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Abdominal Pain in Children: Clinical Spectrum and the Challenge of Recognizing Surgical Causes

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Abstract

***Background*:** Abdominal pain is common and may have surgical or non-surgical causes. Clinical manifestations can be nonspecific, particularly in younger children, and surgical pathology may remain unrecognized. This study evaluated diagnoses among children with abdominal pain requiring surgical assessment after assessment.

***Methods*:** An observational study was conducted at Pakistan Air Force Hospital Base Faisal and Base Masroor, Karachi, from September 2024 to December 2025. Children aged 1–12 years with abdominal pain whose cause remained uncertain after clinical assessment and investigations were consecutively enrolled for surgical consultation. Diagnoses and management were categorized as surgical or non-surgical. Data were analyzed descriptively.

***Results*:** Eighty-four children included: 49 (58.3%) boys and 35 (41.7%) girls. Fifty-one (60.7%) were aged 1–5 years. Nonspecific abdominal pain was most frequent (21, 25.0%), followed by constipation (16, 19.0%), urinary tract infection (8, 9.5%), and mesenteric lymphadenitis (7, 8.3%). Appendicitis occurred in 4 (4.8%) children. Eight (9.5%) required surgical or procedural intervention; 7 (8.3%) underwent surgery and 1 (1.2%) underwent hydrostatic reduction.

***Conclusion*:** Most children were managed conservatively; however, surgical pathology was identified in 9.5%. Careful assessment, appropriate investigations, repeated examination, and surgical consultation are important.

Keywords: Abdominal pain in children, acute abdomen, differential diagnosis, surgical emergencies, pediatric surgery, diagnostic challenges.

1. INTRODUCTION

Abdominal pain is one of the most common clinical presentations in children in emergency and outpatients, and represents a diagnostic challenge because of its broad spectrum of surgical and non-surgical causes. Although most episodes are self-limiting and related to conditions such as constipation, gastroenteritis, viral illness, or other medical disorders, a small proportion may indicate potentially serious surgical pathology requiring timely intervention [1, 2]. The clinical presentation may be nonspecific, particularly in younger children, and symptoms can overlap considerably between surgical and medical conditions. Initially, a benign-appearing presentation, may occasionally mask appendicitis, intussusception, incarcerated hernia, intestinal obstruction, or other potential surgical causes. History and repeated clinical examination are central to the evaluation of abdominal pain in children, particularly when the initial diagnosis remains uncertain. When the clinical picture remains unclear despite serial assessment over 12-24 hours, further investigations, including ultrasonography, may be warranted to identify evolving pathology. This approach supports the importance of timely reassessment of children with persistent abdominal pain beyond 24 hours, particularly to avoid missing potential surgical conditions [3].

Although non-surgical conditions account for the majority of acute abdominal pain presentations in

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children, surgical and procedural conditions may still occur among children with initially uncertain diagnoses. Their recognition requires careful clinical assessment, appropriate investigations, and timely pediatric surgical consultation to facilitate appropriate observation, procedural management, or operative treatment when indicated [4, 5].

This study therefore aimed to evaluate the spectrum of surgical and non-surgical causes of abdominal pain among children whose pain and underlying etiology remained unresolved following initial clinical assessment and baseline investigations and who subsequently required pediatric surgical evaluation, while highlighting the importance of timely recognition of potentially serious surgical conditions.

2. METHODOLOGY

This observational study was conducted at the Department of Pediatrics and Pediatric surgery, PAF Hospital Faisal and Masroor Base, Karachi, following approval from the Institutional Review Board (IRB) from September 2024 to December 2025.

2.1. Inclusion and Exclusion Criteria

Children were included if they met all of the following criteria:

- Age 1–12 years.
- Presented with abdominal pain through the emergency department or outpatient services.
- The underlying cause remained unidentified after detailed history, physical examination, and appropriate baseline investigations and initial management. (Blood cp, Urine analysis, and the Ultrasound of abdomen).
- The treating pediatrician requested pediatric surgical consultation to exclude a possible surgical cause.
- A final diagnosis could be established following clinical evaluation and appropriate investigations.

Patients were excluded if they met any of the following criteria:

- A definitive medical or surgical diagnosis was established during the initial assessment.
- Clinical information was incomplete.

2.2. Sampling

All consecutive patients fulfilling the eligibility criteria during the study period were enrolled using consecutive sampling. Demographic characteristics, including age and sex, were recorded. Clinical findings, relevant investigations, pediatric surgical assessment, final diagnosis, and subsequent management were documented.

Following pediatric surgical consultation, further clinical evaluation and investigations were performed as clinically indicated. Final diagnoses were classified as surgical or non-surgical according to the underlying etiology and definitive management. Surgical and procedural interventions included appendicectomy, management of cholecystitis, repair of incarcerated hernia, treatment of testicular torsion, and hydrostatic reduction of intussusception. Patients without an indication for surgical or procedural intervention were managed conservatively with appropriate medical treatment, supportive care, and clinical observation by Pediatrician.

2.3. Data Analysis

Data were entered, cleaned, and analyzed using SPSS v26. Descriptive statistics were used to summarize demographic and clinical characteristics. Continuous variables such as age were expressed as mean ± standard deviation or median with interquartile range, depending on data distribution. Categorical variables, including sex, diagnosis, diagnostic category, and management, were presented as frequencies and percentages.

Inferential statistics were used to assess associations between demographic or clinical characteristics and the final diagnostic category (surgical versus non-surgical).

2.4. Study Outcomes

The primary outcome was the identification and distribution of surgical and non-surgical causes of abdominal pain among children referred for pediatric surgical evaluation because the diagnosis remained uncertain following initial clinical assessment. Particular emphasis was placed on identifying potentially serious surgical conditions requiring timely intervention.

Secondary outcomes included demographic characteristics, presenting clinical features, investigations contributing to the final diagnosis, and subsequent management.

3. RESULTS

A total of 84 children with abdominal pain met the study criteria and were evaluated following pediatric surgical consultation. Of these, 51 (60.7%) children were between 1 and 5 years of age, while 33 (39.3%) were between 5 and 12 years. The younger age group comprised 32 (62.7%) boys and 19 (37.3%) girls, whereas the older age group included 17 (51.5%) boys and 16 (48.5%) girls. Overall, the study population consisted of 49 (58.3%) boys and 35 (41.7%) girls (Table **1**).

Table 1: Demographic characteristics of children included in the study (n = 84).

Age group	Male n (%)	Female n (%)	Total n (%)
1–5 years	32 (62.7)	19 (37.3)	51 (60.7)
5–12 years	17 (51.5)	16 (48.5)	33 (39.3)
Overall	49 (58.3)	35 (41.7)	84 (100)

The final diagnoses demonstrated a broad spectrum of surgical and non-surgical causes of abdominal pain. Nonspecific abdominal pain was the most frequent diagnosis, occurring in 21 (25.0%) patients, followed by constipation in 16 (19.0%), urinary tract infection in 8 (9.5%), and mesenteric lymphadenitis in 7 (8.3%). Other diagnoses included pneumonia in 5 (6.0%), cholecystitis/hepatitis in 4 (4.8%), acid peptic disease in 4 (4.8%), typhoid in 4 (4.8%), appendicitis in 4 (4.8%), pancreatitis in 3 (3.6%), abdominal tuberculosis in 3 (3.6%), subacute intestinal obstruction secondary to adhesions in 2 (2.4%), intussusception in 1 (1.2%), incarcerated hernia in 1 (1.2%), and testicular torsion in 1 (1.2%) (Table **2**).

Table 2: Final diagnoses among children referred for pediatric surgical evaluation (n = 84).

Final Diagnosis	n	%
Nonspecific abdominal pain	21	25
Constipation	16	19
Urinary tract infection	8	9.5
Mesenteric lymphadenitis	7	8.3
Pneumonia	5	6
Cholecystitis/hepatitis	4	4.8
Acid peptic disease	4	4.8
Typhoid	4	4.8
Appendicitis	4	4.8
Pancreatitis	3	3.6
Abdominal tuberculosis	3	3.6
Sub-acute intestinal obstruction secondary to adhesions	2	2.4
Intussusception	1	1.2
Incarcerated hernia	1	1.2
Testicular torsion	1	1.2
Total	84	100

Most children were managed conservatively following establishment of the final diagnosis. Four children with appendicitis underwent appendicectomy, while one child with cholecystitis and one with an incarcerated hernia underwent surgical treatment. One child with testicular torsion also required surgical management. One child with intussusception was successfully treated by hydrostatic reduction. Thus, 8 (9.5%) patients required surgical or procedural intervention, while 76 (90.5%) were managed conservatively with appropriate treatment and clinical observation (Table **3**).

Table 3: Management of children according to final diagnosis (n = 84).

Management	Specific intervention	n (%)
Surgical/ procedural intervention	Appendicectomy	4 (4.8)
	Surgical treatment of cholecystitis	1 (1.2)
	Repair of incarcerated hernia	1 (1.2)
	Surgery for testicular torsion	1 (1.2)
	Hydrostatic reduction of intussusception	1 (1.2)
Total surgical/procedural intervention		**8 (9.5)**
Conservative management	Medical treatment, supportive care and observation	**76 (90.5)**
Total		**84 (100)**

These findings demonstrate a broad clinical spectrum of abdominal pain in children referred for pediatric surgical evaluation. Although most patients had non-surgical conditions, 9.5% had surgical or procedural conditions requiring intervention, highlighting the importance of careful clinical assessment and timely pediatric surgical evaluation in children with persistent or diagnostically uncertain abdominal pain.

4. DISCUSSION

Abdominal pain is a common presentation in children and remains a diagnostic challenge because a wide range of surgical and non-surgical conditions may produce overlapping clinical manifestations. In the present study, 84 children aged 1–12 years with abdominal pain of initially unidentified etiology were evaluated following

pediatric surgical consultation. The findings demonstrated a broad spectrum of underlying causes, with non-surgical conditions accounting for the majority of cases [6]. Nevertheless, 8 (9.5%) children had surgical conditions requiring intervention, emphasizing the importance of maintaining an appropriate index of suspicion for surgical pathology even when the overall likelihood of surgical disease is relatively low. Pediatric abdominal pain has a broad differential diagnosis, and although most cases are self-limiting or non-surgical, potentially serious surgical conditions may initially present with nonspecific or overlapping features, making careful clinical assessment and timely recognition important [1, 7].

Nonspecific abdominal pain was the most common diagnosis in our study, accounting for 21 (25.0%) patients. This finding is consistent with previous literature showing that a substantial proportion of children presenting with abdominal pain do not receive a specific identifiable diagnosis and can often be managed conservatively [8, 9]. These children were generally clinically stable, without features suggesting an acute surgical abdomen, and improved with conservative management and observation. Constipation was the second most frequent diagnosis, occurring in 16 (19.0%) patients. As reported in other studies, constipation is well recognized as a common cause of abdominal pain in childhood, with studies demonstrating that it accounts for a substantial proportion of abdominal pain presentations in children [8, 10]. In our study, appropriate dietary advice, including increased fluid and fibre intake, together with medical treatment where indicated, resulted in clinical improvement.

Other non-surgical diagnoses included urinary tract infection, mesenteric lymphadenitis, pneumonia, cholecystitis/hepatitis, acid peptic disease, typhoid, pancreatitis, and abdominal tuberculosis. Urinary tract infection was identified in 8 (9.5%) children and was managed according to the clinical presentation and relevant laboratory and microbiological findings. Mesenteric lymphadenitis was diagnosed in 7 (8.3%) children, with ultrasonography contributing to the diagnosis in relevant cases. Mesenteric lymphadenitis is a recognized cause of acute abdominal pain in children and may clinically mimic acute appendicitis, particularly when pain is localized to the right lower quadrant [1]. The presence of pneumonia and urinary tract infection also illustrates that abdominal pain in children may arise from extra-abdominal or non-gastrointestinal conditions, emphasizing the importance of considering a broad differential diagnosis during evaluation [1, 10].

The findings highlight an important clinical principle: the relatively low proportion of children with surgical disease should not result in complacency during assessment. Surgical conditions may initially present with nonspecific, atypical, or evolving symptoms, particularly during the early stages of disease [7]. Appendicitis, intestinal obstruction, incarcerated hernia, testicular torsion, and intussusception can progress rapidly if not recognized and appropriately managed. Careful reassessment and repeated clinical examination are therefore important when the diagnosis remains uncertain after the initial assessment. Although surgical conditions represented a minority of the diagnoses, their potential morbidity makes their timely recognition particularly important. Appendicitis was the most frequent surgical diagnosis in our series, occurring in 4 (4.8%) patients. All four underwent appendicectomy and had an uneventful recovery. The diagnosis was established through integration of clinical assessment with relevant laboratory and ultrasonographic findings, an approach supported by pediatric appendicitis literature emphasizing clinical assessment together with selective imaging in establishing the diagnosis. Early pediatric surgical consultation and continued clinical assessment are particularly important because the presentation of abdominal surgical emergencies in children may be variable and challenging to recognize.

Other operative conditions included cholecystitis, incarcerated hernia, and testicular torsion, with one patient diagnosed with each condition. All three patients underwent operative treatment and recovered without reported postoperative complications. These conditions are recognized pediatric surgical emergencies in which timely diagnosis and appropriate intervention are important. One child was diagnosed with intussusception and was successfully treated with hydrostatic reduction, avoiding operative intervention [7]. Non-operative enema reduction, including hydrostatic reduction, is an established treatment for appropriately selected children with intussusception and can avoid surgery when successful.

Accordingly, 8 (9.5%) children required surgical or procedural intervention: 7 (8.3%) underwent operative treatment and 1 (1.2%) underwent a non-operative procedure. This distinction is important because not all conditions requiring intervention necessarily require surgery and provides a more accurate representation of the management burden associated with the surgical and procedural diagnoses identified in this cohort [1, 7].

5. CONCLUSION

Most children with abdominal pain had non-surgical causes, but a small yet important number had surgical conditions requiring timely intervention. Careful

assessment, appropriate investigations, repeated examination, and early pediatric surgical consultation are essential to avoid delayed diagnosis and potentially serious complications.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board (FRPMC-IRB-2024-66). Informed consent was obtained from the parents of the participating children.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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AUTHOR CONTRIBUTIONS

NR: Conceptualization, study design, supervision, data collection, data analysis and writing.

MM: Data curation, writing original draft and editing.

NA: Data collection and writing original draft.

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