

Not so FAST—let's not abandon the pediatric focused assessment with sonography in trauma yet

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The recent article by Holmes *et al.* (1) represents the largest prospective trial of the focused assessment with sonography in trauma (FAST) in stable pediatric trauma patients. The final conclusion of the authors is that the “*findings do not support the routine use of the FAST in this setting.*” Based on their data and stated outcomes this is not an untrue statement, but before we put away the ultrasound machine on these patients some additional perspective may be warranted.

First—semantic but important—while this study found no evidence of benefit to performance of a FAST in this population based on their primary outcomes, there was also specifically no evidence of harm. Patients undergoing FAST did not have an increased length of stay, and their care was no more expensive. In fact, while peer-reviewed manuscripts discourage the use of “trends”, the absolute values of the length of stay and cost were lower in the FAST group, just not significantly so. The results do discuss “*one case of missed intra-abdominal injury in the FAST group*” which would seem to suggest this injury was missed by FAST. However, on closer inspection this patient actually received a CT and the CT was misread—so it would be erroneous to attribute this “miss” to the FAST exam. This large study thus shows no evidence of harm, just no evidence of help.

The key question then is whether there might be unmeasured or incompletely measured outcomes that could tilt the balance toward a benefit for performance of FAST in at least some stable pediatric trauma patients? We

do have data to show that the FAST exam is specific—in the mid to high 90% range—both overall and in pediatric patients (2,3). It has been suggested that a negative FAST could provide “unwarranted” reassurance, but data from the current study do not seem to show that reliance on a needed CT is decreased with a negative FAST (4).

So when might a FAST make a difference? Presumably when it is positive. In fact, a prior paper also with first author James Holmes, a meta-analysis of FAST in pediatric patients, concluded that “*a hemodynamically stable child with a positive US examination should immediately undergo abdominal computed tomographic scanning.*” (3). The current paper does not make this conclusion any less valid, but the low prevalence of positive FAST examinations, intra-abdominal injury, and laparotomy do not allow us to know what impact “immediate” CT in such patients might have. This study is simply not powered to make a conclusion one way or the other—of 925 patients only nine (less than 1%) underwent laparotomy.

There were four primary outcomes in this study: rate of CT use, missed injury, length of stay, and charges—none of which were found to be positively (or negatively) affected by FAST. The clinically important outcome—which is admittedly rare—is whether a positive FAST in a stable pediatric patient could impact time to definitive diagnosis and intervention. It would take a large number of positive FAST examinations and interventions to measure this. I can attest that I have seen an unexpected positive FAST expedite time

to CT and intervention in both adult and pediatric patients, and I have seen missed hemoperitoneum decompensate and require blood transfusion and rushed intervention that may have been avoided with more timely diagnosis. The median time to CT in this study was ~2.5 hours—easily enough time for an initially stable pediatric patient to decompensate with potential morbidity or even mortality.

Regarding one of the primary outcomes, CT use, it is also unclear why half the patients in the FAST group received CTs after the FAST examination, despite a decrease in physician suspicion of intra-abdominal injury after FAST performance. The overall use of CT appears to be a relatively high in general for pediatric patients, in both groups. What factors lead clinicians to pursue CTs even after low negative likelihood ratio test in patients with low suspicion for intra-abdominal injury? This is a limitation of a single site study and may reflect an institutional culture of CT use in pediatric trauma that may not be generalizable. As stated in the accompanying *JAMA* editorial by David Kessler “*Rather than removing FAST examinations from pediatric trauma algorithms, the results of the clinical trial by Holmes et al should encourage the trauma, pediatric emergency medicine, and ultrasound communities to work together to further investigate the many unresolved questions about integrating FAST examinations into pediatric blunt abdominal protocols.*” (5). There is certainly likely room to move on decreasing unnecessary pediatric CT in these cases, and FAST may still have a role.

Another issue is that while this study focused on FAST examination of the abdomen alone, the typical examination performed in trauma patients is now the eFAST—with the “e” for “extended” to include sonographic evaluation for pneumothorax. Pneumothorax, which occurs more commonly in blunt trauma than hemoperitoneum requiring operative intervention, is probably best evaluated by ultrasound particularly in pediatric patients (6,7). While there is less evidence specific to the pediatric population, ultrasound lacks radiation and shows much better test characteristics, particularly improved sensitivity *vs.* a supine radiograph (8). Again anecdotal, but I have seen multiple cases in both adult and pediatric patients where significant pneumothoraces requiring intervention had a diagnosis recognized by ultrasound that was not initially apparent on chest radiography. While this article focuses on the abdominal portion of the FAST, it may have the unfortunate effect of blunting the use of a safe and effective test for diagnosis and exclusion of pneumothorax.

Perhaps the most important and negative impact of this article likely involves training and experience in point-of-care ultrasound. While strong evidence for the use of FAST in unstable pediatric trauma is also lacking, there is reason to believe that (as in adults) the FAST examination is more helpful in guiding management when the prevalence of conditions needing intervention is higher. However, in order to be confident and accurate in performing and interpreting FAST examinations you need to do a lot, and continue to do them. If we forego FAST examinations in all stable patients and then just do them when a pediatric patient is critically ill, it is likely we will collectively become worse at this examination. The components of the FAST are also the components of other examinations that have utility far beyond trauma in evaluation of the abdomen, chest and heart. This study shows that agreement between the “treating physician” and the “expert reviewer” was only moderate (Kappa 0.45), with substantial rate of false positive and false negative diagnoses by the presumably non-expert clinician. How do you think the experts became expert? By doing a lot of exams. An article such as this could in fact become a self-fulfilling prophecy: FAST is not needed; FAST is not done; FAST is not done well; therefore, FAST is not needed (until it is needed). Unfortunately, the conclusions of this article are likely to be supported disproportionately by physicians who aren’t comfortable with ultrasound—cited as evidence that they don’t need to do it, further impeding their comfort and accuracy with this powerful tool.

In the end, we are left with an imperfect test and a (thankfully) rare finding—pediatric abdominal trauma in need of intervention. It is true that not performing a FAST in a stable pediatric patient is unlikely to negatively affect management in this population. There are few tests that will likely negatively affect management in this population, as there is no management needed in the vast majority of these patients—most would be fine if they never saw a doctor (despite the \$45,000+ median charge). However, it only takes one: if this is your patient (or your child) and an unexpected true positive FAST leads to more timely and needed intervention, then that is a positive impact. This study can’t tell us about this. It can only tell us that FAST is not harmful, and that we need more practice!

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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