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REVIEW ARTICLE

Surgical Approaches for Rectal Prolapse and their Comparative Study

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ABSTRACT

Rectal prolapse is a distressing condition often affecting elderly patients. Open rectopexy has a proven track record in the treatment of this condition but may be complicated by significant morbidity. The benign nature of the disease and reduced pain and pulmonary complications of the laparoscopic approach makes this an attractive operation in this patient group. Laparoscopic prosthesis fixation rectopexy and lateral ligament suspension with and without colectomy have been described with low recurrence rates, good patient acceptability, symptom improvement, on both radiological and physiological assessments. Currently, the laparoscopic approach with ventral mesh rectopexy or resection rectopexy is the two most commonly used techniques. As high quality evidence is missing, an individualized approach is recommend for every patient considering age, individual health status and the underlying morphological and functional disorders.

Keywords: Laparoscopy, Mesh rectopexy, Rectal prolapse, Resection rectopexy, Suture rectopexy.

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INTRODUCTION

Complete rectal prolapse is defined as protrusion of all layers of the rectum through the anal canal, full thickness rectal prolapse (FRP). A protrusion of mucosa only is called mucosa prolapse (MP).

A common classification divides three grades as follows:

1. *Rectal prolapse I°:* Inner (recto-rectal) intussusception of the rectum proximal of the anal canal;
2. *Rectal prolapse II°:* Inner (recto-anal) intussusception into the anal canal;
3. *Rectal prolapse III°:* Prolapse of the rectum beyond the anus (external prolapse).

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The etiology is unclear. Rectal prolapse is often associated with obesity, pregnancy, chronic constipation and other conditions that lead to increased abdominal pressure.

The most common anatomic varieties in patients with rectal prolapse are redundant sigmoid, diastases of the elevator ani, loss of the vertical position of the rectum and its sacral attachments and a deep cul-de-sac.[1,2] A rectal prolapse I° is seen in 20 to 50% of healthy individuals.[3,4]

OPERATION PROCEDURES

Multiple operations have been described for the rectal prolapse. In the following section, techniques and results of operations as far as they are performed laparoscopically are explained and rated (Table 1).

The aim of the operation generally is to correct the morphologic alteration, and thereby treat the symptoms of the patient, e.g. improve incontinence or constipation and incomplete emptying, depending on what major symptoms the patient is suffering from. This can be achieved by three ways:

1. Fixation of the rectum (rectopexy);
2. Resection or plication of redundant bowel; and
3. Mobilization of the rectum. Most operations combine the two principles of rectal mobilization and rectopexy, some operations add bowel resection.

The approach can be trans anal/perineal or transabdominal. Abdominal operations seem to result in lower recurrence rates but there are no randomized controlled trials substantiating this.[5,6] Perineal procedures avoid laparotomy/laparoscopy, and therefore, may have a lower operative risk and morbidity. They may, therefore, be more suitable for older or high-risk patients with a relevant co-morbidity, although again there are no adequately powered RCTs to back these recommendations up.

Virtually all abdominal procedures that were originally described via laparotomy can also be performed laparoscopically. The laparoscopic surgery of rectal prolapse was first introduced in 1992 and consisted of a sutureless rectopexy with staples without bowel resection. In the meantime, besides the conventional laparoscopic approach, there are new reports of a robotic-assisted approach with the da Vinci system.[7,8] The transabdominal operations differ mainly in the extent of rectal mobilization, the method of rectal fixation and the additional sigmoid resection.

Table 1: Abdominal procedures for rectal prolapse

Type of procedure	*Operation technique*
Suture rectopexy (Sudeck)	Complete rectal mobilization to level of levators
	Suture of rectum to presacral fasica
Anterior sling rectopexy (Ripstein)	Complete rectal mobilization to level of levators circular wrapping of mesh around rectum and attachment to the promontory
Lateral mesh rectopexy (Orr-Loygue)	Anterior + posterior complete rectal mobilization fixation by two lateral mesh strips to promontory
Ventral mesh rectopexy (D'Hoore)	Strictly anterior rectal dissection to level of levators
	Fixation of mesh strip on distal rectum and to promontory
Posterior mesh rectopexy (Wells)	Complete rectal mobilization to level of levators
	Semicircular mesh around rectum posterior, fixation to promontory
Resection rectopexy (Frykman-Goldberg)	Complete rectal mobilization to level of levators sigmoid resection and suture fixation of rectum to promontory
Rectal mobilization without rectopexy	Complete rectal mobilization to level of levators no fixation

RECTOPEXY

The fixation of the rectum to the sacrum is supposed to restore the physiological position of the rectum, and thereby also correct the descensus of the pelvic floor either by simple stitching, stapling or by meshes.

SUTURE RECTOPEXY (SUDECK) (1922)

The operation includes a complete mobilization of the rectum down to the level of the levators. The rectum is then attached to the promontory by suture or staples. The dorsal mobilization induces fibrosis which helps to fixate and hold the rectum in place.[9]

RECTOPEXY WITH MESH OR GRAFT

A mesh or graft is used to achieve a broader fixation and induce more fibrosis. Used materials include fascia lata, synthetic meshes and bio-meshes.[10] The mesh can be placed anteriorly, posteriorly, laterally or around the rectum.

ANTERIOR MESH RECTOPEXY (RIPSTEIN SLING RECTOPEXY) (1952)

After complete mobilization of the rectum a graft constructed out of the fascia lata was wrapped around the rectum and sutured to the promontory. Later instead of a fascia lata graft, synthetic meshes are used.

There is only one case report on this procedure using a laparoscopic approach which found a good clinical outcome (no morbidity, no recurrence).[11]

LATERAL MESH RECTOPEXY (ORR-LOYGUE)

In this procedure, the rectum is completely mobilized anteriorly and posteriorly. Two mesh strips are sutured laterally to the rectum on both sides. The mesh strips are then sutured under tension to the promontory.[12]

POSTERIOR MESH RECTOPEXY (WELLS)

After a complete mobilization of the rectum a mesh is placed around the posterior circumference of the rectum (2/3), and then fixed to the promontory. The ventral third of the rectal circumference is spared to avoid fibrosis and stenosis by shrinking of the mesh.

VENTRAL MESH RECTOPEXY (D'HOORE) (2004)

It's a novel, autonomic nerve-sparing rectopexy technique. The dissection in this operation is strictly ventral in the rectovaginal space down to the pelvic floor without lateral or dorsal mobilization. The rectum is attached to the sacrum by a mesh which is sutured to the anterior side of the rectum. The ventral dissection and position of the mesh has several advantages:

- A supra-anal rectocele can be corrected
- The rectovaginal septum is reinforced which prevents an anterior recto-rectal intussusception which may be one of the relevant mechanisms to a full rectal prolapse
- A colpopexy is performed. The avoidance of any lateral or posterior mobilization preserves the autonomic nerves.[13]

Although laparoscopic ventral rectopexy (LVR) is a comparably new method it was rapidly adopted and up to now, more than 30 retro- and prospective series have reported outcome and postoperative function. Two systematic reviews have summarized the data.

Indications for the procedures were intussusception as well as overt rectal prolapse, rectocele, obstructive defecation syndrome (ODS) and vaginal vault prolapse.

RESECTION RECTOPEXY (FRYKMAN-GOLDBERG)

A sigmoid resection is combined with a rectopexy, mostly a sutured rectopexy. The resection results in the following morphologic changes:

- An area of fibrosis develops around the anastomosis and the sacrum which leads to a rectal fixation to the sacrum
- The colon lies in a straighter course which avoids torsion and sigmoidocele.[14]

Especially in patients with an elongated sigmoid and slow-transit constipation it is postulated that constipation improves through the resection of redundant colon (Table 2).

ROLE OF ABDOMINAL PROCEDURES AND LAPAROSCOPY

A recent survey asked 391 surgeons over 50 countries for their preferred method for the treatment of rectal prolapse. It revealed that 60% of surgeons would treat healthy patients with an external prolapse with a laparoscopic abdominal procedure, 20% would chose an abdominal method via laparotomy and only 20% favored a perineal approach. For internal prolapse still 40% of the surgeons preferred laparoscopy. While in Europe LVR is the most popular treatment for external prolapse, surgeons in North America favor laparoscopic resection rectopexy (LRR).[15]

An expert consensus paper published in 2013 explicitly recommends a laparoscopic or robotic approach for ventral rectopexy.[16]

But, the learning curve for laparoscopic colorectal surgery has been found to be around 150 to 200 cases for achieving a constant level of proficiency.[17,18] This also seems to apply to laparoscopic rectopexy.

COMPARISON OF LAPAROSCOPIC AND OPEN PROCEDURES

Evidence from randomized studies that compared laparoscopic with open rectopexy is rare. A Cochrane systematic review from 2008 found that the laparoscopic approach resulted in fewer postoperative complications and a shorter hospital stay compared to the open approach. But, these findings are based on only two randomized studies comprising altogether 60 patients. Both studies used a ventral mesh fixation without resection (Table 3).[19-21]

DISCUSSION

Postoperative major complications were only cardiorespiratory and occurred only in the group with an open operation. A faster recovery (return to solid diet) and a reduced requirement for morphine were found for the laparoscopic group, which altogether resulted in a shorter hospital stay. But, no difference was found for functional parameters (incontinence, constipation, rectal capacity, anal squeeze pressure) and recurrence rates.

Table 2: Outcome of laparoscopic procedures for pelvic floor disorders

	Minor compl. (%)	*Major compl. (%)*	*Mortality (%)*	*Conversion (%)*	*Incontinence (%)*	*Constipation (%)*	*Recurrence (%)*
LSR	0–16	2–11	0	0–5	48–82 (+)	11(–)–70% (+)	2–20
LMR	0–5	0–3	0	0–5	76–92 (+)	38(–)–36% (+)	1.3–6
LVR	0–36	0–5	0–0.4	0–7.4	70–90 (+)	60–80% (+)	0–14
LRR	11–21	0–4	0–0.8	0–6	62–94 (+)	53–80% (+)	0–11

Table 3: Comparative rectopexy studies (open *vs* laparoscopic, different procedures)

Study	*Procedure*	*Patients*	*Results*
Sajid (2009)	LR	330	No difference in Mort, Morb, Inc, Cons, recurrence shorter hospital stay for LR
Meta-analysis (12 studies) different procedures	OR	358	Shorter operation times for OR
Caddedu (2012)	LR	192	No difference in Mort, Morb, Inc, Cons, recurrence
Meta-analysis (8 studies) different procedures	OR	275	
Senapeti (2013)	SR	38	No difference in morbidity, recurrence and functional outcome
Randomized	RR	40	
Forminje (2014)	LVR	40	More minor complications in LRR
Retrospective	LRR	28	No difference in major complications, recurrence and functional outcome
Sahoo (2014)	LPR	38	No differences in morbidity, recurrence and functional outcome
Retrospective	LSR	32	
Lechaux (2004)	LRR	13	Significant more patients with worsening of constipation in the LMR-group (26 *vs* 8%)
Prospective	LMR	35	No differences in morbidity and improvement of continence
Madbouly (2002)	LRR	12	No difference in complications and functional outcome
Prospective	LPR	12	

Data from studies that compare open *vs* laparoscopic rectopexies or studies that compare different procedures, Mort: Mortality; Morb: Morbidity; Incontinence: Fecal incontinence; Cons: Constipation; LR: Laparoscopic rectopexy; OR: Open rectopexy; SR: Suture rectopexy; RR: Resection rectopexy; LPR: Laparoscopic posterior mesh rectopexy; HS: Hospital stay; OT: Operation time

Two case controlled studies compared open and laparoscopic surgery for rectal prolapse. Kairaluoma et al[22] used different procedures in 106 patients (LRR, suture rectopexy, Wells rectopexy). A longer operation time (170 *vs* 100.5 min) but a shorter hospital stay (5 *vs* 7 days) was found for laparoscopy. Functional outcome, recurrence rates and complications did not differ between case- and control-group. Kariv et al[23] found similar results. In this study, also different techniques were applied. One third of patients in each group had resection rectopexy respectively suture rectopexy respectively mesh rectopexy (predominantly Ripstein anterior rectopexy for open surgery, Well's procedure in laparoscopic surgery). Incontinence and constipation improved in all patients, with a significant higher improvement in the laparoscopic group (74 *vs* 54%). A likely explanation for this finding was the much more frequent use of the Ripstein procedure in the open surgery group where the circular anterior mesh placement can result in a stenosis which obviously in turn contributes to the occurrence of constipation.[24] For this reason, a circular mesh placement is now considered obsolete by most authors.

de Hoog et al[25] compared open rectal prolapse surgery to a conventional laparoscopic and a robot-assisted approach in a prospective non-randomized setting. Half of the patients were operated with the Well's procedure, the other half with a ventral rectopexy. While the functional outcome (incontinence, constipation) improved significantly in all three groups, the recurrence rates during a 2-year follow-up were significantly increased in the robot-assisted (20%) and the conventional laparoscopic group (27%) *vs* 2% in the open group.

In a recent meta-analysis, 12 comparative studies comprising 688 patients (330 with laparoscopic rectopexy) were analyzed.[26] A drawback of this meta-analysis was that only one study was randomized and that several different procedures (resection, non-resection) were used even within studies. Nevertheless a significant shorter hospital stay was found for the laparoscopic group, while no differences between the open and laparoscopic approach were found for complication rates, postoperative functional outcome, recurrence rates and mortality. A meta-analysis from 2012 showed the same results.[27]

LAPAROSCOPIC RECTOPEXY IN ELDERLY PATIENTS

It is thought that the group of elderly patients especially profits from laparoscopic surgery. A recent systematic review showed significant advantages in short-term outcome in laparoscopic colorectal surgery for elderly people.[28] As the incidence of rectal prolapse and pelvic floor disorders increases with age it is important to know if laparoscopic procedures are safe for this group of patients and if they offer a good alternative to perineal procedures.

For ventral rectopexy, a recent French study evaluated 4303 patients from a national database. Patients aged more than 70 years were compared to patients younger than 70 years. Elderly patients had more minor complications (urinary, wound complications) and a longer hospital stay, but major complication rate and mortality were not different.[29] Another study used a modified laparoscopic Orr-Loygue technique in 46 elderly patients (median age 83 years) with rectal prolapse. A significant cardiac morbidity was observed. Two patients died of cardiac arrest. Two patients were re-operated for recurrent prolapse after 2 months. The reasons for the recurrences were mesh dislocations. Faecal incontinence improved significantly (Wexner-Score decreased from 19 to 5 points after 1 year). Constipation did not improve. Most patients were satisfied with the operation, but there was no association seen between satisfaction and functional result.[30]

A German study from 2012 studied the outcome of LRR in elderly patients (>75 years). The complication rate was slightly increased compared to the younger population. Incontinence and constipation improved in half of the patients irrespectively of age.[31]

Dyrberg used a laparoscopic dorsal mesh rectopexy in 81 older patients with FRP.[32] A remarkable major complication rate of 14.8% was reported. Port site hernias with consecutive ileus and postoperative hemorrhage each occurred in 5% of patients. The 13.5% of recurrences were observed at a median follow-up of 2 years.

TYPICAL COMPLICATIONS AND THEIR MANAGEMENT

A study in a tertiary referral center analyzed the typical complications after mesh rectopexy: Mesh fistulation or erosion of the rectum, vagina or the bladder, rectovaginal fistula, early symptomatic recurrence, rectal stricture and chronic pelvic pain were observed. In this study, all complications could be managed laparoscopically.[33]

The reasons for early recurrence were in all 27 cases, an inadequate technique during the prior operation (only limited or no ventral dissection, no sutures in the rectovaginal space, detachment or incorrect position of the staples, wrong placement of the mesh to the lateral instead the anterior rectal wall with development of an enterocele). These cases were treated by placement of a new mesh and fixation with staples and sutures. Rectovaginal fistulas were treated with removal of the mesh and abdominal or transvaginal fistula repair. Rectal injuries and strictures were operated by anterior resection and a placement of a bio-mesh. In all patients with rectal

strictures the mesh had been stapled to the mid-sacrum rather than to the promontory. Erosions of the vagina or the bladder were managed by mesh removal, defect repair and insertion of a bio-mesh. All women with this complication were postmenopausal and had previous hysterectomy. In patients that complained about chronic pain unresponsive to pain medication, the mesh showed an excessive inflammation. A replacement of the mesh by a teflon-coated mesh improved symptoms. After revisional surgery, quality of life and bowel function improved significantly.

Two case reports describe a mesh fistulation in the rectum.[34,35] Typical symptoms were recurrent fever, pelvic pain and rectal bleeding. Diagnosis was made by flexible sigmoidoscopy. In one case, therapy was anterior rectum resection, in the other case, the mesh was extracted laparoscopically and a loop-ileostomy was performed.

Tranchart et al[36] observed six rectal mesh migrations after 312 laparoscopic ventral mesh rectopexies (1.9%). The median time interval between surgery and onset of symptoms was 53 months (4–124 months). The treatment was transanal partial mesh resection, in one case where a recto-cutaneous fistula was present, a deviating colostomy was added. A recurrent mesh migration was again treated with partial mesh resection. After a median follow-up of 40 months all patients were free of complaints and showed no recurrent mesh, migration.

As a rare but serious complication lumbosacral discitis at the site of rectal fixation was observed after ventral rectopexy and resection rectopexy. Only four cases are reported in literature. Patients presented typically 1 to 3 months after the initial operation with severe lower back pain, fever and malaise. An magnetic resonance imaging (MRI) revealed the diagnosis. A contrast enema was helpful to rule out a rectal fistula. Broad spectrum iv-antibiotics covering colonic flora are the treatment of first choice. In some cases, antibiotic treatment was not sufficient, and removal of mesh or suture material was necessary, in one case with a deviating colostomy.[37,38] A gynecological review found 26 cases of discitis after sacrocolpopexy or rectopexy in a 50-year period.[39] Although this complication is rare it should always be considered in patients complaining of persisting back pain after any type of rectopexy.

FINANCIAL CONSIDERATIONS

An Australian study from 2004 conducted a cost-effectiveness analysis for posterior mesh rectopexy in a randomized setting. When costs for theater time, staff, laparoscopic equipment and hospital stay were included, the laparoscopic operation was less costly than the open operation. The shorter hospital stay in the laparoscopic group accounted for this saving.[40]

CONCLUSION

The evaluation of the different operation techniques is difficult, as the quality of available studies is low and outcome parameters are not defined consistently.

The laparoscopic approach for rectal prolapse is equivalent to the open approach in terms of functional and clinical outcome. The recurrences rates do not seem to differ, although single studies suggest higher recurrence rates after laparoscopic surgery. Advantages are a shorter hospital stay. It has to be remarked that the evidence is based on only two randomized and a few prospective and comparative case-controlled studies with significant heterogeneity in patient characteristics and in applied surgical procedures, making a relevant selection bias very probably.

Regarding complications and conversion rates all laparoscopic procedures provide similar good results with each having their typical complications (anastomotic leakage, mesh complications). Recurrence rates for all methods are below 10% within a follow-up of up to 5 years but studies that extended follow-up to 10 years found recurrence rates of up to 20%.

Laparoscopic resection rectopexy and LVR improve both constipation and faecal incontinence in a similar degree, but randomized studies are missing. Laparoscopic suture rectopexy (LSR) and Laparoscopic posterior rectopexy (LPR) have about the same effect on incontinence, but they tend to have a lesser effect on constipation, in some studies these operations even worsened constipation in a relevant number of patients.

As high quality evidence is missing, an individualized approach is recommend for every patient considering age, individual health status and the underlying morphological and functional disorders. Moreover, as most operations actually show acceptable results, the choice of procedure also depends on the experience and learning curve of the surgeon.

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