

Ultrasound scan as a diagnostic adjunct in acute appendicitis in children

Miloš Parović, David Selwyn, Sanja Besarović, David Horton

Hull University Teaching Hospitals, Hull, UK

Purpose

- Acute appendicitis is the most common paediatric surgical emergency
- Clinical examination is challenging, leading to delay in diagnosis and complications¹
- Ultrasound scan (USS) is suggested as the most appropriate initial investigation in suspected appendicitis²
- COVID-19 pandemic emphasised the importance of avoiding unnecessary surgery and shortening the in-hospital stay
- The aim of this study was to assess the 1) sensitivity and specificity, and 2) positive and negative predictive value of USS in diagnosis of acute appendicitis

Methods

- A single-centre, retrospective cohort study which included 127 paediatric patients investigated with an USS for suspected appendicitis (Table 1)
- Blood tests were taken on admission and USS performed as soon as possible
- The standards for diagnosis of acute appendicitis by USS were obtained from the literature (Table 2)³
- The final diagnosis was confirmed on histology
- Patients who were discharged and did not re-present were deemed not to have had appendicitis

Results

- The total of 138 patients with suspected appendicitis were identified
- 11 appendicectomies were performed without an USS and all had confirmed appendicitis on histology
- US was performed on 127 patients; 21 true positive, 17 false positive, 84 true negative and 5 false negative cases were identified (Figure 1)
- The sensitivity of USS in appendicitis was 81%, specificity 83%, negative predictive value 94% and positive predictive value 55% (Table 3)

Conclusion and clinical implications

- Our study shows that we can confidently rely on negative USS to exclude the diagnosis of acute appendicitis in children
- This could lead to a shorter in-hospital stay and should prompt an early search for an alternative diagnosis
- A positive USS should be used with caution and should not replace clinical acumen when making a diagnosis of acute appendicitis

References:

- 1) Bundy, et al (2007). Does This Child Have Appendicitis? *JAMA : the journal of the American Medical Association*, [online] 298(4), pp.438–451
- 2) Koberlein, G.C., et al. (2019). ACR Appropriateness Criteria® Suspected Appendicitis-Child. *Journal of the American College of Radiology*, [online] 16(5), pp.S252–S263.
- 3) Dibble, E.H., et al (2018). Effectiveness of a Staged US and Unenhanced MR Imaging Algorithm in the Diagnosis of Pediatric Appendicitis. *Radiology*, 286(3), pp.1022–1029.

The authors declare no conflict of interest

Table 1 Patient demographics

Total participants (n)	127
Male/Female (n)	48/79
Mean age (years)	10.9
Age range (years)	4-15
Blood test results	Median (Q1,Q3)
White cell count (x10 ⁹ /L)	9.7 (7.7,14.9)
Neutrophils (x10 ⁹ /L)	5.8 (3.9, 11.3)
CRP (mg/L)	4.1 (0.4, 21.0)

Table 2 USS features suggestive of appendicitis

Antero-posterior diameter of appendix >6mm
Appendiceal fat stranding
Free fluid
Appendicolith
Probe tenderness
Appendiceal abscess

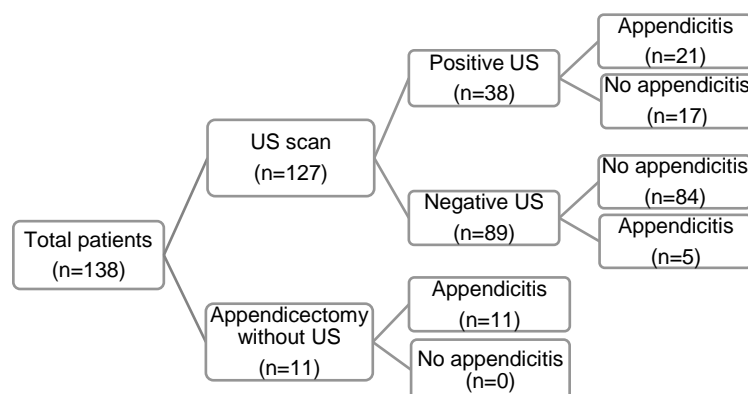


Figure 1 Flowchart showing study algorithm

Table 3 Outcomes

Sensitivity (%)	81
Specificity (%)	83
Positive predictive value (%)	55
Negative predictive value (%)	94

NHS

Hull University Teaching Hospitals
NHS Trust