Acute colonic pseudo-obstruction in an infant after retroperitoneal pyeloplasty successfully treated with rectal irrigation

Ayman Al-Jazaeri*

Division of Pediatric Surgery, College of Medicine, King Saud University, Riyadh, Saudi Arabia

ABSTRACT

Acute colonic pseudo-obstruction is frequently observed in adults but is rarely seen in children. The illness has never been reported in infants, who might differ in their reaction to the acute bowel distension and their response to the available management options. This report describes the presentation of acute colonic pseudo-obstruction in an infant after retroperitoneal pyeloplasty and its successful treatment with rectal irrigation.

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Acute colonic pseudo-obstruction (ACPO) mainly affects adults, particularly the elderly, who typically present with acute large-bowel obstruction without any mechanical cause. Most colonic motility disorders in infants are congenital. Among these, Hirschsprung’s disease is the most frequently encountered, whereas acquired transient colonic non-mechanical large-bowel obstruction is very rare.

In 1948, Ogilvie first described acute colonic dilatation without mechanical obstruction in patients with retroperitoneal tumors, and attributed the loss of colonic motility to the imbalance of autonomic colonic innervation caused by perivertebral ganglion damage [1]. If left untreated, colonic pseudo-obstruction can lead to perforation, sepsis, and respiratory compromise due to the diaphragmatic splinting effect. The latter has a particular impact on infants because their softer diaphragmatic muscles offer minimal resistance to the compression by the distended abdominal organs.

Here, we describe an unusual presentation of ACPO in a 2-month-old infant, acquired after retroperitoneal pyeloplasty, and discuss the possible pathogenesis and different management options.

1. Case description

Ureteropelvic junction obstruction resulting in grade IV hydronephrosis and worsening of right renal function was diagnosed in a 2-month-old otherwise healthy boy. His urea and creatinine levels were within the normal range, and his left kidney was not as severely affected. He underwent an open retroperitoneal dismembered right-sided pyeloplasty through a flank incision. The proximal one-third of his right ureter was fibrotic, requiring dissection from its surrounding tissues before excision. The distal ureter was then anastomosed to the dilated pelvis over a trans-anastomotic 4-Fr double-J stent. The procedure took 86 min to complete. A dose of third-generation cephalosporin was administered preoperatively, and a urethral catheter was placed for bladder drainage postoperatively. Acetaminophen was prescribed for postoperative pain control at a dose of 15 mg/kg every 4 h.

The infant recovered well initially; however, 6 h after the procedure, he started vomiting and showed noticeable abdominal distension, which was attributed initially to the effect of general anesthesia. The next day, his mother was not able to feed him, as his abdomen had become more distended and tense, resulting in noticeable breathing difficulties. A plain radiograph of the abdomen showed a gasless rectum and a markedly distended colon down to the sigmoid that was pushing up to the diaphragm (Fig. 1). The significant distention and diaphragmatic splinting, there was an initial concern that the infant might develop respiratory distress. Accordingly, his parents were informed about the possibility of performing an urgent surgical decompression and leaving a diverting stoma. At this stage, his O₂ saturation was maintained at around 92% in room air and he was stable hemodynamically with adequate urine output. We elected to treat him conservatively with gastric decompression through a nasogastric tube and started rectal
irrigations with 10 mL/kg normal saline QID. The initial rectal irrigation attempt was successful in expelling some colonic gas and stool, leading to a gradual colonic decompression. On the second postoperative day, water-soluble contrast enema (Fig. 2) was performed, the results of which helped rule out acquired mechanical large-bowel obstruction; however, unlike in adults, it is considered very unlikely at this age. His abdominal distention continued to improve with rectal irrigation throughout the second postoperative day (Fig. 3), and he started passing gas and stool spontaneously by the third day. An ultrasound was performed at this time, and perinephric or abdominal collections were excluded as possible causes. By the end of the second postoperative day, oral feeding was gradually reinstated and was well tolerated by the patient; consequently, the frequency of rectal irrigation was reduced by the third postoperative day and was eventually stopped by the sixth day.

2. Discussion

ACSO is a frequent cause of non-mechanical acute bowel obstruction in the older age groups. The typical clinical presentation is characterized by marked abdominal distention, nausea, and vomiting associated with an inability to pass gas or stools [2,3]. Abdominal radiographic imaging classically shows generalized colonic distension with maximum dilatation affecting the proximal colon with or without associated small bowel dilatation [4]. The dilatation tends to stop abruptly, leaving a gasless or cutoff sign in the sigmoid or rectum. The diagnosis is ideally confirmed by ruling out mechanical colonic obstruction by using contrast enema [5], which has a 96% sensitivity and 98% specificity [6]. Although CT scan has been used to diagnose bowel obstruction in adults [7], its use in children is not recommended because of the risk associated with radiation exposure and because of its limited utility given the very rare causes of mechanical large bowel obstruction at this age.

Although the exact pathogenesis of ACPO is not known, it has been attributed to an imbalance in the autonomic innervation of the bowel, specifically parasympathetic deprivation and sympathetic stimulation [8]. Such imbalance might be observed after pharmacological intervention, or spinal and retroperitoneal trauma. In Wegener and Borsch’s [4] analysis of 1027 adult cases, the most frequent observed causes were postoperative conditions (23%), particularly pelvic surgeries, followed by cardiopulmonary illnesses (17.5%), systemic and metabolic disorders (15.3%), and trauma (11.2%). A similar distribution of causes was reported in another large study [9]. ACPO has rarely been reported in children with hematological malignancies [10,11] or sickle cell disease [12], and after pelvis [13] or lumbar vertebral [14] surgeries. While chronic forms of colonic motility disorders, predominantly Hirschsprung’s disease, are well-recognized entities in infants and newborns, transient acquired ACPO has not been reported before in infants with normal colonic motility. Although the exact cause of ACPO in the case reported here is difficult to identify, it could be attributed to the retroperitoneal paravertebral ureteric dissection that might have triggered adjacent autonomic ganglion disturbances, leading

![Fig. 1](image1.png)

Fig. 1. AP abdominal radiograph showing mainly a gas-distended large bowel causing diaphragmatic splinting at point A. Point B demonstrates a gas cutoff at the rectum.

![Fig. 2](image2.png)

Fig. 2. A) Lateral view and B) AP view of water-soluble contrast enema demonstrating the absence of mechanical obstruction.
to the acquired transient colonic dysmotility. Moreover, leaving a double-J stent might have added to the persistent irritation to nearby paravertebral tissues. This hypothesis is supported by the observations of ACPO in adults after urological procedures including renal transplantation [15,16] and nephrectomy [17]. Another possibility is an ileus caused by postoperative urinary leak however, in the present case it was ruled out by abdominal ultrasound.

The approach to the management of ACSO in infants might differ significantly from that in adults and older children. In adults, treatment urgency has been linked to the diameter of cecal distention. Such measure is difficult to apply in children because of the age-related variability in colon size and the relative resistance of the infant colon to the local ischemia caused by acute distention. The suggested management plan in this age group is to focus on the degree of respiratory compromise caused by colonic distension and diaphragmatic splinting. Pediatric surgeons are familiar with the seriousness of diaphragmatic splinting due to abdominal gas distention in infants and young children, whether it is intra-intestinal as in ventilated C-type trachea-esophageal fistula [18] or extra-intestinal as in the case of perforation during intussusception reduction attempts [19,20]. Moreover, abdominal gas distension during laparoscopy in children has been shown to cause decreases in diaphragmatic compliance, tidal volume, and oxygen saturation [21,22].

Similar to adults, the initial treatment efforts are focused on supportive measures, including gastric decompression, correcting fluid and electrolyte disturbances, and cessation of narcotics [23]. In older children and adults, initial bedside colonic decompression can be attempted with a rectal tube. Alternatively, in infants, we recommend initiating rectal irrigation, as it has been proven effective in decompressing the colon in infants with Hirschsprung’s disease. Meanwhile, acquired mechanical obstruction should be ruled out by using contrast enema, despite the remote possibility of the condition at this age. Further management is based on balancing the initial response with the degree of respiratory and hemodynamic compromise. In the present case, because of the remarkable distension and discomfort, we considered the option of surgical decompression and colostomy. However, we did not proceed with this approach because the patient was able to maintain adequate oxygen saturation in room air and had good urine output, in addition to the successful initial rectal irrigation leading to the prompt passage of gas and stool. Within two days, adequate resolution of the abdominal distension was achieved, enabling starting of oral feeding.

Surgical options in adults, such as colostomy and colostomy, are known to be associated with high rates of mortality and morbidity. With the reported mortality of as high as 30% in adults attributed to associated comorbidities, the success rate of surgical intervention can be as low as 59% [4,9]; however, we expect a much lower surgical complication rate in children because of their comparatively better general condition. Surgical treatment in adults has been largely replaced by endoscopic decompression, which has a higher reported success rate of 79.3% and a lower mortality of 1–3% [4,24]; nevertheless, it still has a high recurrence rate, as 20–40% of these cases require another endoscopic decompression attempt [4,25].

Neostigmine has become a popular drug in the treatment of ACPO after its effectiveness was demonstrated in a randomized clinical trial in adults [26] and its success has been demonstrated in older children [10–13]. However, its effectiveness and safety in treating ACPO in infants have not been previously documented. Neostigmine works by inhibiting acetylcholinesterase, leading to acetylcholine accumulation in muscle nerve synapses, which could enhance colonic motor activities [27]. It can have serious and potentially fatal adverse effects such as heart block and bronchospasm. Ponec et al. [26] reported symptomatic bradycardia in 2 of their 18 cases, and Maher and Young [28] reported cardiac arrest in a 16-year-old girl treated with neostigmine for ACPO that developed after orthopedic surgery. In the study by Lee et al. [11], of the 10 children treated with neostigmine for ACPO, one developed transient diplopia and another experienced excessive abdominal pain. Moreover, unlike rectal irrigation, neostigmine infusion requires cardiac monitoring and multidisciplinary care. Despite the reported drawbacks, neostigmine has become the standard of care in adults, as it obviously offers a better alternative to other modalities that are associated with high mortality and morbidity [29].

Surgeons should consider ACPO among the causes of acute large-bowel obstruction in infants who have had normal colonic motility. After initiating supportive measures, we suggest starting regular rectal irrigation as it has been proven safe and effective in relieving colonic distention in infants. Neostigmine can be considered an alternative in infants who are unresponsive to rectal irrigation. Surgical options such as colostomy are better left for infants who develop respiratory compromise, other ACPO-related complications, or to those with failed nonsurgical treatments.

References


