

## A Prospective Clinicosonographic Study of Acute Abdomen

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### Abstract

**Background:** The acute abdomen is the main term for an unclear emergency situation of the abdominal cavity. The acute abdomen is an important reason for the admission of patients into the emergency room. In certain situations, abdominal pain may be a symptom of a severe, life-threatening disease process, which can be managed properly with help of clinical examination and ultrasound. In this study we take up the how the clinical examination and ultrasound help us to reach a final diagnosis and manage the cases accordingly.

**Aim and Objective:** 1. Evaluate the diagnostic accuracy of ultrasound on acute abdomen and the way the ultrasound examination contributes to the diagnosis.

2. Evaluate under which circumstances ultrasonographic diagnosis of the acute abdomen, considering medical and economical quality classifications, the alternative choice to comparable diagnostic measures.

**Patients and Methods:** Eighty patients attended and admitted to the M K C G Medical college and Hospital, Berhampur, Ganjam, Odisha, India from November 2020 to June 2022 were included in the study. Patients undergone detail clinical examination, X-Ray, Ultrasound and CT scan, the final diagnosis was made and accordingly managed.

**Results:** Out of 80 cases of clinically diagnosed acute abdomen, 73 cases were diagnosed as having one or other pathology by ultrasound examination and in 7 cases, the ultrasound shows normal study which were further evaluated by X ray and contrast enhanced CT. Of the 73 cases, the ultrasound diagnosis of 62 cases coincided with clinical diagnosis.

In the present study, the final diagnosis of 16 cases was acute appendicitis but, 20 cases were provisionally diagnosed clinically. Out of which the ultrasound examination confirmed the diagnosis of 15 cases. Total number of clinically diagnosed peritonitis cases were 20, in which ultrasound examination confirmed the diagnosis in 17 cases. The number of clinically diagnosed cases of acute cholecystitis were 6, in which ultrasound confirmed the diagnosis in 5 cases. The number of clinically diagnosed acute intestinal obstruction were 10 and the ultrasound confirmed 8 cases. The number of cases clinically diagnosed blunt injury peritonitis were 10, and ultrasound confirmed in all cases. Out of 10 cases the ultrasound examination shows hollow viscus perforation in 6 cases and solid organ injury in 4 cases. The number of cases clinically diagnosed liver abscess were 2 and which were confirmed on ultrasound.

**Conclusion:** The acute abdomen is a syndrome of sudden onset that affects the abdominal and pelvic cavity and is generally accompanied by pain and other abdominal symptoms. Its severity and propensity for rapid progression demand prompt, systemic evaluation and in many cases surgical intervention. The evaluation of a patient with an acute abdominal pain requires an understanding of the aetiology and clinical symptoms and signs that may lead to the diagnosis of an acute abdomen.

In the process of diagnosis of acute abdomen first and foremost importance is given to clinical diagnosis, based on history and thorough clinical examination. Ultrasound is the sole diagnostic modality in conditions where the diagnosis could not be made on the basis of clinical examination (head injury, unconscious patients, mentally ill patients)

Liberal use and a clinical approach are the key points in Sonography of acute abdomen. Sonography is a variable tool to lower both the number of unnecessary laparotomies and the technique related to surgical delay.

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## Introduction

The acute abdomen is the main term for an unclear emergency situation of the abdominal cavity. The acute abdomen is an important reason for the admission of patients into the emergency room. Further, this illness ranks 40% of all consultations in the emergency care sector [1]. The syndrome of acute abdominal pain generates a large number of hospital visits and may affect the very young, the very old, either sex, and all socioeconomic groups [2]. In certain situations, abdominal pain may be a symptom of a severe, life-threatening disease process, whereas in other situations, it may be a symptom of a more benign underlying condition [3].

Usually, though by no means always, there are other symptoms which accompany the pain, but in majority of the cases of acute abdominal disease, pain is the main symptom and complaint. The very terms ACUTE ABDOMEN and ABDOMINAL EMERGENCY which are constantly applied to such cases, signify the urgent need for prompt diagnosis and active treatment.

It is common knowledge however, that when confronted with a patient suffering great abdominal pain it is often very difficult to be certain as to the exact intra-abdominal lesion which has given rise to

symptoms. In some instances, the urgent need for surgical assistance may be so obvious that the need for transference of the patient to a surgical centre is clear. In other cases, the observer may, if in doubt, think it discreet to discuss the problem with a fellow practitioner before deciding any course of action.

The proper management of patients with acute abdominal pain requires a timely decision about the need for surgical operation. This decision requires evaluation of the patient's history and physical findings, laboratory data and imaging tests. The acute abdomen requires an early and direct diagnosis because of its potential of having a life-threatening differential diagnosis.

Ultrasound plays an important role in the diagnosis of acute abdomen, and it is widely used in practice. Other methods of diagnosing acute abdominal illness are: clinical examinations with inspection and palpation, Computer tomography and X-ray examination, surgical exploration and Laparoscopy.

### Aim and Objective of the Study:

1. Evaluate the diagnostic accuracy of ultrasound on acute abdomen and the way

the ultrasound examination contributes to the diagnosis.

2. Evaluate under which circumstances ultrasonographic diagnosis of the acute abdomen, considering medical and economical quality classifications, the alternative choice to comparable diagnostic measures.

The overall objective this study to evaluate the effects of ultrasonography on the diagnostic accuracy management patient admitted the emergency department for abdominal pain. Clinical assessment remains fundamental to the management of the acute abdomen. However, number methods improving diagnostic acute abdomen available, one which immediate ultrasound examination the abdomen.

The main aim of this study is to evaluate the diagnostic accuracy of ultrasound on acute abdomen and the way the ultrasound examination contributes to the diagnosis. Secondly, this study will evaluate under which circumstances ultrasonographic diagnosis of the acute abdomen, considering medical and economical quality classifications, the alternative choice to comparable diagnostic measures.

#### **Materials:**

##### **Inclusion criteria:**

1. All the cases attended and admitted to surgical ward of MKCG MCH Berhampur for acute abdomen requiring surgical intervention.

##### **Exclusion criteria:**

1. Cases less than 14 years of age group
2. All the pregnant women
3. All cases having some co morbid conditions like Chronic liver diseases, chronic kidney diseases, cardiac diseases.
4. Diagnosis could not be established even after clinical and ultrasound examination.

#### **Methods:**

The data pertaining to history, clinical examination and ultrasound abdomen of the patients attending emergency surgical ward MKCG MCH BERHAMPUR was collected. Proper informed consent was taken and detailed proforma was filled up. The collected includes preoperative clinical and ultrasound diagnosis along with the final or intraoperative diagnosis. The total number of cases included in the study was 80. Patients age below 14 years are excluded from the study. The cases in which no diagnosis has been established even after clinical and ultrasound examination were excluded from the study.

The evaluation of acute abdominal disorders begins with careful history and a thorough clinical examination. The following data were collected: epidemiological (sex and age), clinical (pain abdomen, vomiting, fever, bowel abnormalities, trauma, physical examination and analyses), ultrasonographic and intraoperative findings.

The diagnosis of clinically suspected appendicitis was made on the basis of pain in the right lower abdomen and the presence or absence of one or more of the following criteria: fever (deemed to be a body temperature at physical exploration above 37.5°C), pulse >90 per minute and Blumberg's sign (pain) following abdominal decompression).

In the diagnosis of acute cholecystitis, presence of tenderness in right hypochondrium and Murphy's sign taken into consideration. In case of peritonitis, presence of tenderness, guarding and rigidity throughout the abdomen are taken into consideration. The diagnosis of intestinal obstruction was made on the basis of history pertaining to previous operations and physical examination findings of distension and tenderness all over the abdomen.

As part of the general work up for surgery random blood sugar, blood urea, serum

creatinine, serum electrolytes, haemoglobin percentage, chest x ray, ECG were done for the patients. X ray erect abdomen was done for those patients with clinical suspicion of acute intestinal perforation and obstruction.

After thorough clinical examination and establishing provisional diagnosis, ultrasonographic examination has been done by the radiologist. Immediate operation has been done for those cases whose clinical diagnosis has been correlated with that of ultrasound diagnosis.

#### Criteria for Intraoperative Diagnosis

Acute Appendicitis-Inflamed appendix, Catarrhal appendix, Faecoliths, hypertrophied mesoappendix.

Cholecystitis- Peri gallbladder adhesions, thickened gallbladder wall, presence of stones.

Peritonitis due to Perforation- Presence of free fluid in the peritoneal cavity and presence of perforation.

Intestinal obstruction- Presence of dilated bowel loops, adhesions, strictures, growths.

Peritonitis due to trauma- Solid organ injury (liver and spleen) and hollow viscus perforation.

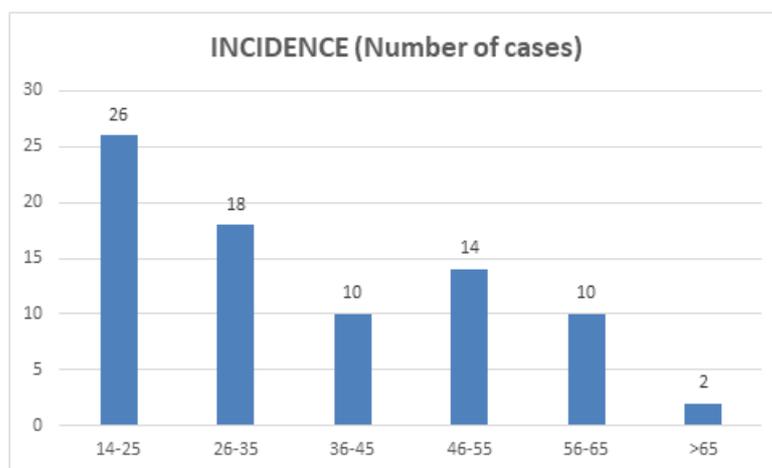
#### Results and Data Analysis:

The total number cases studied in the present series is 80. These are the admitted cases in the emergency ward of general surgery department M K C G MCH BERHAMPUR between 2020 and 2022 in surgical unit.

#### Age Incidence:

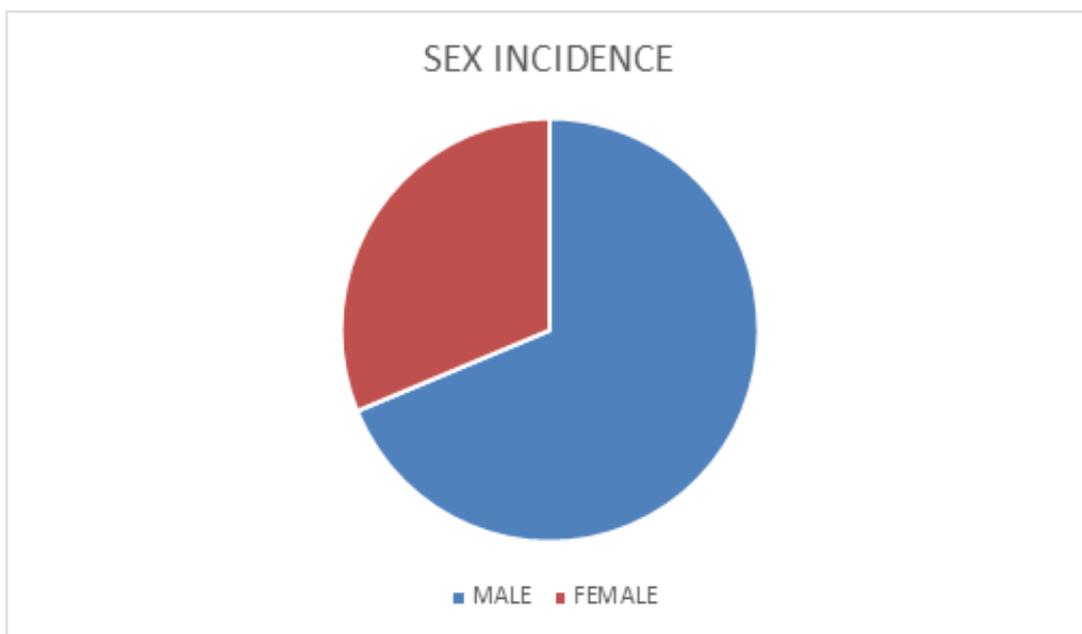
**Table 1: Age wise incidence**

AGE	INCIDENCE (Number of cases)
14-25	26
26-35	18
36-45	10
46-55	14
56-65	10
>65	2



**Figure 1: Age wise incidence**

In this study majority of the patients are in the age group of 14-25 years. The youngest patient in present series is 15 years and the eldest is of 72 years. (Table 1, Chart 1)



**Figure 2: Sex wise incidence**

**Table 2: Sex wise incidence**

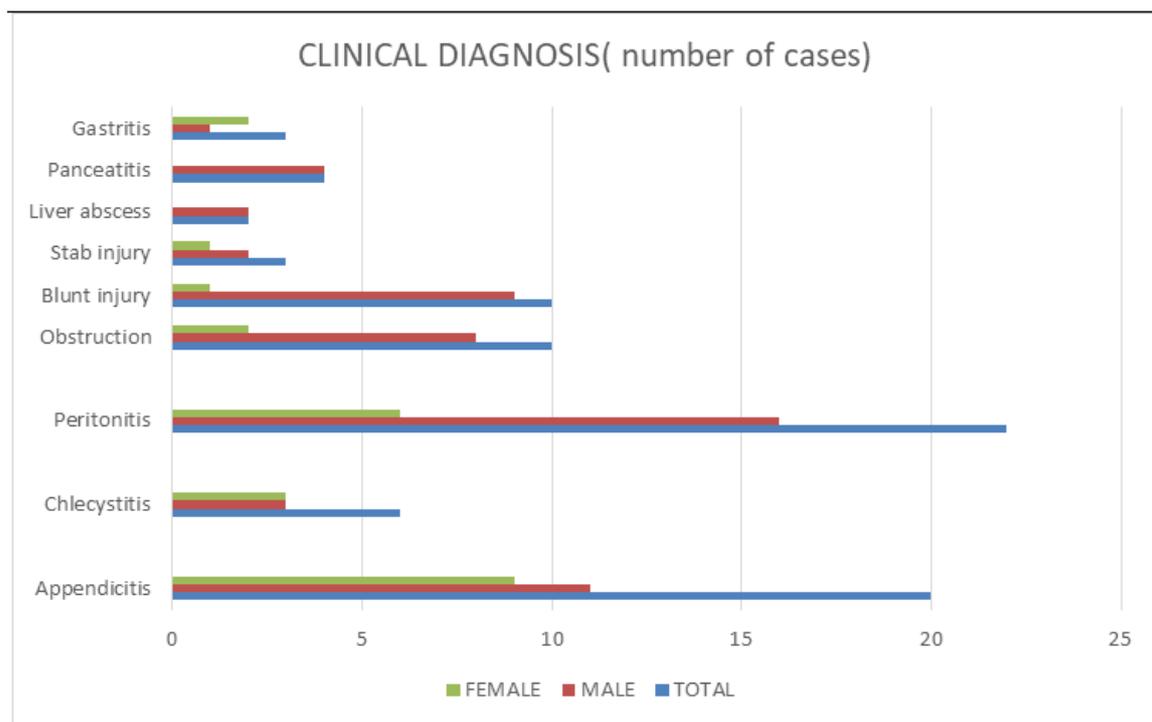
SEX INCIDENCE: TOTAL	MALE	FEMALE
80	55	25

The total number of male patients in study is 55 and that of female patients is 25. The male to female ratio is 2.2:1 (Table 2, Chart 2)

Clinical Diagnosis:

**Table 3: Clinical diagnosis (number of cases -male/female)**

CLINICAL DIAGNOSIS	TOTAL	MALE	FEMALE
Appendicitis	20	11	9
Cholecystitis	6	3	3
Peritonitis	22	16	6
Obstruction	10	8	2
Blunt injury	10	9	1
Stab injury	3	2	1
Liver abscess	2	2	0
Pancreatitis	4	4	0
Gastritis	3	1	2



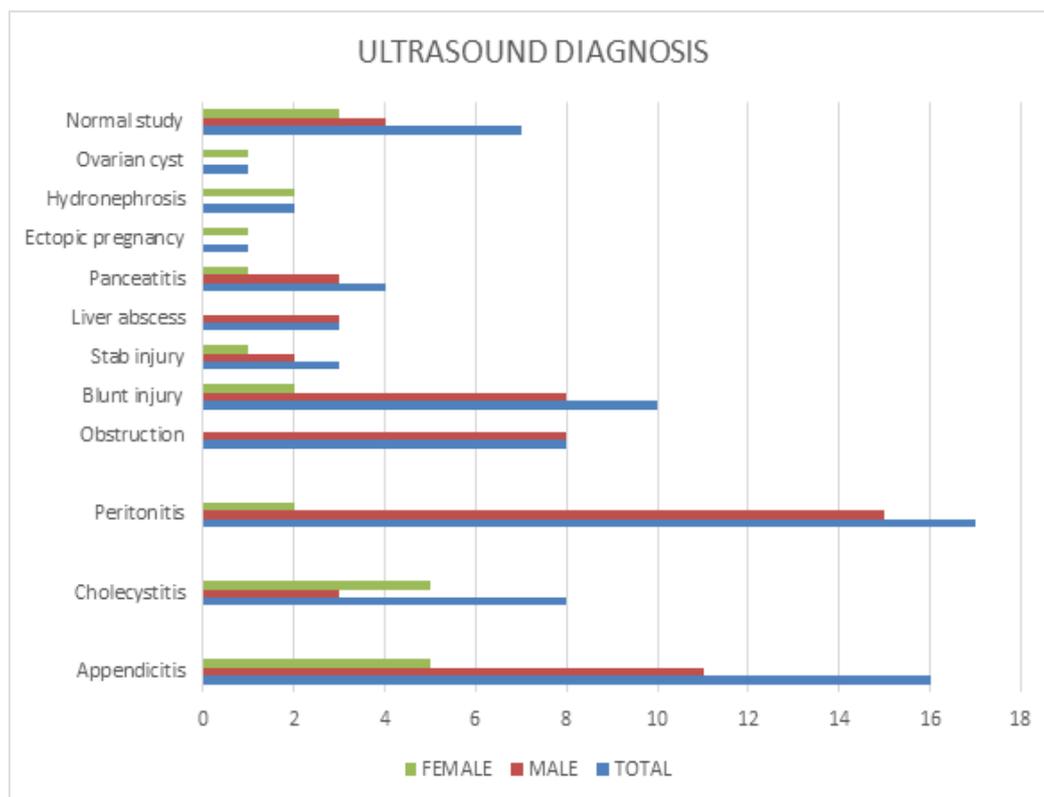
**Figure 3: Clinical Diagnosis (Number of cases Male/Female)**

75% cases of acute abdomen cases in this study on clinical diagnosis turned out to be of 4 common entities i.e., peritonitis, appendicitis, intestinal obstruction & trauma. (Table 3, Chart 3)

**Ultrasound Diagnosis:**

**Table 4: Ultrasound Diagnosis (Male/Female)**

ULTRASOUND DIAGNOSIS	TOTAL	MALE	FEMALE
Appendicitis	16	11	5
Cholecystitis	8	3	5
Peritonitis	17	15	2
Obstruction	8	8	0
Blunt injury	10	8	2
Stab injury	3	2	1
Liver abscess	3	3	0
Pancreatitis	4	3	1
Ectopic pregnancy	1	0	1
Hydronephrosis	2	0	2
Ovarian cyst	1	0	1
Normal study	7	4	3



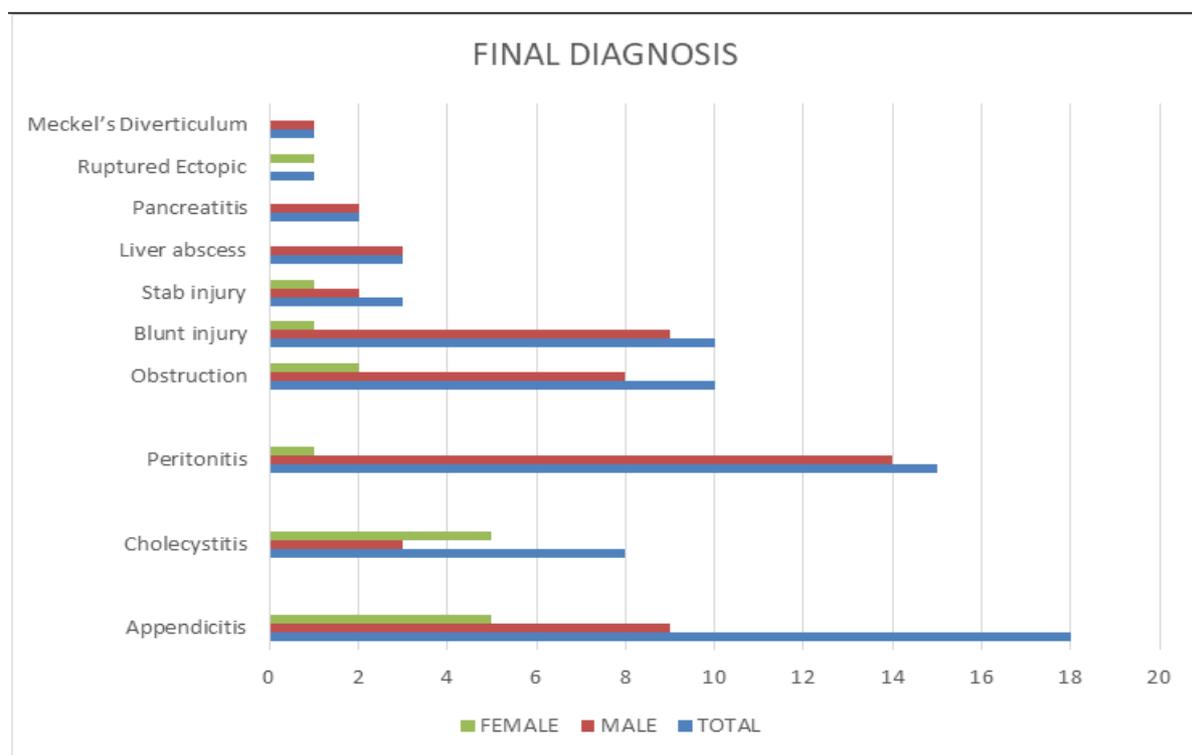
**Figure 4: Ultrasound Diagnosis (Number of cases- Male/Female)**

Out of the 80 cases, ultrasound examination established some diagnosis in 73 cases & in remaining 7 cases reported as normal study. (Table 4, Chart 4)

Intraoperative / Final Diagnosis:

**Table 5: Final /Intraoperative Diagnosis (Number of cases -Male/Female)**

FINAL DIAGNOSIS	TOTAL	MALE	FEMALE
Appendicitis	18	9	5
Cholecystitis	8	3	5
Peritonitis	15	14	1
Obstruction	10	8	2
Blunt injury	10	9	1
Stab injury	3	2	1
Liver abscess	3	3	0
Pancreatitis	2	2	0
Ruptured Ectopic	1	0	1
Meckel's Diverticulum	1	1	0



**Figure 5: Final/Intraoperative Diagnosis (Number of Cases -Male/Female)**

Out of 80 cases 68 cases were operated immediately and the remaining cases were further investigated to come to final diagnosis. Majority of the cases include peritonitis followed by appendicitis & obstructions. One case diagnosed both clinically and ultrasound as acute

appendicitis, came out as Meckel's diverticulitis at intraoperative diagnosis. (Table 5, Chart 5)

Comparison of Clinical with Ultrasound and Intraoperative/Final Diagnosis

**Table 6: Comparison Between Clinical/Ultrasound/Intraoperative Diagnosis (Number of Cases)**

	CLINICAL DIAGNOSIS	ULTRASOUND DIAGNOSIS	INTRAOP/FINAL DIAGNOSIS
Appendicitis	20	15	16
Cholecystitis	6	5	5
Peritonitis	22	17	17
Obstruction	10	8	10
Blunt injury	10	10	10
Stab injury	3	3	3
Liver abscess	2	3	3
Pancreatitis	2	3	4
TOTAL	75	64	68

No of Cases in Which Alternative Diagnosis Detected on Ultrasound Instead of Pathology As Per Clinical Diagnosis:

**Table 7: Alternate Diagnosis detected in Ultrasound**

APPENDICITIS	4
CHOLECYSTITIS	1
PERITONITIS	3
PANCREATITIS	1

Of the four cases of clinically diagnosed appendicitis, ultrasound examination came as hydronephrosis (2), ovarian cyst (1), ruptured ectopic pregnancy (1). One case of clinically diagnosed cholecystitis shows liver abscess on ultrasound. Of the three cases clinically he diagnosed as peritonitis, ultrasound shows pancreatitis (2), ectopic

(1).one case of clinically diagnosed pancreatitis shows cholecystitis on ultrasound examination. (Table 7)

No of Cases in Which Management Changed Due to Subsequent Ultrasound Examination

**Table 8: Management changed due to Subsequent Ultrasound Examination (Number of cases)**

PERITONITIS	2
CHOLECYSTITIS	1
PANCREATITIS	1

Of the two cases of peritonitis diagnosed clinically, the ultrasound examination show pancreatitis. One case of clinically diagnosed cholecystitis shows liver abscess and one case of pancreatitis shows cholecystitis on ultrasound which were further evaluated to confirm the ultrasound diagnosis. (Table 8).

Out of 80 cases of clinically diagnosed acute abdomen, 73 cases were diagnosed as having one or other pathology by ultrasound examination in 7 cases, the ultrasound shows normal study which were further evaluated by X ray and contrast enhanced CT. Of the 73 cases, the ultrasound diagnosis of 62 cases coincided with clinical diagnosis.

In the present study, the final diagnosis of 16 cases was acute appendicitis but, 20 cases were provisionally diagnosed clinically. Out of which the ultrasound examination confirmed the diagnosis of 15 cases and showed alternative pathology for 4 cases which included hydronephrosis, ovarian cyst, and ectopic and equivocal for one case which was proceed to CT and the

diagnosed of acute appendicitis is confirmed.

Total number of clinically diagnosed peritonitis cases were 20, in which ultrasound examination confirmed the diagnosis in 17 cases and remaining three cases were further evaluated by X ray and contrast enhanced CT, and the diagnosis came as peritonitis for 2 cases and pancreatitis for the remaining one cases.

In the present study, the number of clinically diagnosed cases of acute cholecystitis were 6, in which ultrasound confirmed the diagnosis in 5 cases and the remaining one case diagnosed as liver abscess.

The number of clinically diagnosed acute intestinal obstruction were 10 and the ultrasound confirmed 8 cases. The remaining two cases further evaluated by X ray and contrast CT and finally diagnosed as obstruction.

The number of cases clinically diagnosed blunt injury peritonitis were 10, and ultrasound confirmed in all cases. Out of 10 cases the ultrasound examination shows

hollow viscus perforation in 6 cases and solid organ injury in 4 cases. The number of cases clinically diagnosed liver abscess were 2 and which were confirmed on ultrasound.

### **Discussion:**

Acute abdomen is always a challenging for the clinician and the sonologist to arrive at an accurate diagnosis. As seen in our study, the incidence of acute abdomen is more common in younger age group i.e., 15-25 years. This is largely due to acute appendicitis cases where incidence is maximum in this age group [4-8].

In our study there is a significant difference in the male to female ratio in the occurrence of acute abdomen. Higher ratio in males may be related to associated smoking and alcohol which act as risk factors for many aetiologies of acute abdomen [9].

Acute cholecystitis is common in female sex in our study like many other studies [10], this may be due to female sex itself is a major risk factor for some acute abdominal conditions like biliary tract disorders.

In our study, the commonest cause of acute abdomen is peritonitis due to bowel perforation [11]. This could be due to two main reasons 1) High prevalence of gut infections like *Helicobacter Pylori* and Typhoid in our setups which can lead to perforations of the bowel. 2) High incidence of prolonged NSAIDs (easily available as over the counter) abuse in low socio-economic group which can lead to bowel perforations.

As evidenced in our study clinical diagnosis can be established in all cases of acute abdomen with good basic clinical examination skills [12]. In our study Emergency ultrasound diagnosis correlated fairly well with clinical diagnosis in majority of cases of acute abdomen [13-14], but clinical diagnosis is more correlated with intraoperative/final

diagnosis than ultrasound diagnosis in acute abdomen [15].

In our study it is evident that clinical diagnosis is superior to ultrasound diagnosis for cases acute appendicitis, but ultrasound more helpful diagnosing doubtful cases of blunt injury abdomen, liver abscess pancreatitis.

In our study clinical diagnosis of acute cholecystitis is around 90 % but ultrasound diagnosis showed 100% compared with other studies, where the ultrasound diagnosis has >95% accuracy [16-18].

Ultrasound can alternate diagnosis clinically cases of acute abdomen which might alter management. The concordance rate high between clinical ultrasound diagnosis, suggesting that ultrasound examination complementary the clinical examination. [19]

### **Conclusion:**

The acute abdomen is a syndrome of sudden onset that affects the abdominal and pelvic cavity and is generally accompanied by pain and other abdominal symptoms. Its severity and propensity for rapid progression demand prompt, systemic evaluation and in many cases surgical intervention. The evaluation of a patient with an acute abdominal pain requires an understanding of the aetiology and clinical symptoms and signs that may lead to the diagnosis of an acute abdomen. In the process of diagnosis of acute abdomen first and foremost importance is given to clinical diagnosis, based on history and thorough clinical examination. Because there are many causes of acute abdominal pain, a systematic approach by the evaluating clinician is necessary to narrow the differential diagnosis. It is vital that the clinician have an understanding of the mechanisms of pain generation and be familiar with the presentations of common diseases that cause abdominal pain<sup>3</sup>. Recognizing the red flags in the history and physical examination, the initial imaging and laboratory findings helps to determine

which patients may have a serious underlying disease process, and therefore warrant more expedited evaluation and treatment. Ultrasonography is helpful for the clinical diagnosis by confirming it and preventing in delaying the final diagnosis and subsequent surgical intervention. By ultrasound additional lesions can be identified apart from clinically detected pathology. Ultrasound examination is more useful in elderly patients where the clinical signs can be obscured due to lax abdominal wall. Ultrasound is the sole diagnostic modality in conditions where the diagnosis could not be made on the basis of clinical examination (head injury, unconscious patients, mentally ill patients). Liberal use and a clinical approach are the key points in Sonography of acute abdomen. Sonography is a variable tool to lower both the number of unnecessary laparotomies and the technique related to surgical delay.

#### Bibliography:

- Vauth C, Englert H, Fischer T, Kulp W, Greiner W, Willich SN, Stover B. Schulenburg JM Graf von der. Sonographic diagnosis of acute abdomen in children and adults; 1.
- R.Scott Jones, M.D and Joffrey A. Claridge, ACUTE ABDOMEN 2004;43:1219.
- Mark H. Flasar, MD, Eric Goldberg, MD. The Medical Clinics of North America; acute abdominal pain; Division of Gastroenterology and Hepatology, Department of Medicine, University of Maryland Medical centre, Baltimore, MD, USA; Med clin N Am 90 2006;481-503.
- John Maa and Kimberly S. Kirkwood, Sabiston Text Book of Surgery; 18th Edition; Volume 2; THE APPENDIX 2008;49:1333.
- Mohammed Akber Ali Mardan, Tariq Saeed Mufti, Irfan Uddin Khattak; Role of Ultrasound In Acute Appendicitis; J Ayub Med Coll Abbottabad 2007; 19(3).
- Rebeca Pintado Garrdio, Marta Moya De La Calle, Susan Sanchez Ramzom, Miguel Angel Castro Vallamor, Sara Plaza Loma, Marceleno Mendo Gonzalez, Indications and Usefulness of Ultrasonography for suspected appendicitis in emergency department; acute Radiodiagnosis Department; Rio Hortera University Hospital. Valladolid, Spain, 2008; 20: 81-86.
- P. Ronan O'Connell. Bailey & Love's Short Practices of Surgery: edition 25<sup>th</sup>: The Vermiform Appendix 2008;67: 1208. John Maa, Kimberly S. Kirkwood
- Sabiston Text Book of General Surgery; the biologic basis of modern surgical practice; 18th edition; Appendix, 2008; 49:1334.
- Ceylan-Isik AF, McBride SM, Ren J. Sex difference in alcoholism: who is at a greater risk for development of alcoholic complication? Life Sci. 2010 Jul 31; 87(5-6):133-8.
- Kim SB, Kim KH, Kim TN, et al. Sex differences in prevalence and risk factors of asymptomatic cholelithiasis in Korean health screening examinee: A retrospective analysis of a multicenter study. Medicine (Baltimore). 2017; 96(13): e6477.
- Kumar D, Garg I, Sarwar AH, Kumar L, Kumar V, Ramrakhia S, Naz S, Jamil A, Iqbal ZQ, Kumar B. Causes of Acute Peritonitis and Its Complication. Cureus. 2021 May 28; 13(5): e15301
- Patterson JW, Kashyap S, Dominique E. Acute Abdomen. [Updated 2022 Jul 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022
- K. Kirk Shung. Diagnostic Ultrasound imaging and blood flow measurements; role of ultrasound in medical imaging 2006; 1:1.
- K. Kirk Shung. Diagnostic Ultrasound imaging and bloodflow measurements; role of ultrasound in medical imaging 2006; 1:2.

15. Momin, Rehan Sabir, et al. Clinical and radiological diagnosis in acute abdominal emergencies. *Journal of Evolution of Medical and Dental Sciences*, 13 Aug. 2015; 4(65):11308
16. Yusoff IF, Barkun JS, Barkun AN. Diagnosis and management of cholecystitis and cholangitis. *Gastroenterol Clin North Am*. 2003;32(4):1145-68.
17. Lee J, Meson G, Koehler R. Cholecystosonography; Accuracy, Pitfalls & Unusual findings. *Am J Surg* 1980; 139:223. S.
18. Yusoff IF, Barkun JS, Barkun AN. Diagnosis and management of cholecystitis and cholangitis. *Gastroenterol Clin North Am* 2003; 32(4):1145-68.
19. Kenfuni M. M., Gallouo M., Alafifi Mahmoud, Tsikambu A. C. D., Alafifi R., Moataz A., Dakir M., Debbagh, A., & Aboutaieb, R. Pyonephrosis. Risk factors, clinical, para-clinical and anatomopathological profile about 19 cases. *Journal of Medical Research and Health Sciences*, 2022;5(2): 1770–1773.