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Indications and outcome of childhood preventable bowel resections in a developing country

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ABSTRACT

Background: While many bowel resections in developed countries are due to congenital anomalies, indications for bowel resections in developing countries are mainly from preventable causes. The aim of the following study was to assess the indications for, morbidity and mortality following preventable bowel resection in our centre. **Patients and Methods:** Retrospective analysis of all cases of bowel resection deemed preventable in children from birth to 18 years from June 2005 to June 2012. **Results:** There were 22 preventable bowel resections with an age range of 7 days to 17 years (median 6 months) and male:female ratio of 2.1:1. There were 2 neonates, 13 infants and 7 older children. The indications were irreducible/gangrenous intussusceptions (13), abdominal gunshot injury (2), gangrenous umbilical hernia (2), blunt abdominal trauma (1), midgut volvulus (1), necrotizing enterocolitis (1), strangulated inguinal hernia (1), post-operative band intestinal obstructions (1). There were 16 right hemicolectomies, 4 small bowel resections and 2 massive bowel resections. Average duration of symptoms before presentation was 3.9 days (range: 3 h-14 days). Average time to surgical intervention was 42 h for survivors and 53 h for non-survivors. Only 19% presented within 24 h of onset of symptoms and all survived. For those presenting after 24 h, the cause of delay was a visit to primary or secondary level hospitals (75%) and ignorance (25%). Average duration of post-operative hospital stay is 14 days and 9 patients (41%) developed 18 complications. Seven patients died (31.8% mortality) which diagnoses were irreducible/gangrenous intussusceptions (5), necrotising enterocolitis (1), midgut volvulus (1). One patient died on the operating table while others had overwhelming sepsis. **Conclusion:** There is a high rate of morbidity and mortality in these cases of preventable bowel resection. Typhoid intestinal perforation did not feature as an indication for bowel resection in this series.

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INTRODUCTION

Bowel resection can be done for various intestinal pathologies involving various lengths of both the small and large intestines and ranging from congenital to acquired causes. The congenital causes such as intestinal atresias, Hirschsprung's disease and intestinal duplications are potentially not preventable and involved bowel segments need to be excised as part of their standard treatment protocols. In most developed countries, bowel resections in children are done mainly for these congenital pathologies. In low and middle income countries like ours, a lot of bowel resections are for acquired causes deemed to be preventable.[1-3] This is because the pathological processes are allowed to progress and lead to loss of bowel viability due to late presentation to hospital and consequently late intervention. Efforts geared towards early detection of pathologies, engendering early treatment, may help reduce the attendant morbidities and mortalities associated with preventable bowel resections.

We present the indications, morbidity and mortality of bowel resections deemed to be from preventable causes in our environment.

PATIENTS AND METHODS

This is a retrospective study of all children aged 1 day to 18 years who had bowel resection for indications deemed to be preventable over a 7-year period from June 2005 to June 2012. The patients' age, sex, duration of symptoms before presentation, cause of late presentation in those that presented after 24 h of symptoms, duration from presentation to surgery, indication for bowel resection, type of bowel resection, post-operative complications, duration of post-operative stay, outcome, cause of death were obtained from patient folders, theatre and ward

records. The congenital indications such as intestinal atresia, intestinal duplications and Hirschsprung's disease were excluded from this study. Furthermore excluded were all other laparotomies, groin or umbilical exploration for acquired intestinal pathologies which did not require bowel resection. The management of these patients usually involved adequate fluid and electrolyte resuscitation before surgical exploration is done and those who meet the indications are offered bowel resection and anastomosis. The data were entered into Statistical Package for Social Sciences (SPSS 15.0 version ,SPSS Inc, Chicago III) and analysed. The results are presented as averages, median, percentages and ratios as well as tables.

RESULTS

A total of 22 paediatric patients had bowel resection during this period comprising 15 males and 7 females (male:female ratio 2.1:1) and were aged 7 days to 17 years. These included 2 neonates, 13 infants, 7 older children. The indications [Table 1] were irreducible/gangrenous intussusceptions (13), abdominal gunshot injury (2), gangrenous umbilical hernia (2), blunt abdominal trauma (1), midgut volvulus (1), necrotizing enterocolitis (NEC) (1), strangulated inguinal hernia (1), post-operative band intestinal obstructions (1). The distribution of these indications with age of patients is shown in Table 1. There were 16 right hemicolectomies for irreducible/gangrenous intussusception (11), gangrenous umbilical hernia (2), gangrenous right inguinal hernia (1), NEC (1), abdominal gunshot injury (1); 4 small bowel resections for post-operative adhesive intestinal obstruction (1), abdominal gunshot injury (1), gangrenous ileocolic intussusception (1), blunt abdominal trauma (1) and 2 massive bowel resections for midgut volvulus (1), gangrenous ileocolic intussusception (1). Average duration of symptoms before presentation was 3.9 days (range: 3 h-14 days) for all patients but 5.7 days (range: 2-14 days) for the mortalities. Time from admission to surgical intervention was 42 h for survivors and 53 h for non-survivors. Only 19% presented within 24 h of onset of symptoms and all survived. For those presenting after 24 h, the cause of delay was a visit to other hospitals (75%) and ignorance (25%). Average duration of post-operative hospital stay is 14 days. A total of 9 patients (41%) developed 18 complications including surgical site infection (6), superficial wound breakdown (4), burst abdomen (2), anastomotic breakdown (4), prolonged post-operative ileus (1), secondary haemorrhage (1). Those that had post-operative complications were irreducible/gangrenous ileocolic intussusceptions (5), blunt abdominal trauma (1), abdominal gunshot injury (1), midgut volvulus (1), gangrenous umbilical hernia (1). The distribution of complications amongst the different indications is shown in Table 2. Seven patients died giving a mortality rate of 31.8% (4 females and 3 males). Of those that died the diagnoses were irreducible/gangrenous intussusceptions (5), necrotising enterocolitis (1), midgut volvulus (1). One patient had death on the operating table while in others mortality was from overwhelming sepsis.

Table 1: Distribution of diagnoses and age of the 22 patients who had bowel resection

Diagnosis	0-1 month	1-12 months	1-5 years	6-10 years	11-17 years	Total
Irreducible/gangrenous intussusceptions	—	13	—	—	—	13
Abdominal gunshot injury	—	—	1	—	1	2
Gangrenous umbilical hernia	—	—	1	—	1	2
Blunt abdominal injury	—	—	—	1	—	1
Necrotizing enterocolitis	1	—	—	—	—	1
Gangrenous inguinal hernia	1	—	—	—	—	1
Midgut volvulus	—	—	—	—	1	1
Post-operative adhesive intestinal obstruction	—	—	—	1	—	1
	2	13	2	2	3	22

Table 2: Distribution of post-operative complications

Diagnoses	Surgical site infection	Superficial wound breakdown	Anastomotic breakdown	Burst abdomen	Prolonged ileus	Secondary haemorrhage	Total
Gangrenous/irreducible intussusceptions	4	3	2	1	—	1	11
Abdominal gunshot injury	—	—	—	—	1	—	1
Gangrenous umbilical hernia	1	1	—	—	—	—	2
Blunt abdominal injury	1	—	1	1	—	—	3
Midgut volvulus	—	—	1	—	—	—	1
Total	6	4	4	2	1	1	18

DISCUSSION

In the present study, the commonest indication for bowel resection is irreducible or gangrenous intussusception in infants. This is in consonance with some other studies in developing countries.[1] Typhoid intestinal perforation was not an indication for bowel resection in this study as opposed to some other series where it was the commonest indication.[2] This may probably be due to low incidence of typhoid intestinal perforation in our hospital as many resort to bore holes for their drinking water supply as opposed to some other areas where water from contaminated streams are used for domestic purposes. During the period in review, only six cases of typhoid intestinal perforation in children were operated on and all had simple closure with no bowel resection. Most resections were in infancy reflecting the peak age group for childhood intussusceptions, which was the most common indication for bowel resection in our study. It is low in neonates because intussusceptions is uncommon in this age group and most bowel resections in this age group are due to congenital indications.[1] In other series external hernias[3-5] and bowel perforations[6] were commonest indications. Faecal fistula was not an indication in our series but featured prominently in some others.[3]

Only one case of NEC required bowel resection. This may not mean NEC is uncommon, but many may die without a definite diagnosis or may not have needed a laparotomy involving the surgeon. Furthermore, mortality involving premature neonates who are at higher risk of developing NEC is still high in our environment and hence, they may not live long enough to develop NEC. In another study of abdominal surgical emergencies in a developing country no NEC was recorded.[7] Most umbilical hernias come for care only when they are symptomatic[8] and hence increasing the likelihood of strangulation, gangrene and bowel loss. Inguinal hernias should be repaired on an elective basis at any age to prevent irreducibility and strangulation that may lead to bowel loss.[9] Post-operative adhesive band obstruction led to bowel resection in only one case in the present study but featured prominently in some others.[4]

Right hemicolectomy is the most commonly performed bowel resection as most pathologies requiring resection, especially ileocolic intussusceptions, involve the ileocaecal region. Poor time to diagnosis and late presentation for tertiary care is evident in this study. This may explain the unacceptably high bowel resection rate in the cases of intussusceptions (72%) with manual reduction achievable only in 28% of cases. Improvement in time to presentation at the tertiary centre could be achieved by adequate training of the health staff in the primary and secondary levels of health care to identify these cases of preventable bowel resection for early referral and subsequent prompt treatment to save their bowel. Furthermore, better road network and more efficient means of transportation will ensure easier access from rural areas to our tertiary facility. Improved security network and control of small arms will reduce the risk of exposure of children to abdominal gunshot injury. As an effective vaccination to significantly reduce the incidence of infantile intussusceptions is yet to be discovered,[10,11] early detection and treatment should be encouraged. The spectrum of complications in the present study is similar to that from other studies in developing countries.[1,2,12] The mortality rate of 31.8% from this study is similar to that noted in some studies[4] but higher than others.[1,2] The long length of hospital stay has negative cost implications both in terms of direct and indirect cost to the health system. All were transfused leading to avoidable blood transfusion and further depleting the already strained blood bank services. Delay in definitive surgery was mainly from local logistic challenges and financial difficulties.

CONCLUSION

There are a wide spectrum of indications for bowel resection, most common of which is irreducible/gangrenous intussusceptions and the most common bowel resection is right hemicolectomy. Typhoid intestinal perforation and faecal fistula did not feature as indications for bowel resection in this series. Late presentation is a daunting challenge and the high mortality and morbidity can be significantly reduced by early detection, early treatment, adequate and prompt resuscitation, surgery and intensive post-operative care.

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