ISSN: 0975-3583,0976-2833 VOL13,ISSUE08,2022

To assess the accuracy of pre-operative diagnosis of acute abdomen patients treated by surgical intervention

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ABSTRACT

Introduction: Acute abdominal pain is one of the most common presenting complaints at emergency of general surgery department and due to its varied aetiology; it poses significant diagnostic challenges for surgeons.

Aim and objective: To assess the accuracy of pre-operative diagnosis of acute abdomen patients treated by surgical intervention.

Objective

To find out the diagnostic accuracy of pre-operative clinical methods in acute abdomen cases by taking histo-pathological diagnosis as gold standard

Materials and methods: Department of General Surgery, AGMC & GBP Hospital. The procedure was carried out for 1 year. Patients of acute abdomen undergoing surgery admitted during the study period fulfilling the inclusion and exclusion criteria was included in this study

Conclusion: Clinical examination was the found to be statistically correlating with the intra-operative findings.

INTRODUCTION

Acute abdominal pain is one of the most common presenting complaints at emergency of general surgery department and due to its varied aetiology; it poses significant diagnostic challenges for surgeons. Acute abdomen is a term used to encompass a spectrum of surgical, medical and gynaecological conditions ranging from trivial to life threatening conditions, which require hospital admission, investigations and treatment. It has sudden onset, can persist for several hours to days and is associated with wide variety of clinical features specific to underlying condition or disease. It remains the important cause of mortality and morbidity in the emergency department. Acute abdomen varies from mild dull aching pain, to frank guarding and rigidity with associated systemic symptoms. Surgeon managing a case of acute abdomen should be aware of diverse aetiology of acute abdomen, so there is a need to enlist the different aetiologies leading to acute abdomen and the most common among them.[1] It is important that all emergency surgery patients are evaluated with a standard approach to avoid omissions, provide timely

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resuscitation, effective investigation and efficient surgical intervention. The initial challenge in emergency setting is to decide whether the patient is acutely unwell. Previous studies have shown that a considerable volume of diagnostic errors would be reduced by paying more attention to diagnosis before laparotomy.[2]

Preoperative diagnosis of acute abdomen is crucial to minimize the morbidity and mortality especially where the diagnostic facilities are limited.

Preoperative accurate diagnosis prevents from unnecessary laparotomies and results in reducing negative operation.

The workup proceeds in the usual order of history, physical examination, laboratory, and imaging studies.[3]

Improvements in imaging techniques, especially multi detector CT, have revolutionized the diagnosis of the acute abdomen. The most difficult diagnostic dilemmas of the past, appendicitis in young women and ischemic bowel in elderly patients, can now be diagnosed with much greater certainty and speed; this has resulted in more rapid operative correction of the problem with less morbidity and mortality. however, CT scan use is still limited by the high cost factor which leads to fewer people being able to afford it. [4]

Laparotomy is a surgical procedure involving a large incision through the abdominal wall in order to gain access to the abdominal cavity, which can be used for both exploratory and therapeutic purposes. Therapeutic laparotomy is most commonly preferred in acute abdominal surgical emergencies as it provides good field of vision and takes minimal time which is a vital resource in emergencies. Very often an accurate diagnosis cannot be made without surgery and many wonders are revealed on opening the abdomen. So, it is the last court of appeal in investigating abdominal cases

A few studies considering the accuracy of pre-operative diagnosis has been performed. The goal of this study is to determine the accuracy of pre-operative clinical diagnosis among acute abdomen treated by surgical intervention and find out the diagnostic accuracy of ultrasonography, a pivotal tool in aiding the clinical diagnosis, in the tertiary care hospital of North Eastern India. The study will help us to refine our clinical skills while trying to accurately diagnose the acute abdomen cases and thus save valuable time otherwise spend in battery of tests trying to solve diagnostic dilemma. Agartala Government Medical College is the only tertiary care centre in whole of Tripura, and caters to the whole North-East India as a centre of excellence. Improving our clinical skills would help us to lower the mortality rates of patients presenting with acute abdomen in urgent need of surgical intervention.

AIM AND OBJECTIVE

Aim

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To find out the diagnostic accuracy of pre-operative clinical methods in acute abdomen cases by taking histo-pathological diagnosis as gold standard

MATERIALS AND METHODS

Study design: Cross sectional study

Type of study: Observational study

Study setting: Department of General Surgery, AGMC & GBP Hospital

Study duration: The procedure was carried out for 1 year

Study population: Patients of acute abdomen undergoing surgery admitted during the study period fulfilling the inclusion and exclusion criteria was included in this study

Inclusion criteria: 1) Patients of all age group and gender with clinical manifestations suggestive of the need to undergo emergency laparotomy

Exclusion criteria: 1) Patients who refuse to give consent

2) Patients with traumatic acute abdomen

Sample size and sampling technique: Earlier study has shown that pre-operative diagnostic accuracy for acute abdomen patients admitted for surgical intervention is around 77.7%.

Thus, using the formula (4pq)/l^2 where p = prevalence

q = 100-p

l = error,

We get p = 77.7, q = 22.3 and error as 10%, we get sample size as 69.

Now since there are 2 admission days per week, first patient admitted with acute abdomen from 9 am to4 pm and first patient admitted after 4pm to 12 am was taken up for work up. They were investigated under the standard protocol and if they fulfil the inclusion and exclusion criteria they were taken up for the study. This was carried out till 69 patients are included in the study.

Study tools: Prepared proforma recording the history of the patients, clinical examination findings, USG, x-ray, laboratory examination findings of the patientspost laparotomy and histo pathological findings

Data collection: Case series method. Informed consent was taken. Patients was examined by the admitting surgical team after taking a thorough history, relevant points in the history included the patient's gender, site of pain, character of pain, fever, loss of appetite, change in bowel habit, vomiting, abdominal distension and urinary or genital symptoms. Factors in the clinical examination that was considered of significant contribution to the final diagnosis include temperature, tachycardia, and abdominal tenderness and localized or generalized guarding. In all studied cases, white blood cell (WBC) count with a differential leukocyte count (DLC) and measurement of neutrophil percent was performed on admission. Urinalysis (UA) was performed for all of patients. Abdomen X-ray, US and serum amylase level measurements were performed in some cases considering the clinical suspicion. Pre-operative diagnosis was made by surgical residents based on clinical examination and investigations compared to the post-operative diagnosis. Rate of negative laparotomy, sensitivity, specificity, positive and negative predictive values considering leucocytosis (WBC count ≥11,000 per micro litre in peripheral blood smear),

ISSN: 0975-3583,0976-2833 VOL13,ISSUE08,2022

granulocytosis (neutrophils >75% in DLC), UA (considered positive if contained ≥ 5 WBC or ≥ RBC or showed pregnancy) was recorded. USG and X-ray chest (PA view) and X-ray abdomen (erect) was performed for all patients and recorded. After surgery, a tissue sample which taken during surgery is send to the Department of Pathology for histo-pathological examination. For this study, the diagnosis obtained on histopathological examination taken as the gold standard.

Statistical Analysis:

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS (version 25.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Data had been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. Two-sample t-tests for a difference in mean involved independent samples or unpaired samples. Paired t-tests were a form of blocking and had greater power than unpaired tests. A chi-squared test ($\chi 2$ test) was any statistical hypothesis test wherein the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate.

Explicit expressions that can be used to carry out various t-tests are given below. In each case, the formula for a test statistic that either exactly follows or closely approximates a t-distribution under the null hypothesis is given. Also, the appropriate degrees of freedom are given in each case. Each of these statistics can be used to carry out either a one-tailed test or a two-tailed test.

Once a t value is determined, a p-value can be found using a table of values from Student's t-distribution. If the calculated p-value is below the threshold chosen for statistical significance (usually the 0.10, the 0.05, or 0.01 level), then the null hypothesis is rejected in favor of the alternative hypothesis.

p-value ≤ 0.05 was considered for statistically significant.

DISCUSSION

Momin RS et al [5] (2015) found that Acute Abdomen was most common in age group between 20-40 years with male predominance. Acute appendicitis was the most common cause of surgical condition, followed by Peritonitis and then Intestinal Obstruction. The diagnostic accuracy rates in male and female patients were 93% and 80% respectively.

We found that the mean age (mean± s.d.) of patients was 36.3696 ± 13.9029 years. It was found that 6(8.7%) patients had ≤20 years of age, 44(63.8%) patients 21 to 40 years of age, 15(21.7%) patients had 41 to 60 years of age and 4(5.8%) patients had 61 to 80 years of age. We found that 22(31.9%) patients had female and (47.1%) patients had male.

Chalya PL et al [6] (2011) found that Males outnumbered females by a ratio of 1.3: 1. Their median age was 28 years and the modal age group was 21-30 years. The median duration of illness was 5.8 days. The majority of patients (69.0%) had no previous history of treatment for peptic ulcer disease.

ISSN: 0975-3583,0976-2833 VOL13,ISSUE08,2022

It was found that [7](100.0%) patients had pain in abdomen, 46(66.7%) patients had vomiting, 21(30.4%) patients had fever, 15(21.7%) patients had abdomen distension, 9(13.0%) patients had constipation and 8(11.6%) patients had diarrhoea.

It was found that [8](91.3%) patients had tenderness present. We found that 28(40.6%) patients had guarding. It was found that 24(34.8%) patients had rigidity.

Salam SS et al [9](2018) found that Males were more than females (55.6% vs. 44.4%). More than half of the patients were from urban areas (55.6%) and majority were from middle class families (88.8%). All the patients in the study presented with pain abdomen, 10 patients (18.5%) with typical pain abdomen and 44 patients (81.4%) with atypical pain abdomen. In 18 cases (33.3%), there was history of anorexia and 18 cases (33.3%) gave a history of vomiting with varying frequency. Fever was present in 30 cases (55.6%). 2 patients (3.7%) had diarrhoea and 25 (46.2%) gave history of constipation. Majority of the patients (81.4%) were diagnosed as acute appendicitis, 11.1% as appendicular abscess and appendicular perforation in 7.4% of cases. Appendicectomy was performed in 29 patients (53.7%), laparotomy was performed in 1 case (1.8%), where there was generalised peritonitis and incision and drainage done in 6 cases (11.1%) and non-operative treatment considered in 18 patients (33.3%).

It was found that 25(36.2%) patients had sluggish bowel sound. We found that 69(100.0%) patients had abdomen mass. It was found that 28(40.6%) patients had abnormal TLC. We found that 27(39.1%) patients had abnormal neutrophil. We found that 3(4.3%) patients had abnormal serum amylase. It was found that 1(1.4%) patient had few white cells in urine.

We found that 33(47.8%) patients had done straight X-Ray abdomen, 48(69.6%) patients had done USG of abdomen –pelvis, 11(15.9%) patients had done CT abdomen.

Menke J. et al [7](2010) found that 66% of the patients were male and 34% were female. Total leukocytes count and differential leukocytes count were most sensitive in evaluating patients with acute appendicitis and peritonitis while plain X-ray abdomen had highest sensitivity in evaluating patients with bowel obstruction and acute peritonitis as well. Acute appendicitis was the most common cause (60%) of patient presenting to emergency and casualty as acute abdomen.

It was found that 36(52.2%) patients had acute appendicitis, 2(2.9%) patients had appendicular rupture/perforation, 22(31.9%) patients had hollow viscus perforation, 6(8.7%) patients had intestinal obstruction, 1(1.4%) patient had intussusception and 2(2.9%) patients had necrotising pancreatitis.

We found that 34(49.3%) patients had Acute Appendicitis, 3(4.3%) patients had Appendicular perforation, 2(2.9%) patients had Colon Carcinoma, 18(26.1%) patients had Duodenal Perforation, 4(5.8%) patients had Gastric perforation, 1(1.4%) patient had Illeocecal Carcinoma, 3(4.3%) patients had Illeocecal Volvulus, 1(1.4%) patient had Intussusception, 1(1.4%) patient had Meckels Diverticulum, 1(1.4%) patient had Necrotising Pancreatitis and 1(1.4%) patient had Necrotising Pancreatitis & duodenal perforation.

ISSN: 0975-3583,0976-2833 VOL13,ISSUE08,2022

It was found that in acute appendicitis, 34(100.0%) patients had acute appendicitis in clinical diagnosis. In appendicular perforation, 1(33.3%) patient had acute appendicitis and 2(66.7%) patients had appendicular rupture/perforation in clinical diagnosis. In colon carcinoma, 2(100.0%) patients had intestinal obstruction in clinical diagnosis. In duodenal perforation, 18(100.0%) patients had hollow viscus perforation in clinical diagnosis. In gastric perforation, 4(100.0%) patients had hollow viscus perforation in clinical diagnosis. In illeocecal tuberculosis, 1(100.0%) patient had intestinal obstruction in clinical diagnosis. In illeocecal volvulus, 3(100.0%) patients had intestinal obstruction in clinical diagnosis. In intussusception, 1(100.0%) patient had intussusception in clinical diagnosis. In meckels diverticulum, 1(100.0%) patient had acute appendicitis in clinical diagnosis. In necrotising pancreatitis, 34(100.0%) patients had necrotising pancreatitis in clinical diagnosis. In necrotising pancreatitis & duodenal perforation, 34(100.0%) patients had necrotising pancreatitis in clinical diagnosis. Association of clinical diagnosis vs. histopathology was statistically significant ($p<0.001$).

SUMMARY

We found that the mean age (mean± s.d.) of patients was 36.3696 ± 13.9029 years. It was found that 6(8.7%) patients had ≤20 years of age, 44(63.8%) patients 21 to 40 years of age, 15(21.7%) patients had 41 to 60 years of age and 4(5.8%) patients had 61 to 80 years of age. We found that 22(31.9%) patients had female and (47.1%) patients had male.

It was found that 69(100.0%) patients had pain in abdomen, 46(66.7%) patients had vomiting, 21(30.4%) patients had fever, 15(21.7%) patients had abdomen distension, 9(13.0%) patients had constipation and 8(11.6%) patients had diarrhoea.

It was found that 63(91.3%) patients had tenderness present, 28(40.6%) patients had guarding, 24(34.8%) patients had rigidity, 25(36.2%) patients had sluggish bowel sound and 69(100.0%) patients had abdomen mass.

It was found that 28(40.6%) patients had abnormal TLC, 27(39.1%) patients had abnormal neutrophil, 3(4.3%) patients had abnormal serum amylase and 1(1.4%) patient had few white cells in urine.

We found that 33(47.8%) patients had done straight X-Ray abdomen, 48(69.6%) patients had done USG of abdomen –pelvis and 11(15.9%) patients had done CT abdomen.

It was found that 36(52.2%) patients had acute appendicitis, 2(2.9%) patients had appendicular rupture/perforation, 22(31.9%) patients had hollow viscus perforation, 6(8.7%) patients had intestinal obstruction, 1(1.4%) patient had intussusception and 2(2.9%) patients had necrotising pancreatitis.

We found that 34(49.3%) patients had Acute Appendicitis, 3(4.3%) patients had Appendicular perforation, 2(2.9%) patients had Colon Carcinoma, 18(26.1%) patients had Duodenal Perforation, 4(5.8%) patients had Gastric perforation, 1(1.4%) patient had Illeocecal Carcinoma, 3(4.3%) patients had Illeocecal Volvulus, 1(1.4%) patient had Intussusception, 1(1.4%) patient had Meckels Diverticulum, 1(1.4%) patient had Necrotising Pancreatitis and 1(1.4%) patient had Necrotising Pancreatitis & duodenal perforation.

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It was found that in acute appendicitis, 34(100.0%) patients had acute appendicitis in clinical diagnosis. In appendicular perforation, 1(33.3%) patient had acute appendicitis and 2(66.7%) patients had appendicular rupture/perforation in clinical diagnosis. In colon carcinoma, 2(100.0%) patients had intestinal obstruction in clinical diagnosis. In duodenal perforation, 18(100.0%) patients had hollow viscus perforation in clinical diagnosis. In gastric perforation, 4(100.0%) patients had hollow viscus perforation in clinical diagnosis. In illeocecal tuberculosis, 1(100.0%) patient had intestinal obstruction in clinical diagnosis. In illeocecal volvulus, 3(100.0%) patients had intestinal obstruction in clinical diagnosis. In intussusception, 1(100.0%) patient had intussusception in clinical diagnosis. In meckels diverticulum, 1(100.0%) patient had acute appendicitis in clinical diagnosis. In necrotising pancreatitis, 34(100.0%) patients had necrotising pancreatitis in clinical diagnosis. In necrotising pancreatitis & duodenal perforation, 34(100.0%) patients had necrotising pancreatitis in clinical diagnosis. Association of clinical diagnosis vs. histopathology was statistically significant ($p<0.001$).

CONCLUSION

Acute abdomen diagnosis is based on complete history taking, physical examination and investigation tools including laboratory tests and radiological findings. The investigative modalities are good guidance and helpful to confirm the diagnosis.

Acute abdomen was nearly twice as common in males as in females and the age group with the highest incidence was 21- 40 years. Acute appendicitis was the most common presentation of acute abdomen in our study. Pain abdomen and vomiting were the leading symptoms, while tenderness and guarding were the leading signs.

Clinical examination was the found to be statistically correlating with the intra-operative findings.

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ISSN: 0975-3583,0976-2833 VOL13,ISSUE08,2022

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Table: Association between clinical diagnoses vs. histopathology

	HISTOPATHOLOGY											
CLINICAL DIAGNOSIS	**Acute Appendicitis**	**Appendicular perforation**	**Colon Carcinoma**	**Duodenal Perforation**	**Gastric perforation**	**Illeocecal Tuberculosis**	**Illeocecal Volvulus**	**Intussuception**	**Meckels Diverticulum**	**Necrotising Pancreatitis**	**Necrotising Pancreatitis & duodenal perforation**	**TOTAL**
Acute Appendicitis	34	1	0	0	0	0	0	0	1	0	0	36
Row %	94.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	100.0
Col %	100.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	52.2
Appendicular Rupture/perforation	0	2	0	0	0	0	0	0	0	0	0	2
Row %	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Col %	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9
Hollow Viscus	0	0	0	18	4	0	0	0	0	0	0	22
	0.0	0.0	0.0	81.8	18.2	0.0	0.0	0.0	0.0	0.0	0.0	100.0

ISSN: 0975-3583,0976-2833 VOL13,ISSUE08,2022

perforation	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	31.9
Row %												
Col %												
Intestinal Obstruction	0	0	2	0	0	1	3	0	0	0	0	6
	0.0	0.0	33.3	0.0	0.0	16.7	50.0	0.0	0.0	0.0	0.0	100.0
Row %	0.0	0.0	100.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	8.7
Col %												
Intussusception	0	0	0	0	0	0	0	1	0	0	0	1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Row %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	1.4
Col %												
Necrotising Pancreatitis	0	0	0	0	0	0	0	0	0	1	1	2
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	100.0
Row %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	2.9
Col %												
TOTAL	34	3	2	18	4	1	3	1	1	1	1	69
Row %	49.3	4.3	2.9	26.1	5.8	1.4	4.3	1.4	1.4	1.4	1.4	100.0
Col %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0