

# Role of Ultrasound in evaluation of children with acute abdomen

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## Abstract

**Objectives:** To evaluate the ultrasonography abdominal findings in children with acute abdomen in children and assess the gastrointestinal disease patterns that can be evaluated by ultrasound. **Design:** A descriptive prospective study. **Setting:** LN Medical College, Bhopal. **Subjects:** 74 children who presented with acute onset abdominal pain. **Results:** Of the 74 children, 17 (23%) were normal on sonography; 32(43%) have intestinal obstruction, 11 (14.8%) have appendicitis and 6 (8.1%) have abscess.

**Key words-** Acute abdomen, Sonography, Intestinal obstruction

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## Introduction

Acute abdomen can be defined as "A syndrome induced by wide variety of pathological conditions that require emergent medical or more often surgical management". Recurrent Abdominal pain is most common cause of routine OPD visit as well as emergency visit in pediatric age. Similar Acute abdominal pain is also a common clinical problem among children visiting the emergency department. Most of the times these are non-surgical problems but wide range of surgical conditions are not rare. Acute appendicitis is most common surgical condition. Although by proper history and through clinical examination, diagnosis can be made in most of the cases but sonography has proven to be a reliable technique for establishing the diagnosis of acute abdomen [1,2,3].

Historically, computed tomography (CT) Scan has been the first choice of imaging in acute abdominal pain, with sensitivity of up to 96% and specificity of up to 97%<sup>(4,5)</sup>. However, because of the radiation injuries, high establishment cost, lack of expertise in interpretation of

findings in small cities especially in developing countries and diagnostic accuracy of emergency ultrasonography similar to CT Scan, ultrasonography become first choice in evaluation in suspected pediatric acute abdomen [6,7,8].

In this study we have evaluated the diagnostic accuracy of ultrasonography in helping to make diagnosis in children presented with acute abdomen.

## Material and Methods

74 patients of pediatric age group (<14 yrs), presenting with acute abdominal pain either at emergency department or pediatric outpatient department were evaluated initially by clinical examination and then by ultrasonography and X-ray from ..... to ..... at ..... Children were selected on the basis of strict inclusion criteria. Only those children with acute onset abdominal pain and having no history of similar pain in the recent past were included in the study.

## Results

**Table-1: Clinical symptoms of patient (Total patient 74).**

Symptoms	Number	Percentage (%)
Acute Abdomen	74	100
Vomiting	39	53
Fever	40	54
Abdominal Distention	42	57
Guarding/Rigidity	39	53

Table No: 01 depicts that abdominal distention (57%), fever (54%) and vomiting (53%) was the most common associated symptoms with acute abdomen. Guarding and rigidity was present in 53% cases

**Table-2: Final Diagnosis of Acute Abdomen**

Disease	Number of Patients	Percentage (%)
Intestinal Obstruction	32	43.2
Abscess	06	8.1
Appendicitis	11	14.8
Mesenteric lymphadenopathy	3	4
Renal Colic	1	1.3
Pancreatitis	1	1.3
HPS	1	1.3
Unknown	19	25.6

Table No-02 depicts that intestinal obstruction was most common cause (43%) of acute abdomen. Renal colic, pancreatitis and HSP were uncommon (1.3% each) cause. Appendicitis is present in 14.8% cases. Mesenteric lymphadenopathy is rare (only 4%) cause but in 25.6% cases causes were un-identified.

**Table-3: Results of 4 steps Diagnosis**

Diagnosis	Clinical Evaluation	UGG Evaluation	Clinical Evaluation + USG	Clinical Evaluation + USG+ Radiography	Final Diagnosis
Intestinal Obstruction	30	19	31	32	32
Abcesses	05	04	06	06	06
Appendicitis	10	07	10	11	11
Mesenteric lymphadenitis	02	02	03	03	03
Renal colic	1	1	1	1	1
Pancreatitis	1	1	1	1	1
Hypertrophic pyloric Stenosis	1	1	1	1	1
Unknown	14	12	16	19	19
Correct diagnosis	64	47	69	74	74

Table No-03 depicts that diagnostic accuracy of clinical evaluation is much higher (86.4% Vs 63.5%) as compare to USG evaluation, if both steps performed individually. But accuracy gradually increased (93.2%), if clinical evaluation and USG done simultaneously. If radiography also added in evaluation, diagnostic accuracy increased to 100%. In 19 (25.6%) cases etiological cause not established. Intestinal obstruction is the most common pathology in 32 (43.2%) cases, appendicitis in 11 (14.8%) and intra-abdominal abscess in 06 (8.1%) cases.

## Discussion

Sonography is widely available, can be performed at the bedside easily, required less preparation and less intervention time, there is no risk of radiation, relatively inexpensive, and may show evidence of other causes of abdominal pain. It is particularly useful in evaluating young women and pregnant women, in whom the radiation dose to the reproductive organs should be minimized. Acute abdomen is some of common emergencies where diagnosis should be made with most accuracy, because definitive management depends on accurate diagnosis. Diagnostic accuracy is increased if ultrasonography and radiography are added over clinical evaluation. There are wide range of etiological causes which can cause acute abdomen, some of non-serious and

some of serious need immediate attention. In most of places conventional radiograph (X-Ray) of abdomen are used as a first diagnostic modality in acute abdomen [9]. But diagnostic accuracy is less and most of the time unable to reach some conclusion. Because of the diagnostic limitation plain film of abdomen, Ultrasono-graphy provide more and sometimes entirely different information about abdominal pathology. Laparoscopy and Computed Tomography (CT), are reserved as second-line investigation methods due to the risk of surgical invasiveness in laparoscopy, and radiation exposure in CT. Diagnostic accuracy CT Scan is better than ultrasonography but emergency ultrasonography has shown almost similar results in the diagnostic work-up of children

## Research Article

presenting with acute abdomen. In our study diagnostic accuracy of sonography alone was found 65.%. Mendelson et al and Walsh et al in there respective studies found ultrasonography to be 50% diagnostic to identify the cause of acute abdomen in children [10,11]. Diagnostic accuracy in adult is less as compare to children. Studies in adult population found diagnostic accuracy of ultrasonography is around 25-34.7% [12,13]. This higher diagnostic efficacy in pediatric patients is attributed to their thinner abdominal wall and use of higher frequency probes. In 25.6% cases cause remains unknown despite taking help of ultrasonography and radiology. Nothing can replace the clinical acumen of the pediatrician, 86.4% cases accurate diagnosis was made only with clinical examination.

Ultrasonography should be used as an adjunct to the clinical evaluation. Except in few cases, ultrasonography gradually replacing plain abdominal radiographs in making etiological diagnosis. Ultrasonography helps in making faster diagnosis and earlier institution of necessary medical or surgical intervention. USG can be used as a initial imaging modality in case of non-traumatic acute abdomen. It is as good as laparoscopy in diagnosing acute abdominal pathologies. It is ideally suited for children not only because of its non-invasive nature and cost-effectiveness but also because it doesn't expose the children to radiation.

### Conclusion

Ultrasonography has a definite role in investigating the child presented with acute abdomen. It should be considered as the initial imaging modality. Findings in this study confirm that ultrasound is an relatively accurate, reliable, and rapid screening method to evaluate the causes of acute abdomen especially surgical in children. Ultrasonography is a good modality for investigation of children as it is easily available, cost-effective & can be done in bed side & above all it has no radiation hazard.

**Recommendation:** High-resolution ultra sonography provides an accurate and specific test for identification of causes of acute abdomen and is recommended by the authors as an examination of choice in children with acute abdominal pain.

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