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Comparative Analysis of Clinical, Radiological and Operative Findings in Acute Abdomen

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Abstract: A prospective observational study was conducted on 125 patients with acute abdomen to compare clinical, radiological and operative finding. The most common age group was 21-30 years with male preponderance. Nausea or Vomiting were most predominant symptoms in these patients. Anorexia followed by fever was the next important symptom. Guarding was the single statistically significant sign (p=.02), other common signs were tenderness, rigidity, distention, tachycardia and silent abdomen. A total of 59(47.2%) patients had raised total leucocyte count with sensitivity of 47.54%, and specificity of 66.67% respectively (p = .58); differential leukocyte count was raised in 86(68.8%) patients with sensitivity of 70.49% and positive predictive value of 97.73% the test was statistically significant (p = .0092). Appendicitis was the most common cause of laparotomy followed by perforation peritonitis, obstruction and mesenteric ischemia. Diagnostic accuracy of X-ray was 72.86% while that of US was 75.6%. While X-ray had highest sensitivity in obstruction (87.5%), ultrasound was most sensitive to diagnose appendicitis (90.19%). Clinical accuracy was 89.6% higher than radiological accuracy and reflects that in acute abdomen clinical judgment is accurate for diagnosis of acute abdomen and investigation are only supplementary and cannot replace clinical decision.

Keywords: Acute abdomen, laparotomy.

INTRODUCTION

The term acute abdomen usually refers to symptoms of abdominal pain and sign of abdominal tenderness. This clinical presentation often requires emergency surgical therapy.[1] Acute abdomen encompasses around 5-10% of emergency department admissions, though the number of patients may be less but those who fall in this category requires maximum attention by the treating physician in order to minimize the morbidity the mortality that it can cause.[2] Much has been written about the algorithms to diagnose acute abdomen, although the basic approach to assessment of acute abdomen remains much the same today, the introduction of new diagnostic technologies and better resuscitation methods, coupled with an aging population and new disease processes, necessitates periodic revision of the traditional approach as well as constant broadening of the differential diagnosis.[3] The present study was conducted in Pt. B. D. Sharma University of Health Sciences in order to curtail these diagnostic problems and evaluate the role of increasing use of investigations over clinical acumen.

MATERIALS AND METHODS

This was a prospective observational study performed in department of surgery Pt. B.D. Sharma College, Rohtak, Haryana, India from December 2012 to February 2014 to compare the pre-operative diagnosis based on clinical examination and investigation with the operative diagnosis in acute abdomen. All patients who presented to emergency department with clinical diagnosis of acute abdomen were included in the study; pediatric age group (14 years and below), acute abdomen in pregnancy and gynecological causes of acute abdomen & patients managed conservatively were excluded from the study.

Total 125 patients who underwent laparotomy were available for analysis. Total leukocyte count, differential leukocyte count and ultrasound were done in all the cases whereas X-ray abdomen and CT-scan were performed in selected patients according to suspected disease. Pre-operative diagnosis based on clinical examination and investigations were compared with the operative diagnosis based on operative findings. Rate of negative laparotomy, sensitivity, specificity, positive & negative predictive values of the investigations were calculated. Statistical analysis was done by using computer-based SPSS-20.0 software programme. Student's t-test and Chi-square tests were applied wherever applicable to find out the level of significance and P value <0.05 was considered as the level of significance.

RESULTS

A total of 125 patients underwent emergency laparotomy, 96(76.8%) were male and 29(23.2%) were female with male to female ratio of 3.31:1. Mean age of patient was 36.08 ± 17.08 with the range of 15-80 years. Most common age group was 21-30(27.2%), followed by 15-20(24%). Acute appendicitis was the most common cause of acute abdomen, accounting for 55(44%) cases. These cases of appendicitis include simple inflamed appendix, gangrenous appendix and perforated appendix. Second commonest cause for acute abdomen was perforation peritonitis 38(30.4%), which include peptic perforation and intestinal perforation. Less commoner diagnosis for acute abdomen were intestinal obstruction 24(19.2%) and mesenteric ischemic disease accounting for total of 8(6.4%) cases as shown in table 1.

Table 1 showing distribution of cases.

CASES	N (PERCENTAGE)
Acute appendicitis	55 (44%)
Perforation peritonitis	38 (30.4%)
Intestinal obstruction	24 (19.2%)
Mesenteric ischemia	8 (6.4%)

Acute abdominal pain was elicited to be the most common symptoms present in 98.4% patients followed by nausea/vomiting in 77.6%, anorexia in 42.4% and fever in 40.8% patients. Anorexia was most commonly demonstrated in acute appendicitis whereas Vomiting was the leading complaint in cases of obstruction. Fever was the overall least common symptom present only in 51 cases. None of the presenting symptoms were specific and lack the desired level of significance except vomiting which is highly significant (p = <.001). Distribution of symptoms is shown in Table 2 below.

Table 2 Showing distribution of symptoms among patients.

SYMPTOMS	PERCENTAGE
Abdominal pain	98.4%
Nausea/vomiting	77.6%
Anorexia	42.4%
Fever	40.8%

The commonest clinical sign was tenderness present in 117 (93.6%) patients followed by guarding 78(62%) and was the only statistical significant factor (p=.02) among all the clinical signs. Tachycardia was present in 58 (46.4%) patients followed by distension in 43 (34%) patients, rigidity in 29 (23%) and rebound tenderness in 22 (17%) patients. Bowel sounds were exaggerated in 3 cases all belonging to obstructive pathology. A total of 59 (47.2%) patients had raised TLC among which 58 patients had positive laparotomy findings with sensitivity of 47.54%, and specificity of 66.67% respectively. The test was statistically not significant with two tailed p = .58; differential leukocyte count was raised in 86(68.8%) patients with sensitivity of 70.49% and positive predictive value of 97.73% the test was statistically significant (p = .0092).

Abdominal X-Ray was requested in 70 (56%) of acute abdominal patient. In 51 (72.86%) cases abnormal finding was present. Abdominal X-ray was performed in all suspected cases of perforation, obstruction, and mesenteric ischemic sparing acute appendicitis cases. Highest accuracy of X-ray abdomen was found in cases of obstruction (87.5%). Ultrasound was performed in all patients. A total of 94 (75.2%) had positive finding in ultrasound in which 2 patients were found to have no intra-operative pathology. 31 (24.8%) patients had either inconclusive or normal ultrasound finding, in which 30 patients had positive intra-operative finding, giving a sensitivity of 75.41%, specificity of 33.33%, a PPV of

97.87% and NPV value of 3.23%. The two-tailed P value equals 0.3270. The test is statistically not significant. Highest accuracy of ultrasound was present in cases of appendicitis (90.19%) followed by perforation (84.21%), obstruction (54.16%) and was least diagnostic in cases of mesenteric ischemia (12.5%).

CT scan was asked in 6 cases out of which it helped in confirming the clinical diagnosis in two cases, in another 2 cases it gave new diagnosis and in rest of two it was inconclusive adding no advantage to clinical or radiological diagnosis.

Overall radiological diagnostic accuracy depends upon the positive findings present in either X-ray or ultrasound or both so that the x-ray and ultrasound can complement each other while making a diagnosis. A total of 105(84%) patients had one or the other positive radiological finding out of which 103 were correct. In 20(16%) patients it was either inconclusive or negative among which 21 were found to have pathology. Clinical evaluation resulted in operative decision in 114 patients out of which 112 were correct and 2 cases undergo negative laparotomy. Highest diagnostic accuracy was found in perforation peritonitis (97%) followed by appendicitis 94.54%, obstruction 91.66% and in cases of mesenteric ischemia accuracy was 50%. The overall accuracy was 89%. The sensitivity of clinical diagnosis was 91.80% and its specificity was 33.33% whereas percentage of positive predictive value and negative predictive value was 98.25 and 9.09 respectively. In overall clinical diagnostic accuracy the two-tailed P value equals 0.0047 which is highly significant. In appendicitis the p value = 0.0005 which is highly statistically significant.

DISCUSSION

The most common age group in this present study was 21-30 years (27.2%) is in accordance with various other studies.[4,5,6,7] The spectrum of disease changes with increasing age; appendicitis being the most common pathology in age group less than 30 years whereas obstruction and perforation peritonitis common in more older age group of more than 30 years which is in accordance with the results shown by Katarzyna[8].

After NSAP which was included in some studies appendicitis was the most common cause of laparotomy in emergency department which was also true for present study.[1,4-7] Among other causes perforation peritonitis was the second most common cause of acute abdominal surgery this finding was not in accordance with results of other studies, as in most of the above series cholecystectomy was the standard procedure[4-6] for acute cholecystitis in emergency department which was kept on conservative management with antibiotics and supportive care and later planned for interval cholecystectomy and is not included in the present study. Obstruction was the next most common cause after perforation which is in accordance with other studies. Our results simulates with Chhetri[7] who has not included gynecological causes and cholecystitis in their study. The least common but significant cause of acute abdominal surgery was mesenteric ischemic disease accounting for total of 8(6.4%) cases which was higher than what is reported by M. Asif[9] and Katarzyna[8] which reflects higher prevalence of vascular and ischemic diseases in the regional patients and may requires further evaluation.

Nausea or Vomiting were most consistent with acute abdominal pathology in our study as well as few other studies.[5,6] Vomiting/nausea was the only single factor which had statistical significance (p<.0001). Anorexia followed by fever was the next important factor which is also in accordance with both of these studies; however none of them had required level of significance. In this study 93.6% patients had localized or generalized tenderness. 62.4% patients had guarding which is in agreement with the result of Matin MA[6] and Marjan Laal[5]. Guarding was the single statistically significant factor(p=.02) among all the clinical signs in present study the results are in accordance with Saleh et al.[10] It reflects that guarding whenever present should be dealt with great care and every possible attempt should be made to rule out acute abdominal pathology.

Our study showed low sensitivity of total leucocyte count was 47.54 % which was lower than what was reported in Marjan laal[5] and Chhetri[7]. However the PPV of 98.31% was comparable with these studies. Total leukocyte count lacks the desired sensitivity and specificity and was statistically non significant and is in accordance with both the above studies however when talking of differential leukocyte count the sensitivity and specificity was 70.49% and 66.67% respectively. Differential leukocyte count was statistically significant in univariate analysis both in isolated appendicitis (p=.0014) and overall acute abdomen (.0092). These results were not produced by any of the above studies who found its lack of desired sensitivity and specificity.

Although x-ray are always a part of imaging work up, in a recent study of patients whose abdominal radiographs was interpreted as normal or nonspecific, majority (81%) had positive findings on CT, US or upper GI imaging.[11] In present study highest accuracy of X-ray abdomen was found in cases of obstruction (87.5%). X-ray was helpful in diagnosing 75% cases of peptic perforation and in intestinal perforation the accuracy was 72.22%. Sensitivity in perforation is between 45-

80%[5-7] the present study also supports this fact. X ray abdomen helped to change the diagnosis in only 3 cases i.e. 4.28% which is in accordance with what was reported in results by few other studies.[6,7,12,13]

Ultrasound (US) is an imaging modality widely available in the emergency department. In our study ultrasound was performed in all the patients. A total of 94(75.2%) had positive finding in ultrasound in which 2 patients were found to have no intra-operative pathology. Highest accuracy of ultrasound was present in cases of appendicitis up to 90.19% which is in agreement with most of the studies who reported it to be 69-90%.[5,7,14] Overall sensitivity and specificity of ultrasound was 75.41% and 33.33% respectively. Results are comparable with other studies who have reported the accuracy between 67-90%.[1,5-7] Ultrasound alone led to the change of diagnosis in 9 cases out of 125 i.e. 7.2% cases of acute abdomen but when combined with x-ray abdomen the overall accuracy increases to 83.61% higher than plain X-Ray abdomen (72.86%) and ultrasound (75.2%) when used alone. CT scan was done in 6 cases of clinical doubtful diagnosis in which it told correct diagnosis in 4 cases. Among these cases it confirmed the clinical diagnosis in 2 cases; gave a new diagnosis in 2 cases and was not helpful in rest 2 cases. The results cannot be compared with other studies with such a low volume.

In our study negative appendectomy rate was 5.45%, which is lower than statistics presented by other studies between 10-30% .[5,7,15] The overall negative laparotomy rate was 2.4% which is significantly lower than other studies who reported 10-17% .[5,7] The reason can be attributed to the fact that in our study all the cases were seen by at least a senior registrar or consultant surgeon before a final diagnosis and decision to operate was made. The overall diagnostic accuracy was around 91.80% which further increased after radiological correlation up to 96%. The change made by radiological investigation over clinical diagnosis had the two-tailed P value equals 0.5809 and is statistically not significant. Further evaluation of role of radiological investigation may be necessary as the cases whose primary diagnosis was operative but were kept on conservative management after radiological study were not included in the study.

CONCLUSION

Appendicitis is most common cause of acute abdomen. Tenderness and Neutrophilia played a crucial role in diagnosis; Neutrophilia is more sensitive than TLC and can be present before leukocytosis. X-ray has low sensitivity and specificity. Ultrasound has high sensitivity for Appendicitis but low overall sensitivity and low specificity thus adds little advantage over properly performed clinical examination. Thus in acute abdomen clinical judgment is the key to diagnosis and investigations are only supplementary and cannot replace clinical decision.

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