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Diagnostic Role Of Ultrasononography In Non-Traumatic Acute Abdominal Emergency

[1]Dr. Manasvi Sinha, [2]Dr. Rohit Yadav, [3]Dr. Udita Wadhwani,
[1]3rd Year Resident, [2]Assistant Professor, [3]Senior Resident,
Department of Radiodiagnosis,
American International Institute Of Medical Sciences, Udaipur, Rajasthan, India,313001

***Corresponding Author:**
Dr. Manasvi Sinha
Awadh Kunj, Road no-6A, Rajendra Nagar, Patna, Bihar -800016

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Abstract

Background: The most common reason for emergency admissions is acute abdominal pain. It usually refers to presence of severe abdominal pain developing suddenly, over a period of several hours.

Material and methods: It was a prospective study carried out in the department of radiodiagnosis in American International Institute Of Medical Sciences. In this study 200 patients were taken with complaints of severe abdominal pain except those with a history of trauma or with a history of chronic abdominal pain. Clinical history, physical examination, ultrasonography, other imaging methods were used to come to a final conclusion.

Results: In our study of US evaluation, diagnosis was given in 179/200(89.5%) cases and in rest of the 21/200(10.5%) cases, US was inconclusive. Most common diagnosis given were KUB calculus, acute appendicitis and acute cholecystitis seen in 45/200(22.5%), 36/200(18%) and 26/200(13%) respectively. GIT system was most commonly involved, in 101/200 cases (50.5%). Others systems involved were KUB 48/200(24%), biliary 32/200(16%), peritoneal 14/200(7%) and genital 5/200(2.5%). Most common three diagnoses were KUB calculus, acute appendicitis and acute cholecystitis seen in 45/200(22.5%), 36/200(18%) and 26/200(13%) respectively.

Conclusion: USG is more accurate and it is cheap, non-invasive, reliable, simple to perform and can be repeated as and when required. Ultrasonography is superior in organ system imaging. It helps in showing organ specific lesions and its accurate measurement which is helpful in follow up and response to treatment.

Keywords: Acute abdomen, ultrasound, non -traumatic

Introduction

The term acute abdomen defines a clinical syndrome characterized by abdominal pain of sudden onset developed over a period several hours requiring surgical or medical treatment [(1)]. It usually refers to presence of severe abdominal pain developing suddenly, over a period of several hours[(2)]. However condition that present with clinical features of short duration (few days, usually 3-5) which might indicate a progressive intra-abdominal condition that is threatening to patient`s life or capable of causing severe morbidity are also sometimes included in acute abdomen[(3)]. Acute abdomen does not invariably signify the need for surgical intervention. A good history, thorough clinical examination, laboratory investigations and imaging studies are necessary in order to arrive at a correct diagnosis, so that appropriate management can be done. The spectrum of non-traumatic acute abdomen is broad and varies according to referral and demographic patterns[(4)].

US have been largely used in clinical practice and in protocol of investigation of non-traumatic acute abdomen pain. US are easily available, lack of radiation and have revolutionized the diagnosis of

many acute intra-abdominal conditions[5]. It is a high-resolution imaging technique. Other advantage is the Doppler ultrasound, which allows visualization of blood low and assessment of low dynamics[1]. Inappropriate use of ultrasonography in the assessment of acute abdominal pain can lead to an increase in the workload of the personnel involved, prolonged inpatient stay, possible delay in treatment , and increased hospital costs[6].

Though CT scan has been shown to increase the referring physician`s level of certainty in the diagnosis, reduce hospital admission rates, and help in guiding the therapeutic strategy, including surgical intervention, it is more expensive, has radiation hazards, not widely available especially in rural settings, non-portable and require certain prerequisites especially the contrast enhanced CT [7,8].

Magnetic Resonance (MR) Imaging and diagnostic laparoscopy are also available, but they are used far less frequently for initial diagnostic workup.

The purpose of laboratory tests and radiological examination is to confirm or exclude diagnostic possibilities that are being considered based on a proper history and physical examination. The main goal of imaging in acute abdomen is to narrow down the differential diagnosis and for prompt treatment[1].

The main aim of this study is to analyze the accuracy of ultrasonography in the diagnosis and further management of the patients.

Methods:

This was a prospective study of 200 patients carried out at a tertiary hospital in Udaipur during a period of Three months. Patients were subjected to routine haematological, urine examination and biochemical estimations. All the 200 admitted patients were examined in the ward and provisional clinical diagnosis was made by the information obtained from clinical history and physical examination. Simultaneously, routine laboratory and radiological investigations were carried out.

Inclusion Criteria:

All the patients, with non- traumatic acute abdominal emergencies with provisional clinical diagnosis referred to Department of Radiology and Imaging for further evaluation were included for the study.

Exclusion Criteria:

1. Patients with abdominal trauma.
2. Patients with suspected or confirmed pregnancy.
3. Already radiologically diagnosed patients.

All the procedures were done with patient`s prior written informed consent and confidentiality was taken care of in all the cases. All the included patients were imaged with using Philips Affinity 50 ultrasound machine, with curvilinear, linear and TVS probes as per case need with reports given in emergency itself.

Data collected from routine investigations was used to reach a reasonable provisional diagnosis. Following this, all the patients were examined by radiologists. With co-relation of clinical history, physical findings and ultrasonographic findings, ultrasonographic diagnosis was made. Out of the 200 patients, 86 patients were managed conservatively while the rest 114 patients were operated at appropriate time. Operative findings were noted. Final diagnosis was made after the surgery. Comments on individual cases were noted.

Results:

Most of the patients were in age group of 41-50 years (Table1). Male to female ratio is 1.59 with 123 males and 77 females (figure 1).

Table 1: Distribution by age group

Age group (in years)	No. of cases
0-10	7
11-20	17
21-30	39
31-40	43

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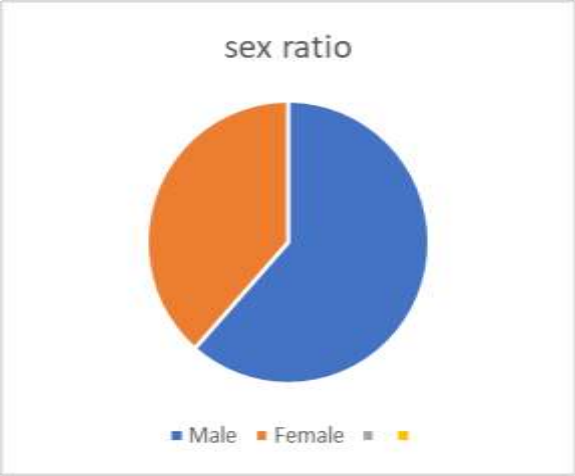
41-50	48
51-60	17
61-70	13
71-80	10
81-90	6

Figure: Sex ratio



Most common clinical complaint of patients was abdominal pain (localized or diffuse) present in 100% cases followed by vomiting, fever, abdominal distension and diarrhoea seen in 17.5% (35/200), 13.5% (27/200), 11.5% (23/200) and 5% (10/200) cases respectively (Table 2).

Table 2: Presenting complains:

Associated complaints	No. of cases	% of cases
Vomiting	35	17.5
Fever	27	13.5
Abdominal distension	23	11.5
Diarrhoea	10	5

107/200(53.5%) cases were sent with the provisional clinical diagnosis and 93/200(46.5%) cases had no provisional clinical diagnosis/ non-specific diagnosis. Most common provisional clinical diagnosis was ureteric colic given in 22/200 patients i.e. 11% cases. Second and third common clinical diagnoses were renal colic and acute gastroenteritis given in 17/200 patients (8.5%) and 15/200 patients(7.5%) respectively(Table 3).

Table 3: Provisional clinical diagnosis.

Clinical diagnosis	No. of cases	% of cases (out of 200)
No clinical diagnosis given	93	46.5%
Clinical diagnosis given	107	53.5%

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Ureteric colic	22	11%
Renal colic	17	8.5%
Acute appendicitis	10	5%
Acute gastroenteritis	15	7.5%
Acute cholecystitis	8	4%
Acid peptic disease	7	3.5%
Acute pancreatitis	11	5.5%
Sub-acute intestinal obstruction	14	7%
Torsion of ovarian cyst	3	1.5%

Ultrasonographic Evaluation:

Diagnosis was given in 179/200(89.5%) cases and in rest of the 21/200(10.5%) cases, USG was inconclusive. Most common diagnoses given were KUB calculus disease with proximal system dilation, acute appendicitis and acute cholecystitis seen in 45/200(22.5%), 31/200(15.5%) and 26/200(13%) cases respectively. No false positive case was seen.

However, there were 21 false negative cases (10 acid peptic disease, 5 appendicitis, 2 gastroenteritis, 3 acute pancreatitis and 1 epiploic appendagitis) (Table 4). The patients were managed as per case need with conservative, conservative followed by surgical and emergency surgical management done in 98/200(49%), 23/200(11.5%), 79/200(39.5%) cases respectively(Table 5).

Table 4: Ultrasonography evaluation in Diagnosis of Disease.

Provisional diagnosis given by USG	No of cases	% of cases
Normal USG	21	10.5%
Provisional diagnosis given	179	89.5%
KUB system calculus disease	45	22.5%
- Renal calculus with hydronephrosis	11	5.5%
- Calculus at PUJ with proximal hydronephrosis	9	4.5%
- Ureteric calculus with proximal hydroureteronephrosis	18	9%
- Calculus at VUJ with proximal hydroureteronephrosis	7	3.5%
Ureteric stricture	2	2%
Acute pyelonephritis	1	0.5%
Acute cholecystitis	26	13%
- Acute cholecystitis with cholelithiasis	17	8.5%
- Acalculus acute cholecystitis	9	4.5%
CBD pathology	6	3%
- Choledocholithiasis	6	3%

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Acute appendicitis	31	15.5%
- Acute appendicitis	24	12%
- Perforated appendicitis	7	3.5%
Acute pancreatitis	15	7.5%
- Early acute pancreatitis	11	5.5%
- Pancreatic pseudocyst	4	2%
Small bowel obstruction	10	5%
Chronic constipation with acute abdominal distension due to large bowel dilation	1	0.5%
Inflammatory bowel disease	1	0.5%
Intussusception	9	4.5%
Bowel tuberculosis	12	6%
Peritonitis	14	7%
- Non-Tubercular peritonitis	13	6.5%
a. Acute peritonitis without small bowel ileus or obstruction	6	3%
b. Acute peritonitis with small bowel obstruction	5	2.5%
c. Acute peritonitis with small bowel ileus	2	1%
- Tubercular peritonitis	1	0.5%
Ovarian hemorrhagic cyst	5	2.5%
Thrombosis in SMA	1	0.5%

Table 5: Management

Management	No. of cases	% of cases
Conservative	98	49%
Conservative followed by surgical	23	11.5%
Emergency surgical	79	39.5%

Final diagnosis was made based on clinical examination, radiological workup, biochemical tests, medical management with follow-up, and surgical findings. GIT system was most commonly involved, in 101/200 cases (50.5%). Others systems involved were KUB 48/200(24%), biliary 32/200(16%), peritoneal 14/200(7%) and genital 5/200(2.5%). Most common three diagnoses were KUB calculus, acute appendicitis and acute cholecystitis seen in 45/200(22.5%), 36/200(18%) and 26/200(13%) respectively (table 6).

Table 6: Final diagnosis

System	Final diagnosis	Cases	%

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KUB system		
1. Calculus Disease	45	22.5%
- Renal calculus with hydronephrosis	11	5.5%
- Calculus at PUJ with proximal hydronephrosis	9	4.5%
- Ureteric calculus with proximal hydroureteronephrosis	18	9%
- Calculus at VUJ with proximal hydroureteronephrosis	7	3.5%
2. ureteric stricture	2	2%
3. Acute pyelonephritis	1	0.5%
GIT system		
Acute appendicitis	36	18%
- Acute appendicitis	26	13%
- Perforated acute appendicitis	10	5%
Acute pancreatitis	18	9%
- Early acute pancreatitis	14	7%
- Pancreatic pseudocyst	4	2%
Small bowel obstruction	10	5%
Chronic constipation with acute abdominal distension due to large bowel dilation	1	0.5%
Inflammatory bowel disease	1	0.5%
Intussusception	9	4.5%
Acid peptic disease	10	5%
Epiploic appendagitis	1	0.5%
Acute gastroenteritis	2	1%
SMA thrombosis	1	0.5%
Bowel tuberculosis	12	6%
Biliary system		
Acute cholecystitis	26	13%
- Acute calculus cholecystitis	17	8.5%
- Acute acalculus cholecystitis	9	4.5%
CBD pathology	6	3%
- choledocholithiasis	6	3%
Peritoneum		
1. Non tubercular peritonitis	13	6.5%

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- Acute peritonitis without small bowel ileus or obstruction	6	3%
- Acute peritonitis with small bowel obstruction.	5	2.5%
- Peritonitis with small bowel ileus	2	1%
2. Tubercular peritonitis	1	0.5%
Genital system		
Ovarian hemorrhagic cyst	5	2.5%

In this study ultrasonography was diagnostic in 89.5% of patients. 13 patients were misdiagnosed and in 8 patients other investigations were required for confirmation of diagnosis(Table 7).

Table 7: Diagnostic Accuracy of Ultrasonography in Acute Abdominal Condition.

USG	No. of patients	Percentage
Diagnostic	179	89.5%
Mis – diagnostic	13	6.5%
Other investigations required	8	4%

Discussion:

In this study, the ultrasonographic diagnosis in case of renal calculus, Cholecystitis, choledocholithiasis, peritonitis, Intussusception, and ovarian cyst was 100% and in acute appendicitis and acute pancreatitis it was 86% and 83% respectively. Ultrasonography is highly accurate in gall bladder conditions. The sensitivity of ultrasonography in diagnosing pancreatic conditions is 83%. In cases of gastritis, no specific pathology was found on ultrasonography. In mesenteric lymphadenitis, ultrasonography accurately diagnosed the condition and all patients were managed accordingly. In appendicitis, it gave an accurate diagnosis in 86% cases. There are a few studies which have looked at the various parameters we analyzed. Walsh et al 9, while evaluating the role of immediate USG in acute abdomen showed that USG was more informative than plain X-Ray in 40% of their cases. Al Ajerami10 in his study on acute appendicitis found the overall sensitivity and specificity of ultrasound, using surgical outcome as the gold standard, to be 84.8% and 83.3% respectively. Allemann et al11 reported that in USG done by surgeons for patients with acute abdominal pain the correct diagnostic rate from 348 patients (70%) to 414 patients (83%). In the same study, USG was found to have a sensitivity and specificity of 94% and 99% in 5 diagnosing biliary tract disease. Mishra et al12 in their study of imaging for acute abdomen had 13 cases of appendicitis. USG was diagnostic in 11 with sensitivity and specificity of 91.6% and 97%. Zoller et al13 in their meta analysis demonstrated that USG has sensitivity of 85% and a 8 specificity of 96% in diagnosing acute appendicitis. Mc Grath et al14 in their study on the role of early USG in the management of the acute abdomen concluded that it is most useful in the diagnosis of gynecological disorders. Manfredi et al15 concluded that USG in acute pancreatitis is a good screening test in patients with suspected biliary pancreatitis and a mild clinical course but contrast enhanced CT is preferred for patients with acute pancreatitis.

In our study of US evaluation, diagnosis was given in 179/200(89.5%) cases and in rest of the 21/200(10.5%) cases, US was inconclusive. Most common diagnosis given were KUB calculus, acute appendicitis and acute cholecystitis seen in 45/200(22.5%), 36/200(18%) and 26/200(13%) respectively. No false positive case was seen. However , there were 21 false negative cases (10 acid peptic disease, 5 appendicitis, 2 gastroenteritis, 3 acute pancreatitis and 1 epiploic appendagitis). These cases were diagnosed as follows {a). Acid peptic disease :

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Clinical , Laboratory and Endoscopic findings, b).Acute appendicitis: CECT Abdomen and confirmed Post operatively, c). Acute Pancreatitis : laboratory findings, d). Epiploic Appendigitis: CECT Abdomen , e). Acute Gastroenteritis: Laboratory findings}.

Ultrasonography also diagnosed 100% cases of peritonitis(14/14), small bowel obstruction (10/10), CBD pathology(6/6) , bowel tuberculosis(12/12) , intussusception(9/9), SMA thrombosis(1/1) and ovarian hemorrhagic cysts(5/5).

As per present study we agreed that USG remains the superior diagnostic modality diagnosing most of the acute abdominal emergencies with significant accuracy. The patient were managed as per case need with conservative, conservative followed by surgical and emergency surgical management given in 98 (49%), 23(11.5%) and 79(39.5%) respectively. Karmakar S et al prospective study showed that 72% patients required emergency operations, either in the form of laparotomy or appendicectomy16.

Final diagnosis was made on clinical examination, Radiological workup , Biochemical tests, Medical management with follow-up, surgical findings. GIT system was most commonly involved, in 101/200 cases (50.5%). Others systems involved were KUB 48/200(24%), biliary 32/200(16%), peritoneal 14/200(7%) and genital 5/200(2.5%). Most common three diagnoses were KUB calculus, acute appendicitis and acute cholecystitis seen in 45/200(22.5%), 36/200(18%) and 26/200(13%) respectively.

Conclusion:

This study demonstrate that in the diagnosis of acute abdomen, USG is more accurate. It is cheap, non-invasive, reliable, simple to perform and can be repeated as and when required. Ultrasonography is superior in organ system imaging. It helps in showing organ specific lesions and its accurate measurement which is helpful in follow up and response to treatment. Ultrasonography is also helpful in diagnosing alternative disease and to reduce negative surgical rate, so that unwanted laparotomies can be avoided.

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