The role of routine transanastomotic T tube ostomy in jejunoilealatresia:A prospective, randomized study

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Abstract

Introduction: Jejunoileal atresia (JIA) is a common cause of neonatal intestinal obstruction and is a common surgical emergency. The aim of this study was to compare primary anastomosis without resection of the dilated segment with transanastomotic T tube jejunostomy (TATTO) versus resection of the dilated segment without T tube as the control group for treatment of patients with JIA.

Material and Methods: During 2008 to 2013, 105 patients were diagnosed with JIA at the time of surgery and were recruited for this study. Data relating to efficacy and procedural complications were compared among patients. The criteria for exclusion were duodenal obstruction, colonic atresia, intestinal perforation, malrotation, and also JIA patients with associated other anomalies like meconium ileous, gastroschisis and anorectal malformation.

Results: A total of 125 patients were diagnosed and 16 patients were excluded. Our patients were divided into a control group (n=52) and a TATTO group (n=57). The TATTO group had a significantly shorter postoperative hospital stay (12 vs. 23 days, p=0.001) and time to start feeding (9 vs. 13 days, p=0.003) compared with the control group. Sepsis (12.0% vs. 32.7% p=0.004), other complications (3.6% vs. 15.4% p=0.001) and the associated morbidity were significantly lower in the TATTO group.

Conclusion: The findings suggest that the TATTO technique was a better method for the treatment of children with JIA, as study showed lesser morbidity and mortality rates.

Keywords: Jejunoileal atresia; Primary anastomosis; Transanastomotic T tube ostomy, Outcome

Introduction

Intestinal obstruction is a common surgical emergency in the neonatal period. It occurs in approximately 1 in 1500 live birth.[1] Intestinal atresia is the third most common cause of intestinal obstruction after Hirschsprung's disease and meconium ileus.[2] Early bilious vomiting, abdominal distension, non-passage of meconium, and maternal polyhydromnios is very alarming.[2] In many countries, most of the congenital intestinal obstruction is being diagnosed in prenatal period by ultra sonogram. The most popular practiced surgical methods for JIA are 'resection and anastomosis' or 'early enterostomy' and subsequent anastomosis[3]; Mikulicz, Bishop-Kopp and/or Santullienterostomy techniques might be performed. The trend in a stable patient with JIA without any complication is towards resection and end-to-back anastomosis. Dilated proximal segment of atresia has ineffective peristalsis and produces postoperative functional obstruction, sepsis, complications, delay in the starting of oral feeding and subsequently longer hospital stay. On the other hand resection of the entire dilated intestinal segment especially of the proximal segment of the jejunum increases the complications and may even

result in a short bowel if carried out. Short bowel syndrome is the largest problem in neonates with JIA.[4-5] Preservation of bowel length is laudable since avoidance of feeding problems post operatively is our main purpose. Bishop-kopp and Mikuliczentrostomy methods were performed in meconium peritonitis, volvulus of intestine and intestinal gangrene patients and were excluded from this study. This study was performed in order to evaluate the outcomes according to different operative strategies of transanastomotic T tube jejunostomy (TATTO) without resection of the dilated segment (TATTO group) and resection of the dilated segment without T tube (control group) for patients with JIA and primary anastomosis.

Material and Methods

This is a prospective study took place at Mofid Children's Hospital; which is a tertiary teaching hospital affiliated to ShahidBeheshti University of Medical Sciences in Tehran, Iran; between July 2008 and June 2013.

Perioperative management

Small intestinal obstruction in neonates was diagnosed by radiological and clinical presentation. They were managed conservatively and were prepared for operation. They were kept warm, oral feeding was with held, gastric decompression by both continuous and intermittent nasogastric suction was carried out. IV serum and antibiotics (Ampicillin, Amikacin and metronidazole) for covering both aerobic and anaerobic microorganisms and IV Vitamin K were given. Laboratory tests including blood grouping, CBC, coagulation tests, blood urea, serum creatinine, serum bilirubin and serum electrolytes were carried out and electrolyte abnormalities and any anemia were corrected.

Surgery procedure and data collection

The abdomen was opened through a supra-umbilical transverse incision under general anesthesia. Diagnosis of JIA was confirmed at the time of surgery during laparotomy. Distal petency of lumen was checked by normal saline irrigation to exclude additional pathology. Patients were eligible to enter randomized clinical trials to two different operative strategies as follow:

(i) Transanastomotic T tube jejunostomy (TATTO) group

Fifty-five patients underwent treatment with primary anastomosis without resection of the dilated segment and an appropriate size (10 or 12 Fr) latex T tube was installed in the dilated segment of small intestine, proximal to the anastomosis, the long limb of the perpendicular part of T-shaped tube was passed through the narrow distal intestine through the anastomosis as TATTO. The longer part of tube was fixed to the intestinal wall and led out through a small stab wound incision of abdominal wall, far away from the laparotomy wound and the intestine with a T-tube inside was brought close to the abdominal wall by gentle tube traction and secured with a single stitch suture.

(ii) Control group

There were 52 neonates in the control group. They underwent treatment with resection of the proximal dilated segment and primary end to back anastomosis without a T tube.

Demographic factors such as gender, birth weight, type of atresia, associated anomalies, as well as the diagnostic method, operative method, sepsis, any associated complications and outcomes were investigated. The criteria for exclusion were duodenal obstruction, colonic atresia, intestinal perforation, malrotation, and also

JIA patients with other associated anomalies like meconium ileous, gastroschisis and anorectal malformation. Data regarding efficacy and surgical complications were compared among patients.

Postoperative management

After surgery nasogastric tube was placed to control gastric residuals and assess the need for fluid and electrolyte replacement. Overall, parental nutrition was started on the 5th postoperative day and antibiotics were continued until alimentary tract recovery. Oral feeding was started gradually, based on gastrointestinal function as a soft, flat abdomen, clear gastric effluent of low volume, and active defecation. Patients were discharged from the hospital, based on assessment of the following criteria; the wound healed normally, received exclusive oral feeding and regular bowel movement. Then patients were followed at intervals of 1 week, 2 week, 1 month, 3 months and 6 months and T tubes were extracted during days 7 to 14th after hospital discharge. Small amounts of leakage followed the removal of T-tube and stopped after several hours. The demographic factors such as feeding history, vomiting, bowel movement, abdominal distention, and weight were observed at all stages of follow-up.

Statistical Analysis

All statistical analyses were performed using PASW Statistics 18 (version 18; SPSS, Inc., 2009). Data are given as mean, median, and standard deviation (SD). Statistical significance of difference between groups is tested by Chi Square ($\chi 2$) test for categorical data and by Mann–Whitney U test for continuous parameters. Values of $P \leq 0.05$ were considered statistically significant.

Results

From 2008 to 2013, 125 neonates underwent operation for intestinal obstruction. We excluded 16 patients with complicated JIA (3 necrotizing enterocolitis, 3 meconium peritonitis, 2 meconium ileus, 2 volvulus, 2 intestinal gangrene, 2 gastroschisis, 1 omphalocele and a giant meconial cyst). The characteristics of the patients are shown in Table 1. The mean age of patients was 3.2 (SD ± 4.7) days at admission and 4.6 (SD ± 5.7)days at operation. The median follow-up period was 5.5 months (1–8 months). The mean weight of neonates in both series was nearly the same (2700 gr vs. 2900 gr). The most common type of atresia was IIIa in both groups (61.5% and 36.8% respectively).The mean length of dilated intestinal segment resected was 10.2 cm in the control group. In the TATTO group, the output by T-tube at first was made of gas and fluent intestinal contents and normal stool was noted later but 12 patients did not pass any stool. In such situation x-ray studies with contrast material (Gastrografin) injected through the T-tube were performed. This study permitted to confirm the patency, continuity of intestine and also facilitated defecation in 10 patients. In 2 patients with TATTO, we found intestinal occlusion by contrast study and a second operation for surgical revision was carried out. The mean duration for starting oral intake postoperatively in the TTATO group was shorter (9 vs.13 day, p =0.003). T tube was in place for a mean of 13 days (10-22) post operatively. The rate of sepsis in the control group was higher (32.7 % vs12%, P value =0.004) but other complications were lower in the TATTO group (p value= 0.001). The most common early complications were anastomosis leakage and intestinal fistula (3%), intestinal adhesions and obstruction (11%) and sepsis (32.7%) and 6 patients underwent a second operation in the control

group. The mean hospital stay was shorter in neonates with tube ostomy (12 vs. 23.1, p value =0.001). The mortality rate was 30% for neonates in the control group and 10.5% (p value =0.001) in the TATTO group.

TATTO group: Underwent primary anastomosis without resection of the dilated segment and T tube ostomy was created.

*Control group: Underwent primary end to back anastomosis with resection of the proximal dilated segment without T tube.

#Statistical significance of difference between groups is tested by Chi Square ($\chi 2$) test for categorical data and by Mann–Whitney U test for continuous parameters.

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Table 1: The characteristics of the study patients (n =109)

	Control group* (n = 52)	**TATTO group** (n = 57)**	**P Value#**
	Mean (SD)	**Mean (SD)**	
Age of hospitalization (days)	3.1 (5.8)	3.3 (3.8)	0.183
Age of operation (days)	4.5 (6.6)	4.9 (4.9)	0.293
Gender			
Male (n, %)	34 (65.4)	28 (49.1)	0.418
Female (n, %)	18 (34.6)	29 (50.9)	0.512
Type of atresia¥			0.078
Type I	3	13	
Type II	4	3	
Type IIIa	32	21	
Type IIIb	2	3	
Type IV	11	17	
Weight (g)	2700 gr ()	2900 gr ()	0.547
Range	1800-4200	1450 - 4000	
The length of dilated segment resected (cm)	10.2 (18.3)	0	
Range	4 – 35	0	
The first time of postoperative feeding (day)	13(12.4)	9 (7.6)	0.003*
Range	10 -32	10 -20	
The time of remove of T tube(day)	0	13	
Range		10 -22	
Sepsis (n, %)	17 (32.7)	12%	0.004*
Complication (n, %)	8 (15.4)	2 (3.6)	0.001*
Hospital staying (day)	23.1 (12.2)	12(7.1)	0.001*
Range	12 -35	7-23	
Death (n, %)	15 (30)	6 (10.5)	0.001*

Discussion

Jejunoileal atresia is a common cause of neonatal intestinal obstruction and results from an intra-uterine mesenteric vascular accident.[6] During the last century the mortality rate for JIA has dramatically decreased from 90% in the first half of the 20th century,[8] to around 20% in the mid-1950s,[10] and declined to 10-12% in the early 1990s.[9] In most studies, survival in neonates with JIA has improved from 64% to 90%, [12-14] which is in line with our findings and owing to prenatal diagnose, neonatal intensive care, nutritional support, effective antibiotic and advances in surgical techniques.[9] Several surgical techniques

may be performed for treatment of JIA such as resection and end to back anastomosis, tapering entroplasty and bowel plication, Mikulicz, Bishop-koop, Santulli and T-tube entrostomy. [15, 16] The major causes of morbidity and mortality is sepsis and short bowel syndrome.[4] One of the causes of sepsis is related to atonic dilated proximal bowel and ineffective peristaltic movement and subsequent bacterial overgrowth.[9] This risk may be reduced by resection of the dilated bowel segment which in turn may cause the shortening of the intestine specially at the proximal part of jejunum and short bowel syndrome may occur. Creation of an enterostomy has the advantage of allowing deflation of the dilated proximal bowel and at the same time it allows the intestinal contents to pass gradually through the distal unused bowel (low pressure anastomosis). In our study, deflation of the dilated segment and functioning low output stoma occurred by using the TATTO technique and resection of the long dilated segment was no longer necessary. On the other hand TATTO was useful for contrast bowel study, for prevention of anastomotic ostomaobstraction and anastomotic leakage, for evaluation of the bowel continuity (if needed) and also for repeated intestinal irrigation and eventually the relief of intestinal obstruction. In addition, extraction of the T tube is very simple and its orifice closes fast and a subsequent operation is unnecessary. As shown, complication and sepsis occurred more often in the control group; yet, no statistically significant distinction was found between the 2 groups in terms of duration of surgery. Therefore, transanastomotic T tube entrostomy may be able to replace other various types of entrostomy.

There are several principle weaknesses in this study. The first is the comparatively small number of patients. Future studies are recommended to confirm the findings with more sample size. Second, lack of availability of good neonatal intensive care units still is a major problem in the third world countries and may increase mortality rates in studies such as ours.

Conclusion

The findings suggest that the TATTO technique was a better method for the treatment of children with JIA as study showed lesser morbidity and mortality rates. Future studies in the form of RCTs are needed to confirm the findings.

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