Focused Assessment with Sonography in Trauma (FAST)

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Disclosure:
Fujifilm Sonosite - Travel / Honorarium to Teach PoCUS

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The Objectives of the FAST / eFAST

FAST:
- Diagnose / exclude free fluid in pericardium
- Diagnose / exclude free fluid in peritoneum

Extended FAST (eFAST):
- Diagnose / exclude pneumothorax
- Diagnose / exclude free fluid in pleural cavities
- Diagnose / exclude free fluid in pericardium
- Diagnose / exclude free fluid in peritoneum

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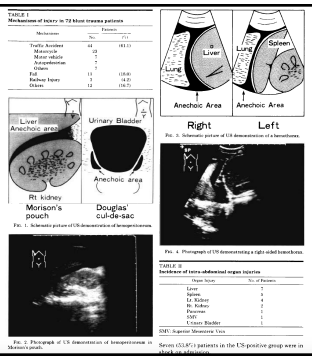
Emergency Center Ultrasonography in the Evaluation of Hemoperitoneum: A Prospective Study

AKIO KIMURA, M.D., AND TOSHIBUMI OTSUKA, M.D.

The reliability of ultrasonographic detection (US) of hemoperitoneum in blunt abdominal trauma was evaluated in a prospective study of 72 patients. Independent of the examiner, sensitivity, specificity, and accuracy were, respectively, 86.7%, 100%, and 97.2%. Laparotomy was indicated in 76.9% of US hemoperitoneum-positive cases. No negative laparotomies were performed in this study group. If hemoperitoneum is revealed in US and vital signs are unstable, we think laparotomy is indicated. We believe that US in an emergency center is a quick, safe screening method in the evaluation of blunt abdominal trauma. US might take over a great part of the role of diagnostic peritoneal lavage.

Diagnostic peritoneal lavage (DPL) has been widely used for the evaluation of blunt abdominal trauma since its first description by Root et al. in 1965 (12), especially in the United States. Recently, with the improvement of electronic technology and the portability of machines, ultrasonography (US) has been routinely used in emergency centers for several years in Japan and in Europe. Its usefulness has been gradually accepted, but its reliability in assessing blunt abdominal trauma is still uncertain. In this study we prospectively analyzed the accuracy of US detection of hemoperitoneum in blunt abdominal trauma.

If an anechoic or echo-free space was recognized in Morison's (hepatorenal) pouch or Douglas' cul-de-sac, we took it as positive for hemoperitoneum, which is schematically shown in Figure 1. A real picture of intraperitoneal fluid collection in Morison's pouch is demonstrated in Figure 2. Screening for hemothoraces bilaterally, cardiac tamponade, or for injury to the liver, spleen, and bilateral kidneys was also performed routinely. As shown in Figure 3, the liver and spleen are used as an acoustic window to detect right and left hemothorax, respectively. A real picture of a right hemothorax is demonstrated in Figure 4. Most examinations were done within 15 minutes, and it took no longer than 5 minutes to evaluate for hemoperitoneum. The most common extra-abdominal injuries were those in the extremities, occurring in 35 patients (48.6%).



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Clinical Applications

FAST and eFAST can be used in the following clinical scenarios:

- Blunt trauma
- Penetrating trauma
- Unexplained hypotension
- Suspected ectopic pregnancy
- Bladder Distension and Rupture
- Other clinical settings and scenarios (hip arthroscopy)

Diagnosis of Intraabdominal Fluid Extravasation After Hip Arthroscopy With Point-of-Care Ultrasonography Can Identify Patients at an Increased Risk for Postoperative Pain

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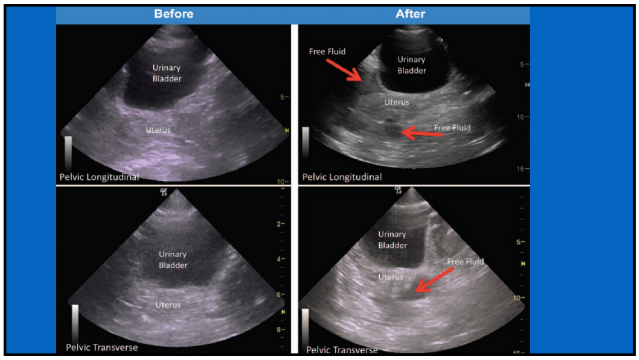
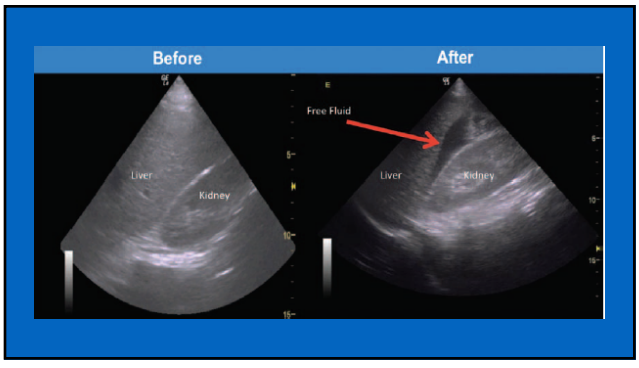
BACKGROUND: Intraabdominal fluid extravasation (IAFE) after hip arthroscopy has historically been diagnosed in catastrophic circumstances with abdominal compartment syndrome requiring diuresis or surgical decompression. A previous retrospective study found the prevalence of symptomatic IAFE requiring diuresis or decompression to be 0.16%, with risk factors including surgical procedure and high pump pressures. IAFE can be diagnosed rapidly by using point-of-care ultrasound (POCUS) via the Focused Assessment With Sonography for Trauma (FAST) examination, which is a well-established means for detect free fluid with high specificity and sensitivity. In this study, we used POCUS to determine the incidence of IAFE in patients undergoing hip arthroscopy. We predicted a higher incidence and that patients with IAFE would have symptoms of peritoneal irritation such as pain and nausea.

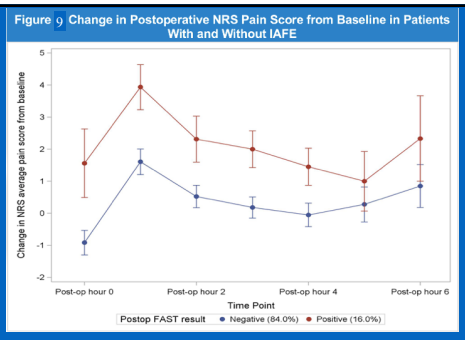
METHODS: One hundred patients undergoing ambulatory hip arthroscopy were prospectively enrolled. A FAST examination was performed after induction by a trained anesthesiologist to exclude the preoperative presence of intraperitoneal fluid. Postoperatively, the same anesthesiologist repeated the FAST examination, and patients with new fluid in the abdominal or pelvic peritoneum were diagnosed with IAFE. Patients were followed up in the postanesthesia care unit (PACU) for 6 hours assessing pain, antiemetic and opioid use, and length of stay.

RESULTS: Sixteen of 100 patients were found to have IAFE (16.0%; 99% confidence interval [CI], 8.4–28.1). These patients had, on average, a greater increase in pain score from their baseline assessment throughout their entire PACU stay (adjusted difference in means [99% CI]: 2.1 points [0.4–3.9], $P = .002$). Patients with IAFE used more opioids, but this difference did not meet statistical significance (adjusted difference in means [99% CI]: 7.8 mg oral morphine equivalents [−2.8 to 18.3]; $P = .053$). There were no differences in postoperative nausea interventions or length of stay.

CONCLUSIONS: Our incidence of IAFE was 16%, showing that IAFE occurs quite commonly in hip arthroscopy. Patients with IAFE had a greater increase in pain scores from baseline throughout the PACU stay. None of our patients required interventions. These findings suggest that even a small amount of new fluid in the peritoneum may be associated with a worse postoperative experience. This study brings awareness to a common yet potentially life-threatening complication of hip arthroscopy and highlights a unique and meaningful way that anesthesiologists in the perioperative setting can use POCUS to rapidly identify and guide management of these patients. Further studies with a larger sample size are needed to identify surgical and patient risk factors. (Anesth Analg 2016;XXX:00–00)







Learning Objectives

- Where to place the transducer and how to orientate it in the four positions in the FAST protocol
- How to obtain the standard views in each position
- Know what to look for in the views
- Evaluate whether free fluid is present or not

Equipment and Skills

Knowledge of B-mode ultrasound imaging

Ultrasound machine

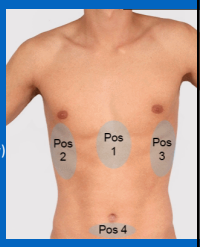
Transducer (abdominal, microconvex, echo):

- Low frequency – good penetration

FAST Exam – 4 Positions

FAST:

- Position 1: Cardiac subcostal view (Pos 1 - SC-view)
- Position 2: Right upper quadrant view (Pos 2 - RUQ-view)
- Position 3: Left upper quadrant view (Pos 3 - LUQ-view)
- Position 4: Pelvic longitudinal and transverse view (Pos 4 - P-view)

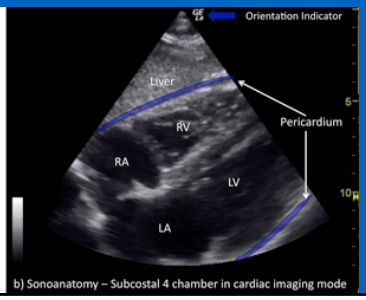


Correct Orientation

Cranial

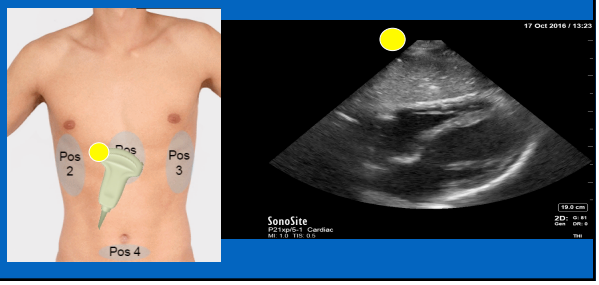
Caudal

Position 1: Subxiphoid View

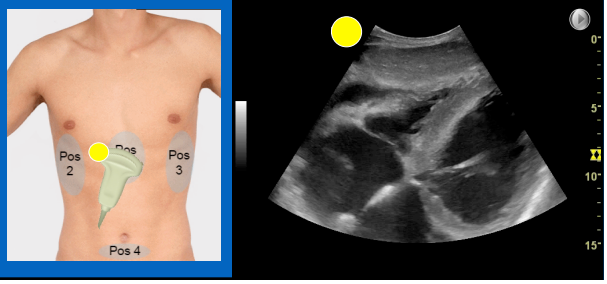


b) Sonoanatomy – Subcostal 4 chamber in cardiac imaging mode

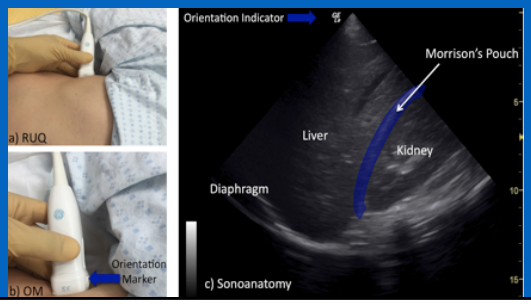
Position 1: Subxiphoid View



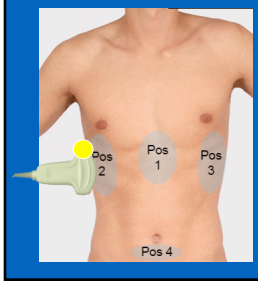
Position 1: Subxiphoid View – Free Fluid



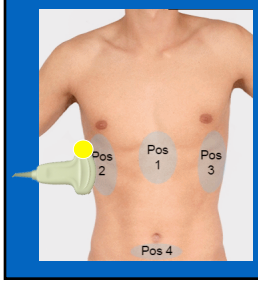
Position 2: RUQ - Peri-Hepatic View



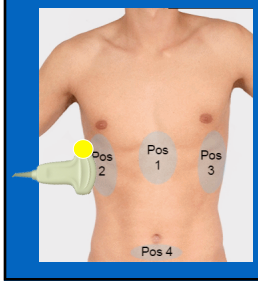
Position 2: RUQ - Peri-Hepatic View

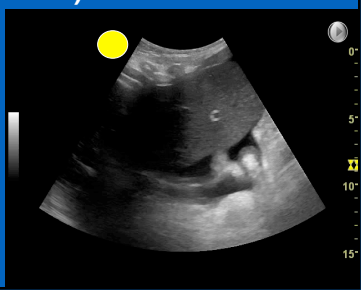


Position 2: RUQ - Peri-Hepatic View (Free Fluid)

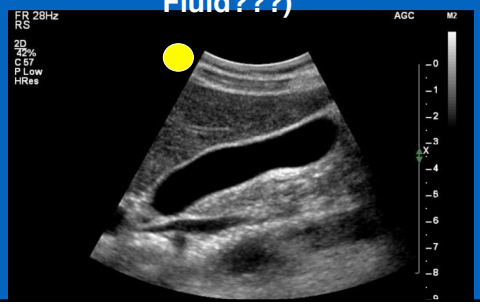


Position 2: RUQ - Peri-Hepatic View (Free Fluid)

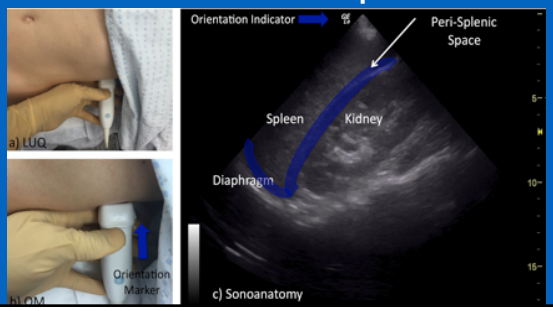




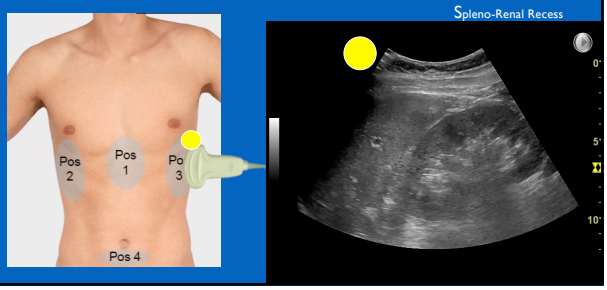
Position 2: RUQ - Peri-Hepatic View (Free Fluid???)



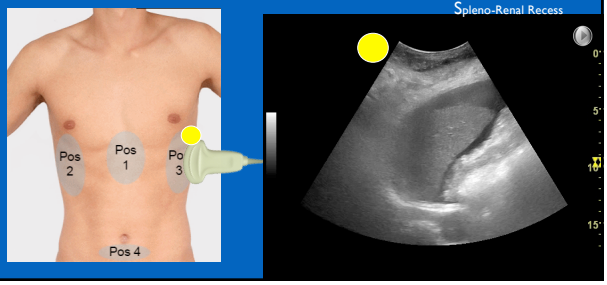
Position 3: LUQ - Peri-Splenic View



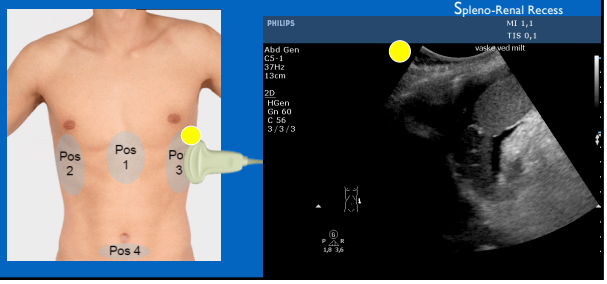
Position 3: LUQ - Peri-Splenic View



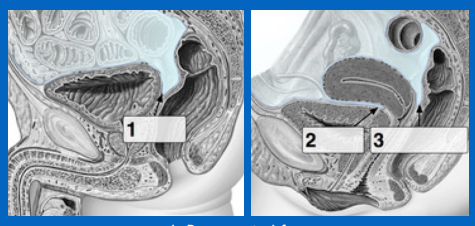
Position 3: LUQ - Peri-Splenic View (Free Fluid)



Position 3: LUQ - Peri-Splenic View (Free Fluid)



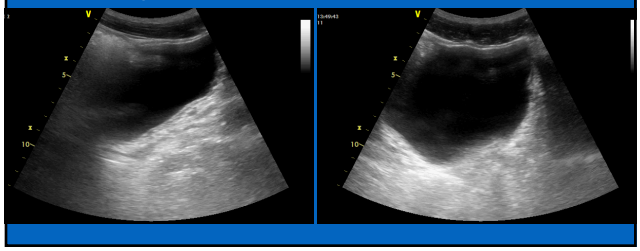
Position 4: Pelvic Views



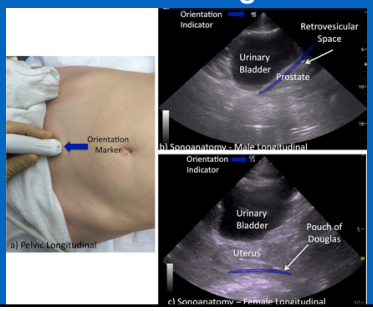
1: Rectovesical fossa
2: Vesicouterine pouch
3: Rectouterine pouch (Pouch of Douglas)

Position 4: Pelvic Views

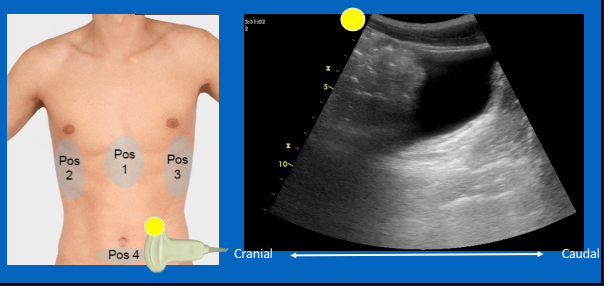
Longitudinal | Transverse



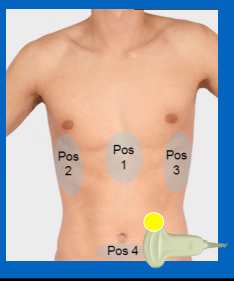
Position 4: Pelvic Longitudinal View

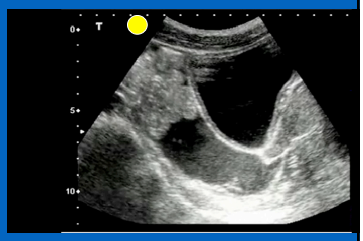


Position 4: Pelvic Longitudinal View

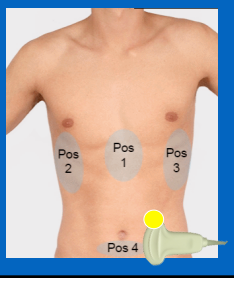


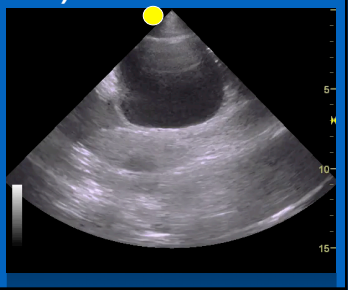
Position 4: Pelvic Longitudinal View (Free Fluid)



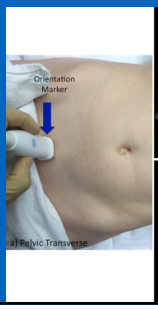


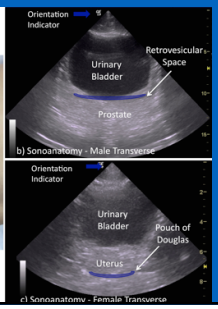
Position 4: Pelvic Longitudinal View (Free Fluid)



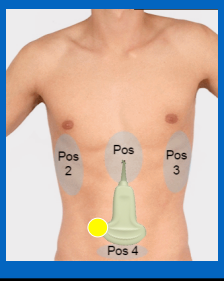


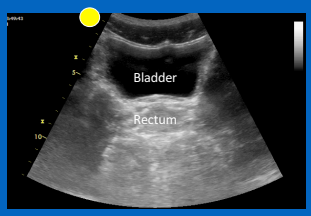
Position 4: Pelvic Transverse View



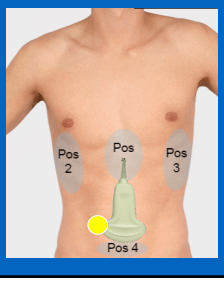


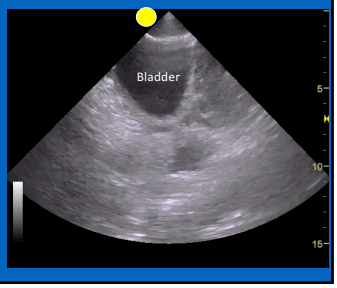
Position 4: Pelvic Transverse View



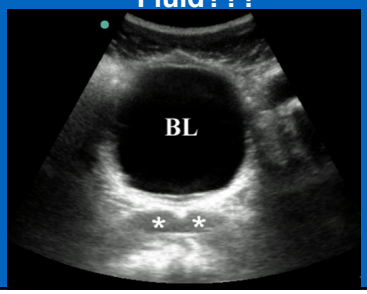


Position 4: Pelvic Transverse View

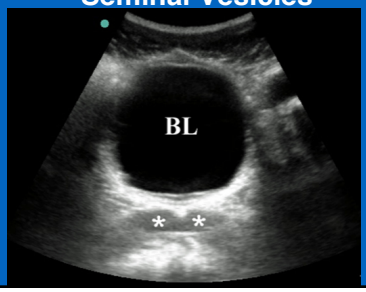




Position 4: Pelvic Transversal View - Free Fluid???



Position 4: Pelvic Transversal View - Seminal Vesicles



Free Fluid

Hypoechogenic = black

Patient position

Location:

- Pericardial sack
- Abdomen/Pelvis

FAST Reminders

Purpose of FAST

Systematic approach and examination technique

Look all places

False negative FAST examination (Over-gain, empty bladder, liver tip)

False positive FAST examination (Gallbladder, Vessels, Prostate, SV)

Integrate with clinical assessment

Reassessment