Original Article

Presentation and Outcome of Treatment of Jejunoileal Atresia in Nigeria

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Abstract

Background: Intestinal atresia is a common cause of neonatal intestinal obstruction. Previous reports from Nigeria have indicated a high mortality rate. This is a report of current outcome review from one tertiary center. **Patients and Methods:** A retrospective analysis of infants managed for jejunoileal atresia in 10 years (2005–2014). The information retrieved from patients' records was analyzed using SPSS 17. **Results:** There were 38 patients (19 boys and 19 girls) aged 1–28 days (median 4 days). Twenty-four patients (63.2%) presented after 48 h of life. Twenty-five (65.8%) had jejunal atresia and 13 (34.2%) had ileal atresia. Six patients had associated anomalies. The most common atresia was type III (39.5%, 15 patients). Twenty-eight (73.7%) patients had a resection of the atresia and anastomosis and others had enterostomies. Total parenteral nutrition and neonatal intensive care support were not available during the period of the study. Bowel function was established within 1 week and 27 (71.1%) patients commenced oral feeding. Twenty-six (68.4%) patients had postoperative complications resulting in prolonged hospital stay of 2–44 days (median = 13). Mortality was 34.2% (13 patients). Factors that significantly affected mortality were intestinal necrosis at presentation, postoperative complications, and severe malnutrition. **Conclusion:** Intestinal atresia is still associated with unacceptably high morbidity and mortality, due to late presentation, and lack neonatal intensive care services and parenteral nutritional support. Efforts need to be intensified to address these factors to improve outcome.

Keywords: Intestinal atresia, mortality, neonatal intestinal obstruction

Introduction

Jejunoileal (small bowel) atresia is a common cause of neonatal intestinal obstruction. It usually presents within the neonatal period except in cases of stenosis which may present later in life. Small bowel atresia is associated with high morbidity and mortality in Sub-Saharan Africa unlike in developed countries. Reports from Nigeria give mortality rate as high as 15.4%–41%;[1-5] mainly due to delayed presentation, poor socioeconomic factors, poor health facilities, lack of nutritional support, and lack neonatal intensive care services. We reviewed the presentation and outcome of patients treated for jejunaileal atresia in a single tertiary center in North-central Nigeria, to ascertain current outcomes.

Patients and Methods

This is a retrospective analysis of infants managed for jejunoileal atresia in 10 years (January 2005 to December 2014) at the Ahmadu Bello University Teaching Hospital, Zaria, North Central Nigeria. The treatment protocol involved resuscitating all patients, correction dehydration, electrolyte derangement, correction and maintenance of blood glucose level, control of sepsis, correction of anemia before surgery, and administration of parenteral antibiotic (amoxicillin, metronidazole, and gentamycin). Plain abdominal radiograph was done ascertain mechanical intestinal obstruction, and diagnosis of atresia was confirmed at laparotomy. Resection of proximal dilated 10 cm and distal 5 cm of bowel from the atresia was done. In patients with marked foreshortened, bowel tapering or enterostomy was performed. Narrowing of residual proximal dilated bowel was done by resection of part of antimesenteric wall or imbrication/plication. Postoperative care

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included the administration of dextrose-containing intravenous fluids, broad-spectrum antibiotic, analgesia (intravenous pethidine 0.5 mg/kg body weight 6 hourly), intensive monitor of vital signs by nurses and doctor in the division, and intranasal oxygen supplement when required. Oral feeding commenced when bowel function returned. Initially, with expressed breast milk by nasogastric tube gavage feeding, then direct breastfeeding when full oral intake was tolerated.

The information retrieved from patients' records included demographics, presentation, type of atresia, associated anomalies, type of surgery, residual length of small bowel after resection, complications and commencement of oral intake, and outcome of treatment. All patients with suspected jejunoileal atresia but died before surgery and duodenal and colonic atresia were excluded from the study. Data were analyzed using Statistical Package for the Social Sciences. (Statistics for Windows, version 17.0. Chicago: SPSS Inc.). Categorical data were analyzed using the Chi-square test and level of statistical significance was set at $P < 0.05$.

Results

There were 38 patients (boys 19 and girls 19) aged 1–28 days (median 4 days) at presentation, with 24 (63.2%) presenting after 48 h of life [Figure 1]. Routine antenatal ultrasound scan was done in all patients; however, prenatal diagnosis was made only in one patient showing a "triple bubble" sign. All patients were admitted by the neonatologist and referred with clinical or radiology diagnosis of intestinal obstruction. Preoperative duration for resuscitation and preparation for surgery was 1–12 days (median 1 day). Delayed surgery was due to financial constraints with delay diagnosis and treatment.

Twenty-five (65.8%) patients had jejunal atresia, whereas 13 (34.2%) had ileal atresia. One of the patients had type IV jejunal atresia with associated colonic atresia. The average number of jejunoileal atresia patients managed was 4 per year. Six (15.8%) patients had associated anomalies (including other gastrointestinal anomalies in 4, 10.5% [one patient had ARM + pyloric stenosis, another patient had ARM + pelvic kidney, and two patients had malrotation of midgut]; anterior abdominal wall defect in 2, 5.3% [an omphalocele and gastroschisis]; and renal anomaly in 1, 2.6%). The most common type of atresia seen was type III (39.5%, 15) [Table 1]. In five patients, necrosis of the proximal dilated intestinal segment was observed (three patients with jejunal [2 type IIIb and 1 type I] and 2 ileal [type IIIa and type I]).

Twenty-eight (73.7%) patients had a resection of the atresia and end to back anastomosis. Six (15.8%) patients who were very ill and were of poor anesthetic risk had resection of the atresia and ileostomy, whereas the patient who had associated pyloric atresia had gastrojejunostomy and ileostomy. One patient with type I jejunal atresia who had associated midgut malrotation had excision of the obstructing web and a Ladd's procedure, whereas the patient with gastroschisis had silo application as initial treatment. One patient had significant foreshortened bowel had no bowel resection instead bowel tapering and primary anastomosis. Narrowing of the proximal dilated bowel was done by the resection of part of antimesenteric wall in 13 (34.2%) patients, whereas three (7.9%) patients had plication, and in others, size discrepancy was minimal after resection of the atresia with adjacent intestine (10 cm proximal and 5 cm distal). In six patients who had enterostomy, nothing was done to narrow the proximal bowel. The residual length of small intestine after resection was 10–182 cm (median 125 cm). Total parenteral nutrition (TPN) and mechanical ventilation were not available for any patient. Postoperative feeding was done by limited parenteral nutrition using dextrose in Ringer's lactate, parenteral amino acid (Astymin®), and multivitamin. Bowel function was established within 1 week in 27 (71.1%) patients, and oral intake was commenced of which three had enterostomy. Full oral intake achieved by 15 days in 28 patients.

Twenty-six (68.4%) patients developed complications after surgery [Table 2]. Hospital stay was prolonged in patients who had postoperative complication (range: 2–44 days,

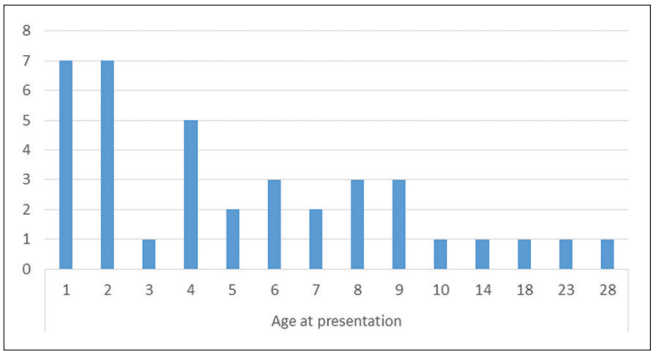

Figure 1: Frequency distribution of age of patients with jejunoileal atresia

Table 1: Frequency distribution of type of small bowel atresia

Type of atresia	Frequency	Percentage
Type I	13	34.2
Type II	2	5.3
Type IIIa	9	23.7
Type IIIb	6	15.8
Type IV	8	21.1

Table 2: Complications following surgery for jejuno-ileal atresia

Complications	Frequency	Percentage
Surgical site infection	6	15.8
Neonatal sepsis and jaundice	9	23.7
Wound dehiscence	3	7.9
Severe malnutrition	4*	10.5
Respiratory insufficiency	3*	7.9
Anastomotic dehiscence	2	5.3

*One patient had severe malnutrition and respiratory insufficiency

median = 15.5) compared to those without a complication (range: 7–16 days, median = 11) (P = 0.016). Mortality occurred in 13 patients (34.2%), 8 patients with jejunal atresia, and 5 with ileal atresia. Only three patients had ≤50 cm small bowel left after resection of nonviable bowel, one had severe malnutrition after surgery and died, whereas 2 died of malnutrition and overwhelming sepsis. Ten patients died without achieving full oral intake within 15 days after surgery. Factors contributing to mortality include intestinal necrosis and postoperative complications (P = 0.001). All patients who had bowel gangrene died. All 26 surviving patients were well at 2 years of follow-up.

Discussion

Intestinal atresia is the third most common cause of neonatal intestinal obstruction in Nigeria, after anorectal malformations and Hirschsprung disease.[6,7] Although an earlier study had observed strangulated inguinal hernia to hold this position,[8] recently, the frequency of strangulated inguinal hernia has reduced. Jejunal atresia is more common than ileal atresia in our study (jejunal: ileal, 25:13) and in a study from Khartoum (jejunal: ileal, 23:6),[9] in contrast to a study from Nepal where ileal atresia was more common (jejunal: ileal, 11:17).[10]

Jejunoileal atresia in our setting is associated with delayed presentation as in the present report with 63.2% presenting after the second day of life; however, this presentation appears to be slightly earlier than in a previous report from the same center.[3] Other series reported average age of presentation between 3 and 10 days,[1-5,11-13] and a prospective study observed that a high number of patients presented early.[12]

Despite having routine antenatal ultrasound scans, prenatal diagnosis was made in only one of our patients.[14] In many developing countries, prenatal diagnosis is uncommon.[10,12,13] This could be due to the steep learning curve and/or poor resolution ultrasound machines. However, a study in Enugu reported that 56% of their patients had a prenatal diagnosis of intestinal atresia out of those who had antenatal sonography.[1] Higher rates of prenatal diagnosis have been reported in developed countries where 29%–86.6% were observed, where better facilities and skills are readily available.[15,16] In view of the limitation in out setting, prenatal ultrasound scan appears not to affect the time of presentation and overall outcome of treatment.[15]

An average preoperative duration for resuscitation and preparation for surgery of 2.3 days was seen in this study, this is much shorter than most other studies in our setting[1,5] and could be attributed to early referral from the neonatologist.

Congenital anomalies associated with jejunoileal atresia is less common than observed with duodenal atresia;[1,13] intestinal atresia in patients with gastroschisis is well documented.[12,15,17] Nearly 15.8% of patients in this study had associated congenital anomalies. Multiple anomalies as observed in two of our patients were reported in other studies.[11,15,17,18] Some studies reported high cardiovascular anomalies,[11,15] whereas others reported associated cystic fibrosis with intestinal atresia.[15,19] Rarely, there could be associated pyloric atresia or stenosis.[20]

In this study, type III jejunoileal atresia was the most observed [Table 1]; however, when the subtypes of type III are reviewed separately, our study and other studies from Nnewi, Benin, and Khartoum observed more type I atresia (4, 44.4%; 15, 34.9%; and 10, 34.5%, respectively).[2,5,9] Another study observed type II atresia being more common.[15] Therefore, it appears the spectrum of jejunoileal atresia types varies widely.

Resection of intestine close to the atretic segment also removed the abnormal innervations portion of the intestine.[21,22] Resection of the blind bulbous end reduced the mortality of intestinal atresia in Great Ormond Street Hospital from 69% to 33%, which makes the resection of bowel and anastomosis where feasible the treatment of choice.[23] Tapering enteroplasty was done by resection and enteroplasty or imbrications/plication when the difference in caliber was not significant. As in other studies, patients who were too ill or those with gross contamination from gangrenous bowel had a resection of bowel involved and stoma formation.[12] We believe the distal bowel length is underestimated due to its collapsed state from disuse while the proximal length is exaggerated due to obstructive distension and stretching. Most of our patients had no risk of short bowel syndrome except one patient with postresection small bowel length <25 cm; this was similar to other studies due to extensive resection usually of gangrenous bowel or foreshortened bowel.[11,15]

TPN and neonatal ventilation are not readily available in a resource-limited setting like ours,[5,9,10,13] which have been shown to improve outcome.[19] Patients were given intravenous dextrose, amino acids (Astymin®), and microelements, but lipids are not readily available, and when available, it is in adult packaging and quite expensive. Two (50%) of our patients who had severe malnutrition died; therefore, severe malnutrition may contribute to morbidity and mortality as observed in another study.[19] Due to lack of TPN, patients who would have been TPN dependent or survived after the judicious use of TPN usually die during the postoperative period in our setting.

Bowel function was established within 1 week in 71.1% (27) of the patients and tapering enteroplasty may have made this feasible.[1] All surviving patients established oral feeding by 15th day after surgery. This is comparable to studies in the region which also identifies early enteric feeding as key to survival.[1,5,11,17,24] Other studies reviewed, however, did not report the timing of feeding after surgery.[2,3,10]

A high complication rate of 68.4% in our study was attributed to delayed presentation, either before or within the hospital, poor neonatal intensive care, and limited resources.[3,15] Patients with other gastrointestinal anomalies who require additional treatment are more likely to have complications. This results in an unacceptable high morbidity, prolonged hospital stay, and high medical costs. Another similar study showed a lower rate of complications in their patients.[19]

Mortality was higher in patients with proximal atresia and also in those who had jejunal atresia coexisting with multiple congenital anomalies, although either of these did not statistical significantly ($P = 0.11$) affect the outcome of treatment. The patient who had gastroschisis with jejunal atresia and another with jejunal atresia, anorectal malformation, colonic atresia, and pyloric atresia died. Patients with delayed surgery, bowel gangrene, and complications appeared to have a higher risk of mortality.[10] There was minimal improvement in survival from 59% to 65.8% in our center.[3]

Mortality in jejunoileal atresia has reduced considerably over the years in developed countries.[5,15,19] However, in developing counties, the mortality is still regrettably high due to the limitation of required highly trained neonatal care personnel, neonatal anesthetist, and neonatal intensive services.[1-5,9,10,12,13]

Conclusion

Intestinal atresia is still associated with unacceptably high morbidity and mortality, due to late presentation, inadequate neonatal intensive care, and lack of parenteral nutritional support in our setting. Efforts need to be intensified to address issues of delayed presentation and improvement in neonatal care and facilities.

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Conflicts of interest

There are no conflicts of interest.

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