

# Role of USG and Plain Radiograph in Non-Traumatic Acute Abdomen

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**Abstract:** *Background:* The most frequent reason for emergency admissions is acute abdominal. The ability to diagnose disease early with tests like X-ray and ultrasound helps prevent unnecessary laparotomies and allows for rapid treatment. Acute abdomen patients who are seriously ill develop suddenly, over a period of several hours or a few days. *Materials and Methods:* The study was carried out at R. D. Gardi Medical College and C. R. Gardi Hospital, Ujjain subject to approval by the ethical committee, in the Department of Radio-diagnosis. 109 patients presenting to the hospital with acute non-traumatic & non-obstetric abdominal conditions in whom the clinical diagnosis has been done already (Male or female of more than 10 yrs of age) during the study period were included in the study. Patients who presented to us with acute abdomen were admitted to the hospital and were subjected to a plain x-ray of the abdomen or ultrasonography of the abdomen. *Results:* A total of 109 patients were enrolled in our study, 69 of whom were men (64%) and 40 of whom were women (36%). The following was the cause of acute abdomen in our investigation. There were 29 individuals with intestinal obstruction instances (27%), 41 patients (38%) had cases of acute ureteric/renal and vesical calculi. 6% of patients had GI perforations. There were 6 individuals (5%) with acute appendicitis. 09 individuals (8%) had acute cholecystitis. 2% of the patients had acute pancreatitis. 10 patients (9%) had liver abscesses. Two patients (2%), or pyonephrosis on the left, were seen. *Conclusion:* This study demonstrates the critical significance that straightforward USG and plain radiograph play in making a conclusive diagnosis of acute abdomen and preventing unwanted laparotomies.

**Keyword:** non-traumatic acute abdomen, ultrasonography, x-ray

## 1. Introduction

The phrase "acute abdomen" is commonly used to describe a patient who is critically sick and displaying abdominal discomfort, soreness, and stiffness. Together, a radiologist and a physician can identify an acute abdomen. For acute abdominal diseases, a precise diagnosis is required. An early and accurate diagnosis is essential for prompt and appropriate management in order to limit morbidity and mortality. delay in diagnosis and treatment and unnecessary laparotomies are done due to considerable overlap of symptoms and signs of various disease entities causing acute abdomen. Moreover, the identification of surgical problems is of utmost importance, as most patients with acute abdomen do not require surgery. The main goal of imaging in the acute abdomen is to narrow down the differential diagnosis and for prompt treatment. Plain radiographs and USG has been the advantage of being non-invasive, portable, and cheap. An ultrasound machine requires few attachments, is easy to install, takes up little space, and costs minimal money. With the exception of a few instances where the bowels are noticeably distended, Pathology may go undiagnosed in these conditions because air is a poor sound wave conductor, but it can still be observed on an abdomen plain X-ray in situations when ultrasonography has failed to detect the lesion. As a result, a study was created to evaluate the acute abdomen utilizing plain-radiograph and USG.

## 2. Material and Methods

This prospective observational study was carried out on patients sent to the Department of Radio-diagnosis at Ruxmaniben Deepchand Gardi Medical College, Ujjain, Madhya Pradesh from November 2020 to October 2022. A

total of 109 subjects were in this study. Results were checked by two radiologists (PI and CO-PI) and final comparative data was prepared from the Plain radiograph and Ultrasound study.

### Inclusion criteria:

- All the patients, suspected of having abdominal pain (non-traumatic) were referred from surgical, medicine, pediatric and gynecology departments for sonographic and plain radiograph evaluation on an emergency basis.

### Exclusion criteria:

- Patients with traumatic abdominal conditions.
- Patients with Obstetric disorders.

### Description of Tool:

- 1) Allengers Medical System Mars 50.
- 2) Gelogiq V5 (Ultrasound Machine)

### Procedure methodology

All the procedures were done with the patient's prior written informed consent and confidentiality was taken care of in all the cases. All patients with acute abdomen after thorough clinical examinations were sent for radiological evaluation by the Department of Surgery, medicine, gynecology, and Pediatrics. Ultrasonography and Plain radiograph were done as per requirements. Abdomen in plain x-ray, AP view, with horizontal beam in the upright posture was adopted. When the clinical situation called for it, plain X-rays of the abdomen were obtained in both the supine and left lateral decubitus positions. X-ray machine model no: ALLENGERS MEDICAL SYSTEM MARS 50. Plain X-rays were evaluated by one blinded radiologist with a clinical history of abdominal pain only. No other details of the patient were given. Similarly, ultrasonography was done

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by another blinded radiologist with the same patient details at USG machine model no: GE LOGIC V5 with curvilinear, linear, and TVS probes as per case need with reports given in emergency itself. The reports of radiographs and ultrasonography were not conveyed to the respective radiologist. Special investigations like intravenous urography, contrast studies of the gastrointestinal tract, and CT scans of the abdomen were conducted /obtained whenever advised by the concerned physician or if the patients got it done from outside; however, imaging details are not included in the study.

**3. Result**

In this study, 69 male and 40 female were included. According to place of residence, 78.89% of patients were from rural backgrounds (table-1). As shown in Table 2 gastrointestinal system accounts for 37.61% of cases of acute abdomen. X-Ray was 96% diagnostic in cases of perforation peritonitis. Intestinal obstruction was diagnosed in 96.55% of cases (table-3). It is evident from table-5 that out of 166 X-rays done.3 (1.80%) were uniquely diagnostic i. e. they all showed gas under the diaphragm (perforation) when it was not suspected clinically. It is evident from Table-5 that out of 166 X-rays done 3 (1.80%) were uniquely diagnostic i. e., they all showed gas under the diaphragm (perforation) when it was not suspected clinically was able to diagnose 96% of cases of cholecystitis. intestinal obstruction was diagnosed only in 50 % of cases with USG (table-6). It is evident from the table-7 that out of 92 USG

abdomen done, 14 (15.21%) were uniquely diagnostic i. e. showed a diagnosis other than the first clinical diagnosis.

**Table 2:** Distribution of cases according to residence

S. No	Residence	No of cases	Percentage
1	Rural	86	78.89
2	Urban	23	21.11
		109	100

**Table 3:** System- Wise distribution of acute abdomen cases

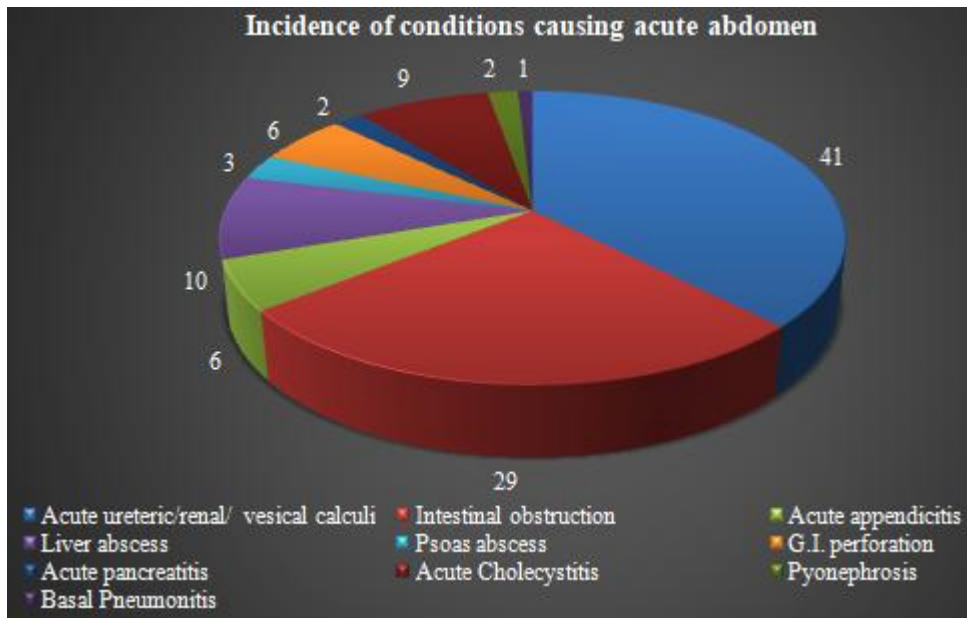
S No	System	No of cases	percentage
1	Gastrointestinal tract	41	37.61
2	Genitourinary	43	39.45
3	Miscellaneous	25	22.94
Total		109	100

**Table 4:** Incidence of conditions causing acute abdomen

S. No.	Causes	No. of cases	Percentage
a.	Intestinalobstructions	29	27
b.	Acuteureteric/renal/vesicalcalculi	41	38
c.	Glperforation	06	5
d.	Acuteappendicitis	06	5
e.	Acutecholecystitis	09	8
f.	Acutepancreatitis	02	2
g.	Liverabscess	10	9
h.	Bilateralbasalpneumonitis	01	1
i.	Psoasabscess	03	3
j.	Leftpyonephrosis	02	2
	<b>Total</b>	<b>109</b>	<b>100</b>

**Table 5:** Incidence of conditions causing acute abdomen X-RAY

S. No.	Causes	No. ofcases	X-Ray Abdomen (Positive)	Percentage	USG Abdomen (Positive)	Percentage
a.	Intestinalobstructions	29	28	96.55	27	93.10
b.	Acuteureteric/renal/vesicalcalculi	41	24	58.53	38	92.68
c.	Glperforation	06	06	100	5	83.33
d.	Acuteappendicitis	06	-	-	5	83.33
e.	Acutecholecystitis	09	2	-	9	100
f.	Acutepancreatitis	02	-	-	2	100
g.	Liverabscess	10	-	-	9	90
h.	Bilateralbasalpneumonitis	01	1	100	-	-
i.	Psoasabscess	03	1	33.33	3	100
j.	Leftpyonephrosis	02	-	-	2	100
	<b>Total</b>	<b>109</b>	<b>62</b>	<b>56.88</b>	<b>100</b>	<b>91.74</b>



#### 4. Discussion

Abdominal pain is most common cause for hospital admissions in most parts of the world. For the therapy of the patient, whether conservatively or surgically, early identification of the underlying etiology is extremely valuable.

Real-time ultrasonography is becoming a popular method of examining clinical issues in the abdomen. When compared to a plain abdominal X-ray, it is non-invasive, safe, simple to do, convenient for the patients, and is demonstrating growing accuracy and specificity. However, because air is a poor conductor of sound waves, ultrasonography has occasionally failed to identify abdominal lesions in cases when the bowels are significantly dilated. However, the benefits and drawbacks of both plain X-ray abdominal imaging and ultrasonography are explored here, and an effort has been made to determine which is more effective in the diagnosis of acute abdomen.

**Intestinal obstruction:** small and big bowel blockages can be distinguished on an abdominal plain x-ray in cases of acute intestinal obstruction. With an accuracy rate of 96.55%, it was diagnostic in 28 instances in our series. When a mechanical blockage is detected, ultrasonography is not very useful. The most frequent causes of intestinal blockage are adhesions and strictures, neither of which can be seen on an ultrasonogram. Most patients with blockage have an abundance of gas in the intestinal lumen, which commonly results in sonograms that are of poor diagnostic quality. However, sonography may be useful in a small number of patients with mechanical blockage who do not have severe gaseous distension. In 27 cases of intestinal blockage in our dataset, it provided a 93.1% accurate diagnosis.

**Acute ureteric/renal/vesical calculi:** In the urogenital system, 90% of stones are radio-opaque, while 10% are radiolucent. 10% of the time, stones in the abdomen can be overlooked on an ordinary X-ray. Such radiolucent stones can be detected by ultrasound. In one patient in our series, a simple X-ray missed a ureteric stone, although an ultrasound

detected it and an IVU verified it. In another patient, an ultrasound missed a stone in the middle third of the ureter with a modest shift in back pressure. But in that instance, the stone was detected by a simple abdominal X-ray and verified by an I. V. U. Since an ultrasonogram only provides a two-dimensional image, it might be challenging to determine the stone's actual size. Due to extensive intestinal coil overlap there, it might be challenging to see stones, especially in the middle section of the ureter. Although the ultrasonography may not always be able to see the stones, hydro-ureter, and changes in the kidney's back pressure may indicate an obstructive lesion. USG and plain X-ray are complementary in the treatment of urinary diseases, particularly urolithiasis. I. V. U. testing could be necessary to get the final diagnosis.

**Hollow viscus perforation and appendicitis:** In our series, which included 2 ileal perforations and 4 duodenal perforations that revealed gas behind the diaphragm domes, in cinema, upright stance. In our study, appendicular puncture has not shown gas under the diaphragm. We saw general indicators such as soft tissue masses and localized ileus. GI perforations with ultrasound revealed a small number of dilated and collapsed intestinal coil loops, as well as free fluid in the peritoneal cavity. These results were all ambiguous. A likely diagnosis was reached using these data in combination with clinical characteristics. Appendicular mass could be detected by ultrasonography, and serial ultrasonography allowed us to determine whether the mass was decreasing or growing larger. So, in addition to aiding in the identification of appendicular masses, ultrasonography also aids in the treatment of appendicular masses.

**Hepatobiliary system:** Clinical diagnosis cannot be guaranteed for illnesses of the hepatobiliary system, particularly calculus cholecystitis and acalculous cholecystitis. Both ordinary X-rays and ultrasonography are effective investigative tools. Gallstones could be recognized on plain film in 2 of the 9 instances in our collection, and nonspecific symptoms were seen in three other cases. Plain abdominal radiography was not conclusive for the remaining cases. Out of 9 instances in our study, 4 had gallstones, and

5 had acalculous cholecystitis, according to the ultrasound results. Sludge is defined as slowly moving material within the gall bladder that exhibits a uniform echo pattern in the absence of acoustic shadowing. Sonographic Murphy's sign and thickening of the gall bladder wall were seen in our study. One instance had a severely enlarged gall bladder with stones in Hartmann's pouch.

**Pancreas:** Out of two instances in our series, two were pancreatitis-related. The pancreas was larger and had hypoechoic regions on ultrasonography, along with peri pancreatic collection. In some cases, pancreatic duct hypertrophy and stones in the pancreatic duct with or without an acoustic shadow might be observed during ultrasonography. On ultrasonography, there were no similar findings in our dataset. Anechoic mass comprising debris is present in pancreatic abscesses, and occasionally strong echoes from gas bubbles can be recognized. However, in our series, no such observations were observed. Plain x-ray did not provide any promising results. In addition to aiding in case diagnosis, ultrasound technology also aids in case management. By doing repeated abdominal ultrasounds, ultrasound can determine if the hemoperitoneum is progressing or stagnant, which has an impact on how patients are managed.

## 5. Conclusion

This study demonstrates that in the diagnosis of acute abdomen, ultrasonography is more accurate than conventional x-ray. When the accuracy rate for both investigations is combined, it can reach 90–95% or even higher. A simple X-Ray And USG plays important role in diagnosis so that unwanted laparotomies can be avoided.

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