Management of jejunoileal atresias: a difficult and different scenario in the east

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Abstract

Intestinal atresia is a common cause of neonatal intestinal obstruction, and management of this disease in limited setup of a developing country is very difficult. This study is a retrospective study of patients with jejunoileal atresias and their postoperative outcome in a teaching hospital in eastern Nepal over a 5-year period. There were 28 children (19 boys and 9 girls). 11 children (39.28%) had jejunal atresia and 17 (60.71%) had ileal atresia. Eight (28.5%) patients died, 6 were jejunal atresia (54.5%) and 2 were ileal atresia (11.7%). The most common cause of death was sepsis which occurred in 7 out of 8 cases (87.5%). The risk factors for mortality identified were leucopenia, neutropenia, delay in surgery, location of atresia and type of atresia. Jejunal atresia tended to have a higher mortality than ileal atresia, and severe types of atresia (type IIIb and IV) were more often associated with mortality than other types of atresia. The significant differences between jejunal and ileal atresia were the increased duration between presentation and surgery, longer postoperative and total hospital stay, presence of more severe atresias and an increased risk of mortality in case of jejunal atresias. The prognosis for this disease have definitely changed in the last few decades in developed countries but in our environment, problems like late presentation and diagnosis, lack of availability of good neonatal intensive care units and parenteral nutritional support still prevail.

Introduction

Intestinal atresia is a common cause of neonatal intestinal obstruction. In last few decades, the management of neonates with jejunoileal atresias has improved because of improvements neonatal intensive care, advances in operative techniques and use of total parenteral nutrition (TPN)[1-3]. With these approaches, the morbidity
and mortality of these patients has decreased to a large extent. However, the scenario in developing countries like Nepal is still different; we have our own inherent problems in managing these children in our limited setup, and mortality remains high as in other underprivileged countries\textsuperscript{[4-6]}. This study is a prospective study to analyze clinical characteristics in patients with jejunoileal atresias and their postoperative outcome in a teaching hospital in eastern Nepal over a 5-year period and we intend to highlight the management problems in our environment.

**Patients and methods**

From January 2004 to December 2008, 28 children with jejunoileal atresia were operatively managed at our institution and we prospectively kept their records. Data analysis was performed using the SPSS software package (version 15.0, SPSS Inc, Chicago, IL). Data were analyzed using the $X^2$ test for categorical data and student’s t-test for continuous variables. Two-tailed values of $P$ below 0.05 were considered statistically significant. Data are summarized using mean and standard deviation for normally distributed variables and median for non-normally distributed continuous variables.

**Results**

There were a total of 28 children which included 19 boys and 9 girls. The median age at presentation was 3 days (range 1 day -18 months). One child with jejunal web presented at 18 months and another child with ileal web came at 42 days of age. The median weight at presentation was 2.7 kg (range 2-4 kg). Five patients were preterm (history regarding exact gestational age could not be elicited; majority of mothers could tell only whether the child was term or preterm). Two mothers had
history of polyhydramnios. Only 3(10.71%) children were born in the same hospital, 10(35.71%) were delivered in other hospitals and 15(53.57%) were born at home. Bilious vomiting and abdominal distension were present in all patients (Table 1). Five patients were suspected initially to have neonatal septicemia with septic ileus and were managed in the pediatric wards, which later turned out to be atresias. Three patients passed meconium prior to presentation (a jejunal web, an ileal web, and another atresia at the duodenojejunal flexure). These children had appreciable dilatation of the rectum. Rest of the children did not pass meconium and the rectum negotiated only an infant feeding tube. Plain abdominal x-ray was done in all 28 children. The other plain films showed varying degrees of multiple air-fluid levels. Two patients with jejunoileal atresias had a barium enema done, which showed a microcolon, but it could not be done in every patient. Two children presented with pneumoperitoneum.

Treatment included resuscitation with intravenous fluids, nasogastric decompression, placement of urethral catheter, and administration of intravenous antibiotics (cefotaxime and gentamicin) and metronidazole for anaerobic coverage. 11 children (39.28%) had jejunal atresia and 17 (60.71%) had ileal atresia. One patient had a jejunal web, which was excised after an enterotomy, and a Heineckie-Meckuliz enteroplasty was done. Another patient had an ileal web, which was excised with closure of the enterotomy. A significant finding in these two patients that differ from others is that these webs were incomplete, they were passing stools at presentation and presented late. After confirming the diagnosis by laparotomy and confirming the distal patency by infusing normal saline through no. 6 Foley’s catheter and viewing its passage through the rectum, minimal resection of the proximal bowel with antimesenteric tapering enteroplasty and end-to-end anastomosis was done for all jejunal atresias and 7 patients with proximal ileal atresia. In one patient with combined proximal ileal and colonic atresia, excision of the atretic segment alongwith
ileotransverse anastomosis was done. In other 9 patients with distal ileal atresia, ileostomy with distal mucous fistula was done. In 6 patients ileostomy closure has been done, the remaining 3 patients are planned for ileostomy closure. Two neonates had associated malrotation, one had distal ileal volvulus, one patient had an ileal atresia due to entrapment in the falciform ligament, and another had an enteric duplication cyst with multiple true diverticuli associated. Another patient had ileal atresia due to entrapment in the omphalic ring. TPN could not be offered to these patients after surgery, due to its unavailability in our region.

Sepsis occurred in 7 patients (Table 2). There were 7 superficial wound infections, 2 burst abdomen, 1 parastomal herniation, which required redo operation in the form of a double-barrel ileostomy, and 1 adhesive obstruction which presented after 1 month of initial surgery. Three patients had anastomotic dehiscence with intraabdominal abscess that required laparotomy for drainage. Eight (28.5%) patients died, 6 were jejunal atresia (54.5%) and 2 were ileal atresia (11.7%). The most common cause of death was sepsis which occurred in 7 out of 8 cases (87.5%). One patient with jejunal atresia died after 7 days due to aspiration when started orally, two died from sepsis after intraabdominal abscess formation from an anastomotic leak and were reoperated, but could not be saved. Three patients died due to persistent abdominal distension due to paralytic ileus and sepsis. One patient with ileal atresia also died due to leak and sepsis, another one on stoma died due to sepsis, disseminated intravascular coagulation and gangrene of the stoma.

The risk factors for mortality identified were leucopenia, neutropenia, duration from presentation to surgery, location of atresia and type of atresia (Table 3,4). The mean TLC in survivors was 15304±12835.71 per ml, whereas in non-survivors, it was 12138±4933.25per ml. Non-survivors tended to have a significantly lower neutrophilia than survivors (47% vs. 51%). Delay in operation was also a significant
factor for survival (23.55±33.5 hrs for survivors, and 48.37±88.14 hrs for non-survivors). Jejunal atresia tended to have a higher mortality than ileal atresia, and the severe types of atresia (type IIIb and IV) were more often associated with mortality than other types of atresia. The total hospital stay was also significantly lower in non-survivors than survivors (10.25±6.94 days versus 11.3±3.85 days). The significant differences between jejunal and ileal atresia were the increased duration between presentation and surgery, longer postoperative and total hospital stay, presence of more severe atresias and an increased risk of mortality in cases of jejunal atresias (Table 5). There was no significant difference in the two groups in the sex ratio, age and weight at presentation, and frequency of complications.

**Discussion**

Intestinal atresia is a common cause of neonatal intestinal obstruction. Vascular accidents are thought to predispose to a majority of these lesions\[9\]. There have been encouraging recent reports in management of intestinal atresia. However, the situation in developing countries has not changed. This study is intended to review the clinical characteristics and management of 28 children with jejunoileal atresias presenting to an eastern region hospital in Nepal, a South Asian country.

The clinical features of these children deserve special consideration. Vomiting and abdominal distension were the commonest features. Failure to pass meconium was another common presenting symptom, however, it was absent in cases of incomplete ileal and jejunal webs and a case of atresia at the duodenojejunal flexure. In this report, the median age at presentation was 3 days. One of the reasons that we found for the delay in presentation was the misinterpretation of passage of mucus as meconium by the parents and even by the peripheral health workers. None of our patients were diagnosed in the antenatal period. Antenatal diagnosis could
have decreased the duration of presentation to our hospital. As already mentioned,
majority of our deliveries still occur at home means that delay in presentation is
inevitable. Though overall delay in presentation has not been found to be a
significant factor for mortality, two of the patients had incomplete webs, which led to
their late presentation. If we evaluate only those children who had complete
obstruction, then delay in presentation still becomes a significant factor for mortality.
Apart from delayed presentation, there were delays in operative intervention also
due to diagnostic dilemmas, especially where the child passed meconium before
presentation. Even in cases of complete obstructions, diagnosis was delayed due to
predominant presentation in the form of neonatal sepsis with jaundice, lethargy and
fever. Perhaps a policy of using routine barium enema in suspected children could
have reduced this duration and subsequent adverse outcome.

Another aspect that should be mentioned is the bitter fact that the neonatal
intensive care unit of our hospital is usually filled with large volume of infectious
illnesses, by virtue of our location, so only few of our children could be treated in the
intensive care unit. Though statistical analysis could not be done, this could have
been a significant factor in the outcome of the disease. Management strategies had
to be modified therefore, considering the clinical status of the patients and the
deficiencies in investigative and management facilities, especially the unavailability
of TPN, elemental feeds and intensive care facilities. We preferred for tapering
enteroplasty and anastomosis after minimal resection for jejunal and proximal ileal
cases and stoma for distal ileal atresias to avoid the consequences of short bowel
syndrome, which could never have been managed in our setting\(^{[10]}\). A greater
number of anastomosis could have meant a higher chance of leaks and subsequent
dismal prognosis, and a greater number of stomas would have necessitated the use
of TPN, which is not possible in our set-up. The postoperative mortality of 28.5% in
this series differs largely from data in the developed countries, but it is comparable
to with reports from the third world[1-6]. Perhaps the persistent abdominal distention occurring postoperatively and the anastomotic leaks which contributed to mortality were due to minimal resection and resultant hypotonic functional obstruction and abnormal motility in the retained dilated proximal bowel[1]. Mortality has been found to be decreased by generous resection of the proximal bowel and anastomosis, but it would have increased the incidence of short bowel syndrome[2-10]. We had a high incidence of early morbidities than other studies conducted so far, which were tackled as far as possible.

The risk factors for mortality identified were leucopenia, neutropenia, delay in presentation, duration from presentation to surgery, location of atresia and type of atresia. Leucopenia and neutropenia are factors that have never been identified before. Probably those patients in whom the immunity is not good enough to respond to the hostile environment do not fare well to survive. As has been mentioned, duration from presentation to surgery was another risk factor. The longer the time taken to present to the hospital, for diagnosis, resuscitation and intervention was, the graver the prognosis would be. Mortality was also found to be associated with location and types of atresia. The more distal the lesion the more are the chances of survival. Severe atresias (type IIIb and IV) had a significantly higher mortality than other types of atresia. Burjonrurupa et al has also identified severe atresias as significant predictors of mortality[11]. Jejunal atresias were of more severe forms than ileal ones (63.63% of jejunal atresias were type IIIb or IV, whereas only 17% of ileal atresias were type IIIb or IV). The higher mortality in jejunal atresia was probably due to presence of other congenital anomalies which were missed. Though none of our patients had a clinically detectable congenital anomaly, these might have been a significant factor in the outcome. Rigorous search for associated anomalies was not feasible in our study; another reason that these were not picked up may be small volume of cases. In many previous studies, associated anomalies
have been found to be an important prognostic factor for survival\textsuperscript{[11]}. We also found location of atresia as significant factor for survival. Ileal atresias had a significantly better survival than jejunal atresia, like in study by Tongsin et al\textsuperscript{[12]}. In some earlier studies, jejunal atresia fared better, whereas in others, there was no association\textsuperscript{[11,13]}. Survivors tended to have a longer hospital stay than non-survivors, which meant that death occurred significantly earlier in these unfortunate patients, who came late to the hospital and died early as well due to early complications. Unlike other studies, we did not find significance of weight in relation to mortality\textsuperscript{[12,13]}.

The prognosis for intestinal atresia has improved significantly in recent years because of development in procedures for preservation of intestinal length, better management of associated anomalies, small bowel transplantation and improved perioperative management. In developing countries however, as in our environment, the situation is different and the results are still far from good. Late presentation and/or diagnosis resulting in deterioration of the patient, lack of availability of neonatal intensive care units due to occupancy by non-surgical diseases and lack of parenteral nutritional support are bitter factors that definitely account for the poor outcome in our setup. We accept with our heart that our results do not conform to international standards, but there are very few options presently. Probably the proportions of death in our study could have been decreased by extensive search for associated congenital anomalies, the availability of TPN and better intensive care facilities, which we hope to achieve in the near future.

**Conclusion**

The prognosis for intestinal atresia in the last few decades may have changed in developed countries but our environment still suffers from problems like late
presentation and diagnosis, lack of availability of good neonatal intensive care units and parenteral nutritional support which may be responsible for the poor outcome in our setup.

**Abbreviations**

TPN : Total Parenteral nutrition
TLC: Total leucocyte count

**Competing interests**

The authors declare that they have no competing interests.

**Authors' contributions**

VCS, SK, PP and PS made substantial contributions to concept and design of the article. CSA and SA contributed significantly in critical revision and drafting the manuscript. All authors read and approved the final version of the manuscript

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Table legends:

**Table 1**: Clinical features of jejunoileal atresia

**Table 2**: Complications

**Table 3**: Type of atresia associated with location and survival

**Table 4**: Risk factors for mortality

**Table 5**: Differences between jejunal and ileal atresias
Additional files provided with this submission:

Additional file 1: Table 1.doc, 28K
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