Laparoscopic Ventral Rectocolpopexy for Rectal Prolapse Syndromes: Restoration of Anatomy and Improvement of Function

21

Bart Van Geluwe, Albert Wolthuis, and Andre D'Hoore

21.1 Introduction

Treatment of rectal prolapse syndromes, including external rectal prolapse, internal intussusception (or internal rectal prolapse), and rectocele remains one of the most difficult clinical problems in colorectal surgery [1, 2]. These conditions can lead to different anorectal disorders varying from obstructive defecation to fecal incontinence due to chronic sphincter damage [2, 3].

Several surgical procedures have been developed in an attempt to repair these conditions that are distressing for the patient [4]. No standard method has been accepted by the surgical community to date, although abdominal rectopexy is considered to be superior to perineal or transanal approaches because of lower recurrence rates and better functional outcome [5, 6]. Unfortunately, the induction or worsening of postoperative constipation has been observed as the most common side-effect of rectopexy. An inherent step in classic rectopexy is the full mobilization of the rectum. Autonomic nerve injury during extensive posterolateral rectosigmoid mobilization may lead to postoperative dysmotility and impaired evacuation [7]. In contrast, transanal partial rectum resection or plication may induce or worsen incontinence [6, 8]. Laparoscopic ventral recto(colpo)pexy (LVR) using a polypropylene mesh has been introduced with the aim of combining a good functional outcome of the abdominal procedure while avoiding both postoperative constipation and incontinence [9–12]. The aim of this chapter is to present the technical aspects involved in LVR, accompanied by a brief overview of the functional outcome and discussion relating to the merits and indications of this procedure.

B. Van Geluwe (✉)
Department of Abdominal Surgery,
University Hospitals Gasthuisberg, Leuven, Belgium
e-mail: bartvangeluwe@hotmail.com

A. L. Gaspari, P. Sileri (Eds), *Pelvic Floor Disorders: Surgical Approach*,
Updates in Surgery
DOI: 10.1007/978-88-470-5441-7_21, © Springer-Verlag Italia 2014

21.2 Surgical Technique of LVR

21.2.1 Patient Preparation and Installation

All patients receive limited bowel preparation (fleet enema) and a single dose of a broad-spectrum antibiotic. Thrombosis prophylaxis using low-molecular-weight heparin is continued during the hospital stay. Patients are placed on a mouldable "bean bag", allowing them to be in a safe steep Trendelenburg position during the laparoscopic procedure. The patient is positioned in a modified lithotomy position with both arms along the body, and catheterized. After installation of a pneumoperitoneum, a 5 mm port is placed under the umbilicus, and the camera is inserted. It is helpful to have an angled 30° scope, especially for the deepest dissection. Three additional ports are inserted: into the right iliac fossa (12 mm), the right lateral abdominal wall (5 mm), and the left lower quadrant (5 mm). Both the surgeon and the assistant surgeon (camera operator) are standing on the right side of the patient. With the patient in a steep Trendelenburg position, all the small bowel is retracted out of the pelvis. A temporary hysteropexy using transparietal sutures through the round ligaments enhances the pelvic view. Dissection is performed using either ultrasonic shears or monopolar coagulation.

21.2.2 Peritoneal Incision and Sacral Promontory Dissection

The assistant surgeon retracts the mesosigmoid to the left. The right ureter is visualized as it crosses the right iliac artery. A peritoneal incision is made over the right side of the sacral promontory to expose the vertebral ligament, which should be sufficiently dissected to allow safe mesh fixation at the end of the procedure. A dissection that is too medial must be avoided to safeguard the left iliac vein. Special care is taken not to damage the right hypogastric nerve and the median sacral vessels at the pelvic inlet.

The peritoneal incision is then extended caudally in an inverted J-form from the sacral promontory along the line of the right uterosacral ligament to the deepest part of the pouch of Douglas.

21.2.3 Opening the Rectovaginal Septum

Denonvilliers' fascia is incised, and the rectovaginal septum is opened widely after firm retraction of the deepest part of the pouch of Douglas. Dissection is performed on the anterior aspect of the rectum, leaving all fibrous tissue against the posterior vaginal wall, and it is continued as deep down as possible to the perineal body (transverse white fibers). Lateral and posterior dissection is avoided. Thus, rectal mobilization or transsection of the so-called lateral ligaments is not performed. At this stage, the surgeon can decide to resect the redundant

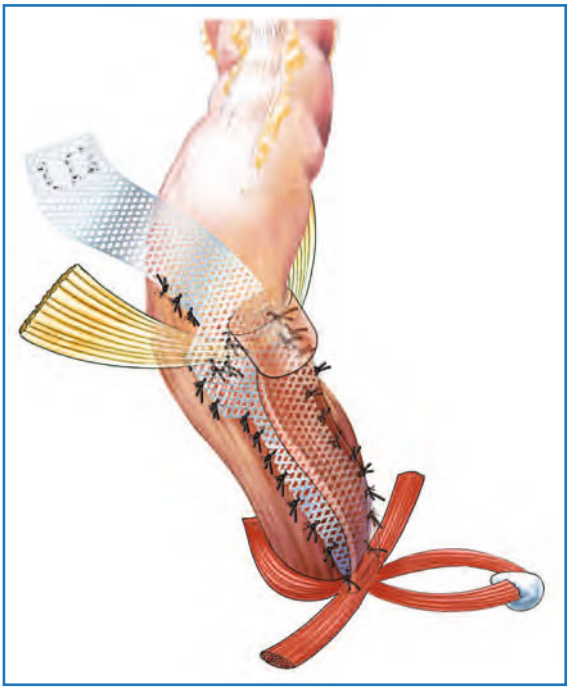

Fig. 21.1 The ventral position of the mesh allows correction of rectorectal intussusception, reinforcement of the rectovaginal septum and performance of a colpopexy. Closure of the peritoneum above the mesh elevates the pouch of Douglas

pouch of Douglas (Douglasectomy) to ensure that the mesh is sutured to the seromuscular layer of the ventral rectum. However, care should be taken not to enter the rectum inadvertently, and hemostasis should be meticulous. In the rare event of perforating the vagina, provided it is small and there is no contamination, this is repaired with an absorbable suture and the procedure is continued. If the rectum is perforated, the procedure should not be continued.

21.2.4 Mesh Fixation (Rectum–Promontory)

A Marlex mesh (Bard, Crawley, UK) trimmed to approximately 3 × 17 cm is used in all patients. The mesh can be left wider at the site where you expect the site of the colpopexy, to allow adequate vault suspension (Fig. 21.1). The mesh is sutured to the ventral aspect of the distal rectum using nonabsorbable sutures (EthibondExcel 0; Ethicon, Johnson & Johnson, Brussels, Belgium). The sutures are passed through the right lower quadrant (12 mm) port. Extracorporeal suturing seems the most appropriate in the deepest part (at the level of the perineal body). Further sutures fix the mesh to the lateral seromuscular border of the rectum, proximal and distal to the incised pouch of Douglas (Fig. 21.2). Those sutures will prevent a higher rectal intussusception. The position of the mesh allows reinforcement of the rectovaginal septum. Care should be taken to ensure

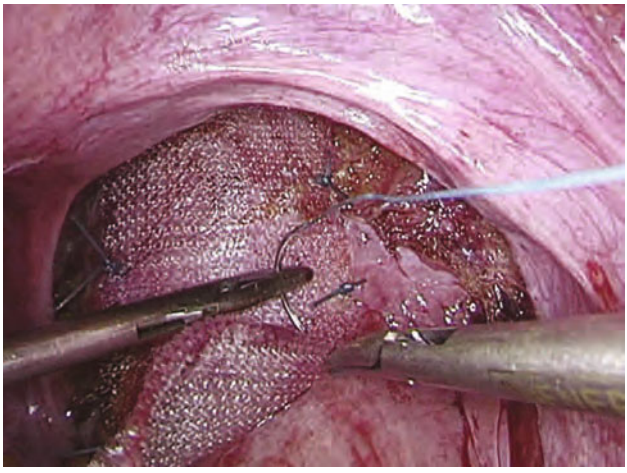

Fig. 21.2 The strip of polypropylene is sutured to the anterior aspect of the rectum

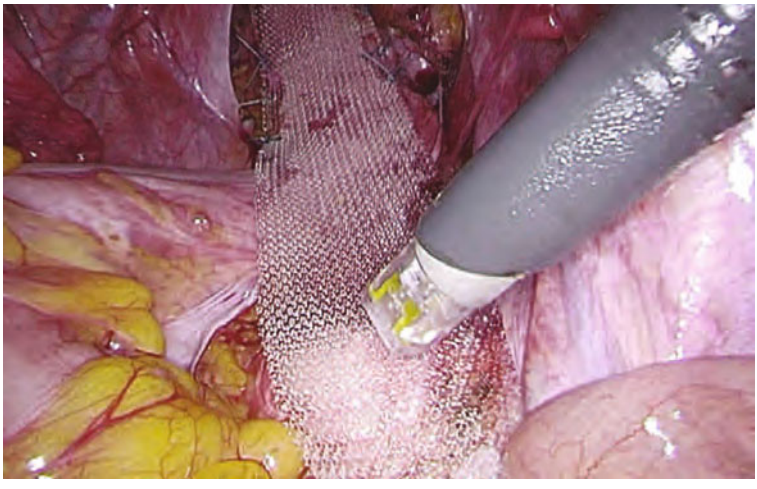

Fig. 21.3 Proximal fixation of the mesh to the sacral promontory using a stapler device

that the mesh lies flat upon the rectum to avoid any mechanical erosion due to mesh kinking.

The mesh is then fixed to the sacral promontory using an endoscopic "tacker" device (Endopath EMS; Ethicon Endo-surgery, Norderstedt, Germany) (Fig. 21.3), and secured with one stitch of Ethibond 2.0. No traction is exerted on the rectum, but the prolapse should be reduced at the time of mesh fixation. The rectum remains in the sacrococcygeal hollow. The surgeon should take care not to strangle the rectosigmoid between the sacral promontory and the mesh.

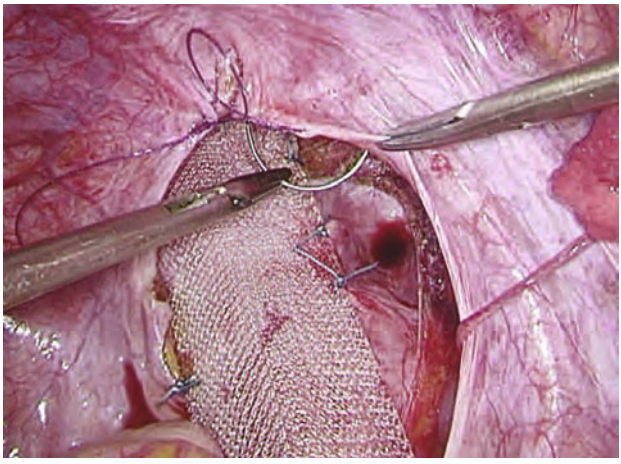

Fig. 21.4 The lateral borders of the peritoneum are closed over the mesh elevating the neo-Douglas over the colpopexy

21.2.5 Colpopexy and Peritoneal Closure

The posterior vaginal apex (vaginal vault) is then identified and elevated by a vaginal trainer and sutured to same strip of mesh. Two lateral sutures incorporate the (remainder of the) uterosacral ligament. If an enterocele is present, more sutures must be made. Ideally, the sutures should not perforate the vaginal wall. This maneuver allows closure of the rectovaginal septum and suspension of the middle pelvic compartment. In this way, a vaginal vault prolapse or enterocele is corrected.

The lateral borders are closed over the mesh using the V-Loc 90 absorbable wound closure device (Covidien, Mansfield, Massachusetts, USA) elevating the pouch of Douglas over the colpopexy (and creating a neo-Douglas) (Fig. 21.4). This maneuver is important to avoid any later small-bowel entrapment and/or erosion.

No peritoneal drain is left in place. Ports are removed in a routine fashion, and only the fascia at the 12 mm port is closed.

21.2.6 Perineotomy (Facultative)

It can be difficult to complete the rectovaginal septum dissection to the level of the pelvic floor. This maneuver is important in treating a complex, supra-anal rectocele. In this specific situation, the surgeon can decide to complete the laparoscopic dissection with a small perineotomy. The incision is made immediately dorsal to the vaginal orifice to open the perineal body. Dissection should be meticulous to avoid any perforation of the vagina or rectum. After perineotomy, this dissection joins the laparoscopic dissection plane, allowing mesh fixa-

tion in the deepest part of the rectovaginal septum and restoring the perineal body. However, a perineotomy can be avoided in most patients with a total rectal prolapse and should only be performed when laparoscopic dissection at the level of the perineal body fails.

21.2.7 Postoperative Treatment

The patient can resume oral intake the day of surgery. A fiber-enriched diet is prescribed. The urinary catheter is removed the following day, and mobilization is started. According to clinical progress, the patient can be discharged from day 1 onwards. Straining efforts and heavy lifting are discouraged for 4–6 weeks after surgery.

21.3 Outcome after LVR

From January 1999 to December 2008, 405 patients underwent LVR for rectal prolapse syndromes. The mean age was 54.6 years [standard deviation (SD) 15.2] and median age was 55 years (range 16–88). Most patients were women ($n = 376$, 93%). Of the 405 patients, 168 (41.5%) had undergone previous pelvic surgery, the most common of which was hysterectomy in 154 patients (39%) (Table 21.1). In 27 patients (6.8%), LVR was performed for recurrent rectal prolapse.

Most of the patients had an internal rectal prolapse (45.9%, $n = 186$). Other indications were total rectal prolapse (43%, $n = 174$) and isolated rectocele and/or enterocele (11.1%, $n = 45$). In 95 of the patients (23.5%) the laparoscopic dissection of the rectovaginal septum was completed with a small perineotomy to treat a complex supra-anal rectocele, as previously described [13].

Table 21.1 Previous pelvic surgery in 168 patients who underwent laparoscopic ventral rectopexy for rectal prolapse syndromes

Procedure	*n* (%)
Hysterectomy	154 (39.1)
Cystopexy	36 (9.1)
Rectopexy	19 (4.8)
Delorme/Altemeier	8 (2.0)
Cesarian section	15 (3.8)
Sphincter repair	4 (1.0)
Gynecological procedure	4 (1.0)
Colectomy	3 (0.8)
Kidney transplantation	1 (0.3)
Prostatectomy	1 (0.3)
Total	**168 (41.5)**

Data concerning operative difficulties and conversion, postoperative morbidity, and recurrence were gathered from a prospective database. Postoperative complications were graded according to Clavien–Dindo [14, 15]. The mean follow-up was 25.3 months (SD ±30, range 6–143). An extensive institutional questionnaire that assessed symptoms of anorectal and sexual dysfunction was used.

Data are presented as mean and SD, median and range. The Wilcoxon signed rank test was used for nonparametric paired data and a *t* test for paired and unpaired samples. $p < 0.050$ was considered statistically significant.

21.3.1 Conversions

Conversion to laparotomy was required in eight patients (2%). Five patients underwent conversion because of adhesions as a result of multiple abdominal operations. In three patients, acute bleeding from the left iliac vein occurred, requiring urgent laparotomy to obtain hemostasis. All underwent open ventral rectopexy. There were no other intraoperative complications and no blood transfusion was required.

21.3.2 Morbidity

Perioperative mortality did not occur. Morbidity was noted in 74 patients (18%), but it was minor (grade I and II complications) in the majority of patients: urinary tract infection in 23 patients (5.9%), superficial wound dehiscence in 18 patients (4.6%), prolonged ileus treated conservatively in 12 patients (3.1%), and postoperative hematoma or bleeding in nine patients (2.3%) (Table 21.2). Six patients (1.5%) underwent a re-intervention under general anesthesia within 30 days after surgery (grade III complications, Table 21.3).

Ten patients (2.5%) developed dyspareunia during follow-up. Prolonged (6 weeks) neuralgia at the right lower quadrant port was documented in six patients (1.5%). Five patients (1.3%) with mesh erosion were seen. All these

Table 21.2 Grade I and II complications

Complication	n (%)
Urinary tract infection	23 (5.9)
Superficial wound dehiscence	18 (4.6)
Postoperative ileus	12 (3.1)
Hematoma/bleeding	9 (2.3)
Cardiac problems	6 (1.3)
Fever	3 (0.8)
Pain	4 (1.0)
Total	**74 (18)**

Table 21.3 Grade III complications

Complication	*n* (postoperative day)
Drainage perineal hematoma	1 (day 1)
Omental bleeding	1 (day 1)
Bowel perforation	1 (day 2)
Examination under anesthesia	1 (day 3)
Adhesiolysis	1 (day 11)
Strangulation	1 (day 28)
Total	**6 (1.5%)**

patients underwent a combined approach with perineotomy for a grade III supra-anal rectocele. In another five patients (1.3%), a trocar site hernia was diagnosed. No major septic complications (pelvic abscess, mesh infection, or lumbar discitis) were observed.

21.3.3 Hospital Stay

Overall, the mean hospital stay was 4.5 days (SD 2.1; median 4 days, range 2–21). We observed a significant reduction of hospital stay over time. The median hospital stay for the last 50 patients was 3.2 days, significantly shorter than the hospital stay of 5.1 days for the first 50 patients ($p = 0.03$).

21.3.4 Recurrence

Clinical recurrence was noted in 4.6% of 174 patients after LVR for total rectal prolapse. Only four of these eight patients underwent further perineal surgery: colporaphia posterior resection of mucosal prolapse.

The recurrence rate for internal rectal prolapse after LVR was low (0.5%), but the need for further perineal surgery during follow-up was higher (4.3%) (Table 21.4).

Failure of the mesh fixation to the sacral promontory was noted in four patients during re-laparoscopy (Table 21.5). In one patient, dehiscence of the rectal fixation was seen, and in another incomplete reduction of the prolapse at the time of mesh fixation evidently resulted in a persistent prolapse.

Table 21.4 Recurrence after laparoscopic ventral recto(colpo)pexy and need for further perineal surgery during follow-up

	Total no. of rectal prolapses (%)	Internal rectal prolapses (%)
Recurrence	8/174 (4.6)	1/185 (0.5)
Need for further perineal surgery	4/174 (2.3)	8/185 (4.3)

Table 21.5 Recurrences after laparoscopic ventral recto(colpo)pexy and subsequent surgical therapy

Type of recurrence	Time post-operation (months)	Site of failure	Reoperation
Total prolapse	6	Promontory	Laparoscopy resection rectopexy (Frykman–Goldberg)
Total prolapse	6	Promontory	Laparoscopic refixation
Total prolapse	13	Incomplete reduction	Altemeier procedure
Internal prolapse	36	Rectal fixation	Laparoscopic refixation
Total prolapse	36	Promontory	Laparoscopic refixation
Total prolapse	72	Promontory	Laparoscopic refixation

21.3.5 Symptomatic Outcome

After LVR for total rectal prolapse a significant improvement was noted in 85.6% of patients at final follow-up. Symptoms of obstructed defecation resolved completely in 71.1% of patients, while new-onset constipation was documented in only ten patients (2.3%). Fecal incontinence improved in 84.5% of patients.

Obstructed defecation, present in 120 patients with internal rectal prolapse before LVR, resolved in 59.2% of patients. Constipation was induced in 3%. Fecal incontinence was improved in 88.9% of patients with internal rectal prolapse. At final follow-up, 70.4% of patients reported improvement of functional outcome after LVR for internal rectal prolapse. Thus, symptomatic improvement was significantly lower ($p < 0.050$) than in patients with total rectal prolapse.

21.4 Discussion

Surgical treatment of rectal prolapse syndromes, including total rectal prolapse, internal intussusception (or internal prolapse), and rectocele, remains one of the most controversial areas in colorectal surgery [1, 2]. Different opinions and a large number of different operations are described in the literature [4]. LVR was developed in an attempt to fulfill the three main objectives of prolapse surgery: restoration of the anatomy in a reliable, safe, and reproducible way; improvement of anorectal function (fecal incontinence and obstructed defecation); and avoidance of functional sequellae, i.e., constipation, incontinence [9, 10].
Although roughly 40% of patients in this study had had previous pelvic surgery, the need for conversion to laparotomy was very limited. Dissection starts at the sacral promontory with preservation of the right hypogastric nerve. Special care is taken not to damage the left iliac vein at the pelvic inlet. Acute bleeding from the left iliac vein occurred in three patients and required urgent laparotomy.

Dissection in the rectovaginal septum should be very meticulous to avoid any perforation. It can be difficult to complete the dissection down to the pelvic

floor. This maneuver is important in treating a low, supra-anal rectocele. In this specific situation, the laparoscopic dissection in the rectovaginal septum can be completed via a small perineotomy. In the long term, five mesh erosions were noted, all into the vagina. All these patients underwent a combined approach with perineotomy for a grade III supra-anal rectocele. No mesh infection or erosion into the rectum was observed in this series. It can be concluded that the use of a polypropylene mesh on the anterior surface of the rectum is safe.

The observed recurrence rate of 4.6% is in line with the reported recurrence rates for classical mesh rectopexy [16]. Failure of the mesh fixation to the sacral promontory was noted in four patients during re-laparoscopy. An adequate anchorage of the mesh to the sacral promontory is essential and this seems to be the Achilles tendon of the procedure.

After LVR for total rectal prolapse, a significant improvement occurred in 85% of patients at final follow-up. The symptoms of obstructed defecation resolved completely in 71% of patients, while constipation was induced in only 2.3%. Incontinence improved in 85% of patients. The same tendency can be seen for internal rectal prolapses, although the overall symptomatic improvement was 15% lower, especially in patients with obstructed defecation. Surgeons need to be aware that functional factors may also play a role in obstructed defecation. Therefore, potential functional problems should be investigated prior to LVR in patients with internal rectal prolapse. Moreover, mechanical and functional obstruction may co-exist. Presence of a functional problem might explain why anatomical reconstruction will not, or only partly, improve function in some patients. It is evident that LVR benefits a selected group of patients with internal rectal prolapse. The challenge is to identify which patients.

In conclusion, early and late outcomes after LVR performed during a 10-year period in patients with rectal prolapse syndromes were reviewed. LVC, with or without perineotomy, was found to be safe, with relatively low morbidity. Functional outcome supports its efficacy. The indication for LVR in patients with internal rectal prolapse should be optimized.

Acknowledgements
The authors are grateful to Mr Christian Bogaerts, Brussels, for providing the figures.

References

1. Festen S, van Geloven AA, D'Hoore A et al (2011) Controversy in the treatment of symptomatic internal rectal prolapse: suspension or resection? Surg Endosc 25:2000-2003
2. Jones OM, Cunningham C, Lindsey I (2011) The assessment and management of rectal prolapse, rectal intussusception, rectocoele, and enterocoele in adults. BMJ 342:325-329
3. Wijfels N, Jones O, Cunnigham C et al (2013) What are the symptoms of internal rectal prolapse? Colorectal Dis 15:368-373
4. Madoff RD, Mellgren A (1999) One hundred years of rectal prolapse surgery. Dis Colon Rectum 42:441-450

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. Orrom WJ, Bartolo DC, Miller R et al (1991) Rectopexy is an ineffective treatment for obstructed defaecation. Dis Colon Rectum 34:414-416
8. Penninckx F, D'Hoore A, Sohier S, Kerremans R (1997) Abdominal resection rectopexy versus Delorme's procedure for rectal prolapse: a predictable outcome. Int J Colorectal Dis 12:49-50
9. D'Hoore A, Penninckx F (2006) Laparoscopic ventral recto(colpo)pexy for rectal prolapse: surgical technique and outcome in 109 patients. Surg Endosc 20:1919-1923
10. D'Hoore A, Cadoni R, Penninckx F (2004) Long-term outcome of laparoscopic ventral rectopexy for total rectal prolapse. Br J Surg 91:1500-1505
11. Portier G, Iovino F, Lazorthes F (2006) Surgery for rectal prolapsed: Orr-Loygue ventral rectopexy with limited dissection prevents postoperative-induced constipation without increasing recurrence. Dis Colon Rectum 49:1136-1140
12. Boons P, Collinson R, Cunningham C, Lindsey I (2010) Laparoscopic ventral rectopexy for external rectal prolapse improve constipation and avoids de novo constipation. Colorectal Dis 12:526-532
13. D'Hoore A, Vanbeckevoort D, Penninckx F (2008) Clinical, physiological and radiological assessment of rectovaginal septum reinforcement with mesh for complex rectocele. Br J Surg 95:1264-1272
14. Clavien PA, Barkun J, de Oliveira ML et al (2009) The Clavien–Dindo classification of surgical complications: five-year experience. Ann Surg 250:187-196
15. Dindo D, Demartines N, Clavien PA (2004) Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 240:205-213
16. Faucheron JL, Voirin D, Riboud R et al (2012) Laparoscopic anterior rectopexy to the promontory for full-thickness rectal prolapse in 175 consecutive patients: short- and long-term follow-up. Dis Colon Rectum 55:660-665