

16 au 18 Décembre 2013

Faculté de médecine Nîmes – Amphithéâtre 2



Lundi 16 Décembre		Mardi 17 Décembre		Mercredi 18 Décembre	
8h45	Accueil des participants et présentation de la formation Dr BOBBIA	8h30	ETT : Cœur Pulmonaire Aigu Dr ROGER	8h3	FAST Echographie Dr BOBBIA
9h00	Bases physiques et techniques Pr DAUZAT	10h0	Pause	9h4	Echographie gynécologique Dr POUGET
10h3	Pause	10h5	ETT : Tamponnade Dr ROGER	10h	Pause
10h4	Bases physiques et techniques Pr DAUZAT	11h3	ETT : valvulopathies Dr ROGER	10h	Echographie des voies urinaires Dr MOREAU
12h1	Pause Déjeuner	12h0	Pause Déjeuner	10h	Echographie des voies biliaires Dr MOREAU
13h3	Principes de l'échographie clinique chez le patient aigu Dr BOBBIA	13h3	Doppler Trans Crânien Dr ROGER	11h	Pause Déjeuner
14h1	Intérêt de l'échographie clinique chez le patient aigu Dr MULLER	14h3	Echographie de l'Aorte abdominale Dr BOBBIA	12h	Principes d'échographie pulmonaire Dr BONNEC
14h4	ETT Normale Dr MULLER	16h0	Pause	14h	Pause
15h3	Pause	16h1	Recherche de TVP : Compression veineuse 4 points Dr BOBBIA	15h	Pneumothorax et épanchements pleuraux Dr BONNEC
15h4	ETT Normale Dr MULLER	17h0	Utilité de l'échographie pour les ponctions vasculaires Dr GENE GIANFRANCO RE	15h	Echographie diaphragmatique Dr BONNEC
17h0	ETT: Evaluation de la fonction du VG Dr MULLER	17h4	Fin des enseignements de la journée	16h	Fin du séminaire
17h3	ETT : Evaluation des pressions de remplissages du VG Dr MULLER			17h	

Séminaire Echographie du patient aigu



FAST échographie



X. BOBBIA

*Division Anesthésie Réanimations
Douleur Urgences*



FAST

- FAST ?
- PEC du PTG à l'admission
- PFAST
- Limites et perspectives

FAST

- FAST ?
- PEC du PTG à l'admission
- PFAST
- Limites et perspectives

FAST ?

**Focused Abdominal Sonography
for Trauma**



**Focused Assessment of the
Sonography examination of
Trauma patient**

FAST?

Utilisation de l'échographie avec méthode
standardisée dans la prise en charge des patients
polytraumatisés

FAST?

Utilisation de l'échographie avec méthode
standardisée dans la prise en charge des patients
polytraumatisés

Dépistage échographique d'épanchement séreux
(3P)

- Péritoine
- Plèvre
- Péricarde

FAST?

Utilisation de l'échographie avec méthode
standardisée dans la prise en charge des patients
polytraumatisés

Dépistage échographique d'épanchement séreux
(3P)

- Péritoine
- Plèvre
- Péricarde

FAST : Intérêt?

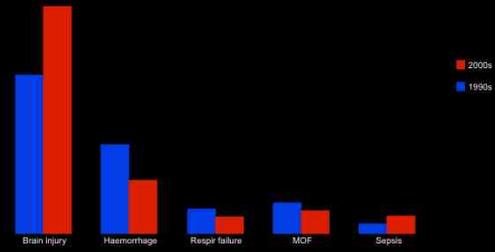
Polytraumatisé - Causes de mortalité
Quelles lésions?

Region	Seattle (n = 390) (%)	Monterrey (n = 265) (%)	Kumasi (n = 252) (%)
Head	47	22	22
Thorax	25	37	10
Abdomen	20	34	6
Extremity	8	7	57
Unknown	0	0	5

^a $p < 0.001$ ($df = 6$) for differences among the groups (unknowns excluded).

Mock et al J trauma 1998

PTG - Epidémiologie



Pfeifer et al - injury 2009

FAST - Réalisation



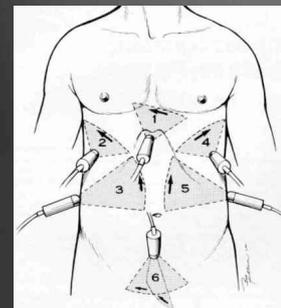
Examen avec une seule sonde



FAST - Réalisation

Prospective Analysis of a Rapid Trauma Ultrasound Examination Performed by Emergency Physicians

, O. John Ma MD Mateer, James R. MD; Ogata, Masaaki MD; Kefer, Michael P. MD; Wittmann, Dietmar MD; Aprahamian, Charles MD



The Journal of Trauma: Injury, Infection, and Critical Care
Numero : Volume 38(6), June 1995, pp 879-885

FAST - Réalisation



Prospective Analysis of a Rapid Trauma Ultrasound Examination Performed by Emergency Physicians

, O. John Ma MD Mateer, James R. MD; Ogata, Masaaki MD; Kefer, Michael P. MD; Wittmann, Dietmar MD; Aprahamian, Charles MD

The Journal of Trauma: Injury, Infection, and Critical Care
 Numéro : Volume 38(6), June 1995, pp 879-885

Location	Total Examinations	True Positifs	True Négatifs	False Négatifs	False Positifs	Se (%)	Sp (%)	Accuracy (%)
Intrapéritonéal	245	32	207	5	1	86	99	98
Pleural	240	25	214	1	0	96	100	99
Péricardial	245	6	238	0	1	100	99	99
Rétropéritonéal	245	1	243	1	0	50	100	99
TOTAL	975	64	902	7	2	90	99	99

FAST - Réalisation



The Indeterminate Abdominal Sonogram in Multisystem Blunt Trauma

Boulangier B, Brennanman F, Kirkpatrick A, McLellan B, Nathens A
 Journal of Trauma Injury Infection & Critical Care, 45(1):52-56, July 1998.

417 patients 28 (6.7%) résultats indéterminés

Factors	n
Patient factors (n = 20)	
Subcutaneous emphysema	14
Obesity	6
Sonographer factors (n = 8)	
Equivocal for free fluid	4
Unable to generate adequate images for interpretation ^a	4

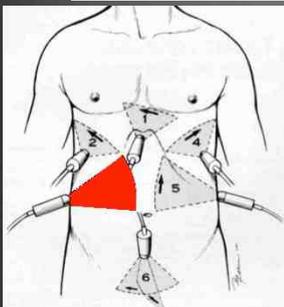
^a Without a discernable cause (e.g., obesity).

FAST - Réalisation

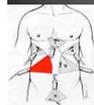
Early Detection of Hemoperitoneum by Ultrasound Examination of the Right Upper Quadrant: A Multicenter Study

Rozycski, Grace S. MD; Ochener, M. Gage MD; Feliciano, David V. MD; Thomas, Bruce DO; Boulangier, Bernard R. MD; Davis, Frank E. MD; Falcone, Robert E. MD; Schmidt, Judith A. DNSc.

The Journal of Trauma: Injury, Infection, and Critical Care
 Numéro : Volume 45(5), November 1998, pp 878-883



FAST - Réalisation



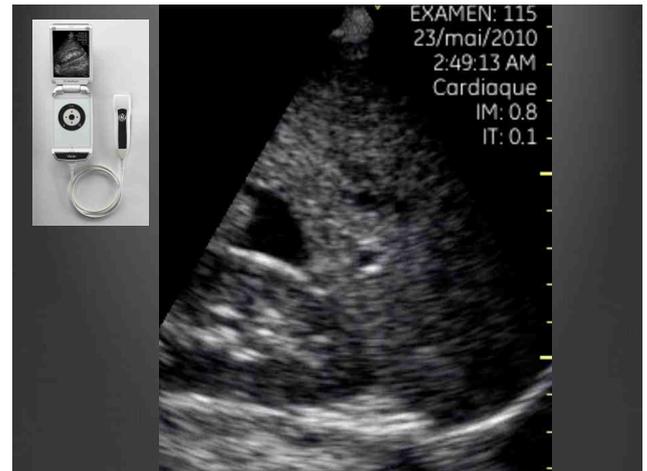
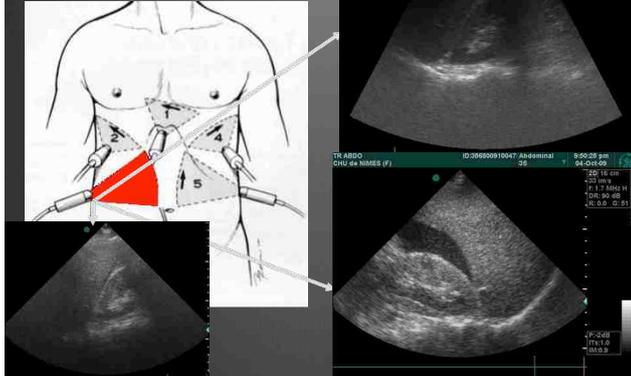
Early Detection of Hemoperitoneum by Ultrasound Examination of the Right Upper Quadrant: A Multicenter Study

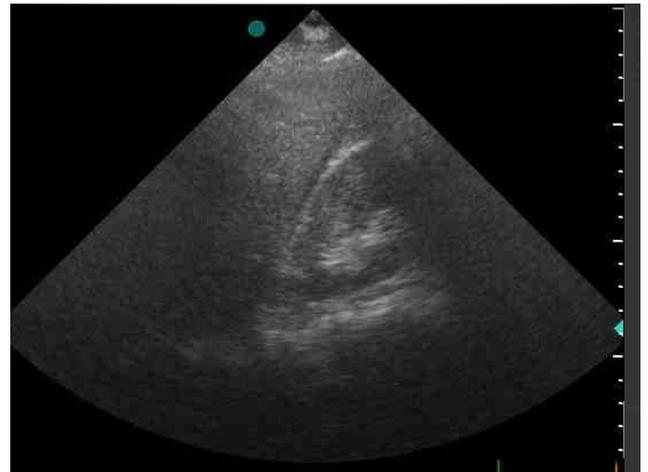
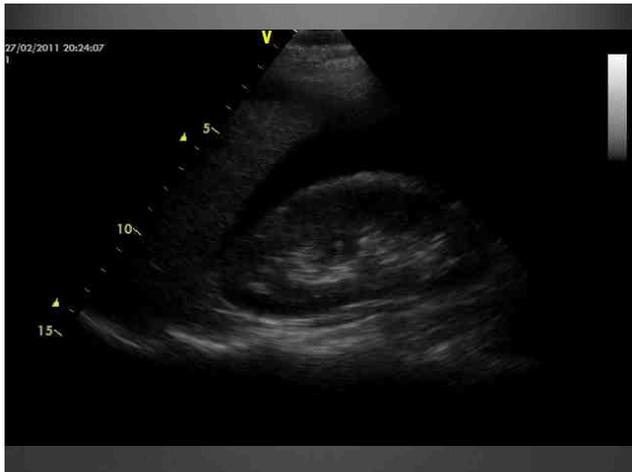
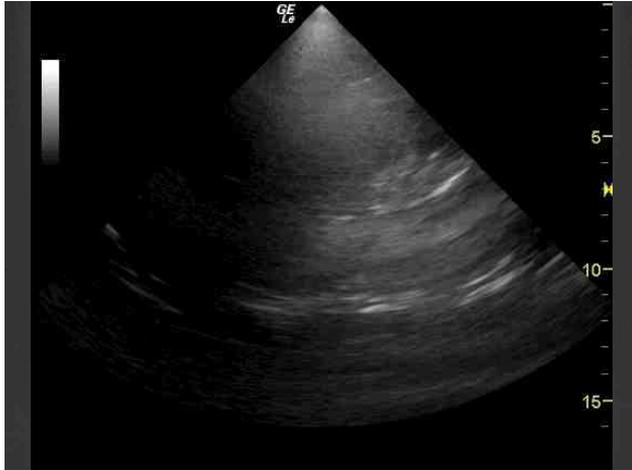
Rozycski, Grace S. MD; Ochener, M. Gage MD; Feliciano, David V. MD; Thomas, Bruce DO; Boulangier, Bernard R. MD; Davis, Frank E. MD; Falcone, Robert E. MD; Schmidt, Judith A. DNSc.

The Journal of Trauma: Injury, Infection, and Critical Care
 Numéro : Volume 45(5), November 1998, pp 878-883

Intra-abdominal injuries	Number of patients	Region			P value
		RUQ	LUQ	Pelvis	
Multiple	114	97 (85,5%)	63 (55,3%)	49 (43%)	0,001
Single					
Spleen	69	49 (71%)	23 (33%)	21 (30,4%)	0,001
Liver	53	41 (77,4%)	18 (34%)	20 (37,7%)	0,001
Hollow viscera only	26	16 (61,5%)	7 (26,9%)	19 (73,1%)	0,578
Rétropéritonéal only	13	10 (76,9%)	4 (30,7%)	2 (15,4%)	0,013
TOTAL	275	213 (77,5%)	115 (41,8%)	111 (40,4%)	

FAST - Réalisation





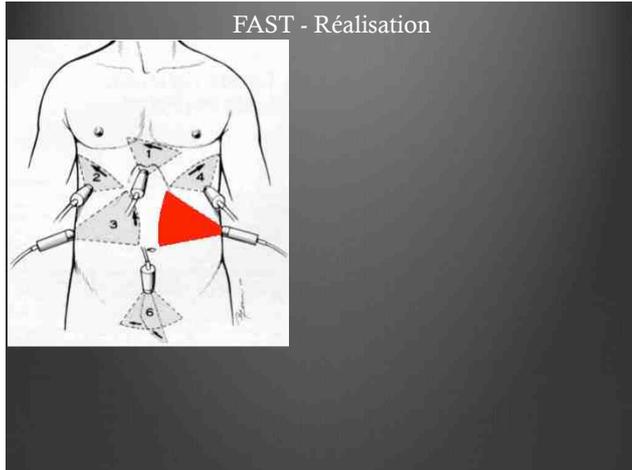


Bibliographie: quoi de neuf?

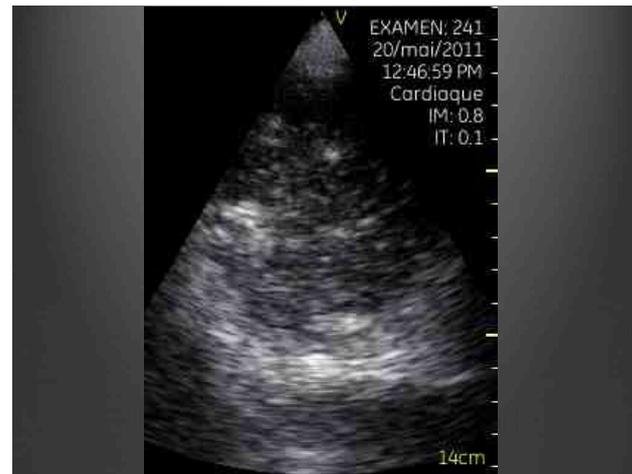
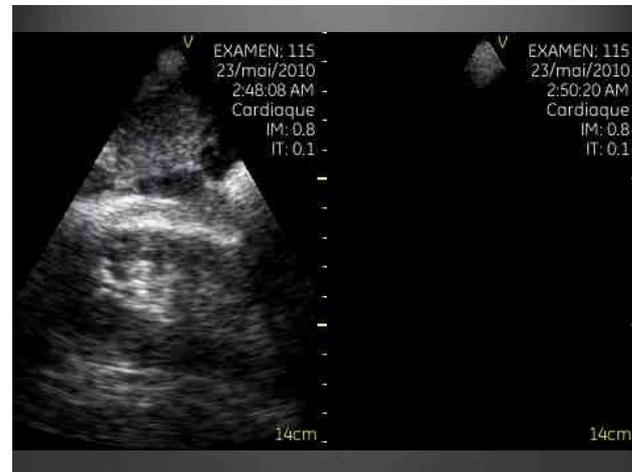
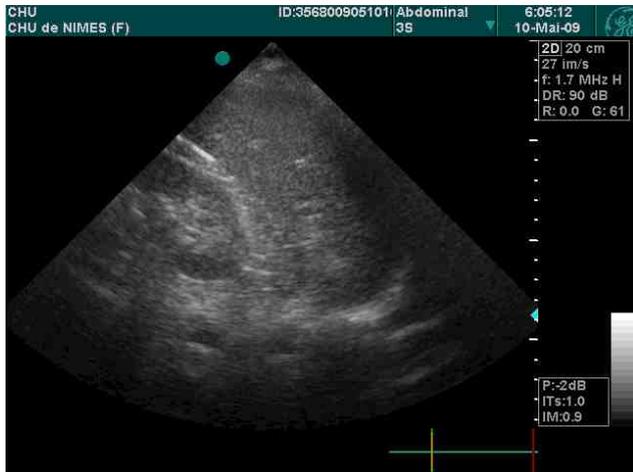
THE FAST DOUBLE-LINE SIGN: A FALSE POSITIVE FINDING ON THE FOCUSED ASSESSMENT WITH SONOGRAPHY FOR TRAUMA (FAST) EXAMINATION

Paul R. Sierzewski, MD, RDMS, Joel M. Schofer, MD, LCDR MC USN, Michael J. Bauman, MD, and Jason T. Nomura, MD, RDMS

The Journal of Emergency Medicine, Vol. xx, No. x, pp. xxx, 2009



FAST





FAST – limites et perspectives

Pierre A. Poletti, MD
Karen Kinkead, MD
Bernard Vermeulen, MD
François Imray, MD
Pierre-François Ugeux, MD
François Terrier, MD

Blunt Abdominal Trauma: Should US Be Used to Detect Both Free Fluid and Organ Injuries?¹

96 • Radiology • April 2003

TABLE 2
US Findings Compared with CT or Surgical Findings in 205 Hemodynamically Stable Patients

US Findings vs CT or Surgical Findings ¹	Initial US Examination				Second US Examination*	
	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Sensitivity (%)	NPV (%)
Free fluid at US vs free fluid at CT (n = 83)	93 (77/83)	95 (115/121)	93 (77/83)	95 (115/121)	96 (80/83)	98 (118/121)
Free fluid and/or organ injury at US vs organ injury at CT or surgery (n = 99)	72 (71/99)	88 (93/106)	85 (71/84)	77 (93/121)	84 (83/99)	87 (106/122)
Free fluid at US vs organ injury at CT or surgery (n = 99)	65 (64/99)	82 (87/106)	77 (64/83)	71 (87/122)	68 (67/99)	73 (87/119)
Organ injury at US vs organ injury at CT or surgery (n = 99)²	41 (39/99)	94 (100/106)	87 (39/45)	62 (100/160)	55 (54/99)	77 (115/160)
Spleen injury (n = 44)³	27 (12/44)	98 (157/161)	73 (12/16)	83 (157/189)	54 (15/44)	85 (160/189)
Liver injury (n = 41)³	51 (21/41)	99 (158/159)	95 (21/22)	89 (158/178)	73 (30/41)	94 (164/175)
Kidney/adrenal gland injury (n = 20)³	40 (8/20)	96 (182/186)	67 (8/12)	94 (182/194)	55 (11/20)	95 (185/194)
Other organ injuries (n = 12)³	8.0 (1/12)	100 (193/193)	100 (1/1)	95 (193/204)	33 (4/12)	96 (193/201)

Note.—Numbers in parentheses are the data used to calculate the percentages. Patients who underwent immediate surgery after the initial US examination and did not undergo CT were excluded from this analysis.
 * The specificity and PPV of findings at second US could not be calculated because the radiologist was aware of CT results at the time of this examination.
 ¹ Numbers are those of patients verified to have this finding at CT or surgery.
 ² Only parenchymal injuries, not the presence of free fluid, were considered.
 ³ Including bowel, mesenteric, bladder, and pancreatic injuries.

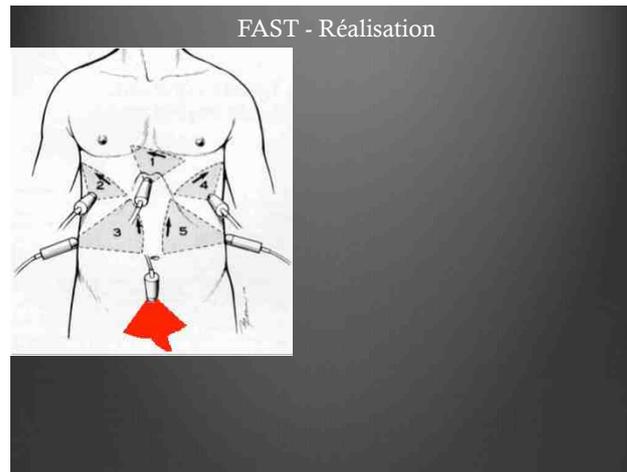
FAST – limites et perspectives

Blunt Abdominal Trauma: Does the Use of a Second-Generation Sonographic Contrast Agent Help to Detect Solid Organ Injuries?

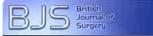
Pierre-Alexandre Poletti¹, Alexandra Platon¹, Christoph D. Becker¹, Gilles Mentha², Bernard Vermeulen², Léo H. Buhler² and François Terrier¹

210 traumatismes abdominaux stable A/R 2004; 183:1293-1301

Injuries	Sensitivity (%) of Admission Sonography	Detection Rate (%)	
		Control Sonography	Contrast-Enhanced Sonography
All solid organs ^a	40 (35/88)	57 (50/88)	80 (70/88)
Spleen			
Grade I	25 (1/4)	25 (1/4)	25 (1/4)
Grade II	31 (4/13)	66 (6/13)	62 (8/13)
Grades III-V	55 (6/11)	44 (7/11)	100 (11/11)
Liver			
Grades I and II	28 (4/14)	50 (7/14)	71 (10/14)
Grade III	31 (5/16)	56 (9/16)	88 (14/16)
Grade IV	88 (7/8)	88 (7/8)	100 (8/8)
Kidney and adrenal gland			
Grades I and II	28 (2/7)	43 (3/7)	57 (4/7)
Grades III-V	56 (5/9)	67 (6/9)	100 (9/9)



PFAST?



Prehospital ultrasound imaging improves management of abdominal trauma.

Walcher F et al. Br J Surg. 2006 Feb;93(2):238-42.

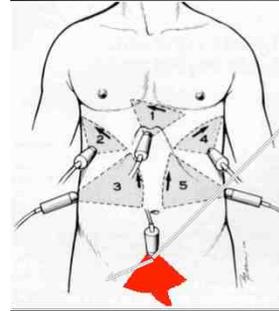
PFAST = prehospital focused abdominal sonography for trauma

202 trauma abdo en préhospitalier
26 Vrai Positif

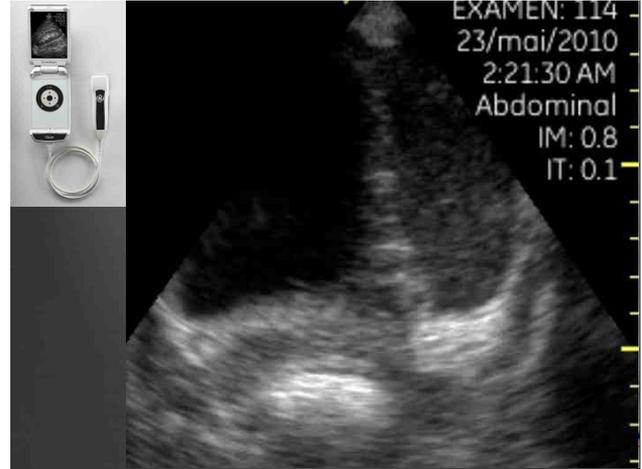
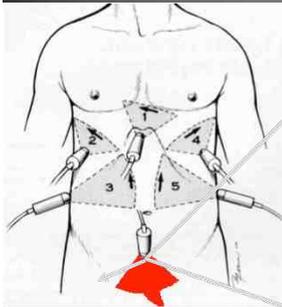
17 positif dans un seul quadrant

Douglas	18	69%
RUQ	12	46%
LUQ	8	31%

FAST - Réalisation



FAST - Réalisation





FAST – Hémopéritoine?

Surgeon-Performed Ultrasound for the Assessment of Truncal Injuries

Lessons Learned From 1540 Patients

Rozycki GS, 1998 Oct;228(4):557-67.

Table 1. ULTRASOUND RESULTS OF TOTAL PATIENT POPULATION

Specific Groups	FP	FN	Sensitivity (%)	Specificity (%)
Precordial/trans thoracic (313)	2	0	100	99.3
Blunt abdominal (1227)	2	16	78.3	99.8
Normotensive (1197)	2	16	75.7	99.8
Hypotensive (30)	0	0	100	100

Total = 1540 patients.

FP = False positive.

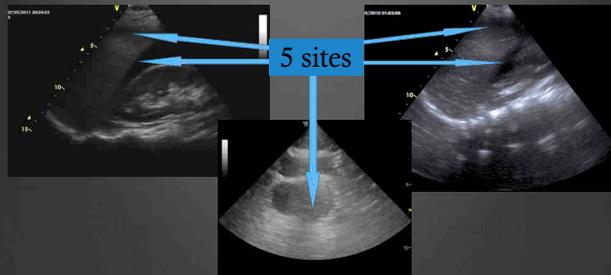
FN = False negative.

FAST – Intérêt dans la PEC du PTG

Hemoperitoneum Score Helps Determine Need for Therapeutic Laparotomy

2001;50:650-656.

Score de McKENNEY



FAST – Réalisation - Quantification

Hemoperitoneum Score Helps Determine Need for Therapeutic Laparotomy

Bondevy L, Mc Kenney MD, Sank G, Mc Kenney MD, FACS, Stephan M, Caba MD, FACS, Rosmond C, Quinn MD, Diego B, Nunez MD, Matthew Doherty MD, and Nicholas Natus MD

J Trauma. 2001;50:650-656.

Score de McKENNEY

Obtenue en additionnant la profondeur (en cm) de la citerne d'hémopéritoine la plus profonde:

- Péri hépatique
- Péri splénique
- Pelvis.

Et le nombre de site supplémentaire dans lesquels est mis en évidence du sang (5 sites)

FAST – Réalisation - Quantification

Hemoperitoneum Score Helps Determine Need for Therapeutic Laparotomy

Reinistry L, McKittrick MD, Stark G, McKittrick MD, FACS, Stephen M, Caba MD, FACS, Raymond Cooper, MD, Diego B. Nunez, MD, Matthew Delosh, MD, and Nicholas Xanaris, MD

J Trauma. 2001;50:650-656.

Score de MCKENNEY

Table 1 Ultrasound hemoperitoneum score versus need for laparotomy

	OR n (%)	No OR ^a n (%)
USS ≥ 3	39 (85)	7 (15)
USS < 3	8 (15)	46 (85) ^b
Total	47	53

OR, operation; USS, ultrasound score.

^a $p < 0.0001$.

^b Includes two nontherapeutic operations.

FAST – Réalisation - Quantification

Hemoperitoneum Score Helps Determine Need for Therapeutic Laparotomy

Reinistry L, McKittrick MD, Stark G, McKittrick MD, FACS, Stephen M, Caba MD, FACS, Raymond Cooper, MD, Diego B. Nunez, MD, Matthew Delosh, MD, and Nicholas Xanaris, MD

J Trauma. 2001;50:650-656.

Score de MCKENNEY

Table 2 Initial systolic blood pressure versus need for laparotomy

	OR n (%)	No OR n (%)
SBP ≤ 90 mm Hg	13 (72)	5 (28)
SBP > 90 mm Hg	34 (43)	46 (56)
Total ^a	47	51

OR, operation; SBP, systolic blood pressure.

^a Initial blood pressure not available on all patients.

FAST – Réalisation - Quantification

Hemoperitoneum Score Helps Determine Need for Therapeutic Laparotomy

Reinistry L, McKittrick MD, Stark G, McKittrick MD, FACS, Stephen M, Caba MD, FACS, Raymond Cooper, MD, Diego B. Nunez, MD, Matthew Delosh, MD, and Nicholas Xanaris, MD

J Trauma. 2001;50:650-656.

Score de MCKENNEY

TABLE 3 Initial Systolic Blood Pressure and Need for Laparotomy in Patients with a Score of ≥ 3

SBP	OR n (%)	No OR n (%)	Total
≤ 90 mm Hg	10 (100)	0	10
> 90 mm Hg	32 (89)	4(11)	36

SBP, systolic blood pressure; OR, operation.

FAST – Réalisation - Quantification

Hemoperitoneum Score Helps Determine Need for Therapeutic Laparotomy

Reinistry L, McKittrick MD, Stark G, McKittrick MD, FACS, Stephen M, Caba MD, FACS, Raymond Cooper, MD, Diego B. Nunez, MD, Matthew Delosh, MD, and Nicholas Xanaris, MD

J Trauma. 2001;50:650-656.

Score de MCKENNEY

Table 5 Comparison of the ability to predict the need for a therapeutic operation for an ultrasound hemoperitoneum score, initial systolic blood pressure, and base deficit

	Sensitivity (%)	Specificity (%)	Accuracy (%)
USS ≥ 3	83	87	85
SBP ≤ 90 mm Hg	28	90	58
BD ≥ 6	49	74	58

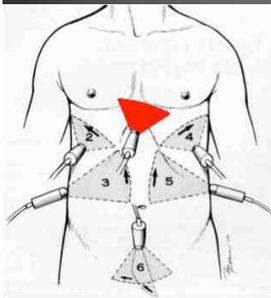
US, ultrasound score; SBP, initial systolic blood pressure; BD, base deficit.

FAST - Réalisation

The Role of Ultrasound in Patients with Possible Penetrating Cardiac Wounds: A Prospective Multicenter Study

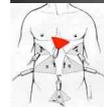
Rozycki, Grace S. RDMS, MD; Feliciano, David V. MD; Ochsner, M. Gage MD; Knudson, M. Margaret MD; Hoyt, David B. MD; Davis, Frank MD; Hammerman, David BS; Figueredo, Vincent MD; Harviel, J. Duncan MD; Han, David C. MD; Schmidt, Judith A. DNSc

The Journal of Trauma: Injury, Infection, and Critical Care
Numéro : Volume 46(4), April 1999, pp 543-552



FAST - Réalisation

The Role of Ultrasound in Patients with Possible Penetrating Cardiac Wounds: A Prospective Multicenter Study



Rozycki, Grace S. RDMS, MD; Feliciano, David V. MD; Ochsner, M. Gage MD; Knudson, M. Margaret MD; Hoyt, David B. MD; Davis, Frank MD; Hammerman, David BS; Figueredo, Vincent MD; Harviel, J. Duncan MD; Han, David C. MD; Schmidt, Judith A. DNSc

The Journal of Trauma: Injury, Infection, and Critical Care
Numéro : Volume 46(4), April 1999, pp 543-552

261 traumatisés thoracique

225 (86,2%) vrai négatif

29 (11,1%) vrai positif

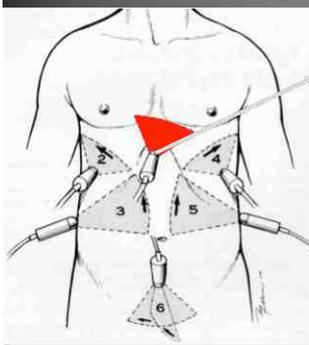
0 faux négatif

7 (2,7%) faux positif

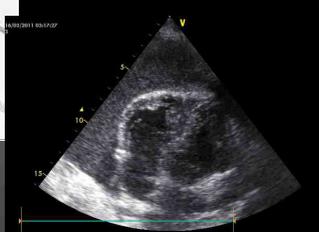
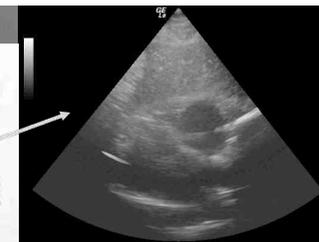
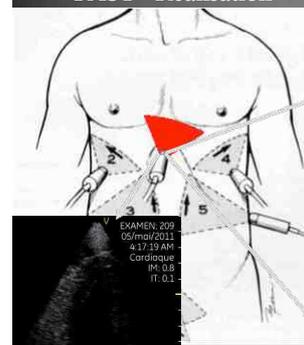
Sensibilité 100%

Spécificité 97%

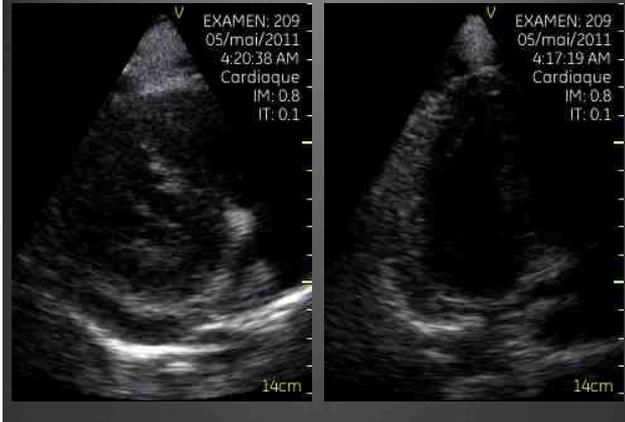
FAST - Réalisation



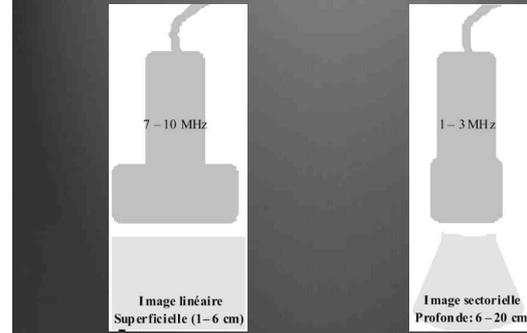
FAST - Réalisation



FAST - Réalisation



FAST - Réalisation

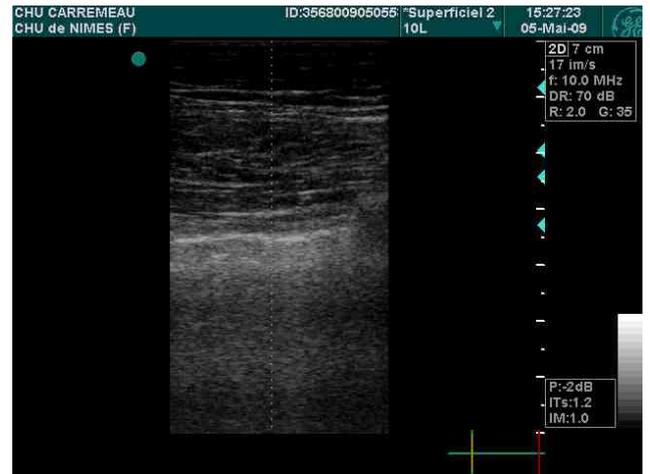


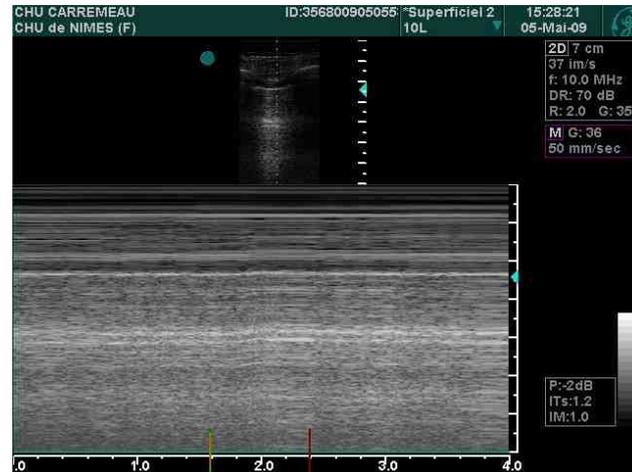
FAST - Réalisation



Sonde basse fréquence, cardiologie (1,8 MHz)

Sonde haute fréquence (8 MHz)





FAST - Réalisation

Trauma Ultrasound Examination Versus Chest Radiography in the Detection of Hemothorax

O John Ma, MD*
James R Mateer, MD, RDMS†

ANNALS OF EMERGENCY MEDICINE 29:3 MARCH 1997

FAST - Réalisation

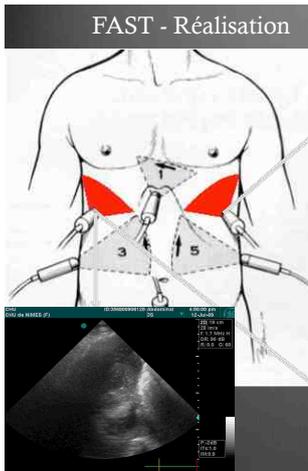
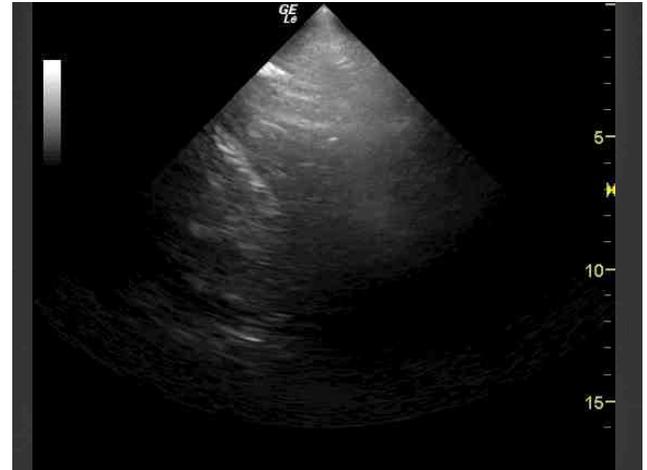
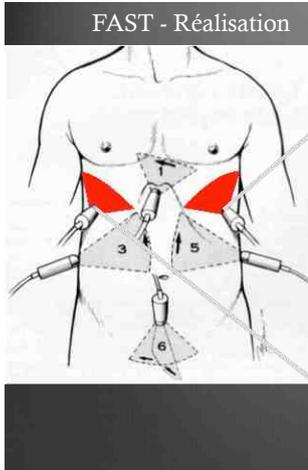
Trauma Ultrasound Examination Versus Chest Radiography in the Detection of Hemothorax

O John Ma, MD*
James R Mateer, MD, RDMS†

ANNALS OF EMERGENCY MEDICINE 29:3 MARCH 1997

240 traumatisés thoraciques

	US	Rx
Sensibilité	96 %	96 %
Spécificité	100 %	100 %





FAST - Réalisation

Hand-Held Thoracic Sonography for Detecting Post-Traumatic Pneumothoraces: The Extended Focused Assessment With Sonography For Trauma (EFAST)

Kirkpatrick, A W. MD, FACS; Sirois, M MD; Laupland, K B. MD; Liu, D MD; Rowan, K MD; Ball, C G. MD, MSc; Hameed, S M. MD; Brown, R MD, FACS; Simons, R MD, FACS; Dulchavsky, S A. MD, FACS; Hamilton, D R. MD, PhD; Nicolaou, S MD

The Journal of Trauma: Injury, Infection, and Critical Care
Numéro : Volume 57(2), August 2004, pp 288-295

FAST - Réalisation

Hand-Held Thoracic Sonography for Detecting Post-Traumatic Pneumothoraces: The Extended Focused Assessment With Sonography For Trauma (EFAST)

Kirkpatrick, A W. MD, FACS; Sirois, M MD; Laupland, K B. MD; Liu, D MD; Rowan, K MD; Ball, C G. MD, MSc; Hameed, S M. MD; Brown, R MD, FACS; Simons, R MD, FACS; Dulchavsky, S A. MD, FACS; Hamilton, D R. MD, PhD; Nicolaou, S MD

225 traumatisés thoraciques

The Journal of Trauma: Injury, Infection, and Critical Care
Numéro : Volume 57(2), August 2004, pp 288-295

	US	Rx
Sensibilité	49 %	21 %
Spécificité	99 %	99 %

FAST - Réalisation

FAST - Réalisation

CHU de NIMES (F) ID: *Veine M Inf 2 2:24:47 am 07-Oct-09

2D 4 cm
37 im/s
f: 8.0 MHz
DR: 65 dB
R: 6.0 G: 28

CHU de NIMES (F) ID: 3568800906127 *Superficiel 10L 8:55:55 pm 12-Jul-09

2D 3 cm
47 im/s
f: 10.0 MHz
DR: 75 dB
R: 2.0 G: 34

M G: 36
50 mm/sec

P: 0dB
ITs: 0.9
IM: 1.2

CHU de NIMES (F) ID: *Veine M Inf 2 2:24:47 am 07-Oct-09

2D 4 cm
37 im/s
f: 8.0 MHz
DR: 65 dB
R: 6.0 G: 28

P: 0dB
ITs: 0.9
IM: 1.2

CHU de NIMES (F) ID: 3568800906127 *Superficiel 10L 8:55:55 pm 12-Jul-09

2D 3 cm
47 im/s
f: 10.0 MHz
DR: 75 dB
R: 2.0 G: 34

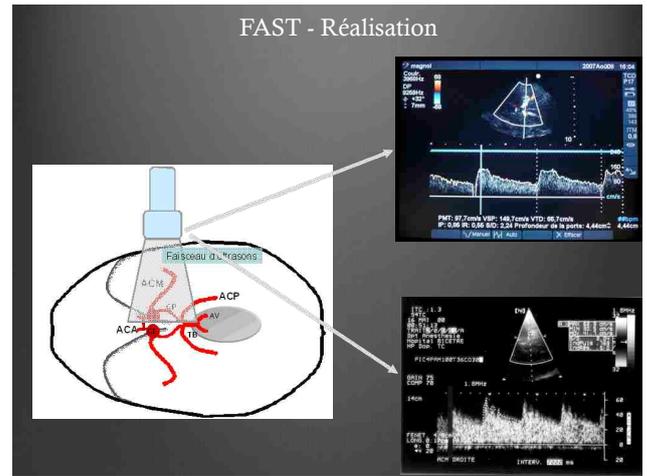
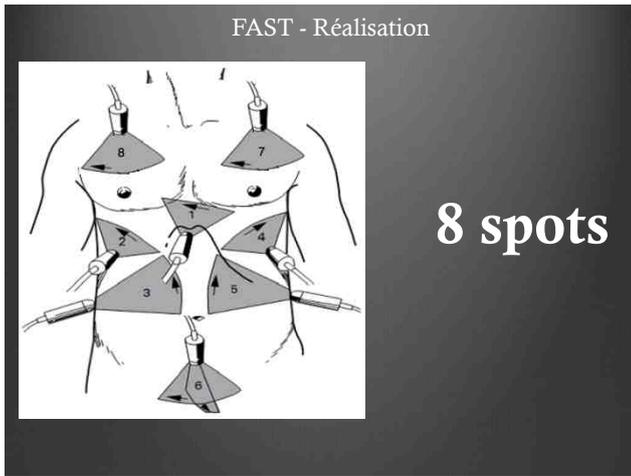
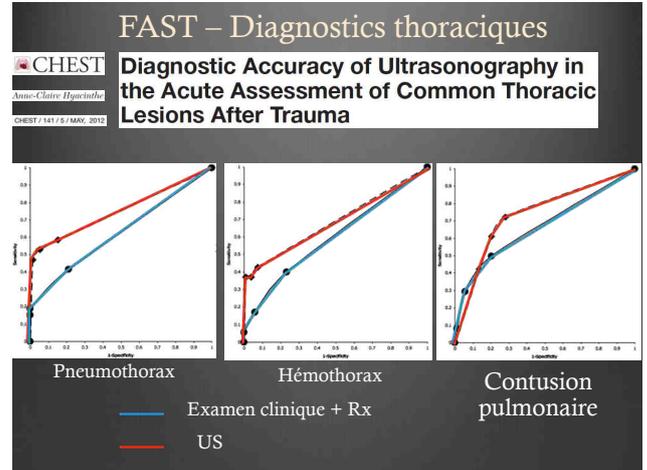
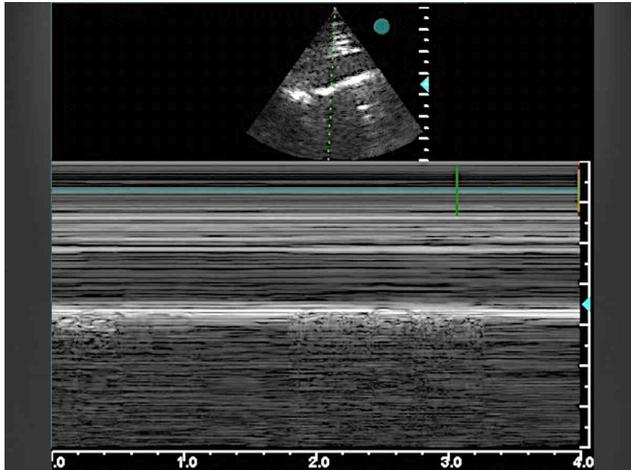
M G: 36
50 mm/sec

P: 2dB
ITs: 0.9
IM: 1.0

CHU de NIMES (F) ID: *Veine M Inf 2 2:24:02 am 07-Oct-09

2D 4 cm
37 im/s
f: 8.0 MHz
DR: 65 dB
R: 6.0 G: 28

P: 0dB
ITs: 0.9
IM: 1.2



FAST ?

Emergency Ultrasound Guidelines

[Ann Emerg Med. 2009;53:550-570.]

American College of Emergency Physicians

Established Applications	Newer Applications
AAA: 3	Deep Venous Thrombosis: 2
Cardiac: 4	Thoracic: 2
US guided Central access: 4	Musculoskeletal: 1
FAST: 4	Ocular: 1
Pregnancy: 3	Procedural: 1
Shock: 3	

Figure 4. Emergency ultrasound applications graded in the Fryback-Pearl hierarchical model of effectiveness assessment: clinical sonography.