

Clinical Practice Statement

Ultrasound Should Be Strongly Considered as the Initial Imaging Modality in Acute Appendicitis in the Pediatric Patient (5/7/2013)

Reviewed and approved by the AAEM Clinical Practice Committee.

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It is the position of the American Academy of Emergency Medicine that when appropriate expertise is available ultrasonography (US) should be strongly considered as the initial imaging modality when evaluating the pediatric patient with suspected acute appendicitis who requires imaging.

Background: A growing body of research supports the use of ultrasonography as the initial imaging modality for pediatric patients with suspected acute appendicitis. The advent of widely available computed tomography (CT) shifted ED imaging for abdominal pain away from ultrasound and toward CT.

CT of the abdomen and pelvis for pediatric appendicitis has a sensitivity of 94% and specificity of 95%. Though highly sensitive and specific its use in a child less than 1 year old will induce malignancy in approximately 1/550 scans. It is estimated for every 1000-2000 CT scans performed on children under 15 years old one malignancy will result. Approximately 5-9 million pediatric CT scans will be performed this year resulting in approximately 2,500-9,000 new cases of cancer during those individual's lifetime.

In the setting of suspected acute appendicitis, ultrasound has the benefit of reasonable accuracy without ionizing radiation. The lower sensitivity of ultrasound does not allow it to rule out appendicitis. However, incorporating ultrasonography into an algorithm of clinical impression, serial exams, and CT, when needed, is cost-effective.

Discussion: Multiple national studies have documented increasing utilization of CT for the evaluation of acute appendicitis in pediatric patients. In the time period of 1998 – 2008, the use of CT for the evaluation of pediatric acute abdominal pain increased from 0.9% to 15.4%. A second study showed that in the time from 1999-2007 the odds of undergoing CT in the evaluation of abdominal pain increased each year. A third study demonstrated the median CT utilization of 34% and US utilization of 6% for children. The frequency of ultrasound utilization, negative appendectomy rate, and incidence of appendicitis did not change in these same time frames in the

study periods.

A common criticism of ultrasonography in the evaluation of acute appendicitis is the inferior sensitivity compared to CT of the abdomen and pelvis. Multiple studies of ultrasonography in the pediatric population cite sensitivities inferior to CT. However, clinical data do not support increased diagnostic accuracy with increased CT utilization.

One group conducted a prospective study to test the performance of a practice guideline utilizing exam, labs, US as initial imaging, and CT for equivocal cases after ultrasound is indeterminate. The group found that more than half the patients were managed without CT. The study protocol resulted in a cost-savings overall and decreased length of stay. Other studies have supported cost savings from a graduated practice guideline utilizing US prior to CT.

There is growing concern that exposure to ionizing radiation should be limited, particularly in this young group. Algorithms utilizing US in conjunction with serial exams and CT provides less exposure to radiation and comparable diagnostic accuracy.

Ultrasonography utilized in the initial evaluation of the pediatric patient with suspected appendicitis functions as a specific diagnostic modality. The incorporation of US into a decision-making algorithm provides an accurate and cost-effective clinical approach to suspected acute appendicitis while reducing exposure to ionizing radiation.

Recommendations: Ultrasonography should be strongly considered as the initial imaging modality when evaluating the pediatric patient with suspected acute appendicitis who requires imaging. Level of recommendation: Class A.

The incorporation of US into a decision-making algorithm minimizes ionizing radiation and provides an accurate and cost-effective clinical approach to suspected acute appendicitis. Level of recommendation: Class B.

Research, Relevant History and References

The authors queried the PubMed database (10/22/11) with the key words *ultrasound, pediatric, appendicitis*. 200 articles were published in the last 5 years. 37 of these articles were reviewed for relevance and quality in addressing the clinical question of diagnosing acute appendicitis in the pediatric population.

By employing the AAEM Clinical Practice Advisory Statement Literature Search/Grading Process Proposal- Final Revision Version 3.0, November, 2011 nineteen articles were found to be of relevance.