



ELSEVIER

Contents lists available at ScienceDirect

## Seminars in Pediatric Surgery

journal homepage: [www.elsevier.com/locate/sempedsurg](http://www.elsevier.com/locate/sempedsurg)

# Adhesive small bowel obstruction—Acute management and treatment in children



Timothy B. Lautz, MD, Katherine A. Barsness, MD, MS\*

Ann and Robert H. Lurie Children's Hospital of Chicago, Northwestern University Feinberg School of Medicine, 225 East Chicago Ave, Box 63, Chicago, Illinois 60611

## ARTICLE INFO

**Keywords:**  
Adhesions  
Children  
Laparoscopy

## ABSTRACT

Adhesive small bowel obstruction is a significant cause of short- and long-term morbidity in infants and children. Unfortunately, the majority of scientific literature relative to adhesive obstructions continues to be dominated by adult studies. In this article, the existing literature for infant and pediatric adhesive obstructions is reviewed, with relevant comparisons to the available adult data. In addition, general guidelines for the management of infant and pediatric adhesive obstructions are recommended, based on the best available evidence.

© 2014 Elsevier Inc. All rights reserved.

## Introduction

Adhesive small bowel obstruction (aSBO) is a significant cause of long-term morbidity in children following abdominal operations. While more common after laparotomy, aSBO also occurs following laparoscopic procedures. Obstruction can occur anytime from the early postoperative period after the index operation to many decades later.

The reported incidence of adhesive small bowel obstruction varies considerably following different index operations. Overall, aSBO is reported to occur in 1–6% of children following abdominal surgery.<sup>1–5</sup> A population-based analysis of Scottish children found that 1.1% of children had a readmission directly related to aSBO in the 5 years following abdominal operation.<sup>4</sup> Excluding appendectomy, which has a much lower rate of obstruction (0.3%), the rate of aSBO was 5.3% for other operations and varied considerably based on the operative site: 6.5% for general laparotomy, 5.4% for small intestinal surgery, and 2.1% for colonic surgery. Particularly high rates of obstruction have been reported following ileostomy formation and closure (25%),<sup>6</sup> Ladd procedure for malrotation (24%),<sup>7</sup> and nephrectomy from Wilm's tumor (8.9%).<sup>1</sup> The low rate of aSBO (< 1%) following appendectomy has been corroborated in other studies, but may be more common in patients with perforated appendicitis.<sup>8</sup>

In a review of the Healthcare Cost and Utilization Project, Kids' Inpatient Database we previously reported that the mean age of children admitted with adhesive small bowel obstruction is 12.6

years, and that 63% of patients are male.<sup>9</sup> Young et al.<sup>5</sup> reported a higher incidence of aSBO in infants (< 1 year of age), irrespective of the initial site or indication for laparotomy. In contrast, Grant et al.<sup>4</sup> found that the higher rate of aSBO in younger children was likely attributable to the much smaller proportion of appendectomies in that age group compared to the older children.

## Diagnosis and initial management

Diagnosis of aSBO in children is based on history and physical exam combined with selective use of imaging studies. The most frequent symptoms include crampy abdominal pain, anorexia, emesis, and obstipation. Late signs including lethargy, constant abdominal pain, and distention are worrisome findings.

The paradigm for the initial management of children with aSBO is similar to that for adults and has not changed appreciably in the last 2 decades. Emergent laparotomy is indicated for patients presenting with signs of bowel ischemia, which may include peritoneal signs on exam, tachycardia, fever, laboratory studies indicating leukocytosis or lactic acidosis, and/or worrisome cross-sectional imaging. For the majority of children who do not present with signs and symptoms of ischemia, initial management includes bowel rest, enteral decompression with a nasogastric tube, and aggressive fluid resuscitation and correction of electrolyte abnormalities. Serial abdominal examinations are performed to identify early signs of developing bowel ischemia.

While widely utilized in the adult population, the risk versus benefit ratio of computed tomography (CT) imaging in children presenting with aSBO is not well established. In a retrospective institutional analysis, Jabra et al.<sup>10</sup> reported that CT had 87%

\* Corresponding author.

E-mail address: [kbarsness@luriechildrens.org](mailto:kbarsness@luriechildrens.org) (K.A. Barsness).

sensitivity and 86% specificity for diagnosing small bowel obstruction in children. Likewise Wang et al.<sup>11</sup> reported that CT is highly sensitive for diagnosing SBO in children (91.5%) and that it was useful for identifying the site of obstruction (78.7%) and the cause of obstruction (68.1%). However, the diagnosis of SBO can usually be established based on history, physical examination, and plain radiographs. The main hypothetical benefit from CT is its potential to identify patients with high-grade obstruction who have bowel ischemia or otherwise require bowel resection. Although not studied specifically in children with aSBO, CT has been shown to have utility for distinguishing benign from worrisome pneumatosis intestinalis in children beyond the neonatal period.<sup>12</sup> Worrisome CT findings included bowel wall thickening, free peritoneal fluid, and extent of pneumatosis. In the adult population, a meta-analysis of 15 studies found that CT had 83% sensitivity and 92% specificity for identifying bowel ischemia.<sup>13</sup> The same study found that CT had a sensitivity of 92% and specificity of 93% for identifying complete obstruction and was therefore useful for identifying which patients were unlikely to improve without operation. Similar studies on the sensitivity and specificity of CT use for aSBO in infants and children are lacking.

### Success of non-operative management

The success of non-operative management in patients presenting without signs or symptoms of bowel ischemia is dependent upon the extent of obstruction. In adults, non-operative management is employed in most cases of partial small bowel obstruction and is even successful in nearly half (46%) of patients with CT evidence of high-grade obstruction.<sup>14</sup>

In the pediatric population, 35–45% of patients present with concerning findings that require immediate laparotomy.<sup>9,15</sup> Among those in whom non-operative management is attempted, the overall success rate varies from 16–52%.<sup>9,16,17</sup> Vijay et al.<sup>17</sup> reported that children in the first year of life, as well as those who underwent index operation for Hirschsprung's disease or intussusception, appeared to have a lower response rate to non-operative management. Young et al.<sup>5</sup> also reported a lower response rate to non-operative management in infants, particularly if the aSBO occurs early after the initial operation.

Although not validated specifically in children, several models and scoring systems have been formulated in adults for predicting which patients with aSBO will require operative intervention. In a prospective analysis of 100 patients, Zielinski et al.<sup>18</sup> found that factors associated with the need for operation included obstipation ( $p = 0.014$ ), prior SBO ( $p = 0.018$ ), number of prior abdominal operations ( $p = 0.006$ ), history of hernia ( $p = 0.028$ ), history of malignancy ( $p = 0.007$ ), as well as CT findings of lack of small bowel feces sign ( $p = 0.006$ ), thickened small bowel wall ( $p = 0.014$ ), free intraperitoneal fluid ( $p = 0.002$ ), mesenteric edema ( $p = 0.007$ ), and transition point ( $p = 0.002$ ). In a compact model, the combination of obstipation plus CT findings of mesenteric edema and lack of small bowel feces sign had a concordance index of 0.77 for predicting need for operative exploration.<sup>19</sup>

Newer studies in adults have begun to focus on the serum biomarker procalcitonin to (1) determine risk for intraoperative bowel ischemia and/or necrosis and (2) predict success or failure of conservative aSBO management. Procalcitonin, initially identified as a biomarker for inflammation and sepsis, has a wide biologic range, short time of induction, and a long half-life.<sup>20,21</sup> Markogiannakis et al.<sup>22</sup> assessed a variety of demographic and clinical data among a cohort of 100 adult patients presenting with a small bowel obstruction necessitating operative therapy. In multivariate analyses, an elevated serum procalcitonin level was the only serum marker predictive of bowel ischemia with an OR of

2.25 (95% CI: 1.225–4.140). In a separate study, subgroup analysis of patients enrolled in a randomized controlled trial examining the value of CT scan and oral gastrografin in the management of postoperative SBO, serum procalcitonin levels correlated both with failure of conservative management [odds ratio (OR) = 3.5] and with bowel ischemia (odds ratio = 46.9).<sup>23</sup> While procalcitonin has been previously studied in other pediatric disease states, there are currently no data relative to the predictive value of procalcitonin for pediatric aSBO.

### Timing of surgery and risk of bowel resection

The old adage, “Never let the sun rise or set on a small bowel obstruction” was based on the concern that delay in operation was associated with an increased risk of bowel ischemia, the need for bowel resection, and subsequent complications. While this dogma is clearly outdated, there is some evidence of a correlation between the timing of operation and the risk of bowel resection.

Feigin et al. found that 31% of children who underwent operative intervention for aSBO required small bowel resection.<sup>24</sup> No child who underwent surgery in the first 16 h after admission required bowel resection. Of 50 children who underwent surgery in the first 48 h, 6 (12%) required bowel resection, compared to 3 of 11 (27%) beyond 48 h. In a representative national sample from the United States, we found that compared to surgery within the first day after admission, the odds of bowel resection were similar on the second day after admission [odds ratio = 1.40,  $p = 0.1$ ] but increased when surgery was performed on days 3–14 (OR = 1.67,  $p = 0.003$ ).<sup>9</sup>

In the adult population, results are conflicting in regard to whether timing of surgery correlates with the risk of bowel resection. In a multivariate model, Bickell et al.<sup>25</sup> found that there was a slight increase in the risk of resection with each hour of delay (adjusted relative risk = 1.003,  $p = 0.03$ ). In contrast, an analysis of the National Inpatient Sample by Schraufnagel et al.<sup>26</sup> found no correlation between the number of preoperative hospital days and the rate of complications, including bowel resection.

### Alternative therapies

The role of adjunct therapies for treating aSBO without an operation is intriguing, but currently inconclusive. A number of studies have investigated the utility of gastrografin and other water-soluble contrast agents both as a therapeutic intervention, as well as a way to determine which patients might benefit from ongoing non-operative management. Bonnard et al.<sup>27</sup> studied 8 children with uncomplicated aSBO who received oral gastrografin after 48 h of conservative management without improvement compared to 16 controls who did not. They obtained an abdominal radiograph 4–6 h after gastrografin administration. Six patients with contrast seen in the cecum had feeding initiated and were discharged on the same day. The two patients without contrast in the cecum underwent surgery. Compared to the controls, patients who received gastrografin had decreased hospital length of stay. In the adult literature, a number of randomized controlled trials have been performed with different protocols and mixed results.<sup>28–31</sup> Assalia et al.<sup>28</sup> randomized 107 patients to receive gastrografin or conventional therapy upon admission for ASBO. They found that gastrografin decreased the fraction requiring surgery from 21% to 10% and decreased the length of stay among patients who responded to conservative treatment. However, this study was performed prior to the widespread introduction of CT for better characterizing the degree of obstruction. Choi et al.<sup>30</sup> randomized patients who remained obstructed after 48 h

Download English Version:

<https://daneshyari.com/en/article/4176531>

Download Persian Version:

<https://daneshyari.com/article/4176531>

[Daneshyari.com](https://daneshyari.com)