

Evaluation of Ultrasounds Done in the Emergency Department in Patients Suffering From Acute Appendicitis at a Tertiary Care Teaching Hospital

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ABSTRACT

Background: Acute appendicitis patients report in the emergency department usually with the primary complaint of abdominal pain. One of the problems encountered by the emergency physicians is the diagnosis of patients presenting with acute appendicitis. One of the main reason which results in the perforation and worsening of such cases is the delay in the diagnosis of the acute appendicitis. Ultrasound is one the routinely employed diagnostic technique used in the diagnosis of various internal lesions. Hence; we planned the present retrospective study to assess the skills of emergency doctors (ED) regarding the use of ultrasound and its various applications.

Materials & Methods: The present retrospective study included assessment of all the cases of acute appendicitis that were reported and underwent ultrasound. All the ultrasounds were performed in the right lower quadrant of the abdomen. Of interest was whether EDs with strong backgrounds in other ultrasound applications, but without focused training for appendicitis, could diagnose appendicitis with reasonable accuracy. All the results were analyzed by SPSS software.

Results: Out of total 63 positive cases of ultrasound, 50 cases were actually affected by appendicitis while in 13 cases, appendicitis was absent. Out of 196 cases in which ultrasound

were absent, 71 cases actually had appendicitis while in 125 cases, appendicitis was absent. Out of all 259 cases, in 121 cases, appendicitis was present while in 138 cases, appendicitis was absent.

Conclusion: Proper training is required for performing ultrasound in suspected pathologies of abdominal region for avoiding false positive and negative cases.

Key words: Appendicitis, Emergency, Ultrasound.

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INTRODUCTION

In patients with acute appendicitis, the primary complaint is pain in abdominal area. The diagnostic pattern of colicky central abdominal pain followed by vomiting with shifting of the pain to the right iliac fossa was first described by Murphy but it may only present in 50% of cases.¹ Peri-umbilical colicky pain is the description of the typical pain as reported by the affected patients which further intensifies during the first 24 hours, becoming constant and sharp, and migrates to the right iliac fossa.^{2,3} Visceral innervation of the midgut results in the referred pain or the initial pain. Loss of appetite, constipation, nausea and profuse vomiting are other common symptoms encountered in such patients.⁴

A meta-analysis of the symptoms and signs associated with a presentation of acute appendicitis was unable to identify any one diagnostic finding but showed that a migration of pain was associated with a diagnosis of acute appendicitis.^{3,4}

One of the problems encountered by the emergency physicians is the diagnosis of patients presenting with acute appendicitis. For malpractice claims, perforated appendicitis is the most common abdominal disorder having 4% mortality rate.^{5,6} One of the main reason which results in the perforation and worsening of such cases is the delay in the diagnosis of the acute appendicitis. Ultrasound is one the routinely employed diagnostic technique used in the diagnosis of various internal lesions.⁷ Hence; we planned the present retrospective study to assess the skills of emergency doctors (ED) regarding the use of ultrasound and its various applications.

MATERIALS & METHODS

The present retrospective study was conducted in the department of radiology and emergency wing, Rama Medical College and Hospital and Research Centre Hapur, Uttar Pradesh (India) and

included assessment of all the cases of acute appendicitis that were reported and underwent ultrasound during the study period. Ethical approval was taken from institutional ethical committee.

All the ultrasounds were performed in the right lower quadrant of the abdomen. Of interest was whether EDs with strong backgrounds in other ultrasound applications, but without focused training for appendicitis, could diagnose appendicitis with reasonable accuracy.

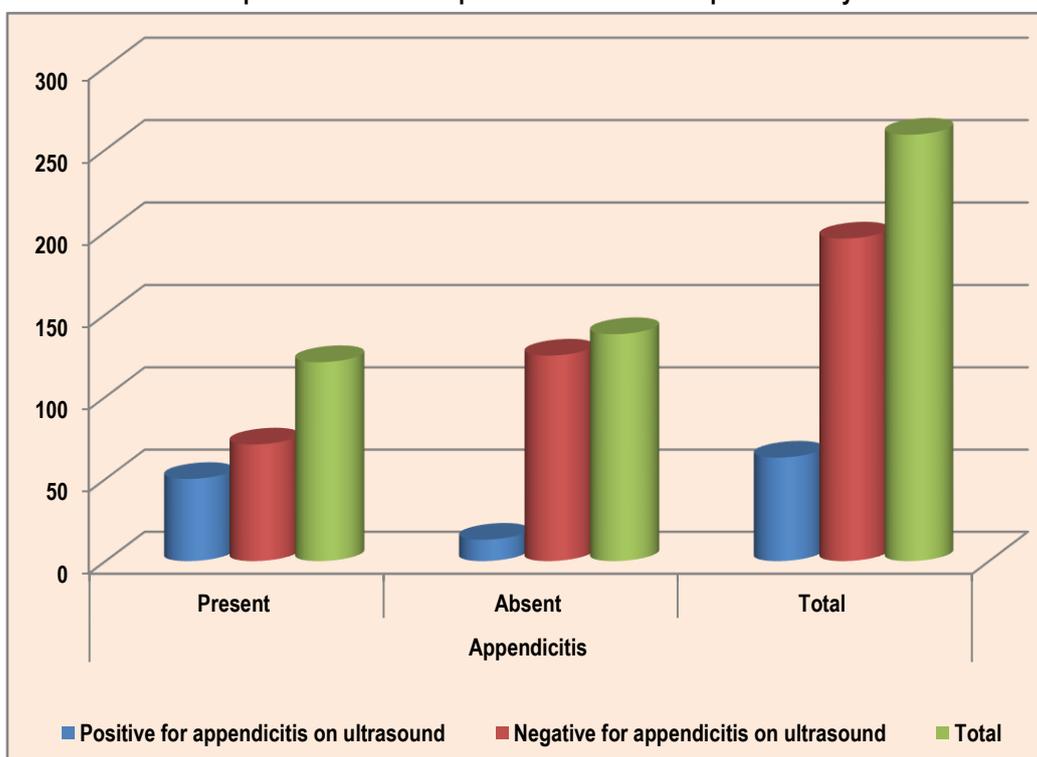
All EDs had previous training in the following applications: gallbladder, aorta, trauma, lower extremity deep venous thrombosis, cardiac, renal, procedure guidance, and pelvis. From the data records, consecutive patients of all ages and genders

who had right lower quadrant scans. Patients were more likely to be scanned if there was concern to expedite their care by attempting to demonstrate acute appendicitis at the bedside. The sole primary sonographic criterion for the physician to make the diagnosis of appendicitis was a non-compressible RLQ tubular structure of at least six millimeters. For the present study, secondary sonographic findings such as appendicolith, hyperemia on color flow Doppler, interruption of the echogenic submucosa, or extraluminal fluid collections were not diagnostic criteria. All the results were analyzed by SPSS software. Univariate and multivariate regression curves were utilized for assessment of level of significance.

Table 1: Distribution of patients included in the present study

Parameter	Appendicitis		
	Present	Absent	Total
Positive for appendicitis on ultrasound	50	13	63
Negative for appendicitis on ultrasound	71	125	196
Total	121	138	259

Graph 1: Distribution of patients included in the present study



RESULTS

Table 1 and Graph 1 show the distribution of patients included in the present study. Out of total 63 positive cases of ultrasound, 50 cases were actually affected by appendicitis while in 13 cases, appendicitis was absent. Out of 196 cases in which ultrasound were absent, 71 cases actually had appendicitis while in 125 cases, appendicitis was absent. Out of all 259 cases, in 121 cases, appendicitis was present while in 138 cases, appendicitis was absent. Table 2 and Graph 2 shows the accuracy of Ultrasound done by EDs. Specificity for ultrasound was 0.92 while sensitivity was 0.40.

DISCUSSION

One of the common abdominal emergency surgeries affecting 7 percent of the population is the acute appendicitis. Diagnosis by the emergency physician (EP) remains challenging, because clinical evaluation alone yields sensitivity of 39–74% and specificity of 57–84%.⁷⁻⁹ Specialist investigations are rarely needed to confirm a diagnosis of acute appendicitis, and the diagnosis is predominantly a clinical one. No specific diagnostic test for appendicitis exists, but the judicious use of simple urine and blood tests, particularly inflammatory response variables, should allow exclusion of other pathologies and provide additional

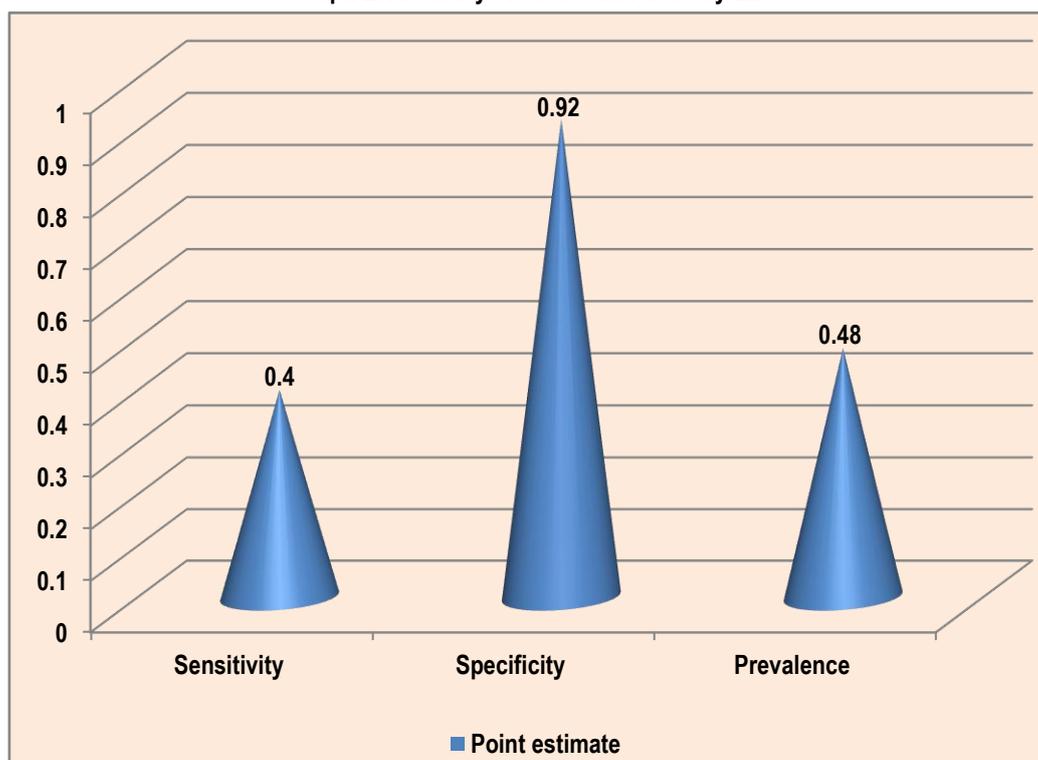
evidence to support a clinical diagnosis of appendicitis.¹⁰ Ultrasound is one of the frequently done investigations in the diagnosis of acute appendicitis.¹¹ Hence; we planned the present retrospective study to assess the skills of emergency doctors (ED) regarding the use of ultrasound and its various applications. In the present study, we observed that the specificity and the sensitivity

of ultrasound in predicting the correct diagnosis was 0.40 and 0.90. Our results were in correlation with the results of previous authors. Fox et al determined whether emergency physicians (EPs) who have skills in the other applications of ultrasound can apply these in appendicitis diagnosis and they concluded that ultrasound training was insufficiently accurate.¹²

Table 2: Accuracy of Ultrasound done by EDs

Parameter	Point estimate	95 % confidence interval	
Sensitivity	0.40	0.30	0.54
Specificity	0.92	0.83	0.97
Prevalence	0.48	0.39	0.57

Graph 2: Accuracy of Ultrasound done by EDs



Bhatt et al validated the score in a nonreferred population by EPs. A convenience sample of children, 4-18 years old presenting to a pediatric emergency department (ED) with abdominal pain of less than 3 days' duration and in whom the treating physician suspected appendicitis, was prospectively evaluated. Score components (right lower quadrant and hop tenderness, anorexia, pyrexia, emesis, pain migration, leukocytosis, and neutrophilia) were collected on standardized forms by EPs who were blinded to the scoring system. Interobserver assessments were completed when possible. The score's performance improved when two cut-points were used. When children with a paediatric appendicitis score (PAS) of ≤ 4 were discharged home without further investigations, the sensitivity was 97.6% with a NPV of 97.7%. When a PAS of ≥ 8 determined the need for appendectomy, the score's specificity was 95.1% with a PPV of 85.2%. From the results, they concluded that the PAS is a useful tool in the evaluation of children with possible appendicitis.¹³

Torbati et al assessed the impact of an emergency department (ED) guideline employing selective use of helical computed tomography (CT) on clinical outcomes of female patients with suspected appendicitis and reported that appendiceal perforation rate for males was 0.25 (95% CI = 0.14 to 0.36) during guideline use and 0.38 before; perforation rate for females was 0.06 during guideline use and 0.23 before. Helical CT had 92% sensitivity, 97% specificity, and 96% accuracy in diagnosing appendicitis. From the results, the authors concluded that Helical CT is highly accurate in detecting appendicitis in patients with equivocal ED presentations.¹⁴

Pritchett et al analyzed patients undergoing appendectomy for acute appendicitis for their demographics, diagnostic and treatment alternatives, outcomes and the authors concluded that increasing use of CT scanning in acute appendicitis increases cost of care, decreases contribution to margin, prolongs patient's stay in the emergency department, and delays time to operation.¹⁵

CONCLUSION

From the above results, the authors concluded that proper training is required for performing ultrasound in suspected pathologies of abdominal region for avoiding false positive and negative cases.

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