

## Research Article

# Local Correction Procedures for Stoma Prolapse

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## Abstract

**Aim:** To assess the outcomes following several kinds of local repairs for stoma prolapse to determine the optimal local prolapse repair procedure.

**Methods:** Thirty-seven patients (24 men, median age: 63 years, range: 33 years to 88 years) undergoing 45 local repairs were prospectively registered, and their medical records were retrospectively reviewed in characteristics of patients and stoma, operative outcomes, and recurrence.

**Results:** Stapler repair with anastomosis was performed in 26 repairs, button-pxy fixation in 12 repairs, fascia fixation in 4 repairs, stapler closure in 2 repairs, and modified Gant-Miwa procedure in one repair. The selection criteria for the procedure were different in each repair. The operative time and bleeding volume were acceptable in all procedures without mortality. Postoperative morbidities were few and not serious. Recurrence of stoma prolapse after stapler repair with anastomosis, button-pxy fixation, fascia fixation, and stapler closure occurred in 3.8%, 41.7%, 50% and 0% of repairs, respectively, during a median follow-up period of 13 months (range: 1 month to 120 months). Stoma closure after repair and emergent surgery for stoma prolapse were performed in 5 (13.5%) and 3 (8.1%) of 37 patients, respectively.

**Conclusion:** The selection of repair method might depend on the patients' general conditions, expected survival period, and possibility of stoma reversal. Button-pxy fixation maybe used for transient stoma. Otherwise, stapler repair with anastomosis or closure can be an option for prolapse repair according to the condition of stoma.

**Keywords:** Stoma complication; Stapler repair; Local correction; Button pxy fixation; Stoma prolapse repair

## Introduction

Stoma prolapse is a complication occurring in 2% to 26% of patients after stoma creation, and it often disturbs the quality of life of patients with stoma [1-4]. The prolapse can mostly be managed conservatively by Wound, Ostomy, and Continence (WOC) nurses [5-7]. When complications by stoma prolapse make stoma care by WOC nurses difficult and/or the stoma prolapse affected the normal bowel functioning, surgical managements can be considered. If stoma functions as a faecal diversion, stoma prolapse is resolved by stoma reversal.

The surgical approach for stoma prolapse repair can be broadly classified into the abdominal approach, which is often via a midline laparotomy, and the local approach around the stoma [8]. The abdominal approach is more invasive and requires induction of general anesthesia, although there are recent reports of abdominal procedures being performed laparoscopically [9,10]. The local approach is considered a less invasive procedure. Several procedures have been reported as local approaches, including button pxy fixation [11-13], conventional method [8], repairs similar to the Altemeier's procedure [14], Delorme operation [15,16] and Miwa-Gant method [17], stapler technique [18-25] and mesh strip technique [26]. However, studies on the outcomes after operative repair of a stoma prolapse are scarce and the lack of comparative data and short-term follow-up have made choosing the optimal correction method for stoma prolapse difficult. Even in a recent report, the largest number

of analyzed patients who underwent repair with abdominal and local approaches was 23 [8]. We therefore aimed to assess the outcomes of several local repairs for stoma prolapse in our institution and clarify the selection criteria for choosing the appropriate local repair procedure for stoma prolapse.

## Materials and Methods

### Ethical information

The protocol of this study was approved by the institutional review board of Fujita Health University and performed in accordance with the 1964 World Medical Association's Declaration of Helsinki and its later amendments. All patients gave their written informed consent prior to inclusion in the study.

### Patient population and study design

This retrospective observational cohort study was conducted in the colorectal division of a single hospital. Thirty-seven patients who underwent local repairs for stoma prolapse between December 1997 and April 2020 were prospectively registered, and their medical records were retrospectively reviewed. The characteristics of patients and stoma, operative outcomes, and recurrence of stoma prolapse in each local repair procedure were investigated.

### Operative procedures

Button-pxy fixation was performed according to the procedure described by Canil, et al. and Katsuno, et al. [11,13] After identifying

the fixation point from the limb of the stoma by using the fingers, followed by injection of local anesthesia into the skin, two straight needles with 2-0 non-absorbable threads attached a standard round-edged laboratory coat button were passed through the bowel wall and anterior abdominal wall. Another button was fitted with the threads at the skin side of the abdomen, and the threads were tied to properly fix the limb of the stoma to the abdominal wall.

Stapler repair with anastomosis was done according to the procedure described by Maeda, et al. and Masumori, et al. [18,24] After pulling out the prolapsed stoma with Babcock forceps as long as possible, the prolapsed stoma was vertically divided using a stapler (GIA 60; Covidien, Tokyo, Japan or PCEE60A; Ethicon, Tokyo, Japan) down from 1 cm to 2 cm above the skin level. Then, the prolapsed stoma was divided horizontally and circumferentially at 1 cm to 2 cm above the skin level.

Simple excision and closure of a distal limb of a loop stoma prolapse with a stapler device (Stapler closure) was performed according to the procedure reported by Masumori, et al. [22] After grasping and lifting the prolapsed distal limb of the stoma with two Babcock forceps, a stapler (GIA™ 80-4.8 stapler; Covidien, Mansfield, MA, USA) was used in the distal limb of the prolapsed stoma at 1 cm to 2 cm above the skin level and then fired.

Fascia fixation was performed as a modified procedure of button-pxy fixation without using a button. A curved needle with 0-absorbable thread was passed from the inside of the proximal limb of stoma through the bowel wall, abdominal fascia, and bowel wall into the stoma lumen, and then a suture was tied without a button. Six to 8 stitches were made in the proximal limb of stoma.

The modified Gant-Miwa procedure was performed according to the procedure for rectal prolapse [27] described by Furumoto, et al. [17] Mucosal plication of the prolapsed bowel was performed to shorten the prolapsed bowel length.

**Criteria for prolapse repair and procedure selection**

Stoma prolapse repair was indicated for stoma prolapse with a length of >5 cm, stoma prolapse causing difficulty in stoma care by WOC nurses, and/or for stoma prolapse affecting normal bowel functioning.

The button-pxy fixation was selected for patients with poor general conditions and/or expected short-term survival and stoma reversal. Stapler closure was indicated in patients with irreducible loop stoma prolapse of the distal limb, when no decompression was required in the distal limb of the stoma. Fascia fixation was principally performed for the proximal limb of ileostomy prolapse. The modified Gant-Miwa procedure was used in patients with poor general conditions and expected short-term survival after button-pxy fixation failure. Otherwise, stapler repair with anastomosis was selected to maintain the continuity of the intestine by excising and anastomosing the prolapsed stoma.

**Criteria for recurrence and follow-up period**

Recurrence of stoma prolapse was defined as a stoma prolapse with a length of >5 cm that developed at the initial repair site. Follow-up period of each procedure was determined from the repair date to the last follow-up date or next repair date. The median follow-up

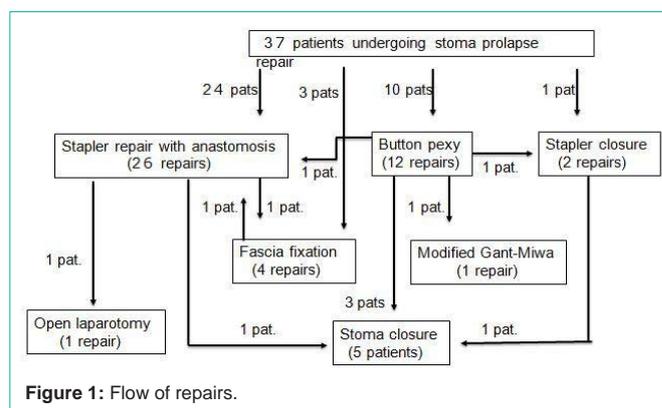


Figure 1: Flow of repairs.

Table 1: Characteristics of patients and stoma.

Age	Median 63 years (range 33-88)
Sex	
Male	24
Female	13
Original diseases and reasons for stoma	
Advanced colorectal cancer	7
Crohn's disease	6
Stoma after peritonitis	5
Leakage after LAR	4
Covering stoma after LAR	4
Advanced gynecological cancer	2
Pseudo-obstruction of intestine	2
Post-Miles surgery	1
Rectal cancer in the aged	1
Traffic accident	1
Fournier's syndrome	1
Decubitus	1
Post-Miles surgery + colon cancer	1
Ischemic colitis	1
Stoma type	
Loop colostomy	24
End colostomy	8
Loop ileostomy	4
End ileostomy	1
Initial side of prolapse in loop stoma	
Distal	15
Proximal	9
Both	4

period of all patients was 13 months (range 1 month to 120 months).

**Results**

Thirty-seven patients underwent 45 local repairs and one open laparotomy for stoma prolapse during the follow-up period (Figure 1). Patients' median age was 63 (range: 33-88) years, and the male-to-female ratio was 24:13. Original diseases and conditions requiring

**Table 2:** Operative outcomes of each procedure.

Procedure	Stapler with anastomosis	Button pexy	Fascia fixation	Stapler closure	Gant-Miwa
Number of repairs	26	12	4	2	1
Anesthesia (per repair)					
General	4	0	1	0	0
Lumber	11	0	0	0	0
Venous	11	0	3	2	0
Local	0	12	0	0	0
Stoma type					
Loop colostomy	17	9	0	2	1
End colostomy	4	3	1	0	0
Loop ileostomy	3	0	3	0	0
End ileostomy	1	0	0	0	0
Operative time (min) Median (range)	37 (15-75)	10 to 20	15 (10-37)	25 and 30 min	-
Bleeding volume (mL) median (range)	10 (0-214)	minimal	minimal	0 and 5	-

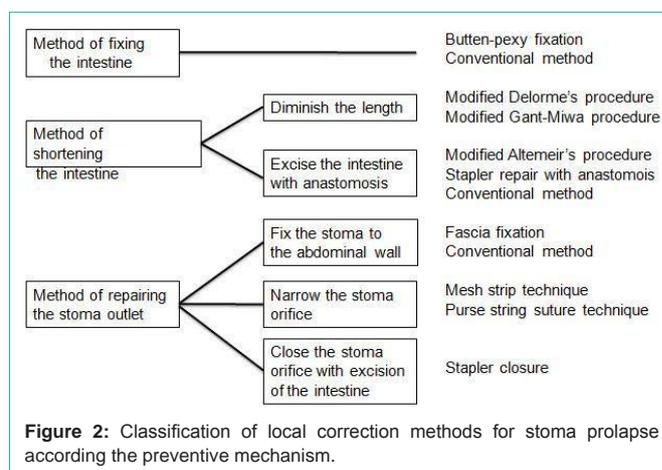
**Table 3:** Outcomes of each procedure.

Procedure	Stapler with anastomosis	Button pexy	Fascia fixation	Stapler closure	Gant-Miwa
Number of repairs	26	12	4	2	1
Recurrence (n)	1 (3.8%)	5 (41.7%)	2 (50%)	0	1
Follow-up period (months) Median (range)	12 (1-120)	12 (1-103)	12 (7-70)	7 and 48	18
Morbidity after repair	0	Skin ulcer 1 Infection 1	0	pain 2	0
Number of stoma closure	1	3	0	1	0

stoma creation are listed in Table 1. Most stomas were constructed as to-be permanent stoma owing to the presence of metastatic lesions or other reasons. Emergent stoma construction was performed in 11 of 37 patients (29.7%). Stoma type and initial side of loop stoma prolapse are listed in Table 1. Twenty-four of 37 stomas (64.9%) were loop colostomies. Stoma prolapse occurred in 15 distal limbs of 28 loop stomas (53.6%) and in 4 proximal and distal limbs (14.3%) initially. Stapler technique with anastomosis was performed in 26 repairs, button-pexy fixation in 12 repairs, fascia fixation in 4 repairs, stapler closure in 2 repairs, and modified Gant-Miwa procedure in 1 repair (Figure 1). One patient with prolapse of both limbs of ileostomy initially underwent stapler repair with anastomosis in the distal limb and fascia fixation in the proximal limb; therefore, a total of 38 patients underwent initial local correction (Figure 1). Median length of stoma prolapse was 10 (5 to 22) cm. The length of stoma prolapse was >7 cm in all patients, except in two patients (5 cm and 6 cm long).

**Operative outcomes**

All button-pexy fixations were performed under local anesthesia at the outpatient clinic or ward (Table 2). One patient who underwent fascia fixation and stapler repair with anastomosis for prolapse of both limbs of ileostomy requested for general anesthesia. Otherwise, fascia fixation was performed under venous anesthesia. Stapler closure for irreducible loop stoma prolapse was emergently performed under venous anesthesia. The modified Gant-Miwa procedure was done at the ward without anesthesia due to the patients' poor general conditions; therefore, the exact operative time and bleeding volume were not determined, although these are acceptable for critical cases.



**Figure 2:** Classification of local correction methods for stoma prolapse according to the preventive mechanism.

Stapler repair with anastomosis was mainly performed under lumber or venous anesthesia. General anesthesia was selected according to patients' request. Each procedure had a short operative time and small bleeding volume. We sometimes experienced bleeding at the stump of the division site with the stapler repair; however, haemostasis was achieved by stitching.

**Recurrence**

Recurrence occurred in one of 26 repairs (3.8%) following stapler repair with anastomosis, 5 of 12 (41.7%) repairs after button-pexy fixation, and 2 of 4 repairs (50%) after fascia fixation (Table 3). Recurrence occurred in the proximal limb of loop ileostomy at 9 months after stapler repair with anastomosis, which was treated

**Table 4:** Reports of stoma prolapse repair.

Procedure	Authors	Number (repairs)	Stoma type (per patient)	Length of prolapse (cm)	Anesthesia	Morbidity	Follow-up Median (range)	Recurrence per repair (%)	Time to recurrence (months)
Conventional local repair	Mittal R	15	-	-		1	23	8 (53.3%)	Mostly within 12
Open laparotomy	Mittal R	8	-	-	General	2	55	3 (37.5%)	Mostly within 12
Lap-enteropexy	Davidson J	15	13-ileostomy	-	General	1	20	1 (7%)	5.4
			1 loop colostomy						
Button-pxey fixation	Canil BK	6	ileostomy	-	Local	1 skin erosion		1 (16.7%)	1
			colostomy						
Button-pxey fixation	Our Report	12	7 loop-colostomy	5 to 15	Local	1 skin ulcer	12 (1-103)	5 (41.7%)	1, 2, and 8
			3 end-colostomy			1 infection			
Stapler with anastomosis	Hata F	5	4 end-colostomy	-	Venous	-	11 (3-64)	0	-
			1 end ileo-colostomy						
Stapler with anastomosis	Our Report	26	17 loop-colostomy	5 to 22	Lumbar	0	12 (1-120)	1 (3.8%)	9
			4 end-colostomy		Venous				
			3 loop-ileostomy		General				
			1 end ileostomy						
Mesh strip technique	Sobrado CW	10	1 end colostomy	6 to 20	Local	0	25 (12-89)	0	-
			9 loop-ileostomy						
Purse string suture	Tanimura	23	10 loop ileostomy	-	No	1 pain	13.5 (2-57)	13 (56.5%)	0.5-4
			3 end colostomy			1 incarceration			

by fascia fixation at 14 months after the initial repair (Figure 1). However, re-recurrence occurred at 6 months after fascia fixation, and the patient died at 1 month after re-recurrence due to advanced gynecological cancer. Another case of recurrence after fascia fixation occurred in the proximal limb of the loop ileostomy at 9 months after repair, which was treated by stapler repair with anastomosis without further recurrence (Figure 1). A new stoma prolapse appeared in one proximal limb of loop colostomy after stapler repair with anastomosis for prolapse of distal limb. This patient underwent emergent laparotomy for incarceration of the new stoma prolapse (Figure 1). One patient who experienced failure after 3 times of button-pxey fixation underwent emergent stapler closure for irreducible prolapse at 13 months after the last fixation (Figure 1). Recurrence after button-pxey fixation occurred 1-8 months after each fixation in this patient. Another patient underwent stapler repair with anastomosis at 6 months after button-pxey fixation failure and died 5 months later without further recurrence. The modified Gant-Miwa procedure was performed at 8 months after button-pxey fixation failure, instead of re-button-pxey fixation, due to the existence of parastomal hernia (Figure 1). This old and bedridden patient had skin ulcerations at 2 months after the fixation, and the fixation stitch was removed (Table 3). Re-recurrence of prolapse with a length of 5 cm after the modified Gant-Miwa procedure was conservatively treated. One infection occurred at the button-pxey fixation site, and the thread was removed at 5 days after fixation (Table 3). This patient underwent stoma reversal at 6 months after fixation without prolapse recurrence. Two other patients underwent stoma closure after button-pxey fixation (Figure 1). Two patients had transient abdominal pain after stapler

closure (Table 3), but the pain was controlled conservatively and eventually subsided.

Emergent surgery for stoma prolapse was performed in 3 of 37 patients (8.1%) due to incarceration of stoma prolapse during the follow-up period. Stoma closure was finally done in only 5 of 37 patients (13.5%) after prolapse correction (Figure 1 and Table 3). No mortality was confirmed after surgery in each repair.

## Discussion

Stoma prolapse often occurs in loop colostomies and involves the distal limb [8,28-32]. Stoma prolapse repaired in this study often occurred in loop colostomy (24/37 stomas, 64.9%) and in 15 distal limbs (53.5%) and 4 proximal and distal limbs (14.3%) of 28 loop stomas initially. Our findings were consistent with those of previous reports [28-32].

Stoma prolapse is a full-thickness protrusion of the bowel through the stoma site [32]. Arumugan, et al. [33] defined stomal prolapse as an increase in stoma size after maturation requiring a change in the appliance or subsequent surgical treatment. Thus far, the length of stoma prolapse as a definition of stoma prolapse and criteria for surgical treatment has not been clarified. The length of stoma prolapse was 6 cm to 20 cm, except in our series (Table 4), [14-17,19-21,25,28]. Median length of stoma prolapse was 10 cm (5 to 22), and the length of stoma prolapse was >7 cm in all patients, except in two patients (5 cm and 6 cm long), in this study. We performed stoma prolapse repairs only when the stoma prolapse made stoma care by WOC nurses difficult and/or stoma prolapse affected normal bowel

functioning. We tentatively defined the length of stoma prolapse required for repair to be >5 cm. According to the reported data [14-17,19-21,25,28] and our experience, the length of stoma prolapse of >6 cm to 7 cm could be a candidate for stoma prolapse repair when stoma care by WOC nurses became difficult and/or stoma prolapse affected normal bowel functioning.

The patients in this study requiring stoma repair mostly had poor general conditions and/or critical conditions due to advanced cancer and other reasons, which is consistent with patients in other studies [19-21,25]. Button-pexy fixation was considered one of the most minimally invasive procedures among the local corrections performed in this study, as it could be accomplished under local anesthesia with little morbidity and has acceptable operative time and bleeding volume. Three stoma closures could be easily performed after button-pexy fixation, as the repair requires minimal manoeuvre to the intestine. Therefore, button-pexy fixation might be suitable for patients with transient stoma. Operative time was short and bleeding volume was minimal without mortality, and post-operative morbidities were few and not serious for all local corrections in this study (Table 2 and 3). Therefore, all local corrections performed in this study were feasible and minimally invasive.

Regarding the Pathophysiology of loop stoma prolapse in the transverse colon, Maeda, et al. [34] proposed that abdominal pressure induced stoma prolapse by pushing the stoma up between the abdominal wall and the stoma in cases of redundant and mobile colon [34]. This mechanism is considered to be consistent with that of the prolapse of an end stoma. Stoma prolapse repair is aimed at preventing or eliminating the following factors: the space between the abdominal wall and intestine and redundant and mobile intestine. Additionally, narrowing or closing of the stoma outlet to prevent protrusion of invaginated intestine can be a measure for stoma prolapse repair. According to the abovementioned Pathophysiology and additional measure, we can propose the classification of local correction methods (Figure 2). Button-pexy fixation [11-13] fixes the intestine to the abdominal wall to eliminate mobility of the intestine. The modified Delorme's [15,16] and Gant-Miwa procedures [17] diminish the length of the intestine to improve symptoms of the redundant intestine, and the modified Altemeier's procedure [14] and stapler repair with anastomosis [18-21,23-25] shorten the length of the intestine by excising the intestine. Excision and anastomosis are performed manually in Altemeier's procedure and by using a stapler device in stapler repair with anastomosis. Fascia fixation studied in this report eliminates the space between the stoma and the abdominal wall. The mesh strip [26] and purse string suture techniques [35, 36] narrow the stoma orifice to prevent the protrusion of invaginated intestine. Closing the stoma orifice with shortening of the intestine is performed by stapler closure [22]. In conventional methods and abdominal approaches, fixation of the intestine, excision of the intestine, and/or fixation of the stoma to the abdominal wall are performed [8].

Most of the abovementioned procedures were described in case reports or reports with <5 cases [14,17,20-23,25]. We summarized the reports with >5 repairs in Table 4 [8,9,11,19,26,36]. The recurrence rate after Button-pexy fixation was 16.7% to 41.7% per repair. The methods for shortening the length of the intestine, including

modified Delorme's and Gant-Miwa procedures, were presented in case reports [15-17]. The recurrence rate after the Gant-Miwa procedure for rectal prolapse was reported to be 0% to 31% [27]. It was considered that the methods for shortening the length of intestine might have some limitations in length reduction due to the nature of the procedure. Therefore, these methods might not be suitable for long stoma prolapse. Recurrence after stapler repair with anastomosis rarely occurred at a rate of 0% to 3.8% per repair (Table 4), which is consistent to recurrence rate modified Altemeier's procedure according to the mechanism of repair, although the data with the specific number of cases are lacking [14]. In the modified Altemeier's procedure, there might be some risks of mesenteric vessel ligations and bleeding, as this procedure has to be performed manually. Contrarily, these risks can be controlled by stapler closure of the mesentery in stapler repair with anastomosis. However, cost of stapler repair can be a problem. When balancing costs and risks, the conditions of the patients should be the determining factor [24]. Recurrence occurred in 50% of patients after fascia fixation. This repair might have some limitations in terms of eliminating the mechanism of prolapse, as the ileum in the proximal part of loop ileostomy might be more mobile than expected, and fascia fixation did not have enough strength for steady fixation. The mesh strip and purse string suture techniques make the stoma orifice narrow at different sites [26,35,36]; the mesh strip technique at the skin level and purse string suture technique at the top of stoma showed a recurrence rate of 0% and 56.5% per repair, respectively (Table 4). The mesh strip technique might be advantageous as it eliminates the space between the stoma and the abdominal wall. Incarceration occurred in one patient after the purse string suture technique, although it was released by cutting the encircling suture. Stapler closure seems to be a steady repair for incarcerated loop prolapse in cases that do not require decompression in the distal limb of the stoma [22]. It is unclear why the recurrence rate after conventional local repair is high, and the rates remarkably differ between open laparotomy and lap-enteropexy (Table 4). Operative recurrent prolapse mostly occurred within 12 months (8/10, 80%) in Mittal's report [8]. In our report and other studies, the recurrence mostly occurred within 1 month to 9 months. Therefore, the difference in the recurrence rate between the conventional local repair and stapler repair with anastomosis does not depend on only on the follow-up period.

The limitation of the study is its retrospective and single-centre design as well as its small population size and short follow-up duration. A multi-centre study with more cases in each procedure is required in the future.

## Conclusion

The stoma prolapse with a length of >6 cm to 7 cm, stoma prolapse causing difficulty in stoma care by WOC nurses, and/or stoma prolapse affecting normal bowel functioning could be candidates for repair procedures. Each local procedure was feasible and minimally invasive. Selection of the repair method might depend on the patients' general conditions, expected survival period, and possibility of stoma reversal. Button-pexy fixation can be used for transient stoma. Otherwise, stapler repair with anastomosis or closure can be an option for stoma prolapse repair according to the condition of the prolapsed stoma.

## Declarations

### Ethics approval

The protocol of this study was approved by the institutional review board of Fujita Health University and performed in accordance with the 1964 World Medical Association's Declaration of Helsinki and its later amendments.

### Consent to participate

All patients gave their written informed consent prior to inclusion in the study.

### Consent for publication

All authors gave consent to participate in this study and publish the report.

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