

Analytical Study of Surgical Abdomen in Pediatric Subjects: An Institutional Based Study

Jitendra Kumar¹, Sourabh Kumar Jain^{2*}

¹Assistant Professor, Department of Paediatrics, K. D. Medical College, Hospital & Research Center, Mathura, Uttar Pradesh, India.

^{2*}Assistant Professor, Department of General Surgery, K. D. Medical College, Hospital & Research Center, Mathura, Uttar Pradesh, India.

ABSTRACT

Background: Acute abdominal pain is one of the most frequent pediatric emergencies, accounting for nearly 5–10% of emergency visits. Although many cases are benign, a significant proportion require urgent surgical evaluation, most commonly for appendicitis or hernia-related complications.

Materials & Methods: This study included 100 children aged 1 month to 17 years, divided into traumatic and non-traumatic groups. Clinical data, imaging findings, and laboratory parameters were analyzed using SPSS version 20.0 to identify surgical causes of acute abdomen.

Results: The mean age of the children was 11.3 years, with a slight male predominance (56%). Acute appendicitis (70.7%) was the leading non-traumatic cause, while multiple organ injury (36%) was the most common traumatic finding, followed by intestinal and liver trauma.

Conclusion: Acute abdomen in children often necessitates prompt surgical attention, with appendicitis being the primary non-traumatic cause and multi-organ involvement in traumatic

cases. Early diagnosis and intervention remain vital for reducing morbidity and improving recovery outcomes.

Key words: Surgical, Abdomen, Children.

*Correspondence to:

Dr. Sourabh Kumar Jain,
Assistant Professor,
Department of General Surgery,
K. D. Medical College, Hospital & Research Center,
Mathura, Uttar Pradesh, India.

Article History:

Received: 06-02-2019, Revised: 27-02-2019, Accepted: 20-03-2019

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.2.075	

INTRODUCTION

Acute abdominal pain (AP) is among the most frequent reasons for patients seeking medical attention in emergency departments (ED) and outpatient settings, accounting for approximately 5–10% of all ED consultations.¹

Clinically, acute AP is characterized as nontraumatic abdominal pain lasting up to five days. The underlying causes span a wide spectrum—from mild, self-limiting conditions to severe, potentially life-threatening pathologies. Prompt and accurate diagnosis is crucial, as it facilitates timely and appropriate management, thereby improving patient outcomes and reducing the risk of complications. Etiologically, acute AP can be broadly categorized into urgent and nonurgent causes. Urgent conditions demand immediate intervention—typically within 24 hours or sooner when ischemia is suspected—to prevent progression to critical illness, while nonurgent causes may not necessitate such rapid management.²

The etiology of acute AP varies according to age and sex, making age-based classification a practical approach for refining differential diagnosis and optimizing diagnostic testing, imaging selection, and definitive treatment planning. Among nonsurgical

causes, the five most common diagnoses include upper respiratory tract infections (either isolated or accompanied by otitis media or sinusitis) in 23.7% of cases, abdominal pain of undetermined origin (15.4%), gastroenteritis (15.4%), constipation (9.4%), and urinary tract infection (8%).³ Although most emergency visits for acute abdominal pain are due to benign, self-limiting conditions, a surgical cause is identified in up to 20% of cases. Among infants under one year, the leading surgical diagnoses include incarcerated inguinal hernia (45.1%) and intussusception (41.9%), whereas these conditions are rare in older children.^{4–6}

Hence, the present study was conducted to analyse surgical abdomen in pediatric subjects.

MATERIALS & METHODS

The present study was conducted on children aged between one month and seventeen years. 100 children were selected and categorized into two groups—traumatic and non-traumatic. The non-traumatic group included children presenting with acute abdominal conditions not related to trauma but necessitating

surgical intervention, whereas the traumatic group comprised patients who developed acute abdominal pain secondary to traumatic injuries.

Demographic details such as age, gender, presenting symptoms, and clinical signs were retrieved from hospital case sheets. Information regarding etiological factors, laboratory findings including total leukocyte count (TLC), differential count (DC), C-reactive protein (CRP), and imaging outcomes such as ultrasonography (USG) and computed tomography (CT) scans of the abdomen were recorded.

Data pertaining to admission and discharge times, daily progress, and in the traumatic group, additional biochemical parameters including amylase, lipase, alanine aminotransferase (ALT), aspartate aminotransferase (AST), total protein, and albumin-globulin ratio were documented. Categorization of the traumatic etiologies was done based on injured organ. All statistical analyses were performed using Microsoft Excel spreadsheets and the Statistical Package for the Social Sciences (SPSS) software, version 20.0.

RESULTS

The mean age of the children presenting with acute abdominal conditions was 11.3 years, indicating a predominance of cases in

the older pediatric population. Out of a total of 100 subjects, 56% were boys and 44% were girls, demonstrating a slight male preponderance. This distribution suggests that acute abdominal emergencies were marginally more frequent among male children compared to females.

The most common surgical finding was acute appendicitis, accounting for 70.7% of all non-traumatic cases, making it the leading cause of acute abdomen in children. Incarcerated inguinal hernia constituted the second most frequent etiology (21.3%), followed by intussusception (5.3%) and hollow viscus perforation (2.7%). These findings highlight that inflammatory and obstructive causes were predominant among non-traumatic acute abdominal conditions requiring surgical intervention.

The majority of patients (36%) had multiple organ injuries, reflecting the high impact of blunt abdominal trauma. Intestinal or colonic trauma was observed in 24% of cases, followed by liver injuries (20%), while spleen and kidney trauma each accounted for 8% of cases.

Pancreatic injury was comparatively rare, observed in 4% of patients. These results indicate that abdominal trauma in children frequently involves multiple organs, with the liver and intestines being the most commonly affected solid and hollow viscera respectively.

Table 1: Demographic data

Variable	Number	Percentage (%)
Mean age (years)	11.3 years	
Boys	56	56
Girls	44	44

Table 2: Surgical findings in Non-Traumatic Group (n = 75)

Findings	Number of Cases (n)	Percentage (%)
Acute appendicitis	53	70.7
Incarcerated hernia	16	21.3
Intussusception	4	5.3
Perforation	2	2.7
Total	75	100%

Table 3: Surgical findings in Traumatic Group (n = 25)

Findings	Number of Cases (n)	Percentage (%)
Multiple organ injuries	9	36
Intestine/colon trauma	6	24
Liver trauma	5	20
Spleen trauma	2	8
Kidney trauma	2	8
Pancreas trauma	1	4
Total	25	100

DISCUSSION

An acute abdomen refers to the sudden onset of severe abdominal pain resulting from an underlying intra-abdominal pathology that frequently necessitates prompt surgical intervention. It represents a medical and surgical emergency, demanding rapid assessment and management to prevent potentially life-threatening complications. In pediatric practice, acute abdomen remains one of the most challenging and distressing presentations encountered by clinicians. The difficulty arises not only from the broad spectrum of possible etiologies—

ranging from inflammatory and infectious processes to obstructive or traumatic causes—but also from the unique physiological and communicative limitations of children, which can obscure classical symptoms and delay diagnosis. Early recognition and timely surgical evaluation are therefore crucial in improving outcomes and reducing morbidity among pediatric patients presenting with this condition.⁷⁻¹⁰ Hence; the present study was conducted to analyse surgical abdomen in pediatric subjects.

In the present study, the mean age of the children presenting with acute abdominal conditions was 11.3 years, indicating a

predominance of cases in the older pediatric population. Out of a total of 100 subjects, 56% were boys and 44% were girls, demonstrating a slight male preponderance. This distribution suggests that acute abdominal emergencies were marginally more frequent among male children compared to females. The most common surgical finding was acute appendicitis, accounting for 70.7% of all non-traumatic cases, making it the leading cause of acute abdomen in children. Incarcerated inguinal hernia constituted the second most frequent etiology (21.3%), followed by intussusception (5.3%) and hollow viscus perforation (2.7%). These findings highlight that inflammatory and obstructive causes were predominant among non-traumatic acute abdominal conditions requiring surgical intervention. The majority of patients (36%) had multiple organ injuries, reflecting the high impact of blunt abdominal trauma. Intestinal or colonic trauma was observed in 24% of cases, followed by liver injuries (20%), while spleen and kidney trauma each accounted for 8% of cases. Pancreatic injury was comparatively rare, observed in 4% of patients. These results indicate that abdominal trauma in children frequently involves multiple organs, with the liver and intestines being the most commonly affected solid and hollow viscera respectively. van Ramshorst GH et al, in a previous study, identified major risk factors for abdominal wound dehiscence in the pediatric population. Patients younger than aged 18 years who developed abdominal wound dehiscence in three pediatric surgical centers during the period 1985–2005 were identified. For each patient with abdominal wound dehiscence, four controls were selected by systematic random sampling. Patients with (a history of) open abdomen treatment or abdominal wound dehiscence were excluded as control subjects. Putative relevant patient-related, operation-related, and postoperative variables for both cases and control subjects were evaluated in univariate analyses and subsequently entered in multivariate stepwise logistic regression models to identify major independent predictors of abdominal wound dehiscence. A total number of 63 patients with abdominal wound dehiscence and 252 control subjects were analyzed. Mean presentation of abdominal wound dehiscence was at postoperative day 5 (range, 1–15) and overall mortality was 11%. Hospital stay was significantly longer ($p < 0.001$) in the case group (median, 42 vs. 10 days). Major independent risk factors for abdominal wound dehiscence were younger than aged 1 year, wound infection, median incision, and emergency surgery. Incisional hernia was reported in 12% of the patients with abdominal wound dehiscence versus 3% in the control group ($p = 0.001$). Abdominal wound dehiscence is a serious complication with high morbidity and mortality. Median incisions should be avoided whenever possible.¹¹ Balachandran B et al summarized management of acute abdomen in children. The goal of emergency management is to identify and treat any life-threatening medical or surgical disease condition and relief from pain. In mild cases often the cause is gastritis or gastroenteritis, colic, constipation, pharyngo-tonsillitis, viral syndromes or acute febrile illnesses. The common surgical causes are malrotation and Volvulus (in early infancy), intussusception, acute appendicitis, and typhoid and ischemic enteritis with perforation. Lower lobe pneumonia, diabetic ketoacidosis and acute porphyria should be considered in patients with moderate-severe pain with little localizing findings in abdomen. The approach to management in ED should include, in order of priority, a rapid cardiopulmonary

assessment to ensure hemodynamic stability, focused history and examination, surgical consult and radiologic examination to exclude life threatening surgical conditions, pain relief and specific diagnosis. In a sick patient the initial steps include rapid IV access and normal saline 20 ml/kg (in the presence of shock/hypovolemia), adequate analgesia, nothing per oral/IV fluids, Ryle's tube aspiration and surgical consultation. Continuous monitoring and repeated physical examinations should be done in all cases. Specific management varies according to the specific etiology.¹² Lambropoulos V et al revealed uncommon surgical causes found during surgery in children who were misdiagnosed as acute appendicitis. Eight hundred twenty children have undergone appendectomy. In six children another uncommon cause of the symptoms was revealed during surgery. In one patient the cause was a duplication cyst of the terminal ileum, in two patients an omental torsion, in one patient a meckel diverticulum torsion, in one patient a splenic rupture and in one patient a retroperitoneal tumor. All of the patients were successfully managed during the first operation. The possibility of other uncommon causes of right quadrant abdominal pain should always be kept in mind, especially when there is a negative appendicitis.¹³

CONCLUSION

Acute abdomen in children encompasses a wide range of surgical emergencies, with acute appendicitis emerging as the most common non-traumatic cause and multiple-organ involvement predominating in traumatic cases. Early diagnosis and timely surgical intervention are crucial to reducing morbidity and improving outcomes in pediatric patients presenting with acute abdominal conditions.

REFERENCES

1. Jesudason EC, Walker J. Rectal examination in paediatric surgical practice. *Br J Surg.* 1999;86:376–78.
2. Suri S, Gupta S, Sudhakar PJ, Venkataramu NK, Sood B, Wig JD. Comparative evaluation of plain films, ultrasound and CT in the diagnosis of intestinal obstruction. *Acta Radiol.* 1999; 40: 422–28.
3. Zhou H, Cheng W. Primary peritonitis in children. *Ann Coll Surg HK.* 2000;4:53–6.
4. John SD. Trends in pediatric emergency imaging. *Radiol Clin North Am.* 1999;37:995–1034.
5. Axelrod DA, Sonnad SS, Hirschl RB. An economic evaluation of sonographic examination of children with suspected appendicitis. *J Pediatr Surg.* 2000;35:1236–1241.
6. Bachoo P, Mahomed AA, Ninan GK, Youngson GG. Acute appendicitis: the continuing role for active observation. *Pediatr Surg Int.* 2001;17:125–128.
7. Toorenvliet BR, Bakker RF, Flu HC, Merkus JW, Hamming JF, Breslau PJ. Standard outpatient re-evaluation for patients not admitted to the hospital after emergency department evaluation for acute abdominal pain. *World J Surg.* 2010;34(3):480–486.
8. Abu-El-Hajja M, Lin TK, Palermo J. Update to the management of pediatric acute pancreatitis: highlighting areas in need of research. *J Pediatr Gastroenterol Nutr.* 2014;58(6):689–693.
9. Frank B, Gottlieb K. Amylase normal, lipase elevated: is it pancreatitis? A case series and review of the literature. *Am J Gastroenterol.* 1999;94(2):463–469.

10. Yang RW, Shao ZX, Chen YY, Yin Z, Wang WJ. Lipase and pancreatic amylase activities in diagnosis of acute pancreatitis in patients with hyperamylasemia. *Hepatobiliary Pancreat Dis Int.* 2005;4(4):600–603.
11. van Ramshorst GH, Salu NE, Bax NM, Hop WC, van Heurn E, Aronson DC, Lange JF. Risk factors for abdominal wound dehiscence in children: a case-control study. *World J Surg.* 2009 Jul;33(7):1509-13.
12. Balachandran B, Singhi S, Lal S. Emergency management of acute abdomen in children. *Indian J Pediatr.* 2013 Mar; 80(3): 226-34.
13. Lambropoulos V, Papageorgiou I, Kepertis C, Sfoungaris D, Spyridakis I. Uncommon Surgical Causes of Right Lower Quadrant Pain In Children. Single Center Experience. *J Clin Diagn Res.* 2015 May;9(5):PR01-3.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Jitendra Kumar, Sourabh Kumar Jain. Analytical Study of Surgical Abdomen in Pediatric Subjects: An Institutional Based Study. *Int J Med Res Prof.* 2019 Mar; 5(2):319-22. DOI:10.21276/ijmrp.2019.5.2.075