaneously, and capillary refill is brisk. He has several facial lacerations. Cardiopulmonary examination is normal except for tachycardia. Abdominal examination reveals right upper quadrant tenderness. Neurologic examination is normal. Abdominal computed tomography scan demonstrates a grade III liver laceration. Which of the following is most important to minimize risk of infection and overall length of stay for this patient?

  - (A) Admission to the intensive care unit
  - (B) Early broad-spectrum antibiotics
  - (C) Early intubation to maximize oxygen delivery
  - (D) Insertion of perihepatic drainage catheter
  - (E) Maintain serum glucose < 200 mg/dL
2. A 27-year-old umpire wearing no protective gear is inadvertently struck in the chest by a player's bat. He lost consciousness for approximately 30 seconds after impact. During EMS transport, vital signs are: blood pressure, 102/76 mm Hg; heart rate, 114 bpm; respiratory rate, 22 breaths/min; and pulse oximetry, 97% on 2 L oxygen via nasal cannula. On arrival at the emergency department (ED), the patient is awake and alert, complaining of chest pain. He has ecchymosis and tenderness over his sternum. Lungs are clear, and heart sounds are tachycardic with no murmur. His physical examination is otherwise normal. Which of the following is the best screening tool for assessing blunt cardiac injury?

  - (A) Creatine kinase (CK) and CK-MB
  - (B) Electrocardiogram (ECG)
  - (C) Transesophageal echocardiogram
  - (D) Transthoracic echocardiogram
  - (E) Troponin
3. A 32-year-old woman who is 17 weeks pregnant was a restrained driver involved in a motor vehicle crash. No air bags were deployed. She complained of neck, back, and abdominal pain after the crash. Initial vital signs are: temperature, 99°F; blood pressure, 108/64 mm Hg; heart rate, 94 bpm; and respiratory rate, 18 breaths/min. A radiograph of the cervical spine is normal. A focused abdominal sonography for trauma (FAST) ultrasound demonstrates free fluid in her pelvis. Complete blood count is normal, Kleihauer-Betke test is negative, and her  $\beta$ -human chorionic gonadotropin level is 23,255 mIU/mL. Which of the following is the most appropriate next intervention?

  - (A) Infraumbilical diagnostic peritoneal lavage (DPL)
  - (B) Discharge home with obstetrician/gynecology follow-up
  - (C) Surgical consult
  - (D) Transfer to the obstetric service for cardiotocographic monitoring
  - (E) Transvaginal ultrasound

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4. A 10-year-old boy was a rear seat passenger who was wearing a lap belt in a vehicle that was struck from behind while stopped. The child complains of neck pain, abdominal pain, and lower back pain. Vital signs are: temperature, 98°F; blood pressure, 102/54 mm Hg; heart rate, 105 bpm; respiratory rate, 22 breaths/min; and pulse oximetry, 99% on room air. His airway is patent, he has no respiratory compromise, and capillary refill time is less than 2 seconds. Physical examination is remarkable for cervical spine and lumbar spine tenderness and bilateral lower quadrant abdominal tenderness with a band-like area of ecchymosis over the lower abdomen. Neurologic examination is normal. Plain radiographs of the cervical and lumbar spine are normal, and a FAST scan is negative. Complete blood count is normal, serum lactic acid is 1.1 mg/dL, and base excess is –1. What is the most appropriate next step in this patient's treatment?
- (A) Discharge home with follow-up in 24 hours
  - (B) Observe in the ED for 4 hours
  - (C) Obtain plain radiographs of the abdomen
  - (D) Perform DPL
  - (E) Transfer to a trauma center for further management

#### ANSWERS AND EXPLANATIONS

1. (E) **Maintain serum glucose < 200 mg/dL.** Stress from a traumatic event results in hyperglycemia. According to Bochicchio et al,<sup>1</sup> abdominal surgery patients who were hyperglycemic on postoperative day 1 had an infection rate 2.7 times greater than those who were normoglycemic. Tight glucose control is recommended in critically ill patients. Empiric use of broad-spectrum antibiotics in trauma patients is not indicated. In a patient who is oxygenating well, intubation is unnecessary. Placement of a drainage catheter is not standard of care in liver lacerations. Intensive care unit admissions are associated with increased morbidity due to the risks of nosocomial infections.
2. (B) **ECG.** ECG is the recommended screening test for detecting blunt cardiac injury. Nonspecific ECG changes can be present in up to 80% of patients suspected for blunt cardiac injury.<sup>2</sup> ECG changes that correspond to clinically significant blunt cardiac injury are usually present at the time of ED presentation. In young, hemodynamically stable patients, a normal ECG precludes the need for further evaluation to detect blunt cardiac injury. The echocardiogram is useful in evaluating cardiac function after blunt cardiac injury but has little utility as a screening tool. CK and CK-MB lack the specificity to detect blunt cardiac injury and can be confounding if there is concomitant skeletal muscle injury. Although troponin is not affected by skeletal muscle injury, the sensitivity is no better than CK.<sup>2</sup>
3. (C) **Surgical consult.** The FAST scan is an effective screening tool to detect the presence of free fluid in the abdomen and pelvis.<sup>3</sup> Isolated scant amounts of pelvic fluid in a hemodynamically stable pregnant patient has been thought to be physiologic. However, in the pregnant trauma patient, this may not be the case. It is reasonable that if free fluid is noted on a FAST scan, the source of the fluid may indeed be related to intra-abdominal injury rather than physiologic. A surgical consult in this patient would be the most appropriate intervention. Discharging the patient home would not be safe. The patient is only 17 weeks pregnant and fetal monitoring is not indicated, as the fetus is not viable. A DPL would likely not add much, as the FAST scan already noted the presence of fluid. It may be possible to identify the etiology of the fluid, but an infraumbilical approach is not recommended. A transvaginal ultrasound is more sensitive than transabdominal for detecting pelvic free fluid but would add no further information to this case.
4. (E) **Transfer to a trauma center for further management.** The decision to transfer a patient who has sustained a traumatic injury is based on several criteria. The mechanism of injury must be assessed to determine the potential for occult injury. In this patient, the presence of a "seat belt sign" is a clue to possible underlying abdominal injury. Pediatric patients with a seat belt sign have a 3 times greater chance of having an underlying abdominal injury and are almost 13 times as likely to have a gastrointestinal injury.<sup>4</sup> This child was suboptimally restrained, which increases his risk to sustain intra-abdominal injury threefold. The mechanism of injury and the lower abdomen ecchymosis suggests that this child should be transferred to a trauma center. Despite a negative FAST scan, it would be unsafe to discharge this patient home, even after 4 hours. Ultrasound is not adequate to exclude intra-abdominal injury in this setting. Plain radiographs of the abdomen are not recommended in the trauma patient. DPL is not indicated in a blunt trauma patient with normal vital signs.<sup>5</sup>

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