



## Ultrasonographic Evaluation of Acute Abdomen In Children

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### Abstract

*Acute abdomen is a medical emergency, in which there is sudden and severe pain in abdomen of recent onset with accompanying signs and symptoms that focus on an abdominal involvement. It can represent a wide spectrum of conditions, ranging from a benign and self-limiting disease to a surgical emergency. The aim of our study is to evaluate the acute abdomen in children of less than 12 years by ultrasonography. During the study of 1 year we had examined 60 cases of acute abdomen coming to the department of Radiodiagnosis. The USG findings were correlated with final diagnosis made by operative method or by doing follow-up of the patient. Among these patients USG could give the proper diagnosis in 71% cases of appendicitis, 66% cases of Cholecystitis, 66% cases of pancreatitis, 50% cases of hollow-viscus perforation & 100% cases of renal calculus.*

*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*

**Key word:** *ultrasonography (USG), acute abdomen,*

### Introduction

Acute abdomen is defined according to 'Washington manual of surgery' as abdominal pain of more than six hours in a previously healthy individual. There are a plethora of cases ranging from viral gastroenteritis to hollow-viscus perforation that can lead to acute abdomen in children. Ultrasonography is very useful in children as it is non-invasive, cost-effective, and repetitive & doesn't expose the child to any radiation as happens in X-ray & CT scan examination. Also it can be done as a bed side investigation. Abdominal pain is common for

seeking medical care at emergency department all over the world. The causes of acute abdomen in children can vary depending upon the age & can be divided into diseases that can be treated with medical care & those that must be treated with surgical intervention. The role of the diagnostic imaging is to determine whether the acute abdominal pain is due to a surgically or medically treated disease. .

The aim & objective our study is to evaluate the causes & Sonographic appearance of the pathologic processes that lead to abdominal pain in paediatric patient of age group 0 to 12 years.

Ultrasound findings were correlated with final diagnosis, which was established by surgical procedure, FNAC or follow-up of the cases.

### **Results & observation:**

In the present study 60 cases of acute abdomen in paediatric age group (0-12years) were evaluated by ultrasound. The results & observation of the study has been summarised & presented under the following heading.

#### **1. Acute appendicitis**

14 cases were found to be having appendicitis. On USG we have found evidence of appendicitis in 10 cases. The findings were: blind ended tubular structure in right iliac fossa with inflamed surrounding & collection in 2 cases. In another 2 cases there are clumped bowel loops forming an appendicular lump. Appendicolith in the base of the appendix was found in one case. The remaining 4 cases were having recurrent appendicitis. On USG of these patient no significant findings were noted

#### **2. Intestinal Ascariasis**

Round worms were noted in 10 cases of pain abdomen. Clumps of round worms are noted in these patients presenting with intermittent abdominal pain. Follow-up of the patient after treatment of antihelminthiasis revealed no worm & no pain.

#### **3. Mesenteric lymphadenitis**

5 cases in our study revealed multiple enlarged lymph nodes in the mesentery. In three of the cases the lymph nodes were matted & showed necrotic areas within. On FNAC of these nodes tuberculosis was confirmed. The other 2 cases revealed non-specific lymphadenitis which were normalised after antibiotic treatment.

#### **4. Acute Cholecystitis**

In our study we have suspected 6 cases of having acute cholecystitis. Two cases revealed calculi in the GB with pericholecystic edema where as four cases were found to be acalculus cholecystitis as

evidenced by only pericholecystic edema with positive Murphy's sign. Bio-chemical correlation revealed 2 of the acalculus cholecystitis patients were actually suffered from hepatitis.

#### **5. Biliary colic**

Five cases revealed worms in the CBD with dilated proximal IHBR. Worms were recognised in USG as two parallel echogenic lines forming a tubular structure. In one case worm was also seen in the GB lumen.

#### **6. Acute pancreatitis**

6 cases in our study were proved to be suffered from acute pancreatitis. Among these patient USG revealed bulky pancreas with decrease echogenicity & ascites in 3 cases where as other 1 case revealed only minimal ascites & peripancreatic edema. In the remaining two cases excessive gas filled bowel loops are noted, so proper evaluation of pancreas could not be done by ultrasound. Bio-chemically these patients were proved to be suffered from acute pancreatitis. The most reliable sign in acute pancreatitis is presence of free fluid in the peritoneal cavity

#### **7. Renal disease**

Calculus was the most common cause of pain abdomen in renal disease. 10 cases were found to have calculi, out of which in 5 patient calculi were present in the upper & mid ureter where as in remaining 5 patient calculi were seen in the vesico-ureteric junction. Variable grade of hydronephrosis were present in these patient

#### **Hollow-viscus perforation**

It was diagnosed in 1 case where the main diagnostic evidence was air as well as fluid in the peritoneal cavity. Air could be detected by USG in one case. Air is seen in the peritoneal cavity as echogenic lines with reverberation artefacts which shifted on patient's position. Echogenic fluid suggestive of exudative collection was found in the peritoneal cavity in one case which on follow-up came to be a case of perforation.



**Fig 1** calculus in GB (cholelithiasis)



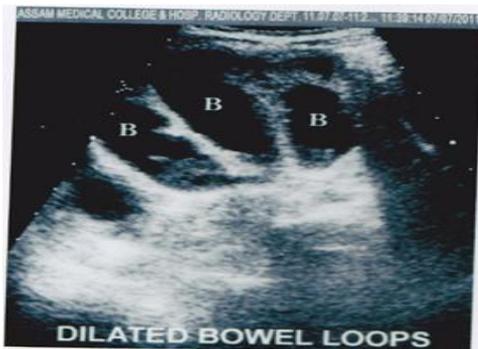
**Fig: 2** dilated & inflammed appendix (appendicitis)



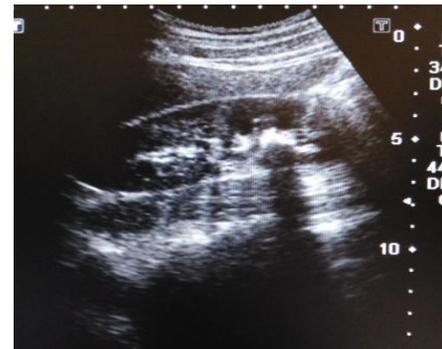
**Fig: 3** round worm in Gall Bladder



**fig: 4** round worm in intestine



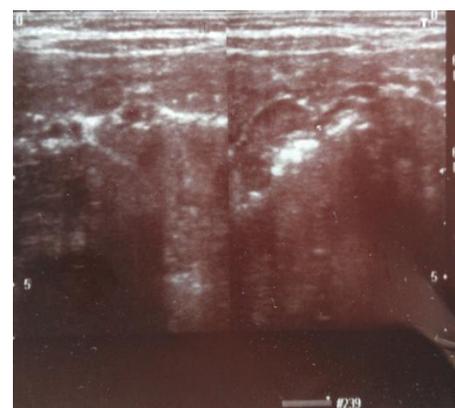
**Fig:5---** dilated bowel loops in intestinal obstruction.



**Fig:6---** renal calculus



**Fig:7** bulky pancreas



**fig:8** mesenteric lymphadenitis

**Table: 1**

Disease	Number of patient suspected by USG	Final diagnosis	% of USG diagnosis
Appendicitis & its complication	10	14	71%
Intestinal Ascariasis	10	10	100%
Mesenteric lymphadenitis	5	5	100%
Acute cholecystitis	6	4	66%
Biliary colic	5	5	100%
Acute pancreatitis	4	6	66%
Renal calculi	10	10	100%
Hollow-viscus perforation	1	2	50%
Non specific pain abdomen		2	

**Discussion**

The ultrasonographic examination provides useful information in the areas of the abdomen viz; the biliary tract, gall bladder, liver, spleen, pelvis and kidneys. USG meets the requirement of multi organ imaging modality in a patient with acute abdomen. USG may confirm or disprove a clinical diagnosis, provide an alternate diagnosis or add miscellaneous information that may be helpful in patient's management.

In our series we have diagnosed 10 cases of appendicitis. In other 4 cases USG did not find any significant evidence of appendicitis which were proved later as recurrent appendicitis. So the sensitivity USG in our study was 71%. Yousef et al <sup>[1]</sup> in 1987 in their study revealed 80% of sensitivity in diagnosis of appendicitis. It is seen that USG is sensitive for acute appendicitis but not for recurrent cases

Mesenteric lymphadenitis may clinically mimic acute appendicitis, intussusception, ovarian torsion, and other causes of acute abdomen <sup>[2,3]</sup> Mesenteric lymphadenitis were found in 5 cases, out of which 3 cases were tuberculosis & other 2 cases were non-specific which were cured after antibiotic treatment. The 3 tubercular lymphadenitis revealed matted & necrotic centre. The diagnosis of lymph node abnormality relies on size & shape criteria. <sup>[4,5]</sup> In our study we have taken the size of 5mm in short axis diameter with proper clinical findings.

In our study we have given the diagnosis of cholecystitis in 6 cases. Out of which 2 cases came to be of hepatitis. So sensitivity is 66%. The most sensitive sign of cholecystitis is presence of cholelithiasis along with Murphey's sign & wall thickness of more than 5mm. USG is 100% sensitive in detection of gall stones which compares well with the study by Simeone et al (1980) <sup>[6]</sup>. Raghavendra et al <sup>[7]</sup> found Gall bladder wall thickness of more than 5mm in 70% of cases, where as we found in 100% cases.

In our series we have diagnosed 4 cases of pancreatitis. 2 cases were missed due to excessive bowel gas. Sensitivity was 66%. According to Sarti et al (1980) <sup>[8]</sup> more than 60% cases revealed diffuse enlargement of gland where we have found it in 75% cases. Echogenicity of the gland was predominantly hypoechoic in 75% cases in our study where Khosla et al found in 50% cases. Only peripancreatic edema leading to ill-defined margin was found in 25% case & it is comparable to Doust et al (1976) <sup>[9]</sup>

Hollow-viscus perforation was diagnosed in 1 case. The main diagnostic criterion is air in the peritoneal cavity along with echogenic fluid. Chen et al <sup>[10]</sup> found 42% sensitivity of USG where as in our study it was 50%

For detection of renal calculus, USG is almost 100% sensitive as in our study which can be compared with Erwin et al <sup>[11]</sup>

### Summery & Conclusion

A total of 60 cases were selected for this study who came to the department of Radiodiagnosis with the complaint of acute abdomen. These patients were evaluated by USG & the probable diagnosis was given which were later correlated with the surgical or biochemical findings. USG is the easily available & cost effective tool which can give valuable information regarding the diagnosis of acute abdomen. It was seen that for detection of renal calculi & intestinal Ascariasis USG was 100% sensitive. Difficulty arises one when there is excessive gas in the bowel.

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