Imaging in Trauma

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42.1 Introduction

Along this book, the theme imaging in trauma, mainly in what concerns ultrasound and computed tomography, was extensively cited in the services protocols. This chapter aims to explain in a simple and objective way the main advantages and disadvantages of each one of these methods and the technical approach of ultrasound in the face of an emergency.

Since it emerged as a diagnostic method during the Second World War, ultrasonography was instituted as an important method in the assistance of trauma victims. Initially, it was only used for abdominal exams. However, as long as experience with the method was earned, it came to be used also for thoracic evaluation. In 1997, it received the denomination FAST (Focused Assessment with Sonography for Trauma), and used worldwide until the present time.

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A. Nasr et al. (eds.), *The Trauma Golden Hour*,
https://doi.org/10.1007/978-3-030-26443-7_42

Blunt abdominal trauma: FAST × computed tomography

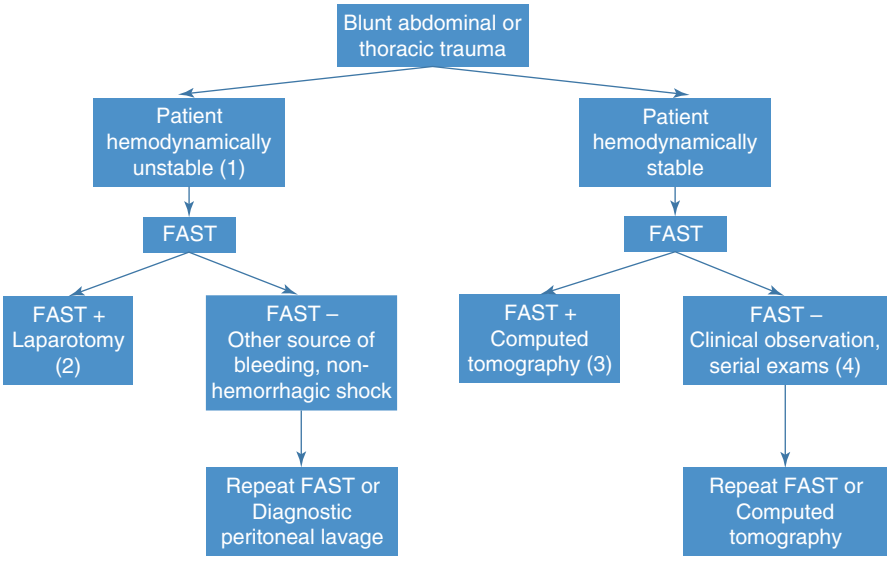
	FAST	Tomography
Stability	Unstable	Stable
Aim	Search free fluid	Search organic injuries
Advantages	Early diagnosis FAST can be repeated Accuracy of 86–97%	Specific to define injury Sensibility of 92–98%
Disadvantages	Operator-dependent Image distortion due to meteorism and subcutaneous emphysema Did not diagnose injuries to the pancreas, intestine, and diaphragm	High cost and duration Use of contrast – Risk of anaphylaxis Did not diagnose injuries to the pancreas, intestine, and diaphragm

42.2 Technique

Transductor: convex – 2.5–3.5 MHz

Tracking sites:

- Perihepatic space: right posterior axillary line – between 11 and 12 ribs.
- Perisplenic space: left posterior axillary line – between 10 and 11 ribs.
- Pericardium: Transductor on the right side of the xiphoid appendix and left inferior costal ridge.
- Pelvis: Transductor at the midline, above the pubic symphysis.



42.3 Conclusion

(1) Blunt abdominal trauma victim who is hemodynamically unstable should be quickly approached by a cheap and sensible method of triage which does not interfere with other procedures. This is the great advantage of FAST. It will document only the presence or absence of free fluid in pericardium, perihepatic space, perisplenic space, and pelvis.
(2) Hemodynamically unstable patients with a negative FAST make us think about other causes of shock. It is worth to remember that although very accurate, as every ultrasound, FAST is operator-dependent . Furthermore, obese patients, with intestinal weather or subcutaneous emphysema, have the exam impaired. Also, injuries of the diaphragm, intestine, and pancreas are not diagnosed by the exam.
(3) Patients with a positive FAST, but hemodynamically stable, always should undergo a computed tomography with intravenous contrast. This exam has an accuracy of 92–98%, providing us with information about the presence of injuries of specific organs, retroperitoneal injuries, and pelvic injuries. It is worth to remember that tomography cannot detect injuries of the diaphragm, intestine, and pancreas. Therefore, a positive FAST in the absence of hepatic or splenic injuries is very suggestive of injury to the gastrointestinal tract or mesentery. From this point, the conduct will be taken according to the grade of impairment found in CT or the patient's clinical change.
(4) In case of hemodynamic stability and negative FAST, it is important to do clinical observation of the patient, be alert to possible changes of the general condition, fall of the blood pressure, or the hematocrit. If any change happens, FAST can be repeated or a CT can be performed.

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