

Original Article

Factors Related to Postoperative Chronic Diarrhea in Patients with Slow Transit Constipation

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Key Words

Slow transit constipation;
Total colectomy;
Chronic diarrhea

Purpose. Slow transit constipation (STC) is mainly treated by surgical intervention. However, postoperative complications are not uncommon. This study focuses on the factors that may affect postoperative chronic diarrhea.

Methods. We reviewed the cases of patients who suffered from STC and underwent surgical intervention from January 1994 to December 2004. A total of 78 patients were enrolled in this study.

Results. The male patient to female patient ratio was 13:65. The average age of the patients was 40.8 years (range, 17-78 years). Of the 78 patients, 22 (28.2%) suffered from STC with concomitant pelvic floor dysfunction. The frequency of postoperative bowel movements ranged from once per day to 12 times per day. The incidence of chronic diarrhea was 15.3%. The main factors affecting the incidence of postoperative chronic diarrhea were sex (male patients had a higher incidence) and age (patients older than 50 years had a higher incidence).

Conclusion. Postoperative chronic diarrhea can be predicted preoperatively, and the findings of this study can help clinicians educate patients about the possible postoperative complications.

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Constipation is the second most common self-reported complaint related to the gastrointestinal tract. The incidence of constipation in population-based studies is between 2% and 34%.^{1,2} However, the etiology of constipation is variable, and it can be categorized as primary and secondary constipation. Primary constipation is defined as the functional impairment of the gastrointestinal tract's propulsive capacity, without any definite anomaly within the tract or any associated medical condition. This disorder is further classified as normal transit constipation (constipation predominantly due to irritable bowel syndrome);

pelvic floor dysfunction, which affects stool evacuation; and slow transit constipation (colonic inertia).

The treatment strategy for primary constipation includes a well-defined understanding of its etiology and initial conservative management, including a high-fiber diet, increased daily intake of water, and exercise. If pelvic floor dysfunction is the main reason for constipation, management can also involve bio-feedback retraining of the pelvic floor muscles. In most cases, constipation symptoms can be treated using these management strategies; however, in a few cases, conservative treatment may fail and surgical

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intervention may be warranted.

Surgical intervention for slow transit constipation was introduced by Sir William Arbuthnot Lane more than 100 years ago.^{3,4} However, after the initial experiences, this surgical method was abandoned owing to the occurrence of many postoperative complications. However, since the last 3 decades, this procedure is being used once again, and has become the only surgical treatment option having limited complications. The most common complication after total colectomy with ileorectal anastomosis is small-bowel obstruction, which occurs in 2-71% cases, as reported in different series studies.⁵ The second most common postoperative complication is chronic diarrhea, which should be controlled with medication. In this study, our objective was to identify the possible related factors that could help us educate patients about the possible postoperative complications associated with this surgical procedure and thus, achieve better satisfaction.

Materials

Using the surgery database of the Chang Gung Memorial Hospital, we collected data on patients who had undergone subtotal colectomy with ileosigmoid colon anastomosis or total colectomy with ileorectal anastomosis between January 1994 and December 2004. Patients who underwent these surgeries because of organic lesions (megacolon, colitis, malignancy, or Hirschsprung's disease) were excluded from the study. We reviewed the outpatient records, diagnostic evaluations, surgical details, and postoperative complications recorded in the medical charts. All patients underwent Sitz marker studies, which showed more than 60% (12/20) of radiopaque scatter around the whole colon. This procedure is the main diagnostic test for slow transit constipation. The patients also underwent procedures for assessing pelvic function, such as anorectal manometry, the balloon expulsion test, and defecography to define the concomitant pelvic floor dysfunction. Colonoscopy, double-contrast lower gastrointestinal tract imaging, or contrast barium enema lower gastrointestinal tract imaging was performed before the surgery to rule out possible organic lesions

in the colon. General data like patient age, sex, time of symptom onset, duration of symptoms, operative methods, and postoperative complications were collected for retrospective analysis.

Chronic diarrhea was defined as the need for prolonged daily use of Imodium to control bowel movements for more than 6 months. Data on other postoperative complications such as small-bowel obstruction, prolonged ileus, bloating, abdominal pain, incontinence, and persistent constipation were also collected but have not been shown in this report.

Methods

Data analysis was performed using SPSS software package (version 18.0, SPSS Inc. Chicago, IL). Factors associated with chronic diarrhea were analyzed using the Chi-square test. A *p*-value less than 0.05 meant that the concerned factor was significantly correlated with postoperative chronic diarrhea.

Results

A total of 78 patients met the diagnostic criteria for slow transit constipation and underwent surgery during the study period. Of these 78 patients, 65 were women and 13 were men. Further, 22 of these 78 patients suffered from concomitant pelvic floor dysfunction. The mean age of the patients was 40.8 years (range, 19-78 years). The mean duration of constipation was 10.2 years (range, 4-30 years). The mean postoperative follow-up time was 26 months (range, 4-96 months). Of the 78 patients, 46 underwent total colectomy with ileorectal anastomosis, whereas 32 underwent subtotal colectomy with ileosigmoid colon anastomosis. Patient who received surgical treatment had increased their bowel movement from 1 time per day to 12 times per day. The incidence of postoperative chronic diarrhea was 15.4% (12/78). The data collected for analysis are presented in Table 1.

Male patients who suffered from slow transit constipation and received surgical intervention had a significantly higher risk of developing postoperative

Table 1. Analysis of the predictive factors of post-operative diarrhea

		Post OP diarrhea	No diarrhea	<i>p</i> value
Gender	Male	7/13 (54%)	6/13 (46%)	0.00002
	Female	5/65 (7.7%)	60/65 (92.3%)	
Age	< 50 years	5/64 (7.8%)	59/64 (92.2%)	0.00007
	≥ 50 years	7/14 (50%)	7/14 (50%)	
Age of STC onset	< 20 years	2/28 (7.1%)	26/28 (92.9%)	0.13
	≥ 20 years	10/50 (20%)	40/50 (80%)	
Concomitant PFD	Yes	6/30 (20%)	24/30 (80%)	0.37
	No	6/48 (12.5%)	42/48 (87.5%)	
Level of rectal stump	Low	8/46 (17.4%)	38/46 (82.6%)	0.56
	High	4/32 (12.5%)	28/32 (87.5%)	
Total		12/78 (15.38%)	66/78 (84.62%)	

STC: Slow transit constipation; PFD: Pelvic floor disorder.

chronic diarrhea (7/13, i.e., 56% vs. 5/65, i.e., 7.1%; $p = 0.00002$). Further, the age at which the operation was performed also showed significant correlation with postoperative chronic diarrhea. We divided the patients into 2 groups – those aged 50 years or more (old group) and those under 50 years (young group). The incidence of chronic diarrhea was significantly lower in the young group than in the old group (7.8% vs. 50%, $p = 0.00007$).

Postoperative diarrhea was more commonly observed in patients with late-onset symptoms ($p = 0.17$), although this trend was not statistically significant. This may be due to the small sample size used for analysis. The level of anastomosis did not attain statistical significance; this is another interesting result obtained in our study. We will discuss these results in the next section.

Discussion

Constipation is a common complaint related to the gastrointestinal tract. It is believed to affect approximately 25% of the population and greatly affects their quality of life. The potential causes of constipation are varied, and the most problematic type of constipation is slow transit constipation, also known as colonic inertia. This is an extreme type of constipation, which does not respond to general management options like a high-fiber diet, increased water intake, exercise, and

laxatives. Diagnosis of slow transit constipation requires Sitz marker studies, which show how markers are retained or delayed during their passage through the entire colon. The mechanism of slow transit constipation is still not well understood, and several theories have been proposed.⁶

Because slow transit constipation responds poorly to conservative treatment, surgical intervention was introduced as a treatment measure more than 100 years ago. Sir William Arbuthnot Lane reported the first case of abdominal total colectomy with ileorectal anastomosis for treating slow transit constipation; however, this procedure was quickly abandoned during the early 20th century because it was associated with high morbidity and mortality.^{3,4} Between the 1960s and 1970s, with advancements in medication and instrumentation, this procedure again regained its value as a treatment option. Today, this procedure is a well-accepted, effective treatment for intractable slow transit constipation.⁵

However, this procedure is still not the ideal treatment for slow transit constipation because it is associated with many postoperative complications. The most common postoperative complication is small-bowel obstruction (2-71%; median, 18%), due to extensive dissection with consequence of diffuse adhesion. Other less common postoperative complications like chronic diarrhea (0-46%; median, 14%), abdominal pain/bloating, recurrence of constipation (0-33%; median, 9%), or incontinence (0-52%; median,

14%) have been reported.⁵ For this reason, adequate patient selectivity is essential for the success of surgical intervention to treat this condition.¹¹⁻¹³ Owing to recent advancements in diagnostic work-up, propagation delay in the colonic segment can be ascertained; segmental resection with procedures like hemicolectomy is an approved treatment that has shown adequate results with few complications.¹⁵

Our study focused on postoperative chronic diarrhea – the second common postoperative complication. As mentioned above, our literature review showed that the incidence of diarrhea is approximately 0-46% (median, 14%).⁵ In our study, the postoperative chronic diarrhea occurred in 12 patients (15.3%). This incidence is comparable to that observed in the reviewed literature. We also identified certain factors that may be related to the incidence of postoperative diarrhea. These include the sex of the patient and the age at which the surgery was performed.

It is unclear as to why sex of the patient may have a significant effect on the incidence of postoperative chronic diarrhea. Interestingly, we found that the male patient to female patient ratio in the constipation-affected population was approximately 1:3. Furthermore, this ratio was reported to be 1:9 among those with slow transit constipation.⁷ The reason for this was not well understood until recent years. Jose Behar and his colleagues have tested the smooth muscle cells in normal individuals and patients with slow transit constipation. They found that progesterone, which is exclusively a female sex hormone, plays an important role in the pathogenesis of slow transit constipation. They found that overexpression of progesterone receptors in the colonic smooth muscle cells results in downregulation of the contractile G-proteins and upregulation of the inhibitory G-proteins. This may explain the predominance of slow transit constipation in women.^{8,16} The high incidence of post-operative diarrhea observed in these male patients may represent another type of slow transit constipation which need further study to approve this subgroup.

Older patients who underwent total or subtotal colectomy for treatment of constipation had a significantly high incidence of postoperative diarrhea. However, the reason for this is unclear. We hypothesize

that intractable constipation in the older patients may have been due to degenerative changes in the enteric nerve fibers or smooth muscles. This group of patients who underwent surgical intervention tended to have a higher incidence of postoperative diarrhea. On the other hand, the incidence of postoperative diarrhea was lower in cases of early-onset intractable constipation that was epidemiologically related to slow transit constipation.

In our study, 22 patients (28.2%) had pelvic floor dysfunction along with slow transit constipation. There was no obvious relationship between postoperative diarrhea and the presence or absence of pelvic floor dysfunction. However, we believe that pelvic floor dysfunction should be managed before surgical intervention, even though the management priority for this group of patients is debatable. Lubowski et al. have treated these patients without prior management of pelvic floor dysfunction, and they achieved the same outcome.⁹ Other authors suggest that patients with pelvic floor dysfunction should receive biofeedback therapy or undergo rectocele repair before total colectomy and ileorectal anastomosis.¹⁰⁻¹⁴ Nevertheless, the treatment outcome for this group of patients was poorer than that for patients with only slow transit constipation.¹⁴ In our study, there was no difference in the incidence of postoperative chronic diarrhea between patients with and without pelvic floor dysfunction (20% vs. 12.5% $p = 0.37$). This may be because co-existence of pelvic floor dysfunction with slow transit constipation may be related to the recurrence of constipation but not to diarrhea.

Different surgical procedures have been applied for the management of slow transit constipation. The most widely applied procedure is total colectomy with ileorectal anastomosis. However, other procedures like subtotal colectomy with ileosigmoidostomy or cecorectal anastomosis have shown the same effects and few complications.¹⁵ Alternative advancements like minimal invasive surgery can also reduce postoperative complications and recovery time. In our study, patients undergoing anastomosis at different levels did not show any difference in the incidence of postoperative diarrhea. This may be because different surgeons have varying views on the optimal anastomosis level.

Conclusion

Slow transit constipation that not responds to medical management might warrant surgical intervention. However, meticulous preoperative evaluation is mandatory to avoid possible misdiagnosis and postoperative complications. In our study, male patients and older patients had a significantly high incidence of postoperative diarrhea. These results suggest that before surgery, patients with slow transit constipation should be informed about the possible risk of developing postoperative diarrhea.

References

1. Sonnenberg A, Koch TR. Epidemiology of constipation in the United States. *Dis Colon Rectum* 1989;32:1-8.
2. Whitehead WE, Chaussade S, Corazziari E, Kumar D. Report of an International workshop on management of constipation. *Gastroenterology International* 1991;4:99-113.
3. Arbuthnot Lane W. The results of operative treatment of chronic constipation. *Br Med J* 1908;I:1:26-30.
4. Arbuthnot Lane W. Chronic intestinal stasis. *Br Med J* 1909; I:1:408-11.
5. Knowles CH, Scott M, Lunniss PJ. Outcome of colectomy for slow transit constipation. *Ann Surg* 1999;230:627-38.
6. Chong Liang He, Larry B, Linan W, John P, Tonia Young Fadok, Joseph S, Gianrico F. Decreased interstitial cell of cajal volume in patients with slow-transit constipation. *Gastroenterology* 2000;118:14-21.
7. Charles H. Ks, Mark S, Chris R, Abdulhakim G, Greger L, Kamm MA, Lunniss PJ. Idiopathic slow-transit constipation: an almost exclusively female disorder. *Dis Colon Rectum* 2003;46:1716-7.
8. Xiao ZL, Victor P, Poero B, Jose B. Role of progesterone signaling in the regulation of G-protein levels in female chronic constipation. *Gastroenterology* 2005;128:667-75.
9. Lubowski DZ, Chen FC, Kennedy ML, King DW. Results of colectomy for severe slow transit constipation. *Dis Colon Rectum* 1996;39:23-9.
10. Lundin E, Karlbom U, PaÈhlman L, Graf W. Outcome of segmental colonic resection for slow-transit constipation. *Br J Surg* 2002;89:1270-4.
11. Valter R, Damiano C, Santi G, Rossana A, Roberto C. Is total colectomy the right choice in intractable slow-transit constipation? *Surgery* 2006;140:435-40.
12. Zutshi M, Hull TL, Trzcinski R, Arvelakis A, Xu M. Surgery for slow transit constipation: are we helping patients? *Int J Colorectal Dis* 2007;22:265-9.
13. Mollen RM, Kuijpers HC, Claassen T. Colectomy for slow-transit constipation: preoperative functional evaluation is important but not a guarantee for a successful outcome. *Dis Colon Rectum* 2001;44:577-80.
14. Bernini A, Madoff RD, Lowry AC. Should patients with combined colonic inertia and nonrelaxing pelvic floor undergo subtotal colectomy? *Dis Colon Rectum* 1998;41:1363-6.
15. Federico Marchesi, Leopoldo Sarli, Luigi Percalli. Subtotal colectomy with antiperistaltic cecorectal anastomosis in the treatment of slow-transit constipation: long-term impact on quality of life. *World J Surg* 2007;31:1658-64.
16. Ping C, Victor P, Piero B, Jose B. Abnormalities of prostaglandins and cyclooxygenase enzymes in female patients with slow-transit constipation. *Gastroenterology* 2007;133:445-53.

原 著

蠕動緩慢型便秘手術治療後慢性腹瀉 相關因子探討

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目的 蠕動緩慢型便秘的治療方式是以手術為主，然而手術之後併發症並不少見，本文主要探討對手術治療蠕動緩慢型便秘後引發慢性腹瀉之相關因素。

方法 藉由病歷審閱方式回顧 1994 年 1 月到 2004 年 12 月間，蠕動緩慢型便秘藉由手術方式治療之病患，總共有 78 位病患進入本次研究。

結果 男性病患與女性病患比例為 13 比 65，病患平均年紀為 40.8 歲（介於 17 到 78 歲）。這 78 位病患中，有 22 位病患合併有骨盆腔底部異常（佔 28.2%），手術後每日排便次數介於一次到十二次之間，發生慢性腹瀉的比例為 15.3%。發生手術後慢性腹瀉的影響因子為男性性別之病患以及年齡高逾五十歲之病患，有較高的慢性腹瀉發生率。

結論 手術後發生慢性腹瀉的情況可以在術前被評估，本次研究可提供臨床醫師運用在評估病患接受手術治療蠕動緩慢型便秘時，可能發生之手術後併發症。

關鍵詞 蠕動緩慢型便秘、大腸全切除、慢性腹瀉。