

Original research article

To evaluate the profile and outcome of patients who underwent surgery for POA and to identify significant risk factor.**Dr. Ashoka Nand Thakur****Assistant Professor, Department of Paediatrics surgery, Patna Medical College and Hospital, Patna Bihar, India.****Corresponding Author: Dr. Ashoka Nand Thakur****Abstract**

Aim: The aim and objective of the present study to determine the profiles and outcomes of patients who underwent surgery for POA and to identify significant risk factor.

Materials and methods: This is a retrospective study conducted in the Department of Paediatrics surgery Patna Medical College and Hospital, Patna, Bihar, India and Sushrut Child Surgery Centre, Patna, Bihar from October 2017 to April 2020. Total 100 patients, ages 0–18 years with the diagnosis of POA were included in this study. The outcomes recorded were the presence of gangrene or perforation during the surgery for postoperative adhesions, the need for intestinal resection and stoma creation during POA surgery, the length of hospital stay, and 30-day morbidity and mortality. The presence of bowel strangulation, need for resection, and stoma creation during POA surgery were also included as risk factors in analyzing the morbidity and mortality outcomes.

Results: The average age at the time of POA surgery was 90.7 months with the range of 1.5–228.8 months. There were 20 infants, who were less than 1 year old, 49 children with ages 1 to 12, and 31 adolescents, 13 years old and above. With reference to the ages at their index operations, the average was 76.2 months with the youngest only 4 day-old neonate and the oldest at 18 years old. There were 17 neonates, 26 infants, 38 children ages 1–12, and 19 adolescents. The most common index diagnosis was appendicitis with 32 cases which is 32% of the cases. Of the 32, 18 were reported to be ruptured. The second most common diagnosis was intussusception with 12 patients. Intussusception was the most common diagnosis for patients under 1 year old who subsequently had MBO from POA. The most common index operation was appendectomy. 13 were reported to be exploratory laparotomies with a midline incision and 16 were recorded as simple appendectomies with a right lower quadrant abdominal incision. The most common index operations Peritonitis during their index surgery was documented in 41 patients. Stoma creation was done in 24 cases. 80% of cases had their index operation in an emergency setting and only 25 operations were classified as elective. The average interval from the index operation to the POA surgery was 19.1 months. With regard to the outcomes of the POA surgeries, 57% underwent only adhesiolysis or enterolysis. However, among the 100 cases, 20 required segmental intestinal resection and 26 necessitated the creation of a stoma. It was reported that there was intestinal perforation or gangrene in 20 cases at the time of the POA surgery.

Conclusion: we concluded that the timely operative intervention can prevent bowel strangulation in cases of mechanical bowel obstruction from POA.

Introduction

Postoperative adhesions are almost inevitable after most abdominal surgeries. The severity and extent of adhesions are, however, variable, and, fortunately, the majority of adhesions do not manifest clinically. In spite of this, adhesive intestinal obstruction is common in adults

and considered the second cause of intestinal obstruction after obstructed abdominal wall hernias and a major cause of morbidity and significant health care costs.¹ In more than 90% of patients following peritoneal cavity opening, obstructive structures (adhesions or bands) are expected regardless of the type of surgery.²⁻⁴ Postoperative adhesions are the most frequent cause of small bowel obstruction (SBO) and account for more than 75 % of SBOs.⁵ In Western societies, approximately 20 % of all surgical emergencies were caused by acute SBO.⁶ For children, acute SBO occurs in 1% to 6% of cases after abdominal surgery, and the rate is dependent on the initial type of operation.^{7,8} The operative procedures most frequently related to SBO in pediatric patients are appendectomy or surgery for peritonitis.⁹ The strategy for SBO management is implemented according to the clinical evaluation, biological tests, and imaging. When acute SBO patients fail to exhibit signs of strangulation, an initial trial of nonoperative management is suggested, including gastrointestinal drainage decompression, along with intravenous fluid resuscitation.¹⁰ Successful resolution of the obstruction with nonoperative management has been reported in approximately 50% of adults.¹¹ The majority of adhesions are asymptomatic however complications associated with postoperative adhesions are a source of considerable morbidity. The index variables identified were the time interval from index to POA surgery, the urgency of the index surgery, the presence of peritonitis in the index surgery, and stoma creation during the index surgery. The aim of the present study

Materials and methods

This is a retrospective study conducted in the Department of Paediatrics surgery Patna Medical College and Hospital, Patna, Bihar, India and Sushrut Child Surgery Centre, Patna, Bihar from October 2017 to April 2020.

Methodology

Total 100 patients, ages 0–18 years with the diagnosis of POA were include in this study. Those patients who did not undergo surgery for MBO secondary to POA were excluded. Those patients who underwent surgery initially for the possibility of MBO from POA but were found out intraoperatively to be otherwise, and those patients who underwent surgery where the presence of adhesions was only incidental and not the primary cause of the MBO were also excluded in the study. All patients included had at least one prior abdominal surgery. The demographic and clinical characteristics of the patients were studied. The age, the number of prior operations, the urgency of the index operations, the time interval from the index to the POA surgery, the presence of peritonitis, and stoma creation during the index operations were considered risk factors. The outcomes recorded were the presence of gangrene or perforation during the surgery for postoperative adhesions, the need for intestinal resection and stoma creation during POA surgery, the length of hospital stay, and 30-day morbidity and mortality. The presence of bowel strangulation, need for resection, and stoma creation during POA surgery were also included as risk factors in analyzing the morbidity and mortality outcomes.

Results

100 patients underwent surgery, which confirmed intraoperatively the diagnosis of MBO from POA. The male: female ratio was 1.5:1 . The average age at the time of POA surgery was 90.7 months with the range of 1.5–228.8 months . There were no neonates in the series at POA surgery. There were 20 infants, who were less than 1 year old, 49 children with ages 1 to 12, and 31 adolescents, 13 years old and above. With reference to the ages at their index operations, the average was 76.2 months with the youngest only 4 day-old neonate and the oldest at 18 years old. There were 17 neonates, 26 infants, 38 children ages 1–12, and 19

adolescents. Table 1 show the demographic profiles of the patients in the study. The most common index diagnosis was appendicitis with 32 cases which is 32% of the cases. Of the 32, 18 were reported to be ruptured. The second most common diagnosis was intussusception with 12 patients. Intussusception was the most common diagnosis for patients under 1 year old who subsequently had MBO from POA. For adolescents, on the other hand, after appendicitis, the second most common diagnosis was a previous operation for abdominal trauma. Table 2 lists all the index diagnoses and their frequencies. The most common index operation was appendectomy. 13 were reported to be exploratory laparotomies with a midline incision and 16 were recorded as simple appendectomies with a right lower quadrant abdominal incision. Table 3 lists the most common index operations

Table 1: Demographic profile at index and POA surgery

Gender	
Male	60
Female	40
Age at POA operation	Mean: 90.7 months
	Range: 1.5–228.8 months
	Median: 64.0 months
	IQR: 12.6–175.2 months
<30days	0 (0%)
30 days to <1 year	20 (20%)
1–12 years	49(49%)
13–18 years	31 (31%)
Age at index operation	Mean: 76.2 months
	Range: 0.04–227.4 months
30 days	17(17%)
30 days to <1 year	26(26%)
1–12 years	38 (38%)
13–18 years	19 (19%)

Table 2: List of index diagnosis and frequency

Appendicitis	32
Intussusception	12
Abdominal trauma	7
Imperforate anus	7
Hydrocephalus	6
Malrotation	5
Congenital diaphragmatic hernia	4
Hirschsprung's disease	4
Intestinal atresia	3
Ovarian tumors	3
Meconium peritonitis	2
Cholecystitis	2
Inguinal hernia with intestinal incarceration	1
Septic ileus	1
Peutz-Jeghers syndrome	1
Congenital adhesive band	1
Patent omphalomesenteric duct	1

Biliary atresia	1
Meckel's diverticulum	1
Wilm's tumor	1
Vaginal perforation	1
Omental cyst	1
Cloacal exstrophy	1
Familial adenomatous polyposis	1
Unknown	1

Table 3: Most common index operations

Appendectomy	31
Exploratory laparotomy	13
Simple appendectomy	16
Manual reduction of intussusception	6
Intestinal resection for intussusception	6
Exploratory laparotomy for trauma	6
Closure of ostomy	6
Ventriculoperitoneal shunt insertion	5
Transverse colostomy for imperforate anus	5
Tumor resection (ovarian, Wilm's, and omental)	5

Peritonitis during their index surgery was documented in 41 patients. Stoma creation was done in 24 cases. 80% of cases had their index operation in an emergency setting and only 25 operations were classified as elective.(table.4)

The average interval from the index operation to the POA surgery was 19.1 months with a range of 6 days to 11 years and 11 months. Majority of the MBO secondary to POA that required surgical intervention occurred within the first year after the index operation at 65%. For those who presented with less than 1-year interval, 73% were during the first 6 months after their previous surgery. There were also 17 cases of early POA that had their re-operation done less than 1 month after their index surgery. Table 4 show the clinical profiles and risk factors present during the index surgery. With regard to the outcomes of the POA surgeries, 57% underwent only adhesiolysis or enterolysis. However, among the 100 cases, 20 required segmental intestinal resection and 26 necessitated the creation of a stoma. It was reported that there was intestinal perforation or gangrene in 20 cases at the time of the POA surgery.

Table 4: clinical profiles and risk factors at index surgery

Urgency of index operation	
Emergency	80 (80%)
Elective	25 (25%)
Peritonitis during index surgery	41 (41%)
Stoma creation during index surgery	24 (24%)
Interval between index and POA	Mean: 19.1 months Range: 0.35–137 months
No of operations prior to POA	
One	85

Two	12
Three	2
Four	1

Table 5: Outcome of patients

Presence of gangrene or perforation	20 (20%)
Resection during POA surgery	20(20%)
Stoma creation during POA surgery	26 (26%)
Morbidity	11 (11%)
Mortality	9 (9%)
Length of hospital stay Prolonged hospital stay (≥10 days)	Mean: 19.1 days Range: 5–125 days 70(70%)

The 30-day morbidity rate was at 11% with 5 patients having wound and fascial dehiscence and 5 patients having intestinal anastomotic leaks. 1 of those patients had both complications. The other two patients' complications were a recurrence of the MBO from POA and a strangulated parastomal hernia. The series has a mortality rate of 9% with 9 dying within 30 days after their POA surgery. The 3 patients with anastomotic leaks after POA surgery and the 2 patient with strangulated parastomal hernia eventually died. All 9 mortalities reported sepsis as their primary cause of death. The average overall length of hospital stay of the patients during their admission for POA was 19.1 days.

Discussion

Adhesions continue to be a common consequence of abdominal surgery with serious morbidity and occasional cause of death as well as an economic burden.¹ The exact incidence of adhesive intestinal obstruction in children is not known but has been reported to vary from 2.2% to 8.3%.^{12,13} This is in contrast to adults, where in many counties adhesive intestinal obstruction is considered the second commonest cause of intestinal obstruction after obstructed abdominal wall hernias. The presence of gangrene and perforation during POA surgery, bowel resection, and stoma creation during POA surgery were also analyzed as risk factors to morbidity, mortality, and length of stay. Analysis showed that only the presence of 30-day morbidity, mortality, and length of hospital stay had significant risk factors. However, due to the limited number of patients in this series, the lack of statistical significance to the association of the other risk factors to the other outcomes can affect the results of this analysis. Significant association was noted with stoma creation during the index operation and resection and stoma creation during their POA surgery to the presence of morbidity. These patients were five times more likely to have postoperative morbidity than patients without stoma at index operation or those without resection during POA surgery. Also, patients found to have gangrene or perforation at POA surgery were 44 times more likely to have morbidity than patients without gangrene or perforation at POA surgery. The finding of bowel gangrene or perforation during the surgery for POA is expected to lead to more complications since these patients undergo additional surgical procedures like intestinal resection and stoma creation, compared with a simple adhesiolysis where there is no breach of intestinal integrity. The presence of gangrene or perforation can definitely lead to more infectious complications; however, this subset analysis was not included in this study. In terms of mortality, patients with stoma creation at index operation, gangrene or perforation at POA surgery, resection, and stoma creation at POA surgery were 5.30 times more likely to

expire than patients without these factors within 30 days postoperatively. It was also noted on analysis that patients who underwent their index operation at an older age were less likely to die during their POA surgery. Compared with neonates during index surgery, infants were 90% less likely to expire. Patients with age at index operation of more than 1 year were 95% less likely to expire than patients who were neonates during their index surgery. This particular association between the age at index operation and mortality can be statistically significant; however, factors such as the primary diagnosis as well as comorbidities can also be clinically significant. These factors were not covered in this analysis. With regard to length of hospital stay during the POA surgery, association was seen in the age at index and the age at POA surgery to the length of hospital stay. Prolonged hospital stay was arbitrarily defined as more than 10 days which is the general average length of day of our patients in our institution. For every month increase in age at index operation, the odds of prolonged hospital stay of a patient decreases by 0.52%. For every month increase in age at postoperative adhesion, the odds of prolonged hospital stay of a patient decreases by 0.22%. In Janik et al. series, adhesive intestinal obstruction developed within 2 years in 80% of their patients, and in another series adhesive intestinal obstruction developed within 3 months from the initial operation.^{14,15} similar observation in this study we found. The reason for this variation is not known. in our study the most common index operation was appendectomy. 13 were reported to be exploratory laparotomies with a midline incision and 16 were recorded as simple appendectomies with a right lower quadrant abdominal incision. Table 3 lists the most common index operations. The causes predisposing to adhesive intestinal obstruction are also variable, but appendectomy continues to be the commonest cause. In a series of 871 children who had appendectomy, 1.3% of them developed adhesive intestinal obstruction, and this was the highest (3.4%) in those who had perforated appendicitis.¹³

Conclusion

The most common diagnosis that had POA corresponds also to the most common abdominal operation done in children in our institution. Significant risk factors for morbidity during POA surgery were stoma creation at index operation, the presence of gangrene or perforation, intestinal resection, and stoma creation during POA surgery. The same risk factors were also significant in terms of mortality with an additional risk added when the patient is a neonate during the index surgery. we concluded that the timely operative intervention can prevent bowel strangulation in cases of mechanical bowel obstruction from POA.

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