

A comparative study of pre-operative with operative diagnosis in acute abdomen

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Abstract

In this observational study (from August 2000 to January 2001) 102 patients of all age group with non-traumatic acute abdomen were studied to see the negative laparotomy rate and the diagnostic accuracy and predictive values of different investigations in acute abdomen. The disease was most common in the age group 20-29 years with male predominance. More than half of the acute abdomen was due to the acute appendicitis. Neutrophil leucocyte count had the highest sensitivity (91.5%) while Plain X-ray abdomen showed the highest specificity (88.8%) and positive predictive value (88.6%) in diagnosing acute abdomen. Urinalysis showed the highest negative predictive value (93.3%). Overall diagnostic accuracy was 78.4%, which was statistically significant ($P < 0.05$). Diagnostic accuracy was highest in bowel obstruction (82.4%) and lowest in peritonitis due to viscus perforation (69.0%). Negative laparotomy rate was 17.6% in the study, which was statistically significant ($p < 0.05$). It was highest with peritonitis due to viscus perforation (20.7%), and lowest in bowel obstruction (11.8%).

Key words: Acute abdomen, laparotomy.

The term “acute abdomen” denotes an episode of severe abdominal disorder, which may require urgent surgical intervention. Many medical and gynaecological diseases also manifest as acute abdomen and to differentiate them at times is quite difficult¹.

Pre-operative diagnosis of acute abdomen with limited facilities is very crucial to minimize the morbidity and mortality in the developing countries like ours, where the facilities of diagnosis are limited and clinical acumen play a pivotal role in the diagnosis and management of acute abdomen. Thus, surgeons in developing countries need to improve diagnostic acumen and decision-making in the management of the acute abdomen.

Previous studies have demonstrated that management errors can be significantly reduced by accurate pre-operative diagnosis in acute abdomen². Accurate and confirmative pre-operative diagnosis of acute abdomen ensures definitive per-operative surgical treatment, which in turn minimizes the negative laparotomy.

The complexity of acute abdomen is such that a careful, methodical diagnostic approach is necessary in order to arrive at a correct diagnosis.

Correct pre-operative diagnosis of acute abdomen remains challenging despite proper history taking and clinical examination, as well as advancement in new

imaging techniques like computer-aided diagnosis, ultrasound imaging, computed tomography and laparoscopy^{3,10,15}. In this study, attempts had been made to compare the pre-operative diagnosis with per-operative findings so as to guide the practicing physicians to manage the cases of acute abdomen properly.

Patients and methods

This was a prospective observational study conducted in the Department of surgery of Bir Hospital and Patan Hospital (tertiary level hospitals) from August 2000 to January 2001 to compare the pre-operative diagnosis based on clinical examination and investigation with the operative diagnosis in acute abdomen. Total 102 patients of all ages and both sexes with clinical features suggestive of acute abdomen who underwent laparotomy were included in the study while traumatic acute abdomen and those patients managed conservatively were excluded. Total leucocyte count, differential leucocyte count, urinalysis and plain xray abdomen were done in all the patients on admission. Abdominal ultrasonography and serum amylase were done in

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selected groups of patients according to types of the 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-11.0 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

Out of 102 patients who underwent emergency laparotomy with the provisional diagnosis of acute abdomen 62% were male and 38% female.

Fig 1. Aetiology of acute abdomen (n=102)

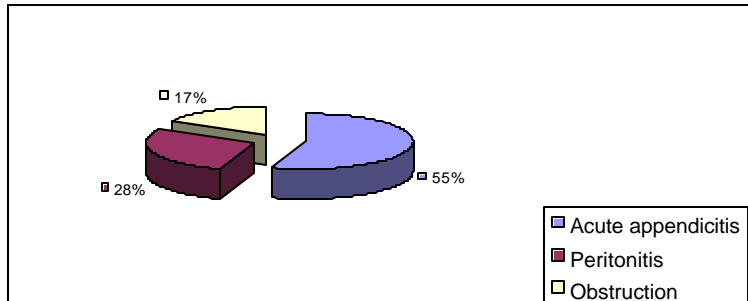
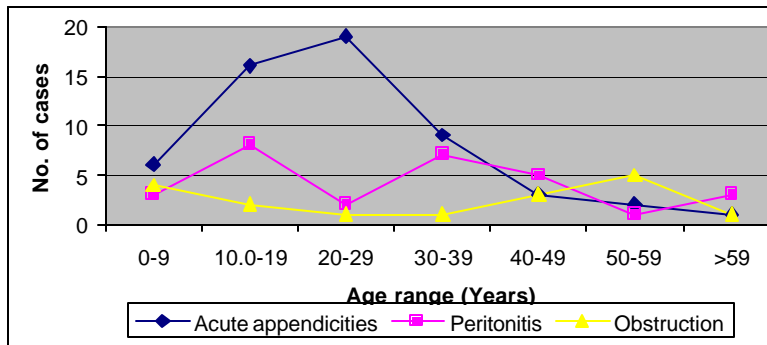


Fig 2. Aetiological distribution of acute abdomen by age (n=102)



Fifty five percent of the total patients of acute abdomen comprised of acute appendicitis, 28% peritonitis due to viscus perforation, and 17% of the cases had to bowel obstruction. Sixty seven percent

of the patients were of 10-30 years age, 10% were of less than 10 years age and 23% of patients were above 39 years age. Maximum numbers of patients (27%) were in age range 20-29.

Table1. Investigation performed to diagnose acute abdomen

Investigation (n=102)	Positive finding	% positive
TLC	71	69.6
DLC	76	74.5
Urinalysis	27	26.5
PAX	44	43.1
USG Abd	30	35.3

TLC= Total leucocyte count, DLC= Differential leucocyte count, PAX= Plain abdominal X-ray, USG Abd=ultrasound of abdomen

Total Leucocyte Count was found raised in 69.6% of patients and Differential Leucocyte Count in 74.5%. Urinalysis showed abnormality in 26.5% of patients whereas Plain abdominal X-ray was positive in 43.1% of patients. Abdominal Ultrasonography was

performed in 86 patients and 35.3% of reports had positive findings. Serum amylase was estimated in 29 patients and in 31.1% there was positive finding (>400U/L).

Table 2. Predictive values of investigations

	TLC	DLC	USG	PAX	Urine	Amylase
Sensitivity (%)	87	91.5	69.4	68.4	75.0	50.0
Specificity (%)	66.7	64.5	81.5	88.8	85.4	72.0
Pos pred value (%)	84.5	85.5	69.4	88.6	55.6	22.2
Neg pred value (%)	70.9	76.9	75.8	68.9	93.3	90.0

TLC= Total leucocyte count, DLC= Differential leucocyte count, PAX= Plain abdominal X-ray, USG Abd=ultrasound of abdomen

Differential Leucocyte Count had the highest sensitivity of 91.5% while serum amylase had the least sensitivity of 50%. Plain abdominal X-ray had the highest specificity while Differential Leucocyte Count had the lowest specificity of 64.5%. Plain abdominal X-ray had the highest positive predictive

value of 88.6% and serum amylase had the lowest positive predictive value of 22.2%. Urinalysis had the highest negative predictive value of 93.3% while Plain Abdominal X-ray had the lowest negative predictive value of 68.9%.

Table 3. Correct pre-operative diagnosis (n=102)

Pre-operative diagnosis	Correct pre-op diagnosis	% correct	P value
Acute Appendicitis (56)	46	82.1	0.003
Causes of Peritonitis (29)	20	69.0	0.002
Causes of Obstruction (17)	14	82.4	0.227
Total (102)	80	78.4	0.000

Highest diagnostic accuracy of 82.4% was seen with obstructive causes with no statistically significant difference (P=0.227). Lowest diagnostic accuracy of 69% was observed with causes of peritonitis. Acute appendicitis had the diagnostic accuracy of 82.1%. Overall diagnostic accuracy was 78.4%. There was statistically significant difference between the pre-operative and operative diagnosis (P=0).

Discussion

Accurate diagnosis of acute abdomen is still difficult despite improvement in clinical examinations and investigative procedures³. Acute surgical emergencies constitute 50% of all general surgical admissions and 50% of them are for acute abdomen, 50% of which require surgical intervention. If the diagnosis is in doubt it is advised to operate for exploration rather than wait and see. But this policy will definitely raise the unnecessary laparotomy rate and the morbidity^{4,5}.

The highest incidence of acute abdomen was seen in 20-29 years age group in our study, while in other studies it was seen in age group 10-30 years⁶. Acute appendicitis was the commonest cause of acute abdomen in this study, which comprised 55% of the

total patients. Viscus perforation peritonitis accounted for 28% of the total patients and bowel obstruction constituted 17% of the cause. In other studies also acute appendicitis was the commonest cause constituting 17% to 51% of acute abdomen, while other common causes were intestinal obstruction constituting 15% to 24% and viscus perforation comprising 8% to 12⁶.

Our study showed Total Leucocyte Count was moderately sensitive with low specificity. Differential Leucocyte Count was quite sensitive with very low specificity. In other studies Total Leucocyte Count was non-specific and relatively insensitive while Differential Count indicating a left shift increased the sensitivity. Thus neither test is sufficiently sensitive or specific to be a good predictor of surgical acute abdomen⁷.

Plain Abdominal X-ray has actual indication in less than 5% of patients with acute abdomen and can change the diagnosis and management of acute abdomen in up to 6%^{8,9,10}. It has most useful role in evaluating patient with mechanical obstruction of gastrointestinal tract. Routine and indiscriminate use of Plain abdominal X-ray is not recommended in the acute abdomen^{9,12}. In our study it had sensitivity of

68.4%, specificity of 88.8%, positive predictive value of 88.6% and negative predictive value of 68.9%. Our study showed urinalysis had high negative predictive value and specificity with low sensitivity and positive predictive value. Similar studies are not available though it is recommended for routine analysis in all patients evaluated for acute abdomen to rule out urinary tract infection, urinary calculi, diabetes mellitus and ectopic or normal pregnancy¹. Ultrasonography had very low sensitivity in our study but quite high specificity. In other study its diagnostic accuracy was as high as 95% in acute cholecystitis and 86% in acute appendicitis. In acute appendicitis it has 75% sensitivity but has 100% specificity. It is most useful in pregnant patients presenting with acute abdomen.

It is seen in other series that only 50% of the patients have same diagnosis on discharge, as on admission⁵ while our study had 78.4%, which was statistically significant. The reason could be as all the cases were seen by at least a consultant surgeon before the final diagnosis and decision to operate was made in our study. Diagnostic accuracy is about 80% with experienced clinician while younger doctors are right in 50%² while our study had highest accuracy in case of bowel obstruction and lowest with causes of peritonitis. Other study shows in at least 20% of cases decision to operate is uncertain¹⁰ and the surgeon must make a gamble to look and see rather than wait and see¹² and structured record forms had been found to improve diagnostic accuracy by 20%. Though negative laparotomy rate of as low as 7% to up to 22% are observed in literature^{10,15} in our series overall negative laparotomy rate was 17.6%, which was statistically significant. Highest rate of negative laparotomy was seen in patients of peritonitis and lowest with bowel obstruction. Acute appendicitis had 16% negative rate, which was statistically significant though negative appendicectomy rate of 15% to up to 30% are reported in other series^{11,12}.

Conclusion

Acute abdomen was nearly twice as common in males as in females and the age group with the highest incidence was 20- 29 years. Diagnostic accuracy of pathology for acute abdomen was 78.4%. It was highest in obstructive pathology and lowest in peritonitis due to viscus perforation. The overall negative laparotomy rate was 17.6%. It was highest with peritonitis due to viscus perforation (20.7%), and lowest in bowel obstruction (11.8%). Differential Leucocyte Count had the highest sensitivity and Plain abdominal X-ray with highest specificity and positive predictive value. Urinalysis showed the highest

negative predictive value. Acute appendicitis was the commonest cause of acute abdomen.

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