



Management of Meconium Ileus: 5 years' experience at Dhaka Shishu (Children) Hospital

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Abstract

Background : Meconium ileus (MI) is one of the common cause of intestinal obstruction in neonate. It can be present with various complications (about 50%) like volvulus, atresia, and gangrene of the gut, perforation and meconium cyst.

Objective : This study aimed to compare various surgical procedures used in the treatment of meconium ileus and to assess their efficacy regarding survival and complications in our center.

Methods : This retrospective study was done to all cases of meconium ileus admitted in the Department of neonatal surgery of Dhaka Shishu (Children) Hospital during the past 5 years (2011 to 2016). The medical records of all patients with meconium ileus were studied. The surgical procedures were Mikulicz procedure, Bishop-Koop procedure done in case of complicated cases and Mikulicz procedure, Bishop-Koop and T tube ileostomy done in uncomplicated cases. Outcomes were compared between complicated and uncomplicated group and between the surgical procedures.

Results : Total patients were 224. Among them 8 were excluded due to incomplete data. The mean age was 3.23 days. Twenty four neonates were preterm. Fifty-two percent were uncomplicated MI and 48.15% were complicated.

Among 112 uncomplicated cases, Mikulicz procedure done in 33 cases, Bishop-Koop procedure done in 37 cases and rest were treated by T tube ileostomy procedures. Among 104 cases of complicated meconium ileus, Mikulicz procedure done in 75 cases and 42 cases were treated by Bishop-Koop stoma.

Predominant complications in Mikulicz procedures were high output fistula (67.6%), sepsis (34.84%) and skin excoriation (58.33%), while in Bishop-Koop procedure were sepsis (59.25%), anastomotic leak and reoperation (25.75%). In T tube ileostomy, complications were intra-peritoneal leak with reoperation and sepsis (9.52%). Twenty five (11.6%) stoma prolapse were found in Mikulicz ileostomy. The overall mortality of meconium ileus was 36.6%, in simple MI 23 out of 112 and in complicated MI 56 out of 104. This difference was significant.

Conclusion : Considering the study result we concluded that complications occur more frequently in Mikulicz procedure and it is significantly associated with mortality, Bishop-Koop ileostomy can be considered but anastomotic leak is still an important complication of this procedure. In uncomplicated cases T tube ileostomy found as the best option.

Keywords : Meconium ileus; Bishop Koop ileostomy; T tube ileostomy; Mikulicz ileostomy.

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Introduction

Meconium ileus (MI) is one of the common causes of intestinal obstruction in neonate, accounting for 9–33% of intestinal obstruction at this age. Obstruction occur secondary to the intraluminal accumulation of inspissated and desiccated meconium.¹ previously, meconium ileus was considered to be closely associated with cystic fibrosis. But, recent studies demonstrated that it can occur frequently without association of cystic fibrosis. Though the exact pathogenesis of meconium ileus in the absence of cystic fibrosis is unknown, a spectrum of genetic and pathological abnormalities may play a role.²

Two form of meconium ileus can be described, uncomplicated and complicated meconium ileus.¹ In the uncomplicated form, thickened meconium obstructs the mid ileum and there is proximal dilatation, bowel wall thickening and congestion occurs. In complicated cases, this condition is complicated by volvulus, atresia, necrosis, perforation and meconium peritonitis and pseudocyst formation.¹ Uncomplicated meconium ileus can be treated with therapeutic contrast enemas with water-soluble and hyper or isoosmolar contrast.³ Several complications have been reported following Gastrografin enema like perforation, necrotizing enterocolitis, shock and occasional death.⁴ Therefore, some

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criteria should be fulfilled before performing this procedure.³

Reported success rate of non-operative management of uncomplicated meconium ileus is about 60 to 70% in newborn and current short-term operative treatment showed survival rate of 70 to 100%.⁵ Options for surgical management of meconium ileus include resection of dilated ileum with primary anastomosis, Bishop–Koop ileostomy, Santulli procedure or Mikulicz procedure.¹ These are extensive operation, associated with gut reduction and high stoma output. A second surgery also required to close the stoma.^{6,7} In uncomplicated meconium ileus, tube or T-tube ileostomy which includes enterotomy, evacuation of thick meconium and placement of T-tube for post-operative irrigation.^{7,8} This procedure do not require gut resection and there is no intraperitoneal anastomosis. After extraction of T-tube the wound heal spontaneously and second operation to close the stoma is not required.⁹

In our center, we do not have fluoroscopy to try non operative management of uncomplicated meconium ileus. Mikulicz ileostomy, Bishop Koop ileostomy has been practiced in our center for long time in both types of meconium ileus. In both of these procedures a second surgery to close the stoma is required. Recently we have started T tube ileostomy for uncomplicated meconium ileus.

This retrospective study was done to compare various surgical procedures used in the treatment of meconium ileus and to see their efficacy regarding survival and complications.

Materials and Methods

This retrospective study was done in all cases of meconium ileus admitted into the Department of Neonatal surgery; Division of Pediatric Surgery; Bangladesh Institute of Child Health (BICH) and Dhaka Shishu (Children) Hospital, Dhaka, Bangladesh during the past 5 years (2011 to 2016). The medical records of 224 cases of meconium ileus were studied. Of those 8 cases were excluded due to incomplete data.

All patients on admission kept NPO, received nasogastric decompression, I/V fluid and antibiotic. After initial resuscitation patients were taken to Operation Theater. After confirmation of diagnosis at laparotomy different operative procedures (Mikulicz/Bishop Koop/T tube ileostomy) performed depending on timing, patient condition and surgeons experience. Informed written consent was taken from parents or legal guardian of all patients before operation. We did not do any resection primary anastomosis in any group and nor T tube ileostomy done in complicated group. Postoperative complications were evaluated.

We had taken permission properly from the ethical board of Dhaka Shishu (Children) Hospital to do this study. Statistical significance is determined by using the Statistical Package for Social Sciences (SPSS) version 22. Associations of continuous

data were assessed using student t- test. Associations of categorical data were assessed using Chi-square test and Fisher's exact test. For both test, $p < 0.05$ was considered significant.

Results

During the study period total 3976 neonatal surgical cases were admitted, among them 224 were meconium ileus. The incidence of meconium ileus was 56.4 per 1000 neonatal surgical cases at the center. Eight patients were excluded for inadequate data. The mean age of presentation of neonates with meconium ileus was $3.23(\pm 1.08)$ days (range from 2 days to 6 days).

Male and female were same in number (108) and ratio. Twenty one neonates presented with meconium ileus were preterm, representing 11.11% of all cases. Among the studied cases, 112 cases (51.85%) were uncomplicated meconium ileus and 104 cases (48.15%) were complicated (Table: I).

Table I : Demographic characters of uncomplicated and Complicated MI (N=216)
Uncomplicated (n=112) Complicated (n=104) p value

	Uncomplicated (n=112)	Complicated (n=104)	p value
Age	3.31±1.13	3.15±1.02	0.28
Sex			
Male	51	57	0.22
Female	61	47	
Weight (kg)	2.48±.26	2.48±.23	0.96

In complicated meconium ileus, the complications were small gut volvulus (43.3%), gangrene of loaded ileum (32.2%), perforation with peritonitis (37.5%), intestinal atresia with adhesions (16.3%), and meconium pseudocysts in 16 cases (15.4%). 11 patients had more than one complication. Per-operative finding of Complicated MI shown in (Table-II).

Table II: Per-operative findings of Complicated MI (N=104)

Findings	Number	%
Small gut volvulus	45	43.3%
Perforation with peritonitis	39	37.5%
Gangrene of loaded ileum	34	32.7%
Intestinal atresia with adhesions	17	16.3%
Meconium pseudocysts in cases	16	15.4%

In uncomplicated meconium ileus (112), T-tube ileostomy done in 42 patients, Bishop Koop ileostomy in 37 patients and Mikulicz ileostomy done in 33 patients. Main post-operative complications of uncomplicated meconium ileus were peristomal skin excoriation in 35 cases, high output fistula in 31 cases and sepsis 27. Most of these were seen in Mikulicz ileostomy procedure. In complicated meconium ileus 102, Bishop Koop ileostomy in 29 patients and Mikulicz ileostomy done in 75 patients.

Main post-operative complications of complicated meconium ileus was sepsis 64. Others were high output fistula (49) and peristomal skin excoriation (36). The complications were mostly related to Mikulicz ileostomy procedure. Post-operative morbidity and mortality according to the procedures and types of meconium ileus shown in Table-III and IV.

Table III : Post-operative Morbidity and Mortality of Uncomplicated meconium ileus (N=112)

Variables	T- tube ileostomy (N=42)	Bishop Koop ileostomy (N=37)	Mikulicz ileostomy (N=33)	Total
High Output Fistula	--	2 (5.4%)	29 (88.87%)	31
Intraperitoneal Leak & Reoperation	4(9.5%)	9(24.32%)	--	13
Sepsis	4 (9.5%)	8(21.6%)	15(45.45%)	27
Wound infection	2(4.77%)	7(18.9%)	9(27.3%)	18
Skin excoriation	--	3(8.1%)	32(97%)	35
Mortality	3(7.14%)	6(16.21%)	14(42.42%)	23

Table IV : Post-operative Morbidity and Mortality of Complicated meconium ileus (N=104)

Variables	Mikulicz ileostomy (N=75)	Bishop Koop ileostomy (N=29)	Total
High Output Fistula	44(58.7%)	5(17.24%)	49
Intraperitoneal Leak & Reoperation	--	8(27.6%)	8
Sepsis	49(65.33%)	15(51.72%)	64
Wound infection	14 (18.7%)	5(17.24%)	19
Skin excoriation	31(41.33%)	5(17.24%)	36
Mortality	45 (60%)	11 (37.93%)	56

Mean hospital stay was less in Mikulicz ileostomy procedure and more in Bishop-Koop Ileostomy procedure in both group (Figure-1).

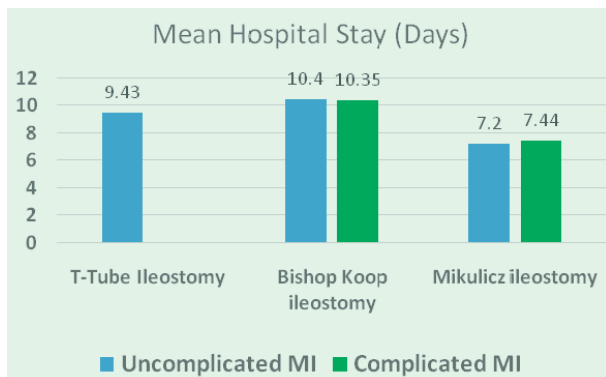


Figure-1: Mean hospital stay of uncomplicated and complicated meconium ileus.

Overall mortality was 36.6% (79 out of 216). In uncomplicated cases it was 20.53 % (23/112) and 53.84% (56/104) in complicated cases. This difference was significant (p<.001). Table- IV and Figure-2 show the mortality pattern.

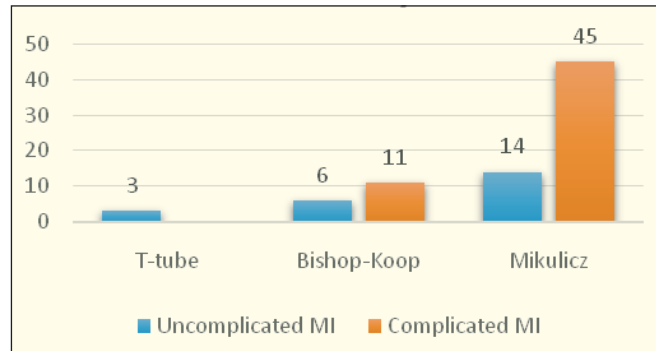


Figure-2 : Mortality pattern of uncomplicated and complicated meconium ileus.

Discussion

Meconium ileus was considered to be a fatal condition till 1948 when Hiatt and Wilson introduced enterotomy and saline irrigation of the obstructing pellets. With the improvement of neonatal surgical care over past decades survival is now approaching 95 to 100%.¹

In our study, about half (47.9%) of the patients were presented with different complications of meconium ileus. Predominant complications were volvulus, gangrene, perforation and atresia. Delphin et al, Rescorla et al and Karimi et al reported similar findings.^{5,7,10}

Karimi A et al mentioned complication of meconium ileus is high may be due to ineffective prenatal diagnosis of meconium ileus and the consequent delayed diagnosis and referral.¹⁰ In this study, Mikulicz ileostomy (50%) was the most common procedure then Bishop-Koop procedure (30.55%). Results were similar to Haithem H A.¹¹ In presence of contamination our surgeons preferred Mikulicz procedure as it requires less operation time and no intraperitoneal suture line. Therefore, it reduces duration of anesthesia and avoids intraperitoneal leakage in these sick patients.

Post-operative morbidities like high output fistula, skin excoriation and sepsis were more common in Mikulicz procedure. This is because Mikulicz procedure mostly performed in complicated cases. Intra peritoneal leakages were found more in Bishop Koop procedure followed by T tube ileostomy. Delpin et al and Karimi et al mentioned higher risk of leakage in Bishop Koop procedure.^{5,10} Bishop Koop procedure allows passage of intestinal contents into distal bowel, more fluid and nutrients are absorbed. Therefore, high output fistula, skin excoriation and

sepsis are less.¹² All patients survived after Mikulicz and Bishop Koop procedure required another operation to close stoma. This disadvantage is reported by most of the authors.^{1,10,12}

T-tube ileostomy only performed in uncomplicated cases. Intra peritoneal leakages were few (4 of 42 cases) and other complications were negligible. Stomas closed spontaneously after extraction of tube, therefore second operation did not require. After first description by Harbergeet al several authors described T tube ileostomy as a safe and effective procedure for uncomplicated meconium ileus.^{6,8,9} Results of these studies were consistent with our study.

In both types of meconium ileus mean hospital stay for Mikulicz procedure was lower (7.2 to 7.44 days) than other procedures, as there was no intra-peritoneal suture line and stoma function establish earlier. The result is similar to Karimi et al and Haithem's studies.^{10,11}

The overall mortality of meconium ileus was 36.6%, which is lower than Haithem H A study, but was very high in comparison with other studies where the survival was between 85-100%.^{1,11} Mortality (53.8%) was significantly higher in complicated group. Complicated patients mostly developed sepsis (61.5%) and it was very difficult to manage these patients without neonatal intensive care support.

The best survival was encountered in patients treated T tube ileostomy in uncomplicated cases and with Bishop Koop procedures in both uncomplicated and complicated meconium ileus. The worst result was Mikulicz procedure in both types. Ziegler MM and Karimi et al reported, resection with stoma creation is the safer procedure, preventing peritonitis due to anastomotic leakage but the need later on for closure of stoma being a relative disadvantage, although closure of stoma can be done later on as an elective safe procedure.^{1,10}

Conclusion

Considering the study result it can be concluded that unsatisfactory result was found in patient treated with Mikulicz

procedure. Further more, it was significantly associated with mortality. In Bishop- Koop procedure intra-peritoneal leakage and sepsis were more common but survival was higher than Mikulicz procedure. In uncomplicated cases T tube ileostomy is the best option to be performed due to less complication and high survival rate.

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