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Laparoscopic resection rectopexy for rectal prolapse: a single-center study during 16 years

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Abstract
Background Many different techniques to treat rectal prolapse have been introduced. Laparoscopic resection rectopexy has been shown to entail benefits regarding both perioperative results and short-term outcome, whereas data for long-term outcome are scarce.
Methods Between 1993 and 2008, all laparoscopic resection rectopexies for rectal prolapse II° or III° were selected from a prospective laparoscopic colorectal surgery database. We analyzed demographic, perioperative, and follow-up results. We defined two periods (1993–2000 and 2001–2008) for comparison of data. Long-term follow-up was obtained by sending questionnaires to all patients. Evaluation included constipation, incontinence, and recurrence of prolapse.
Results Between January 1993 and November 2008, we performed 152 laparoscopic resection rectopexies for rectal prolapse. Median age was 64.1 years (±14.6). Conversion rate was 0.7% (1), mean operation time was 204 (±65.3) min, and was significantly shorter in the second period compared with the first ($P < 0.0001$). Mortality was 0.7% ($n = 1$). Complication rates were 4% ($n = 6$; major) and 19.2% ($n = 29$; minor), respectively. Mean length of hospital stay was 11.3 (±6.4) days and was significantly shorter in the second period compared with the first period ($P < 0.0001$). Mean time of follow-up was 47.7 (±41.6) months. Improvement or complete elimination of constipation was stated by 81.3% (65), and improvement or elimination of incontinence was stated by 67.3% (72). Overall recurrence rate was 11.1% ($n = 10$) with a rate of 5.6% ($n = 5$) for a 5-year period. Of those patients with previous perineal surgery for rectal prolapse, 53.8% (7/13) experienced recurrent prolapse after laparoscopic resection rectopexy in contrast to 3.9% (3/77) of patients without previous perineal prolapse surgery ($P < 0.0001$).
Conclusions Our data support the benefits of laparoscopic resection rectopexy for rectal prolapse regarding both perioperative results and long-term functional outcome. Preceding perineal or open abdominal operations have an impact on recurrence after laparoscopic resection rectopexy.

Keywords Rectal prolapse · Laparoscopy · Resection rectopexy · Follow-up · Recurrence

Rectal prolapse is characterized as a circumferential protrusion of the rectal wall. Different stages can be defined ranging from intussusception to full-thickness prolapse with complete outward prolapse through the anal canal. Women are affected predominantly with an age-dependent increase in incidence. After aged 65 years, the incidence is approximately 10/1000 [1]. Symptoms vary from increased peranal secretion to complete incontinence or chronic outlet obstruction.

Throughout the past century, more than 100 different surgical techniques have been introduced to treat patients with rectal prolapse [2]. In principle, perineal can be distinguished from abdominal approaches. The goal of each individual procedure is replacement of the protruding rectum, which leads to better function. Many studies, both retrospective and prospective, evaluated the outcome after surgery for rectal prolapse [1, 3, 4]. However, the

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heterogeneity of those studies limits the usefulness of even meta-analyses to serve as practice guidance [5]. It has been shown that perineal procedures entail higher rates of recurrent prolapse (0–44%) compared with abdominal approaches (0–12%) [6]. Also, the improvement rate for both incontinence and constipation is higher in patients who received abdominal rather than perineal surgery [6]. The advantages of laparoscopic surgery in general and laparoscopic colorectal surgery in particular have been demonstrated [7].

This study was designed to evaluate both the perioperative results and the long-term functional outcome in patients who received laparoscopic resection rectopexy for rectal prolapse. Special focus was set on those patients who experienced recurrent prolapse.

Materials and methods

Patients and data

Distinct stages of prolapse were defined. A beginning internal prolapse above the anal canal was graded I° (intussusception), an internal prolapse into the anal canal visible only by proctoscopy was graded II°, and a complete full-thickness protrusion of the rectum through the anal canal was graded III°. Data from all patients who received laparoscopic resection rectopexy with rectal prolapse II° or III° at the Department of Surgery, University Hospital Schleswig-Holstein Campus Lübeck, Germany, were extracted from a prospective "laparoscopic colorectal surgery" database. Incontinence and constipation were recorded preoperatively but not scored. Also, body mass index (BMI) and previous operations were documented. The period for recording perioperative results started at the time of surgery and ended with the discharge of the patient. Complications were defined as minor in cases where no surgical reintervention was necessary. Complications were defined as major when patients had to undergo surgical reexploration. Operation time was defined as the beginning of the skin incision to completion of the surgical dressing. We defined two equally long periods for evaluation and comparison of data: January 1993 to December 2000 and January 2001 to November 2008, respectively.

Prospective follow-up for long-term results was performed by sending standardized questionnaires to each patient. Patients older than 85 years were not addressed. Neither were those whose operation was performed less than 6 months ago. Patients who did not return a completed questionnaire were addressed a second time. Evaluation included recurrence of prolapse, improvement of constipation (categories "none," "improved," "same," and "worse") and improvement of incontinence (categories "none," "improved," "same," and "worse"). Recurrence of prolapse was defined as a recurrent full-thickness prolapse (III°) or a recurrent prolapse diagnosed throughout follow-up examinations (II°). We performed telephone interviews with both the patient and their general practitioner in cases where answers on the questionnaire were not entirely clear and in all cases where patients had stated a recurrence of prolapse.

Surgical technique

The patient is put into lithotomy position. To allow maximal tilting of the table, we use both shoulder and left lateral supports. We create the pneumoperitoneum by performing a mini-laparotomy for insertion of the camera trocar 3 cm cranial of the umbilicus. We commence mobilization of the left colon by dissecting the lateral embryonic adhesions toward the splenic flexure. Unless we encounter a dolichocolon in patients with a history of severe constipation, we do not mobilize the splenic flexure. We then fenestrate the mesentery of the sigmoid colon and expose the mesentery by using an angulated retractor, elevating the sigmoid to the ventral abdominal wall. The sigmoid arteries are dissected close to the colon and we take care to preserve the left colic artery, the trunk of the superior mesenteric artery, and the superior rectal artery. After identification of the left ureter behind the fascia of Gerota, we begin to dissect the cranial mesorectum under preservation of the lateral rectal ligaments. Mobilization of the rectum is performed down to the pelvic floor. We routinely perform a transanal washout before we transect the colon using a linear cutter. The incision of the left lower trocar is enlarged according to the diameter of the colon (3–5 cm), and the specimen then extracted. The colorectal anastomosis is performed intracorporeally in a double-stapling technique. A pneumatic test verifies the absence of any primary leakage. The pexy is performed by performing two running sutures fixating the rectum from the left and right lateral walls to the peritoneal edge. One drain is placed in the pelvis.

Statistical analysis

All calculations were performed by using the SPSS 14 (SPSS Inc., Chicago, IL) software. Continuous variables were expressed as mean ± standard deviation. The length of follow-up was expressed as median and range. Statistical analysis was performed using χ^2 test, t test, and Fisher's exact test, respectively. Results were considered significant with $P < 0.05$. A $P < 0.0001$ was not calculated exactly and is noted as $P < 0.0001$.

Results

Perioperative results

Between January 1993 and November 2008, a total of 152 patients with a rectal prolapse II° or III° received laparoscopic resection rectopexy. There were 50.7% (77) patients with prolapse II° and 49.3% (75) patients with prolapse III°. Throughout the same period, we performed 15 perineal and 11 primarily open abdominal procedures for rectal prolapse. For the laparoscopic cohort, the median age was 64.1 (±14.6) years. Patients were female in 94.7% ($n = 144$). With 68.4% ($n = 104$), the majority of patients were diagnosed as having rectal prolapse with an outlet obstruction. Chronic/recurrent diverticulitis was detected in 14.5% ($n = 22$) to accompany the prolapse, and 17.1% ($n = 26$) were diagnosed with rectal prolapse only. Mean overall BMI was 24.1 (±4). Comparison between 1993 to 2000 (74 patients) and 2001 to 2008 (78 patients) did not show a significant difference in BMI with 23.4 (±3.4) for the first and 24.6 (±4.3) for the second interval ($P = 0.152$). Overall, 8.6% (13) had BMI > 30.0. There was no significant difference of patients with BMI > 30 between the first (5.4%; 4) and second (11.5%; 9) interval ($P = 0.460$). Previous pelvic surgery had been performed in 42.1% ($n = 64$).

In one patient we had to convert to open surgery due to a bleed, which in an anatomically difficult situs could not be managed sufficiently laparoscopically. This resulted in a conversion rate of 0.7%. Mean operation time was 204.1 (±65.3) min. Comparison between the two intervals resulted in a significant difference with 232.3 (±65.9) min and 174.3 (±50.8) min, respectively ($P < 0.0001$).

Mortality rate was 0.7% ($n = 1$). This 84-year-old female patient developed a trocar hernia with a consecutive ileus. She underwent surgical reintervention with segment resection of the ileum and closure of a small fascial gap. No anastomotic leakage was observed. Due to aspirations, she developed severe pneumonia, which caused sepsis and eventually multi-organ dysfunction followed by multi-organ failure.

The overall rate of major complications was 4% ($n = 6$) without a significant difference comparing the periods of 1993–2000 (5.4%, $n = 4$) and 2001–2008 (2.6%, $n = 2$; $P = 0.436$). Three of five bleedings, which entailed a reintervention, could be managed laparoscopically. We observed one anastomotic leakage (0.7%).

The overall rate of minor complications was 19.2% ($n = 29$). The comparison between the period of 1993–2000 and 2001–2008 did not reveal a significant difference in the rate of minor complications with 23.3% ($n = 17$) and 15.4% ($n = 12$), respectively ($P = 0.348$). Details for both minor and major complications are listed in Table 1. Mean overall length of hospital stay was 11.3 (±6.4) days. There was a significant difference between the periods of 1993–2000 and 2001–2008 with 13.8 (±7.7) and 8.7 (±3.3) days ($P < 0.0001$).

Follow-up

A total of 150 patients who had received laparoscopic resection rectopexy were discharged from our clinic. At the time of follow-up evaluation, seven patients had died without any cause related to surgery, 29 patients were older than aged 85 years, and in nine patient's surgery had been less than 6 months ago. With 106 patients and 71 returned questionnaires the rate of response was 67%. Mean time of follow-up was 47.7 months (±41.6; range, 6–176 months). In combination with preceding surveys, we were now able to analyze a collective of 90 patients who had completed 139 questionnaires.

Table 1 Perioperative results

No. of patients	Total ($n = 151$) % (n)	1993–2000 ($n = 73$) % (n)	2001–2008 ($n = 78$) % (n)
Minor complications	**19.2 (29)**	**23.3 (17)**	**15.4 (12)**
UTI	5.9 (9)	6.8 (5)	5.1 (4)
BOD	3.3 (5)	4.1 (3)	2.6 (2)
Respiratory	2.0 (3)	1.4 (1)	2.6 (2)
Bleeding	1.3 (2)	1.4 (1)	0 (0)
Stenosis	0.7 (1)	1.4 (1)	0 (0)
Others	7.9 (12)	9.6 (7)	6.4 (5)
Major complications	**4.6 (6)**	**6.8 (4)**	**1.3 (2)**
Bleeding	3.3 (5)	5.4 (3)	1.3 (2)
Anastomotic leakage	0.7 (1)	1.4 (1)	0 (0)
Mortality	**0.7 (1)**	**1.4 (1)**	–
Conversions	**0.7 (1)**	**1.4 (1)**	–

An addition of individual categories of minor complication results in a sum greater than the number of patients because some patients had more than one minor complication

UTI urinary tract infection, *BOD* bladder outlet disorder

Minor complications: $P = 0.348$, Major complications: $P = 0.436$

Table 2 Long-term results for functional outcome

	None % (*n*)	Better % (*n*)	Same % (*n*)	Worse % (*n*)
Constipation	46.3 (30)	35 (23)	12.5 (8)	6.2 (4)
Incontinence	23.4 (17)	43.9 (32)	25.2 (18)	7.5 (5)

Patients who preoperatively had symptoms of constipations and incontinence, respectively, were evaluated for postoperative improvement

Of those patients who had been recorded to have previous constipation, 81.3% ($n = 53$) stated a complete elimination or definite improvement of constipation after surgery (Table 2). Of those patients who had been recorded with previous incontinence, 67.3% ($n = 49$) stated an elimination of incontinence or a definite improvement after surgery. Within a 5-year-period of follow-up, rates for improvement of constipation and incontinence were 89.1 and 76%, respectively.

The overall recurrence rate for rectal prolapse was 11.1% ($n = 10$). Within a 5-year period of follow-up, the rate was 5.6% ($n = 5$). Of 14.4% ($n = 13$) patients who had previous perineal prolapse surgery, 53.8% ($n = 7$) had experienced recurrent prolapse (Table 3). There were 85.6% ($n = 77$) patients who did not have previous surgery for rectal prolapse, of which 3.9% ($n = 3$) patients had recurrent prolapse after laparoscopic resection rectopexy at our department. This difference was statistically significant ($P < 00001$). Excluding patients with previous perineal operations, we recorded an overall recurrence rate of 3.3% ($n = 3$).

Discussion

Various studies have been published regarding laparoscopic resection rectopexy for rectal prolapse [8–16]. Size of collectives from single-center studies ranges from 10 to 117 [9, 10]. Raftopoulos et al. [16] analyzed a cohort of 130 patients pooled from of 15 different centers. The PROSPER trial recruited 293 patients to compare laparoscopic or open abdominal and perineal procedures. It also compares Delorme's vs. Altemeier's operation and suture vs. resection rectopexy (http://www.prosper.bham.ac.uk/index.shtml. Accessed 17 Dec 2009). At the time this article was finished, the results were pending.

Kariv et al. [12] reported 111 patients with attempted laparoscopic surgery for rectal prolapse, among which 32 had a resection rectopexy. Their overall conversion rate was 7.2%, but they did not state the particular conversion rate for resection rectopexy. They had excluded patients from the study with a BMI exceeding 40 and those with previous complex abdominal surgery. For us, neither of the two was a reason for exclusion of patients. Conversion rate was 0% in two studies with 30 and 18 patients, respectively [11, 13]. Ashari et al. [9] reported a conversion rate of

Table 3 Prolapse recurrences and previous procedures

Primary surgery	Age (year), sex	After operations (year after previous surgery for prolapse)
Rehn-Delorme	84, F	1. *lap. resection rectopexy* (1)
		2. dorsal levatorplasty, ventral rectopexy (1)
		3. pre- and post-anal repair (1)
Rehn-Delorme	60, F	1. pre- and post-anal repair (4)
		2. *lap. resection rectopexy* (5)
		3 Rehn-Delorme (4)
Rehn-Delorme	61, F	1. *lap. resection rectopexy* (1)
		2. sacral nerve stimulation (2)
		3. Rehn-Delorme (2)
Altemeier	23, F	1. *lap. resection rectopexy* (1)
		2. lap rectopexy (3)
?	32, F	1. perineal and open abdominal procedure (1)
		2. perineal procedure (4)
		3. open resection pexy (13)
		4. open abdominal procedure (8)
		5. implantation of Thiersch-Device (7)
		6. *lap. resection rectopexy* (1)
Rehn-Delorme	71, F	1. Rehn-Delorme (2)
		2. *lap. resection rectopexy* (1)
		3. lap. Hartmann's procedure (2)

Patients with recurrence of rectal prolapse and procedures performed before laparoscopic (lap.) resection rectopexy at our clinic (in italic)

Number in parentheses indicates the number of years after the preceding surgery

? = Primary surgery unknown. This female patient had undergone more than five perineal and abdominal operations for rectal prolapse before she presented to our department

Age = patient's age at the time of primary surgery for prolapse

F female

0.9% in 117 patients. Our own results reveal a conversion rate of 0.7%, and it can be stated that conversion in laparoscopic resection rectopexy is rare provided that the procedure is performed at a center experienced with this operation. Unless there are definite contraindications for a laparoscopic approach, such as severe medical comorbidities, HIV, or extreme adhesions, we offer laparoscopic resection rectopexy to all patients with a given indication for this procedure. We tend to offer perineal surgery to patients who are older than aged 80 years.

After overcoming the learning curve and as an effect of operation standards, we were able to significantly decrease the operation time from 232.3 to 174.3 min. Similarly, Ashari et al. showed a decrease in time needed for the procedure [9]. The time reported in their study was 180 min in the first and 110 min in the last quartile. Mean operative time in another study was 133 min [11]. Laparoscopic resection rectopexy at our center often is performed by surgeons who have not completed the learning curve for laparoscopic colorectal surgery. Also, we resect a rather long segment of the left hemicolon because we believe that this leads to better functional outcome. This implies a more extensive mobilization as an important time factor. Both facts contribute to the slightly longer operating time compared with other studies.

Although we have been performing laparoscopic resection rectopexy for rectal prolapse for 16 years, our median follow-up is only 47.7 months. This is due to the fact that we were able to constantly increase the annual number of the procedure, which results in more patients with shorter follow-up. Data on long-term outcome are scarce and many authors subsume follow-up results for diverse laparoscopic procedures [12], which makes comparison difficult. Byrne et al. [15] performed telephone interviews with 14 patients with a median follow-up of 65 months. Only a minority of 36% rated themselves better regarding a pre-existing constipation. In contrast, with 82, 62, and 69%, many studies report much higher rates of improvement [9, 11, 13]; our own data support the effectiveness of laparoscopic resection rectopexy to improve constipation. Equally, previous incontinence is effectively improved by the procedure as shown by the data of the current study as well as others [1, 6].

Our recurrence rate was 11.1%, which is higher than that reported in other studies. After a median follow-up of 18 months, Stevenson et al. [13] stated a recurrence rate of 0%, whereas other authors reported recurrence in 2.5% [9] and 4.7% [15]. At 5 years of follow-up, however, recurrence in our data decreases to 5.6%. To our knowledge, no study has analyzed the rate of recurrence of rectal prolapse depending on previous surgical prolapse procedure. Our data show that previous perineal operations for rectal prolapse increase the risk for recurrence after laparoscopic resection rectopexy because the difference in recurrence rate in patients with previous perineal surgery was significantly higher that the rate in patients without previous procedures.

Published rates of recurrence differ by as much as 47% from the recurrence rate estimated by calculation analysis depending on how the data are censored and on event definition [17]. Obviously, diagnosis of a recurrent rectal prolapse II° cannot be stated on the basis of a questionnaire. However, an indication for surgery in a patient with II° prolapse is given with the simultaneous existence of functional compromises. For patients with previous constipation and/or incontinence and a definite improvement of symptoms after surgery, we would expect a recurrence of symptoms accompanying a recurrent rectal prolapse. Patients with recurrent constipation or incontinence were assessed clinically with focus set on recurrent prolapse. Therefore, we believe that our recurrence rate does encompass recurrences for both II° and III°. Still, because of the number of patients lost to follow-up, we have to acknowledge the possibility of a higher recurrence rate.

The current study strongly supports that laparoscopic resection rectopexy is safe, fast, and very effective to improve function. More evaluations of long-term outcome are needed that focus on each particular laparoscopic procedure to adequately compare different techniques. The indication to perform a laparoscopic resection rectopexy in patients with a previous perineal procedure and a recurrent prolapse should be stated critically because these patients seem to have a high risk to develop yet another recurrence.

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References

1. Matzel KE, Heuer S, Zhang W (2008) Rectal prolapse. Abdominal or local approach. Chirurg 79:444–451
2. Schiedeck TH, Schwandner O, Scheele J, Farke S, Bruch HP (2005) Rectal prolapse: which surgical option is appropriate? Langenbecks Arch Surg 390:8–14
3. Steele SR, Goetz LH, Minami S, Madoff RD, Mellgren AF, Parker SC (2006) Management of recurrent rectal prolapse: surgical approach influences outcome. Dis Colon Rectum 49: 440–445
4. Lieberth M, Kondylis LA, Reilly JC, Kondylis PD (2009) The Delorme repair for full-thickness rectal prolapse: a retrospective review. Am J Surg 197:418–423
5. Tou S, Brown SR, Malik AI, Nelson RL (2008) Surgery for complete rectal prolapse in adults. Cochrane Database Syst Rev 4:CD001758

6. Madiba TE, Baig MK, Wexner SD (2005) Surgical management of rectal prolapse. Arch Surg 140:63–73
7. Alves A, Panis Y, Slim K, Heyd B, Kwiatkowski F, Mantion G (2005) French multicentre prospective observational study of laparoscopic versus open colectomy for sigmoid diverticular disease. Br J Surg 92:1520–1525
8. Bruch HP, Herold A, Schiedeck T, Schwandner O (1999) Laparoscopic surgery for rectal prolapse and outlet obstruction. Dis Colon Rectum 41:1189–1194
9. Ashari LH, Lumley JW, Stevenson AR, Stitz RW (2005) Laparoscopically-assisted resection rectopexy for rectal prolapse: ten years' experience. Dis Colon Rectum 48:982–987
10. Xynos E, Chrysos E, Tsiaoussis J, Epanomeritakis E, Vassilakis JS (1999) Resection rectopexy for rectal prolapse. The laparoscopic approach. Surg Endosc 13:862–864
11. Benoist S, Taffinder N, Gould S, Chang A, Darzi A (2001) Functional results two years after laparoscopic rectopexy. Am J Surg 182:168–173
12. Kariv Y, Delaney CP, Casillas S, Hammel J, Nocero J, Bast J, Brady K, Fazio VW, Senagore AJ (2006) Long-term outcome after laparoscopic and open surgery for rectal prolapse: a case-control study. Surg Endosc 20:35–42
13. Stevenson AR, Stitz RW, Lumley JW (1998) Laparoscopic-assisted resection-rectopexy for rectal prolapse: early and medium follow-up. Dis Colon Rectum 41:46–54
14. Madbouly KM, Senagore AJ, Delaney CP, Duepree HJ, Brady KM, Fazio VW (2002) Clinically based management of rectal prolapse. Surg Endosc 17:99–103
15. Byrne CM, Smith SR, Solomon MJ, Young JM, Eyers AA, Young CJ (2008) Long-term functions outcomes after laparoscopic and open rectopexy for the treatment of rectal prolapse. Dis Colon Rectum 51:1597–1604
16. Raftopoulos Y, Senagore AJ, Di Giuro G, Bergamaschi R (2005) Recurrence rates after abdominal surgery for complete rectal prolapse: a multicenter pooled analysis of 643 individual patient data. Dis Colon Rectum 48:1200–1206
17. DiGiuro G, Ignajotvic D, Brogger J, Bergamaschi R (2006) How accurate are published recurrence rated after rectal prolapse surgery? A meta-analysis of individual patient data. Am J Surg 191:773–778