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Citation: Sivitz, AB, Cohen, SG, Tejani, C. Evaluation of Acute Appendicitis by Pediatric Emergency Physician Sonography. *Annals of Emergency Medicine*. October 2014; 64 (4): 358-364.

Clinical Question: Determining the accuracy of pediatric emergency physician sonography for acute appendicitis in children.

Introduction: Nowadays, the utility of ultrasound is increasingly becoming embraced by the field of Emergency Medicine. Even more beneficial is its use in the pediatric population especially with its lack of potentially harmful radiation. More and more trained emergency physicians are using ultrasound in much of their decision-making. This study's goal was to determine how accurate pediatric ED sonography would be in detecting acute appendicitis. An additional benefit of this skill includes minimized treatment delays. After focused training to emergency physicians, the physician would hopefully be able to perform bedside ultrasound for suspected appendicitis. The American College of Radiology is advocating that ultrasound be the first-line imaging choice for children.

Methods: The study is a prospective observational study performed from August 2009 through May 2012 at an urban teaching hospital with an estimated yearly volume of 30,000 patients. Children enrolled in the study were those suspected to have acute appendicitis. Trainees in the study included one faculty pediatric EM physician, and 12 pediatric EM fellows (who did not have experience with sonography of the bowel). The faculty physician, however, had a significant amount of bedside US experience and gave a 45-minute lecture to the fellow and supervised them with the ultrasound. Fellows were to follow a scanning protocol. The treating physicians were blinded to the sonographic findings. Each ultrasound exam was reviewed by a pediatric EM sonologist and a pediatric radiologist (both blinded).

Results: 254 subjects were enrolled, 23 patients were lost to follow up. 26 children had positive pathology for appendicitis, 4 appendectomies were negative. There were no cases of missed appendicitis. A total of 264 sonographic exams were performed and 32% of the patients ultimately had appendicitis. Bedside US was determined to have a sensitivity of 85% with a 95% CI of 75-95%, and a specificity of 93% (95% CI of 85-100%). There were 13 false positive studies (though the patients had sonographic McBurney's point tenderness), and 7 of these had periappendiceal inflammation.

Conclusion: This study was able to conclude remarkable accuracy in training EM physicians with bedside US for detecting acute appendicitis. Additionally, by having the study performed at the bedside, there was an average 2.5 hour earlier detection of appendicitis than with official radiology studies. Though ultrasonography is operator dependent, one caveat to performing any ultrasound study is that nonvisualization can occur (which can occur once the appendix has ruptured). Three imaging studies missed appendicitis and two of those cases were due to lack of visualization and measurement of the entire appendix, which stresses how important it is to trace the appendix until its end. Without question, bedside ultrasound for acute appendicitis should be a skill taught to EM physicians.

Limitations: The study was performed in only one center and the fellows at this facility may not have all had the same baseline knowledge regarding ultrasound techniques, as some may have had more experience during

residency. Plus, the lead sonographer (the faculty pediatric EM physician) performed majority of the imaging – which was due to availability. The sonographers were not blinded to the patient’s pain while performing the exam, which could have led to false interpretations. Children lost to follow up may have presented at other institutions.

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