POSITIVE FAST WITHOUT HEMOPERITONEUM DUE TO FLUID RESUSCITATION IN BLUNT TRAUMA

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Abstract—Background: The focused assessment with sonography in trauma (FAST) examination is an important screening tool in the evaluation of blunt trauma patients. Objectives: To describe a case of a hemodynamically unstable polytrauma patient with positive FAST due to fluid resuscitation after blunt trauma. Case Report: We describe a case of a hemodynamically unstable polytrauma patient who underwent massive volume resuscitation prior to transfer from a community hospital to a trauma center. On arrival at the receiving institution, the FAST examination was positive for free intraperitoneal fluid, but no hemoperitoneum or significant intra-abdominal injuries were found during laparotomy. In this case, it is postulated that transudative intraperitoneal fluid secondary to massive volume resuscitation resulted in a positive FAST examination. Conclusion: This case highlights potential issues specific to resuscitated trauma patients with prolonged transport times. Further study is likely needed to assess what changes, if any, should be made in algorithms to address the effect of prior resuscitative efforts on the test characteristics of the FAST examination. © 2014 Elsevier Inc.

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INTRODUCTION

Among patients who present to the emergency department (ED) with traumatic injuries, a large fraction, up to 65%, have blunt abdominal trauma (BAT) (1). Accurately and rapidly identifying patients that require emergent laparotomy to control hemorrhage can be challenging. The focused assessment with sonography in trauma (FAST) examination is an important screening tool to assist in identifying emergent injuries in blunt trauma patients (1–7).

In its clinical policy on abdominal trauma, the American College of Emergency Physicians refers to bedside ultrasound as the initial diagnostic modality of choice in hemodynamically unstable patients to identify the need for emergent laparotomy (class B recommendation) (6). Similarly, the Eastern Association for the Surgery of Trauma practice guidelines and Advanced Trauma Life Support also recommend FAST examination as the initial screening test in patients with BAT (8,9).

There is, however, no distinction made in these policies between trauma patients receiving initial stabilization and those who are transferred to a referral center after resuscitative efforts have been initiated elsewhere. We present a case of a motor vehicle collision victim whose positive FAST examination was due to transudative third-spacing of fluids after massive volume resuscitation, rather than hemoperitoneum.

CASE PRESENTATION

A 21-year-old previously healthy woman was transported to a referring institution’s ED after a motor vehicle
collision. She was a rear-seat passenger ejected approximately 40 feet from the vehicle. On arrival of emergency medical services she was responsive only to painful stimuli, with snoring respirations and fixed pupils. Her first documented Glasgow Coma Scale score was 4 (Eye response 2, Verbal response 1, Motor response 1). Initial vital signs included a heart rate of 94 beats/min, blood pressure of 143/80 mm Hg, respiratory rate of 12 breaths/min, and SpO2 of 94% on ambient air. She was intubated by paramedics in the field and transported to the nearest community ED. On arrival, the patient developed pulseless ventricular tachycardia, and advanced cardiac life support was initiated, with return of spontaneous circulation. A FAST examination showed no intraperitoneal free fluid or pericardial effusion, and chest radiography demonstrated lung contusions without evidence of pneumothoraces. Prior to transfer, she received a total of 5 L normal saline and 4 units packed red blood cells, as well as dopamine and norepinephrine infusions for persistent hypotension.

The patient was transferred to our institution, an urban Level I adult trauma center, via critical care helicopter, with a transport time of approximately 50 min. On arrival, her heart rate was 158 beats/min, blood pressure 87/52 mm Hg, and SpO2 87% while mechanically ventilated with FiO2 of 1.00. Pupils were equal and fixed at 6 mm. Breath sounds were equal bilaterally. Portable x-ray study of the chest revealed diffuse pulmonary edema. A bedside FAST examination demonstrated free fluid in the right upper quadrant, left upper quadrant, and pelvic windows (Figure 1). There was no pericardial effusion, and normal lung sliding was seen bilaterally. Given persistent hypotension despite aggressive volume resuscitation and the positive FAST examination, the patient was transported emergently to the operating room for exploratory laparotomy, during which free fluid in the abdomen was identified, but no significant hemoperitoneum or abdominal injuries were discovered. An intraoperative transesophageal echocardiogram showed a left ventricular ejection fraction of 10%. After operative intervention, she was transported for a computed tomography (CT) scan, which showed diffuse cerebral edema and uncal herniation, consistent with traumatic and anoxic brain injury. Ultimately, the suspected causes of hypotension were cardiogenic and neurogenic rather than hemorrhagic. The patient was admitted to the surgical intensive care unit, where she died 3 days later, after confirmation of brain death and withdrawal of supportive care.

**DISCUSSION**

Bedside ultrasound has become a key diagnostic screening tool, enabling the rapid identification of conditions that previously would have been more difficult or time-consuming to diagnose. In blunt abdominal trauma, multiple studies have shown the FAST examination to have high sensitivity (79–100%) and specificity (95–100%) for identifying significant injuries (6). Based on those findings, assessment algorithms direct hemodynamically unstable patients with free fluid on FAST examination to the operating room for emergent exploratory laparotomy (8,10). In addition, one of the benefits of the FAST examination is that it can be easily repeated. Serial FAST examinations have been shown to increase sensitivity and are routinely recommended (11). There are not, however, any guidelines on using serial FAST examinations in the assessment of trauma patients who have already received volume resuscitation or in those who have experienced prolonged transport times.

This case describes a positive FAST examination due to third-spacing after massive volume resuscitation and illustrates a number of key points. Although in the correct clinical setting the FAST examination is a sensitive test for intraperitoneal hemorrhage, ultrasound is not typically able to distinguish between blood and other fluid. In uncertain cases, and when CT is unavailable or the patient is too unstable for CT, a diagnostic peritoneal aspirate could help distinguish hemoperitoneum from ascites, gastric contents, or other sources of intraperitoneal fluid. In this case, it was assumed that the positive FAST represented hemoperitoneum, and given the significant hemodynamic instability, no further testing was performed prior to exploratory laparotomy. However, the positive FAST examination was likely due to extravasated fluid, not blood, secondary to a combination of aggressive volume resuscitation and increased capillary permeability.
due to the systemic inflammatory response to massive trauma. We are not aware of prior documented cases of a positive FAST due to resuscitative efforts.

With regionalization of trauma care, patients are increasingly transferred to trauma centers for specialized evaluation and management (12). With the time spent at the initial facility and the subsequent transport time, trauma patients may have significant delays in definitive management. One study from Rhode Island found that trauma patients spent an average of 162 min at the local community hospital prior to transport to a trauma center (13). In rural locations, resource-limited settings, or combat environments, patients may have significant transport times several hours from the initial injury.

CONCLUSION

With increasing use of centralized, and somewhat delayed, trauma care, more resuscitation prior to definitive treatment will occur. Further study is likely needed to assess what changes, if any, should be made in algorithms to address the effect of prior resuscitative efforts on the test characteristics of the FAST examination.

REFERENCES