The Role of the FAST exam in the EDRU

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Disclosures
Goals

• Describe the performance, and performance characteristics, of the FAST/E-Fast
• Answer critical questions about the use of FAST exams in trauma
• Formally integrate FAST exams into Trauma Resuscitations in the EDRU
Critical Questions

• FAST vs E-FAST?
• Blunt vs Penetrating Trauma
• Pediatrics – is it different?
• When is a positive FAST an indication for the OR?
FAST Exam – A Panacea?

• Bedside
• Rapid
• No radiation
• Cheap
• Repeatable
• No complications

• Potential Clinical Benefits
  Reductions in:
  - Time to surgery
  - CT Use
  - ED/Hospital LOS
  - Complications
  - Cost
  - Radiation
FAST Exam

• 4 key locations
• Free Fluid
• Sensitivity for intraperitoneal hemorrhage
  • 43-100%
• Specificity
  • 90-100%
FAST Views

• RUQ views
  • Sagittal probe orientation
  • 7\textsuperscript{th}-9\textsuperscript{th} ICS, oblique orientation
  • Morison’s pouch
  • Sub-phrenic
  • Inferior renal pole
  • Diaphragm/lung

• Sub-xiphoid view
  • Transverse probe orientation
  • Liver, right heart, left heart
  • Eval chambers and relative size of ventricles, squeeze, pericardial fluid

• LUQ View
  • Sagittal probe orientation
  • 5\textsuperscript{th}-7\textsuperscript{th} IC space, oblique position
  • Sweep from Ant to Post
  • Spleno-renal and sub-phrenic recesses, inferior renal pole
  • Diaphragm/Pleural interface

• Pelvic View
  • Sagittal and Transverse probe orientation
  • Full bladder
  • Fluid behind bladder, behind uterus, behind loops of bowel
E-Fast – Extended FAST

• Lung windows
• Increased sensitivity for PTX over CXR (43-91% vs 11-50%)
• 2nd-3rd IC Space (reduce DoF)
  - Sliding lung
  - Comet tails
  - M-mode “sea shore” sign
    - “bar code” or
    “stratosphere” sign
  in PTX
• What is the clinical significance?
• [https://youtu.be/26RQyxk5vGc?t=34s](https://youtu.be/26RQyxk5vGc?t=34s)
E-Fast (cont’d)

Comet-tail Artifacts

M-mode: Lung Point, Sea shore, Bar code signs
Limitations of the FAST

Injuries
- Lack of FF in pediatric SOI
- Mesenteric, hollow viscous, diaphragmatic, and isolated penetrating injuries
- Retroperitoneal bleeding/injuries
- Successfully identifies occult PTX not needing intervention

Patient Characteristics
- False positives (ascites, physiologic FF in females, PD, VP shunts, uroperitoneum in pelvic trauma)
- Obesity, subcutaneous emphysema, bowel gas, adhesions, patient cooperation and positioning
- Pericardial fat pad, pre-existing effusions
- Mainstem intubation, pleurodesis, severe COPD
Alternatives to FAST

• Physical Exam!
• CT
• Diagnostic Peritoneal Lavage
• Local Wound Exploration
• Laparoscopy/Laparotomy
**Clinical Condition:** Blunt Abdominal Trauma

**Variant 1:** Unstable patient.

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US chest abdomen and pelvis (FAST scan)</td>
<td>8</td>
<td>Rapid assessment of free fluid, patient condition permitting. Chest radiograph, KUB, and FAST scan are complementary examinations. All are commonly performed in this setting, patient condition permitting.</td>
<td>O</td>
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</tbody>
</table>

**Variant 2:** Stable patient.

<table>
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<td>5</td>
<td></td>
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**Rating Scale:** 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level*
Emergency ultrasound-based algorithms for diagnosing blunt abdominal Trauma (update 9/15)

4 RCTs
Poor to moderate methodologic quality

Pooled Mortality Data RR 1.00 (95% CI 0.50 to 2.00)
FAST-based pathways reduced CT Scans (random effects model
RD -0.52, 95% CI -0.83 to -0.21)
“In a hemodynamically unstable patient with blunt abdominal trauma is bedside ultrasound the diagnostic modality of choice?...

**Level B recommendation** – In hemodynamically unstable patients (systolic blood pressure < or = 90 mm Hg) with blunt abdominal trauma, bedside ultrasound, when available, should be the initial diagnostic modality performed to identify the the need for emergent laparotomy”

“Serial Ultrasounds can be helpful in patients with blunt abdominal trauma.”

“Ultrasound should not be considered the sole test”

“A negative ultrasound result in a hemodynamically unstable patient does not preclude the need for further diagnostic testing.”
• FAST falls under primary survey “C – Circulation”
• A negative FAST does not rule out IAI
• “Absolute indication for laparotomy is a contraindication to FAST”

• Pediatric Caveats
  • large volume blood more assoc with significant injury but need for operative management determined by hemodynamic instability and response to resuscitation. Small amounts FF in stable child deserves CT scan
  • Isolated intraprenychymal injury (without FF) occurs in 1/3 of SOI in kids.

* Role of FAST depends on patient stability and ATLS principle of rapid responders, transient responders and non-responders
Practice Management Guidelines for the Evaluation of Blunt Abdominal Trauma: The EAST Practice Management Guidelines Work Group

William S. Hoff, MD, Michelle Holevar, MD, Kimberly K. Nagy, MD, Lisa Patterson, MD, Jeffrey S. Young, MD, Abenamar Arrillaga, MD, Michael P. Najarian, DO, and Carl P. Valenziano, MD

**Fig. 1.** Evaluation of BAT: unstable patient.

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*J Trauma. 2002;53:602–615.*
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*CT scan may be elected based on institutional experience or clinical suspicion of intra-abdominal injury.

Western Trauma Association Critical Decisions in Trauma: Management of Pelvic Fracture With Hemodynamic Instability

James W. Davis, MD, FACS, Frederick A. Moore, MD, FACS, Robert C. McIntyre, Jr., MD, FACS, Christine S. Cocanour, MD, FACS, Ernest E. Moore, MD, FACS, and Michael A. West, MD, FACS

Fig. 1. Algorithm for management of pelvic fracture.

Penetrating Trauma

- EAST - Practice Management Guidelines for Selective Nonoperative Management of Penetrating Abdominal Trauma
  - J Trauma 2010; 68 (3) 721-733
  - Additional studies necessary if FAST negative
  - “Not enough data to make a recommendation about the use of US in this patient population”

- 2009 Meta-analysis – 8 studies
  - N=565
  - Sensitivity 28-100%. Specificity 94-100%.
  - Positive fast should prompt ex-lap. Negative should prompt additional studies.
2017 Western Trauma Stab Wound Abdomen Alg.

* Presented at March meeting
Pediatrics and the FAST Exam

• 2009 Survey
  • 15% dedicated Peds EDs used FAST vs 96% Adult EDs

• 2017 study
  • Use of FAST across 14 centers ranged from 1-94% (CT use 6-94%)

• Unique Features
  • >1/3 of children with SOI will have no FF on exam
  • Operative management more often dictated by VS instability rather than presence of free fluid
  • More often used as an extension of the physical exam - repeatable

• Sensitivity (28-90%)
  • 66% for hemoperitoneum (50% for IAI) in 2007 meta-analysis
  • 52% for moderate or greater HP in prospective study

• Specificity (>90%)
FAST In Pediatrics – Hot off the press!

JAMA Original Investigation
Effect of Abdominal Ultrasound on Clinical Care, Outcomes, and Resource Use Among Children With Blunt Torso Trauma: A Randomized Clinical Trial

Focused Assessment with Sonography for Trauma (FAST) in Children Following Blunt Abdominal Trauma: A Multi-Institutional Analysis.
J Trauma Acute Care Surg. ePub 6/6/17
Pediatrics and the FAST (continued)

• Pediatric Take Home points
  • Moderate free fluid suggests hemoperitoneum from IAI requiring further diagnostics
  • Negative FAST in stable patient inadequate as sole diagnostic test
  • Positive FAST in unstable child may prompt earlier transfusion or emergent laparotomy without further imaging
Doc Right

- Completes “C” (circulation) of the primary assessment (assessment of BP, central & peripheral pulses, current IV access) and announces it to the trauma team leader
- Performs the secondary assessment from head to toe and reports all positive and negative findings
- Obtains “AMPLE” history at the completion of the secondary assessment of the patient
- May perform other tasks as delegated by TTL
Principles of FAST exams in the EDRU

• All Trauma Alert Protocol patients should get a FAST exam (Doc Right)
  • Unstable Patients – Part of C, Circulation
  • Stable patients – after secondary exam OR upon return from CT

• Unstable patients with positive FAST exams go to the OR (Non-Responders)

• US should not be used as sole imaging for patients “at risk”
  • CT, serial exams, laparotomy, DPL, LWE

• FAST in Pediatric patients has lower sensitivity for IAI and may not alter management
Discussion