

Original Research Article

The Predictive Risk Factor of Postoperative Recurrence Following Altemeier's and Delorme's Procedures for Full-thickness Rectal Prolapse: An Analysis of 127 Japanese Patients in a Single Institution

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Abstract

Objectives: We aimed to identify risk factors for postoperative recurrence (PR) after Altemeier's and Delorme's procedures for full-thickness rectal prolapse (FTRP).

Methods: We enrolled 127 patients who underwent Altemeier's and Delorme's procedures for FTRP between April 2008 and September 2021. We divided the 127 patients into recurrence and non-recurrence groups and conducted univariate and multivariate analyses. We used six independent variables: age, body mass index (BMI), history of surgical repair for FTRP, coexistence of prolapse in other organs, poor fixation of the rectum on defecography before surgery, length of the prolapsed rectum, and type of surgical procedure (Altemeier's or Delorme's procedures).

Results: PR developed in 51 (40.1%) patients during a mean follow-up period of 453 (range, 9-3616) days. Comparing the recurrence group (n=51) with the non-recurrence group (n=76), significant difference was observed regarding the coexistence of prolapse in other organs (p=0.017) in the univariate analysis. In the multivariate analysis, significant differences were observed in BMI (OR 1.18, 95% CI 1.030-1.350, p=0.020), coexistence of prolapse in other organs (OR 3.38, 95% CI 1.200-9.500, p=0.021), length of the prolapsed rectum (OR 1.030, 95% CI 1.010-1.060, p=0.015), poor fixity of the rectum on defecography (OR 0.332, 95% CI 0.129-0.852, p=0.022), and surgical procedures (OR 0.192, 95% CI 0.064-0.573, p=0.003).

Conclusions: The study suggested that increasing BMI, coexistence of prolapse in other organs, length of the prolapsed rectum, poor fixation of the rectum on defecography before surgery, and types of surgical procedure might be risk factors of PR after perineal surgery for FTRP.

Keywords

full-thickness rectal prolapse, postoperative recurrent risk, Altemeier's procedure, Delorme's procedure

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Introduction

Full-thickness rectal prolapse (FTRP) is a well-known obstructive anorectal disease that frequently occurs in elderly women. FTRP has become widely recognized in Japan, and the population is aging rapidly. For FTRP, surgical repair is the best approach to correct prolapse and might improve

FTRP related symptoms, including incontinence, defecation disorders, and bleeding. Many surgeries using a transabdominal or perineal approach have been proposed. Colorectal surgeons are familiar with Altemeier's and Delorme's procedures as perineal surgeries. These surgeries have advantages such as minimized operative risk and postoperative complications compared with transabdominal surgery, while

perineal surgeries potentially have a high incidence of recurrence[1-3]. According to previous reports[4,5], laparoscopic surgery for FTRP can be performed safely with low recurrence rates. If we preoperatively assess a patient with refractory FTRP, which repeatedly recurs after perineal surgery, we can propose an alternative surgery to minimize postoperative recurrence (PR). We aimed to clarify the risk of PR in patients undergoing Altemeier's and Delorme's procedures for FTRP.

Methods

This study was approved by the Ethics Committee of Toho University Omori Medical Center (No. M21227, 19183). Information about the research was disclosed on our hospital's website and potential participants were given the opportunity to opt-out.

We performed perineal repairs in 134 patients with FTRP at the Toho University Omori Medical Center between April 2008 and September 2021. Seven patients who underwent

Gant-Miwa's procedure were excluded. This study evaluated the risks of PR in 127 patients who underwent Altemeier's and Delorme's procedures for FTRP (Figure 1).

To evaluate the risk factors for PR in these FTRP surgeries, the patients were divided into two groups: recurrence and non-recurrence. Univariate and multivariate analyses were performed to compare the two groups. In the multivariate analysis, we used six independent variables: age[6], body mass index (BMI)[7], history of surgical repair for FTRP[8,9], coexistence of prolapse in other organs, findings of poor fixity of the rectum on defecography before surgery[10-12], length of the prolapsed rectum[9,13,14] and type of surgical procedure (Altemeier's and Delorme's procedures)[15].

The coexistence of prolapses in other organs was typically diagnosed by a coloproctologist. We identified poor fixity of the rectum as the rectum sliding significantly toward the anus during the strain phase of defecography (Figure 2). It is important to note that dynamic cystocolpoproctography was not performed in this study.

Selection of the procedure for FTRP and follow-up after surgery

First, in all patients with rectal prolapse, tolerance to surgery, including frailty and comorbidities, was evaluated by anesthesiologists before surgery. We chose perineal surgery for patients with the American Society of Anesthesiologists (ASA) grade 4 disease. For patients with ASA grades 3 and less, we chose surgeries based on the length of the prolapsed rectum and/or fixation of the rectum on defecography. We proposed abdominal rectopexy for patients with a prolapsing rectum > 5 cm and/or poor fixation of the rectum on defecography. Regarding the selections of the surgical procedure, Altemeier's procedure was considered for patients with a prolapsed rectum > 5 cm and/or poor fixation of the

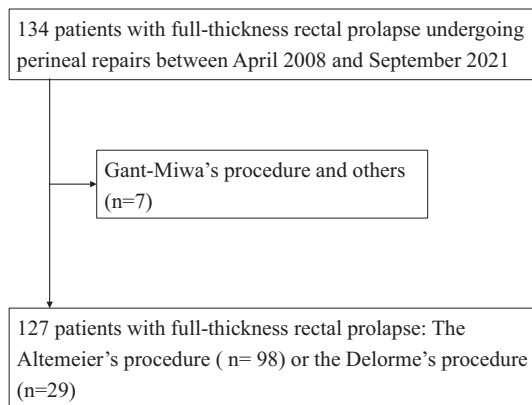


Figure 1. Patient selection.

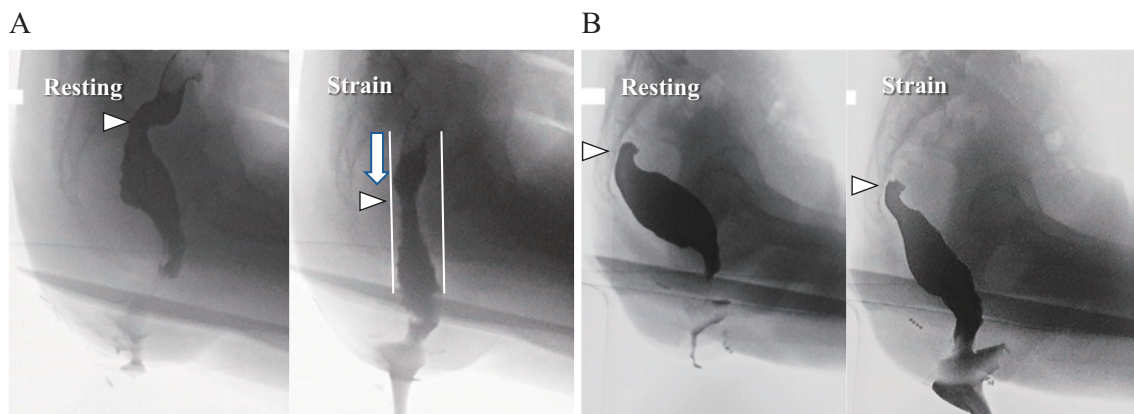


Figure 2. Fixation of the rectum on defecography.

During defecography, the diagnosis of poor fixation of the rectum is established when, in the strain phase, the rectum slides linearly and heavily towards the anus. In defecography A, this characteristic linear sliding towards the anus was observed in the strain phase, contrasting with the observation in defecography B.

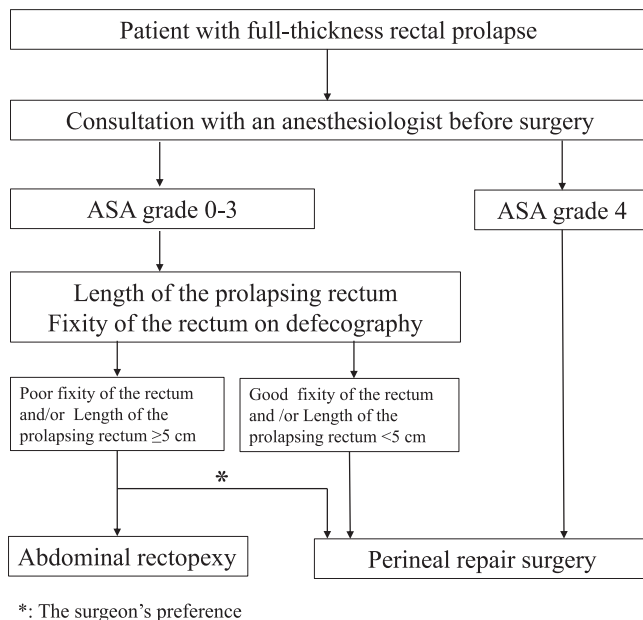


Figure 3. Selection of surgery for FTRP.

rectum on defecography. Finally, the choice of surgical procedure depended on the surgeon's preference and the patient's willingness after consultation with an anesthesiologist (Figure 3).

Patients were followed up regularly at the hospital outpatient department after discharge and were asked whether they had any symptoms that suggested PR in their daily life. When PR was suspected, defecography was performed to verify recurrence.

Statistical analysis

Patients with PR were compared with those without PR using χ^2 and Mann-Whitney U testing for categorical and continuous data, respectively. Tests of significance were two-sided, and p-values <0.05 were considered statistically significant. Logistic regression analysis was used to assess the risk factor of PR after perineal surgery for FTRP. All statistical analyses were performed with EZR, which is a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria). More precisely, it is a modified version of R commander designed to add statistical functions frequently used in biostatistics[16].

Results

Patients' characteristics

Patient characteristics are presented in Table 1. Of 127 patients, 122 (96.1%) were women. The median age of this population was 82 (range, 44-95) years. Fifty-two (40.9%) of the 127 patients underwent a previous surgery for rectal prolapse. The median body mass index was 20.7 (range,

13.8-31.7) kg/m². Twenty-two (17.3%) patients had a prolapse of other organs, including the uterus, vagina, and bladder. The median length of the prolapsed rectum was 50 (range, 17-140) mm. Regarding performance status, 93 (73.2%) of the 127 patients had grade 2 disease, followed by grade 3 (18.1%). To select the surgery for FTRP, we performed defecography to evaluate the coincidence of a sliding hernia of the rectum caused by a defect in the pelvic fascia, which was suspected in 79 (62.2%) patients. Altemeier's and Delorme's procedures were performed in 98 (77.2%) and 29 (22.8%) patients, respectively (Table 2).

High-risk factors of PR following surgery

In this study, PR after surgery developed in 51 (40.1%) patients during a mean follow-up period of 453 (range, 9-3616) days: 36 (36.7%) of 98 patients who underwent Altemeier's procedure and 15 (51.7%) of 29 patients who underwent Delorme's procedure. In the univariate analysis between the recurrence group (n=51) and the non-recurrence group (n=76), significant difference was observed in the coexistence of prolapse in other organs between the two groups (p=0.017, Table 3). In the multivariate analysis, significant differences were observed in increasing BMI (OR 1.18, 95% CI 1.030-1.350, p=0.020), coexistence of prolapse in other organs (OR 3.38, 95% CI 1.200-9.500, p=0.021), length of the prolapsed rectum (OR 1.030, 95% CI 1.010-1.060, p=0.015), poor fixity of the rectum on defecography (OR 0.332, 95% CI 0.129-0.852, p=0.022), and type of surgical procedure (OR 0.192, 95% CI 0.064-0.573, p=0.003) (Table 4).

Discussion

We evaluated the risk factors for PR following Altemeier's and Delorme's procedures in 127 patients with FTRP in a single Japanese institution. Overall, PR occurred in 51 (40.1%) of the 127 patients: 36.7% in Altemeier's procedure group and 51.7% in Delorme's procedure group. According to the Clinical Practice Guidelines of the American Society of Colon and Rectal Surgeons[17], the PR rates for Altemeier's and Delorme's procedures are 10-15% and 16-30%, respectively. In a recent systematic review by Emile et al.[18], the median PR rate of perineal resection procedures for complete rectal prolapse was 16.6%: 11.4% for Altemeier's procedure, 14.4% for Delorme's procedure, and 13.9% for perineal stapled prolapse resection. Elagili et al.[19] compared the surgical outcomes of perineal repair in 75 patients with rectal prolapse and reported recurrence in 14% of the patients. However, a higher PR was reported in the PROSPER study than in previous reports; 24% in Altemeier's and 31% in Delorme's procedure[20]. The difference in PR rates among reports is due to various reasons. PR reached 41% in this study, possibly because of the study

Table 1. Patient Characteristics.

	N=127
Sex, n (%)	
Male	5 (3.9)
Female	122 (96.1)
Age, years*	82 (44-95)
65-74 years, n (%)	16 (12.6)
75-84 years, n (%)	52 (40.9)
85-99 years, n (%)	50 (39.4)
Body mass index, kg/m ² *	20.7 (13.8-31.7)
ASA PS, n (%)	
0	0 (0)
1	7 (5.7)
2	93 (73.2)
3	23 (18.1)
4	4 (3.0)
Previous surgery for rectal prolapse, n (%)	
Positive	52 (40.9)
Negative	75 (59.1)
Length of the prolapsing rectum, mm*	50 (17-140)
Sliding of the rectum caused by a defect in the pelvic fascia, n (%)	
Positive	79 (62.2)
Negative	41 (32.3)
Unknown	7 (5.5)
Prolapse of other organs, n (%)	
Positive	22 (17.3)
Negative	105 (82.7)
Surgery, n (%)	
Altemeier	98 (77.2)
Delorme	29 (22.8)
Observation period after surgery, day*	453 (9-3616)

ASA PS= American Society of Anesthesiologists Physical Status

*: median (range)

population. Patients older than 85 years accounted for 39.4% of the population, including very old patients over 90 years (15.0%). Generally, colorectal surgeons tend to choose perineal surgery for elderly patients; for patients older than 85 years, perineal surgery may be preferred to abdominal surgery. Another reason could be the choice of procedure for patients with concomitant rectal and pelvic organ prolapse and those with a history of surgery for rectal prolapse. In this study, 52 (40.9%) patients had a history of surgery for rectal prolapse, and 22 (17.3%) had concomitant pelvic organ prolapse. Recurrent rectal prolapse was not identified as a risk factor for PR after perineal repair for FTRP; however, Catanzarite et al.[21] reported that PR for rectal prolapse was significantly associated with pelvic organ prolapse. We previously reported that laparoscopic rectopexy should be recommended for recurrent rectal prolapse[22].

Perineal surgery for refractory rectal prolapse, such as FTRP, is challenging for colorectal surgeons; however, laparoscopic repair may resolve the problems encountered in

perineal surgeries. A randomized clinical trial and meta-analysis revealed that laparoscopic repair of FTRP is safe and effective[23-25]. Therefore, if we had selected patients with a high risk of PR among those with refractory rectal prolapses, we could have minimized the PR using other approaches. In this study, the multivariate analysis revealed that increasing BMI, length of the prolapsed rectum, poor fixity of the rectum on defecography, coexistence of prolapse in other organs, and different types of perineal surgical procedure were significantly associated with a high PR after common perineal surgeries.

Regarding the length of the prolapsed rectum, Tanabe et al.[14] reported that 24 (25%) of 96 patients who had undergone Delorme's procedure had PR and that in multivariate analysis, a prolapsed rectum length of ≥ 3 cm was a significant risk factor for PR. Delorme's procedure rather than Altemeier's procedure is generally recommended for patients with smaller prolapses. This recommendation is important when choosing between both procedures. In this study, PR

Table 2. Comparison of the Background between the Altemeier and Delorme Procedures.

	Altemeier (n=98)	Delorme (n=29)	P value
Sex, n (%)			0.078
Male	2 (2.0)	3 (10.3)	
Female	96 (98.0)	26 (89.7)	
Age, years*	83 (44-95)	80 (45-92)	0.091
ASA PS, n (%)			
0	0 (0)	0 (0)	
1	4 (4.1)	3 (10.3)	
2	73 (74.5)	20 (69.0)	
3	18 (18.4)	5 (17.2)	
4	3 (3.0)	1 (3.5)	
Body mass index, kg/m ² *	20.8 (13.8-31.7)	19.5 (14.8-25.5)	0.219
Previous surgery for rectal prolapse, n (%)			0.67
Positive	39 (39.8)	13 (44.8)	
Negative	59 (60.2)	16 (55.2)	
Length of prolapsing of the rectum, mm*	52.5 (20-140)	40 (17-60)	<0.01
Prolapse of other organs, n (%)			0.103
Positive	20 (20.4)	2 (6.9)	
Negative	78 (79.6)	27 (93.1)	
Sliding of the rectum caused by a defect in the pelvic fascia, n (%)			0.380
Positive	64 (65.3)	15 (51.7)	
Negative	29 (29.6)	12 (41.4)	
Unknown	5 (5.1)	1 (6.9)	
Observation period from surgery, day*	335.5 (9-3063)	844 (10-3616)	0.021
Recurrence, n (%)	36 (36.7)	15 (51.7)	0.196
Period until recurrence, day*	154.5 (55-1086)	219 (7-1961)	0.741

ASA PS= American Society of Anesthesiologists Physical Status

*: median (range)

Table 3. Comparison between the Recurrence and Non-Recurrence Groups.

	Recurrence group (n=51)	Non-recurrence group (n=76)	P value
Sex, n (%)			0.157
Male	4 (7.8)	1 (1.3)	
Female	47 (92.2)	75 (98.7)	
Age, years*	81 (66-92)	83.5 (44-95)	0.546
Body mass index, kg/m ² *	2105 (15.6-26.7)	20.3 (13.8-31.7)	0.050
Previous surgery for rectal prolapse, n (%)			0.144
Positive	25 (49.0)	27 (35.5)	
Negative	26 (51.0)	49 (64.5)	
Length of prolapsing of the rectum, mm*	50 (28-140)	50 (17-100)	0.820
Prolapse of other organs, n (%)			0.017
Positive	14 (27.5)	8 (10.5)	
Negative	37 (72.5)	68 (89.5)	
Sliding of the rectum caused by a defect in the pelvic fascia, n (%)			0.201
Positive	30 (58.8)	49 (64.5)	
Negative	20 (39.2)	21 (27.6)	
Unknown	1 (2.0)	6 (7.9)	
Surgery, n (%)			
Altemeier	36 (70.6)	62 (81.6)	0.196
Delorme	15 (29.4)	14 (18.4)	
Period from surgery to recurrence, day*	169 (7-1961)	-	-

*: median (range)

Table 4. Risk Factors for Postoperative Recurrence after Perineal Surgery.

	Odds ratio	95% confidence interval	P value
Body mass index	1.18	1.030-1.350	0.020
Coexistence of prolapse in other organs	3.38	1.200-9.500	0.021
Length of the prolapsed rectum	1.030	1.010-1.060	0.015
Fixity of the rectum on defecography (Poor vs. Good)	0.332	0.129-0.852	0.022
Type of surgical procedure (Delorme vs. Altemeier)	0.192	0.064-0.573	0.003

occurred significantly more in patients undergoing Delorme's procedure, compared to patients undergoing Altemeier's procedure.

We performed defecography in all patients with suspected rectal prolapse, excluding those with poor performance status, because defecography can reveal the condition of a patient with rectal prolapse. Moschowitz suggested that rectal prolapse occurs as a hernia sliding through a defect in the pelvic fascia[26]. In the recent European Society of Coloproctology 'Mesh in the Pelvis' Guideline Webinar (January 2022), rectal prolapse was introduced as a hernia, with the guideline that it should be classified and treated using similar standards as other hernias[12]. Therefore, we believed that the finding of a sliding rectum on defecography was one of the causes of FTRP and evaluated the relationship between them. Laparoscopic anchoring of the rectum on the sacrum is considered a reasonable procedure for rectal prolapse with a sliding hernia. Karas et al.[25] revealed that rectopexy after rectal mobilization for FTRP significantly reduced the 5-year recurrence rate compared with the non-rectopexy group. The latest review and meta-analysis revealed that rectopexy reduced PR, although using a mesh for rectopexy reduced PR better than sutured rectopexy[27].

Rectal prolapse is frequently combined with the prolapse of other organs in the pelvis. In this study, increasing BMI and the coexistence of prolapse in other organs was significantly associated with PR. Vergeldt TF et al. evaluated risk factors of PR after surgery for pelvic organ prolapse by reviewing five articles and reported that parity, vaginal delivery, age, and BMI were significantly associated in at least two articles[7]. Catanzarite et al.[21] evaluated the relationship between PR after surgery for rectal and pelvic organ prolapse. PR occurred most frequently among patients with pelvic organ prolapse who underwent perineal repair (57.1%). They concluded that pelvic organ prolapse was associated with a high rectal prolapse recurrence rate and that patients with concomitant rectal and pelvic organ prolapses should be considered for abdominal repair. Recently, laparoscopic ventral rectopexy plus sacrocolpopexy has been reported for patients with concomitant rectal and pelvic organ prolapse[28,29]. However, further studies are needed to clarify the usefulness of this procedure because of limited evidence.

This study has some limitations. First, it was a retrospec-

tive study with a small sample size from a single institution. This study is an exploratory study from a single facility. To enhance the robustness of our findings derived from a small dataset, we included references from other studies to corroborate the accuracy of our odds ratios. Second, the observation period was significant when PR was evaluated. However, the median observation period after surgery was 453 (range, 9-3616) days, and some patients with a short observation period were included in the study population. Third, we attempted to select the procedure with reference to the length of the prolapsed rectum, the fixity of the rectum on defecography, and a history of surgery for rectal prolapse; however, the final decision depended on the surgeon's preference while consulting the anesthesiologists. Finally, defecography might be an important examination method for choosing the proper procedure for rectal prolapse. With a dynamic cystocolpoproctography, we could get more information to choose a proper procedure to improve FTRP. However, every patient is not able to undergo a defecography and a dynamic cystocolpoproctography[30].

In conclusion, this study suggests that increasing BMI, length of the prolapsed rectum, coexistence of a sliding hernia of the rectum, and different types of surgical procedure are independent risk factors for PR after Altemeier's and Delorme's procedures for FTRP. Patients with sliding of the rectum on defecography were defined as those with poor fixity of the rectum in this study. Rectal fixity on defecography was an independent risk factor for PR after perineal surgery. To the best of our knowledge, this finding has not been previously reported. Given the study's limitations, attention should be given towards rectal fixity on defecography to elucidate the significance of these findings in identifying refractory rectal prolapse with a heightened risk of PR. Considering the risk factors associated with FTRP, abdominal rectopexy may be a better alternative to Altemeier's and Delorme's procedures to improve PR[5,31].

Conflicts of Interest

K. Funahashi received a research grant from Taiho pharmaceutical Co., Ltd. The other authors declare that they have no conflicts of interest to disclose.

Author Contributions

KF made substantial contributions to the conception of

the work. YM and KF made significant contributions to the data analysis and interpretation, and YM drafted the original manuscript. AK, SK, TS, KY, MU, and TK collected the references. All authors have approved the submitted version of the manuscript and agreed to be accountable for any part of the work.

Approval by Institutional Review Board (IRB)

The Ethics Committee of Toho University Omori Medical Center (No.M21227,19183).

Disclaimer

Kimihiko Funahashi is one of the Associate Editors of Journal of the Anus, Rectum and Colon and on the journal's Editorial Board. He was not involved in the editorial evaluation or decision to accept this article for publication at all.

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