Should FAST be FASTER?

Alexander Ng
Trauma Service
Department of Surgery
Auckland Hospital

The FAST examination in trauma

FAST

- *F*ocused *A*ssessment with *S*onography for *T*rauma
  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

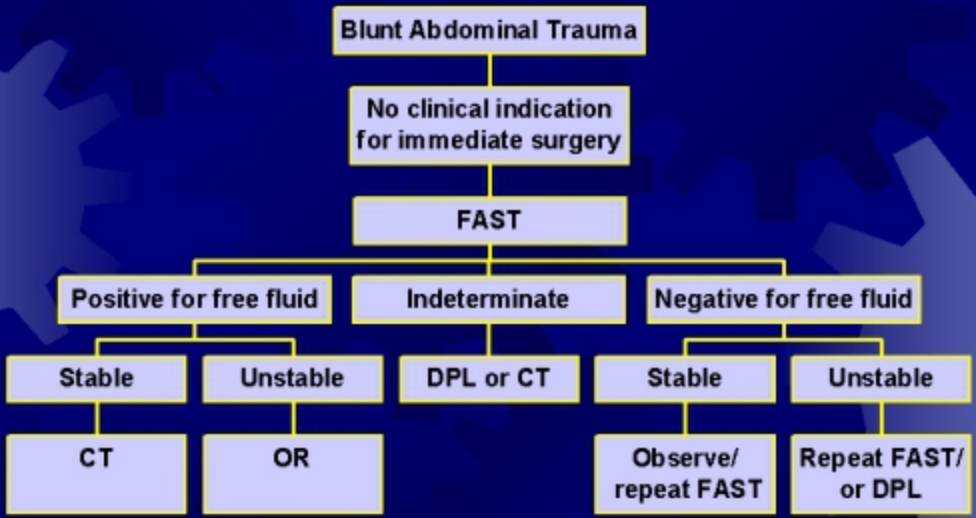
FAST Hardware

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



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 FAST*ER*?

Focused
Assessment with
Sonography in
Trauma including
Extremities and
Respiratory system

The Journal of TRAUMA® Injury, Infection, and Critical Care

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. Ktrkpatrick, 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

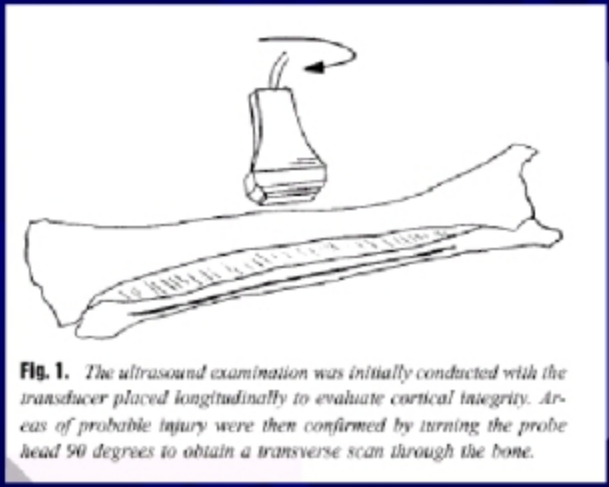


Fig. 1. *The ultrasound examination was initially conducted with the transducer placed longitudinally to evaluate cortical integrity. Areas of probable injury were then confirmed by turning the probe head 90 degrees to obtain a transverse scan through the bone.*

Ultrasonographic appearance of fracture

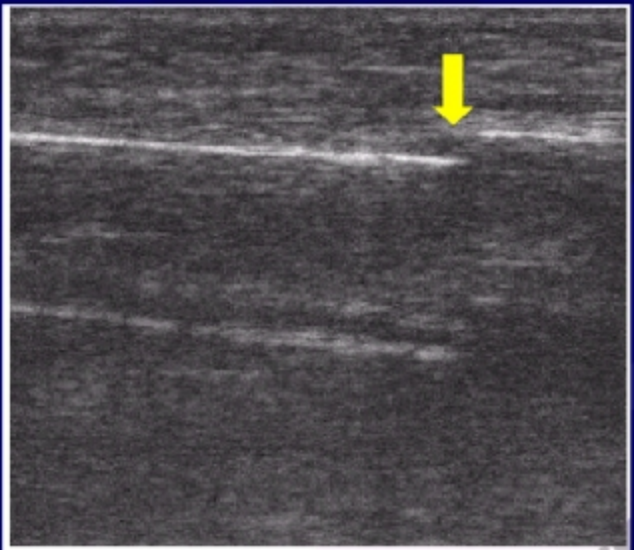


Fig. 2. *Representative static ultrasound image of a midshaft ulna fracture demonstrating a well-demarcated cortical break. There is evidence of fluid accumulation in the soft tissues superior to the fracture site consistent with fracture hematoma.*

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 Location of Injury versus Accuracy

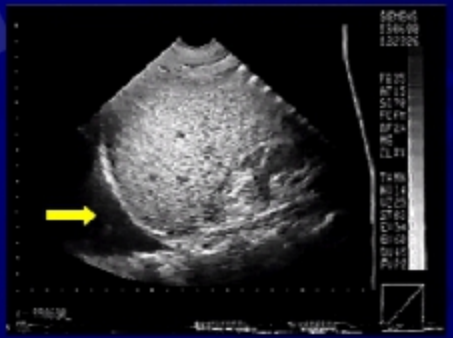
Location	True (Positive)	True (Negative)	False (Positive)	False (Negative)	p Value	Relative Risk
Forearm/arm	12	22	0	1	1.00	1.06
Femur	5	20	0	1	1.00	1.2
Tibia/fibula	15	18	0	3	0.79	0.91
Hand/foot	4	25	0	4	0.11	Inf.
Tendon	9	18	0	1	1.00	1.06

Table 2 Sensitivity versus Specificity of Orthopedic Ultrasound[a]

Location	Sensitivity (%)	Specificity (%)	Physician Overreads
Forearm/arm	92	100	0
Femur	83	100	1
Tibia/fibula	83	100	0
Hand/foot	50	100	2
Tendon	90	100	1

Respiratory assessment

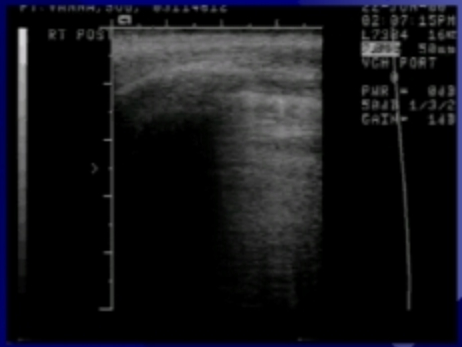
- Chest Ultrasonography
  - Pericardium – one of the 4 P's in the FAST
  - Pneumothorax
  - Pleural effusions/haemothorax



R) hemothorax

Pneumothorax

- Usually a clinical and radiographic diagnosis
- But difficulties arise in:
  - Unstable patients
  - Patients in transport
  - Rural applications
  - Military conflicts



CASE REPORT

The Journal of TRAUMA® Injury, Infection, and Critical Care

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 Torreggiani, MB, FRCR, Richard K. Simons, MD, FRCSC, FACS, and Savvas Nicolaou, MD, FRCPC

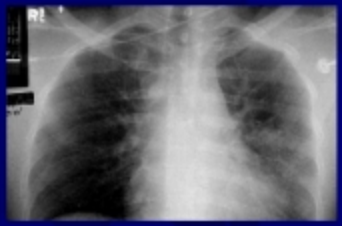
J Trauma. 2001;50:750–752.

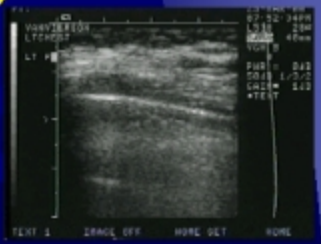
20 yr-old motocross biker

Thrown over handlebars

L) pleuritic chest pain, dyspnoea

Equal air entry





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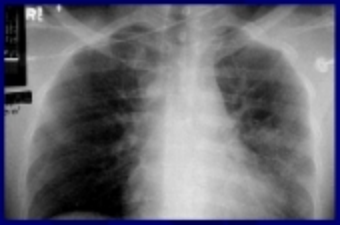

The Journal of TRAUMA® Injury, Infection, and Critical Care

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. Sargsyan, 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 (22 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.

J Trauma. 2001;50:201–205.

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