



CLINICAL PROFILE, OUTCOME AND COMPLICATIONS OF NEONATES REQUIRING ILEOSTOMY AFTER BIRTH: 15 YEARS HOSPITAL BASED OBSERVATIONAL STUDY

Paediatric Surgery

Dr Murchana Khound*	Assistant Professor in Department of Pediatrics , AIIMS Guwahati *Corresponding Author
Dr Sujit Chowdhary	MBBS, MS General Surgery, MCh Pediatric Surgery, FRCS, Board certified in Pediatric Urology from EPU (Europe) & SPU (USA). Senior Consultant Paediatric Surgery and Paediatric urology in Indraprastha Apollo Hospital Delhi
Dr Saroja Balan	MBBS, FRCP,MRCPC, Senior Consultant And Neonatologist, Indraprastha Apollo Hospital, Delhi

ABSTRACT

Background: Ileostomies are commonly performed on newborn babies with surgical abdominal emergencies. Clinical profile and outcome of such babies has not been studied in great details in Indian research studies. **Methods:** It was a 15 years duration observational study conducted in a tertiary care multispecialty hospital. **Result:** Total 65 babies underwent ileostomy from July 2006 to July 2021. Males were 48(73.8%) and females were 17(26.2%). Most common cause of ileostomy was necrotising enterocolitis (55.4%, n=36) followed by Hirschsprung disease (18.5%, n=12) and ileal atresia (7.7%, n=5). The mean gestational age at which the babies were born was 33 weeks (± 4 weeks SD). Mean age of Ileostomy was 16 days. Mean weight at Ileostomy was 2.04 Kg (± 0.96 Kg). Mean age of initiation of feed after ileostomy was 6 days (± 1.7 days SD). Mean time to reach full feed was 11 days (± 3 days SD). Majority of the babies (69.2%, n=45) recovered and were discharged home while 20% (n=11) died, 7.7% (n=5) left against medical advice and 6.1% (n=4) were transferred to other hospitals. Amongst the 45 babies that recovered and were discharged home, 38 babies returned for ileostomy closure and the rest of the 7 babies are in follow up for closure of ileostomy. Mean age at Ileostomy closure was 4 months 4 days (± 2 months 18 days SD). Most important cause of ileostomy in the babies that expired was Necrotising enterocolitis (73%). Post-operative complications were seen in 33.8% which included conjugated hyperbilirubinemia, failure to thrive, prolapse, adhesions, wound dehiscence, etc. **Conclusion:** This is one of the few Indian study which has evaluated the short term course of new-borns requiring ileostomy with variable length of small bowel or large bowel obstruction after birth.

KEYWORDS

Ileostomy, Enterostomy, Necrotising-enterocolitis, Hirschsprung disease, spontaneous intestinal perforation, newborn, infants

INTRODUCTION

The development of perinatal management has made it possible for low birth weight (LBW) infants to survive. Accordingly, abdominal operations have increased due to an increased incidence of acute abdomen conditions such as necrotizing enterocolitis (NEC) and spontaneous intestinal perforation (SIP) in these babies.¹⁻²

Treatment in cases of acute abdomen can be medical or surgical according to the cause, disease severity or patient condition. Some cases may not require surgical intervention and can be managed conservatively. Surgical options may include primary closure, primary anastomosis with intestinal resection, enterostomy with or without intestinal resection, and peritoneal drainage. Although controversy exists about what is the best treatment for each patient, enterostomy is a generally accepted safe treatment option for LBW patients with acute abdomen.³⁻⁶

Ileostomies are commonly performed on newborn babies with surgical abdominal emergencies. Ileostomy is a process by which a stoma (surgical opening) is constructed by bringing the end or loop of small intestine (the ileum) out onto the surface of the skin. It is a strategy that rests the bowel until physiological recovery takes place.⁷ The two large groups of new-borns who require an ileostomy are preterm infants with necrotising enterocolitis (NEC)⁸ and term infants with a wide spectrum of surgical conditions such as ileal atresia, Hirschsprung's disease and volvulus.⁷ Ileostomies are generally done in sick new-born with or without massive gut resection. Variable amount of small bowel and large bowel are resected in these babies who have associated faecal peritonitis with secondary complications. In general, these babies are in septicemic shock and resection of bowel is a high risk surgery in these babies. Recovery of these babies depend on the background pathology and recovery of end organ failure. Outcome of such babies has not been studied in great details in Indian literature. Few studies have been done till now to see the causes of Ileostomy in new-born, the gestational age at ileostomy and ileostomy closure, outcome and complication of ileostomy in new-born. In this study we have studied the 365 days (12 months) course of new-borns requiring ileostomy with variable length of small bowel or large bowel obstruction after birth.

The primary objective of the study was to assess the causes of ileostomy in newborn, the gestational age and weight at which

ileostomy was done, the gestational age at which ileostomy closure was done, to evaluate the outcome of ileostomy in newborn and to estimate the complications of ileostomy in newborns.

MATERIALS AND METHODS

Place of Study: The study was conducted in a tertiary care multispecialty hospital

Study Design: Hospital based observational study

Duration of study: 15 years (July 2006- June 2021)

Method of study: Both inborn and out-born babies requiring ileostomy after birth were enrolled in the study. Neonatal care was given according to standard hospital protocol.

Exclusion Criteria: New-borns with life threatening congenital malformation

It was a retrospective study. Institutional Ethics committee clearance was taken.

- Variables studied in this study included
 - 1) Indications for ileostomy in new-born
 - 2) Gestational age at which babies requiring ileostomy were born
 - 3) Day of life at which ileostomy was done
 - 4) Weight of the babies at the time of ileostomy
 - 5) Age at which ileostomy closure was done
 - 6) Outcome in the babies having ileostomy under the following headings
 - a. Recovered
 - b. Death
 - c. Left against medical advice
 - d. Transferred to other hospital
 - 7) Mean age of starting feeding after ileostomy and time required to reach the full feed in babies who recovered
 - 8) Complications after ileostomy

Statistical Methods

The data obtained was tabulated and analysed statistically using social system version SPSS.16. Shapiro wilk test was used to check if continuous variables follow a normal distribution. Mean was used for normally distributed data whereas Median was used for skewed data.

RESULTS

Total 65 babies underwent ileostomy from July 2006 to July 2021 out

of which 48(73.8%) were males and 17 (26.2%) were females. Indications for Ileostomy

Table 1: Causes Of Ileostomy In Neonates

Cause	Number (N)	Percentage
Necrotising enterocolitis	36	55.4%
Hirschprung disease	12	18.5%
Volvulus	2	3.1%
Gut of prematurity	2	3.1%
Ileal atresia	5	7.7%
Anorectal malformation	2	3.1%
Spontaneous intestinal perforation	3	4.6%
Others	3	4.6%
Total	65	100%

As shown in table 1 in our study most common cause of ileostomy in new-born was necrotising enterocolitis(55.4%, n=36) followed by Hirschprung disease (18.5%, n=12 and ileal atresia(7.7%, n=5). Other causes include spontaneous intestinal perforation(4.6%,n=3), volvulus (3.1%,n=2), gut of prematurity (3.1%,n=2), exomphalus minor with small bowel obstruction(1.5%, n=1)and meconium ileus (3.1%,n=2).

Gestational Age Distribution

The mean gestational age at which the babies were born was 33 weeks (± 4 weeks SD). Lowest gestational age was 26 weeks and the highest gestational age was 39 weeks.

Figure 1: Gestational age distribution

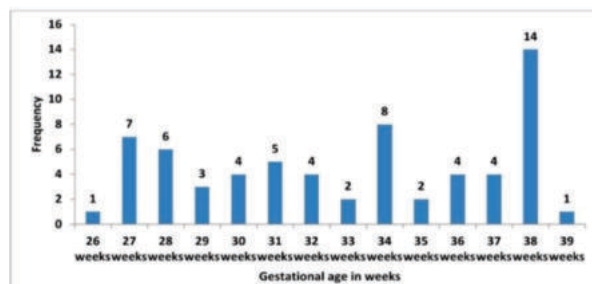
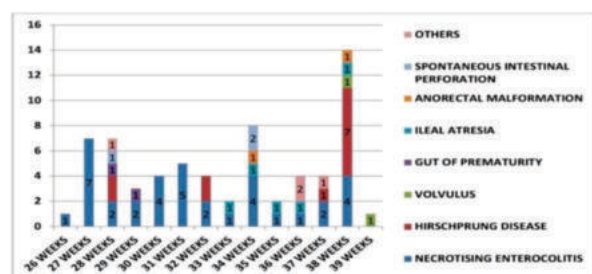


Figure 1 shows majority babies were delivered at 38 weeks of gestational age(14 babies) followed by 34 weeks(8 babies),while 7 babies were delivered at 27 weeks and 6 babies at 28 weeks of gestational age. About 5 babies were born at 31 weeks and 4 babies at 30 weeks, 32 weeks, 36 weeks and 37 weeks for each. At 29 weeks of gestational age, 3 babies were born.

Out of 14 babies born between 26 to 28 weeks who required ileostomy, 10 babies had NEC, 2 babies had hirschprung disease, 1 baby had gut of prematurity and 1 baby had spontaneous intestinal perforation. In babies born between 29 to 32 weeks who required ileostomy, 13 babies had NEC, 2 babies had hirschprung disease and 1 baby had gut of prematurity. In between 33 to 36 weeks born babies who required ileostomy, 7 babies had NEC, 4 babies had ileal atresia, 1 baby had anorectal malformation, 2 babies had spontaneous intestinal perforation and 2 babies had meconium ileus. In babies born between 37 to 39 weeks, 6 babies had NEC, 8 babies had hirschprung disease, 2 babies had volvulus, 1 baby had ileal atresia, 1 baby had anorectal malformation and 1 baby had exomphalus minor with small bowel obstruction.(Figure 2)

Figure 2: Gestational age distribution according to cause

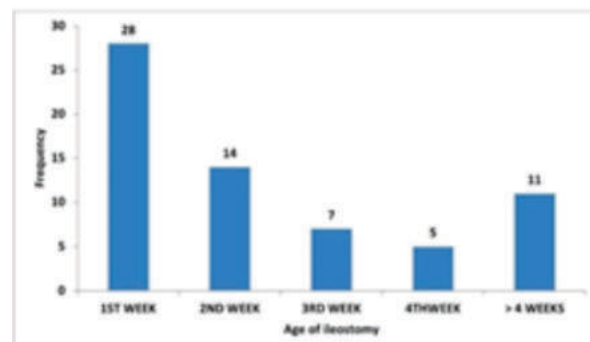


Age Of Ileostomy

Mean age of Ileostomy was 16 days. Lowest age at which ileostomy was done was 2 days and highest age was 77 days.

Majority of the babies had ileostomy in the first week of life (43%, n=28) followed by ileostomy in 2nd week and 4th week of life (22% and 17% babies respectively). In 7 babies, ileostomy was done in 3rd week of life while in 5 babies ileostomy was done in 4th week of birth.(Figure 3)

Figure 3: Weeks of life at which ileostomy was done



Weight At Ileostomy

Mean weight at Ileostomy was 2.04 Kg(± 0.96 Kg). Minimum age at ileostomy was 580 grams and maximum weight was 3.8 Kg. Outcome of babies having Ileostomy

Table 2: Outcome Of Babies Having Ileostomy

Outcome	Number(N)	Percentage
Recovered	45	69.2%
Death	11	20%
Leave against medical advice	5	7.7%
Transferred to other hospital	4	6.1%
Total	65	100%

Out of 65 ileostomies done during the period, majority of the babies(69.2%, n=45) recovered and were discharged home while 20%(n=11) died, 7.7%(n=5) left against medical advice and 6.1%(n=4) were transferred to other hospitals.(table 2)

Amongst the 45 babies that recovered and were discharged home, 38 babies returned for ileostomy closure and the rest of the 7 babies are in follow up for closure of ileostomy.

In present study, 4 babies were transferred to other hospital near their home as it appeared more convenient for the parents to take care of their babies living in their home town. Out of these 4 babies 1 baby returned for ileostomy closure, 2 babies are in follow up for closure of ileostomy and one baby expired at home.

Amongst the 5 babies that left against medical advice, all the babies had advanced necrotising enterocolitis. These babies had a large segment gangrenous small bowel. In 3 patients, poor prognosis was explained, 2 patients were requiring prolong hospital stay. Parents were properly counselled regarding their babies condition. These parents did not wish to continue further hospital treatment and left against medical advice.

Clinical Profile Of The Babies That Expired

Majority of the babies that expired were extremely premature(73%) and had extremely low birth weight(55%). Most important cause of ileostomy in these babies was Necrotising enterocolitis(73%). Majority of the babies had other associated causes like sepsis, respiratory distress syndrome requiring higher ventilatory settings. These patients were very sick and had other associated morbidities predisposing to death.

Mean age at Ileostomy closure was 4 months 4 days(± 2 months 18 days SD). Lowest age at which Ileostomy closure was done was 12 days and highest age was 13 months 12 days.

Mean age of initiation of feed after ileostomy was 6 days(± 1.7 days SD). Minimum age was 3 days and maximum age was 14 days of initiation of feed. Mean time to reach full feed was 11 days(± 3 days SD). Minimum age to reach full feed was 6 and maximum age was 21

days.

Twenty two babies had some post-operative complications. The complications were conjugated hyperbilirubinemia, failure to thrive, prolapse, adhesions, wound dehiscence, ileostomy site hernia, large volume ileostomy loss, diarrhoea, metabolic acidosis and short bowel syndrome.

DISCUSSION

In our study 65 babies had ileostomy in 15 years' period (from July 2006 to July 2021) out of which 48(73.8%) were males and 17 (26.2%) were females. As shown in Table 4 similar distribution was seen in a study by Hee yang et al¹¹. (67% males and 33% females) while to the contrary side, F Ferrara et al⁹ in their study found that out of 33 babies who had ileostomy 42% were males and 58% were females. A study Simon Kargl et al¹⁰ showed 1:1 gender distribution.

Table: 4 Gender Distribution And Causes Of Ileostomy In Various Studies

Study	No of babies who had Ileostomy	Gender	Causes
F ferrara et al, 2013	33 babies	14 (42%)males, 19(58%) females	24 NEC, 4 Meconium peritonitis, 5 meconium ileus
Simon Kargl ¹⁰ et al, 2016	30 babies	15(50%) males, 15(50%) females	17 SIP, 6 Meconium ileus, 5 midgut volvulus, 2 NEC, 1 Hirschprung disease
Hee yang et al, 2018	55 babies	37(67%) males, 18 (33%) females	19 NEC, 17 SIP, 14 meconium related ileus, 5 meconium non related ileus
Current study	65 babies	48(73.8%)males, 17 (26.2%) females	36 NEC, 12 Hirschprung disease, 5 ileal atresia, 3 SIP, 2 volvulus, 2 Gut of prematurity, 2 meconium ileus, 1 exomphalus minor with small bowel obstruction

In our study majority of the babies (55.4%,n=36) who required ileostomy had necrotising enterocolitis. The second common cause was Hirschprung disease (18.5%,n=12) followed by ileal atresia (7.7%, n=5) while other causes were spontaneous intestinal perforation(4.6%,n=3), volvulus (3.1%,n=2), gut of prematurity (3.1%, n=2), exomphalus minor with small bowel obstruction(1.5%, n=1) and meconium ileus (3.1%,n=2).Similarly, in a study by F ferrara et al⁹ and Hee yang et al¹¹, most common cause of ileostomy in babies was necrotising enterocolitis while it was spontaneous intestinal perforation in a study by Simon Kargl¹⁰.

Present study found that mean gestational age of ileostomy was 33 weeks with range of 26 weeks to 39 weeks while in the study by Simon Kargl et al¹⁰ and Hee yang et al¹¹, it was 25 weeks. Rajendran Ramaswamy et al¹² found range of 22 weeks-37 weeks of gestational age at which ileostomy was done (Table 5).

In this study, mean post-natal age of ileostomy was 16 days with range of 2 days to 77 days. Similar findings were found in a study conducted by Simon Kargl et al¹⁰ and Rajendran Ramaswamy et al¹². While Hee yang et al¹¹ found mean age of ileostomy was only 10 days with range of 2 days to 43 days. (Table 5)

Mean weight at time ileostomy was 2040 gm with range of 580 gm to 3800 gm in current study. Similar results were seen in a study by Rajendran Ramaswamy et al¹². (mean 1810.5 gm, range 660 gm – 3000 gm) while it was very less in the study by Simon Kargl et al¹⁰ and Hee yang et al¹¹ (Mean-887gm and 660gm respectively) (Table 5)

Table 5: Gestational Age, Postnatal Days And Weight At Ileostomy In Various Studies

Study	Gestational age at which Ileostomy was done	Post-natal days At which Ileostomy was done	Weight at which Ileostomy was done
Simon Kargl ¹⁰ et al, 2016	Mean 25 Weeks (24 Weeks -32 Weeks)	Mean 18 days (3 days -99 days)	Mean 887gm (510gm – 1489 gm)
Hee yang et al, 2018	Mean 25 Weeks (23 Weeks -32 Weeks)	Mean 10 days (2 days -43 days)	Mean 660gm (430 gm – 930 gm)
RajendranRamaswamy et al, 2016	22 Weeks - 37 Weeks	Mean 20 days (3 days -82 days)	Mean 1810.5 gm (660 gm – 3000 gm)
Current study	Mean 33 Weeks (26 Weeks -39 Weeks)	Mean 16 days (2 days -77 days)	Mean 2040gm (580gm – 3800 gm)

In our study majority of the babies(69.2%, n=45) who had ileostomy recovered and were discharged home while 20%(n=11) died, 7.7%(n=5) left against medical advice and 6.1%(n=4) were transferred to other hospitals. Amongst the 45 babies that recovered and were discharged home, 38 babies returned for ileostomy closure and the rest of the 7 babies are in follow up for closure of ileostomy. Four babies were transferred to other hospital near in their home as it appeared more convenient for the parents to take care of their babies living in their home town. Out of these 4 babies 1 baby returned for ileostomy closure, 2 babies are in follow up for closure of ileostomy and one baby expired at home. Amongst the 5 babies that left against medical advice, all the babies had advanced necrotising enterocolitis. These babies had a large segment gangrenous small bowel. In 3 patients, poor prognosis was explained, 2 patients were requiring prolong hospital stay. Parents were properly counselled regarding their babies condition. These parents did not wish to continue further hospital treatment and left against medical advice. M Crealey et al¹³ in their study found that amongst 16 babies that had ileostomy 2 preterm infants were transferred back to the referring maternity hospital. 3 infants were transferred to the gastroenterology service in another tertiary children hospital. 3 infants required reversal of their ileostomy due to complications during the same admission. Remaining 8 infants(50%) were discharged home

Majority of the babies that expired were extremely premature and had extremely low birth weight. Most important cause of ileostomy in these babies was Necrotising enterocolitis. Majority of the babies had other associated causes like sepsis, respiratory distress syndrome requiring higher ventilatory settings. These patients were very sick and had other associated morbidities predisposing to death. Similar findings were seen in other studies which showed that in VLBW infants, postoperative deaths are due to sepsis, progressive abdominal catastrophes and concomitant diseases of prematurity.¹³⁻¹⁴

Mean age at Ileostomy closure was 4 months 4 days(±2months 18 days SD). Lowest age at which Ileostomy closure was done was 12 days and highest age was 13 months 12 days. The mean age of stoma reversal in Simon Kargl et al¹⁰ study was 97 days (Range was 42 to 149 days). In a study by Jonathan P. Gertler et al¹⁵, closure of ileostomy was done at a mean age of 18 weeks (range 5 to 36 weeks)¹.

Mean age of initiation of feed after ileostomy was 6 days(±1.7 days SD). Minimum age was 3 days and maximum age was 14 days of initiation of feed. Mean time to reach full feed was 11 days(±3 days SD). Minimum age to reach full feed was 6 and maximum age was 21 days. M Crealey et al in their study found 13 out of 16 babies reached full feed at median of 17 days. Minimum age was 12 days and maximum age was 25 days.¹⁶ In a study by Partap S. Yadav, the mean first sustained feed was achieved at 153.8 ± 28.6 hours while full feeds were achieved within 196.0 ± 40.5 hours in the traditional feeding group.¹⁷

Out of 65 babies, 33.8% patients had some post-operative complications like conjugated hyperbilirubinemia, failure to thrive,

prolapse, adhesions, wound dehiscence, ileostomy site hernia, large volume ileostomy loss, diarrhoea, metabolic acidosis and short bowel syndrome. In a study by Simon Kargl et al¹⁰ found stoma related complications in 66.7% babies which includes stoma prolapse, prestomal obstruction, stoma retraction, high output stoma, peristomal skin excoriation, and stomal ischemia) and post-operative complications in 11% patients only (wound dehiscence, adhesion ileus, anastomotic stricture)¹⁰. Martin L Blakely et al¹⁴ found the overall incidence of postoperative intestinal stricture was 10.3%, wound dehiscence 4.4%, and intra-abdominal abscess 5.8%.

In this study we have evaluated the clinical profile (causes of ileostomy, the gestational age and weight at ileostomy, age at which ileostomy closure, time for initiation of feed and full feed) outcome and complications of ileostomy in newborns. It was a retrospective study conducted over 15 years period including larger cases (65 neonates) compared to other similar studies done in the past. The consequences of ileostomy in such larger newborn babies have not been studied in the Indian research studies in the past. This is one of the few Indian study which has evaluated the 365 days (12 months) course of new-borns requiring ileostomy with variable length of small bowel or large bowel obstruction after birth.

Limitation of this study is that 7.6% (5 out of 65 babies) were lost to follow up because they left against medical advice. But in all these babies we have studied the probable cause of leaving against medical advice. All these babies had advanced necrotizing enterocolitis. 3 patients had poor prognosis and 2 patients required prolonged hospital stay. Their parents were properly counselled regarding their babies condition and they did not wish to continue further hospital treatment and left against medical advice. The causes of death in the babies who expired were also studied in details. This study is also unique in the way that few studies in the past have evaluated the outcome of ileostomy babies in such a detailed matter.

CONCLUSION

In our study we have studied the clinical profile (causes of ileostomy, the gestational age and weight at ileostomy, age at which ileostomy closure, time for initiation of feed and full feed) outcome and complications of ileostomy in newborns. It was a retrospective study conducted over 15 years period including comparatively larger cases than other similar studies done in the past. The consequences of ileostomy in such larger newborn babies have not been studied in the Indian research studies in the past. This is one of the few Indian study which has evaluated the short term course of new-borns requiring ileostomy with variable length of small bowel or large bowel obstruction after birth. The causes of death in the babies who expired were also studied in details. Few studies in the past have evaluated the outcome of ileostomy babies in such a detailed matter. Further studies can be done in future to see the long term outcome of babies requiring ileostomy after birth.

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