Is nonoperative management of adhesive intestinal obstruction applicable to children in a resource-poor country?

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ABSTRACT

Background: Nonoperative management of adhesive intestinal obstruction gives good results in adults but there are scant studies on its outcome in children. This study reports outcomes and experiences with nonoperative and operative management of adhesive intestinal obstruction in children in a resource-poor country. **Patients and Methods:** This is a retrospective analysis of records of children who were managed with adhesive intestinal obstruction at the University of Benin Teaching Hospital between January 2002 and December 2008. **Results:** Adhesive intestinal obstruction accounted for 21 (8.8%) of 238 children managed with intestinal obstruction. They were aged between 7 weeks and 16 years (mean 3 ± 6.4 years), comprising 13 males and eight females (ratio 1.6:1). Prior laparotomy for gangrenous/perforated intussusception (seven, 33.3%), perforated appendix (five, 23.8%), perforated volvulus (three, 14.3%), penetrating abdominal trauma (two, 9.5%) and perforated typhoid (two, 9.5%) were major aetiologies. Adhesive obstruction occurred between 6 weeks and 7 years after the index laparotomies. All the 21 children had initial nonoperative management without success, owing to lack of total parenteral nutrition and monitoring facilities. Outcomes of open adhesiolysis performed between 26 and 48 h in six (28.6%) children due to poor response to nonoperative management, 11–13 days in 12 (57.1%) who responded minimally and 2–5 weeks in three (14.3%) who had relapse of symptoms were encouraging. Exploration of the 21 adhesive obstructions confirmed small bowel obstruction due to solitary bands (two, 9.5%), multiple bands/adhesions (13, 61.9%) and encasement, including one bowel gangrene (six, 28.6%). Postoperatively, the only child who had recurrence during 1–6 years of follow-up did well after a repeat adhesiolysis. **Conclusion:** Nonoperative management was unsuccessful in this setting. Open adhesiolysis may be adopted in children to prevent avoidable morbidities and mortalities in settings with limited resources.

Key words: Adhesive intestinal obstruction, children, nonoperative management

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INTRODUCTION

Postoperative intraperitoneal band and adhesion formation is a common cause of mechanical intestinal obstruction worldwide, with a rising incidence in many developing countries.[1-3] Intraoperative rough handling of bowels and other viscera with resultant serosal and peritoneal abrasions has been reported as a cause of bowel adhesions. The presence of intraperitoneal foreign body, blood clot, abscess and soilage of peritoneal cavity with gut contents serve as nidus for band and adhesion formation.[2] The majority of adhesive intestinal obstruction involves the small bowels, and the sequelae of small intestinal obstruction in children are severe due to rapid onset of fluid/electrolyte derangement, nutritional problems, risk of aspiration and sepsis.[2,4,5]

The place of nonoperative management of adhesive intestinal obstruction is established in surgery as there are many encouraging results with the procedure, particularly in adult patients.[1-9] The avoidance of likely recurrent band and adhesion formation that results in future bowel obstruction following open adhesiolysis was emphasised as an added advantage. However, reports on the outcome of the procedure in children are scant in sub-Saharan Africa.[10,11] Of the criteria for recruiting patients for nonoperative management, age is very important. This is because patients in extremes of age have been reported to fare poorly on nonoperative management, but not many researchers considered patient's age as a selection criterion.[2,3,9-12] Consequently,

many children are managed nonoperatively with avoidable morbidities and mortalities, especially in developing countries. Unlike in the developed centres where sophisticated facilities are available to monitor and detect resolution of bands and adhesions, clinical assessment remains the only monitor of response to nonoperative management in this subregion.[13-15] This means that nonoperative management has a higher chance of failure with increased risk of morbidity and mortality in poor-resource countries.

This 7-year retrospective study reports the outcomes and experiences gained with nonoperative and operative managements of children who were diagnosed with adhesive intestinal obstruction at a referral paediatric surgical centre in Nigeria.

PATIENTS AND METHODS

The case files of all the 21 children managed with adhesive intestinal obstruction at the Pediatric Surgical Center of University of Benin Teaching Hospital in Nigeria over 7 years, from January 2002 to December 2008, were retrieved and analysed in this retrospective study. Data collated included age at prior laparotomy, age at presentation with obstruction, sex, indication for prior laparotomy, aetiology of bands/adhesions, time lag from prior laparotomy to onset of intestinal obstruction, mode of presentation, clinical state on arrival, nonoperative management protocol, monitoring of response, indications for surgical intervention, findings at operation, surgical options, outcome and follow-up.

Statistical analysis

The data were analysed using SPSS version 11 software package and presented as counts, frequency and percentage. Continuous data were expressed as means ± standard deviation.

RESULTS

Of a total of 238 children managed with intestinal obstruction during the period, 21 (8.8%) were secondary to acquired bands and adhesions. They comprised 13 males and eight females, with a male:female ratio of 1.6:1, who were aged between 7 weeks and 16 years (mean, 3 ± 6.4 years). All the children had previous breach of peritoneal cavity as a result of a prior laparotomy. Intra-abdominal lesions complicated by infections and/or peritoneal soilage following gangrenous/perforated intussusception in seven (33.3%) children, perforated appendix in five (23.8%), volvulus with gut perforation in three (14.3%), penetrating abdominal trauma in two (9.5%) and typhoid perforation in two (9.5%) were the major indications for a prior laparotomy while resection of ruptured ovarian cyst in a 12-year-old girl and closure of omphalocele minor in a neonate accounted for one case each, as shown in the table.

The majority of children, 16 (76.2%), had prior laparotomy at other health institutions but were referred when they developed postoperative adhesive intestinal obstruction. Onset of clinical features of intestinal obstruction that were acute in nine, chronic in seven and acute-on-chronic in five children commenced between 6 weeks and 7 years following prior laparotomy. The four cardinal features of mechanical intestinal obstruction, colicky abdominal pain, vomiting, abdominal distension and constipation, were present in all patients. The predominance of any of the four cardinal features was not helpful in determining the location/type of adhesive intestinal obstruction. However, a combination of clinical and plain radiological findings was employed in making the diagnosis of adhesive intestinal obstruction, but the type and location of obstruction were determined intra-operatively. Two children were in shock on arrival, five had fluid and electrolyte derangement while fourteen were clinically stable. Also, shock and bowel gangrene were more common among younger children who developed adhesive obstruction less than 2 years after the prior laparotomy. On the other hand, patients in late childhood were more stable on arrival and the majority had multiple dense bands/adhesions, producing intestinal obstruction about 2 years after prior laparotomy.

All the 21 children were initially managed nonoperatively during the period. These included correction and maintenance of fluid/electrolytes, nasogastric tube placement for bowel decompression, bed restriction and exclusion of oral intake. Parenteral administration of nutritional support (dextrose saline and multivitamins infusions), analgesics and antibiotics was performed. Monitoring of the patients included 4-hourly assessments of urinary output, pulse rate, blood pressure, respiration, temperature and sensorium. Also, daily assessment of nasogastric tube aspirates for colour/volume, blood chemistry and blood gases were routine. Total parenteral nutrition (TPN) and fluoroscopy required to monitor exorbitantly expensive gastrographin small bowel follow-through to determine the extent of resolution of adhesive obstruction were neither available nor affordable in other centres. This was compounded

by the fear of aspiration, resulting in anaphylactic reaction and respiratory failure following the use of affordable barium study in upper gastrointestinal tract obstruction in children with persistent profuse vomiting. Therefore, nonoperative management was abandoned in favour of operative treatment between 26 and 48 h in six children due to poor response and continued deterioration of clinical conditions. Twelve had initial response following a 10-day course of nonoperative management, but symptoms of intestinal obstruction relapsed upon commencement of oral intake, which necessitated operative treatment. This was because the children needed TPN (which was not available) after 10 days of nonoperative treatment. Three children did well on the 10-day course of nonoperative management and were discharged home after 11 days of hospitalization. They were however readmitted between 2 and 5 weeks following discharge due to relapse of symptoms and were subsequently given operative treatment.

Open surgical abdominal exploration of the children revealed a single band trapping the jejuno–ileal segment in two children, multiple bands and adhesions involving small bowels in 13, small bowel encasement in three and small bowel/transverse colon encasement in three [Table 1]. Four children had bowels lumens that were accidentally entered during adhesiolysis, which were identified and closed immediately. Three had bowel resection that was due to the inability to release encased obstructed bowels in two and bowel gangrene, which complicated strangulating bands and adhesions in one child. During 1–8 years postadhesiolysis follow-up, all except one child were symptom free. The one child developed a recurrent adhesive intestinal obstruction 8 months after adhesiolysis but he responded and did well following a second session. Overall, operative treatment gave better outcome that was statistically significant compared to nonoperative management, with no death recorded due to adhesive intestinal obstruction.

DISCUSSION

This study recorded poor outcome with nonoperative management of adhesive intestinal obstruction in children unlike the encouraging results with the procedure in adults.[1-9] All the children were assessed and had initial nonoperative management but were converted to operative treatment due to failed or poor response to treatment. Success with nonoperative management is dependent on adequate selection, fluid/electrolyte replacement, nasogastric tube decompression of proximal dilated bowel segment, availability of parenteral nutrition support, proper selection of analgesics and antibiotics as well as availability of facilities and manpower required to monitor the patients.[1-15] These facilities and manpower were reported to be grossly inadequate in many developing countries, which corresponded with experience in this study.[2,3] Unavailable TPN in this centre during the period was a major drawback that made it impossible to continue nonoperative management beyond 10 days in this series, unlike what is obtained in more developed centres.[8,14,16] The decompression of proximal dilated bowels restores its tone, leading to reduction/release of entangled bowels, relieving obstruction and subsequently leading to a gradual breakdown of the bands and adhesions.[1,2,5,10,11] Resolution of adhesive obstruction can best be assessed using small bowel gastrographin follow-through, but this requires fluoroscopy, which was not available in this centre during the period.

Consequently, no cure or resolution of bands and adhesions could be recorded among these 21 children who were initially managed nonoperatively. Temporary relief of symptoms was recorded in only three (14.3%) cases and, considering the findings at operation, it

Table 1: Indications for prior laparotomy and types of adhesions/bands producing intestinal obstruction with an average time lag after the laparotomy

Indications/aetiology	Numbers	Percentage	Average time lag	Operative findings
Gangrenous/perforated intussusception	7	33.3	1.5 years	Multiple small bowel bands and adhesions 4, small bowel and transverse colon encasement 3, with 1 bowel gangrene
Perforated appendix	5	23.8	5 years	Single jejuno–ileal band 2, multiple bands/adhesions 3
Volvulus with gut perforation	3	14.3	6 months	Small bowel encasement 2, multiple small bowels bands/adhesion 1
Penetrating abdominal trauma	2	9.5	4 years	Multiple small bowels bands/adhesion 2
Typhoid perforation	2	9.5	2 years	Multiple small bowels bands/adhesions 1, small bowels encasement 1
Ovarian cyst	1	4.8	3 years	Multiple small bowels bands/adhesion
Closure of minor omphalocele	1	4.8	6 weeks	Multiple small bowels bands/adhesion
Total	21	100	—	—

is doubtful if nonoperative management beyond 10 days would have led to a cure in these children. Also, children in early childhood fared poorer than those in late childhood years, which strongly supports earlier reports that patients of younger age perform poorly on nonoperative management of adhesive intestinal obstruction.[2,3,10-12] The differential growth between bands/adhesion and viscera (bowels) results in increasingly tight constriction that progress rapidly to irreversible complications in children.[2] Many authors avoid operative treatment due to the reported higher chance of recurrence and overall poorer outcomes in adult patients who had open adhesiolysis.[1-3] In other recent studies,[4,9,16,17] hospital stay and cost of treatment were reported to be higher in operated cases. In these recent studies, however, patients who had open adhesiolysis were reported to record significantly lower incidence of recurrence and had an overall better outcome compared with those managed conservatively.[4,9,16,17] The encouraging results recorded with operative treatment of children in this study agree with these and an earlier comparative study.[16] A statistically significant difference was recorded when recurrence and overall outcomes of operative and nonoperative management were compared.

In studies on adults with intestinal obstruction in this subregion, adhesive intestinal obstruction accounted for between 26 and 35% of the cases.[2,3] However, adhesive intestinal obstruction accounted for only 8.8% children managed with intestinal obstruction during the 7 years of this study. The probability of laparotomy increases with age, which may have accounted for the higher incidence of adhesive intestinal obstruction in adults.[1-3,10,11] Other authors[1,2] reported that the indication for a prior laparotomy, presence of intraperitoneal foreign body and poor tissue handling play significant and contributory roles in band and adhesion formation, which was in agreement with the findings in this study. Consequently, gangrenous/perforated intussusception, perforated appendix, perforated small bowel volvulus, penetrating abdominal trauma and typhoid perforation that resulted in significant peritoneal soilage and contamination were the major indications for a prior laparotomy in this study. The majority (76.2%) of patients had prior laparotomy in peripheral hospitals where tissue handling may have been poor. These factors may have influenced band and adhesion formation in these children, as also reported by others.[1-3,5,17]

The persistence of symptoms and deterioration in clinical conditions were indications for surgical intervention.[4,8,12,16,18] Nonoperative management resulted in avoidable bowel resection in three children due to the formation of dense bowel encasement and gangrene.[1,2] Although adhesiolysis was challenging in some children with accidental entry into bowel lumen, postoperative courses were uneventful.[19] Follow-up in this series recorded a child who had recurrent band and adhesion formation 8 months after adhesiolysis but did well after a second session. Outcomes of open adhesiolysis in this study were better than what were obtained with nonoperative management and they also compare well with laparoscopic adhesiolysis in other centres.[19-22] Nevertheless, the major limitations of this retrospective study are the short duration of follow-up and the experience of being in a single centre where few cases were treated. There is, therefore, a need for cautious generalisation of findings from this study and a need for multi-centre studies with a long duration of follow-up in this subregion.

CONCLUSION

Despite successes achieved with nonoperative management of adhesive intestinal obstruction in adults, this study did not record any significant benefit with the modality of treatment in children. Rather, it resulted in avoidable morbidities. In essence, it was unsafe in children in the setting described. On the other hand, open adhesiolysis with gentle tissue handling gave encouraging results that were comparable to laparoscopic procedures in other centres. It could be advocated from this study that children with adhesive intestinal obstruction may be offered open adhesiolysis after adequate resuscitation to prevent avoidable morbidities and mortalities in developing countries with limited resources.

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