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Original Research Article

Comparison of clinical accuracy v/s investigations in the diagnosis of acute appendicitis

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ABSTRACT

Background: Now a day there is a trend to rely more on high-tech investigations rather than taking thorough history and clinical examination of the patients in the diagnosis of acute pain abdomen. Commonest cause of acute abdomen in the surgical practice is appendicitis. Delay in the diagnosis and treatment of acute appendicitis, leads to complications. Objective of this study was to evaluate the accuracy of clinical diagnosis versus sensitivity and specificity of ultrasound examination and histopathological examination of the resected specimen of appendix. This study also assesses the incidence of negative appendectomies in a medical college hospital of North Karnataka.
Methods: This study included one hundred and fifty patients with history of pain abdomen where clinical diagnosis of acute appendicitis was made. The study period was of 18 months between February 2014 to July 2015. Routine blood investigations and abdominal ultrasonography were done in all cases. All ultrasound positive cases were subjected to surgery. Some ultrasound negative cases were also taken to surgery on the high suspicion of diagnosis of acute appendicitis depending upon thorough history taking and clinical examination. The diagnosis made depending on the ultrasound findings were compared with clinical findings, operative findings and histopathological examination reports.
Results: Out of 150 patients, 104 were male and 46 were female. The common symptoms were pain in the RIF (100%) and anorexia (80%).The overall sensitivity and specificity of clinical diagnosis was 96.9% and 90.48% respectively. The same for ultrasound was 86.99% and 33.33% respectively. The present study shows negative appendectomy rate 6.66% in females and 7.33% in males.
Conclusions: The diagnostic accuracy of ultrasound was 84.87% whereas clinical diagnosis was 96%. Thus, detailed history taking, and thorough clinical examination still holds good in the diagnosis of acute appendicitis and should be stressed in the clinical teaching.

Keywords: Appendicitis, Appendectomy, Histopathological examination, Ultrasound

INTRODUCTION

Abdomen is like Pandora's Box. Diseases of the abdomen constitute a topic full of curiosity. A meticulous examination of the abdomen is one of the most rewarding diagnostic procedures available to the doctor, especially the surgeon. As it had been said by Bailey, "A correct diagnosis is the hand maiden of successful operation" Despite the advancements in the fields of diagnosis the surprises never caese.[1] Acute appendicitis is the most common acute surgical condition of the abdomen.[2]

Approximately seven percent of the population will have appendicitis in their lifetime, with peak incidence occurring between 10 and 30 years.[3,4] Despite technological advances, the diagnosis of appendicitis is still based primarily on the patient's history and the physical examination. Prompt diagnosis and surgical referral may reduce the risk of perforation and prevent complications.[5] When appendicitis manifests in its classic form, it is easily diagnosed and treated. Unfortunately, these classical symptoms occur in just over half of the patients, therefore an accurate and timely 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 the appendicitis, leading to perforation, significantly increases morbidity and prolongs hospital stay. The mortality rate in nonperforated appendicitis is less than 1 percent, but it may be as high as 5 percent or more in young and elderly patients in whom the diagnosis may often be delayed thus making perforation more likely. Delay in diagnosis will lead to complications, which increases morbidity whereas overzealous diagnosis may lead to negative appendectomy rate.[6]

METHODS

Patients with right lower abdominal pain admitted in medical college hospital of North Karnataka in whom acute appendicitis was clinically diagnosed were included in the study.

The sample size calculation was done using open Epi software 2.3.1 version.

$$\text{Formula} = \frac{\text{DEFF x Np(1-P)}}{\text{(d2/Z21-a/2) x (1-N)+p(1-p)}}$$

N- Infinite population, P-8.6% Absolute error(d) -7%, N-150.

Inclusion criteria

- All patients with age above 10 years
- Acute right lower abdominal pain, clinically diagnosed as having acute appendicitis

Exclusion criteria

- Patients less than 10 years of age
- Past H/o of tuberculosis and malignancy
- Patients not willing for surgical treatment

Detailed history was taken, and thorough clinical examination was done for patients included in study. Modified Alvarado score was applied in clinical diagnosis. All patients underwent ultrasonography of abdomen and findings were noted. Patients underwent appendicectomy and all the resected appendicectomy specimens were examined histopathologically and findings were noted.

RESULTS

In this study 150 patients with right lower abdominal pain, admitted in HSK hospital Bagalkot, in whom diagnosis of acute appendicitis was made clinically.

Table 1: Age and sex distribution.

Age group	Sex		Total
	Male	Female	
11-20	24	17	41
21-30	35	28	63
31-40	22	7	29
41-50	6	4	10
51-60	2	2	4
61-70	2	1	3
Total	91	59	150

There was a preponderance of young patients in present study, with incidence being more common in the 2nd and 3rd decade with 42% and 27% respectively, next common in 4th decate of life. Men outnumbered women.

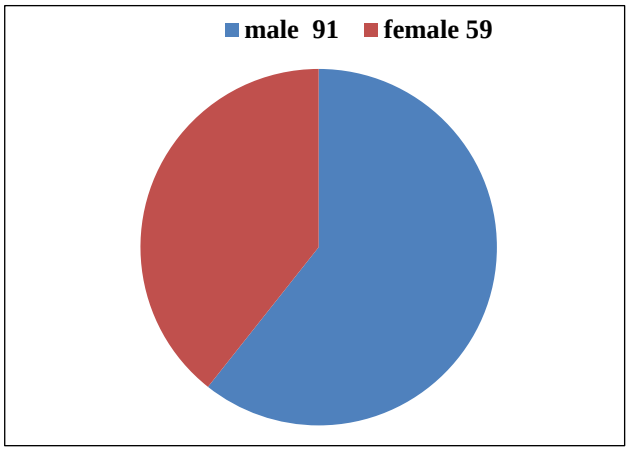

Figure 1: Sex wise distribution of acute appendicitis.

In Lewis et al series of 1000 cases, the incidence of acute appendicitis was found to occur most commonly in the age group of 20-30 years in both males and females.[7] According to Bailey acute appendicitis reaches a peak incidence in teens and early 20s.

Table 2: Distribution of site of pain.

Site of pain	No. of patients
Right iliac fossa	150
Umbilical	79
Epigastric	5
Lumbar	6
Hypogastric	3
Migration of pain	
Present	78
Absent	72

Abdominal pain is the prime symptom of acute appendicitis. Pain is initially diffusely centered in the lower epigastrium and umbilical area, after a period of 1 to 12 hours, usually within 4-6 hours the pain localizes to the right lower quadrant. Variations in the anatomic position of the appendix accounts for many of the variations in the principal locus of the somatic phase of the pain.

According to Bailey, the pain is first noted in the periumbilical region of less intensity and later with the progressive inflammation of the appendix, the parietal peritoneum in the right iliac fossa becomes irritated producing more intense, constant and localized somatic pain. This classical visceral somatic sequence of pain is present only half of those who have supposedly proven to have acute appendicitis. In this study 53% of the patients presented with pain around the umbilicus, of which 52% later shifted Right Iliac fossa. Majority of patients had aching type of pain.

Table 3: Distribution of symptoms.

Symptoms	No. of patients	Percentage
Nausea and vomiting	125	82
Fever	66	42
Anorexia	128	80
Constipation	18	13
Diarrhoea	9	6
Urinary complaints	26	17

Anorexia nearly always accompanies appendicitis particularly in children. The second commonest symptom was nausea or vomiting. Vomiting appears after the onset of pain and vomiting is more common among teenagers and younger age groups, which is due to neural stimulation and the presence of ileus.

Table 4: Clinical signs.

Clinical findings	No. of patients
Pulse rate >90	101
Pyrexia	58
Right iliac fossa tenderness	150
Rebound tenderness	72
Guarding and rigidity	49

Table 5: Alvarado score.

Alvarado score	No. of patients		Percentage
	Male	Female	
7 or >7 more	67	34	67.2
5-6	17	13	19
<5	9	10	14
Total	93	57	100

RIF tenderness was present in 100% of cases. Rebound tenderness was present in 47% of cases, in these cases there was presence of local peritoneal inflammation and guarding was present in 33% (Table 4).

In present study Alvarado score was 7 or more than 7 in 67.2% of cases 5-6 in 19% and less than 5 in 14% cases.

Table 6: Ultrasonography findings.

USG diagnosis	No. of patients
Acute appendicitis	111
Appendicular perforation	8
Appendicular abscess	2
Chronic appendicitis	6
Ureteric calculi	7
Cystitis	3
Ovarian cyst	2
Pelvic inflammatory disease	4
No abnormality detected	7
Total	150

In the present study appendix was visualized in 74% of cases. In present study 84.6% of cases were positive for appendicitis. Out of 127 cases 111 were uncomplicated acute appendicitis. Perforated acute appendicitis was diagnosed in 8 cases and 2 cases of appendicular abscess. 6 cases were chronic appendicitis.

Table 7: Distribution of various positions of appendix.

Position of appendix	No. of patients	Percentage
Retrocaecal	98	65.3
Pelvic	41	27.3
Subcaecal	4	2.6
Preileal	4	2.6
Postileal	3	2
Total	150	100

Table 8: Histopathological reports.

Histopathological reports	No. of patients		Total	%
	Male	Female		
Normal	11	10	21	14
Acute appendicitis	43	24	67	44.6
Acute suppurative appendicitis	6	7	13	8.6
Acute gangrenous appendicitis	1	2	3	2
Acute eosinophilic appendicitis	1	1	2	1.3
Chronic appendicitis	26	18	44	29.3
Total	88	62	150	100

Treatment

Out of 150 cases 127 were positive for appendicitis in ultrasound and 131 were diagnosed clinically based on modified Alvarado score, all cases were taken for surgery. Out of remaining 23 cases which were negative

for appendicitis on ultrasound were also taken for surgery.

Out of 150 surgeries 90 cases were done laproscopically (60 cases were done General anesthesia rest spinal anesthesia was given) remaining 60 underwent open appendicectomy. The most common position of appendix was found to be retrocecal 98 cases followed by pelvic 41 cases.

Table 9: Comparison of sensitivity and predictive values (95% CI).

Parameter	Ultrasound	Clinical diagnosis
Sensitivity	86.99% (80.57-91.51)	96.9% (92-98.79)
Specificity	33.33% (9.67-70)	90.48% (71.0-97.3)
Positive predictive value	96.95% (92.41-98.81)	98.43% (94.4-99.5)
Negative predictive value	9.524% (2.65-28.91)	82.61% (62.8-9.02)
Diagnostic accuracy	84.7% (78.2-89.7)	96% (1.55-98.15)

DISCUSSION

Acute appendicitis is more common in males than in females. Boyd discussing acute appendicitis disease says it is more than twice as common in males as in females and explains it as may be due to fact that young male is more subject to strain and trauma and that their diet is usually richer in protein than that of the females.

In Levis et al Male to Female ratio was 3:2 in present study the male to female ratio was 3.05:1.95. In more than 95% of patients with acute appendicitis, anorexia is the first symptom followed by abdominal pain and in turn followed by vomiting. According to Hardin DM et al study anorexia was present in 100%.[8]

According to Schwartz incidence of vomiting is 75%.[4] According to study by D. Mike Hardin nausea accounts for 90% and vomiting is present in 75%.[8] The incidence of vomiting is 82% in present study almost synchronous with other studies.

In present study 66% of patients had pulse rate more than 90 beats per minute and 38% accompanied with low grade fever. On clinical examination RIF tenderness was present in 100% of cases which was the most consistent feature. It was about 95% in study conducted by Kallan M, et al.[9] Ninety-nine percentage in the study by George Mathews et al.[10] John et al have found lower quadrant tenderness to be significantly more common in patients with appendicitis.[11]

Correlation of clinically diagnosed appendicitis with Histopathology

Out 150 clinically diagnosed cases of appendicitis 127 cases were diagnosed to have appendicitis by Usg. Rest 23 cases where appendix was found to be normal taken up for surgery based on clinical suspicion 4 cases found to have appendicitis on histopathological examination. Thus, ultrasound examination has diagnostic accuracy of 84.87% whereas clinical diagnosis has diagnosis accuracy of 96%. Hence clinical diagnosis still plays very important role in diagnosing of acute appendicitis. Thus, appendicectomy is justifiable in clinically positive cases even though ultrasound showed normal appendix.

In present study over all negative appendicectomy was 14% which is similar to, Dey S et al study done for clinicopathological correlation of acute appendicitis that showed 13% negative appendicectomy.[12] Ultrasound plays a role in diagnosing other cases which mimic appendicitis such as ureteric coli, PID, ovarian cyst etc.

CONCLUSION

Ultrasonography is useful investigation in the clinically diagnosed cases of appendicitis. Its sensitivity is 86.99% and specificity is 33.33%. Whereas that of clinical diagnosis is of 96.9% and 90.48% sensitivity and specificity respectively. Ultrasound examination of the abdomen is cost effective investigation as compared to abdomen CT. Detailed history taking, and thorough clinical examination still holds good in the diagnosis of acute appendicitis.

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