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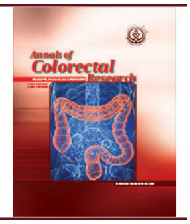

Clinical Outcome After Resection Rectopexy in Patients with Constipation and Rectal Prolapse

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Abstract

Introduction: Laparoscopic resection rectopexy (LRR) is an established procedure for the treatment of rectal prolapse. This study evaluated constipation and gastrointestinal quality of life in patients before and after LRR for rectal prolapse.
Methods: 30 patients (24 females, 6 males) underwent laparoscopic anterior (n=14), posterior (n=8), or suture resection rectopexy (n=8) for rectal prolapse between 2010–2020. Among them, 25 were retrospectively evaluated for constipation and gastrointestinal quality of life using the Cleveland Clinic Constipation Score (CCCS) and Gastrointestinal Quality of Life Index (GIQLI).
Results: The median constipation score fell significantly from 16.0±6.4 to 6.0±4.7 after 68.0±42.8 months (P<0.001). Constipation improved in 20 (80.0%), remained unaltered in 2, and worsened in 3 patients. Prior abdominal surgeries were associated with less constipation improvement (P<0.05). A significant improvement in GIQLI score was observed, with the median total GIQLI score increasing from 95.0±14.8 to 124.0±18.2 (P<0.001). The quality of life improved in 21 patients (84.0%). Positive changes were observed in the GIQLI subscales of gastrointestinal symptoms, emotions, physical status, social dysfunction, and effects of medical treatment (P<0.001). There was no difference in outcome between the three procedures.
Conclusion: Laparoscopic resection rectopexy for rectal prolapse is safe, feasible, and highly effective regarding both perioperative results and long-term functional outcomes. Our results suggest that LRR significantly improves constipation in patients with outlet obstruction and contributes to a higher quality of life.

Keywords: Constipation, Outlet obstruction, Rectal prolapse, Resection rectopexy, Laparoscopy

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Introduction

Rectal prolapse, or procidentia, is defined as intussusception of the rectum and can be categorized as occult (internal), mucosal (partial), or complete (external). While internal rectal prolapse does not extend beyond the anus, external prolapse presents as a protrusion of the entire rectal wall through the anal canal. Occult prolapse is seen by some experts as a precursor of complete prolapse.

Mucosal prolapse refers to the protrusion of only rectal or anal mucosa and should be distinguished from full-thickness prolapse (1). Factors that increase the risk of rectal prolapse are age (over 40 years), female gender, multiparity, vaginal delivery, prior pelvic surgery, chronic constipation, dementia, pelvic floor dysfunction, and anatomic defects (e.g., cystocele, rectocele, enterocele, deep cul-de-sac). This includes the presence of an abnormally deep Douglas pouch, atonic pelvic floor muscles, and weakness of the internal and external sphincter. A condition that is often seen in rectal prolapse is a lack of normal fixation of the rectum, with a mobile mesorectum and lax lateral ligaments. Due to this condition, the small intestine, which normally lies against the anterior rectal wall, can force the rectum through the anal canal. The female gender is more commonly affected, with a peak incidence after the fifth decade. Rectal prolapse results in impaired rectal adaptation to distension and most patients present with abdominal discomfort, incomplete bowel evacuation, anal incontinence, or constipation leading to obstructive defecation syndrome (ODS) (2, 3).

Chronic constipation is a very common and extremely distressing condition for patients, often significantly affecting the quality of life. A 2011 meta-analysis of 261,040 patients found a chronic constipation prevalence of 14.0% in the population (4). In most cases, abnormal morphology of the pelvis, pelvic floor, colon, or rectum underlies ODS. These anatomic changes often occur in combination with one another and subsequently lead to incomplete or prolonged emptying of the rectal ampulla (5). Furthermore, symptoms such as increased effort during defecation, need for digital evacuation, and the frequent need for enemas and suppositories are reported. In addition to a detailed medical history, a careful clinical examination is indispensable for the diagnosis of chronic constipation. Rectal prolapse is diagnosed based on the observation of rectal protrusion or defecography. Depending on the results of the examination, further invasive or imaging procedures may be necessary. For the surgical treatment of rectal prolapse causing ODS, various procedures are available, whereby perianal, transvaginal, and transanal procedures can be distinguished from transabdominal ones (6). The latter can be categorized into procedures with or without resection of the colon, with or without rectopexy, and with or without the use of allogeneic material. In the case of rectopexy, it is also possible to distinguish ventral from dorsal rectopexy. Resection rectopexy combines a sigmoid resection with a rectopexy. There is evidence that laparoscopic resection rectopexy (LRR) is superior to mesh rectopexy in terms of improvements in obstructed defecation symptoms. Hany et al. demonstrated an improvement in constipation in 85.6% of patients after LRR compared to an improvement rate of 71.4% among patients who underwent ventral mesh rectopexy (7). The fixation of the rectum is done either with sutures or using a mesh. Resection induces the development of an area of fibrosis around the anastomosis and the sacrum. This leads to additional rectal fixation to the sacrum and a straighter line for the colon, thereby averting torsion and sigmoidocele. Patients with an elongated sigmoid colon and slow-transit constipation are especially likely to benefit from this procedure (8). Although there are already some studies on the functional outcome after surgery for ODS, their use for clinical practice is limited by a large heterogeneity of the studies (9). Data on LRR for ODS are very limited and the available perioperative data are largely based on small case series. Therefore, this analysis takes the opportunity to evaluate the postoperative outcome after LRR in our patient population. A special focus was set on those patients experiencing constipation as the primary concern.

Patients and Methods

30 consecutive patients with constipation were operated on due to rectal prolapse between January 2010 and December 2020 at the Clinic for General and Visceral Surgery at the Kepler University Hospital in Linz, Austria. Among them, 14 underwent laparoscopic anterior resection rectopexy (LARR), 8 received laparoscopic posterior resection rectopexy (LPRR), and 8 had laparoscopic suture resection rectopexy (LSRR). Overall, 23 of the patients were suffering from external rectal prolapse and seven were suffering from internal rectal prolapse; six patients also reported symptoms of fecal incontinence. Concomitant findings by defecography were rectocele in four patients, enterocele in two patients, and an elongated sigmoid colon in five patients. Additionally, six patients were suffering from diverticular disease. Retrospectively, the clinical and demographic data of the study participants were taken from the hospital information system and all patients were contacted again by telephone. Only 25 of them were reached, and the validated Cleveland Clinic Constipation Score (CCCS) and Gastrointestinal Quality of Life Index (GIQLI) were used to ask them about their preoperative condition and postoperative outcome after resection rectopexy. The GIQLI was divided into five subsections including gastrointestinal symptoms, emotions, physical status, social dysfunction, and effects of medical treatment. Furthermore, patients were asked about prior surgeries in the abdominal and pelvic area and females were questioned about vaginal deliveries. Exclusion criteria for admission to the study were indications for surgery other than constipation and an incomplete follow-up protocol. The study was conducted after approval from the Ethics Committee and Institutional Review Board.

All patients were evaluated preoperatively by a

thorough medical history, physical examination, colonoscopy, and radiological assessment (defecography and CT scan with Gastrografin® preparation and colonic transit time). A detailed assessment was performed of their general condition, comorbidities, and risk factors. Gynecologists, urologists, radiologists, and pelvic floor physical therapists were also included in discussions as needed.

Variables

All variables were analyzed at baseline (preoperative values) and included gender, age, body mass index (BMI), American Society of Anesthesiologists (ASA) class, type of surgery, operative time, complications, and length of stay. Complications were defined as minor in cases where no surgical reintervention was necessary (Clavien Dindo grade 1 or 2) and as major when patients had to undergo surgical reexploration (Clavien Dindo grade 3 or higher). Operation time was defined as the beginning of the skin incision to completion of the surgical dressing. The CCCS and GIQLI were used to evaluate constipation and quality of life, respectively. The responses were scored using a numerical rating scale and were documented before surgery and again at the time of the phone survey. The period for recording perioperative results started at the time of surgery and ended with the discharge of the patient. Candidates were evaluated after a median of 68.0±42.8 months following surgery during a phone interview that included filling out the standardized questionnaires. All data concerning the operations and changes resulting from it were reported. Informed consent was obtained from all of the patients.

Statistical Analysis

Statistical analysis was performed using the open-source R statistical software package, version 3.6.1 (The R Foundation for Statistical Computing, Vienna, Austria). The type I error was not adjusted for multiple testing. Therefore, the results of inferential statistics were only descriptive. An intention to treat approach as well as a per-protocol approach was taken. All data of continuous variables were checked for normal distribution (test of normality: Kolmogorov-Smirnov with Lilliefors significance correction, type I error=10%) and for heteroscedasticity (Levene test, type I error=5%). Comparisons (LARR vs. LPRR vs. LSRR) of variables with normally distributed data without different variances were performed by parametric analysis of variance (ANOVA; due to the results, there was no need for multiple comparisons). For comparisons of all other continuous variables and of variables measured on ordinal scales, non-parametric analysis of variance (Kruskal Wallis test, followed by Nemenyi's multiple comparisons) was used. Data of categorical variables were compared by the exact chi-squared test (with the provision of adjusted residuals). Pre-post comparisons of continuous variables with normally distributed data were performed by the paired t-test; otherwise, and for comparisons of variables measured on ordinal scales, the exact Wilcoxon test was used. Multiple regression analyses (including stepwise approaches) were used to investigate the influence of the following variables on the improvement of the CCCR and GIQLI scores: type of resection rectopexy, age, BMI, follow-up, CCCR, GIQLI, ASA, gender, and pre-operations.

Operation Techniques

In all patients, standardized operation techniques were used and all procedures were performed laparoscopically in the Lloyd-Davies position under general anesthesia by the same surgical team. All patients had preoperative mechanical bowel preparation and oral antibiotics, as well as perioperative parenteral antibiotics. Pneumoperitoneum was created via the umbilical port (11 mm), with peritoneal insufflation with CO2 gas to the pressure of 12 mm Hg. After insertion of the laparoscope (Storz, Germany), three additional ports were placed under direct vision in the right lumbar (11 mm), right iliac (11 mm), and suprapubic (5mm) regions. Following exploration of the abdomen and pelvic area, dissection was started in the promontory area after releasing adhesions to the sigmoid rectum and toward the uterus. The peritoneum was incised, and the superior rectal artery was exposed. The left ureter was visualized, then the mesorectal sheath was opened with electrosurgical scissors; the left and right hypogastric plexuses were visualized and spared. Dissection corresponding to a total mesorectal excision (TME) up to the pelvic floor was performed, whereby heat was not applied to the nerve bundles, and only scissors were used for cutting. The peritoneum was opened at the fold and the rectum was mobilized up to the pelvic floor. Subsequently, a window was created at the upper edge of the superior rectal artery. The mesosigmoid was dissected in the area of the expected resection border up to the colon with the LigaSure Atlas™ (Medtronic, USA) and then the intestine was skeletonized tubularly up to the lower distal resection border in the transition to the upper middle third of the rectum. Finally, the intestine was set down in one stroke by a linear stapler (iDrive®, Medtronic, USA). A Pfannenstiel incision was performed and an Alexis® wound protector/retractor was inserted and the measured colon was resected. The colorectal anastomosis was performed using a circular stapler (Touchstone, 29 mm; Dach Medical Group, Bürmoos, Austria). A pneumatic test was performed to verify the absence of any primary leakage.

For *LARR,* a folded TiO2 Mesh™ (10x15cm, MFP111, AFS medical, Austria) was inserted and placed on the anterior wall of the rectum down to the pelvic floor and was fixed with simple interrupted stitches using 0-Prolene® (Ethicon; Somerville, NJ, USA) at a distance of 2 cm from the anterior

wall. The upper end was pulled in the direction of the promontory and sutured there directly to the promontory with two simple interrupted stitches. This technique was first described by D`Hoore in 2004 in order to allow preservation of the autonomic nerves by mobilizing the rectum in the anterior plane only (10).

LPRR was performed by cutting a TiMESH® in the shape of a cross with the two transverse legs approximately 3 cm long and 2 cm wide. The mesh was held in the correct position on the os sacrum by a ProTack™ Fixation Device. The rectum was fixed with simple interrupted stitches using 0-Prolene® (Ethicon; Somerville, NJ, USA) below the anastomosis on the left and right side of the mesh wings.

For *LSRR,* a continuous suture was made to each side between the peritoneum or lateral os sacrum and the rectum using V-Loc suture without compromising the vascular perfusion, so that the entire intestine was nicely stretched but the anastomosis was naturally free of tension.

Results

Between January 2010 and December 2020, a total of 30 patients with rectal prolapse suffering from outlet obstruction received LRR. After a median of 68.0±42.8 months, all patients were contacted by phone, but five could not be reached. Among the remaining 25 patients, 12 (48.0%) received LARR, 7 (28.0%) underwent LPRR, and 6 (24.0%) had LSRR. The patient demographics and clinical characteristics are shown in Table 1. There was no conversion from laparoscopic to open resection rectopexy. Patients' overall health was graded preoperatively by an anesthesiologist; 11 patients were assigned to ASA class I and II each and 3 patients were assigned to ASA class III. Overall, 19 patients were diagnosed with external and 6 with internal rectal prolapse. Additionally, four patients were suffering from diverticular disease and six also reported symptoms of anal incontinence.

Demographics and Operative Data

Importantly, 7 patients (28.0%) had previously undergone abdominal surgery including appendectomy (n=2), hysterectomy (n=2), colporrhaphy (n=1), and gastric fundoplication (n=1). One patient had previously undergone LRR. Notably, 10 out of 19 women reported a history of vaginal delivery.

A significant reduction of overall CCCS was demonstrated, falling from a median of 16.0±6.4 to 6.0±4.7 (P<0.001) (Figure 1). Constipation improved in 20 patients (80.0%), remained unaltered in 2 patients, and worsened in 3 patients. Regression analysis showed that prior abdominal surgeries were significantly associated with less improvement in constipation (P<0.05). One patient reported the persistence of anal incontinence after surgery. A significant improvement in GIQLI score was observed postoperatively, with the median total GIQLI score increasing from 95.0±14.8 to 124.0±18.2 (P<0.001) (Figure 2). Significant improvements were also

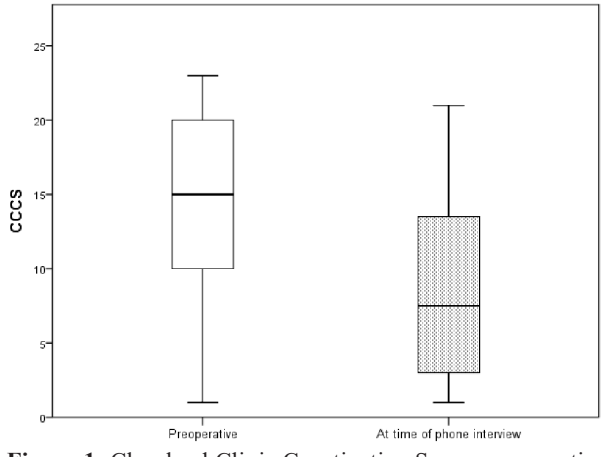

Figure 1: Cleveland Clinic Constipation Score; preoperative and at the time of phone interview

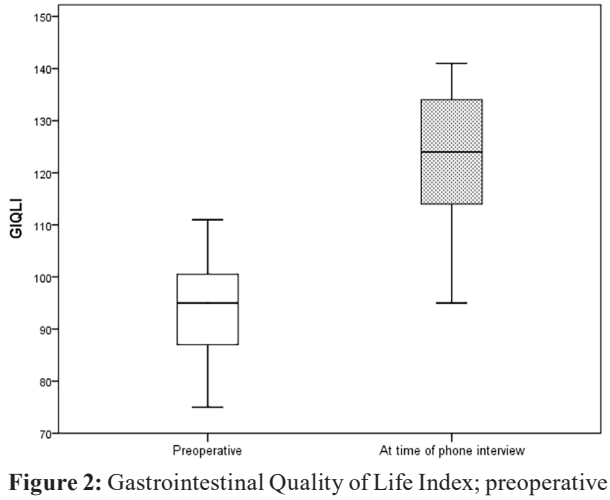

Figure 2: Gastrointestinal Quality of Life Index; preoperative and at the time of phone interview

Table 1: Demographic and clinical characteristics[a]

Characteristics	LARR (n=12)	LPRR (n=7)	LSRPP (n=6)	Total (n=25)
Age (years)	52.5±16.3	43.0±20.6	54.5±15.2	52.0±16.8
Females/males	9/3	6/1	4/2	19/6
BMI (kg/m^2)	20.6±6.1	27.1±4.3	22.0±0.8	21.9±4.8
Previous operation	4/12	1/7	2/6	7/25
Follow-up (months)	18.0±35.7	86.5±39.4	93.3±23.7	68.0±42.8
Operating time (minutes)	138.0±23.3	111.0±26.9	123.5±38.8	130.0±30.96
Complications	0/12	1/7	3/6	4/25
Length of hospital stay (days)	9.5±3.1	10.0±1.8	10.0±9.1	10.0±5.2

BMI: Body mass index; [a] Values are presented as mean±one standard deviation; LARR: Laparoscopic anterior resection rectopexy; LPRR: Laparoscopic posterior resection rectopexy; LSRPP: Laparoscopic suture resection rectopexy

Table 2: CCCS and GIQLI with subsets before surgery and at the time of the phone survey

Characteristics (n=25)	Preoperative (Median±SD)	At time of phone survey (Median±SD)	P value[a]
CCCR	16.0±6.4	6.0±4.7	<0.001**
GIQLI	95.0±14.8	124.0±18.2	<0.001**
Gastrointestinal symptoms	57.0±6.7	69.0±7.8	<0.001**
Emotions	9.0±3.2	15.0±3.9	0.001**
Physical status	17.0±4.0	24.0±4.5	<0.001**
Social dysfunction	10.0±2.6	14.0±2.8	<0.001**
Effects of medical treatment	1.0±0.6	3.0±0.8	<0.001**

CCCS: Cleveland Clinic Constipation Score; GIQLI: Gastrointestinal Quality of Life Index; [a]P-value before surgery versus time of telephone survey. *P<0.05, **P<0.01, [1]Numerical rating scale: the question can be answered with 0 (most favourable) to 4 (least favorable); [2]Numerical rating scale: the question can be answered with 0 (least favourable) to 4 (most favorable)

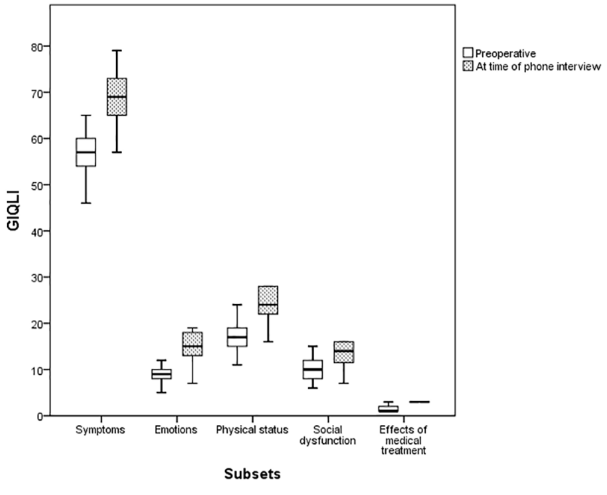

Figure 3: Gastrointestinal Quality of Life Index subsets; preoperative and at time of phone interview. All three figures were created using IBM SPSS Statistics 24.0 (SPSS Inc. Chicago, IL, USA).

observed in all GIQLI subscales (P<0.001) (Table 2) (Figure 3). The quality of life improved in 21 patients (84.0%) and remained unaltered in two patients. Two patients with worsened outcomes reported increased stool consistency and constipation scores.

The overall rate of major complications was 4.0% (n=1). One anastomotic leakage with peritonitis was reported after LSRR, which was treated with a protective loop ileostomy. The overall rate of minor complications was 12.0% (n=3) and included one pelvic abscess after LSRR, which was treated with CT-guided drainage, and one case of anastomotic stenosis after LPRR, which was treated with endoscopic dilation. One patient developed paralytic ileus following pneumonia after LSRR and was transferred to the intensive care unit (ICU). All patients recovered well after the treatment.

Discussion

Rectal prolapse is an extremely distressing and debilitating condition with still very little epidemiologic data available. Older persons and parous women are particularly affected, but the pathogenesis is not sufficiently understood. Therapeutic measures for functional constipation should initially include a high-fiber diet, adequate fluid intake, and increased physical activity. However, it should be noted that there is little evidence that increased fluid intake and physical activity significantly relieve symptoms of chronic constipation. If these measures are not successful, osmotic laxatives can be used. Stimulant laxatives are used as the final drug escalation step (11). The indication for surgical therapy results from subjective suffering and a loss of quality of life. Therefore, patient selection is particularly important to identify those who will benefit most from surgery. Surgical therapy should always be accompanied by stool regulating measures to avoid heavy pressing during defecation. Various surgical procedures for treatment are available and primarily consist of rectopexy with suture or mesh, which may be combined with a sigmoid resection. With the development of new and safer techniques, the majority of the transabdominal approaches are now performed laparoscopically (8). Basically, perineal procedures are thought to be less invasive and complication-prone, but have worse functional outcomes compared with transabdominal procedures (2). In this regard, laparoscopy and its advantages over open surgery are of particular importance. There is evidence that resection-rectopexy is superior to rectopexy without resection in terms of postoperative outcomes, but this is at the expense of a higher complication rate (12). Currently, laparoscopic ventral mesh rectopexy and resection rectopexy are the two most used techniques worldwide (8).

The primary finding of this analysis is the improvement of constipation and gastrointestinal quality of life using the CCCS and GIQLI after LRR in patients with rectal prolapse. Significant improvements were also observed in the GIQLI subscales of gastrointestinal symptoms, emotions, physical status, social dysfunction, and effects of medical treatment. Five patients reported no improvement or worsening in their constipation and four reported no benefit in terms of their quality of life. Improvement of constipation in the literature is reported at 62, 69, and 82% (13). Our data support these results and showed an effectiveness rate of 80.0% after LRR in the improvement of constipation. Mollen et al. demonstrated that rectal mobilization had a statistically significant effect on colonic

function. In their study, total and segmental colonic transit times doubled suggesting reduced mobility of the colon after rectal surgery (14). Interestingly, all four patients with worse GIQLI also showed increased CCCS. Symptoms that improved in these patients were related to the elimination of the prolapse and incontinence. Several single-center studies have been published on the functional outcome after LRR for rectal prolapse, where the numbers of patients recruited range from 10 to 117 (15, 16). In the PROSPER trial, 293 patients were included to compare laparoscopic, open abdominal, and perineal procedures. No significant differences were reported in prolapse recurrence, incontinence, bowel function, and quality of life. However, the quality of life improved clearly across all procedures (17). Conversion rates from laparoscopic to open approach vary from 0% (18) to 7.2% (19). Our results revealed a conversion rate of 0%. Therefore, it can be claimed that conversion in LRR is low when performed at a high-volume center for laparoscopic colorectal surgery. Our overall complication rate of 16.0% (n=4) was similar to previous studies (13). Most complications were reported after LSRR (50%; n=3). However, the validity of this finding is strongly limited by the small number of patients included in this subgroup. Furthermore, there was a significant difference in follow-up, with LSRR having the longest duration and LARR the shortest. This is explained by the fact that we have increasingly preferred LARR due to recent data suggesting more favorable results on the functional outcome after LARR compared to LPRR and LSRR. While observational and retrospective studies show good functional results and a low rate of complications and recurrence, evaluation of long-term outcomes are still scarce. More data that focus on each particular laparoscopic procedure is needed to adequately compare different techniques. Therefore, an individualized approach is recommended for every patient considering age, comorbidities and the underlying morphological and functional disorders.

Conclusion

The present study strongly supports that LRR for rectal prolapse is safe, feasible, and highly effective in terms of both perioperative results and long-term functional outcomes. Our results suggest that LRR significantly improves constipation in patients with outlet obstruction and contributes to a higher quality of life.

Conflicts of interests: None declared.

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