Focused Abdominal Sonography in Trauma (FAST)

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Introduction

Assessment of the abdomen for possible intra-abdominal injury due to trauma is a common clinical challenge for surgeons and emergency medicine physicians. The true problem with torso trauma is not to determine the presence of an organ lesion, but to identify clinically significant intra-abdominal injuries. Physical findings may be unreliable because of altered patient consciousness, neurological deficit associated with head injury or spinal injury, medication, or other associated injuries.

In this scenario, the modalities available to the clinician in the emergency room are Diagnostic Peritoneal Lavage (DPL), clinician performed Ultrasonography (USG) in the Casualty department and Computed Tomography (CT) scanning.

Diagnostic Peritoneal Lavage (DPL) involves instillation of sterile normal saline in the peritoneal cavity and assessing the nature of effluent fluid to determine the probability of intra-abdominal visceral injury. Although it is thought to be superior to clinical examination in assessing abdominal injuries, it is an invasive procedure with a risk of organ injury if performed by untrained persons. CT remains the radiological standard for investigating the injured abdomen but requires patient transfer to the CT scan suite and delay. It is unsuitable for patients who are haemodynamically unstable. USG is an easily accessible, portable, noninvasive, and reliable diagnostic tool for assessment of abdominal trauma. It can be performed at the bedside in the casualty department by the clinician without causing delay in the management of the patient. The idea of focused ultrasonography is to specifically identify the presence of fluid i.e blood or enteral contents in the peritoneal cavity, pleura or pericardium was mooted by McKenney et al in 1996 [1].

Method

The primary objective of focused abdominal sonography in trauma (FAST) is to identify the presence of haemoperitoneum in a patient with suspected intra-abdominal injury. The indications of FAST are haemodynamically unstable patients with suspected abdominal injury and those with significant extra-abdominal injuries (orthopaedic, spinal, chest) requiring a non-abdominal emergency surgery. We advocate that FAST should be done in all patients with blunt abdominal injury and injuries to the torso below the level of nipples with haemodynamic instability.

Who should do FAST? FAST is performed by the surgeon attending the injured patient at the emergency department or in the intensive care unit (ICU) as a bedside procedure while the resuscitation is in progress. The need to shift the patient to the radiology department for FAST defeats the very purpose of this diagnostic tool. FAST is recommended to be performed using a 3.5 or 5 MHz ultrasound sector transducer probe and gray scale 'B mode' ultrasound scanning. The scan starts with the sub-xiphoid region in the sagittal plane in order to set the gain levels in the machine. (Fig. 1). The probe is then moved to the right to assess the Morrison's (hepato-renal) pouch in the sagittal plane. Then the probe is moved to the left to scan the spleno-renal recess in the sagittal plane. At this point, the bladder is recommended to be filled with 200-300 ml of sterile normal solution through the urinary catheter and the catheter clamped. This provides an excellent sonological window for visualization of the pelvis in the transverse plane. In patients who have a suspected bladder injury precluding filling of the bladder, a saline filled bag is placed over the hypogastrium, which provides an acoustic window for the pelvis. The total time taken for such a scan would be around 5-8 minutes.

Interpretation: Free fluid (blood, intestinal contents) in the peritoneal cavity appears anechoic (black)

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Fig. 1 : Probe positions for FAST
(Courtesy: Manual of Trauma. Lippencourt Williams, Dec 1999)

compared with the echogenicity of the surrounding structures (Fig.2). The pericardial and pleural cavities are assessed for presence of fluid in the sub-xiphoid view of FAST. The scanning of the most dependent areas of the peritoneal cavity provides an opportunity to pick up presence of anechoic fluid against the contrast provided by the liver and spleen. The outline and echogenicity of the liver, spleen and kidneys is also assessed in this scan. The pelvic window provides information about free fluid in the pelvis and provides assessment of the bladder. The presence of free intra-peritoneal fluid or solid organ injury is considered as a positive FAST [2].

Limitations of FAST include poor sonological window in obese patients and in those who have extensive subcutaneous emphysema over the abdomen. Interpretation of FAST requires training and basic knowledge of interpreting of ultrasound images. Small

Fig. 2 : FAST showing fluid in hepato-renal pouch

amounts of haemoperitoneum and solid organ injuries especially in patients who arrive very early after injury to the emergency department may be missed. Significant retroperitoneal injuries including those to major vessels and kidneys may be missed by FAST because of interference by overlying bowel gas [3]. Precious time should not be wasted in the performance of FAST in the patient with obvious abdominal injuries who require urgent operative intervention.

The sensitivity of the FAST scan has been quoted as 78% with a specificity of 99% in the evaluation of intra-abdominal injuries and it is a highly specific tool to “rule in” presence of intra-abdominal injury during the initial assessment of trauma patients. Emergency physicians, after a training programme which may be as short as two weeks, can use FAST in the early assessment of trauma patients with acceptable specificity [4].

References

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