

A 24-year-old previously healthy man is brought to the emergency department after an accident involving an all-terrain vehicle. He was driving the vehicle on the side of a hill when it rolled over and landed on top of him. His friends pulled him out and called paramedics. In the emergency department, the patient is alert but anxious and diaphoretic. He is wearing a cervical collar. Blood pressure is 82/61 mm Hg, pulse is 122/min, and respirations are 24/min with shallow breaths. He has a scalp laceration that has stopped bleeding. Pupils are equal and reactive to light. There is bruising over the chest wall and abdomen. The trachea is midline. Bilateral breath sounds are present. The abdomen is distended with rebound tenderness. Bowel sounds are absent. Chest x-ray shows several rib fractures, including the right eighth and ninth ribs and the left fourth rib, without a pneumothorax. Focused assessment with sonography shows a large amount of intraperitoneal fluid. Pelvic x-ray is negative for fractures. The patient remains hypotensive after rapid infusion of 2 L of intravenous fluids and is taken for urgent exploratory surgery. Which of the following injuries is the most likely cause of this patient's persistent hypotension?

- ☐ A. Abdominal aortic injury
- ☐ B. Diaphragmatic hernia
- ☐ C. Duodenal hematoma
- ☐ D. Hepatic laceration
- ☐ E. Pancreatic transection
- ☐ F. Splenic infarction
- ☐ G. Urinary bladder rupture

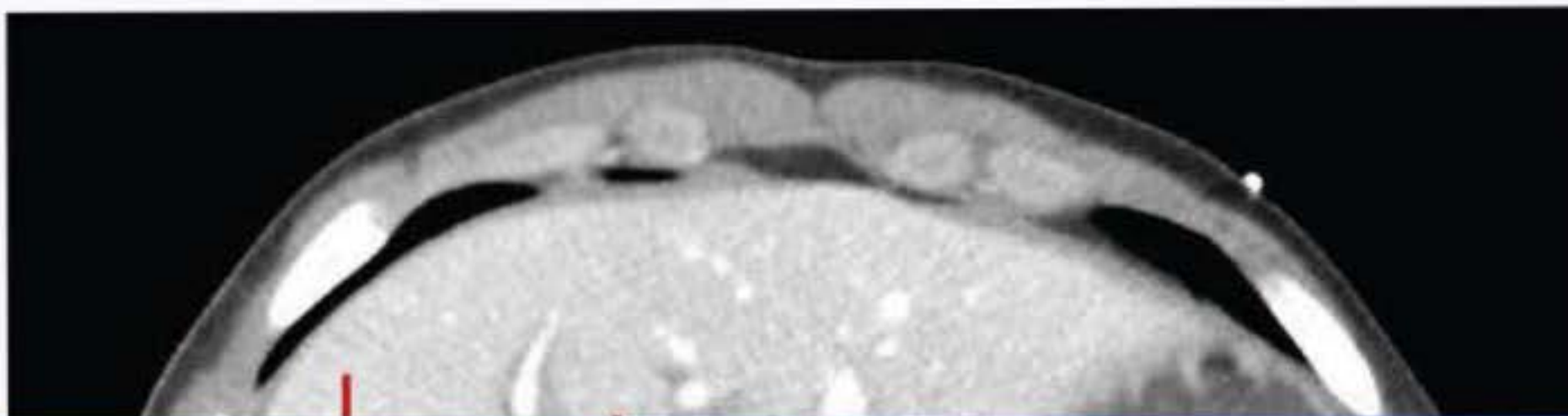
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- ☐ A. Abdominal aortic injury [17%]
- ☐ B. Diaphragmatic hernia [0%]
- ☐ C. Duodenal hematoma [3%]
- ☒ D. Hepatic laceration [68%]
- ☐ E. Pancreatic transection [1%]
- ☐ F. Splenic infarction [9%]
- ☐ G. Urinary bladder rupture [0%]

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Explanation:

User Id:





This patient with **blunt abdominal trauma (BAT)**, hypotension, right chest/abdominal wall injury, and free intraperitoneal fluid most likely has a **hepatic laceration (HL)**, one of the most **common solid organ injuries**, along with splenic lacerations, due to BAT. In this patient, the HL was likely due to the **right eighth and ninth rib fractures**. Other manifestations of HL include right upper quadrant pain and right shoulder pain due to irritation of the phrenic nerve from hemorrhage. Factors increasing the likelihood of intra-abdominal injury include the "seat belt sign" (ecchymosis over the abdomen in the pattern of a seat belt), rebound tenderness, abdominal distension/guarding, and concomitant femur fracture.

After primary survey, patients with BAT should be assessed for the presence of intra-abdominal organ injury with a bedside Focused Assessment with Sonography for Trauma (FAST), which evaluates both the abdomen and pericardium. Hemodynamically unstable patients with positive FAST (eg, intraperitoneal fluid) should be taken for exploratory laparotomy.

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(Choice A) Abdominal aorta injuries due to BAT occur in <1% of cases. Many patients with aortic injury die before reaching the hospital, and those who do survive often have serious concomitant injuries (eg, spinal or pelvic fractures).

(Choice B) Diaphragmatic injuries due to trauma are infrequent, are sometimes seen on chest x-ray (eg, abdominal organs in chest, abnormal nasogastric tube positioning, diaphragm elevation), and may result in significant respiratory distress; they would not explain the intraperitoneal fluid.

(Choices C and E) Duodenal and pancreatic injuries due to BAT are relatively uncommon but may present with nausea, vomiting, inability to tolerate oral intake, progressive abdominal pain, and sepsis. Patients with **duodenal hematomas** may also have evidence of small-bowel obstructions. However, neither duodenal hematomas nor pancreatic transections are commonly associated with free intraperitoneal fluid.

(Choice F) Although the spleen is one of the most frequently injured organs during BAT, the result is usually laceration and not infarct. Splenic infarct commonly presents with left-sided abdominal pain with radiation to the shoulder, fever, and vomiting. Free fluid is not common unless the infarct progresses to hemorrhage and rupture.

(Choice G) Urinary bladder rupture can occur during BAT, especially in patients with pelvic fractures. Patients commonly present with gross hematuria and may have evidence of intraperitoneal fluid, but significant hemodynamic instability is not common.

Educational objective:

Hepatic laceration is one of the most common solid organ injuries due to blunt abdominal

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Educational objective:

Hepatic laceration is one of the most common solid organ injuries due to blunt abdominal trauma. Common manifestations include hypotension, free intraperitoneal fluid, right upper quadrant pain and bruising, and right shoulder pain due to phrenic nerve irritation.

References:

1. **Investigation of blunt abdominal trauma.**
2. **An experience with blunt abdominal trauma: evaluation, management and outcome.**

Media Exhibit

al hematoma

