Original Research

Usefulness of laparoscopic posterior rectopexy for complete rectal prolapse: A cohort study

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ABSTRACT

Background: Transabdominal rectopexy for complete rectal prolapse reportedly yields more definitive results than transperineal surgery. Recently, minimally invasive laparoscopic rectopexy has become a popular treatment option for patients with rectal prolapse. Herein, we describe our surgical procedure for correction of rectal prolapse. We further aimed to perform a comparative assessment between perioperative outcomes achieved with open and laparoscopic applications of this technique.

Materials and methods: In this cohort study, 65 patients underwent posterior rectopexy (laparoscopic, 50; open, 15) between April 2008 and December 2015. The basic procedure consisted of posterior rectopexy using mesh fixation (modified Wells' method). We assessed and compared perioperative outcomes (duration of surgery and hospitalization, complication rates, blood-loss, degree of fecal incontinence) of laparoscopic and open rectopexy. Furthermore, pre- and post-operative urinary incontinence was measured (using pad test, questionnaire) and compared to determine the effects of the procedure on pelvic organ function. A p-value < 0.05 indicated statistical significance.

Results: The mean operative time of the laparoscopic and open procedures was 127 and 83.6 min, respectively. The amount of blood-loss was negligible and 77 (range, 18–200) g with the laparoscopic and open approaches, respectively. The mean duration of hospitalization was 4.2 and 7.2 days for the former and latter procedures, respectively (p < 0.05). Rectal prolapse and fecal incontinence (evaluated using Wexner's score) diminished in all patients. Urinary incontinence also decreased postoperatively. There were no recurrences of rectal prolapse.

Conclusion: Laparoscopic rectopexy can be safely performed in older patients to achieve early postoperative ambulation and significantly shorten the hospital-stay. It may therefore be considered an effective treatment for complete rectal prolapse and urinary dysfunction.

1. Introduction

Rectal prolapses are rare, occurring in approximately 0.5% of the general population. However, the frequency is higher in females > 50 years of age and in the older population. Risk factors for rectal prolapse include female sex, aging, chronic diarrhea, chronic constipation, multiparity, dementia, and pelvic floor dysfunction [1–3]. Rectal prolapse occurs due to poor rectal muscular fixation. It is important to repair this laxity and restore rectal muscles to their normal state while correcting prolapse [4,5]. Surgery is the definitive treatment modality for rectal prolapse. Transabdominal rectopexy for complete rectal prolapse, reportedly helps achieve better results than transperineal

surgery [6]. Most patients with rectal prolapse are older. While transabdominal surgery under general anesthesia is an ideal option, since it yields better results, minimally invasive laparoscopic rectopexy has recently become a popular treatment for patients with rectal prolapse [7].

Many patients with complete rectal prolapse have concurrent pelvic organ prolapse (POP) coupled with functional impairments, resulting in decreased quality of life (QOL). Considering functional impairments caused by POP, we performed laparoscopic posterior rectopexy in patients with complete rectal prolapse [8,9].

The aim of this study was to report our laparoscopic surgical method for rectal prolapse correction and the outcomes obtained with respect to

restoration of pelvic organ function.

2. Materials and methods

2.1. Indications for transabdominal rectopexy

All new patients presenting with < 5-cm rectal prolapse, were operated using a perineal approach. Recurrence of prolapse was observed in those who had been previously treated using a transperineal approach. Therefore, new patients presenting with ≥ 5-cm prolapse of the rectum and those with recurrent prolapse were operated via the transabdominal route. A transperineal approach under lumbar anesthesia was used in patients unfit for general anesthesia. These patients were excluded from the study. The anal mucosa was inspected with the patient in the sitting position, for diagnosing rectal prolapse. Complete rectal prolapse was associated with concentric folds of prolapsed tissue. If the prolapse was not obvious on clinical examination, patients were encouraged to photograph the prolapsed rectum in-situ at home or undergo an echography to reach a conclusive diagnosis.

2.2. Operative procedures (laparoscopic approach)

We dissected and mobilized the rectal tissue up to the level of levator ani muscle and performed laparoscopic posterior rectopexy using a mesh sheet (so-called modified Wells' rectopexy), elevation of peritoneal reflection, and retroperitoneal repair. The laparoscopic surgical procedure is described in further detail as follows:

1. Patient position

Surgery was performed in the lithotomy position, to confirm condition of the rectal prolapse intraoperatively.

2. Skin incision and trocar positions

Five trocars (5-mm) were used. The first trocar was inserted at the umbilical region. Subsequently, two trocars were inserted through the right and left lower abdominal walls and the left and the right lateral regions.

3. Mesorectum dissection and mobilization

The prolapsed rectal tissue usually involves the deep pouch of Douglas (Fig. 1a). Using an internal approach, the peritoneal membrane was incised from the right side of mesorectum near the peritoneal reflection at the sacral promontory. After confirming the location of the hypogastric nerve on the right side of the rectum, further dissection was performed from the dorsal side in the left caudal direction, through the layer between the pre-hypogastric nerve fascia and the mesorectal fascia. The posterior rectal wall was thus dissected to the maximum possible extent until the levator ani muscle was sufficiently exposed (Fig. 1b). In some cases, this muscle was in an edematous state, due to repeated rectal prolapse. The dissection was similarly performed from the lateral side. While dissecting the lateral rectal wall, we considered it crucial to dissect the lateral ligament and sufficiently elevate the rectum, to achieve complete resolution of the prolapse. As the urinary bladder and the uterus were simultaneously elevated, the anterior rectal wall was not dissected.

3. Rectal fixation

We performed posterior rectal fixation using polytetrafluoroethylene mesh (width, ~5-cm), considering its adaptability. The mesh was placed below the level of bifurcation of the bilateral hypogastric nerves and fixed vertically on the left and right sides using absorbable spiral tackers (Fig. 1c). The mesh was wrapped around ~ two-

thirds of the rectum from the posterior side. Both the mesentery and the mesh were fixed using sutures (Fig. 1d).

4. Retroperitoneal repair

The retroperitoneum was sutured and closed in an elevated position.

4.1. Operative procedures (open approach)

The open approach involved median laparotomy performed through the lower abdomen. The operative technique was the same as that employed for laparoscopic rectopexy.

4.2. Comparing laparoscopic and open approaches

Parameters including operative duration, extent of blood-loss, and length of hospital-stay were compared between patients operated using either approach (laparoscopic/open).

4.3. Evaluation of fecal incontinence and urinary function

The frequency of fecal incontinence was evaluated pre- and postoperatively (1 year) using Wexner's score [10]. In addition, a pad test was administered for the patients who complained of urinary dysfunction. The pad test result was defined as the change in pad-weight over a 24-h period. The individual burden and severity of incontinence were also determined using the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) in patients with urinary dysfunction [11]. These measurements were taken pre- and postoperatively (after 1-month) and compared, to assess the impact of the procedure on patients' QOL.

4.4. Statistical analysis

All statistical analyses were performed using the JMP version 12.0 software (SAS Institute Inc., Cary, NC, USA). The Chi-square and Mann-Whitney U tests were used to compare the level of association between either surgical approach and various perioperative factors. A p-value < 0.05 was considered to indicate statistical significance.

This work has been reported in accordance with the STROCSS criteria [12].

5. Results

5.1. Patients characteristics

We performed rectopexy in 65 patients meeting the inclusion criteria, during the study period between April 2008 and December 2015. Of these, laparoscopic and open procedures were performed in 50 and 15 patients, respectively. The subjects consisted of 59 women and 6 men with a mean age of 77 (range, 27–90) years. All patients were classified as having complete, full-thickness rectal prolapse (Table 1). All patients complained of fecal incontinence. Totally, 10 patients had undergone treatment for rectal prolapse in the past.

5.2. Surgical outcomes

The median operative duration was 83.6 (range, 48–106) and 127 (76–176) min for the laparotomy and the laparoscopy groups, respectively, while the intraoperative blood-loss was 77 (18–200) g and a small volume in the former and latter groups, respectively. However, these differences did not reach statistical significance. The postoperative hospitalization period was 10.2 and 4.2 days in the laparotomy and laparoscopy groups, respectively (P < 0.05, Table 1). Rectal prolapse improved in all patients postoperatively (Fig. 2).
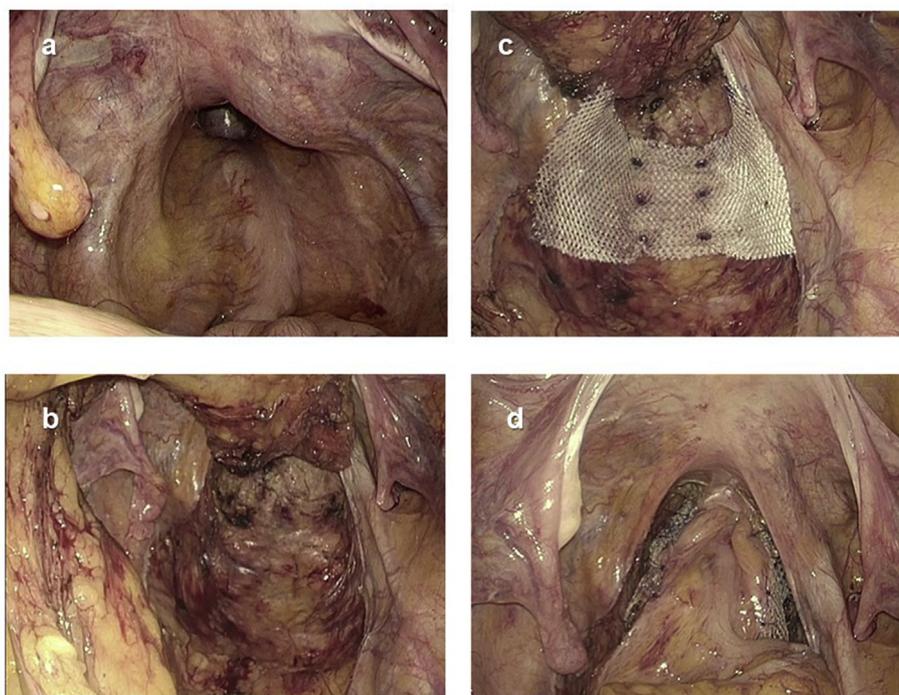
Fig. 1. Rectal prolapse involving the deep pouch of Douglas. (b) Mesorectum dissection and mobilization. (c) Mesh fixed by spiral tackers. (d) Rectal fixation with mesh.

Table 1
Patients characteristics and surgical outcomes.

	Laparoscopy (50)	Open (10)	*P* value
Patients			
Age (years)	75.2 (27–90)	77 (72–86)	N.S.
Gender			
Male	5	2	N.S.
Female	45	8	
Surgical outcomes			
Bleeding (g)	0	77 (0–200)	N.S.
Operating time (min)	127.0 (76–176)	83.6 (48–106)	N.S.
Hospital Stay (days)	4.2 (3–7)	10.2 (8–15)	< 0.05

N.S.: not significant.

5.3. Long-term outcomes

The mean follow-up duration was 55-months. No severe complications (Clavien-Dindo Classification Grade ≥ III) occurred during the follow-up period and no patient experienced recurrence of prolapse. Furthermore, no differences were observed in rate of recurrence between patients operated using laparoscopy and open laparotomy. (Table 2).

5.4. Bowel function measurement

Wexner's scores of both groups of patients indicated postoperative reduction in occurrence of fecal incontinence (Table 2).

5.5. Urinary function measurement

Urinary incontinence was found to improve postoperatively in all 10 patients who were administered the pad test (Fig. 3a). In addition, ICIQ-SF scores of the 20 evaluated patients with the complaint of urinary incontinence were found to be comparable. The mean score decreased from 10.75 to 4.6 (Fig. 3b).

6. Discussion

The anatomical factors contributing towards rectal prolapse include a deep pouch of Douglas, division of the puborectal muscle, an extended sigmoid colon, a widened anal sphincter, failure of fixation of the posterior rectal wall, and disappearance of the distal, horizontal part of the rectum. The key features of transabdominal rectopexy involve dissecting and mobilizing the rectum adequately, followed by its secure fixation [7,13,14]. Although, mobilizing the rectum may reduce recurrence of prolapse, in some cases, dissection of the anterior part of the pouch of Douglas makes simultaneous elevation of the urinary bladder and the uterus difficult. Careful preoperative assessment is needed to establish occurrence of coexisting symptoms of constipation and fecal incontinence. Totally, 20–35% of patients with rectal prolapse present with urinary incontinence, and 15–30% have associated vaginal prolapse [2,9]. Therefore, symptoms of anterior prolapse, such as urinary incontinence, or those associated with vaginal and uterine prolapse, need to be evaluated. While anterior rectal wall dissection in posterior rectopexy has been reported, this technique is not known to produce enough tension to allow synchronous elevation of the anterior organs, when the prolapsed rectum is lifted and fixed intraoperatively. Therefore, we modified conventional posterior rectopexy to overcome this drawback.

When patients experience functional impairments (e.g., urinary) caused by ptosis of pelvic organs and require elevation of all involved organs, not dissecting the anterior peritoneum of the pouch of Douglas may be more useful. Anterior dissection may impair the important hammock function (based on the Integral Theory) of the rectovaginal septum [15]. Therefore, in such patients, it is preferable to perform only posterior fixation after posterior rectal dissection and mobilization. We obtained favorable results by suspending pelvic organs along with the rectum, without performing dissection of the anterior peritoneal membrane. In patients with urinary incontinence, the posterior urethrovesical angle (PUVA) was widened [16]. A simultaneous elevation of the urinary bladder using this procedure may lead to an improved PUVA.

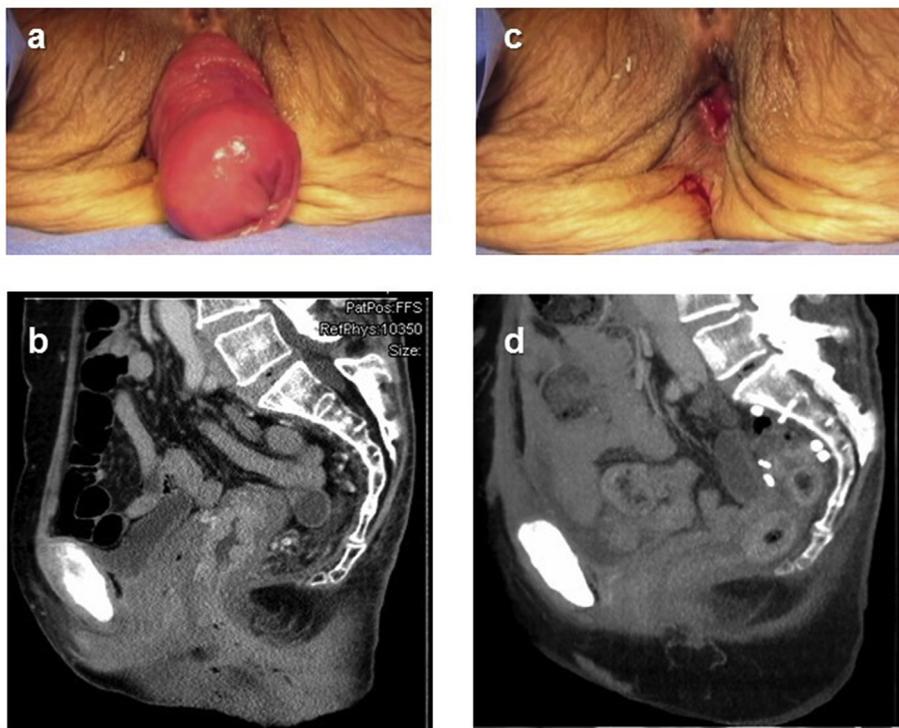Fecal incontinence is associated with rectal prolapse and may be

Fig. 2. Rectal prolapse (a) Preoperative external view (b) Preoperative CT scan (c) Postoperative external view (d) Postoperative CT scan.

Table 2
Long-term outcomes.

	Laparoscopy (50)	Open (15)	P value
Follow-up period (months)	40 (10–60)	42 (24–60)	N.S.
Wexner's score (Mean)			
pre-operative evaluation	16	16.2	N.S.
post-operative evaluation	1	1.2	
Recurrence	0	0	N.S.

N.S.: not significant.

caused by chronic dilation of the anal sphincter following reduction in internal anal sphincter pressures. Since many patients with fecal incontinence secondary to rectal prolapse show an improvement in their symptoms once the prolapse is treated, rectal prolapse correction should the first treatment of choice for this group [17]. In posterior

rectopexy, dissection of the lateral ligament leads to a decrease in intestinal motility and thereby induces a tendency towards developing constipation, which may counteract fecal incontinence in affected patients.

Reportedly, laparoscopic rectopexy shows no significant difference in rates of occurrence of both recurrence and complications, as compared to laparotomy [7, 18]. The laparoscopic method has some disadvantages. It is an expensive technique requiring a specialized facility (limiting the number of training institutions) and a prolonged operative duration. The operative time was slightly longer as compared to that of laparotomy in our study. However, the extent of blood-loss and the rates of complications and recurrence were comparable between the two methods. A laparoscopic approach to the posterior wall of the rectum is easier, and the magnified view allows clear visualization of important nerves and blood vessels, and thus inadvertent vascular and nerve injury can be avoided. Our finds show that laparoscopic posterior
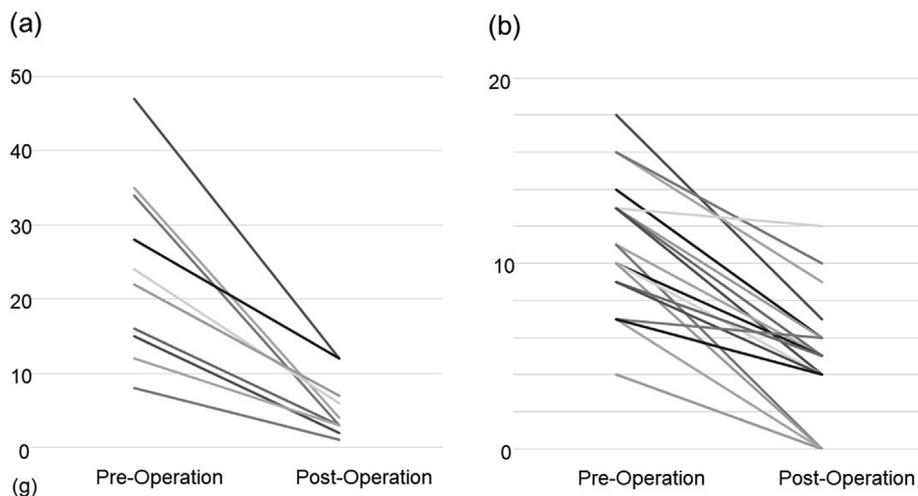

Fig. 3. Urinary function measurement (a) Pre- and post-operative pad test. (b) Comparative analysis of pre- and postoperative ICIQ-SF scores.

rectopexy leads to an early discharge and is more effective than an open surgery. Therefore, laparoscopic posterior rectopexy should be considered a useful surgical modality.

Rectopexy methods include fixation by suturing of the mesorectum, posterior fixation using artificial items (Wells' method), and anterior fixation (Ripstein method). The recurrence rate is approximately 0–13% for any of these methods of fixation [19]. We also perform laparoscopic posterior rectopexy using a convenient proline mesh, which is considered to enable stronger rectal fixation than that achieved with only sutures. Rectopexy simply allows for repair of poor rectal fixation, which does not correct the underlying cause of the prolapse (e.g. weak pelvic floor musculature). Therefore, there is a high likelihood of recurrence when only sutures have been employed to fix the rectal tissue intraoperatively.

Reportedly, anterior fixation tightens the rectum from the anterior side, causing passage disorder or stenosis, which may result in severe constipation, rectal erosion, or perforation [20,21]. Furthermore, additional dissection of the sigmoid colon tended to decrease postoperative constipation [22]. However, none of the patients who underwent sigmoid colon dissection in this study, experienced complications such as postoperative failure of sutures or severe postoperative constipation (requiring revision surgery). As defecation was controlled in all patients with administration of oral laxative agents, we did not consider dissection of the sigmoid colon a mandatory step.

Our findings show that laparoscopic posterior rectopexy can be feasibly performed in older patients. The introduction of the laparoscopic approach allows early postoperative ambulation and significantly reduces the hospitalization period. It also allows for simultaneous elevation of both the urinary bladder and the uterus in some cases and improves urinary functional impairment and thus QOL, suggesting that this procedure is a useful treatment not only for rectal prolapse but also for concurrent POP.

7. Conclusions

In conclusion, laparoscopic posterior rectopexy can be safely performed for complete rectal prolapse in older patients. While laparoscopic rectopexy for rectal prolapse may be used in an increasing number of cases in the future, further studies with a larger number of patients are necessary to validate our findings.

Ethical approval

This study was approved by our institutional review board. (Ref. No. zn190110).

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Author contribution

HH contributed for the study design, data collection, data analysis, and writing.

MS contributed for the study design and data analysis and proofread the manuscript.

YK contributed for the study design and data analysis and proofread the manuscript.

MM contributed for the study design and data analysis and proofread the manuscript.

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Guarantor

HH is the guarantor who accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

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CRediT authorship contribution statement

Hiroki Hashida: Formal analysis. **Masato Sato:** Formal analysis. **Yukiko Kumata:** Formal analysis. **Motoko Mizumoto:** Formal analysis. **Masato Kondo:** Formal analysis. **Hiroyuki Kobayashi:** Formal analysis. **Takehito Yamamoto:** Formal analysis. **Hiroaki Terajima:** Formal analysis. **Satoshi Kaihara:** Formal analysis.

Declaration of competing interest

Authors declare no conflict of interest or financial ties to disclose associated with this study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijsu.2019.10.024.

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