



Causes and Management of Acute Abdominal Pain in Children: A Review Article

**May Abdullah S. Alanazi^{1#}, Abdulaziz Muslih Muhaylan Alsharari^{2†},
Ibrahim Awadh R. Alanazi^{2†} and Abdulaziz Mashan R. Alanazi^{2†}**

¹*Pediatric Infectious Disease, Maternity & Pediatric Hospital of Arar, Saudi Arabia.*

²*Northern Border University, Arar, Saudi Arabia.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Acute abdominal pain is one of the commonest prevalent grievances in children, and it frequently requires emergency room diagnosis and management. Abdominal pain in children differs with age, concomitant symptoms, and pain site. While most cases of acute abdominal embarrassment are self-limiting and benevolent, there are certain diseases that can be life-threatening and necessitate instant care, such as appendicitis, intussusception, or intestinal obstruction. To decide the cause of acute abdominal pain and recognize children with surgical conditions, scrupulous history taking and numerous physical checkups are mandatory. The most important and realistic first goal in the evaluation of acute AP is to distinguish between surgical and nonsurgical situations, which are further divided into urgent and non-urgent categories. A thorough history and physical examination, laboratory investigations to evaluate comorbidity, and imaging scans are usually used for these purposes. Management decisions should necessitate teamwork between the emergency room physician, a surgeon, and a radiologist. Consecutive reassessment and symptomatic treatment with hardworking follow-up are necessary for management as soon as possible in urgent disorder.

[#]Consultant;

[†]Medical intern;

*Corresponding author: E-mail: Dr_mai1987@hotmail.com;

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1. INTRODUCTION

Acute abdominal discomfort is a common and difficult problem for pediatricians to deal with. It accounts for 5%–10% of all visits to the emergency room [1].

Acute abdominal pain (AP) is the pain that occurs without a traumatic cause and lasts no more than 5 days. It can also be caused by a wide range of illnesses, from minor and self-limiting to life-threatening. Early and correct diagnosis allows for better management and, as a result, better outcomes and a lower risk of morbidity. There are two types of causes for acute AP: urgent and non-urgent. To avoid consequences, urgent causes require quick treatment (within 24 hours or sooner if accompanied with ischemia), but non-urgent causes do not require fast treatment [2].

Assessing acute abdominal discomfort is a condition that necessitates exceptional clinical judgement. Children's capacity to provide an accurate history may be limited. A faulty diagnosis can have disastrous consequences, either by failing to act when action is required or by ordering unneeded tests and procedures. Early on, the practitioner should determine whether the stomach discomfort is acute or chronic, as this will help determine the therapeutic urgency [3].

The severity of the sickness and whether there is a potential surgical cause of stomach pain should be the focus of the initial assessment of acute abdominal pain [4].

Abdominal pain can be caused by a variety of conditions. Gastroenteritis is the most common medical cause, and appendicitis is the most common surgical cause which vary in frequency depending on age and gender. In the acute surgical abdomen, pain usually comes before vomiting, whereas in medical situations, the opposite is true. Gastroenteritis or food poisoning are frequently linked to diarrhea. Any child experiencing discomfort in the right bottom quadrant should be suspected of having appendicitis [5].

While the majority of emergency visits presenting with severe abdominal pain are self-limited and benign medical diagnoses, up to 20% of them may have a surgical origin. The most common

surgical cause in non-traumatic instances of acute abdomen in children under the age of one year was incarcerated inguinal hernia (45.1 %), followed by intussusception (41.9 %).

Acute appendicitis (64.0 %), incarcerated hernia (7.5 %), trauma (16.3 %), intussusception (6.3 %), intestinal blockage (1.3 %), are the most prevalent reasons of acute surgical diagnosis in children over the age of one year [6].

Acute AP remains a severe diagnostic problem, despite growing use of diagnostic laboratory and imaging modalities. As previously indicated, the underlying causes of acute AP differ by age group. As a result, there is a wide range of diagnostic and therapy options available. Children have significant hurdles due to nonspecific symptoms, a lack of classical presentation in many cases, and the difficulty of undertaking a thorough and reliable examination [7].

Medical history, physical examination, and test findings have a higher sensitivity for distinguishing between urgent and non-urgent diseases than for particular diagnoses [8,9].

As a result, it is extremely reasonable to develop an evidence-based easy decision-making method for practitioners to employ when facing children with acute AP who required urgent diagnoses because any delay may have a major effect on the outcome.

1.1 Study Objectives

To summarize the updated evidence regarding the causes and management of acute abdominal pain in children.

2. PATHOPHYSIOLOGY

Visceral (splanchnic) pain, parietal (somatic) pain, and referred pain are the three types of abdominal pain.

When noxious stimuli damage a viscus, such as the stomach or intestines, visceral pain ensues. Visceral pain fibres are stimulated by tension, stretching, and ischemia. Nerve endings become more sensitive as a result of tissue congestion and inflammation, and the threshold for stimulation is lowered. Visceral pain is frequently dull, poorly localised, and felt in the midline

because visceral pain fibres are bilateral, unmyelinated, and enter the spinal cord at several levels.

The epigastrium is where pain from foregut structures (e.g., lower oesophagus, stomach) is usually felt. Periumbilical pain is caused by midgut tissues (such as the small intestine), while lower abdomen discomfort is caused by hindgut structures (such as the large intestine).

The stimulation of the parietal peritoneum causes parietal discomfort. Pain from ischemia, inflammation, or straining of the parietal peritoneum is communicated to specific dorsal root ganglia on the same side and at the same dermatomal level as the source of the pain via myelinated afferent fibres. Coughing or movement might worsen parietal discomfort, which is usually acute, strong, distinct, and confined.

Referred pain shares many of the same characteristics as parietal pain, but it is felt in far-flung locations that are supplied by the same dermatome as the afflicted organ. It stems from the fact that afferent neurons from many locations share core pathways. Because the T9 dermatome distribution is shared by the lung and the abdomen, a patient with pneumonia who also has stomach pain is a classic case [10].

3. ETIOLOGY AND CAUSES

Abdominal pain can be caused by a variety of factors, making diagnosis difficult. A comprehensive history and physical examination can usually restrict the range of possible diagnosis. It's possible that more tests will be needed to confirm the diagnosis.

Hemorrhage, blockage, or perforation of the gastrointestinal tract or intra-abdominal organs are common causes of life-threatening abdominal discomfort, and they may be linked with specific clinical characteristics [11,12]. Other clinical symptoms separate extra-abdominal causes of abdominal discomfort (such as diabetic ketoacidosis, hemolytic uremic syndrome, and myocarditis). Gastroenteritis, constipation, systemic viral disease, infections beyond the gastrointestinal tract (e.g., streptococcal pharyngitis, lower lobe pneumonia, and urinary tract infection), mesenteric lymphadenitis, and infantile colic are all common causes of stomach pain [13- 17].

3.1 Acute Appendicitis

The most prevalent surgical cause of severe abdominal pain in children is acute appendicitis [12,15]. Periumbilical pain is common in children with appendicitis. It is visceral, nonspecific, and poorly localised. As the underlying peritoneum becomes irritated, the discomfort increases intense between 6 to 48 hours [18].

3.2 Abdominal Trauma

Abdominal trauma can result in solid organ hemorrhage or laceration, intestinal perforation, vascular injury-induced organ ischemia, and intramural hematoma. Penetrating damage is less prevalent than blunt abdominal trauma. Motor vehicle accidents, falling down, and child maltreatment are all common trauma mechanisms [19].

3.3 Intestinal Obstruction

Constipation is a common symptom of intestinal blockage. This symptom is frequently associated with significant intra-abdominal diseases that necessitate immediate diagnosis and treatment. Intussusception, malrotation with midgut volvulus, necrotizing enterocolitis, incarcerated inguinal hernia, and surgical adhesions are all causes of intestinal blockage [15].

3.4 Gastroenteritis

In children, gastroenteritis is the most prevalent medical cause of stomach pain [20]. Before diarrhea, children with acute gastroenteritis may experience a fever, intense cramping abdominal pain, and broad abdominal discomfort. The most common causes include viruses such as rotavirus, Norwalk virus, adenovirus, and enterovirus [20]. In youngsters, bacteria and parasites can cause severe stomach pain.

3.5 Constipation

Constipation in children is commonly accompanied by faecal impaction and severe lower abdominal pain. Children who have fewer than three stools per week, fecal incontinence, huge stools perceptible in the rectum or through the abdominal wall, retentive posturing, or painful defecation are more likely to have constipation [21].

3.6 Mesenteric lymphadenitis

Because mesenteric lymph nodes are frequently seen in the right lower quadrant, this condition can occasionally be mistaken for appendicitis, with the exception that the pain is more widespread [22].

3.7 Peptic Ulcer Disease

In the pediatric population, gastric and duodenal ulcers are infrequent [23]. Peptic ulcers are characterized as either primary or secondary when they occur. Primary ulcers: develop in the duodenum or pyloric channel without any predisposing conditions. They are particularly common in older children and teenagers who come from a loving home.

3.8 Infantile Colic

Colic in infants, especially those with hypertonic characteristics, can cause significant abdominal pain. Colic causes newborns to wail in fits and starts and to draw their knees up against their abdomen. During the first three to four weeks of life, colic is alleviated by the passage of flatus or feces [24].

3.9 Intussusception

When a proximal segment of the intestine telescopes into the lumen of a distal section, this occurs. The intussusception usually occurs in the ileocecal region. Infants between the ages of 3 and 12 months are most commonly affected. The incidence is highest between the ages of 5 and 7 months [24].

3.10 Inflammatory Bowel Disease

This category includes ulcerative colitis and Crohn's disease. Ulcerative colitis; affects the rectum and expands proximally, with a relapsing, remitting course and diffuse inflammation of the intestinal mucosa [24].

3.11 Viral Hepatitis

The viral hepatitis include A, B, C, D, and E. Hepatitis A virus: remains a significant etiology of acute viral hepatitis and jaundice, particularly in developing countries, in travelers to those countries, and in sporadic food-borne outbreaks in developed countries [24].

3.12 Abdominal Trauma

Abdominal trauma accounted for 3% of admissions to pediatric trauma centers,

according to a multi-center prospective research [25]. Penetrating or blunt are the most common classifications. In the case of a hazy or inconsistent history, occult blunt abdominal trauma should always be investigated. In blunt trauma, the liver, spleen, and kidneys are the most often injured intra-abdominal organs. The majority of liver and spleen blunt injuries are treated without surgery.

3.13 Pulmonary

In the pediatric population, primary respiratory diseases such as pneumonia or empyema can cause stomach pain. Recurrent pneumonia in children is mainly caused by a specific predisposition, such as immune and leukocyte function disorders, ciliary function disorders, anatomical anomalies, or certain genetic illnesses like cystic fibrosis [26].

3.14 Functional Abdominal Pain

Non-specific abdominal pain is another name for functional abdominal discomfort, which is frequently chronic or recurrent. On the basis of genetic predisposition, visceral hyperalgesia is the end result of sensitizing medical and psychosocial events [27,28].

Children between the ages of 5 and 14 are most commonly affected. Estimates of prevalence range from 10% to 30% in school-aged children to 87 percent in some gastrointestinal clinics [29].

3.15 Functional Dyspepsia

Postprandial fullness, early satiation, epigastric discomfort, or burning not linked with defecation are defined as one or more of the following annoying sensations on at least four days per month. After a thorough examination, the symptoms are found to be unrelated to any other medical issue [27]

3.16 Irritable Bowel Syndrome

Two months previous to diagnosis, three requirements must be met: [27] Abdominal pain that occurs at least four times per month and is linked to one or more of the following: change in stool frequency, change in stool form, associated with defecation. When a youngster has constipation, the pain does not go away when the constipation goes away. After a thorough examination, the symptoms are found to be unrelated to any other medical problem.

4. EVALUATION

The evaluation of acute AP includes a thorough history and physical examination and often will also involve laboratory tests and/or imaging studies.

In patients who appear ill, as discussed subsequently, the initial evaluation step is consultation with a surgeon who should direct the initial diagnostic steps to make a decision regarding whether the patient should be taken to the operating room. Likewise, the evaluating provider should make liberal use of consultation with a radiologist when contemplating the best imaging studies for a particular patient concern as the radiologist not only has expertise in this area but also knowledge of the local experience and capabilities.

In the evaluation of a child with acute abdominal pain, the most important components are careful history taking and repeated physical examinations.

4.1 History Taking

Important details of the history include symptom onset pattern, progression, location, intensity, characters, precipitating and relieving factors of abdominal pain, and associated symptoms. Age of the patient is a key factor in the evaluation of acute abdominal pain as listed in Table 2. Other important historical variables include recent abdominal trauma, previous abdominal surgery, and a thorough re-view of systems [4-6,10].

Pain relief after a bowel movement suggests a colonic condition, and improvement in pain after vomiting may occur with conditions localized to the small bowel. In surgical abdomen, abdominal pain generally precedes vomiting, and vomiting precedes abdominal pain in medical conditions. Any infants and children presenting with bilious vomiting should be presumed to have bowel obstruction.

5. PHYSICAL EXAMINATIONS

Careful physical examination is essential for accurate diagnosis in children with acute abdominal.

5.1 History Taking

The pattern of symptom start, progression, location, intensity, characters, abdominal pain triggering and relieving events, and related

symptoms are all important aspects of the history. The age of the patient is an important factor in determining the severity of acute abdominal discomfort. Recent abdominal trauma, past abdominal surgery, and a full system review are all crucial historical variables [30,31,32].

Pain alleviation after a bowel movement may indicate a colonic disorder, while pain relief after vomiting may indicate conditions affecting the small bowel. In surgical abdomens, abdominal pain usually precedes vomiting, while in medical situations, vomiting usually precedes stomach pain. Any infants or children who have bilious vomiting should be suspected of having a gastrointestinal obstruction.

5.2 Physical Examinations

In children with acute stomach pain, a thorough physical examination is required for an accurate diagnosis. The external genitalia, testes, anus, and rectum should all be examined as part of the abdominal pain evaluation. Furthermore, in sexually active female adolescents, pelvic examination is critical [39]. appearance in general: Patients with visceral pain change positions often, often writhing in anguish, whereas children with peritoneal irritation stay still or oppose movement.

1. Vital signs: Vital signs are useful in assessing hypovolemia and provide useful clues for diagnosis. Fever indicates an underlying infection or inflammation including acute gastroenteritis, pneumonia, pyelonephritis, or intra-abdominal abscess. Tachypnea may indicate pneumonia. Tachycardia and hypotension suggest hypovolemia or third-space volume loss.
2. Abdominal examination: The evaluating physician should gently palpate the abdomen moving toward the area of maximal tenderness. The physician has to make efforts to determine the degree of abdominal tenderness, location, rebound tenderness, rigidity, distension, masses, or organomegaly.
3. A rectal examination: provides useful information about sphincter tone, presence of masses, stool nature, hematochezia, or melena [33]

5.3 Investigations

To assess the patient's physiological status and provide an accurate diagnosis, specific

laboratory investigations and radiologic evaluations are helpful [34]. In all patients with acute abdominal pain, a complete blood cell count and urinalysis are recommended. The evaluation of the patient's hydration status and acid-base balance is aided by the measurement of serum glucose and electrolytes.

Ultrasound and computed tomography are commonly utilized in the emergency department to determine the origin of abdominal pain [35, 36]. Despite the fact that computed tomography is more accurate than ultrasound, ultrasonography is the recommended imaging modality for a preliminary assessment of many probable causes of paediatric abdominal discomfort because it is noninvasive, radiation-free, and less expensive [36].

6. MANAGEMENT OF ACUTE ABDOMINAL PAIN IN CHILDREN AND ADOLESCENTS

When the underlying reason can be discovered, treatment should be focused on it. While the treatment of each individual ailment is beyond the scope of this paper, there are a few general issues worth discussing. While the patient is being stabilised with adequate hydration and pain treatment, an immediate consultation with a specialist speciality such as surgery, gynaecology, or urology is required in patients with a strong suspicion of a surgical problem. Discharge from the ED or acute care clinic with education on concerning signs and symptoms and very thorough follow-up is often a safe method with children after surgical and urgent medical diseases have been ruled out. Discharged children should be in good health, with normal vital signs and oxygen saturations, as well as adequate pain treatment. Children who do not satisfy these requirements or who look to be more than slightly unwell should be admitted to the hospital for ongoing monitoring and reevaluation. Reevaluation as an inpatient or outpatient is required until the discomfort is relieved. Reevaluation should be done if the pain gets worse or if new symptoms appear.

In general, paediatric patients are at risk of receiving inadequate analgesia [37]. Providers are frequently worried that powerful analgesia (e.g., opioids) may mask symptoms and lead to complications and increased morbidity in the setting of acute AP. A number of prospective, randomised studies have found that using analgesia sparingly can improve diagnosis

accuracy by allowing for a more complete physical examination [38] Opioids appear to be effective in treating acute AP in children without delaying diagnosis [38].

Opioids were not linked to an increased risk of perforation or abscess in children with acute appendicitis, according to a systematic review and meta-analysis [37]. However, the investigation indicated that children were frequently given doses that were insufficient to produce effective analgesia [37] As a general rule, effective pain control should be a treatment objective, and this looks to be safe, especially when the patient's state is reevaluated frequently.

In the absence of a confirmed diagnosis, first empiric therapy based on symptoms may be undertaken in individuals classified as having non-urgent medical issues. Acid suppression is a reasonable first step for people with upper AP, and it is compatible with the standard therapy pathway for patients with persistent upper AP or dyspepsia Patients with a history of constipation, such as fewer frequent stools, hard or painful stools, or palpable stool in the left lower quadrant, may be treated with a stool softener or osmotic laxative, or given an enema in an intensive care setting to check if discomfort improves with a stool.

Finally, in the absence of constipation, antispasmodic medicine can be used to alleviate lower AP or cramp, more distributed pain. In all patients treated symptomatically, close monitoring and reevaluation of response are essential.

7. CONCLUSION

Acute stomach pain is one of the most prevalent complaints in children, and it commonly necessitates emergency room diagnosis and treatment. Although most cases of acute abdominal discomfort are self-limiting and benign, there are some illnesses that can be life-threatening and require immediate attention, such as appendicitis, intussusception, or intestinal obstruction. To determine the source of acute stomach pain and identify children with surgical problems, meticulous history taking and frequent physical examinations are required. The most significant and realistic first goal in the evaluation of acute AP is to distinguish between surgical and nonsurgical situations, which are further divided into urgent and nonurgent

categories. A thorough history and physical examination, laboratory testing to assess comorbidity, and imaging scans are commonly used to do this. Work-up and management decisions in an ill-appearing patient should require teamwork between the acute setting provider, a surgeon, and a radiologist. Serial reevaluation and symptomatic treatment with diligent follow-up are the pillars of management once an urgent condition has been ruled out.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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