REVIEW ARTICLE

Abdomen in Distress:
Modern Approaches to Acute Abdominal Emergencies

Reviewed by:

Dr. Mukul Rastogi

MBBS, MD (Gen. Med.), DNB (Med.), DM (Gastro),
Director of Hepatology and Gastroenterology,
Head – Liver Transplant (Medicine),
Fortis Hospital, Noida

Introduction

Definition and Classification of Acute Abdominal Pain

Acute Abdominal Pain (AAP) is a frequent complaint in the emergency setting, often benign but occasionally linked to life-threatening conditions requiring urgent intervention. Etiologies are diverse, including infections, inflammation, vascular occlusion, bowel obstruction, or rupture of a viscous. Patients commonly present with sudden pain, sometimes accompanied by fever, nausea, vomiting, or distension.[1]

Incidence varies by age and sex. In children, the most frequent nonsurgical diagnosis include respiratory infections (23.7%), pain of uncertain etiology (15.4%), gastroenteritis (15.4%), constipation (9.4%), and urinary tract infection (8%). Surgical causes occur in up to 20% of cases; in infants, incarcerated inguinal hernia (45.1%) and intussusception (41.9%) predominate.[2]

Burden on Healthcare Systems

Abdominal pain contributes to 7–10% of emergency visits and 5–10 million encounters annually in the U.S. Nearly 9% of pediatric primary care consultations are due to AAP. While nonspecific pain and renal colic account for ~60% of cases, diverticulitis and cholecystitis dominate in older adults, whereas appendicitis and renal colic are more common in younger patients.[1,3] Epidemiological studies show a male predominance (62.6%) and rapid presentation, with 72.2% seeking care within 8 hours of pain onset. Common causes include appendicitis, cholecystitis, pancreatitis, intestinal obstruction, peritonitis, urinary tract infections, and gynecologic/obstetric conditions.[4]

Multicenter European data highlight substantial healthcare burden: among 28,085 adults ≥20 years with AAP, 39.8% required hospitalization, 33.9% had pre-outpatient care visits (48.6% of whom were admitted), and 62.7% sought post-outpatient care follow-up within 30 days. Revisits were more common in elderly patients, while pre-outpatient care users had fewer revisits. In-hospital mortality was 3.1%.[5]

Pathophysiology of Acute Abdominal Pain

AAP results from mechanical, inflammatory, and neurogenic mechanisms affecting visceral and somatic structures.[1]

- **Smooth Muscle Spasm:** Spasms of hollow viscera can produce colicky pain, e.g., intestinal wall spasm, biliary spasm postprandially, esophageal spasm in GERD, or ureteric spasm during stone passage, often with nausea and vomiting.[6]
- **Visceral Pain Receptors:** Located in serosa, mesentery, muscle, and mucosa, they are stimulated by stretch, distension, ischemia, or traction. Pain is conveyed by C-fibers, poorly localized, and corresponds to foregut, midgut, or hindgut regions.[1,7]
- **Somatoparietal Pain Receptors:** Found in parietal peritoneum, muscle, and skin, they transmit sharp, localized pain via A-δ fibers.[1,7]
- **Referred Pain:** Due to convergence of visceral and somatic afferents, pain may be perceived in distant somatic regions, e.g., gallbladder pain in the scapula or cardiac pain in the arm.[1,7]

Diagnostic Strategies

Diagnosis requires integration of history, examination, and imaging.[1]

Clinical Assessment and Imaging

Clinical evaluation remains essential but limited by atypical presentations and variability in assessment. Imaging is central:

- **Plain Radiography:** Inexpensive, accessible, low radiation but low sensitivity.
- **Ultrasound:** Widely available, radiation-free, and recommended as first-line imaging; accuracy depends on operator. CT is reserved for inconclusive ultrasound.[8]
- **CT:** Highly sensitive and specific, improves early diagnosis but raises concerns about radiation, cost, and contrast risks.

Differential Diagnosis

Causes span multiple systems:

- **Vascular:** Abdominal aortic aneurysm, mesenteric ischemia
- **GI:** Appendicitis, obstruction, perforated ulcer, diverticulitis, pancreatitis
- **Urologic:** Renal infarction, pyelonephritis
- **Gynecologic:** Ectopic pregnancy, ovarian torsion, PID
- **Systemic/Miscellaneous:** Diabetic ketoacidosis, lead poisoning, sickle cell disease, malignancy[1,7]

Therapeutic Landscape: Management Approaches

Non-Pharmacological Treatment

Cognitive Behavioral Therapy (CBT), acupuncture, spinal manipulation, and exercise can improve pediatric chronic pain, with long-term benefit through neural modulation.[9]

Mind-Body Therapies

CBT: It is based on the link between thoughts, emotions, and behaviors, emphasizing how perception of a situation influences emotional, behavioral, and physiological responses. It involves coping and distraction strategies, relaxation techniques, identifying and changing pain-related thoughts, and modifying family responses to pain. Therapy may include the child alone or with family participation and can be delivered face-to-face or remotely. The family-focused approach aims to reduce environmental factors reinforcing pain behavior and address elements that may trigger it.

Meditation: Meditation is a mental training technique designed to enhance psychological capacities such as attention and emotional self-regulation. Practices include transcendental meditation, mindfulness-based stress reduction, and mindfulness-based cognitive therapy, with mindfulness meditation receiving the most focus in neuroscience. In clinical and research settings, mindfulness is defined as non-judgmental attention to present experiences, requiring regulation of attention and openness to experiences. This approach helps adolescents adaptively attend to pain.

Traditional Health System

Acupuncture: Acupuncture, a traditional East Asian medical practice, involves inserting small needles at specific body points. Related methods include electroacupuncture, acupressure, moxibustion, laser stimulation, and non-invasive electrical stimulation of acupoints. Though its mechanisms remain unclear, studies suggest acupuncture may normalize activity in the limbic system ("pain matrix"), stimulate endorphin release, and influence acid secretion, gastrointestinal motility, and visceral pain through opioid peptide release in the central and enteric nervous system.

Yoga: Yoga has shown benefits for children, improving emotional control, anxiety, and depression, and reducing pain linked to abdominal disorders. A study in 20 children aged 8–18 years with inflammatory bowel syndrome or abdominal pain demonstrated reduced severity and frequency of pain after 10 sessions of yoga. Continued home practice for three months maintained these improvements, though underlying conditions remained unchanged.

Manual Therapy

Massage: Therapeutic massage, including techniques such as compression, trigger points, petrissage, tapotement, and effleurage, has been associated with pain relief in pediatric patients with chronic conditions, including abdominal disturbances. It is considered a reasonable adjuvant therapy, reducing pain, discomfort, distress, and mood alterations.

Spinal Manipulation: The effectiveness of spinal manipulation in abdominal disorders is controversial. Some studies report improvement in children with abdominal pain, while systematic reviews found insufficient evidence for its efficacy in infant colic, citing low-quality studies and inconsistent recommendations.[9]

Pharmacological Treatment

Used after non-pharmacological options, with monitoring for side effects. Potential agents include antispasmodics, antidepressants, antihistamines, anti-reflux drugs, calcium channel blockers, serotonin antagonists, laxatives, antibiotics, and hormones.

- **Antispasmodics:** Antispasmodics like peppermint oil significantly reduced pain in pediatric IBS patients compared to placebo. Mebeverine and trimebutine showed inconsistent or limited effectiveness. Drotaverine, as per clinical evidence, proved most effective, markedly reducing the frequency of pain episodes.
- **Antihistamines:** Cyproheptadine reduced pain frequency/intensity, though studies were small and methodologically limited. Long-term follow-up confirmed effectiveness in 73% and safety in 68%.

- **Antibiotics:** Rifaximin and Cotrimoxazole showed no significant pediatric benefit. Having a role in infective (bacterial) etiology, viral diarrhea is self-limited and needs good hydration.
- **Proton Pump Inhibitors:** Indicated mainly for dyspeptic symptoms due to action in acidic gastric environment.[9]

Antispasmodics in Acute Abdominal Emergencies

Antispasmodics act as smooth muscle relaxants or anticholinergics, reducing spasms and pain. Agents include Hyoscine butylbromide, Dicyclomine, Mebeverine, Otilonium bromide, Alverine citrate/simethicone, Pinaverium bromide, Phloroglucinol, Drotaverine, and Peppermint oil.

- **Hyoscine butylbromide:** Selective muscarinic blockade, reduces visceral pain in IBS.
- **Dicyclomine:** Non-selective muscarinic antagonist, decreases abdominal pain, spasms, and IBS symptoms.
- **Mebeverine:** Calcium channel blocker with anti-cholinergic activity, relieves pain and bloating.
- **Drotaverine:** Potent and directly acting smooth muscle relaxant, effective without anticholinergic side effects.[10,11]

Drotaverine in Acute Management: Injectable Formulation

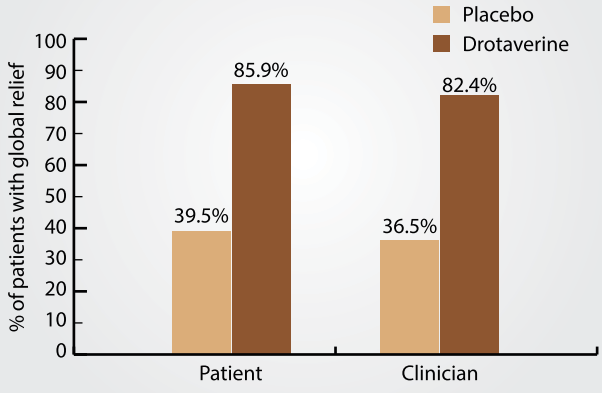
Drotaverine, an antispasmodic drug, is highly effective in the acute management of smooth muscle spasms, particularly in its injectable form. Administered intramuscularly or intravenously, it offers rapid relief for conditions such as renal colic, biliary colic, and intestinal spasms. Clinical studies demonstrate Drotaverine's efficacy in reducing pain associated with acute renal colic, comparable to Diclofenac, with a favorable safety profile. The injectable formulation, typically 40 mg for children and some for adults, acts quickly by inhibiting PDE-4, relaxing smooth muscles in the gastrointestinal, urinary, and biliary tracts. It is especially valuable in emergency settings due to its fast onset, often alleviating pain within minutes.[12,13]

Follow-Up and Maintenance Therapy with Oral Drotaverine

Drotaverine shows incomplete and variable oral absorption, with bioavailability ranging from 24.5% to 91%. Its mechanism of action involves inhibition of PDE-4, leading to increased intracellular cAMP levels and subsequent smooth muscle relaxation. Clinically, an oral dose of 80 mg is generally well tolerated and associated with fewer side effects compared to anticholinergic agents.[14]

A randomized multicenter trial (Rai *et al.*) in 180 IBS patients showed that Drotaverine (80 mg TID for 4 weeks) reduced pain frequency/severity, improved stool frequency, and enhanced global relief compared to placebo, with good tolerability (Fig.1)[11] A Chinese trial (Xue *et al.*) confirmed significant improvements in pain, stool frequency, and Bristol score, though QoL was unchanged; adverse events were minimal.[10]

Figure 1: Global assessment of relief



Combination therapy with antispasmodics, dietary changes, stress management, and probiotics may improve outcomes.[11] Clinical trials have demonstrated that the combination of Drotaverine with Mefenamic acid provides superior analgesic efficacy compared to either agent alone. The combination achieves rapid onset of pain relief through the antispasmodic action of Drotaverine, alongside sustained analgesic and anti-inflammatory effects from Mefenamic acid.[15]

Pediatric Considerations: Drotaverine Suspension

Formulation/Dosing: Ages 4–6: 10 mL suspension (20 mg) TID × 4 weeks. Ages >6: 40 mg tablet TID × 4 weeks. Dosing was flexible based on timing of pain episodes.

Clinical Applications/Safety: Effective in reducing recurrent abdominal pain in children, with no serious adverse effects. Also proven effective in adult renal colic and IBS. Mechanism involves PDE-4 inhibition and smooth muscle relaxation without anticholinergic effects.[16]

Overall Safety, Tolerability, and Future Directions

Drotaverine is safe, well tolerated, and suitable for pediatric and adult use, provided hypersensitivity and severe hepatic/renal impairment are excluded. Monitoring ensures safety in prolonged use.[16]

Future directions include personalized medicine, novel spasmolytics, and advanced formulations to improve adherence. Drotaverine sets a benchmark for safety and efficacy in abdominal pain management and holds potential for broader applications in gut–brain axis disorders.[17]

Conclusion

Acute abdominal pain, often colicky or severe, poses a diagnostic and therapeutic challenge due to its diverse etiologies, ranging from benign conditions like gastroenteritis to emergencies such as appendicitis or perforated viscus. Effective management relies on rapid diagnosis through clinical evaluation, imaging, and laboratory tests to identify the underlying cause. Initial treatment prioritizes pain relief with analgesics like NSAIDs or opioids, tailored to pain severity and etiology, alongside management of symptoms like nausea or dehydration. Nonpharmacologic approaches, such as positioning or hydration, complement medical therapy.

Non-anticholinergic antispasmodics, like Drotaverine, are vital for managing colicky pain by relaxing gastrointestinal smooth muscle. Drotaverine, a highly effective antispasmodic, selectively inhibits PDE4, promoting smooth muscle relaxation and delivering reliable relief from gastrointestinal spasms without anticholinergic side effects like dry mouth or urinary retention. Available in age-specific formulations, such as oral suspension for younger children and tablets for older patients, Drotaverine is well-tolerated and suitable for various spastic conditions. The choice of drug, including Drotaverine, is critical for alleviating symptoms, enhancing patient comfort, and supporting diagnostic clarity.

References

1. Kopitnik NL, Kashyap S, Dominique E. Acute Abdomen. [Updated 2025 Feb 15]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025 Jan-.
2. Hijaz NM, Friesen CA. Managing acute abdominal pain in pediatric patients: current perspectives. *Pediatric Health Med Ther.* 2017;8:83–91.
3. Cervellin G, Mora R, Ticinesi A, Meschi T, Comelli I, Catena F, Lippi G. Epidemiology and outcomes of acute abdominal pain in a large urban Emergency Department: retrospective analysis of 5,340 cases. *Annals of translational medicine.* 2016 Oct;4(19):362.
4. Sabir F, Hanif S, Gardezi F, Saeed M, Bibi R, Haider S. Admission with acute abdomen: presentation, conditions identified and management outcomes. *J Ayub Med Coll Abbottabad.* 2024 Jan-Mar;36(1):165-169.
5. Verleger K, Fischer-Rosinsky A, Möckel M, Schneider A, Slagman A, Keil T, Schenk L; INDEED Research Group. Health care utilization of patients with acute abdominal pain before and after emergency department visits. *Scand J Trauma Resusc Emerg Med.* 2024 Aug 12;32(1):68.
6. https://wbhf.walterbushnell.com/publications/bush-beats/item/8-smooth-muscle-spasm-management
7. Allen S, Wallis DC. Acute abdominal pain. *InnovAiT.* 2023;17(1):39-48.
8. Kiani F, Meshkati Yazd SM, Zarimeidani F, *et al.* Diagnostic Value of Physical Examination, Ultrasound, and Radiography Compared to Computed Tomography in the Evaluation of Nontraumatic Left Lower Quadrant Acute Abdominal Pain. *Emerg Med Int.* 2025;2025:1681801. Published 2025 Jun 9.
9. Santos, M.L.C., da Silva Júnior, R.T., de Brito, B.B., da Silva, F.A.F., Marques, H.S., de Souza Gonçalves, V.L., Dos Santos, T.C., Cirne, C.L., Oliveira, N., Oliveira, M.V. and de Melo, F.F., 2022. Non-pharmacological management of pediatric functional abdominal pain disorders: Current evidence and future perspectives. *World Journal of Clinical Pediatrics,* 11(2), p.105.
10. Al Ghamdi K, Albluwi N, Alammari A, Alibrahim H, Al-Thabet A, Radhi J, Alnamshah F, Alghamdi K, Alshammari N, Ghalib S, Al Dawood A. The Efficacy and Safety of Antispasmodic Agents in the Management of Irritable Bowel Syndrome: A Systematic Review. *Journal of Health Science.* 2023;3:167-80.
11. Rai RR, Dwivedi M, Kumar N. Efficacy and safety of drotaverine hydrochloride in irritable bowel syndrome: a randomized double-blind placebo-controlled study. *Saudi Journal of Gastroenterology.* 2014 Nov 1;20(6):378-82.
12. Blasco G. Pharmacology, mechanism of action and clinical significance of a convenient antispasmodic agent: Drotaverine; The Physician's Update. JAMA Dec 2001; 4(12): 59-66.
13. Amitabh Dash et al. Intramuscular Drotaverine and Diclofenac in Acute Renal Colic: A Comparative Study of Analgesic Efficacy and Safety, Pain Medicine March 2012, Vol 13, Issue 3, Pages 466–471
14. https://go.drugbank.com/drugs/DB06751
15. Sharma JB, Aruna J, Kumar P, Roy KK, Malhotra N, Kumar S. Comparison of efficacy of oral drotaverine plus mefenamic acid with paracervical block and with intravenous sedation for pain relief during hysteroscopy and endometrial biopsy. *Indian J Med Sci.* 2009 Jun;63(6):244-52.
16. Narang M, Shah D, Akhtar H. Efficacy and safety of drotaverine hydrochloride in children with recurrent abdominal pain: a randomized placebo controlled trial. *Indian pediatrics.* 2015 Oct;52(10):847-51.
17. Gheorghe DA. Drotaverine efficacy and safety in patients with colic pain associated with irritable bowel syndrome-observational retrospective clinical study. *Farmacia.* 2025.