

Quickshot Presentation 2

From Imaging to Surgery: Evaluating Imaging Utility and Predictive Power in Positive Appendicitis Cases

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Introduction: Acute appendicitis is a common pediatric surgical emergency, responsible for abdominal pain in up to 8% of children presenting to the emergency department. Diagnosing appendicitis remains challenging, as no combination of clinical parameters and laboratory markers eliminates the need for imaging. Ultrasound (US) is the preferred first-line imaging modality but is frequently non-diagnostic, especially where pediatric radiologists are unavailable. MRI is preferred over CT to avoid radiation but has concerns regarding diagnostic accuracy, cost, and availability. This study evaluates the utilization of imaging modalities for pediatric appendicitis and their diagnostic value in a low-resource care setting.

Methods: A retrospective chart review was conducted on patients up to 18 years old diagnosed with appendicitis from 2017-2022 at a single institution. Demographic and anthropomorphic data, clinical variables, and radiology and pathology reports were reviewed. Chi-square analysis compared MRI positivity between non-diagnostic and normal appendix US groups. T-tests assessed mean WBC and Pediatric Appendicitis Score (PAS) differences between MRI-positive and MRI-negative groups. Positive predictive value (PPV) was calculated for MRI's accuracy in predicting pathology-confirmed appendicitis.

Results: 458 patients were identified; 7% were treated non-operatively for complex appendicitis. Among 425 appendectomies, 106 (25%) had perforation, 305 (71%) were inflamed but non-perforated, and 15 (4%) were grossly normal. Pathology confirmed appendicitis in 99% of cases, with only 7 specimens negative.

None of the patients were taken to the operating room without imaging. US alone was performed in 114 (27%), while 85 (20%) had US followed by MRI, 29 (7%) had US followed by CT, and 4 (1%) had both. Among those without US, 13 (3%) had MRI, 179 (42%) had CT, and 1 (<1%) had both.

MRI positivity rates did not significantly differ between non-diagnostic US and normal appendix findings on US ($p = 0.33$). However, $WBC \geq 11$ significantly increased the odds of a positive MRI (OR 2.72, $p = 0.017$), whereas $PAS \geq 6$ showed a slight but non-significant increase (OR 1.76, $p = 0.319$). MRI demonstrated a strong correlation with pathology-confirmed appendicitis, yielding a PPV of 97.6%. Only 2.4% of MRI-positive cases were false positives, indicating minimal risk of unnecessary surgery.

Conclusion: US alone was sufficient for diagnosis of pediatric appendicitis in 27% of the cases, which shows it to remain useful even in a under-resourced setting, and should be used as first line imaging. In cases of equivocal US, MRI offers excellent diagnostic accuracy without the radiation risks of CT. Considering these findings, most CT scans for pediatric appendicitis could safely be avoided and replaced by MRI.