

Laparoscopic Sutureless Rectopexy Using a Fixation Device for Complete Rectal Prolapse

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Background: Complete rectal prolapse (CRP) commonly affects the daily life of older people and has no established operative treatment approach. We describe our simple method of laparoscopic, sutureless rectopexy, involving rectal mobilization (along with its peritoneum bilaterally) and fixation to the sacral promontory using a fixation device. We also present an analysis of short-term outcomes in patients treated using this procedure.

Materials and Methods: We retrospectively evaluated 62 patients with CRP, who underwent a laparoscopic rectopexy via tack fixation, between 2004 and 2017. The peritoneum was widely attached near the site of peritoneal reflection, as in rectal cancer surgery. The hypogastric nerve was carefully detached from the front of the sacrum. Keeping the nerve intact, we lifted and mobilized the dissected rectum cranially towards the promontory, and the rectal peritoneum was affixed to the sacrum by applying 2 to 3 fixed tacks bilaterally, using a fixation device.

Results: The median age of the study group was 80 (10 to 91) years. All procedures were successful without serious intraoperative complications; only 1 patient required conversion to open surgery. Median values for operative duration, intraoperative blood loss, and postoperative period of hospitalization were 177 (125 to 441) minutes, 5 (0 to 275) mL, and 7 (3 to 17) days, respectively. Only 6 (9.7%) patients experienced recurrence during the follow-up period.

Conclusion: Laparoscopic tacking rectopexy performed using a fixation device for repairing CRP is a simple, safe, and sutureless procedure with no severe complications or mortality.

Key Words: rectal prolapse, laparoscopic colorectal surgery, rectopexy

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Complete rectal prolapse (CRP) is the circumferential protrusion of the rectal wall through the anal canal. Affected patients present with symptoms such as perianal discomfort due to the prolapsed rectum, the cumbersomeness of having to push it back after each defecation, rectal bleeding, incontinence, and constipation, which leads to impaired quality of life.^{1,2} The only definitive treatment is surgical repair.² Although numerous procedures have been described for the correction of CRP, including perineal and abdominal operations, there is no consensus on an optimal treatment strategy.^{2,3} In general, abdominal rectopexy has lower recurrence rates than those of perineal surgery and allows for better correction of anal incontinence.^{4–6} Perineal procedures are usually performed in those at a high risk of complications under general anesthesia, for example, elderly patients or those with significant comorbidities. However, transabdominal repair is preferred by most surgeons.^{7,8}

Advanced laparoscopy and modern general anesthesia have allowed for wider application of abdominal rectopexy, even in elderly patients.⁸ Laparoscopic rectopexy has proven to be superior to open procedures in a randomized controlled trial due to several advantages including fewer complications, shorter hospital stay, decreased postoperative pain, and faster recovery.⁹ We have developed and used the laparoscopic tacking rectopexy (LTR) procedure, which is a simple laparoscopic repair technique performed using a fixation device, without application of sutures, for the treatment of CRP. Here, we describe this unique technique and provide detailed information on patients' outcomes following the procedure.

MATERIALS AND METHODS

In this study, retrospectively analyzed the data of the patients who had undergone surgery for CRP at the Yamaguchi University Graduate School of Medicine and the Shunan Memorial Hospital between 2004 and 2017. Data on clinical findings, surgical techniques, and early and late surgical outcomes were retrospectively analyzed. The preoperative defecography, colonoscopy, and anal manometry were not consecutively performed to all patients. Information on immediate operative outcomes were obtained from the clinical and operative records of patients, while the current status of patients was determined through telephone interviews to evaluate recurrence and worsen constipation for long-term outcomes.

The study was approved by the Ethics Committee of Yamaguchi University (Approval No. H2020-051).

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The authors declare no conflicts of interest.

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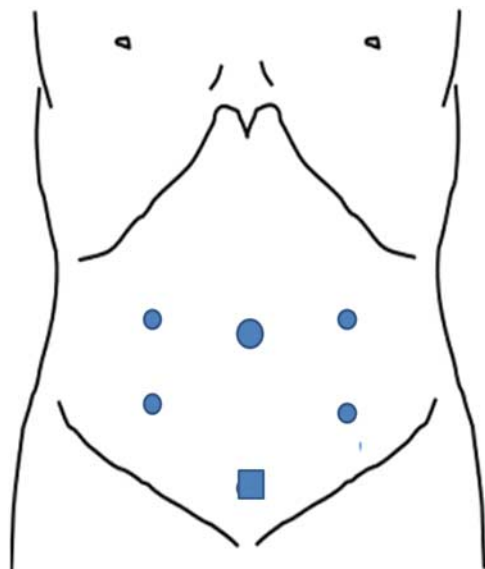


FIGURE 1. Schematic showing the positioning of 5 trocars plus 1 trocar for peritoneal tacking. The square indicates site of the peritoneal tacking port (5 mm). The large circle denotes ports of 12 mm diameter, while the smaller circles indicate points of insertion of 5 mm wide ports.

Surgical Procedure

Both general and epidural anesthesia by sevoflurane and ropivacaine were administered for the procedure. The anal tonus that examines the tension of the tonus of sphincter muscle under general anesthesia was routinely checked before beginning the surgery. The patient was placed in the lithotomy position with Trendelenburg tilting, to achieve small bowel retraction. The operation was performed using 5+1 trocars: a 12 mm trocar at the umbilicus, a 5 mm trocar in the right upper quadrant, an 11 mm trocar in the right iliac fossa, a 5 mm trocar in the left upper quadrant, and a 5 mm trocar inserted in the left iliac fossa. A 5 mm port on the side of the head of the pubis was added to allow fixation of the peritoneal reflection to the sacral promontory (Fig. 1). We initially used a medial approach, followed by a lateral one (similar to that used in rectal cancer surgery), for mobilizing the rectum from its attachment to the sacral promontory. Rectal dissection and mobilization were conducted wholly along the mesorectal fascial plane, and anterior rectal dissection was carefully performed along the inter-recto-vaginal septum down to the pelvic floor level (Fig. 2A) posterior rectal dissection was executed until the levator muscles were exposed without incising the hiatal ligaments, and bilateral rectal dissection was performed along the division of the lateral ligaments of the rectum while taking care to not injure the parasympathetic nerves in this region. We attached a wide band of the peritoneal reflection to the side of the rectum and performed exfoliation. We carefully detached the hypogastric nerve from the front of the sacrum, to avoid injuring the nerve during rectal fixation (Fig. 2B). Keeping the hypogastric nerve intact, we lifted and mobilized the dissected rectum cranially towards the promontory, and the rectal peritoneum was affixed to the sacrum by applying 2 to 3 fixed tacks bilaterally, using a fixation device (Fixation Device AbsorbaTack; Covidien Japan Inc., Japan or Fixation Device ProTack; Covidien Japan Inc.) (Fig. 2C), and the rectal peritoneum was affixed to the sacrum by applying 2 to 3 fixed tacks bilaterally, using a fixation device (Figs. 2D, E). The fixation

was performed on the anterior surface of the first sacrum, and the fixation was ensured by applying the device vertically. Therefore, a port was added to the upper part of the pubis. Fixation was done from the caudal side to avoid tearing of the peritoneum. Compared with suture fixing, there were many fixing points, and it was a big advantage that reliable fixing was possible, regardless of the skill of the operator. Figure 2F depicts the operative field after completion of fixation. An intra-abdominal drain was not placed. Absorb Tucker was used for 38 people who underwent surgery between May 2013 and November 2015.

RESULTS

All 62 study patients are summarized in Table 1. The median age of the group was 80 years. The study group included 45 (73%) elderly patients (75 y and above), and 51 (82.3%) females. Comorbidities were noted in 53 patients (85.5%). The number of patients with an American Society of Anesthesiologists (ASA) score of ≥ 2 was 53 (85.5%). The median disease duration was 18 (range, 1 to 144) months. Totally, 21 (33.9%) patients had recurrent rectal prolapse after undergoing previous repair procedures, that is, transperineal (sclerotherapy: 6, Gant-Miwa \pm Thiersch: 6, Thiersch: 4, Delorme: 4), transabdominal (laparoscopic suture rectopexy: 1), and 1 transsacral resection.

Analysis of the intraoperative and postoperative outcomes of the procedure are summarized in Table 2. All procedures were successful without occurrence of any serious intraoperative complications and with only 1 patient requiring conversion to open surgery. This patient had a prominent “hump-back” (ie, thoracic spine was bent backward), making it difficult to secure the operative field. Median values for operative duration, intraoperative blood loss, and postoperative period of hospitalization were 177 (range, 125 to 441) minutes, 5 (range, 0 to 275) mL, and 7 (range, 3 to 17) days, respectively. There was no mortality. Only 2 patients required reintervention, each for port-site (12 mm) hernia repair and adhesion ileus, respectively. In the latter case, occurrence of adhesion ileus may have possibly been induced by the barbed suture used for mesenteric fixation. The median follow-up period was 30.1 (range, 1 to 127) months. Only 6 (9.7%) patients experienced recurrent rectal prolapse during the follow-up period. The median time to recurrence was 9.7 (range, 6 to 62) months, with 4 of 6 recurrences within 2 years. In 4 cases, the symptoms of rectal prolapse were mild. Hence, only follow-up was performed. Furthermore, 2 cases underwent transperineal procedure. However, in most cases, it was acceptable with bowel control. While complete division of the lateral ligaments of the rectum was associated with a reduced recurrence rate, it correlated with an increased rate of postoperative constipation. There were 36 patients with constipation who were using any laxatives, and totally, 6 patients (9.7%) who had worsening constipation symptoms or needed to increase the dose of laxatives after the procedure.

DISCUSSION

With an increasingly aging population in Japan, the incidence of rectal prolapse in adult patients is on the rise. Surgical repair is the only effective treatment for rectal prolapse. However, there is no established operative method, and several types of repair procedures are suggested in the existing literature.^{2,7,10} Surgical repair of the prolapsed rectum can be performed via various operative

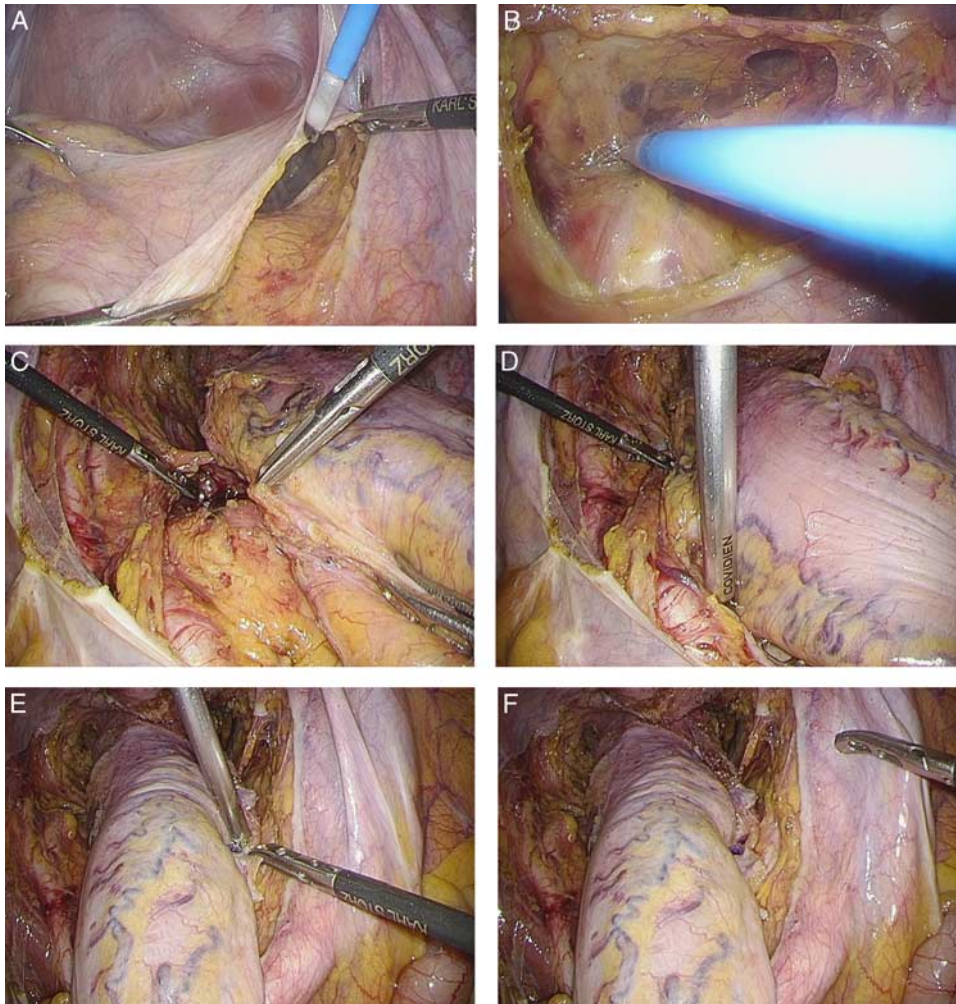


FIGURE 2. A, The peritoneum was widely attached near the site of peritoneal reflection, similar to the procedure used for rectal cancer surgery. B, The hypogastric nerve is detached carefully from the front of the sacrum. C–E, Keeping the nerve intact, the dissected lower rectum is lifted and mobilized cranially towards the promontory, to which the rectal peritoneum is affixed by applying 2 to 3 fixed tacks bilaterally, using a fixation device. F, The operative field after completion of tack fixation.

techniques applied via abdominal or perineal approaches. A representative surgical repair performed via the perineal

approach is the Thiersch procedure (described in 1891),^{10,11} an encirclement procedure in which a prosthesis is inserted around the anus, narrowing the anal opening. While this procedure can be performed under local anesthesia, which is

TABLE 1. Clinical Details of the Patients

	N = 62 [n (%)]
Age [median (range)] (y)	80 (10-91)
Over 75	45 (73)
Males	11 (18)
Females	51 (82)
ASA-PS (1/2/3/NR)	3/40/13/6
Body mass index [median (range)] (kg/m ²)	20.9 (13-29.9)
History of surgery for rectal prolapse	21 (33.9)
Sclerotherapy	6
Gant-Miwa ± (Thiersch)	6
Thiersch	4
Delorme	4
Laparoscopic suture rectopexy	1
Transsacral resection	1

ASA PS indicates American Society of Anesthesiologists physical status; NR, not reported.

TABLE 2. The Short-term and Long-term Outcomes

	N = 62 [Median (Range)]
Conversion to open surgery	1
Operative time	177 (125-487)
Blood loss (mL)	5 (0-275)
Postoperative hospital stay (d)	7 (3-17)
Overall complications [n (%)]	2 (3)
Ileus	1
Port-site hernia	1
Tacker-type [n (%)]	
Absorb	38 (61)
Nonabsorb	24 (39)
Recurrence [n (%)]	6 (9.7)
Follow-up period (mo)	30.1 (1-127)
Worsen constipation [n (%)]	6 (9.7)

an important advantage, it is commonly associated with the occurrence of postoperative wound infection. In patients with serious infections, the prosthesis is required to be removed, which is associated with a high recurrence rate of 30% to 50%.¹¹ Therefore, in most cases, this procedure is performed in combination with other repair techniques implemented via a perineal approach.^{10,11} In the Delorme procedure (introduced in 1900),^{11,12} the rectal mucosa is resected in a columnar shape, followed by plication of the muscular layer. This procedure is relatively safe as intra-abdominal access is not required. However, not fixing the rectum to the sacrum results in a high recurrence rate (4% to 38%) as compared with that observed in repair procedures performed via an abdominal approach, which is a significant disadvantage.^{11,12} In the Altemeier procedure (perineal sigmoid colon-rectal resection, introduced in 1891),^{11,13} the protruding rectum is resected 2 cm above the dentate line, and the mesentery of the sigmoid colon is pulled out to a certain extent, resected, and anastomosed. The main disadvantage is that although rare, pelvic abscess may develop due to suture failure. The recurrence rate with this procedure is reportedly 16% to 30%.¹¹ While performing the Gant-Miwa procedure (1960),^{11,13} a 3-0 absorbable suture is used for plication and ligation of the herniated mucosa. The muscle layer is sutured 20 to 40 times to form a bean-like shape, and the Thiersch procedure is carried out simultaneously. This combination technique became the most popular procedure for correcting rectal prolapse in Japan.^{11,14} The recurrence rate associated with this procedure is reportedly 0% to 30%.^{12,14}

While these operative techniques applied via a transperineal approach are less invasive, they are associated with a higher recurrence rate than those seen with transabdominal procedures.^{7,15} Choice of surgical management should be individualized to balance the risk of the operation and the potential benefit to the patient's quality of life. Therefore, if the patient can tolerate general anesthesia, transabdominal repair procedures should be the operative method of choice for the treatment of rectal prolapse.

Abdominal procedures involve extensive bowel dissection, followed by bowel fixation. Thus, the type of surgical procedure is classified according to the method used, the anatomic location at which the bowel is affixed, and whether resection of the redundant length of sigmoid colon was concurrently performed.¹¹ Abdominal rectopexy and sigmoid colectomy were originally described by Frykman in 1955.¹⁶ The sigmoid-colorectal resection involves removal of the redundant length of the sigmoid colon, which can prevent bowel strangulation and volvulus, as well as correct constipation in some patients. There is a severe risk of anastomotic leakage due to intestinal resection and anastomosis and postoperative mortality may be higher than that associated with other procedures.¹⁷ The recurrence rate seen with the abdominal suture rectopexy is 0% to 12.5%.^{2,18}

In the Ripstein procedure (anterior sling rectopexy, introduced in 1965), the rectum was mobilized and pulled out and sutured to the sacrum, using a 4 to 5 cm wide mesh to affix the rectal wall to the presacral fascia. The recurrence rate for this procedure is reportedly 0% to 13%.^{11,19} Rectal stricture formation is a problematic late complication of this procedure.^{11,20}

Posterior prosthetic rectopexy was described by Wells in 1959.^{11,21} It involves adequate mobilization of the rectum, followed by insertion of a prosthesis into the space between the posterior rectum and the sacrum. The prosthesis is then sutured to both structures. The recurrence rate with this

procedure is 0% to 6%.^{11,22,23} However, postoperative mesh-related complications such as tissue erosion, mesh migration, and infection can occur. In gastrointestinal surgery, there is a known probability of development of postoperative infection.²⁴ In these transabdominal procedures performed using prosthetic materials, occurrence of pelvic sepsis may occur as a consequence of serious postoperative infection, which necessitates removal of the prosthesis.²⁵

Laparoscopic surgery and modern anesthesia techniques have enabled the use of the abdominal approach even in elderly patients.⁸ Laparoscopic surgical techniques have gained popularity, as these are associated with better short-term outcomes than those achieved with open surgery, including less pain, shorter hospital stay, more rapid postoperative recovery, earlier return to work, and superior cosmetic results.²⁶ Currently, laparoscopic surgery has gained wide acceptance throughout the world. Several studies on the safety and feasibility of the laparoscopic transabdominal approach for rectal prolapse have reportedly shown minimal morbidity and low recurrence rates.^{8,27} In our 13-year study period, 62 patients with CRP underwent the LTR procedure. As our LTR procedure does not involve either mesh application or intestinal resection and anastomosis, it is a very useful technique that can be safely performed without a high risk of severe complications or mortality. We encountered a low recurrence rate of 9.7% with this procedure.

The main advantage of our LTR technique is that it is very simple and can be applied commonly. The procedure requires neither mesh fixation nor resection of the sigmoid colon, and it is, therefore, safe with low morbidity and mortality rates. Compared with findings in previous reports, the operative duration was <3 hours which was acceptable.¹⁸ While complete division of the lateral ligaments of the rectum was associated with a reduced recurrence rate, it also caused an increased rate of postoperative constipation. Reportedly, 50% and 15% of patients with and without preoperative constipation, respectively, worsened after suture rectopexy.²³ In most cases, the lateral ligament was divided to enable better mobilization for an adequate anatomic correction of the prolapse for the purpose of reducing the recurrence rate. Six patients (9.7%) experienced constipation after surgery in this study though the symptom was controlled with administration of laxatives, in most patients. We consider that the recurrence rate of LTR performed without laparoscopic suturing and without occurrence of significant complications is comparatively acceptable. The present study had several limitations, including the fact that this was a retrospective small-scale series. However, we propose that our simple LTR can serve as a therapeutic option for the surgical management of patients with CRP. In conclusion, LTR performed using a fixation device for the repair of CRP is a useful procedure that does not require suturing, is simple and safe, and is not associated with severe complications or mortality.

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