Neonatal jejunoileal atresia in a resource-limited setting: a case series highlighting anatomical variations, staged and primary surgical management, and early outcomes

Mathayo Shadrack[1,2,3*], Mohammed Sultan Salim[1,2], Evelyne Neema Assenga[1,4], Ally Hamisi Mwanga[1,2], Victor Ngotta[1,2], Zaitun Bokhary[1,2]

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ABSTRACT

Background: Jejunoileal atresia (JIA) is a leading cause of neonatal intestinal obstruction. Despite advances in neonatal surgery, mortality remains high in resource-limited settings due to delayed presentation, sepsis, and limited perioperative support. We report seven consecutive neonates with JIA managed at our hospital, highlighting diagnostic findings, anatomical variations, surgical approaches, and early outcomes.

Methods: This combined retrospective and prospective descriptive study included seven consecutive neonates admitted with intestinal obstruction between October 2024 and October 2025. Diagnosis was based on clinical evaluation, plain abdominal radiography, and ultrasonography. All underwent open laparotomy via a supra-umbilical transverse incision. Primary end-to-oblique single-layer hand-sewn anastomosis was performed in six cases. One required staged management with resection, double-barrel stoma formation, subsequent anastomosis, and correction of malrotation. Outcomes were analyzed, including follow-up at six weeks after discharge.

Results: Seven neonates were included (median birth weight 2.9 kg; median age 3 days). Two had jejunal atresia type I (28.6%), three ileal type IIIB (42.8%), and two type IIIA (28.6%). All presented within 2–4 days with bilious vomiting, abdominal distension, and failure to pass meconium. The median time to full enteral feeding was 5 days (range 4–7). Mean NICU stay was 7 days. Two developed superficial surgical site infections managed conservatively. No leaks, sepsis, reoperations, or mortality occurred. Median hospital stay was 9 days (range 7–15).

Conclusion: Early diagnosis, optimization, and meticulous surgical technique enabled excellent outcomes in this resource-limited setting, demonstrating safe and effective management of jejunoileal atresia in neonates with consistent multidisciplinary perioperative care.

Keywords: Jejunoileal atresia, neonatal intestinal obstruction, apple-peel deformity, surgical outcomes.

Type of Article: CASE SERIES **Specialty:** Pediatric Surgery

Correspondence to: Mathayo Shadrack
*Department of Surgery, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania.
Email: shadrackmathew@gmail.com
Full list of author information is available at the end of the article.

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Introduction

Congenital intestinal atresia is characterized by complete or partial discontinuity of the intestinal lumen, resulting in mechanical obstruction of the gastrointestinal tract. Among its subtypes, jejunoileal atresia (JIA) accounts for approximately one-third of all neonatal intestinal obstructions worldwide and represents a major indication for emergency neonatal surgery [1,2]. The reported global incidence of JIA ranges between 1 in 1,500 and 1 in 5,000 live births, with variability influenced by access to prenatal diagnosis and perinatal care [3].

In low- and middle-income countries (LMICs), including much of sub-Saharan Africa, JIA continues to be associated with substantial morbidity and mortality. Poorer outcomes are primarily related to delayed presentation, sepsis, and limited neonatal support rather than true differences in incidence. Reported survival rates in African series range from 40% to 80%, in contrast to survival exceeding 90% in developed countries [4-6].

The pathogenesis of JIA is most commonly attributed to intrauterine vascular accidents resulting in ischemic necrosis, resorption of affected bowel segments, and interruption of mesenteric continuity. Less frequently, genetic predisposition, intrauterine volvulus, and internal herniation have been implicated [7].

Clinically, neonates typically present within the first few days of life with bilious vomiting, progressive abdominal distension, and failure to pass meconium. Plain abdominal radiography remains the cornerstone of initial diagnosis, often demonstrating features such as the double bubble sign or multiple air-fluid levels depending on the level of obstruction.

The Louw and Grosfeld classification remains fundamental for understanding anatomical patterns and guiding surgical management:

- Type I: Intraluminal mucosal web with intact mesentery
- Type II: Complete atresia with a fibrous cord connecting the blind ends
- Type IIIA: Complete atresia with V-shaped mesenteric defect
- Type IIIB (apple-peel/Christmas tree): Proximal jejunal atresia with distal bowel spiraling around a single marginal artery
- Type IV: Multiple atresias producing a "string of sausages" appearance [8,9]

At Muhimbili National Hospital, neonatal intestinal obstruction remains one of the most frequent pediatric surgical emergencies. Challenges are often related to delayed referral and limited neonatal support at referring facilities. Despite these constraints, recent improvements in perioperative resuscitation, multidisciplinary collaboration, and surgical expertise have resulted in improved outcomes.

We report a one-year case series of seven neonates with jejunoileal atresia, describing their clinical presentation, anatomical spectrum, surgical management, and early postoperative outcomes.

Methods

Study design and setting

This combined retrospective and prospective descriptive case series was conducted at the Pediatric Surgical Unit of a tertiary referral hospital in Tanzania. Neonates admitted with features of intestinal obstruction between October 2024 and October 2025 were screened. Seven consecutive neonates diagnosed intraoperatively with jejunoileal atresia were included, and no cases were excluded.

The cohort consisted of four retrospective and three prospective cases. One case (Case 4), previously reported separately, was included following institutional ethical approval for secondary analysis and contributes to the comparative evaluation of management strategies within this cohort.

Data collection

Demographic data, antenatal history, clinical presentation, imaging findings, operative details, and postoperative outcomes were collected using a standardized data extraction form. Retrospective data were obtained from medical records, while prospective cases were followed until discharge and for a minimum of 6 weeks post-discharge to assess feeding tolerance and early complications, including short bowel syndrome. No missing data were identified.

Preoperative assessment

All neonates underwent plain abdominal radiography. Abdominal ultrasonography was performed when available to assess bowel dilatation and exclude malrotation. Echocardiography was routinely performed to screen for associated congenital cardiac anomalies. Laboratory investigations included complete blood count, serum electrolytes, and renal function tests. Preoperative management emphasized aggressive resuscitation, correction of electrolyte imbalance, gastric decompression, and thermoregulation.

Surgical technique

All procedures were performed under general anesthesia through a supra-umbilical transverse laparotomy. The entire bowel was systematically examined to determine the site and type of atresia and to exclude multiple lesions.

Dilated proximal bowel and atretic distal segments were resected, followed by end-to-oblique, single-layer, hand-sewn anastomosis using absorbable sutures (Vicryl 5-0 or 6-0). Mesenteric defects were closed where feasible. The average length of resected bowel ranged from 8 to 15 cm. The estimated remaining bowel length was adequate in all cases, including Type IIIB variants. No tapering enteroplasty was performed.

In one case, staged management was adopted due to extensive distal bowel involvement and associated gastrointestinal malrotation. This included resection and double-barrel stoma formation, followed by delayed definitive anastomosis.

Postoperative care

Postoperatively, neonates were managed in the neonatal intensive care unit or surgical neonatal ward. Nasogastric decompression, intravenous fluids, antibiotics, and gradual initiation of enteral feeding were standard. Neonates also received parenteral nutrition support, primarily in the form of peripheral amino acid-based solutions due to the limited availability of total parenteral nutrition. Patients were monitored for anastomotic leak, sepsis, wound infection, and bowel function recovery.

Results

Patient characteristics

Seven neonates (four males and three females) were included. The median birth weight was 2.9 kg (range 2.7-3.1 kg), and median age at presentation was 3 days. All presented within the first 2-4 days of life with bilious vomiting, abdominal distension, and failure to pass

Table 1. *Summary of patient demographic characteristics, clinical presentation features, birth weight distribution, age at presentation, and associated comorbid conditions among cases.*

Case	Sex	Birth Weight (kg)	Age at Presentation (days)	Type of Atresia	Location	Surgical Approach	Time to Full Feeds (days)	Hospital Stay (days)	Complications	Outcome
1	M	2.8	3	Type I	Jejunum	Primary anastomosis	5	10	None	Survived
2	F	3.1	4	Type I	Jejunum	Primary anastomosis	5	7	None	Survived
3	M	2.9	3	Type IIIB	Ileum	Primary anastomosis	6	11	SSI	Survived
4	M	3.0	15	Type IIIB	Ileum	Staged (stoma → anastomosis)	7	15	None	Survived
5	M	2.8	2	Type IIIB	Ileum	Primary anastomosis	5	9	None	Survived
6	M	3.0	4	Type IIIA	Ileum	Primary anastomosis	4	8	None	Survived
7	F	2.7	4	Type IIIA	Ileum	Primary anastomosis	5	8	SSI	Survived

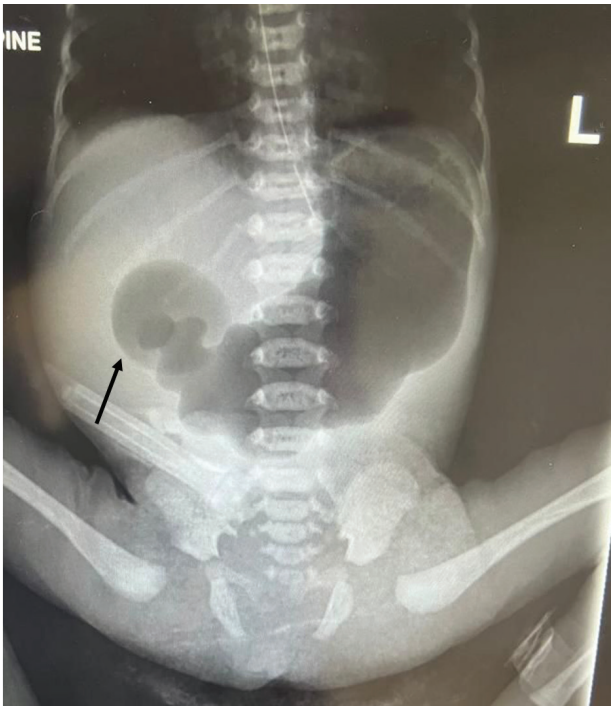

Figure 1. *Plain abdominal X-ray demonstrating markedly dilated proximal small-bowel loops with multiple air-fluid levels and absence of distal gas, consistent with proximal obstruction (black arrow).*

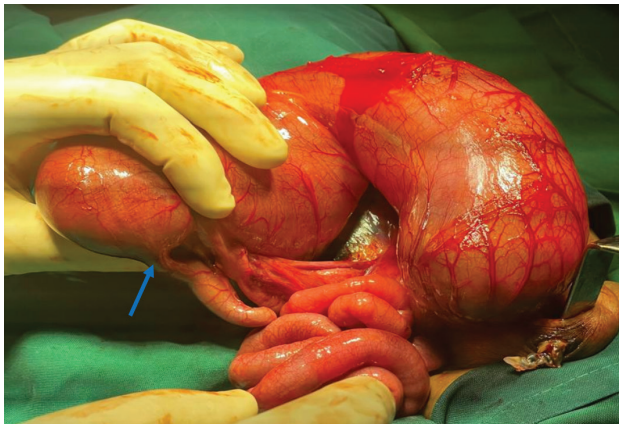

Figure 2. *Intraoperative view demonstrating a jejunal Type I atresia (blue arrow), characterized by an intraluminal mucosal web located approximately 40 cm distal to the duodenojejunal junction, causing luminal obstruction while the bowel wall and serosa remain externally intact.*

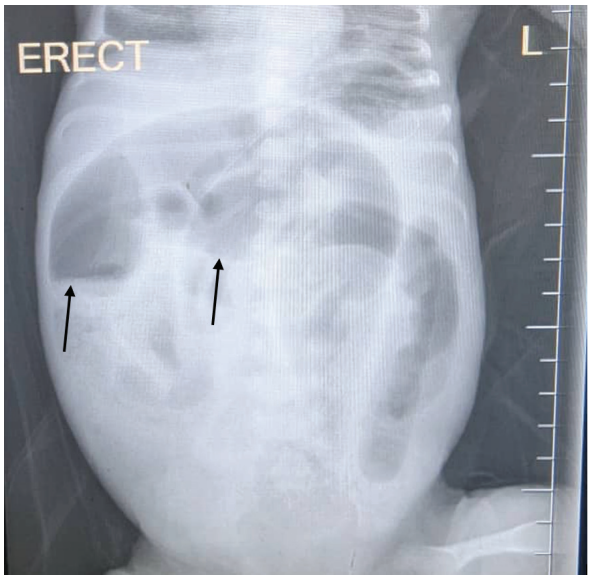

Figure 3. *Plain abdominal X-ray showing multiple stacked air-fluid levels (black arrows) with dilated bowel loops, highly suggestive of a distal small-bowel obstruction.*

meconium. No major associated cardiac anomalies were identified Table 1.

Anatomical types and surgical management

- Type I jejunal atresia: 2 cases (28.6%)
- Type IIIA ileal atresia: 2 cases (28.6%)
- Type IIIB (apple-peel) ileal atresia: 3 cases (42.8%)

Primary resection and anastomosis were performed in six neonates. One neonate underwent staged management with temporary double-barrel stoma formation.

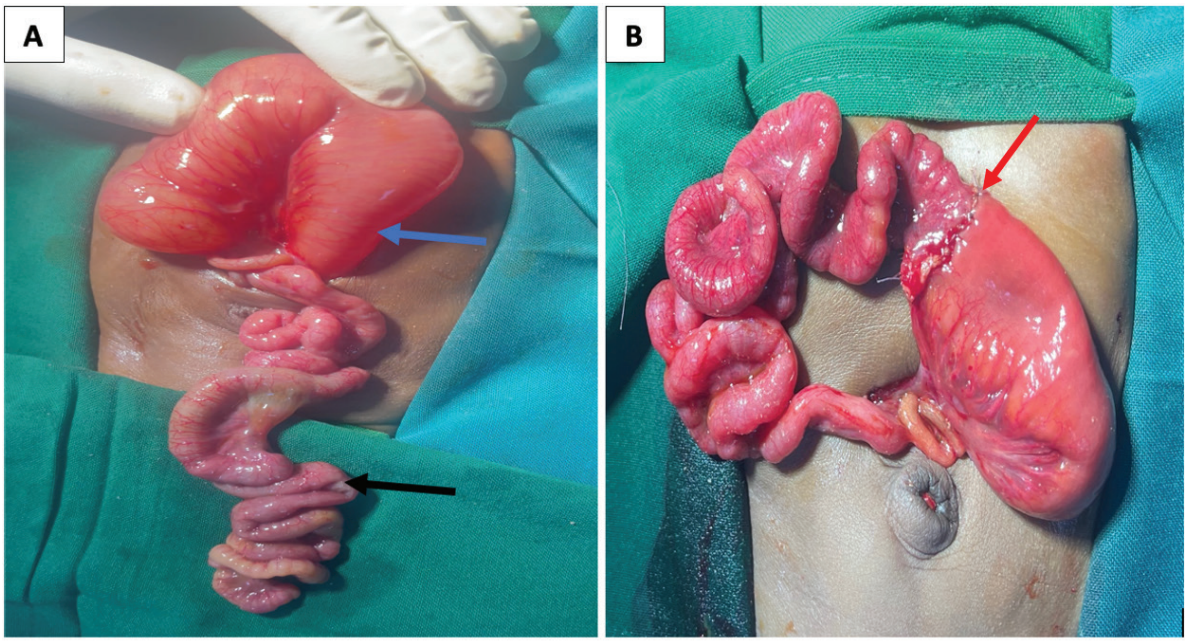

Figure 4A and B. *Ileal Type IIIB atresia (apple-peel) showing a dilated proximal segment (blue arrow) and distal bowel spiraling around a single artery (black arrow); dysplastic segments were resected and an end-to-oblique anastomosis performed (red arrow).*

Figure 5. *Markedly distended newborn abdomen, suggesting congenital intestinal atresia with significant obstruction and accumulation of intraluminal gas and fluid.*

Outcomes

All seven neonates survived. Median time to full enteral feeding was 5 days (range 4-7). The mean NICU stay was 7 days. The median hospital stay was 9 days (range 7-15).

Two neonates (28.6%) developed superficial surgical site infections, which resolved with conservative management. No anastomotic leaks, bowel perforation, sepsis, reoperation, or short bowel syndrome occurred. Weight at discharge was comparable to birth weight in all cases.

Case Presentations

Case 1

A 3-day-old term male neonate (2.8 kg) presented with bilious vomiting, abdominal distension, and failure to pass meconium. An abdominal radiograph demonstrated a double bubble sign (Figure 1).

Laparotomy revealed Type I jejunal atresia due to a mucosal web 40 cm from the duodenojejunal junction (Figure 2).

Web excision and end-to-oblique anastomosis were performed. Feeding commenced on day 5, and the neonate was discharged on day 10.

Case 2

A 4-day-old female neonate (3.1 kg) presented with bilious vomiting and distension. Imaging suggested proximal small bowel obstruction. Laparotomy confirmed Type I jejunal atresia 25 cm from the ligament of Treitz. Primary anastomosis was performed. Mild postoperative ileus resolved conservatively, and the patient was discharged on postoperative day 7.

Case 3

A 3-day-old male neonate presented with marked abdominal distension and bilious vomiting. An abdominal radiograph showed distal obstruction (Figure 3).

Laparotomy revealed Type IIIB ileal atresia with apple-peel deformity (Figure 4A and B).

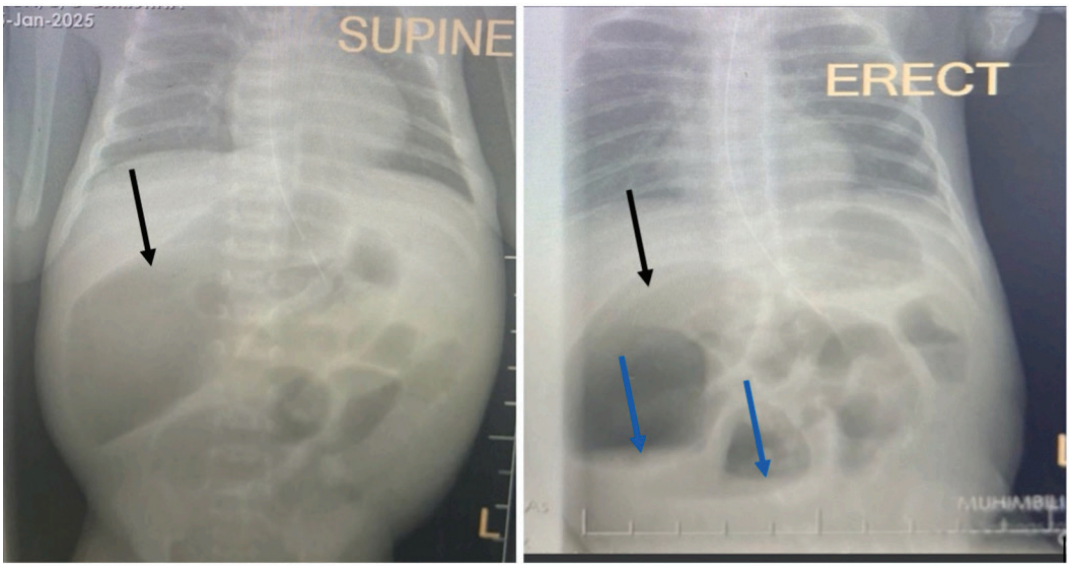

Figure 6. *Supine and erect abdominal X-rays showing multiple air-fluid levels (blue arrows) and markedly dilated small-bowel loops (black arrows), consistent with a neonatal distal intestinal obstruction.*

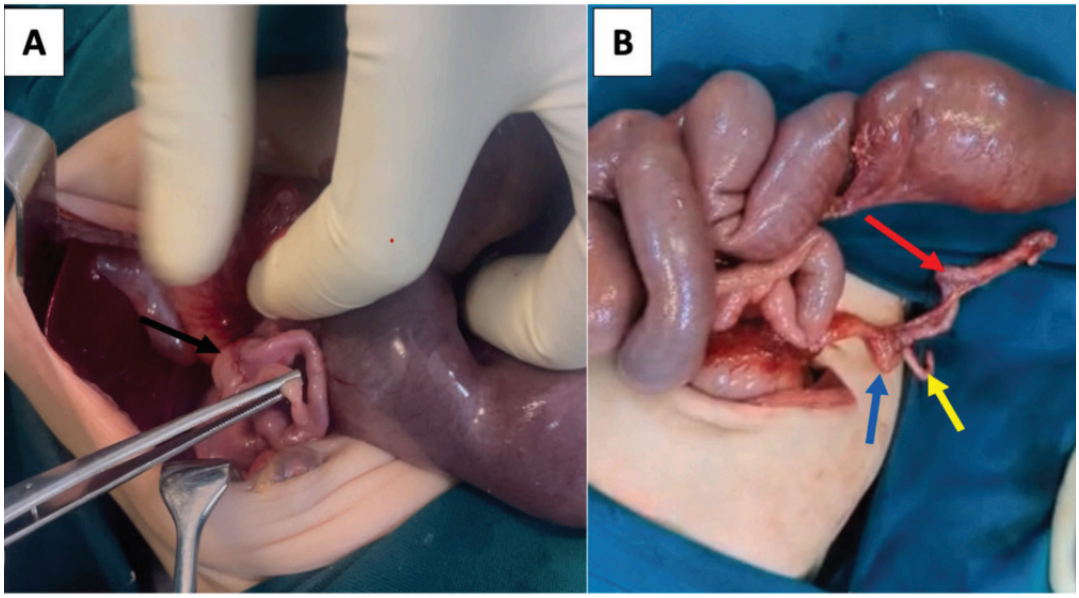

Figure 7A and B. *Image A shows Type IIIb ileal atresia with distal collapsed loops spiraling around a marginal artery, forming a classic "Christmas Tree" pattern (black arrow). Image B demonstrates the detached configuration (red arrow), appendix (yellow arrow), and freely mobile cecum (blue arrow), guiding resection and ascending colostomy*

Resection and primary anastomosis were performed. A superficial wound infection resolved with antibiotics.

Case 4

A 15-day-old male neonate presented with marked distension and metabolic derangement. Radiographs showed massively dilated bowel (Figures 5 and 6).

Laparotomy revealed Type IIIB ileal atresia with associated malrotation (Figure 7A and B). Due to extensive involvement, resection with double-barrel ileostomy and colostomy was performed (Figure 8A and B). Stoma reversal at four months was successful.

Case 5

A 2-day-old male neonate presented with bilious vomiting and obstruction. Type IIIB ileal atresia was found and managed with primary anastomosis. Recovery was uneventful.

Case 6

A 4-day-old male neonate presented with distal obstruction (Figure 9). Laparotomy revealed Type IIIA ileal atresia with a V-shaped mesenteric defect (Figure 10). Primary anastomosis was performed, and the neonate was discharged on day 8.

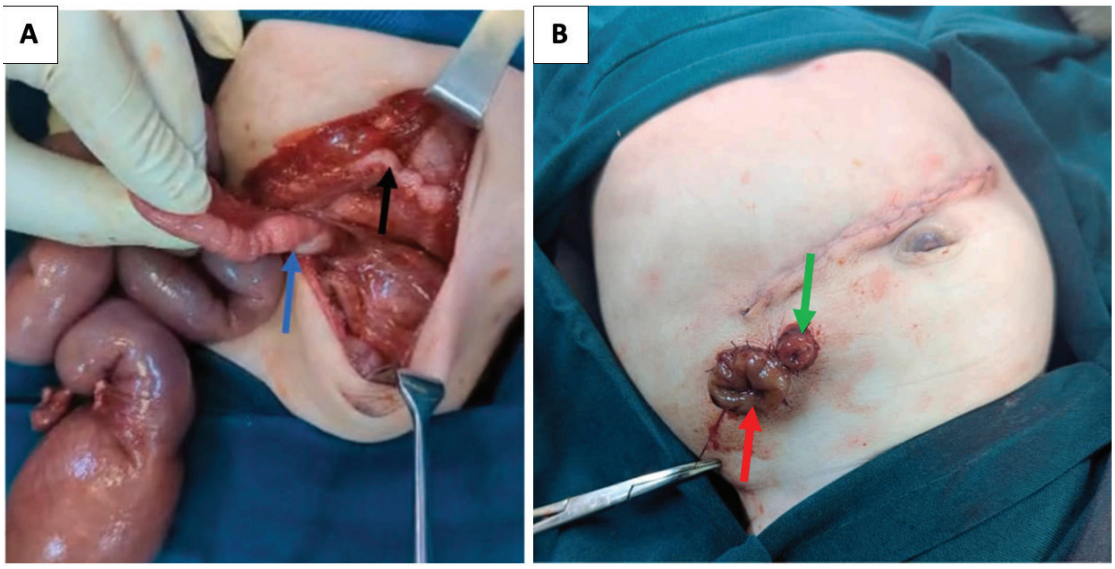

Figure 8A and B. *Image A shows an abnormally right-sided duodenojejunal junction near the hepatic flexure (blue arrows), with collapsed large bowel loops and transverse colon (black arrows), indicating malrotation and distal obstruction. Image B depicts matured ileostomy (red) and colostomy (green) in the right lower quadrant for effective stool diversion.*

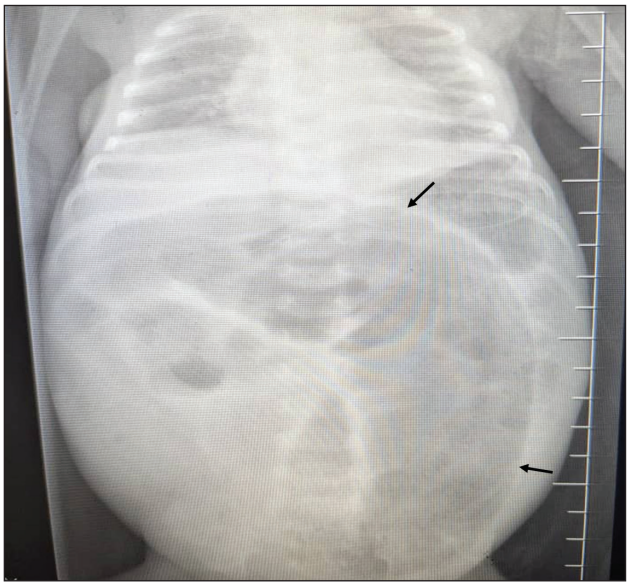

Figure 9. *Abdominal X-ray demonstrating distal small bowel obstruction, characterized by markedly dilated intestinal loops (black arrows) with air-fluid levels, suggesting impaired distal bowel passage and luminal obstruction.*

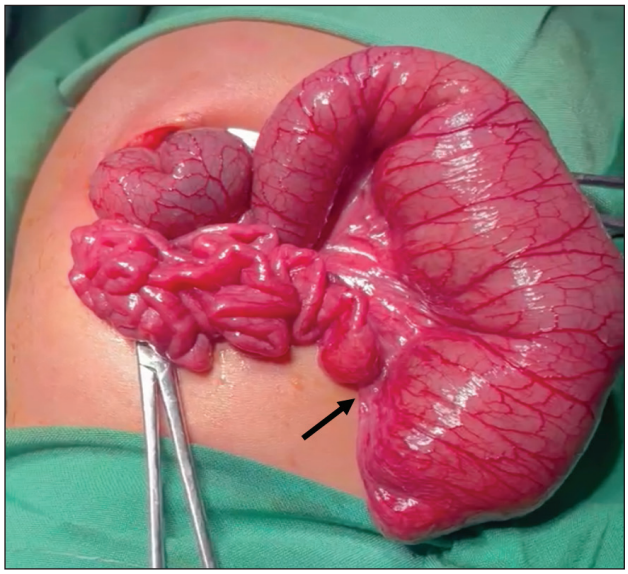

Figure 10. *Intraoperative image showing Type IIIA ileal atresia with a characteristic V-shaped mesenteric defect (black arrow), highlighting the separation of proximal and distal ileal segments and associated mesenteric discontinuity.*

Case 7

A 4-day-old female neonate (2.7 kg) presented with bilious vomiting and obstruction. Type IIIA ileal atresia was identified and repaired primarily. Recovery was uneventful.

Discussion

Jejunoileal atresia remains a major contributor to neonatal surgical morbidity, particularly in LMICs. Although overall incidence is well documented, outcomes vary widely depending on the timing of presentation, anatomical type, and availability of neonatal intensive care [3,5].

The present series demonstrates a 100% survival rate, including complex Type IIIB variants. However, the sample size is small, and findings should be interpreted as a single-institution experience rather than generalizable regional outcomes.

Type IIIB atresia is uncommon, accounting for approximately 5% - 10% of JIA cases, and is traditionally associated with higher mortality due to compromised mesenteric blood supply and reduced bowel length [7,9]. Three neonates in this series had Type IIIB atresia, all of whom survived without short bowel syndrome, contrasting with historically poorer outcomes.

Reported African mortality rates range from 20% to 60% [4-6], compared to survival exceeding 90% in high-income settings [10]. The absence of mortality in this cohort likely reflects early diagnosis, improved perioperative care, and timely surgical intervention [11-13].

Staged surgery remains an important strategy when primary anastomosis is unsafe. In this series, staged management allowed physiological stabilization and successful delayed reconstruction, supporting individualized surgical decision-making.

Early referral and optimization before surgery appear to have played a critical role in improving outcomes in this cohort.

Conclusion

Jejunoileal atresia remains a challenging neonatal surgical condition in resource-limited settings. This case series demonstrates that excellent outcomes, including complete survival, are achievable through timely diagnosis, proper resuscitation, and meticulous surgical technique. Complex variants can be successfully managed with individualized strategies. These findings underscore progress in neonatal medical and surgical care in resource-limited settings.

What's new?

This series demonstrates excellent early outcomes using predominantly primary repair with a standardized hand-sewn anastomosis, documents key anatomical variations, and shows that even complex cases requiring staged repair can be successfully managed without mortality in a low-resource setting.

Acknowledgments

We would like to express our sincere appreciation to the pediatric surgery and neonatal and child health teams at Muhimbili National Hospital.

List of Abbreviations

CXR	Chest X-ray
JIA	Jejunoileal Atresia
LMIC	Low- and middle-income countries
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
NICU	Neonatal Intensive Care Unit
SMA	Superior mesenteric artery
SSI	Surgical Site Infection
US	Ultrasound

PROCESS guideline

This case series has been reported in line with the PROCESS 2025 criteria [14].

Mathayo Shadrack accepts full responsibility for the work and the conduct of the study, had access to the data, and controlled the decision to publish.

Conflict of interest

The authors declare that they have no competing interests.

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Consent for publication

Written informed consent for publication of clinical details and accompanying images was obtained from the parents or legal guardians of all patients. All identifying information has been anonymized to protect patient confidentiality. Copies of the consent forms are available for review by the Editor-in-Chief of this journal on request.

Ethical approval

Ethical approval was obtained from the Institutional Review Board of Muhimbili National Hospital.

Availability of Data and Materials

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Authors' contributions

All authors contributed substantially to the conception and design of the study, data acquisition, surgical management, and manuscript drafting. All authors reviewed and approved the final manuscript.

Author details

Mathayo Shadrack[1,2,3], Mohammed Sultan Salim[1,2], Evelyne Neema Assenga[1,4], Ally Hamisi Mwanga[1,2], Victor Ngotta[1,2], Zaitun Bokhary[1,2]

1. Department of Surgery, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania
2. Department of Surgery, Pediatric Surgery Unit, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania
3. Department of Pediatric Surgery, Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania
4. Department of Pediatric and Neonatology, Muhimbili National Hospital (MNH), Dar es Salaam, Tanzania

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