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Original Research Article

Ultrasonography as a diagnostic tool in acute appendicitis: Rural setup

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ABSTRACT

Background: Despite technological advances the diagnosis of appendicitis is still based primarily clinical assessment. The diagnosis of atypical appendicitis remains clinically challenging and is one of the most commonly missed problems in the emergency department. Ultrasonography is highly operator dependent with a consequently wide reported sensitivity range.
Methods: This is a prospective study conducted in the department of surgery. All patients with right lower abdominal pain, admitted to HSK hospital Bagalkot, in whom acute appendicitis was suspected were analysed from January 2013 to June 2014.
Results: In the present study appendix was visualized in 85% of the patients and periappendiceal collection was found in 7% of patients. Faecolith was found only in 1 case. Out of these 74 cases were uncomplicated acute appendicitis. Perforated acute appendicitis was diagnosed in 6 cases. One case was diagnosed as appendicular abscess and 4 cases were diagnosed as chronic appendicitis. Based on clinical assessment 4 patients were subjected to surgery after 48hours.
Conclusions: Graded compression US remains our first line method in rural setup in the evaluation of patients referred with clinically suspected acute appendicitis.

Keywords: Appendicitis, Diagnosis, Ultrasonography

INTRODUCTION

It is well-known fact that abdomen is a temple of surprises and a magic box as well. Acute appendicitis is the most common acute surgical condition of the abdomen.[1] Approximately 7 percent of the population will have appendicitis in their life time, with the peak incidence occurring between 10 and 30 years.[2,3] Despite technological advances the diagnosis of appendicitis is still based primarily clinical assessment. The diagnosis of atypical appendicitis remains clinically challenging and is one of the most commonly missed problems in the emergency department. Furthermore, the consequence of missing appendicitis, leading to perforation, significantly increases morbidity and prolongs hospital stay. Delay in diagnosis will lead to complication, which increases morbidity whereas overzealous diagnosis may lead to negative appendicectomy rate.[4]

To decide between the lesser of the two evils, that is, a negative appendectomy or an appendicular perforation can often be a vexing problem. The need for a diagnostic aid in doubtful cases is recognized. Ultrasound has been proposed as an ideal non-invasive adjust to diagnosis in suspected appendicitis cases. Ultrasonography is highly operator dependent with a consequently wide reported sensitivity range (44 - 100%).

This study involves the role of ultrasound in early diagnosis of acute appendicitis and to reduce negative

appendicectomy, in patients admitted in Hangal Shri Kumareshwar Hospital and Research Centre, Bagalkot, Karnataka, India during the period January 2013 to June 2014.

METHODS

This is a prospective study conducted in the department of surgery. All patients with right lower abdominal pain, admitted to HSK hospital Bagalkot, Karnataka, India in whom acute appendicitis was suspected were analysed from January 2013 to June 2014.

Inclusion criteria

- All patients above the age of 12 yrs
- Acute right lower abdominal pain clinically presumed to be of appendicular origin

Exclusion criteria

- Patients less than 12 years of age
- Pre-existing ileo-caecal pathology like Tuberculosis or malignancy which is the underlying causes for Appendicitis.
- Patient who are not willing for appendicectomy

A proforma was used to collect relevant information (patient data, presenting complaints, clinical findings, lab investigations, sonological findings, HPR etc.) from all the selected patients, particular attention was paid to the history of previous illness, essential investigations namely total white cell count and ultrasonography of abdomen were done for all patients. The sonographic findings were recorded as positive and negative for acute appendicitis. All USG positive cases were taken for surgery. All USG negative cases were retained for 48 hours under observation and decision in operate was made depending on progress in their clinical course and surgeon's decision. All the specimens of appendix were sent for histopathological confirmation.

Statistical analysis

Data collected will be entered and analyzed using Microsoft Excel and Epi-info software package. Chi square test will be used wherever necessary. This data will be collected in pretested proforma, which includes the general information and clinical details of the patients.

RESULTS

All 100 cases were subjected to ultrasonography and high frequency probe was used in some cases. In the present study appendix was visualized in 85% of the patients and periappendiceal collection was found in 7% of patients. Faecolith was found only in 1 case. Out of these 74 cases were uncomplicated acute appendicitis. Perforated acute appendicitis was diagnosed in 6 cases. One case was diagnosed as appendicular abscess and 4 cases were diagnosed as chronic appendicitis. Based on clinical assessment 4 patients were subjected to surgery after 48hours.

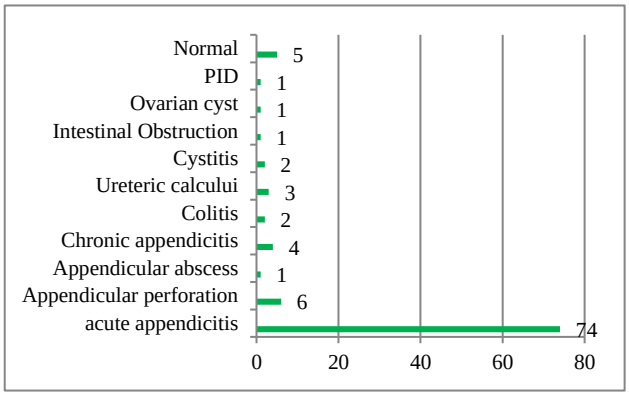

Figure 1: Distribution of usg abdomen diagnosis.

Table 1: Ultra sound results with histopathological report 2 X 2 table.

	HPR+VE	HPR-Ve	Total
USG+VE	81	4	85
USG-VE	4	-	4
Total	85	4	89

Table 2: Comparison of ultra sound results with histopathological report.

Parameter	Estimate	Lower-Upper 95% CIs
Sensitivity	96.4%	90.02-98.78
Specificity	75%	50.5-89.82
Positive Predictive value	95.3%	88.52-98.16
Negative Predictive value	80%	54.81-92.95
Diagnostic accuracy	93%	86.25-96.57

DISCUSSION

For ultrasound examination, graded compression, as described by Puylaert et al was used in present study to displace bowel loops from the right iliac fossa, the aim being to oppose the external abdominal musculature with the psoas muscle.[5] The Caecum and the Extenral iliac vessels were found to be useful anatomic landmarks.

In the present series appendix was visualized in 85% of the patients. In a study by Puylaert et al 88.5% of the patients on ultrasound were reported visualization of the appendix. In another study by Gallindo Galligo et al 82% of the patients reported with Visualisation of appendix.[5,10]

In the present study, a periappendiceal collection or perforation was found in 100% (7 cases). Puylaert et al

reported a diagnostic accuracy of 89% for appendicular abscess.[5] John et al found ultrasound to be particularly useful in detecting per-appendiceal collection, with all cases in their series being diagnosed by ultrasound.[6]

Table 3: Value of usg in the diagnosis of acute appendicitis by various authors.

Authors	Sensitivity	Specificity
Jeffrey et al[7]	89.9%	96.2%
Puylaert JBCM et al[5]	89%	100%
Gallindo Gallego et al[10]	89%	82%
Ziedan et al[11]	74.2%	93.7%
George Mathews et al[12]	88.13%	90.1%
Adams et al[13]	89%	86%
Present study	96.5%	75%

Faecolith was found only in 1 case in our study. Jeffery et al had suggested that, with positive clinical findings, a faecolith should be taken to indicate acute appendicitis, irrespective of the diameter of the appendix.[7]

The overall accuracy of ultrasound was 93%, with a sensitivity of 96.4%, specificity of 75%, a positive value of 95% and a negative predictive value of 80%. The Chi square value is 53.78 and p value is 0.0001 which is highly significant.

According to Korner H et al the negative appendicectomy rate for males is 9.3% and for females.[8] In study conducted by Mohanty SK et al negative appendicectomy rate for male is 4.8% and females is 6.7%.[9] The present study shows negative appendicectomy rate of 3.63% in females and 1.21% in male. In females, negative appendicectomy rate is high. This is probably due to pelvic inflammatory diseases, and ruptured follicular cysts. These conditions are not properly diagnosed on ultrasound and mimic acute appendicitis. We believe at this level of accuracy it is justifiable to operate on all patients with a positive diagnosis of appendicitis by ultrasonography.

Some of the patinent benefits of US include that it is a relatively inexpensive modality and a simple and fast procedure to perform. We recommend that in centre like us where US is readily available and fairly accurate at identifying appendicitis, it should be the investigation of choice for determining operative treatment. We agree that US is highly user dependent, operator skill may be a crucial factor in the diagnostic accuracy of appendicitis.

Table 4: Negative appendicectomyrate.

	Male		Female		Total
	Number	Percentage	Number	Percentage	
HPR+ve	53	96.37	32	91.18	85
HPR-ve	1	3.63	3	8.82	4
Total	54	100	35	100	89

Also, patient age or sex based differences in the diagnosis of appendicitis with using some clinical presentations. Especially because of the inability to compress the right lower quadrant(RLQ), particularly in obese patients, or because of a retrocecal location of the appendix, US could not appropriately visualize the appendix. Some circumstance definitely requires CT abdomen along scoring system in order to increase the diagnostic accuracy.

CONCLUSION

Imaging is necessary in adult patients referred with clinically suspected acute appendicitis: in fact, there is wide agreement that the outcome of acute appendicitis is best with early diagnosis. Graded compression US remains our imaging is necessary in adult patients referred with clinically suspected acute appendicitis: in fact, there is wide agreement that the outcome of acute appendicitis is best with early diagnosis. Graded compression US remains our first line method in rural setup in the evaluation of patients referred with clinically suspected acute appendicitis. Nevertheless, due to variable diagnostic accuracy, the Alvarado scoring system combined with ultrasound can therefore be used as a cheap and inexpensive way of confirming acute appendicitis thus reducing negative appendicectomy rate.

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