

## Original Research Article

# A study on acute surgical abdomen in paediatric age group

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### ABSTRACT

**Background:** Acute abdomen is common surgical problem therefore it is important to understand its epidemiological and clinical aspects in order to adopt appropriate line of management. It is important to distinguish between causes requiring surgical treatment and those do not. Hence this study is undertaken to recognise the pattern of acute abdomen in paediatric age group.

**Methods:** The present study conducted in paediatric surgery unit of department of surgery, Dr. BRAM Hospital, Raipur, Chhattisgarh, India, during January 2013 to December 2015. Patients were admitted and conservative line of management was started. Routine and specific investigations were done. After proper resuscitation and assessment patients were managed either by conservatively or by appropriate surgical procedures. Postoperative care was done and outcome of the study was noted.

**Results:** In the present study, most of the patients were in the age group of 6-10 years (27.5%) followed by neonates (21.67%). Majority of patients were male. Etiology of acute abdomen was congenital in 21.66% cases and acquired in 78.33% cases. In acquired causes most common was non-penetrating abdominal trauma followed by acute appendicitis. In congenital causes most common was anorectal malformations followed by congenital megacolon. Most common presenting symptom was abdominal pain (83.33%) and vomiting (79.17) while most common sign was tachycardia and tenderness. Inflamed appendix was the most common intraoperative finding (16.67%) and colostomy was the most commonly performed operative procedure (25.57% cases) followed by appendicectomy (19.69%). Fever was most common postoperative complication followed by chest infection. Mortality was higher in operative group (16.67%) as compared to non-operative (9.25%) and neonatal mortality was higher followed by infants.

**Conclusions:** Early diagnosis and prompt intervention is crucial factor to improve the outcome in acute surgical abdomen cases.

**Keywords:** Acute abdomen, Etiology, Paediatric age

### INTRODUCTION

Acute abdomen is itself a difficult and perplexing subject in adults but the difficulty is much more in diagnosis and treatment in paediatric age group. Symptom complex of acute abdomen in children and adults is similar but they differ in metabolic, physiologic response and clinical presentation, their tolerance to surgical trauma,

temperature variation, infection, fluid and electrolyte balance. They have low reserve and narrow range of water and electrolyte balance therefore they tolerate acute stress badly.<sup>1-3</sup>

In spite of the advances in the diagnostic modalities, there is no substitute for clinical examination. It is important to distinguish between causes requiring surgical treatment and those do not.<sup>4,5</sup> Hence this study is undertaken to

recognise the pattern of acute abdomen in paediatric age group. The purpose of present study is to analyse incidence, causative factors, associated congenital anomaly, clinico-pathological presentation, its management and associated morbidity and mortality of acute abdomen in paediatric age group.

## METHODS

Acute abdomen is a common condition presenting in paediatric age group. Present study enrolled all the patients presenting with signs and symptoms of acute abdomen in paediatric surgery unit of department of surgery of Dr. BRAM Hospital, Raipur, Chhattisgarh, India during January 2013 to December 2015. Ethical approval was obtained from institutional ethical committee.

### Inclusion criteria

- All patients presented with signs and symptoms of acute abdomen in paediatric surgery unit
- Age <14 years of age.

### Exclusion criteria

- Cases with mild intestinal colic and mild abdominal pain not showing any definitive feature of acute abdomen and relieved after 24 hours.

1<sup>st</sup> time examination was done at the time of visit, second examination after investigation and the third repeat examination to make final diagnosis. According to common presentation of surgical abdomen, it can be classified into three sub-groups:

**Table 1: Common presentation of surgical abdomen.**

Subgroup	Presentation
1.	Definite local tenderness and spasm usually indicate a focal inflammation.
2.	A palpable distended intestinal loop or a movable solid sausage mass indicates intestinal obstruction.
3.	A resistant and silent abdomen indicates generalised peritonitis. By a soft flat abdomen without the above mentioned signs, patients can be excluded.

Immediately after admission, resuscitation with I.V. fluids started till the hydration and urine output becomes normal. Nasogastric decompression and antibiotics started. Close observation of all parameters like pulse rate, blood pressure, respiratory rate, abdominal girth, bowel sounds and tenderness and guarding was done. The following investigations are carried out CBC, blood grouping, urine routine and microscopy, RBS, urea, creatinine, serum electrolytes in all patients.

Plain X-ray abdomen erect was done in all patients. Special X-rays - invertogram and contrast enemas were done, when required. Ultrasonography of abdomino pelvis was done in most of patients for confirmation of X-ray findings and associated others abnormalities. After proper resuscitation and assessment patients were managed either by conservatively or by appropriate surgical procedure. Postoperative care was done and outcome of the study was noted (in terms of survival and death). The results are tabulated stressing the following points-aetiology, age, sex, symptoms, examination findings, investigations, operative findings, and operative procedures adopted. Data was compiled in MS Excel and checked for its completeness and correctness, and it was analysed.

## RESULTS

In our study acute abdomen contributes 27.27% of admissions in paediatric surgery unit. Most of the patients were in the age group of 6-10 years (27.5%) followed by neonates (21.67%) (Table 2). Majority of patients were male (70%). In neonates, 38% had <37 weeks gestational age and 42% had weight <2.5 kg. Etiology of acute abdomen was congenital in 52 cases (21.66%) and acquired in 188 cases (78.33%). In acquired causes most common was non-penetrating abdominal trauma (15%) followed by acute appendicitis (12.5%). (Table 3) In congenital causes most common was anorectal malformations (10.8%) followed by congenital megacolon (5%). Most common presenting symptom was abdominal pain (83.33%) and vomiting (79.17) (Table 4) while most common sign was tachycardia (75%) and tenderness (58.33%). (Table 5)

**Table 2: Age wise distribution of cases.**

Age group	No of cases	percentage
0-1 month	52	21.67
1 month- 1 year	12	5
1-3 year	24	10
3-6 years	44	18.33
6-10 years	66	27.50
10-14 years	42	17.33

On investigating 65% patients were found anaemic and 54% patients had abnormal WBC count. X-ray shows pneumo-peritoneum in only 50% of cases of perforation peritonitis. And Ultrasonography was positive in 53.57% cases (Table 6). Out of 240 cases 132 patients (55%) underwent operative procedure while 108 cases (45%) were managed conservatively. Inflamed appendix was the most common intraoperative findings (16.67%) and colostomy was the most commonly performed operative procedure (25.57% cases) followed by appendectomy (19.69%). (Table 7). Exploratory laparotomy was done in 90 cases and transverse abdominal incision was used in 90% cases. Out of 132 operated patients 50 (37.88%) had fever postoperatively followed by chest infection in 44 (33.33%) (Table 8).

**Table 3: Distribution of cases according to aetiology.**

Etiology	No of cases	Percentage
<b>Inflammatory</b>		
Acute appendicitis	30	12.5
Primary peritonitis	4	1.66
Necrotising enterocolitis	8	3.33
perforation peritonitis	16	6.66
Acute gastroenteritis	18	7.5
Urinary tract infection	14	5.83
Acute gastritis	4	1.66
Jejuno-ileitis	4	1.66
miscellaneous	6	2.5
<b>Acute mechanical obstruction</b>		
Anorectal malformation	26	10.8
Adhesions	6	2.5
Intussusception	4	1.66
Bowel atresia	8	3.33
Malrotation	4	1.66
Congenital megacolon	12	5.0
Meckel's diverticulum	2	0.83
Koch's abdomen	8	3.33
Congenital hypertrophic pyloric stenosis	8	3.33
miscellaneous	12	5.0
<b>Traumatic</b>		
Penetrating	10	4.16
Non penetrating	36	15.0
<b>Vascular</b>	-	-

**Table 4: Distribution of cases according to symptoms.**

Symptoms	No of cases	Percentage
Abdominal distension	142	60
Abdominal pain	200	83.33
Vomiting	190	79.17
Excessive cry	72	30
Loose stool	40	16.67
Fever	76	31.67
Not passing flatus and motion	126	52.51
Blood in stool	6	0.025

**Table 5: Distribution of cases according to signs.**

Signs	No of cases	Percentage
Tachycardia	180	75
Dehydration	100	41.67
Shock	40	16.67
Tenderness	140	58.33
Guarding	136	56.6
Rigidity	90	37.5
Lump abdomen	8	3.33
Absent bowel sound	56	23.33
Signs of established sepsis	50	20.84
Positive per rectal examination	30	12.5

**Table 6: Distribution of cases according to investigations.**

Investigations	No of cases	Percentage
<b>Hemoglobin (gm/dl)</b>		
>11	84	35
mild 8-11	124	51.67
Moderate 6-8	22	9.67
Severe <6	10	4.16
Total	240	
<b>WBC count</b>		
Normal	110	45.83
Abnormal		
High	100	41.67
Low	30	12.5
Total	240	
<b>X-ray in hollow viscous perforation</b>		
Normal	8	50
Abnormal	8	50
Total	16	
<b>Ultrasound</b>		
Positive	60	53.57
Negative	52	47.43
<b>Total</b>	<b>112</b>	

**Table 7: Distribution of cases according to operative procedures.**

Operative procedure	No of cases	Percentage
Resection and anastomosis	12	9.09
Colostomy	34	25.57
Primary repair of perforation	14	10.60
Appendectomy	26	19.69
Ladd's procedure	4	3.03
Exploratory laparotomy with lavage	8	6.06
Cut back anoplasty	6	4.54
Ramstedt's pyloromyotomy	8	6.06
Release of adhesion	2	1.50
Ileostomy	14	10.6
Splenectomy	2	1.50
Suprapubic cystostomy	2	1.50

**Table 8: Distribution of cases according to postoperative complications.**

Complications	No of cases	Percentage
Fever	50	37.88
Shock	16	12.12
Septicaemia	16	12.12
Chest infection	44	33.33
Wound infection	26	19.69
Wound dehiscence	12	9.09
Fistula	2	1.51
Diarrhoea	14	10.60
Anastomotic leak	2	1.51

Postoperative wound infection was found in 26 (19.69%) patients who were mainly in patients with contaminated peritoneum 24 (92.3%). In our study mortality was higher in operative group (16.67%) as compared to nonoperative (9.25%) and neonatal mortality was higher followed by infants (Table 9).

**Table 9: Mortality according to age group.**

Age group	No of cases	Mortality	percentage
0-1 month	52	20	38.46
1 month - 1 year	12	2	20
1-3 year	24	2	7.7
3-6 year	44	2	4.76
6-10 year	66	6	9
10-14 year	42	0	0

## DISCUSSION

Acute abdomen is common surgical problem therefore it is important to understand its epidemiological and clinical aspects in order to adopt appropriate line of management. The incidence of acute abdomen was 5.4% with male to female ratio 2.3:1 in study done by Erkan T et al.<sup>6</sup>

In our study, aetiology of acute abdomen was congenital in 21.66% and acquired in 78.33%. In acquired causes most common was non-penetrating abdominal trauma (15%) followed by acute appendicitis (12.5%). Acute abdomen due to blunt injury abdomen was the most common cause due to fast development of traffic and lack of traffic sense in this area. In inflammatory causes acute gastroenteritis was second most common cause after appendicitis which correlates with the study done by Alexander K.C. et al.<sup>1</sup> In congenital causes most common was anorectal malformations (10.8%) followed by congenital megacolon (5%).

Most common presenting symptom was abdominal pain (83.33%) and vomiting (79.17) which correlates with the Chana RS et al.<sup>3</sup> Evaluation of pain in terms of duration, location, mode of onset and character helps in making diagnosis. Parietal pain is sharper and better localised. Abdominal pain that persist for 6 hours and more with severe intensity increases the likelihood of surgical causes. Vomiting may occur due to severity of pain or because of disease in gastrointestinal tract. When abdominal pain precedes vomiting chances of surgical cause is more.<sup>3</sup> Content and colour of vomiting is also significant in making diagnosis of acute abdomen.

Most common sign was tachycardia (75%) which is an established fact (Julian Britton).<sup>7</sup> It may be due to inflammation, infection, fever, septicaemia, hypovolemia, pain in abdomen, diffuse peritonitis etc. Tenderness was the second most common sign of acute abdomen (58.33%).<sup>3</sup> It may be localised or diffuse. Rebound tenderness was the most important sign which

was present in 20% patients in this study. It is best elicited by percussion. Guarding was present in 56.67% patients. It is due to reflex contraction of muscle of the abdominal wall when the examining hand palpates it and thus causes pain. Rigidity which was due to involuntary increase in the resting tone of the muscles of the abdominal wall was present in 37.5% cases.

On investigating 65% patients were found anaemic. Anaemia doesn't itself affect the outcome in otherwise healthy patient.<sup>4</sup> Healing is impaired by conditions often associated with anaemia such as malnutrition, abnormalities of circulating blood volume and increased blood viscosity following trauma. Anaemia should be corrected preoperatively if possible, low haematocrit can't be tolerated in stressed children. White blood count was normal in 45.83% and abnormal in only 54% patients. This could be due to the fact that most of the patients are partially treated and on medication, some are undernourished and having low immunity. Plain x-ray abdomen was normal in 66.67% patients of acute abdomen. In hollow viscous perforation group, plain x-ray abdomen was positive in 50% cases and in rest 50% plain X-ray was unable to detect pneumo-peritoneum preoperatively which is comparable with the result of Simeone et al.<sup>8</sup> Absence of pneumoperitoneum in hollow viscous perforation may be explained by the position of patient during radiography, sealing of perforation, lack of gas at the site of perforation, adhesion around the perforation or early presentation.<sup>8</sup> Ultrasonography was consistent with intraoperative findings in 53.57% cases and negative in rest 47.43%. Because of non-invasive nature, cost effectiveness and non-exposure to radiation sonography has become a highly reliable tool in diagnosis of acute abdomen in children but its use and proper interpretation is necessary since it is highly operator dependent.<sup>9,10</sup>

In our study 55% underwent operative procedure while 45% were managed conservatively. Most of the blunt injuries, acute gastroenteritis and renal causes are managed conservatively. Study done by Overbo KK et al shows 37% surgical intervention done.<sup>11</sup> Inflamed appendix was the most common intraoperative findings (16.67%) and colostomy was the most commonly performed operative procedure (25.57% cases) followed by appendectomy (19.69%).<sup>6</sup>

During exploratory laparotomy transverse abdominal incision was used in 90% cases. Transverse incision is gold standard for paediatric patients as wound dehiscence rate is very low, easy access to the entire peritoneal cavity and healing occurred with minimal scarring.<sup>12</sup> Postoperatively 37.88% had fever followed by chest infection in 33.33%. Most of the early postoperative fever is caused by inflammatory stimulus of surgery and resolves spontaneously.<sup>7</sup> Pulmonary complications are due to incomplete recovery of chest function, prolonged hospital stay, intubation complications and prolonged surgery.<sup>5</sup> Lungs are not completely developed at birth and

new bronchi and alveoli develop until age 8 years. Pulmonary complications are more in anaemic patients (72.73%). Postoperative wound infection was found in 19.69% patients who were mainly in patients with contaminated peritoneum (92.3%) and in neonates. Wound dehiscence rate was 9.6%, more in malnourished, underweight patients with gastrointestinal emergency surgery and dirty contaminated wound and who had postoperative abdominal distension for longer period.<sup>12-14</sup>

In our study mortality was higher in operative group (16.67%) as compared to nonoperative (9.25%) and neonatal mortality was higher followed by infants. Mortality was higher in patients with congenital anomalies like gastroschisis and exomphalos than acquired group. Mortality in postoperative period was mainly due to sepsis (75%), shock (75%), respiratory distress and toxemia which could be due to delayed presentation. Early surgery was advocated to decrease morbidity and mortality.<sup>2</sup>

## CONCLUSION

Present study concludes that inflammatory causes like acute appendicitis and gastroenteritis are more common cause of acute abdomen followed by mechanical intestinal obstruction. Early diagnosis and intervention are crucial factors to arrest disease process and improving the outcome. The findings of present study will be helpful by giving idea of common etiologies, presentations and outcome.

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