ISSN 1019-8555
The Journal of
Teachers Association
RMC, Rajshahi

Original Articles

Risk Factors for Enterocolitis after the Definitive Treatment of Hirschsprung's Disease

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Abstract

Enterocolitis is a serious complication associated with Hirschsprung's disease. Although past investigators have identified risk factors responsible for this complication before definitive surgery, the factors causing enterocolitis after pull-through have not been determined. The present study was carried out to find out risk factors responsible for development of enterocolitis after pull-through operation.

All the patients with Hirschsprung's disease admitted in the department of pediatric surgery in Dhaka Medical College Hospital (DMCH) and Bangabandhu Sheikh Mujib Medical University (BSMMU) from 1995 through 2001 were included in the study. Risk factors were assessed in three arenas: *patient factors* (gender, age at diagnosis, age at pull-through), *technical factors* (type of repair, transition zone, preoperative enterocolitis) and *mechanical factors* (anastomotic stricture, intestinal obstruction, other complications).

In a total of 88 patients, the incidence of postoperative enterocolitis was 25.5%. The risk of postoperative enterocolitis significantly increased (approximately 3-fold) by specific *mechanical factors* such as anastomotic stricture and intestinal obstruction due to adhesion. Other postoperative complications were equally distributed in patients with and without enterocolitis. These findings implicate the use of measures to decrease mechanical obstruction so as to reduce the incidence of postoperative enterocolitis in Hirschsprung's disease.

TAJ 2002; 15(1): 13-16

Introduction

Enterocolitis remains an important cause of morbidity and mortality following the definitive pull-through in Hirschsprung's disease.[1-3] This life-threatening complication, marked by explosive watery diarrhea, abdominal distension and fever, is seen upto 40% of cases after surgical pull-through procedure, [4,5 with] an associated mortality rate of 3-30%. [6] Many investigators have identified the risk factors for enterocolitis before surgical pull-through procedure.[7-9] These included late diagnosis, long-segment aganglionosis, female child, and positive family history and associated Down's syndrome. But only a few studies have been carried out to identify the risk factors for enterocolitis after the definitive surgery. We have, therefore, endeavored to follow the course and result of the patients in whom enterocolitis developed after the pull-through procedure. And in

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this course, we particularly searched for the risk factors implicated with the development of postoperative enterocolitis.

Materials and Method

Diagnosis and Procedure

A total of 88 patients admitted consecutively in DMCH and BSMMU between 1995 and 2001 were considered. The diagnosis of Hirschsprung's disease was confirmed by labeling biopsy or rectal biopsy. Transverse colostomy was done immediately and definitive pull-through was performed 9 months to 1 year after colostomy. Seventy-two patients underwent Swanson's procedure, 12 patients underwent Soave's procedure and 4 patients had modified Duhamel procedure.

Risk factor assessment for enterocolitis

Enterocolitis developed in 24 patients during the postoperative period. The occurrence took place at a mean duration of 6-12 months after definitive surgery. To assess the risk factors for enterocolitis, a control group (n=64) was considered in those patients who were free of enterocolitis for at least 2 years after the pull-through. Risk factors were scrutinized in three arenas: *patient factors* (gender, age at diagnosis, age at pull-through), *technical factors* (type of repair, transition zone, preoperative enterocolitis) and *mechanical factors* (anastomotic stricture, intestinal obstruction due to adhesion, other complications).

Statistical analysis

Statistical comparisons were performed by x^2 analysis or Student's t-test with statistical significance considered at $p< 0.05$.

Results

Enterocolitis occurred in 24 patients at a mean duration of 6-12 months after definitive pull-through. There was no mortality, and the mean follow-up period ranged from 6 months to 6 years. We determined the risk of development of enterocolitis following definitive surgery by examining patient factors (Table 1), technical factors (Table 2) and mechanical factors (Table 3).

Patient factors as risk of development of enterocolitis

Gender, age at diagnosis and age at pull-through were considered as patient factors incriminated as risks to the development of post-pull-through enterocolitis. Though Teitelbaum et al.[7] showed that girls demonstrated increased risk for enterocolitis, we found no influence of female gender on the development of enterocolitis. Swenson et al.[10] suggested that the incidence of enterocolitis increased in patients with Hirschsprung's disease diagnosed after the first week of life. However, in our study, age at diagnosis did not increase the rate of enterocolitis. Also, the timing of definitive surgery did not contribute any risk to the development of enterocolitis as reflected in the present study (Table 1).

Technical factors as risk of development of enterocolitis

Table 2 summarizes the technical factors viz. type of repair, transition zone and preoperative enterocolitis. In a recent study, Elhalaby[11] noted no significant difference with respect to the development of enterocolitis among the three commonly done procedures of pull-through (Swenson, Soave and Duhamel). In the present study, our finding was consistent with Elhalaby's report. Similarly, the transition zone as well as preoperative enterocolitis demonstrated no significant effect on the development of enterocolitis (Table 2)

Mechanical factors as risk of development of enterocolitis

We considered anastomotic stricture, intestinal obstruction due to adhesion and other complications as mechanical factors. As summarized in Table 3, the first two factors imparted a significant risk to the development of enterocolitis after definitive surgery. The other

complications such as wound infection and stoma complications were equally distributed in both enterocolitis group and in control group. These data point out that anastomotic stricture and intestinal obstruction are specific risk factors for the development of enterocolitis following definitive pull-through in Hirschsprung's disease.

Table: 1

Factors	Enterocolitis(n=24)	Control (n=64)	Significance
Gender:			Not significant
Male	17 (70.8%)	45 (70.3%)	
Female	7 (29.2%)	19 (29.7%)	
Age at diagnosis:			Not significant
< 1 week	14 (58.3%)	38 (59.4%)	
> 1 week	10 (41.7%)	26 (40.6%)	
Age at pull-through:			Not significant
1–2 years	21 (87.5%)	57 (89.1%)	
> 2 years	3 (12.5%)	7 (10.9%)	

Table: 2

Factors	Enterocolitis(n=24)	Control(n=64)	Significance
Type of repair:			Not significant
Swenson	19 (79.2%)	53 (82.8%)	
Soave	4 (16.6%)	8 (12.5%)	
Duhamel	1 (4.2%)	3 (4.7%)	
Transition zone:			Not significant
Upto 10cm from DL	15 (62.5%)	41 (61.5%)	
> 10cm	9 (37.5%)	23 (38.5%)	
Preoperative EC:			Not significant
Present	3 (12.5%)	10 (15.6%)	
Absent	21 (87.5%)	54 (84.4%)	

Table: 3

Factors	Enterocolitis(n=24)	Control(n=64)	Significance
Anastomotic stricture			$p < 0.005$
Present	6 (25%)	2 (3.1%)	
Absent	18 (75%)	62 (96.9%)	
Intestinal Obstruction			$p < 0.05$
Present	3 (12.5%)	1 (1.56%)	
Absent	21 (87.5%)	65 (98.44%)	
Other complications			Not significant
Present	10 (41.7%)	22 (34.4%)	
Absent	14 (58.3%)	42 (75.6%)	

Discussion

Enterocolitis is regarded universally as a serious complication of Hirschsprung's disease. The mortality and morbidity rate due to these sequelae is also quite significant. Several risk factors for enterocolitis in Hirschsprung's disease in preoperative stage have been identified such as female patient, delayed diagnosis and long-segment disease etc. However, the risk factors for enterocolitis after definitive surgery remain an enigma for the pediatric surgeon. In this study, we have attempted to find the risk factors for enterocolitis associated with Hirschsprung's disease following definitive pull-through.

The incidence of post-pull-through enterocolitis in our study was 25.5%. The present study identified two significant risk factors responsible for the development of this complication. The presence of anastomotic stricture and intestinal obstruction due to adhesion increased the risk of subsequent enterocolitis by three folds. This increased risk could not be explained by the usual development of any postoperative complication, because the overall incidence of other postoperative complications was equally distributed in patients with or without enterocolitis in our series. It may, therefore, be inferred that, these risk factors actually played a significant role in the development of enterocolitis. It is widely accepted that enterocolitis develops due to intestinal stasis which facilitates proliferation of luminal microbes and subsequent mucosal invasion.[12] This initiates a local and systemic inflammatory response, resulting in the abdominal distension, diarrhea and fever.[13] It is conceivable therefore that the risk factors identified in the present study increase the risk of development of enterocolitis by promoting intestinal stasis as a result of anastomotic stricture or intestinal obstruction leading to the subsequent inflammatory reaction termed enterocolitis.

A noteworthy feature of this study relates to the fact that many risk factors believed to be responsible for the development of preoperative enterocolitis were not found to increase the risk after definitive surgery, further validating the hypothesis that enterocolitis develops as a consequence of intestinal stasis.[14] In our study, neither patient-factors nor technical-factors altered the risk associated with enterocolitis. Therefore, management strategies in these areas are least likely to minimize the incidence of this complication. By contrast, measures that minimize mechanical obstruction, such as anal dilatation, may confer a protective benefit. Two recent

studies supported this assumption. Marty et al.[15] had shown that regular postoperative rectal irrigation was associated with decreased enterocolitis and Blair et al.[16] had asserted that an internal sphincterotomy had been associated with a decrease in the incidence of enterocolitis.

In summary, the incidence of post-pull-through enterocolitis was found not to be related to patient factors such as age, gender or diagnostic delay, or to technical factors such as definitive procedure or extent of aganglionosis. On the other hand, it is the few specific mechanical factors, anastomotic stricture for example that is related to the increased risk of development of postoperative enterocolitis.

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