

Washington University Emergency Medicine Journal Club
The Prognostic Accuracy of FAST Exam in Hemodynamically Stable Blunt
Trauma

Vignette

You are working a calm night in TCC, having taken care of about a half dozen "vomickers" who had recently finished eating at the new Imo's down the street, when EMS brings in a 27 year old female involved in a motor vehicle accident. She had been traveling approximately 45 mph that ran into the same Imo's restaurant. She was wearing her seatbelt, denies loss of consciousness, and according to the EMS crew her car suffered fairly significant damage to the front end.

She is awake, reporting some pain to her left ankle and neck. She has an unremarkable abdominal and chest exam. There is no seatbelt sign or other external evidence of torso trauma (her ankle is minimally swollen and tender). Her vitals are BP 120/80, P 95, RR 18, T 37°C, and pulse ox 100%.

Overall, she appears well. She has a normal UA and a negative pregnancy test. The trauma surgeon requests chest, pelvis and, neck x-rays. Then, the trauma surgeon asks you to perform a FAST exam. You prepare the ultrasound machine and start wheeling it into her room when you overhear the surgeons discussing the need for a CT scan given her mechanism. Astonished, you quietly wonder, "Why waste time doing a FAST if they are going to push for a CT anyway?" More importantly, since she is well appearing, is there really a need to expose her to radiation risks if her FAST is negative?

You toss the ultrasound probe to the ground, causing Dr. Aubin to have a convulsion right before your eyes, which you will deal with later. The EBM muse has spoken giving you a more important task than Chandra's mental meltdown. Your mission now is to search for evidence of outcomes of negative FAST exams in normotensive blunt trauma patients.

PICO Question

Population: Hemodynamically stable adult blunt trauma patients

Intervention: FAST exam

Comparison: CT abdomen, physical exam, or DPL

Outcome: Therapeutic laparotomy, mortality, or clinical course



Search Strategy

As a connoisseur of EBM, you remember that this topic was previously reviewed using the Wash U Journal Club format in Oct 2005 and can be found via a search of the Journal Club website (see <http://tinyurl.com/777html>). Alternatively, one can find the previous Journal Club summary via a search of the [TRIP database](#) (search terms “FAST exam blunt abdominal trauma”) which archives all of our online Journal Club summaries (we are actually the #1 hit). However, you want to know what is new, not what was true in 2005.

With the assistance of your medical librarian, you search PUBMED using the following strategy (((focused abdominal sonogram for trauma) OR focused assessment with sonography in trauma) OR fast) OR abdominal ultrasound AND trauma AND laparotomy (see <http://tinyurl.com/7lqolud>). Results in 562 articles, and after focusing on those published after October 2005 (following the previous Journal Club), you choose four pertinent titles.

Articles and Answer Keys

Article 1: Does this adult patient have a blunt intra-abdominal injury? JAMA 2012; 307(14):1517-1527. (<http://pmid.us/22496266>) [ANSWER KEY](#).

Article 2: The utility of sonography for the triage of blunt abdominal trauma patients to exploratory laparotomy, AJR 2007; 188:415-421. (<http://pmid.us/17242250>) [ANSWER KEY](#).

Article 3: Association between a positive ED FAST examination and therapeutic laparotomy in normotensive blunt trauma patients, J Emerg Med, 2007; 33(3): 265-71. (<http://pmid.us/17976554>) [ANSWER KEY](#).

Article 4: FAST scan: Is it worth doing in hemodynamically stable blunt trauma patients? Surgery 2010; 148(4):659-701. (<http://pmid.us/20800865>) [ANSWER KEY](#).

Bottom Line

Trauma is the leading cause of death in United States young adults and a [substantial proportion](#) of trauma mortality is secondary to intra-abdominal injuries, usually following blunt trauma. [Falls](#) and motor vehicle collisions are the most common causes of blunt trauma abdominal injury. Delayed diagnoses reduce survival and increase complication rates in blunt abdominal trauma. ([Fakhry 2000](#), [Niederee 2003](#)) The traditional method to risk-stratify blunt abdominal trauma patients uses the ATLS-based primary and secondary survey, relying heavily upon the history (mechanism) and physical exam findings. CT has become the *defacto* imaging test of choice when definitive diagnosis is needed for higher risk patients, but CT has limited efficacy to diagnose [bowel injuries](#) and may be dangerous in pregnant or

unstable patients. Nonetheless, [Livingston et al.](#) suggested that observation is usually not necessary after a negative abdominal CT in these patients.

History and physical exam are inaccurate predictors of post-blunt trauma intra-abdominal injury, as is radiographic imaging (chest, pelvis). For example, blunt trauma victims with [significant hemoperitoneum](#) may have normal vital signs and physical exam. The most helpful physical exam findings are seat belt sign (LR+ 10) and rebound tenderness (LR+ 6.5), but no finding has a LR- less than 0.5 (so their absence does not reduce the probability of significant intra-abdominal injury). With the exception of a base deficit less than -6 mEq/L (LR+ 18, LR- 0.12), labs are also not accurate predictors of an intra-abdominal injury. Physician gestalt is diagnostically accurate if the pre-test probability of intra-abdominal injury is >50% (LR 11) or 10%-50% (LR 8.9) and may be helpful if the estimate is <1% (LR 0.21).

Bedside ultrasound, on the other hand, is an extremely accurate diagnostic test for intra-abdominal injury (LR+ 30, LR- 0.26, adjusted for publication bias), particularly when assessing the hemodynamically unstable patient (LR+ 82, LR- 0.16). The FAST exam is an independent predictor of this need after adjusting for abdominal CT findings, injury severity, GCS, and pre-hospital hypotension. The manuscripts that we analyzed add to the growing body of literature supporting the ED or Surgical Trauma physician FAST exam for blunt abdominal trauma patients ([Bode 1990](#), [Branney 1995](#), [Ma 1995](#), [Healey 1996](#), [Boulanger 1996](#), [Wherrett 1996](#), [Kern 1997](#), [Rozycki 1998](#), [Rose 2001](#), [Richards 2002](#), [Blaivas 2002](#), [Poletti 2003](#), [Brooks 2004](#), [Ma 2005](#), [Melniker 2006](#), [Soyuncu 2007](#)).

FAST is low cost and has no known health consequences as compared to the radiation and [dye-related](#) complications of CT. However, ED-based FAST exams are operator dependant in both image acquisition and image interpretation. The current studies did not assess the learning curve needed to attain or maintain sufficient expertise with the FAST exam in order for the FAST exam to be reliable and accurate. When proficiency is attained and maintained, however, a bedside FAST is almost certainly beneficial in unstable blunt abdominal trauma patients.

The pre-test probability of blunt abdominal trauma patients requiring a therapeutic laparotomy ranges from 2.0% to 7.6%. While further prospective studies to assess FAST in the hands of less experienced learners are underway, an ED FAST exam should be considered the [Standard of Care](#) to expedite CT imaging or operative exploration in hemodynamically stable blunt abdominal trauma patients when the FAST is abnormal. A “positive” FAST exam in these patients increases the pre-test probability for a therapeutic laparotomy of 2.0% to 37%.

On the other hand, a normal FAST exam in hemodynamically stable patients does not sufficiently reduce the post-test probability (2.0% to 0.51%) to obviate the need for further work-up (serial exams, serial FAST, CT). Why is that? FAST is less sensitive and less specific than CT. In addition, FAST misses bowel injuries and retroperitoneal bleeding. The role of ultrasound combined with traditional history/physical exam-based clinical gestalt remains to be defined and quantified. The

clinical decision rules that we have identified ([Poletti 2004](#) and [Holmes 2009](#)) should be prospectively validated with the inclusion of bedside ultrasound FAST exams to better understand the value of combinations of findings in ruling in or ruling out intra-abdominal injury.

The algorithm below summarizes the optimal FAST-based approach to incorporating this literature review into bedside practice. Note that in a teaching institution it is important to distinguish no-risk blunt abdominal trauma patients in whom your suspicion of injury is very low (<1%) because in these very low risk patients, FAST exams are performed for teaching purposes. In these patients, a negative FAST does not need to follow-up with a CT, serial FAST exams, or observation.

