



Original Article

BISHOP KOOP TECHNIQUE IS PREFERRED THAN PRIMARY ANASTOMOSIS IN MANAGING JEJUNOILEAL ATRESIA IN A SETUP WITHOUT NEONATAL INTENSIVE CARE UNIT - OUR INITIAL EXPERIENCE

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Abstract

Background: Neonatal intestinal obstruction due to jejunoileal atresia is not uncommon. Recommended treatment is resection with end to back anastomosis and post operative care in Neonatal Intensive Care Unit (NICU) with Total Parenteral Nutrition (TPN) support. In a setup without NICU and TPN, mortality of primary anastomosis is very high due to unusual delay in starting enteral feeding. Bishop Koop technique seems to allow early oral feeding and rapid establishment of normal gastrointestinal function and thus reduce mortality and morbidity.

Objective: To find out the outcome of Bishop Koop procedure in patients with Jejunoileal atresia.

Methods: This is an ongoing study started from March, 2011 in the Department of Pediatric Surgery, Chittagong Medical College Hospital. Here we are presenting our initial

experience till June, 2012 (duration of 16 months). During this period total 13 patients of uncomplicated Jejunoileal atresia was treated surgically. Four patients were treated by classical end to oblique anastomosis and all died. Rest of the 9 patients were treated by Bishop Koop technique. Overall outcome of this technique was assessed considering time to establish oral feeding and normal bowel movement, cessation of coming distal stoma's effluent, weight gain, death etc.

Result: Out of 9 patients, 6 patients weighing less than 2.5 Kg. Type- III A was the commonest variant. Two patients died following surgery due to sepsis. Oral feeding was possible within 4-7 postoperative day in all survived patients except one. In follow up satisfactory weight gain was observed in all those patients.

Conclusion: Bishop Koop technique could be considered as preferred surgical option in a set up without NICU and TPN.

Key words: Bishop Koop technique, Jejunoileal atresia, NICU

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Introduction

Jejuno ileal atresia is a major cause of neonatal intestinal obstruction. Goeller¹ first described ileal atresia in 1684. Atresia refers to a congenital obstruction caused by complete occlusion of the intestinal lumen². In 1912 Spriggs³ suggested and Louw and Barnard⁴ in 1955 confirmed the role of late intrauterine mesenteric vascular accidents as the cause of most jejunoileal atresia. First successful anastomosis for intestinal atresia was done by Fockers⁵ in 1911. Now a days the operatin of choice in jejunoileal atresia is related to the pathologic findings and specific set of circumstances encountered in each individual case⁶. Most authors prefer a two

layers interrupted end to oblique anastomosis after resection of dilated proximal atretic segment up to 10-15 cm⁷. Some author prefers resection of the proximal dilated atretic segment back to the level where the diameter of intestine approaches 1 to 1.5 cm in ileal atresia or near the ligament of Treitz in jejunal atresia² followed by a two layered end to oblique anastomosis. Post operatively these patients need management in newborn intensive care unit (NICU) with meticulous maintenance of fluid, electrolytes and acid base balance². Glucose levels, serum bilirubin level, serum calcium levels are closely monitored to avoid hypoglycemia, kernicterus and hypocalcaemia². Total Parenteral Nutrition (TPN) with a high calorie infusion delivered via central vein catheterization as an adjunctive method of therapy has significantly improved the overall outcome⁸. Although a primary anastomosis is preferred it may not be advisable in instances of doubtful vascular integrity of intestine, severe peritonitis or in meconium ileus. In these cases resection of the atretic segment and exteriorization is performed either by Mikulicz⁹, Bishop Koop¹⁰, Santulli¹¹ or Rehbein¹² technique. Cause of early death in these infants is infection related to pneumonia, peritonitis, or sepsis¹³ and the most significant postoperative complication following anastomosis include functional intestinal obstruction at the site of anastomosis and anastomotic leak^{13,14}; which is the common cause of mortality following surgery¹⁴. In the past survival rate was low¹³ - 58% to 75% but in recent years overall survival rate improved ranging from 80% to 90% or, more^{15,16,17,18} due to NICU support with TPN. Our centre is handling these patients for more than a decade without NICU and TPN facility but overall outcome following resection anastomosis is hopeless in regard to complications and survival rate. In recent year we have changed our management plan and adopted Bishop Koop technique as preferred surgical option instead of classical end to oblique anastomosis. Here we are presenting our initial experience with limited number of patients.

Methodology

Total 13 patients of uncomplicated Jejunoileal atresia admitted in the department of pediatric surgery, Chittagong medical college and Hospital during the period of March,2011 to June,2012. Surgical intervention was done in all patients after optimizing their general condition. Four patients were treated

by classical end to oblique anastomosis and all died due to anastomotic leakage, peritonitis and septicemia within 3-7 days of operation. Rest of the 9 patients were treated by Bishop Koop technique with a distal stoma keeping flush with skin [Fig- 1 A] and a 5 Fr tube was introduced through the distal stoma for about 5 cm from skin level for normal saline irrigation of distal loop postoperatively [Fig- 1B]. In these patients we did single layer end to side anastomosis with interrupted 5-0 vicryl suture after excision of terminal dilated part of proximal atretic segment [Fig- 1A,B,C]. Postoperatively all patients were kept in post operative bed in our ward and treated with intravenous fluid (10% dextrose in 0.225% saline solution with Potassium supplement-1 m mol/ Kg body weight/ day), Parenteral broad spectrum antibiotic with metronidazole were continued till 5th to 7th postoperative day. Normal saline 10-15 ml was introduced twice daily through the distal loop from first post operative day onwards along with per rectal normal saline enema in a volume of 10-15 ml once daily to facilitate normal bowel movement. Test feeding through nasogastric tube with 5-10 ml expressed breast milk was started when abdominal distension subsided and normal bowel movement established without any sign of peritonitis. Care of the stoma was ensured by simple cleansing with normal saline soaked cotton if needed and application of neomycin ointment around the stoma three times daily. Patient was allowed breast feeding by mouth when test feeding was well tolerated. Then normal saline enema and distal loop irrigation were stopped. After establishment of adequate breast feeding patients were discharged with advice to attend outpatient department two weekly in first month than monthly for next three months. Daily bath with luke warm water at home was advised. Post operative complications like features of intestinal obstruction (anastomotic dysfunction), anastomotic leakage and peritonitis, sepsis, wound infection, wound dehiscence and death were noted. Overall outcome of this technique was assessed considering time to establish oral feeding and normal bowel movement, cessation of coming distal stoma's effluent, weight gain.

Result

Total nine patients (n= 9) were treated by Bishop Koop technique. Among them 5 patients were male and 4 were female. Patients were admitted within 2-13 days after birth. On admission 3 babies weighed 2.5 Kg and above and rest of them weighed 1.5-2.1 Kg. All the patients were term babies except one.

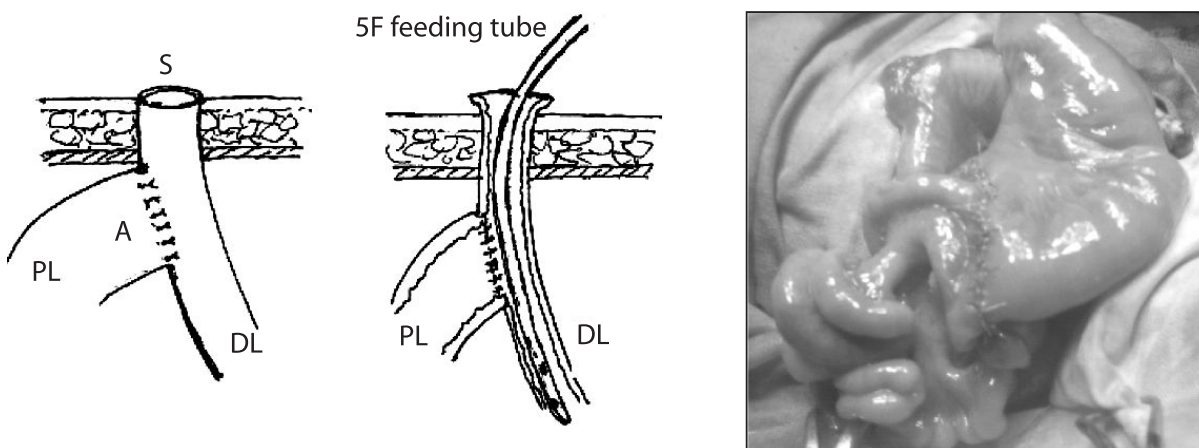


Fig.-1: Diagram of anastomotic technique. [1A and 1B – Proximal loop (PL) , Distal loop (DL) , Stoma (S), Anastomosis (A); 1C- peroperative picture after anastomosis]

Table I
Age, sex, weight, term or preterm

Patient's serial no.	Age on admission (day)	Sex	Weight on admission (kg)	Gestational age (term/pre term)
1	6	M	2.5	term
2	8	M	1.9	term
3	4	F	2.1	term
4	7	F	2	term
5	2	F	2.6	term
6	5	M	2	term
7	8	F	1.9	term
8	13	M	1.5	pre term
9	2	M	2.9	term

Type- III A atresia was the commonest variety (n=5) detected in laparotomy and the length of resected proximal dilated segment was maximum 25 cm, minimum 10 cm (Table-II).

Table II
Type of atresia, resected length of proximal segment, remaining length of proximal segment from Duodeno-Jejunal (D-J) flexure

Patient's serial no.	Type of atresia	Resected proximal atretic segment length (cm)	Remaining proximal segment length from D-J flexure (cm)
1	T-IV	15	10
2	T-III A	15	18
3	T-III A	20	15
4	T-II	10	20
5	T-I	20	22
6	T-III A	25	15
7	T-III A	20	20
8	T-I	20	16
9	T-III A	15	25

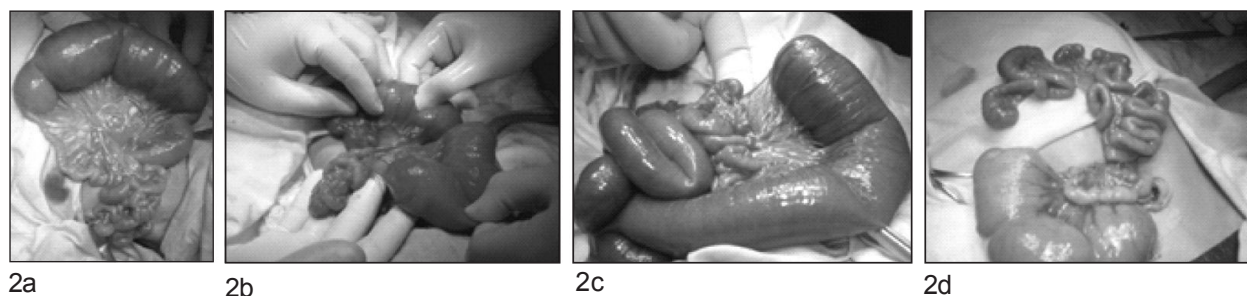


Fig 2 Types of jejunoileal atresia [2A- Type I, 2B- Type II, 2C- Type IIIA, 2D- Type IV]

Following laparotomy and Bishop Koop procedure stool passed within 2nd to 4th post operative day in eight patients. Starting of test feeding was possible on 3rd post operative day in majority of patients (Table- III).

Table III

Time required for establishment of bowel function and oral feeding (day after surgery).

Patient's serial no.	Passage of stool on (Post operative day)	Test feeding started on (Post operative day)	Absolute oral feeding on (Post operative day)
1	2	3	4
2*	Not passed	Could not be started	Not possible
3	4	5	7
4	3	3	4
5	3	3	5
6	2	3	16
7	2	3	4
8*	4	7	Not possible
9	2	3	4

*Died post operatively

Three patients showed features of intestinal obstruction/anastomotic dysfunction in the form of abdominal distension and bilious nasogastric suction for unusual period postoperatively. Two patients developed anastomotic leak and peritonitis. Two patients died due to ongoing sepsis (Table-IV).

Table IV

Early post operative complications.

Patient's serial no.	Postoperative intestinal obstruction	Anastomotic leak and peritonitis	Wound infection/ dehiscence	Sepsis	Death
1	-	-	-	-	-
2*	+	+	+	+	+
3	+	-	-	+	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	+	+	+	-
7	-	-	-	-	-
8*	+	-	-	+	+
9	-	-	-	-	-

*Died post operatively

Table V
Follow up in survived patients (n=7)

Patient's serial no.	Ceasation of coming distal loop content after (POD)	Closure of distal loop after Bishop Koop operation		Weight gain: Weeks after Bishop Koop operation	
		Spontaneous/Surgical	Timing	6 Weeks	10 Weeks
1	2	Spontaneous	4 wk	Not recorded	3.8 kg
2*	-	-	-	-	-
3	5	Surgical	6 wk	2.5 kg	3.2 kg
4	3	Spontaneous	4 wk	Not recorded	3.5 kg
5	2	Spontaneous	6 wk	3 kg	3.7 kg
6	? (anastomotic leak)	Surgical	10 wk	2.3 kg	3 kg
7	7	Spontaneous	6 wk	3 kg	3.6 kg
8*	-	-	-	-	-
9	2	Spontaneous	4 wk	3.2 kg	Not recorded

*Died post operatively

Discharge of intestinal content through distal loop stoma stopped minimum after 2nd POD in three patients and maximum after 7th POD in one patient. Spontaneous closure of distal loop stoma occurred in 5 and rest of the 2 needed surgical closure. All survived patients showed satisfactory weight gain either at 6 weeks or 10 weeks after primary surgery as recorded in follow up visit.

Discussion

In 1957 Bishop and Koop reported a technique for management of simple meconium ileus with the following criteria¹⁹-1) limit intraoperative bowel trauma 2) resect the desperately enlarged proximal bowel loop 3) create an appropriately sized end of proximal loop to side of distal loop anastomosis close to abdominal wall exiting the distal loop for decompressing proximal stoma" while distal obstruction persists 4) provide access for insertion of a catheter into the distal bowel for irrigation 5) permit bed side closure of chimney stoma. Within 24 hours after operation catheter irrigation begins with normal saline 10-15 ml through the distal chimney stoma until normal bowel movement with transcolonic passage of stool established and then the catheter is removed. The chimney stoma may be spontaneously closed within 4-6 weeks or, formal closure may be done under local anaesthesia extraperitoneally. We think that the above mentioned criteria are very much effective in surgical management of jejunoileal atresia where anastomotic dysfunction and anastomotic leakage is the most important cause of morbidity and

mortality.

TPN is ideal for maintaining nutrition in infants and children who are not able to tolerate enteral feedings and young infants require TPN if starvation prolongs more than 4-5 days²⁰. Prolonged starvation postoperatively places patients at risk of wasting, decrease wound healing, edema, failure to growth and development, reduced resistance to infection due to mobilization of protein^{21,22}. With this technique enteral feeding was possible within 4-7 POD except in one (Table III); so that we can prevent sepsis, catabolic phase, hypoproteinaemia, anastomotic leak, wound dehiscence. Thus Total Parenteral Nutrition (TPN) is not necessary. Two of our patient developed anastomotic dysfunction and leakage possibly due to ongoing sepsis and one of them died (Table IV). Another patient died who was preterm low birth weight and ultimately failed to combat sepsis (Table IV). We think both the neonates could be saved with modern NICU support and TPN.

The main reason for anastomotic dysfunction/leakage is gross discrepancy of diameter of the gut at the site of anastomosis which results in a funnel like effect where the dilated proximal segment content not pass adequately through the unused distal narrow part and the increase in intraluminal pressure at anastomotic site causes anastomotic dysfunction and ultimate leakage. In Bishop Koop procedure funneling of anastomotic line can be avoided by wide end to side

anastomosis and distal exteriorized stoma which is few cm proximal to anastomosis effectively decompress the raised intraluminal pressure. Thus the anastomosis can be saved in immediate postoperative period which ultimately matures within 5-7 days. Distal loop irrigation also helps in establishment of early function of the narrow unused distal gut. In our study transanal passage of stool was observed 2-4 days after operation in all patients except in one (Table- III). Per rectal saline enema act as additional stimulant to establish early large gut function and defecation reflex. In our hospital as NICU and Total Parenteral Nutrition supports are absent any condition that leads to unusual delay in establishing enteral feeding in neonates (eg. anastomotic dysfunction/leakage) results in nutritional failure and eventual death in majority of patients.

Discharge of intestinal content through distal loop stoma stopped in minimum 2 days and maximum 7 days after operation in survived patients (Table- V) which indicates free passage of gut content via anastomosis and distal loop. Post operative management of this stoma was very easy as very little or no discharge of intestinal content was noted after 2-7 days of surgery and mother could take care at home with simple cleansing by wet cotton, daily bath and vaseline based antiseptic ointment. Surgical closure of distal loop stoma was needed only in 2 patients and in rest of the 5 patients spontaneous closure was observed in follow up at 4-6 week, specially in those with stoma kept flush with skin level (Table V). None of the mother of survived baby complained of any problem regarding this tiny exteriorized distal stoma. Postoperatively all survived patients developed normal bowel function and as the term newborn normally grows at a rate of 25-30 gm/day over the first six months²⁰, the weight gain was also considered satisfactory as recorded in 6 week/10 week follow up (Table-V).

In this small series it was evident that some factors like low birth weight, delayed referral and established sepsis were most important determinants for successful surgical outcome rather than type of atresia.

Conclusion:

We are quite satisfied with our initial experience of managing jejunoileal atresia patients with Bishop Koop technique in terms of survival without NICU support

and TPN. It is an ongoing study and we recommend further study in other centers so that our pediatric surgical colleagues will feel no hesitation to adopt this technique as preferred surgical option. We think our innovative approach has got the potential to significantly reduce the morbidity and mortality of these unfortunate neonates in developing countries where modern neonatal care facilities are scanty.

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