

# Role of ultrasonography in acute abdominal conditions

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## Abstract

Many patients come to hospitals with acute abdominal conditions. These abdominal emergencies can actually range from simple gastritis to life threatening causes like intestinal obstruction and perforation of a hollow abdominal organ. Hence in such conditions the investigation and diagnosis should be accurate. This study puts a real effort to find the role of Ultrasonography in patients with acute abdominal conditions.

**Key Words:** USG, Abdomen, Acute, Role.

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## INTRODUCTION

Acute abdomen is a condition in which there is a sudden onset of abdominal pain and the patient reveals the signs and symptoms that has something to do with the viscera of the abdomen. It is a medical emergency because such patients in majority of cases are frightened and apprehensive. But as a physician we should understand the fact that only about 20 to 30 percent of such cases that present to us actually need a surgical intervention immediately. So the best alternative is to have a radiological opinion. Although Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) are options, the common man rarely has that kind of financial freedom to undergo these investigations. So the best alternative investigation is Ultrasonography (USG) which is cost effective. These emergencies can actually range

from simple gastritis to life threatening causes like intestinal obstruction, perforation and rupture of a hollow abdominal organ like the stomach<sup>1,2</sup>. So the investigation and diagnosis should be spot on. The region of the abdomen involved should also give the information pertaining to what should be the mode of investigation. It's popularly believed that for the right upper quadrant of the abdomen ultrasonography is the preferred choice and in the right and left lower quadrants CT is the preferred choice<sup>3</sup>. However it should also be understood that clinical diagnosis, laboratory investigations and the imaging diagnosis together will be more accurate in majority of the cases rather than believing and burdening on the imaging diagnosis alone<sup>4</sup>. CT and MRI can be accurate but USG is still the most sought after imaging technique because of its basic simple nature and also cost effectiveness particularly in a country like ours<sup>4,5,6</sup>. This study puts a real effort to find the role of USG in patients presenting with acute abdominal conditions.

## AIMS AND OBJECTIVES

To study the role of Ultrasonography in patients presenting with acute abdominal conditions.

## MATERIALS AND METHODS

This study was done in the Department of Radiodiagnosis at The Oxford Medical College, Hospital and Research Centre, Bangalore.

The study period was from November 2017 to October 2019.

Five hundred and forty patients who presented with acute abdominal conditions from different clinical departments of our hospital were chosen for this study.

Ultrasonography was done for all the patients in our department using GE Machines (Logiq P3, Logiq P5 and Voluson P8). Low frequency curved array and high frequency linear array transducers were used for ultrasonography. The ultrasound diagnosis was made and

then the patients were followed up to find out the exact diagnosis. The final tally was made to find the role of ultrasonography in finding out the exact diagnosis.

**Inclusion Criteria:**

Only patients presenting with acute abdominal conditions.

**Exclusion criteria:**

Patients on steroid therapy and immunosuppressive drugs.  
Patients who have already been diagnosed and have come with relapse.

**RESULTS**

**Table 1: Age Distribution**

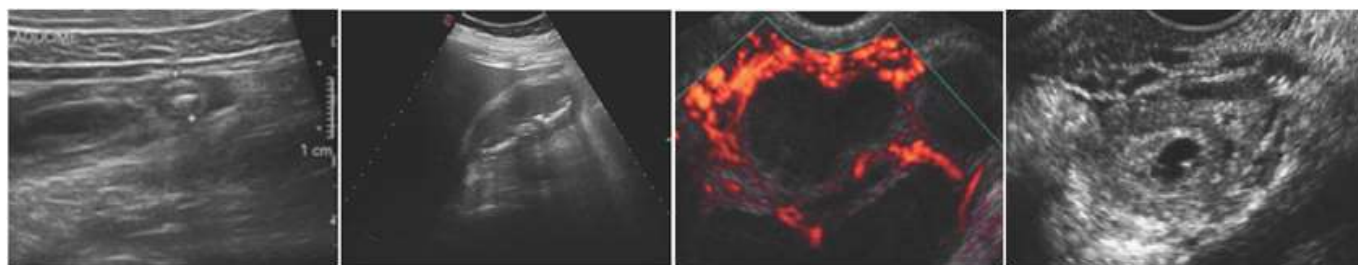
Age in years	No. of cases
1-20	106
21-40	165
41- 60	123
> 60	146
<b>Total</b>	<b>540</b>

**Table 2: Sex Distribution**

Sex	Number of cases	Percentage
Male	300	56
Female	240	44
<b>Total</b>	<b>540</b>	<b>100</b>

**Table 3: USG Diagnosis (Based upon region)**

Region (Pain)	Diagnosis (USG)	Could Not Be Diagnosed by USG
Right upper quadrant	<b>Biliary:</b> Cholecystitis Cholelithiasis <b>Hepatic:</b> Abscess Hepatitis Mass	Oesophagitis Gastritis Cholangitis
Epigastric	Gastric: Peptic ulcer Biliary: Cholecystitis Cholelithiasis Pancreatic: Mass, Pancreatitis	Gastritis Cholangitis Oesophagitis
Left upper quadrant	Gastric: Peptic ulcer Pancreatic: Mass	Esophagitis Gastritis Mesenteric ischemia
Periumbilical Region	Colonic: Early appendicitis Gastric: Peptic ulcer Small bowel: Mass or obstruction	Gastritis
Right lower quadrant	Colonic: Appendicitis Gynecologic: Ectopic pregnancy PID Renal: Nephrolithiasis Pyelonephritis	Colitis, IBD, IBS, Torsion
Suprapubic	Colonic: Appendicitis Gynecologic: Ectopic pregnancy, Torsion Renal: Nephrolithiasis Colonic: colitis	IBD IBS
Left lower quadrant	Gynecologic: ectopic pregnancy PID Renal: nephrolithiasis	Pyelonephritis



**Image 1:** Appendicitis **Image 2:** Cholelithiasis with Cholecystitis **Image 3:** Pelvic Inflammatory Disease **Image 4:** Ectopic Pregnancy

As the interpretation is concerned USG is highly specific in diagnosing the disease in the right upper and epigastric quadrants. But it is not specific in other quadrants.

**Table 4:** Percentage and Significance

Procedure	Percentage	Sensitivity	Specificity
USG	0.5495	87.2%	37.1%

USG	Actual Diagnosis		Total
	Pathology	No Pathology	
Pathology	310	41	351
No Pathology	182	07	189
<b>Total</b>	<b>492</b>	<b>48</b>	<b>540</b>

The sensitivity was 87.2%; The specificity was 37.1%; Positive predictive value was 96.8%; Negative predictive value was 11.7%

### DISCUSSION

The most common causes of acute abdomen depends upon the age of the patient. Causes of abdominal pain according to age of the patient. <sup>2</sup>

Birth to 1 year	1 <sup>st</sup> Decade	2 <sup>nd</sup> Decade	Adults
<i>Medical</i>			
Infantile colic	Gastroenteritis	Gastroenteritis Constipation	Gastroenteritis Constipation
Gastroenteritis	Lower Lobe Pneumonia	Abdominal Tuberculosis	Lower Lobe Pneumonia
Constipation	Constipation	Bowel disease	Pharyngitis
Urinary Tract Infection	Urinary Tract Infection	Functional Pain	Dysmenorrhea
	Sickle Cell Crisis	Lower Lobe Pneumonia	Mittelschmerz
	Henoch-Schonlein purpura	Pharyngitis	Pelvic Inflammatory Disease
	Mesenteric Lymphadenitis	Urinary Tract Infection	Inflammatory Bowel Disease
		Pneumonia	
		Sickle Cell Crisis	
		Henoch-Schonlein purpura	
		Mesenteric Lymphadenitis.	
<i>Surgical</i>			
Intussusception	Appendicitis	Appendicitis	Appendicitis
Volvulus/malrotations	Intussusception	Cholecystitis	Ectopic Pregnancy
Incarcerated Hernias	Volvulus	Testicular Torsion	Testicular Torsion
Hirschsprung's disease	Trauma	Trauma	Ovarian Torsion
Necrotizing Enterocolitis			

USG diagnosis is very useful as it is very cost effective. It can also be used for diagnoses of acute abdominal conditions in pregnant females as it does not have ionising radiation. In this study it was found to be useful. It had highly sensitivity as well. Although a bit low on the specificity, it becomes a very important tool for initial diagnosis. The most common conditions that have to be diagnosed depends upon the age of the patient and the specific quadrant of the abdomen involved. The most commonly involved quadrants are:

Region (Pain)	Diagnosis (USG)
Right upper quadrant	<b>Biliary:</b> cholecystitis Cholelithiasis <b>Hepatic:</b> abscess Hepatitis Mass <b>Oesophagiti Gastritis</b> Cholangitis
Epigastric	Gastric: peptic ulcer Biliary: cholecystitis Cholelithiasis Pancreatic: mass Pancreatitis Gastritis Cholangitis Oesophagitis
Left upper quadrant	Gastric: peptic ulcer Pancreatic: mass Esophagitis Gastritis mesenteric ischemia
Periumbilical	Colonic: early appendicitis Gastric: peptic ulcer small-bowel mass or obstruction Esophagitis Gastritis Colonic: appendicitis Gynecologic: ectopic pregnancy PID
Right lower quadrant	Renal: nephrolithiasis Pyelonephritis Colitis IBD IBS Torsion Pyelonephritis
Suprapubic	Colonic: appendicitis Gynecologic: ectopic pregnancy Renal: nephrolithiasis Torsion IBD IBS
Left lower quadrant	Colonic: colitis Gynecologic: ectopic pregnancy PID Renal: nephrolithiasis Pyelonephritis

The most important aspect that has to be remembered is the fact that the experience of the radiologist also should be considered. This single criterion can make a lot of difference. The most common technique used to examine patients by majority of the radiologists with acute abdominal pain is the graded-compression procedure<sup>7</sup>. In this technique the radiologist can move the interposing fat and bowel can be displaced or compressed by means of gradual compression to show underlying structures. Furthermore, if the bowel cannot be compressed, the noncompressibility itself is an indication of pathology<sup>4,7</sup>. Some time the radiologists use the dynamic examination in evaluation of bowel hernias, mesentery, and omentum through the Valsalva manoeuvre. This manoeuvre may reveal an intermittent hernia, may show the contiguity of a mass with the intraperitoneal space, allowing better depiction of the hernia sac or abdominal wall defect and also showing reducibility<sup>8</sup>. Curved and linear transducers are most commonly used, with frequencies depending on the application and the patient's stature<sup>9,10</sup>. Although MRI and CT are options, the common man rarely has that kind of financial freedom to undergo these procedures. So the best alternative investigation is Ultrasonography.

## CONCLUSION

Ultrasonography is a very useful, cost effective and sensitive imaging modality in patients presenting with acute abdominal pain. The fact that the experience of the

radiologist doing the ultrasound scan should be considered is very important for diagnosis of acute abdominal conditions. Hence competent radiologists can diagnose many diseases by ultrasonography in patients presenting with acute abdominal conditions.

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