

Evaluation of Acute Appendicitis by Pediatric Emergency Physician Sonography

Recently while on my Ultrasound rotation as a first year resident I came across an article in the October 2014 edition of Annals of Emergency Medicine that pertained to my current block but also had potential practice-changing information that would be beneficial for my people to hear. The article by Adam B Sivitz MD, Stephanie Cohen MD, and Cena Tejani MD (titled above and available through Annals) basically sought to answer a critical question:

Can emergency physicians learn to perform bedside ultrasonography for suspected appendicitis with similar sensitivity and specificity as you would expect from standard radiology sonography?

While the premise seems simple, the potential for change in protocol / practice is huge. As most of us know, in the pediatric patient it is considered standard practice to evaluate for suspected appendicitis with radiology ultrasound but at times where resources are limited and radiology reads can sometimes take longer than we'd like a simpler option that is as effective would be considered a Godsend. What the study designers wanted to determine is that if, with practice, emergency physician ultrasound could perhaps bridge the gap and shorten the time it takes to get the patient to definitive care while also not exposing the system to an excessive number of false positives.

The researchers constructed the study as a prospective observational study conducted at a large urban academic center over the course of 3 years. Pediatric patients were enrolled if they presented with or were transferred from another ED with clinical suspicion for appendicitis. The key here is clinical suspicion... if they had radiological evidence from an outside facility suggesting appendicitis then that counted as an exclusion criteria as well as excluding children with previous abdominal surgery or those needing immediate critical care. The study sonographers were a pediatric emergency medicine faculty physician and 12 peds EM fellows, the latter with no previous experience with bowel sonography. The faculty physician then gave a 45 minute lecture and supervised 5 practice exams which served as their "training" prior to the study beginning.

Over the next 3 years the 13 sonographers enrolled 254 children (of 404 eligible patients) with suspected appendicitis, of whom reference standard pathologic data or follow-up was available for 231. 76 children (33%) ultimately had pathology findings positive for acute appendicitis and there were 4 negative appendectomy results (all with negative pediatric EM sonography results) and **no cases of missed appendicitis!** Overall, the physicians obtained a sensitivity and specificity that were surprisingly high... **85%** and 93% respectively and indicated strong correlation with findings noted in radiology exams.

Of course there were limitations to this study such as it being from a single center but the most glaring limitation was that while their numbers were good, it appears that their lead sonographer performed 43% of the overall study imaging and with that person's data dropped overall sensitivity and specificity dropped to **82%** and 88% respectively indicating that **physician experience in scanning and how comfortable they were interpreting the scans are large factors in this equation.** Despite these limitations the study authors concluded "Our finding of a positive likelihood ratio range of 7 to 20 based on a 95% CI suggests that when ED sonography result is positive, the diagnosis of appendicitis is essentially established and further

studies do not appear to be required. Surgical consultants can be involved earlier in the ED course.”

What this means for Emergency Physicians is that the days of sending a pediatric appendicitis patient off to radiology and awaiting results before getting the patient to definitive treatment may be numbered. If these numbers can be duplicated and validated on a larger/longer scale it will be possible to shave hours off of patient wait times for definitive treatment and no need for “second guessing” as EM physicians will have proven they have the ability to diagnose this pathology. This is exciting news for appendicitis, but also carries weight for other potential conditions down the road that will allow EM physicians to essentially be the confirmatory step in diagnosis rather than having to send patients off to radiology to get their “OK” before officially making a call and thus giving greater autonomy to deliver faster and more efficient patient care!

References / Further Reading

- Sivitz AB et al. Evaluation of acute appendicitis by pediatric emergency physician sonography. *Ann Emerg Med* 2014 Oct; 64:358. (<http://dx.doi.org/10.1016/j.annemergmed.2014.03.028>)
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