Should FAST be FASTER?

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The FAST examination in trauma

**FAST**

- *Focused Assessment with Sonography for Trauma*
  
  International Consensus Conference on Sonography in Trauma, Baltimore 1997

  - Ultrasound for trauma: Europe, Japan 1970s
  - North America since early 1990s

  - Noninvasive, rapid, safe, accurate, repeatable assessment in the trauma room

  - Growing recognition of pitfalls associated with present methods for assessing truncal injuries
The FAST examination in trauma

- The use of ultrasound is an extension of the physical examination of the trauma patient.

- Performed in the trauma room, ultrasound enables timely diagnosis of potentially life-threatening hemorrhage.
The FAST examination in trauma

- Principal purpose: determine the presence or absence of free fluid

- The “4 P’s”
  - Perihepatic region (Morison’s pouch)
  - Perisplenic region
  - Pelvic region (cul de sac)
  - Pericardium
FAST Hardware
FAST at Auckland Hospital
FAST in practice

- Performed during the ATLS secondary survey
- Patient remains supine
- Aimed at the detection of free fluid
- FAST should NOT delay resuscitation or other investigations
Algorithm for the management of Blunt Abdominal Trauma

Blunt Abdominal Trauma

No clinical indication for immediate surgery

FAST

Positive for free fluid
- Stable: CT
- Unstable: OR

Indeterminate
- DPL or CT

Negative for free fluid
- Stable: Observe/repeat FAST
- Unstable: Repeat FAST or DPL

CT: computed tomography; DPL: diagnostic peritoneal lavage; OR: operating room
The local perspective on FAST

AUSTRALASIAN TRAUMA SOCIETY

Ultrasound in Trauma

"The Australasian Trauma Society supports and encourages the application of Focussed Abdominal Sonography as a diagnostic modality to be utilised in the initial assessment of the Trauma Patient."

The Working Party is now in the process of developing credentialling guidelines for those who wish to train in Trauma Ultrasound:
Can the role of ultrasound be expanded?
Would there be instances where ultrasound can expedite diagnoses?
Is it time for FASTER?

Focused
Assessment with
Sonography in
Trauma including
Extremities and
Respiratory system
Advanced Ultrasonic Diagnosis of Extremity Trauma: The FASTER Examination

Scott A. Dulchavsky, MD, PhD, Scott E. Henry, MD, Berton R. Moed, MD, Lawrence N. Diebel, MD, Thomas Marshburn, MD, Douglas R. Hamilton, MD, PhD, James Logan, MD, Andrew W. Kirkpatrick, MD, and David R. Williams, MD

- Prospective study at Level 1 trauma center
- 158 examinations in 95 patients
- Trained non-physicians; 2 hours of instruction
- 10.5 MHz linear probe
- Videotaped, comparison with radiography
Ultrasound technique

Fig. 1. The ultrasound examination was initially conducted with the transducer placed longitudinally to evaluate cortical integrity. Areas of probable injury were then confirmed by turning the probe head 90 degrees to obtain a transverse scan through the bone.
Fig. 2. Representative static ultrasound image of a midshaft ulnar fracture demonstrating a well-demarcated cortical break. There is evidence of fluid accumulation in the soft tissues superior to the fracture site consistent with fracture hematoma.
Radiographic appearance

Fig. 3. Radiologic confirmation of the ulnar fracture demonstrates a bicortical fracture with minimal displacement of the bony elements.
## Results

Average scan time: 4 minutes

### Table 1

<table>
<thead>
<tr>
<th>Location</th>
<th>True (Positive)</th>
<th>True (Negative)</th>
<th>False (Positive)</th>
<th>False (Negative)</th>
<th>p Value</th>
<th>Relative Risk</th>
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<tbody>
<tr>
<td>Forearm/arm</td>
<td>12</td>
<td>22</td>
<td>0</td>
<td>1</td>
<td>1.00</td>
<td>1.06</td>
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<tr>
<td>Femur</td>
<td>5</td>
<td>20</td>
<td>0</td>
<td>1</td>
<td>1.00</td>
<td>1.2</td>
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<td>Tibia/fibula</td>
<td>15</td>
<td>18</td>
<td>0</td>
<td>3</td>
<td>0.79</td>
<td>0.91</td>
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<td>0</td>
<td>4</td>
<td>0.11</td>
<td>Inf,</td>
</tr>
<tr>
<td>Tendon</td>
<td>9</td>
<td>18</td>
<td>0</td>
<td>1</td>
<td>1.00</td>
<td>1.08</td>
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### Table 2

<table>
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<tr>
<th>Location</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Physician Overreads</th>
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<tbody>
<tr>
<td>Forearm/arm</td>
<td>92</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Femur</td>
<td>83</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>Tibia/fibula</td>
<td>83</td>
<td>100</td>
<td>0</td>
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<tr>
<td>Hand/foot</td>
<td>60</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>Tendon</td>
<td>90</td>
<td>100</td>
<td>1</td>
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</table>
Respiratory assessment

- Chest Ultrasonography
  - Pericardium – one of the 4 P’s in the FAST
  - Pneumothorax
  - Pleural effusions/haemothorax

R) hemothorax
Pneumothorax

- Usually a clinical and radiographic diagnosis

- But difficulties arise in:
  - Unstable patients
  - Patients in transport
  - Rural applications
  - Military conflicts
Sonographic Diagnosis of a Pneumothorax Inapparent on Plain Radiography: Confirmation by Computed Tomography

Andrew W. Kirkpatrick, MD, FRCSC, Alex K. T. Ng, MD, MBChB, FRACS, Scott A. Dulchavsky, MD, PhD, FACS, Ian Lyburn, MB, FRCR, Allison Harris, MB, FRCR, William Torregiani, MB, FRCR, Richard K. Simons, MD, FRCSC, FACS, and Savvas Nicolaou, MD, FRCPC

20 yr-old motocross biker
Thrown over handlebars
L) pleuritic chest pain, dyspnoea
Equal air entry
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L) pleuritic chest pain, dyspnoea
Equal air entry
Prospective Evaluation of Thoracic Ultrasound in the Detection of Pneumothorax

Scott A. Dulchavsky, MD, PhD, Karl L. Schwarz, MD, Andrew W. Kirkpatrick, MD, Roger D. Billica, MD, David R. Williams, MD, Lawrence N. Diebel, MD, Mark R. Campbell, MD, Ashot E. Sargysan, MD, and Douglas R. Hamilton, MD, PhD

Background: Thoracic ultrasound may rapidly diagnose pneumothorax when radiographs are unobtainable; the accuracy is not known.

Methods: We prospectively evaluated thoracic ultrasound detection of pneumothorax in patients at high suspicion of pneumothorax. The presence of “lung sliding” or “comet tail” artifacts were determined in patients by ultrasound before radiologic verification of pneumothorax by residents instructed in thoracic ultrasound. Results were compared with standard radiography.

Results: There were 382 patients enrolled; the cause of injury was blunt (281 of 382), gunshot wound (12 of 382), stab wound (61 of 382), and spontaneous (18 of 382). Pneumothorax was demonstrated on chest radiograph in 39 patients and confirmed by ultrasound in 37 of 39 patients (95% sensitivity); two pneumothoraces could not be diagnosed because of subcutaneous air; the true-negative rate was 100%.

Conclusion: Thoracic ultrasound reliably diagnoses pneumothorax. Expansion of the focused abdominal sonography for trauma (FAST) examination to include the thorax should be investigated for terrestrial and space medical applications.

Key Words: Pneumothorax, Ultrasound, Space medicine.


382 patients
Blunt/penetrating trauma, spontaneous
Surgical residents
4 MHz linear probe

Sensitivity 95%
Specificity 100%
Applicability of extended ultrasonography

- Military
- Civilian

- Greatest utility when standard equipment unavailable
  - Injury scene
  - During transport
  - Aerospace

- Imaging personnel need not be physicians
- Telemedicine potential
Summary

- Ultrasound in trauma here to stay
- Greatest utility in the trauma room, exclude intra-abdominal bleeding, haemopericardium
- Potential for extended applications, but main utility seems to be outside the trauma room