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Clinical and Histopathological Correlation in Acute Appendicitis in the Pediatric Age Group: A Retrospective Study in Department of Surgery, Faculty of Medicine, University of Misurata

Esam Alsaghair[1*], Salem Shnaishah[2], Ahmed Abugarsa[3], Walid kaibah[4]

[1]Department of Surgery, Faculty of Medicine, University of Misurata, Misurata, Libya
[2]Department of community, Faculty of Medicine, University of Misurata, Misurata, Libya
[3]Department of Surgery, Faculty of Medicine, University of Misurata, Misurata, Libya
[4]Department of Surgery, Faculty of Medicine, University of Misurata, Misurata, Libya

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Abstract

Background:- : Acute appendicitis is the most common surgical emergency in the pediatric population. Accurate diagnosis is crucial to reduce negative appendectomy rates. This study evaluates the clinical presentation, imaging findings, and histopathological outcomes in children who underwent appendectomy.

Methods:- : A retrospective analysis of 131 pediatric appendectomy cases ages (2–16 years) was conducted. Data on demographics, clinical signs, imaging, and histopathology were collected and correlated.

Results: The male-to-female ratio was 2.2:1. The most frequent symptoms were right iliac fossa pain (86.3%), nausea (70.2%), vomiting (54.2%), anorexia (59.5%), and fever (45%). Ultrasound was performed in 89 cases and was positive in 83 (93.3%). CT scans were used in only 2 cases. Histopathology confirmed in 131 patients with a negative appendectomy rate of 23.6%. **Conclusion:** Strong clinical suspicion and imaging (ultrasound) showed high sensitivity. Histopathology remains the definitive diagnostic tool. Combining clinical and radiological findings can reduce unnecessary surgeries

I) Introduction

Acute appendicitis is the most common diagnosis of acute abdomen leading to surgery, especially in children, which occurs after the obstruction of the appendiceal lumen and development of inflammation in the appendix. Fecaliths, parasites, tumors, foreign bodies, and bacterial and viral agents have been identified as the underlying causes of appendicitis. [1]

There is no specific gene associated with the occurrence of appendicitis; however, the risk of this disease is about three times higher in people who have a positive family history than other people. [2]

Complicated acute appendicitis (CAA) associated with longer length of hospital stay, higher complication rate (e.g. surgical site infection), and readmission than uncomplicated cases. [3]

In a recent study, agreement in the diagnosis of appendicitis among surgeons and pathologists was found to be weak; however, this was moderate if the cases were classified as perforated or non-perforated. [4]

esam.zwawe@gmail.com

Clinical scoring systems and imaging modalities such as ultrasound and CT scan are used to improve diagnostic accuracy, yet histopathological examination of the removed appendix remains the gold standard for diagnosis confirmation. [5]

This study aims to evaluate the correlation between the clinical presentation, imaging findings, and histopathological results in pediatric appendicitis to assess the diagnostic accuracy and identify the rate of negative appendectomies**.**

II) Objectives

1. To assess the demographic and clinical profile of pediatric patients with suspected acute appendicitis.

2. To evaluate the accuracy of clinical diagnosis and imaging findings in comparison with histopathological reports.

3. To determine the rate of negative appendectomies.

III) Materials and Methods

1. Study Design: Retrospective descriptive study.
2. Study period: from 1-1-2023 to 31-12-2023 in Misrata medical Centre.
3. Study Population: Pediatric patients aged 2–16 years who underwent appendectomy.
4. Sample Size: 131 cases.
5. Data Collected: Demographic data, clinical symptoms, imaging results, intraoperative findings, histopathological diagnosis.
6. Data Analysis: Descriptive statistics, sensitivity, specificity, PPV, NPV, and diagnostic accuracy of ultrasound based on histopathology

IV) Results:

1- Demographic Distribution;

A) Total cases: 131.
B) Age range: 2–16 years.
C) Mean age: 9 years.
D) Gender distribution:
   (1) Male: 90 cases (68.7%)
   (2) Female: 41 cases (31.3%)

2- Clinical Presentation

Symptom	Number of Cases	Percentage
Abdominal pain	131	100%
Right iliac fossa pain	113	86.3%
Generalized abdominal pain	18	13.7%
Anorexia	78	59.5%
Fever	59	45%
Nausea	92	70.2%
Vomiting	71	54.2%

3- Imaging Modality Use.

Imaging	Number of Cases	Findings
Ultrasound performed	89 case	Positive in 83 (93.3%)
Ultrasound not done	42 case	_____
CT scan performed	2case	Used in complicated cases

Ultrasound was the primary imaging modality, used in 67.9% of cases, with a high positive rate of 93.3%.

4.4 Histopathological Findings:-

Histopathological examination was performed in all 131 cases:

Diagnosis	Number of Cases	Percentage
Normal appendix	31	23.6%
Suppurative appendicitis	87	66.6%
Gangrenous appendicitis	5	4.1%
Perforated appendicitis	7	5.5%

- Negative appendectomy rate: 23.6%.

4.5 Diagnostic Accuracy of Ultrasound (vs. HPE): -

Among the 89 patients who underwent ultrasound:

- True positives: 73
- False positives: 10
- True negatives: 6
- False negatives: 0.

Parameter	Value
Sensitivity	100%
Specificity	37.5%
Positive Predictive Value	87.8%
Negative Predictive Value	100%
Overall Accuracy	88.8%

Ultrasound showed excellent sensitivity and NPV, confirming its reliability as a screening tool.

The low specificity of ultrasound in this study indicates that while it is very reliable for confirming appendicitis, it is not as good at ruling it out when negative. This contributes to a higher number of unnecessary surgeries, emphasizing the importance of combining clinical assessment, lab markers, and imaging — and being cautious when ultrasound alone suggests appendicitis.

V) Discussion:

Acute appendicitis has long been the most common surgical emergency. Although clinicians consider this an easy diagnostic, a considerable percentage of misdiagnoses result in a negative appendectomy. As a result, it remains a clinical entity and diagnostic dilemma. [6]

The incidence of appendicitis is more common in men than females [7], [8], [9], [10]. In the current study, the incidence in males and females was 68.7% and 31.3%, respectively.

This study confirms that acute appendicitis remains a predominantly clinical diagnosis supported by imaging and finalized by histopathology.

- The negative appendectomy rate (23.6%) falls within the globally accepted range of 15–25% (Andersson, 2018).
- Suppurative appendicitis was the most common pathology, observed in 66.6% of patients.
- Ultrasound, with a sensitivity of 100%, demonstrated strong performance in identifying true cases, although specificity (37.5%) was limited. The low specificity of ultrasound in this study suggests that, while it is highly dependable for diagnosing appendicitis, it is less effective at ruling it out when negative. This contributes to an increase in unnecessary procedures, stressing the importance of integrating clinical assessment, lab indicators, and imaging — as well as exercising caution when ultrasonography alone indicates appendicitis.

Comparison with Literatures: -

Study	Negative Appendectomy	Ultrasound Use	Key Observations
Current Study	23.6%	68%	High US sensitivity, modest specificity
Sah et al. (2020)	25%	NA	Emphasized histology to avoid overdiagnosis
Yadav et al. (2019)	18%	Yes	Recommended combined clinical + US assessment
Singh et al. (2017)	20%	NA	Advocated mandatory HPE for all cases

Delays in identifying appendicitis can result in consequences including perforation, gangrene, and septic shock. The incidence of perforation in appendicitis was noted to be 5.5% in our study. Korner H. et al. [11] observed that perforated appendicitis occurred in 12%, with higher rates in children, regardless of gender [11]. Gofrit O. et al. reported that the incidence of perforation in appendicitis was 8.7% [12]. The rate of gangrenous appendicitis was 4.1% in our study. A study by Kulkarni M. et al. [13] and Nabipour [14] reported the incidence of gangrenous appendicitis are 1.53% and 8% of all cases of appendicitis, respectively.

Previous studies have shown that most positive appendicitis cases were reported as acute suppurative appendicitis, gangrenous appendicitis, and perforated appendicitis, confirmed by the final histopathology [5,11,12]. These findings are consistent with our data which showed that most of the positive appendicitis cases 76.4% were reported as acute suppurative appendicitis in the final histopathology report 66.6%, followed by perforated appendicitis 5.5% and the lowest percentage for the acute gangrenous appendicitis 4.1%.

VI) Limitations

Our major limitation of this study was that it is done in single tertiary center. As the study is in a retrospective design, the possibility of unintentional patient selection bias cannot be excluded. Hence, results should be interpreted with caution.

VII) Conclusion

This study highlights the importance of integrating clinical judgment with imaging and histopathology in diagnosing pediatric appendicitis. While ultrasound is an excellent first-line investigation, especially in children, it should not be the only criterion for surgery. Histopathology remains necessary in verifying the diagnosis and minimizing the negative appendectomy rate.

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