

Comparison of Two Different Method of Surgery in Ileus Meconium

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Abstract

Introduction: Meconium ileus occurs when the terminal ileum is obstructed by unusually tenacious meconium; it is more prevalent in neonates with cystic fibrosis. Up to 33% of neonatal small-bowel obstructions are due to meconium ileus. Symptoms such as: vomiting which may be bilious, distention of the abdomen and inability to pass meconium in the first days of life are some of the most common symptoms. Clinical presentation and x-rays are the basis of diagnosis. First step of treatment is contrast enemas under fluoroscopy and if it fails surgery should be carried out. Different surgical methods are used for operative management of uncomplicated meconium ileus. In our series, we have compared two different methods of surgery: Primary resection and anastomosis; and enterostomy using the Bishop-Koop method. We compared their effectiveness and complications.

Materials and Methods: Forty neonates with ileus meconium were included in the study, 20 patients in each group. Alternating allocation that is allocating every other subject to each treatment group: for the Bishop-Koop enterostomy and anastomosis (study group) or primary resection and anastomosis (control group) was carried out. Results of treatment and complications during and after the surgery were recorded in both groups and compared together.

Results: There was 3 case of mortality in the study group (%15) and 8 case of mortality in control group (%40). There was a meaningful statistical difference between mortality in the two groups ($P=0.002$).

Conclusion: Despite the advantages of one stage repair with primary resection and anastomosis in neonates it results in a higher rate of mortality compared to the Bishop-Koop method. Thus performing the two-stage Bishop-Koop repair seems to be a more safe approach for this anomaly.

Keywords

- Ileus meconium
- Primary resection and anastomosis
- Bishop-Koop enterostomy and anastomosis.

Introduction

Meconium ileus is an intraluminal intestinal obstruction in neonates which occurs as a result of inspissated meconium in the distal ileum. It is seen in 10-15% of cystic fibrosis patients; also most patients with meconium ileus suffer from cystic fibrosis. Content of meconium is unique in this disease: reduced water, abnormal high protein and mucoprotein content which results from decreased activity of pancreatic enzyme and prolonged small bowel transit time.¹ Meconium ileus is one of the most common causes of neonatal intestinal obstruction, accounting for 9-33% of cases. One of the earliest manifestations of cystic fibrosis (CF) is meconium ileus, although it is also seen in patients who do not suffer from CF. Meconium ileus has two forms: simple in which meconium starts to thicken in the womb, obstructs the mid ileum and causes proximal dilatation of the bowel, thickening of its wall and congestion; and complicated in which meconium ileus may result in perforation, meconium peritonitis, volvulus, necrosis, atresia and pseudocyst formation. Therapy of choice for simple meconium ileus is nonoperative with gastrografin enema and surgery reserved for enema failures. Complicated meconium ileus requires abdominal exploration especially for those with progressive abdominal distention, evidence of peritonitis and clinical deterioration. Surgery is a must in cases of complicated meconium ileus. Resection occurs more often in complicated meconium ileus than simple ones and is always in need of temporary stomas. In cases of: Persistent bowel obstruction, abdominal mass, persistent or progressive abdominal distension, volvulus, bowel necrosis and perforation and intestinal Meconium cyst formation with peritonitis surgical management is necessary.² The surgical management options include: Enterotomy/ appendectomy with irrigation and enterostomy with/without resection including different method such as: bishop-koop, santulli, miculics or double barreled ileostomy. Resection with primary anastomosis.³ Each surgical method has its own advantages and disadvantages which are subject of debate. In this study we compared two surgical options Bishop-Koop vs. Primary resection and anastomosis and assessed their efficacy and complications.

Materials and Methods

This randomized, single-blind clinical trial was performed between April 2007 and March 2015 in kermanshah university of medical sciences pediatric surgery center (Mohammad Kermanshahi and Emamreza hospitals) that are referral centers of pediatric surgery for middle west of Iran. Forty neonates with meconium ileus were included in the study. Alternating allocation was carried out for all of cases until each group received 20 cases. One group of 20 patients underwent laparotomy, enterotomy with irrigation and evacuation of meconium followed by primary resection and anastomosis (control group), while the other group of 20 patients was treated by the laparotomy and irrigation of meconium and then Bishop-Koop anastomosis of proximal end of intestine to the side of distal bowel and enterostomy of the distal end (study group). All patients who responded to nonsurgical treatment and all cases of complicated meconium ileus (with perforation, volvulus and ...) were excluded from the study. The presence of other accompanying anomalies was explored by echocardiography and abdominal sonography. All cases presented in the first few days of life and all surgeries were carried out by the same pediatric surgeon. The parents of all children signed an informed consent form containing the necessary information. The study was approved by the Ethics Committee of our university. In the control group (primary resection and anastomosis) neonates received intravenous antibiotics for about 5-days and more if needed and then it continued orally. Oral feeding was started after 2-3 days in the study group and after 5-6 days for the control group (since the presence of fecal diversion by ileostomy protects surgical anastomotic site in the study group). In case of complications (such as anastomosis leakage or obstruction) in the control group a double barrel ileostomy would be created for the patient. All cases were closely observed in the postoperative period in the hospital and in outpatient settings after discharge from the hospital for several months. Outcomes and complications were compared in the two groups. Complications such as surgical site infection, leak of anastomosis, obstruction, stoma prolapse and dehiscence were assessed. All data were collected using a checklist designed to conduct the study.

Finally, the data analysis was done using SPSS-16 statistical software.

Sample size: Since we expect a big difference in the complication rate between the two groups; despite the small sample size we believe the difference found would be statistically reliable. Although a bigger sample size would have made the study more reliable, but the rarity of this anomaly and our limited time led us to study on only 40 cases.

Results

Eighteen cases (45%) were male and 22 cases (55%)

were female. Thirty two (80%) were full term and 8 (20%) were born preterm. The mean birth weight was 2663 ± 590 grams (range 1700 to 3900 gr) and the age of the neonates at the time of surgery were 4.3 ± 7.6 days (range, 1 to 15 days). There was no significant difference between the two groups in sex, gestational age, birth weight and age at the time of surgery. The two groups had different findings regarding mean duration of hospitalization after surgery, mortality and major complications which are summarized in [Table1](#).

Table 1: Duration of hospitalization, complication and mortality in the two groups

| Treatment group | Bishop-Koop method | Primary resection and anastomosis | P-value |
|------------------------------------|--------------------|-----------------------------------|---------|
| Duration of hospitalization (Days) | 16 ± 5.2 | 17.5 ± 12.5 | 0.64 |
| Major complication (N%) | 3 (15%) | 8 (40%) | 0.002 |
| Mortality rate | 2 (10%) | 5 (25%) | 0.03 |

Discussion

There are many published articles in the literature about meconium ileus and its treatment, but we found few articles about comparison of the outcome of different surgical options. In a study by Rescorla et al; after unsuccessful GastroGrafen Enema they applied enterotomy and irrigation for simple meconium ileus. In cases of atresia or volvulus: resection, distal irrigation and primary anastomosis were carried out. For perforations and peritonitis: debridement, resection and temporary enterostomy and closure approximately 4-6 weeks later were done. In a study by Docherty et al they also applied enterotomy and irrigation for simple meconium ileus since they experienced a 20% leak rate with Bishop-Koop or Santulli ileostomies. In a study by Mushtaq et al, 10 divided ileostomy/jejunostomy with or without resection and 7 resection and primary anastomoses were carried out. They were able to show a significant reduction in initial hospital stay in patients who underwent primary anastomosis as opposed to stoma formation in both situations of complicated and uncomplicated meconium ileus (26 and 47 days respectively $P < 0.02$).³ There are studies in which therapeutic results of meconium ileus in cystic fibrosis patients have been compared with non cystic fibrosis patients and concluded that prognosis is better in non cystic fibrosis patients independent of treatment options. Meconium Ileus without Cystic Fibrosis has a good respond to conservative management (softening enema) in

most infants.⁴ The Bishop-Koop ileostomy is an effective and time-tested treatment of Meconium Ileus; although in our study primary resection and anastomosis had a significantly more complication rate; but some studies have shown that in selected cases primary resection and anastomosis may have a lower surgical morbidity rate.⁵

Despite all that has been mentioned the optimal surgical technique remains controversial. Although it is believed that primary anastomosis results in higher complication rates (between 21% and 31%) than delayed anastomosis⁶ some believe that a single surgical intervention is preferable in this group of patients (considering the high rate of pulmonary involvement in CF patients). They concluded that Enterotomy, irrigation and primary closure are the treatment of choice for uncomplicated meconium ileus.⁷ Our experience about nonsurgical methods such as meglumine enema was not very good except for neonates with meconium plug. However some studies reported a very high success rate with this method, for example in one study on 25 neonates: 15 patients underwent laparotomy, 9 of which were treated by bowel resection and enterostomy and 6 were managed with enterotomy and irrigation and ten patients with uncomplicated meconium ileus were successfully treated with Gastrografin enema.⁸ In another study an approach of minimally invasive procedure was carried out so as to decrease the operative stress in an already sick neonate. Their study on ten cases of meconium ileus showed that

proximal bowel T-tube drainage and local instillation of N-acetyl cysteine is an effective method.⁹

Conclusion

Considering our findings, it appears that the Bishop-Koop anastomosis in neonates with meconium

ileus and bowel obstruction who do not respond to nonsurgical methods is safer than primary resection and anastomosis and has fewer mortality and morbidity. Similar studies with larger sample sizes are recommended in order to clarify the issue.

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