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Surgery for suspected rotation abnormality: selection of open vs laparoscopic surgery using a rational approach

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Midgut volvulus;
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Abstract

Background: Laparoscopy is increasingly used for children with suspected rotation abnormalities. However, indications for open and laparoscopic approaches are not well defined. We reviewed our experience with both open and laparoscopic approaches to develop a rational approach to these patients.

Methods: Charts of all children undergoing surgery for a suspected rotation abnormality for 10 years were retrospectively reviewed.

Results: There were 173 patients. Of 73 neonates presenting with suspected volvulus, 71 underwent initial laparotomy and 2 were converted from initial laparoscopy. Eighty percent underwent Ladd procedure, 64% had volvulus, and 2 died of midgut volvulus. Of 18 neonates presenting without suspected volvulus, 14 underwent initial laparotomy and 4 had a laparoscopic approach with 1 conversion to laparotomy. Seventy-eight percent underwent Ladd procedure, and 22% had volvulus. Of the 82 older patients, 37 underwent laparotomy and 45 had initial laparoscopy, 8 of which were converted. Sixty-seven percent underwent Ladd procedure, and 28% had volvulus. Postoperative complication rate, median time to full diet, and median hospital stay were comparable with those previously reported in the literature.

Conclusion: Based on our results, we advocate open surgery for neonates with suspected volvulus. Laparoscopy represents an excellent alternative for older children and for neonates presenting without suspected volvulus.

Patients with malrotation have a narrow-based small bowel mesentery that is susceptible to developing midgut volvulus, a condition that can result in significant morbidity and mortality secondary to bowel necrosis. The standard surgical procedure to treat malrotation and prevent midgut volvulus is the Ladd procedure, first described in 1936 [1]. The traditional Ladd procedure is performed through a transverse incision in the upper abdomen, followed by counterclockwise detorsion of midgut volvulus if present, division of Ladd bands, widening of the small bowel mesentery to prevent further volvulus, positioning of intestines into the nonrotation configuration, and appendectomy to prevent future diagnostic confusion.

Since the first report of laparoscopic Ladd procedure in 1995 [2], laparoscopy has been used more frequently in children with suspected rotation abnormalities. There have been several studies supporting the safety and efficacy of laparoscopic Ladd procedure [3-8]. Several series comparing laparoscopic to open Ladd procedure reported less

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postoperative pain, faster time to full diet, and shorter length of hospitalization [5,6,9-11]. Despite this growing literature, the indications for the open or laparoscopic approaches have not yet been well defined. We reviewed our experience with both open and laparoscopic approaches in an attempt to develop a rational approach to this problem.

1. Methods

The charts of all children undergoing surgery for a suspected intestinal rotation abnormality from January 2000 to August 2009 were retrospectively reviewed. Patient demographics, medical history, presenting signs and symptoms, laboratory results, surgical management, immediate outcomes, and outpatient follow-up were documented.

The patients were divided into 4 groups based on age and presentation. Group A were neonates 28 days or younger with suspected volvulus. Group B were neonates without suspected volvulus. Group C were children older than 28 days with suspected volvulus. Group D were older children without suspected volvulus.

Volvulus was suspected based on clinical findings of bilious vomiting, abdominal distension, acute abdomen, fever, or hemodynamic instability; laboratory results of acidosis (pH <7.3) or elevated lactate; and radiologic findings on upper gastrointestinal study or ultrasound that were suggestive of volvulus, such as "corkscrew" or "whirlpool" signs.

The 2-sided Fisher exact test was used to compare conversion rates between different patient groups using Stata SE 10 (Stata, College Station, TX) [12]. A P value less than .05 was considered statistically significant.

The study was approved by the Research Ethics Board at the Hospital for Sick Children (Protocol number 1000008693).

2. Results

2.1. Clinical presentation

In total, there were 173 children who underwent surgery for a suspected intestinal rotation abnormality during the study period. The demographics, clinical presentation, and radiologic tests performed are summarized in Table 1.

There were 73 neonates with suspected volvulus in group A, of whom 60% were male. Their median age was 5 days (range, 0-23 days), and 90% presented to the emergency department or were transferred from another hospital. The most common presenting symptom was bilious vomiting (89%), and a significant proportion had unstable vital signs

Table 1 Demographics and clinical presentation

		Group A (neonates with suspected volvulus)	Group B (neonates without suspected volvulus)	Group C (older children with suspected volvulus)	Group D (older children without suspected volvulus)
No.		73	18	34	48
Sex, male (%)		60	33	68	50
Median age (range)		5 (0-23) d	6 (0-26) d	14 (1-206) mo	18 (1-201) mo
Presentation (%)	ER and transfer	90	22	70	19
	Inpatient	8	72	12	25
	Clinic	2	6	18	56
Most common symptoms (%)	Bilious vomiting	89	0	79	0
	Failure to thrive	7	17	9	13
	Nonbilious vomiting	4	33	15	42
	Low urine output	4	0	0	0
	Constipation	1	0	9	6
	Abdominal pain	–	–	38	35
	Asymptomatic	0	50	0	33
Physical examination findings (%)	Hemodynamic instability	10	0	15	0
	Abdominal distension	8	0	26	0
	Acute abdomen	4	0	12	0
	Fever	1	0	3	0
Concurrent medical conditions (%)		34	78	35	75
Radiologic tests performed (%)	Upper GI study	96	94	94	94
	Ultrasound	30	78	59	58
	CT scan	0	0	6	6

ER indicates emergency room; GI, gastrointestinal; CT, computed tomography.