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A Comparative Analysis of Pre Operative and Operative Findings in Non Traumatic Acute Abdomen: A Prospective Observational Study

Prasad K[1] , Anil Kumar Patel[2], Suresh BP[3]

Author's Affiliation: [1]Assistant Professor, [3]Professor and HOD, Department of General Surgery, Subbiah Institute of Medical Sciences, Shivamogga, Karnataka 577201. [2]Senior Resident , Department of General Surgery, Shri Shankaracharya institute of Medical Sciences, Bhilai, Chhattisgarh 490020, India.

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Abstract

Background: Acute abdomen remains the important cause of morbidity and mortality in emergency. It requires careful history taking and thorough evaluation of symptoms, clinical examination and judicious use of radiological investigation which simplify the evaluation of disease.

Aim and Objectives: To assess the accuracy of radiological diagnosis in comparison to post-operative diagnosis in non-traumatic cases of acute abdomen.

Materials and Method: A prospective observational study of non-traumatic acute abdomen was carried out at Sahyadri Narayana Multispeciality Hospital, Shimoga, Karnataka. Total of 78 cases of acute abdomen patients were evaluated and operated over a period from December 2018 to February 2020 and included in the study group. Pediatric age group (12 years and below), traumatic cases (blunt and penetrating), acute abdomen in pregnancy and gynecological causes of acute abdomen, urological cases, and conservatively managed cases were excluded from the study. Detailed history was taken and relevant physical examination performed. All patients underwent hematological and biochemical investigations, appropriate radiological investigation (USG, AXR and CT-scan) were performed based on clinical suspicion. Clinical and radiological diagnosis based on clinical examinations and radiological investigations was compared with post-operative diagnosis based on operative findings.

Result: The most common age group was 20-60 years with male preponderance. Pain in abdomen was commonest symptom followed by vomiting, anorexia and fever. Tenderness was commonest clinical sign observed followed by rebound tenderness, tachycardia and guarding/rigidity. Acute appendicitis was the most common cause of acute abdomen followed by perforation peritonitis and intestinal obstruction. The overall diagnostic accuracy of clinical examination in acute abdomen was 81.8% and if radiological imaging techniques combined with this, the accuracy raised up to 94%.

Conclusion: The study strongly suggested that with thorough history taking and proper clinical examination, clinical diagnosis was successfully achieved in 82% of patients. Radiological investigations help in confirming clinical suspicions and giving added information of underlying pathology with accuracy of 94%.

Keywords: Abdomen Injury; Radiological Investigations; Trauma; Diagnostic Test; Perforation.

Corresponding Author: Anil Kumar Patel, Senior Resident, Department of General Surgery, Shri Shankaracharya institute of Medical Sciences, Bhilai, Chhattisgarh 490020, India.

E-mail: anilkashyap619@gmail.com
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Introduction

The term acute abdomen refers to signs and symptoms of abdominal pain and tenderness, a clinical presentation that often requires emergency surgical intervention. 'Acute abdomen' encompasses a range of trivial to life threatening surgical, medical and gynecological emergencies. These conditions often require hospital admission, investigation and treatment. Accurate diagnosis and management of patients with acute abdomen remains one of the most challenging tasks for surgeons. The wide range of causes and various spectrum of patient presentation present a formidable diagnostic and therapeutic challenge. Acute abdominal conditions encompass one of the few areas of medical practice where the surgeon often reaches a clinical diagnosis without resorting to radiologic investigations.[1]

Acute abdominal pain is one of the most frequently encountered symptoms in patients seeking emergency department attention and is the most common presenting complaint in patients with surgical diseases of the abdomen. Many medical and gynecological diseases also manifest as acute abdomen and to differentiate them at times is quite difficult. From the surgical point of view, acute abdominal pain is the cardinal symptom of acute abdomen.[2]

Despite availability of newer radiologic technologies including high-resolution CECT, USG and MRI, the physical examination remain a key part of a patient's evaluation and must not be minimized. In acute abdomen, a narrow and accurate differential diagnosis is possible in most patients at the conclusion of the history and physical examination.[1]

USG of the abdomen is a frequently advised investigation by the surgeon in case of acute abdomen. Advantages of USG over other radiological investigations is that it is easily available, cost effective, non-invasive, portable with no known side effects and requires minimal patient preparation.

Plain abdominal radiographs are of limited utility in the evaluation of acute abdominal pain. Although, they may be helpful (free intra-peritoneal air, calcified aortic aneurysm, air fluid levels in obstruction), other diagnostic studies are almost always indicated or perform better as the initial testing. If plain radiographs are utilized, the limitation must be appreciated.[4] Improvements in imaging techniques, especially multi-detector CECT, have revolutionized the diagnosis of the acute abdomen. The most difficult diagnostic dilemmas of the past, appendicitis in young 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.[1]

Accurate recording of the relevant facts is vital and a clear understanding of the anatomy and pathophysiology of intra-abdominal disease is necessary for both diagnosis and treatment. The immediate feedback that an emergency operation provides, on the accuracy and the adequacy of the pre-operative assessment and preparation is another reason why the patient with an acute abdomen is an important part of surgical training.[2]

In view of available literature, we decided to study the various clinical parameters which help to make a diagnosis and assess the accuracy of clinical diagnosis and radiological diagnosis in comparison to post-operative diagnosis in non-traumatic acute abdomen.

Objective

To assess the accuracy of radiological diagnosis in comparison to post- operative diagnosis in non-traumatic cases of acute abdomen.

Materials and Method

The study of non-traumatic acute abdomen was carried out at Sahyadri Narayana Multispeciality Hospital Shimoga. A total of 78 patients of non-traumatic acute abdomen were evaluated and operated over a period from December 2018 to February 2020 were included in the prospective observational study group. A total of 78 cases were selected for the purpose of the study based on the sample size alculated as shown below.

P= 89.6% (Clinical accuracy)5

Confidence level = 95%

Power = 80%

Absolute Precision = E = 10%

Inclusion criteria

Patients presented with acute abdomen who underwent surgery were included.

Exclusion Criteria

Pediatric age group (12 years and below)

Traumatic cases (blunt and penetrating)

Acute abdomen in pregnancy and gynecological causes of acute abdomen

Urological cases

Conservatively managed cases

The general data of patients regarding name, age, sex, religion, occupation, socioeconomic status & address was collected. The symptoms studied were pain, anorexia, vomiting, fever, constipation, diarrhea and lump in abdomen. Pain was the most important symptom recorded with special attention to duration, site, onset & progression. The nature of pain along with its intensity, aggravating and relieving factors were recorded. The associated symptoms like abdominal lump, nausea, vomiting, anorexia and fever were recorded.

The past, personal and family history were also recorded. In female patients, the menstrual history was recorded. A relevant general physical examination along with abdominal & systemic examination was done.

Appropriate laboratory investigations were done which included hemogram, kidney function tests, liver function tests, serum amylase and lipase, random blood sugar, serum lactate, coagulation study and blood grouping based on relevance to the clinical diagnosis. Cardio-pulmonary evaluation was done in patients more than 40 year of age and if necessary in those below 40 years.

On the basis of clinical suspicion, patients were subjected to radiological investigation like USG abdomen, AXR and CECT. The hemodynamic stability, appropriate nil by mouth status, Ryle's tube aspiration and adequate fluid resuscitation along with prior dosage of injectable broad spectrum antibiotics with operative consent was confirmed before subjecting the patient to surgery.

Surgical management was carried out based on the preoperative clinical-radiological diagnosis. The exact operative plan was decided by the operative findings and patient's clinical condition. In appropriate cases laparoscopic surgery was performed.

Data Collection Technique

Data was collected using structured questionnaire method. All patients presenting with acute abdomen who met inclusion criteria were included in the study. History and relevant physical examination was performed in all patients and recorded in the questionnaire. Hemogram, total leukocyte count, differential leukocyte count were done in all the cases whereas X-ray abdomen, ultrasound abdomen and CT-scan was performed in selected patients according to suspected disease. Pre-operative diagnosis based on clinical examinations and radiological investigations was compared with the operative findings. The final data was entered into Microsoft Excel software and the working master chart was made. Further statistical data and results were formulated from the master chart.

Data Analysis

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Graphical representation of data: MS Excel and MS word was used to obtain various types of graphs such as bar diagram, Pie diagram. Statistical software: MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

Results

The present study entitled was "A Comparative Analysis Of Pre Operative And Operative Findings In Non Traumatic Acute Abdomen : A Prospecctive Observational Study"Carried Out At Sahyadri Narayana Multispeciality Hospital,Shimoga, Karnataka. Total 78 patients meeting the inclusion criteria were selected for the study. The clinical details of patients in the study were entered in a specially prepared proforma . The analysis was done to study the various clinical parameters that help to make a clinical diagnosis and to assess accuracy of clinical and radiological diagnosis in comparison to post-operative diagnosis based on operative findings in non-traumatic case of acute abdomen.

Table 1: Clinical diagnosis wise distribution of case group.

Clinical Diagnosis	No of Cases	Percentage
Acute appendicitis	34	43.59%
Acute cholecystitis	11	14.10%
Acute mesenteric ischemia	2	2.56%
Acute Pancreatitis	1	1.28%
Enterocolitis	3	3.85%
Intestinal obstruction	11	14.10%
Perforation peritonitis	14	17.95%
Ureteric calculi	2	2.56%
Total	78	100.00%

The above table shows clinical diagnosis wise distribution among patients in study group. 34

out of 78 patients (43.59%) were diagnosed as acute appendicitis, 11 patients (14.10%) as acute cholecystitis p, 11 (14.10%) patients as intestinal obstruction, 14 (17.95%) patients as perforation peritonitis, 2(2.56%) patients as Acute mesenteric ischemia, 1(1.28%) patient as acute pancreatitis, 2 (2.56%) patients as ureteric calculi and 3(3.85%) patients diagnosed to have enterocolitis.

Table 2: Age wise distribution of cases in study.

Age (years)	Acute appendicitis	Acute Cholecystitis	Acute mesenteric Ischemia	Intestinal obstruction	Perforation peritonitis	Total no. of Cases	Percentage %
15-25	13	0	0	0	0	13	16.67
26-35	13	2	0	1	1	17	21.79
36-45	5	3	1	2	2	13	16.67
46-55	2	2	1	1	2	8	10.26
56-65	3	4	1	3	5	16	20.51
>65	0	1	2	4	4	11	14.10
Total	36	12	5	11	14	78	100%

Above table shows age wise distribution of patients in the study group. Out of 78 patients, thirteen patients (16.67%) were in the age group of 15- 25 years and all of them had acute appendicitis. Seventeen patients (21.79 %) were in age group 26-35 years. Among them, 13 patients had acute appendicitis, 1 patient had perforation peritonitis, and 2 patients had acute cholecystitis and 1 patient had intestinal obstruction. Thirteen patients (16.67 %) were in the age group of 36-45 years; among them 5 patients had acute appendicitis, 3 patients had acute cholecystitis, 2 patients had perforation peritonitis, 2 patients had intestinal obstruction and 1 patient had acute mesenteric ischemia.

Eight patients (10.26%) in the age group of 46 to 55 year, among them, 2 patients had acute appendicitis, 2 patient had perforation peritonitis, 1 patient had intestinal obstruction, 1 patient had acute mesenteric ischemia and 2 patient had acute cholecystitis. Sixteen patients (20.51%) in the age group of 56 to 65 years, among them, 3 patients had acute appendicitis, 5 patients had perforation peritonitis, 3 patients had intestinal obstruction, 4 patients had acute cholecystitis and 1 patient had acute mesenteric ischemia.

Eleven patients (14.10%) were in the age group above 65 years, among them, 1 patients had acute cholecystitis, 4 patients had perforation peritonitis, 4 patients had intestinal obstruction and 2 patients had acute mesenteric ischemia.

Table 3: Gender wise distribution of patients in the study.

Gender	No of Cases	Percentage
Male	42	53.85%
Female	36	46.15%
Total	78	100%

The above table shows gender wise distribution of patients in the study group. 36 patients (46.15 %) were male and remaining 42 patients (53.85 %) were female.

Table 4: AXR erect wise distribution of patients.

	Total Case	Done	Positive		Negative	
			No of Cases	Percentage	No of Cases	Percentage
Acute appendicitis	36	0	0	0	0	0
Perforation peritonitis	14	14	13	92.86	1	7.14
Intestinal obstruction	11	11	11	100%	0	0
Acute cholecystitis	12	0	0	0	0	0
Acute mesenteric ischemia	5	4	0	0	4	100%

The above table shows AXR diagnosis wise distribution among patients in study group. AXR was done in relevant patients with a clinical diagnosis of peritonitis and intestinal obstruction. AXR was done in 29 out of 78 patients.

When compared to the final operative diagnosis, AXR correctly diagnosed 13 out of 14 patients (92.86%) of perforation peritonitis and all 11 patients (100%) of intestinal obstruction. AXR findings in all 4 patients of acute mesenteric ischemia were inconclusive.

Table 5: USG wise distribution of patients.

	Total Case	Done	Positive		Negative	
			No of Cases	Percen-tage	No of Cases	Percen-tage
Acute appendicitis	36	36	31	86.12	5	13.78
Perforation peritonitis	14	1	0	0	1	100
Intestinal obstruction	11	4	3	75	1	25
Acute cholesystitis	12	12	12	100%	0	0
Acute mesenteric ischemia	5	3	0	0	3	100

The above table shows USG diagnosis wise distribution among patients in study group. USG was done in 56 out of 78 patients. When compared to the final operative diagnosis, USG correctly diagnosed 32 out of 36 patients (86%) of acute appendicitis, 3 out of 4 patients (75%) of intestinal obstruction and all 12 patients (100%) of acute cholecystitis. In all 3 patients of acute mesenteric ischemia USG findings were inconclusive.

Table 6: Diagnostic Acuracy of radiological Diagnosis on comparision with clinical diagnosis.

Radiological Diagnosis	Diagnostic accuracy as compared with post-operative diagnosis
Acute Appendicitis	97.22%
Acute Cholecystitis	100%
Intestinal Obstruction	100.00%
Perforation peritonitis	92.86%
Overall	94%

Above table shows correlation between radiological and post-operative diagnosis in the study group. Accuracy of radiological diagnosis in diagnosing acute appendicitis in comparison with post-operative diagnosis was 97.22%, 92.86% for diagnosing perforation peritonitis, 100% for diagnosing acute cholecystitis, 100 % for diagnosing intestinal obstruction, 80% for acute mesenteric ischemia and overall was 94%.

Discussion

Acute abdomen encompasses a significant number of emergency admissions. An early diagnosis and prompt treatment is paramount for a successful management. Accurate diagnosis of non- traumatic acute abdominal diseases is challenging but can be achieved by detailed history, proper clinical examination and judicious use of appropriate radiological investigations.[1]

A prospective observational study was carried out to study the various clinical parameters that help to make a clinical diagnosis in non-traumatic cases of acute abdomen and to study the accuracy of clinical examination and radiological investigations. We confirmed the accuracy of clinical and radiological diagnosis by operative findings. Hence, only patients who underwent surgical procedure were included and formed the basis of this study.

Acute appendicitis is relatively rare in infants and becomes increasingly common in childhood and peaks in early adult life. After middle age, the risk of developing appendicitis is quite small 74. In our study acute appendicitis was commonly seen in age group of 15 to 45 years (31 out of 36 patients). Acute cholecystitis was commonly seen in age group of 36 to 65 years (9 out of 12 patients) and perforation peritonitis, intestinal obstruction and acute mesenteric ischemia were predominantly seen in the elderly age group (19 out of 30 patients were > 55 years age).

Similar results were observed in the study done by Batra et al[6] where most common age group of acute abdomen was 26-35 years, while another study done by Sabhnani and Tomar 7 also reported most common age group for acute abdomen as 21- 40 years. In another study of Reddy et al 8 and Arora et al 5 the predominant age group for acute abdomen was 21-30 years. In a study done by Samir et al 74, acute appendicitis was common in middle age group and perforation peritonitis, intestinal obstruction were common in old age group.

In our study out of 78 patients, 42 (53.85 %) were males and 36 (46.15%) were females.Similar findings were reported in other studies on acute abdomen done by Reddy et al[8] and Batra et al.[6] Another study done by Kumar et al[2] also reported more number of male patients than female with a ratio of 2.74:1. In another large study of 125 patients of acute abdomen done by Arora et al[5], majority of patients were male.

In our study, AXR was done in 29 out of 78 patients who were suspected to have perforation peritonitis or intestinal obstruction on clinical examination. In 13 out of 14 (92.86%) patients of perforation peritonitis, AXR showed air under diaphragm which was suggestive of perforation peritonitis. One patient with sealed rectal perforation was missed on AXR. All patients (11 out of 11 patients, 100%) of intestinal obstruction were correctly diagnosed on AXR.

The selection of imaging studies to evaluate abdominal pain should be guided by differential

diagnoses generated from clinical examination. AXR is usually the first imaging modality chosen for diffuse abdominal pain. It can be obtained rapidly and at a relatively low cost. The location, volume, and distribution of intraluminal air, the presence and distribution of air–fluid levels, and the luminal diameter can often be helpful in diagnosing intestinal obstruction. The ability of plain films to detect free air depends on the volume of free air within the peritoneal cavity.

Sensitivity is maximized, if the patient is placed in the upright or decubitus position for 5 to 10 minutes before obtaining an upright chest or lateral decubitus film, thereby allowing small volumes of air to redistribute to and collect within nondependent areas. Volumes as small as 1 to 2 cm3 of air have been reported using this method.[9,10]

In a study done by Reddy et al 8, accuracy of AXR was 94.11% (16 out of 17) for perforation peritonitis and accuracy for intestinal obstruction was 100% (2 out of 2 patients). In another study done by Kumar et al 2 could successfully diagnose all patients of perforation peritonitis and intestinal obstruction on AXR. In study done by Momin et al[11] overall AXR were found to be accurate in 87.80% of cases. In study done by Arora et al 5 highest accuracy of AXR was found in cases of obstruction (87.5%).

In our study, USG abdomen and pelvis was the commonest radiological investigation performed and was done in 56 out of 78 patients. We performed USG mainly in suspected patients of acute appendicitis and acute cholecystitis. USG correctly identified 31 out of 36 (86.12%) patients of acute appendicitis. In fuve patients (13.78%) of appendicitis, diagnosis was missed on USG. three out of these 5 patients had retro-caecal appendicitis and 2 patients were obese. These are well-known limitation of USG, in obese patients screening is suboptimal and deep seated pathologies like retro-caecal appendicitis can be missed on USG.[12]

Results observed in study done by Arora et al[5] where overall diagnostic accuracy of USG was 75.2% and highest accuracy of USG was present in cases of appendicitis up to 90.19%. In study done by Kumar et al[2] USG was done in 41(68.34%) patients of acute abdomen, out of these 39 patients (96.6%) had positive findings on USG. In study done by Reddy et al[8] USG was done in 33 patients and it had positive findings in 30 patients. Another study done by Momin et al, 66 USG was found to be accurate in 94% of patients. The Accuracy of radiological diagnosis for acute abdomen over post-operative diagnosis in detecting acute appendicitis was 97.22%, 92.86% for diagnosing perforation peritonitis, 100 % for diagnosing acute cholecystitis, 100 % for diagnosing intestinal obstruction, 80% for acute mesenteric ischemia and overall radiological accuracy was 94%.

Results observed in study done by Reddy et al 8 shows radiological diagnostic accuracy in diagnosing acute appendicitis over postoperative was 95%, 83.3% for diagnosing perforation peritonitis, 93.3% for diagnosing intestinal obstruction. In study, done by Batra et al[6] radiological diagnostic accuracy in diagnosing acute appendicitis in comparison to postoperative was 94.12%, 92.86% for diagnosing perforation peritonitis, 92% for diagnosing intestinal obstruction and overall was 90.48%. Kumar et al[2] observed in their study that the radiological diagnostic accuracy rates for acute appendicitis were 95%, 83.3% for peritonitis and 93.3% for intestinal obstruction. In study done by Sabhnani and Tomar, 7 overall radiological diagnostic accuracy was 93.33%.

Conclusion

Majority of the cases were in the age group of 20-60 years with male preponderance. Commonest presenting symptom of non-traumatic acute abdomen was abdominal pain, presented in all patients followed by vomiting, anorexia, and fever. Commonest clinical sign was tenderness, present in almost all patients, followed by rebound tenderness, tachycardia and guarding/rigidity. Most common diagnosis was acute appendicitis, followed by perforation peritonitis, intestinal obstruction. The study strongly suggested that with thorough history taking and proper clinical examination, clinical diagnosis was successfully achieved in 82% of patients. Radiological investigations help in confirming clinical suspicions and giving added information of underlying pathology with accuracy of 94%.

References

1. Squires RA, Postier RG. Acute abdomen. Sabiston Textbook of Surgery. 19th ed. Philadelphia, PA: Elsevier Saunders. 2012;47(2):1141-59.
2. Kumar AJ, Porwal R, Sharma AK, Singh RK, Kumar V, A comparative study of pre- operative with operative diagnosis in acute abdomen, Indian Journal of Basic and Applied Medical Research; September 2016: 5(4): 399-405
3. Prasad H, Rodrigues G, Shenoy R. Role of Ultrasonography In Non Traumatic Acute Abdomen. The Internet J Radiol. 2006; 5:2-15.
4. Smith JE, Hall EJ. The use of plain abdominal x ray

in the emergency department. Emerg Med J 2009; 26:160-163.

5. Arora B, Gupta A, Nandi S, Sarwal A, Goyal P, Gogna S, Karwasra RK. Comparative analysis of clinical, radiological and operative findings in acute abdomen. International J Enhanced Res Med Dental Care. 2015;2(1):1590-2349.
6. Batra G, Athavale VS, Tonape T, Athavale PB, Rege I, Batra P, Non- Traumatic Acute Abdomen A Comparative Analysis of Clinical, Radiological, and Operative findings, Int J of Scientific research.2016;5(11):243-245.
7. Sabhnani G, Tomar S. Negative laparotomy rates in acute abdomen: a declining trend. International Surgery Journal. 2016 ;4(1):323-5.
8. Reddy K, Kumar M, Khullar V, Ramesh TP, hindananda KV, Praneeth. "Acute Abdomen(Atraumatic) : A Comparative Analysis of Clinical, Radiological And perative Findings in A Rural Setup." I SR ournal of Dental and Medical Sciences (IOSR-JDMS) .2017;16(9):34-38.
9. Billittier AJ, Abrams BJ, Brunetto A. Radiographic imaging modalities for the patient in the emergency department with abdominal complaints. Emergency Medicine Clinics. 1996;14(4):789-850.
10. Van der Linden W, Sunzel H. Early versus delayed operation for acute cholecystitis: a controlled clinical trial. The American Journal of Surgery. 1970 ;120(1):7-13.
11. Momin RS, Azhar MA, Hussain S. Clinical and radiological diagnosis in acute abdominal emergencies. Journal of Evolution of Medical and Dental Sciences-JEMDS. 2015;4(65):11308-15.
12. Jeffrey Jr RB. In patients with right lower quadrant pain, is sonography or CT the preferred imaging technique for initial evaluation?. AJR. American journal of roentgenology. 1995;164(6):1547-8.