Focused Assessment with Sonography for Trauma

CME Credits

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A 75-year-old female without a past medical history crashed into the change box in bus at an emergency brake when taking a bus this morning. The chief complaint was right side upper abdominal pain. Her vital sign on arrival was as follows: blood pressure of 124/73 mmHg, respiratory rate of 22/min, pulse of 103 beats per minute, and oxygen saturation of 99%. The chest X-ray demonstrated no rib fractures, pneumothorax, or hemothorax. However, physical examinations showed tenderness and bruise in right side bottom ribs.

As for the assessment of trauma patients, sonography is also important for diagnosis besides understanding the detailed mechanism of injury and complete physical examination.[1] We can use Focused Assessment of Sonography for Trauma (FAST) as an adjunct to primary survey.[2]

Goal of Focused Assessment of Sonography for Trauma

- Whether the patient has internal bleeding in abdomen?
- Whether the patient has pericardial effusion?
- Whether the patient has pneumothorax?
- Whether the patient has hemothorax?

Selection of Probe

- Abdominal probe (with 2.5–5.0 MHz Convex transducer)

Manipulation

Sonographic images

1. Assessment of right upper abdomen [1 in Figures 1 and 3, Morison's pouch]
2. Assessment of left upper abdomen [2 in Figure 1 and 4, Splenorenal recess]
3. Assessment of pelvic cavity [3 in Figure 1 and 5, pelvic view]
4. Assessment of pericardial sac [4 in Figure 1 and 6, subxiphoid view]
5. Assessment of hemothorax [5 and 6 in Figure 2 and 7, costophrenic space]
6. Assessment of pneumothorax [7 and 8 in Figure 2 and 8, anterior chest]

The sonographic image of this case [Figure 9] showed effusion was found in Morison's pouch. The computed tomography showed hepatic laceration. The bleeding was successfully stopped after an emergent transcatheter arterial embolization.

FAST is categorized into integrated sonography. There are many advantages for trauma patient assessment by FAST including rapidness, easy execution at bedside, noninvasion, no concern of radiation, and repeatable scanning. Hence, more and more clinicians consider FAST important. However, FAST also has the following limitations: (1) the evaluation of early abdominal bleeding and the differentiation between ascites and bleeding is operator dependent; (2) difficult manipulation in patients with obesity due to heavy subcutaneous fat; (3) less sensitivity to posterior abdominal bleeding; and (4) no visualized images in patients with traumatic subcutaneous emphysema. Literatures indicate that the sensitivity of FAST is 69%–98% in the detection of free liquid, but only 63% of solid organ injury, whereas the specificity in both is up to 94%–100%.[3] Given that the conditions of clinical trauma patients may change immediately, taking the advantage of FAST in repeated scanning will improve the sensitivity of examination.

Point-of-care ultrasound, which is developing fast in recent years, encourages the first-line physicians to answer clinical

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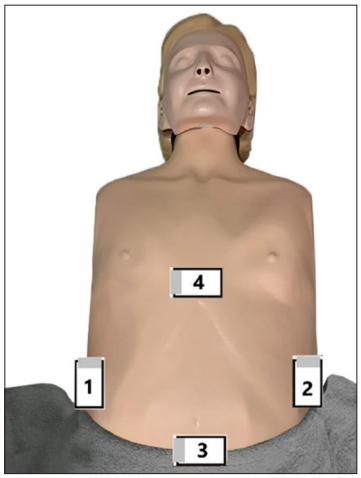

Figure 1: Focused Assessment of Sonography for Trauma assessment of free fluid in abdomen (1–3) and pericardial effusion (4)

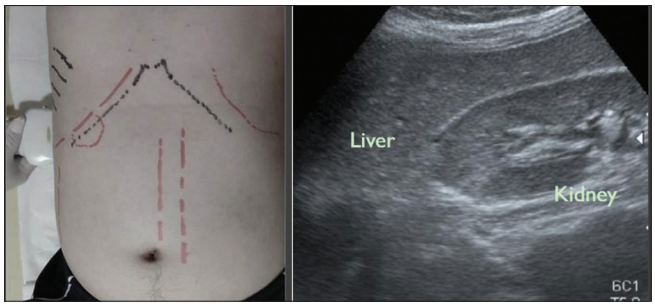

Figure 3: Place the probe parallel to the midaxillary line and then move to the bottom of the right ribs. Check whether there is effusion at the junction of the liver and kidney

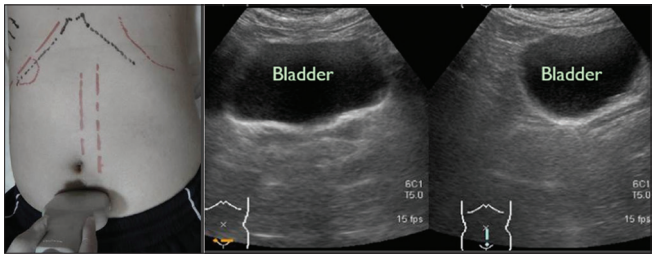

Figure 5: Place the probe above the pubic and swept in transverse and longitudinal directions. Check whether there is effusion in the posterior side of the bladder

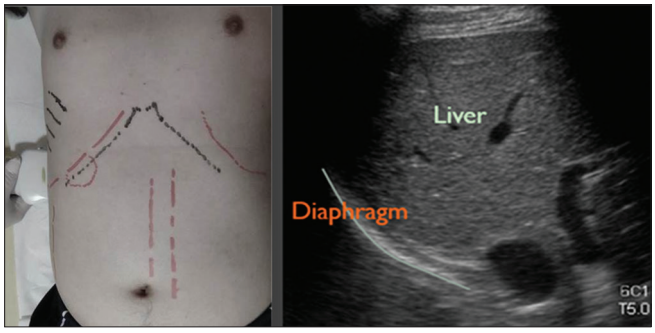

Figure 7: Place the probe parallel to the midaxillary line and then at the border of the ribs at both sides. Check whether there is effusion above the diaphragm

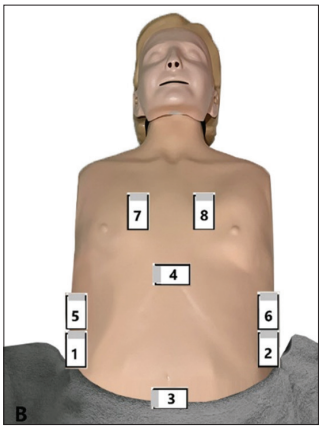

Figure 2: Extended Focused Assessment of Sonography for Trauma (e Focused Assessment of Sonography for Trauma). Assessment of hemothorax (5 and 6) or pneumothorax (7 and 8) in addition to basic Focused Assessment of Sonography for Trauma assessment (1–4)

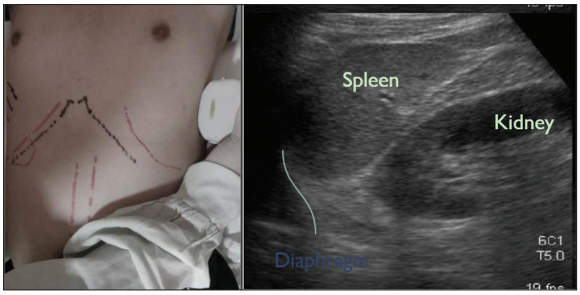

Figure 4: Place the probe parallel to the midaxillary line and then move to the bottom of the left ribs. Check whether there is effusion at the junction of the spleen and kidney

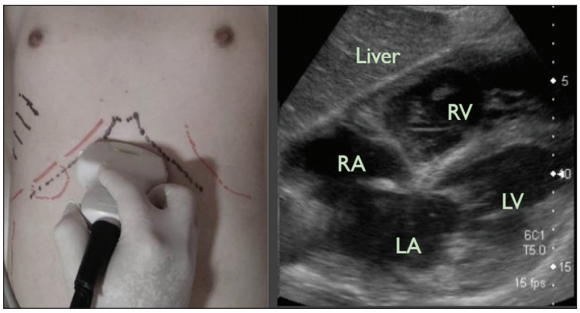

Figure 6: Place the probe horizontally at the bottom of the xiphoid process of the sternum then scan toward the cranial side of the patient. Check whether there is pericardial effusion

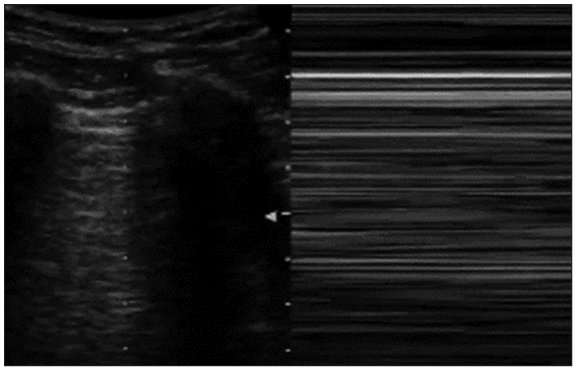

Figure 8: Check whether there is lung sliding sign by two dimensional image or barcode sign (right panel) by M-mode image in the lungs

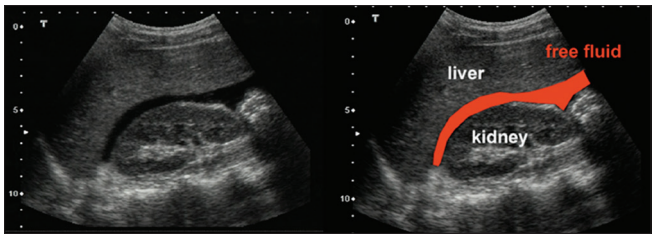

Figure 9: Effusion at Morrison's pouch. The computed tomography showed hepatic laceration. The bleeding was successfully stopped after an emergent transcatheter arterial chemoembolization

questions quickly and precisely with ultrasound. The advance of ultrasound is just like stethoscope in the 21st century, providing clinical specialties more information about organic structure and the related pathology besides medical history inquiry and physical examination.[4] More and more literatures show that, besides the application in trauma patients, FAST is also applied in nontraumatic patients such as those with shock or cardiac arrest.[5,6] It helps intensivists with cause detection in short time and improve the accuracy of diagnosis.

Declaration of patient consent

The authors certify that they have obtained appropriate patient consent form. In the form, the patient has given his consent for the images and other clinical information to be reported in the journal. The patient understands that his name and initial will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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