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Opinion Article

Interventional Strategies for Pediatric Complicated Appendicitis and its Clinical Perspectives

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DESCRIPTION

Appendicitis is the most common cause of emergency abdominal surgery in children, affecting 1%-8% of those evaluated for acute abdominal pain. The lifetime risk of appendicitis is 8.6% in males and 7.1% in females. Complicated appendicitis, characterized by perforation or gangrene with or without an abscess or phlegmon, accounts for about one-third of pediatric cases. Complicated appendicitis is associated with worse outcomes, including longer hospital stays, higher costs, more frequent hospital revisits and increased adverse events compared to uncomplicated cases. Children are more likely than adults to experience complicated appendicitis, which is often attributed to diagnostic delays. Misdiagnosis rates in younger children range from 19%-57%, with perforation occurring in 43%-72% of cases. In school-aged children, misdiagnosis rates decrease to 12%-28% and in adolescents, they drop below 15%.

Diagnosing complicated appendicitis in children is challenging due to nonspecific symptoms that overlap with other conditions, such as bowel obstruction, intussusception, intestinal malrotation, ovarian or testicular torsion, diabetic ketoacidosis, gastroenteritis and urinary tract infections. Radiologic imaging plays a critical role in diagnosis and management. Ultrasound (US) is the preferred initial imaging modality due to its affordability and lack of radiation, although its effectiveness depends on the visibility of the appendix. Limitations of US include challenges in imaging overweight patients, patient discomfort and the availability of skilled technicians. When US fails to visualize the appendix, Computed Tomography (CT) with intravenous contrast or Magnetic Resonance Imaging (MRI) is recommended. CT is particularly useful for identifying complications like abscesses, perforation or bowel obstruction, while MRI provides similar diagnostic accuracy without radiation exposure, making it a safer option for children. Advanced MRI protocols, such as noncontract to allow for rapid imaging without sedation, further reducing risks.

Management of complicated appendicitis varies based on clinical presentation. Children without localized abscesses or phlegmons are typically treated with urgent appendectomy. Meta-analyses of randomized controlled trials indicate that Early Appendectomy (EA) reduces adverse events, unplanned readmissions and overall costs compared to Interval Appendectomy (IA) in children with perforated appendicitis but no Intra-Abdominal Abscess (IAA). However, in cases with IAAs, there is no significant difference in outcomes between EA and IA.

Children presenting with abscesses or phlegmons require tailored management depending on the severity of their condition. Patients need prompt appendectomy and immediate antibiotics, while well-appearing children with localized abscesses or phlegmons more than 5 days-7 days after symptom onset are often managed non-operatively with empiric antibiotics. For children with appendicoliths, interval appendectomy is recommended 10 weeks-12 weeks after the initial episode, whereas shared decision-making with caregivers is suggested for those without appendicoliths.

Percutaneous drainage is generally reserved for well-appearing children with abscesses larger than 3 cm^{-4} cm. Studies have shown that this approach, combined with delayed appendectomy, can lower complication rates compared to immediate surgery. For instance, a retrospective review of children with perforated appendicitis reported a lower complication rate in those who underwent percutaneous drainage and delayed appendectomy compared to those receiving immediate appendectomy. In cases requiring multiple drainage procedures for intra-abdominal abscesses, percutaneous drainage has demonstrated a high clinical success rate of over 92%.

One severe complication of appendicitis is perforation with abscess formation, which usually precludes surgery unless the patient is unstable. A meta-analysis of studies involving over 55,000 patients found that immediate surgery for abscesses or phlegmons resulted in higher morbidity rates, including postoperative infections, intestinal fistulas and small bowel obstruction, compared to non-operative management. The overall complication rate for immediate surgery was 36%, significantly higher than the 14% observed with non-operative management, which typically involves antibiotics with or without abscess drainage.

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CONCLUSION

In conclusion, appendicitis remains the leading cause of emergency abdominal surgery in children, with complicated cases posing significant diagnostic and management challenges. Diagnostic delays and nonspecific symptoms contribute to higher rates of perforation and complications in younger children. Advances in imaging modalities, particularly MRI and ultrasound, have improved diagnostic accuracy while minimizing risks. Management strategies depend on clinical presentation, with early appendectomy preferred for uncomplicated cases and tailored approaches, including non-operative management and percutaneous drainage, for complicated cases. Laparoscopic appendectomy is generally favored for its benefits, despite higher risks of intra-abdominal abscesses in perforated cases, emphasizing the need for individualized care.