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CLINICAL GUIDELINES

Management of patients with rectal prolapse: the 2017 Dutch guidelines

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Abstract

Background Rectal prolapse—both external rectal prolapse and internal rectal prolapse—is a disabling condition. In view of the overwhelming number of surgical procedures described for the treatment of rectal prolapse, a comprehensive update concerning the diagnostic and therapeutic pathway for this condition is required to draw recommendations for clinical practice. This initiative was commissioned by the Dutch Association for Surgery (Nederlandse Vereniging voor Heelkunde) as a multidisciplinary collaboration.

Methods Nine questions outlining the diagnostic approach, conservative and surgical management of rectal prolapse were selected. A systematic literature search for evidence was then conducted in the Medline and Embase databases.

Results Recommendations included diagnostic approach, methods to assess complaints of fecal incontinence and/or obstructive defecation and treatment options, both conservative and surgical. A level of evidence was assigned to each statement following the Grades of Recommendation Assessment, Development and Evaluation (GRADE) system.

Conclusions These guidelines for clinical practice are useful in the diagnosis and treatment of rectal prolapse. There are many statements requiring a higher level of evidence due to a lack of studies.

Keywords Rectal prolapse · Rectopexy · Practice guideline

Introduction

Rectal prolapse (RP) can be divided in external rectal prolapse (ERP) and internal rectal prolapse (IRP) or rectal intussusception. Both are debilitating conditions with a socioeconomic burden. RP is a rather frequently diagnosed condition and has higher prevalence amongst women than men (ratio 9:1) and in people over the age of 50 [1]. In general, patients with an ERP suffer from pain, rectal blood loss and fecal incontinence (FI). Patients with an IRP can suffer from functional complaints as obstructed defecation (OD) or FI. In patients with IRP, a concomitant rectocele and/or enterocele is frequently seen which may contribute to the functional complaints [2, 3]. ERP is a definite indication for surgery. For IRP the decision to operate is more subtle and surgical intervention is restricted to cases with a certain degree of prolapse where conservative management has failed. However, when the decision for surgical management has been made, the choice of operation is complex and unclear. Although in Europe there is a trend towards treating RP by a ventral rectopexy as described by D'Hoore et al., there remains wide variation in surgical treatments and more uniformity is needed in the diagnostic and therapeutic pathway for all healthcare workers treating patients with rectal prolapse. Therefore, this consensus statement was made, reflecting the 2017 Dutch guidelines for rectal prolapse. Recommendations are made about the diagnostic approach, methods to assess functional complaints for both clinical and research-related purposes, conservative treatment, surgical techniques and choice of material used in surgery.

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Materials and methods

Selection of expert panel and questions

A drafting committee with a multidisciplinary panel of experts was selected according to their clinical and scientific expertise. Surgeons, gynecologists, urologists, gastroenterologists, radiologists and physiotherapists participated and are responsible for this guideline. Relevant topics were condensed into nine questions. This report is based on the AGREE II instrument, an internationally accepted tool for creating clinical practice guidelines [4].

Search strategy

The systematic literature review of the 2014 Dutch Guidelines [5] was updated for the period of May 2013 until July 2015 using the electronic databases MEDLINE and Embase. Searches were designed and conducted using relevant keywords and MeSH/Emtree terms. Inclusion criteria were randomized controlled trials (RCT) and non-randomized clinical trials that were comparative studies between two or more different techniques in treatment for IRP and/or ERP.

Grading of the recommendations

The strength of recommendations was graded depending on the level of evidence subtracted from literature analysis. Strength of recommendations was graded according to the Grades of Recommendation Assessment, Development and Evaluation (GRADE) system (Table 1) [6].

Results

Diagnostic approach

Question 1: Are anorectal function tests (ARFT) indicated in patients with a rectal prolapse and FI and/or OD?

ARFT include manometric tests of anorectal function, compliance of the rectum using a balloon and anal endosonography.

- *Statement 1* ARFT are not indicated for patients suffering from an ERP. Due to the severity of complaints and absolute indication for surgery, ARFT are generally not of any added value in the diagnostic approach of ERP.
- *Statement 2* Consider ARFT for patients with FI and/or OD when IRP is suspected and further differentiation in diagnosis may alter treatment. It can be of added value in the diagnostic processes when physical examination gives insufficient information. It is important to keep in mind that IRP as diagnosed by defecogram does not necessarily cause functional symptoms [7–10]. FI is a multifactorial problem. Therefore, it is important to identify the different causes and to focus treatment on the factor with the greatest influence. In patients with OD, dyssynergia of the pelvic floor muscles is an important factor in treatment decision-making as it is a contraindication for rectopexy.

Question 2: How is an IRP adequately diagnosed?

- *Statement 1* Perform a conventional defecography or a functional MRI for patients with OD or FI when an IRP is suspected [11] (GRADE B). Transperineal ultrasound cannot exclude IRP reliably [12–16] (GRADE D), nor can translabial ultrasound [17] (GRADE C).
- *Statement 2* It is recommended that a radiologically confirmed rectal prolapse is described following the Oxford Rectal Prolapse Grading system (ORPG) [1]. This facilitates treatment decision-making and improves communication in healthcare. Grade 1 and 2 are recto-rectal intussusceptions, grade 3 and 4 are recto-anal intussusception rectal prolapses. Grade 5 describes an external rectal prolapse.

Question 3: How should the severity of FI and/or OD be assessed when a rectal prolapse is suspected?

Objective instruments, e.g., ARFT, do not assess severity of FI or OD but analyze the pathophysiological mechanism, and therefore, have a limited correlation to clinical symptoms. Management of patients with complaints of FI and/or OD asks for subjective instruments as well to assess severity of symptoms. This can be done by questionnaires.

Table 1 Quality of evidence grades [6]

GRADE	Letter	Definition
High	A	It is unlikely that future research will change the confidence we have in the estimate of effect
Moderate	B	It is likely that future research will have a substantial impact in the confidence we have in the estimate of effect
Low	C	It is very likely that future research will have a substantial impact in the confidence we have in the estimate of effect
Very low	D	The confidence we have in the estimate of effect is very low

An ideal questionnaire is easy to use, cannot be interpreted in multiple ways, is statistically validated and validated for the population it is used for. Many questionnaires about FI and OD/obstipation can be found in the literature. Knowledge about the experienced severity of complaints can help the surgeon in treatment strategy and evaluate treatment outcome—for clinical and research objectives.

Fecal incontinence For FI, the only questionnaires validated in Dutch are the Fecal Incontinence Quality of Life Scale (FIQL) and the Fecal Incontinence Severity Index (FISI). These respectively assess the impact of FI on quality of life and the subjective degree of FI. Other questionnaires include the Wexner score, Vaizey-questionnaire, St. Marks score.

- *Statement 1* It is recommended that the Dutch version of the Fecal Incontinence Quality of Life Scale (FIQL) is used to assess the impact of FI on the quality of life in patients with a rectal prolapse [18, 19] (no GRADE).
- *Statement 2* It is recommended that the Dutch version of the Fecal Incontinence Severity Index (FISI) is used to assess the degree of FI in patients with a rectal prolapse [18] (no GRADE).

Obstructed defecation For OD, none of the existing questionnaires are validated in a Dutch population. Questionnaires include the Altomare score, Wexner score, Symptom Severity Score, PAC-SYM, PAC-QOL, Longo scoring system. Some of these are more focused on obstipation than on OD.

- *Statement 3* It is recommended that the Obstructed Defecation Score (Altomare) is used to assess the degree of OD in patients with a rectal prolapse [20].

Other symptoms

- *Statement 4* History taking and questionnaires should be complemented by symptoms of prolapse of the other compartments to analyze functional complaints with a urologic or gynecologic origin also. This facilitates the assessment of the need for a multidisciplinary approach.

Question 4: What is the preoperative work-up for a patient with a suspected IRP or ERP?

Knowing that IRP is not necessarily symptomatic (see statement 1.2), work-up for patients with a (suspected) IRP is more complex than for patients with ERP.

Internal rectal prolapse

- *Statement 1* Perform a proctologic examination including internal examination using a procto- or rectoscope to exclude other pathology causing functional symptoms—e.g., anal stenosis, perianal fistula, proctitis, anal carcinoma, low rectal carcinoma, macroscopic defect of the sphincter complex. In addition, previous anorectal surgery, obstetric history and (sexual) abuse are important factors in differentiating in underlying pathology for FI and/or OD.
- *Statement 2* Perform endoscopic examination (or computed tomography–colonography) if indicated, e.g., altered defecation pattern or other alarm symptoms for colorectal malignancies. A sigmoidoscopy can be indicated in patients with IRP and pain to look for a solitary rectal ulcer.
- *Statement 3* Consider a transit study to assess complaints of slow transit constipation (STC). Existence of STC is considered a relative contra-indication to surgery [21].
- *Statement 4* Consider psychiatric or psychologic analysis when there are doubts about a patient's mental stability. When complaints have a psychosomatic origin, surgical treatment is undesirable. However, when mental instability is noted to stand apart from functional symptoms, surgery can still be considered.
- *Statement 5* Consider using patient reported scoring tools for assessment of functional symptoms. This can support treatment decision-making as mentioned in question 3.
- *Statement 6* Discuss complex patients with functional symptoms caused by (multicompartment) prolapse in a multidisciplinary team. A multidisciplinary team should preferably consist of colorectal surgeons, (uro)gynecologists, pelvic floor physiotherapists, radiologists, potentially complemented by gastroenterologists, psychologists/psychiatrists, continence nurses, sexologists or other involved disciplines.
- *Statement 7* Discuss patients with a relative contraindication for surgery in a multidisciplinary team.

External rectal prolapse

- *Statement 8* A liberal attitude is advised in contemplating endoscopic examination for patients with ERP and rectal blood loss. Especially, when other alarm symptoms for malignancy co-exist or when blood is mixed with the stool.
- Further work-up is similar to work-up for IRP as elaborated in statements 4.6 and 4.7.

Conservative treatment

Question 5: What is the conservative treatment for patients with IRP and functional symptoms?

- *Statement 1* Lifestyle counselling must be given to every patient with FI and/or OD caused by IRP irrespectively of conservative or surgical therapy. Recommendations concern a high fiber diet, sufficient fluid intake, regular physical exercise and a careful attitude towards heavy lifting. In addition, patients are advised to start taking stool bulking agents. Bulking agents in combination with osmotic laxatives can be considered as an alternative when the use of bulking agents alone worsens symptoms of OD. This especially applies to patients with OD with concomitant STC and IRP (no Grade). Loperamide can be added to bulking agents for patients with FI [22]. For patients with *urge* FI a low doses of amitriptyline can be prescribed simultaneously due to its anticholinergic effects [23–25].
- *Statement 2* A referral for pelvic floor physiotherapy (PFP) is advised if lifestyle changes and medical management are insufficient in symptom control [26–28] (no Grade). PFP can consist of multiple interventions such as training of specific muscles of the pelvic floor, biofeedback training, electrostimulation, rectal balloon exercises, percutaneous tibial nerve stimulation (PTNS), or transcutaneous tibial nerve stimulation (TTNS). Depending on the underlying suspected factors causing OD or FI, interventions in PFP should be used cause-specifically [29]. The effect of PFP should be evaluated after 6 weeks to 3 months.
- *Statement 3* Retrograde colonic irrigation can be proposed as a final step in conservative treatment before surgery is considered. Although it is mainly of use in FI [30], some patients with OD can benefit from this intervention as well. Specialized support (e.g., from a continence nurse) seems essential in helping the patient and in making it a successful option. Treatment effectiveness should be evaluated after 2 months.

Question 6: What are the indications and contraindications for surgical treatment of IRP and ERP?

- *Statement 1* Indications for surgical intervention:

– *IRP* Patients with grade 3 or 4 IRP (ORPG) with OD and/or FI negatively effecting quality of life, and resistant to conservative management, are considered for surgery. Pain due to a solitary rectal ulcer caused by an IRP is also an indication for surgery.

– *ERP* Any patient with ERP should be considered for surgery. Treatment delay could lead to irreversibly complaints of FI [31].

- *Statement 2* Relative contraindications for surgical intervention:

In general

– *IRP and ERP* History of rectal radiotherapy or inflammatory bowel disease.
– *IRP* Mental instability or pain not related to a solitary rectal ulcer.

Perineal approach

– *IRP* History of previous rectopexy apart from a Delorme's procedure or complaints of urge FI.
– *ERP* History of previous rectopexy.

Abdominal approach

– *IRP and ERP*: male patients with severe (morbid) obesity, severe endometriosis, history of severe episode of diverticulitis, severe adhesions after previous transabdominal surgery or after severe peritonitis.

- *Statement 3* Absolute contraindications for surgical intervention:

– *IRP and ERP* Pregnancy or active proctitis. In addition, contraindication for general anesthesia (e.g., severe cardiac or pulmonary comorbidity) or for spinal anesthesia must be taken into account for resp. abdominal or perineal procedures.
– *IRP* Dyssynergia of the pelvic floor muscles.

Surgical treatment

Question 7: What is the optimal surgical treatment of IRP?

- *Statement 1* LVR is the recommended treatment for patients with an IRP and an indication for surgery. This is supported by a consensus statement from 2014 also [32]. Open rectopexy is associated with higher postoperative morbidity in comparison to laparoscopic or perineal surgery [33] (GRADE C). In addition, the gen-

eral benefits of minimally invasive surgery (e.g., faster recovery with subsequently reduced length of hospital stay, better cosmetic results) have made laparoscopic surgery preferable to open rectopexy. The LVR is the most commonly performed laparoscopic intervention. There is no data directly comparing LVR to perineal procedures. However, data from non-comparative cohort studies suggest LVR has a lower recurrence rate [34, 35]. There is no evidence supporting the use of a resection rectopexy for IRP. In conclusion, this makes the LVR the recommended treatment for IRP.

The robot-assisted LVR for IRP is similar to the LVR regarding functional outcome and complication rate. However, the robotic procedure is more expensive [36] (GRADE D). The decision to use a robotic device in LVR is left to the center itself on the condition that there is enough expertise in performing robot-assisted LVR.

- *Statement 2* A perineal procedure to treat IRP is advised when a transabdominal procedure is contraindicated (see statement 6.2 and 6.3). The recommended perineal procedure is the Contour Transtar (CT), a method of stapled trans-anal rectal resection (STARR) [37] (GRADE C). Another STARR method is the double-stapling procedure for prolapse and hemorrhoids (PPH). CT gives slightly better functional outcome and lower recurrence rates than PPH in patients with IRP and OD [38–40] (GRADE C). Postoperative pain and complications, and quality of life at 3-year follow-up are similar [38] (GRADE D).

  STARR and Delorme's procedure give similar results in functional outcome and postoperative pain in this patient group [37] (GRADE D).

- *Statement 3* In patients with IRP suffering from urge FI, STARR procedures are relatively contra-indicated. Reason for this is that fecal urgency incontinence is seen relatively frequently after STARR procedures [38] (GRADE C).

Question 8: What is the optimal surgical treatment of ERP?

- *Statement 1* LVR is the preferred surgical treatment for ERP (GRADE D). The very limited amount of evidence comparing perineal procedures to (laparoscopic) abdominal procedures shows better complication rates in the transabdominal group and no statistical difference in recurrence rate nor in functional outcome [41–45] (GRADE D). However, the developments and benefits in minimal invasive surgery as mentioned in statement 9.1 put preference to a laparoscopic abdominal approach.

  Rectopexy decreases recurrence risk compared to rectal mobilization alone, without deterioration of the complication rate [46].

  There is no evidence favoring a resection rectopexy over a ventral rectopexy for ERP. Although resection rectopexy is thought to improve complaints of OD by preventing the residual colon to kink, the increased risk of severe complications due to the created anastomosis has to be kept in mind at all times [45, 47, 48].

  In conclusion, this makes the LVR the first-choice surgical treatment for ERP.

  The robot-assisted LVR for ERP is similar to the LVR regarding functional outcome, complication rate and recurrence rate [36, 49–51] (GRADE C). As has been mentioned previously, the robotic procedure is more expensive and the decision to use it is for the center to make.

- *Statement 2* A perineal procedure to treat ERP is advised when a transabdominal procedure is contraindicated (see also statement 6.2 and 6.3). Most commonly performed perineal interventions for ERP are an Altemeier and a Delorme's procedure. There is no difference in functional outcome and recurrence rate between these two procedures [45] (GRADE C). Therefore, the decision depends on the surgeon and his/her preference. The addition of a levatorplasty to a perineal approach has only shown to be beneficial in Delorme's procedure, where it diminishes the risk of recurrence [52] (GRADE C). A levatorplasty added to a Altemeier is thought to have a similar effect on recurrence rate but this is less strongly supported by the evidence [53] (GRADE D). For these reasons, a levatorplasty is recommended in addition to Delorme's procedure and can be considered when an Altemeier is performed.

Question 9: What material should be used in LVR?

- *Statement 1* A polypropylene (PP) mesh is preferably used in LVR (GRADE D).

  There are many different types of meshes differing in size of the pores, type of material, amount of material and composition. Unfortunately, there are very limited studies addressing material choice in LVR specifically. Therefore, the panel decided to look at studies about incisional hernias also. Conclusions drawn from these studies have to be interpreted carefully and critically when extrapolated to LVR.

There is no difference in erosion rate between synthetic and biologic meshes after LVR [54] (GRADE D). Comparing synthetic and biologic meshes in incisional hernia repair, there is also no difference seen in wound infection, bleeding, hematoma, seroma and recurrence [55] (GRADE D). Hence, no preference can be ascribed to either synthetic or biological meshes. It is known from experimental studies that PP is superior to polyester (PE) and expanded polytetrafluoroethylene (ePTFE) regarding tissue ingrowth. (Partial) absorbable meshes are not recommended due to the expected stretching and recurrence.

The only significant difference in the advantage of lightweight meshes compared to heavyweight meshes in incisional hernia repair is postoperative chronic pain [55–59] (GRADE C). The experience that heavyweight meshes are more liable to shrinkage [57] is not proven to be clinical significant. Since the heavyweight polypropylene mesh is the most commonly used material in large cohorts, the panel believes it is the most safe and effective mesh to use. More research is needed to substantiate this recommendation.

Conclusions and future perspective

This guideline was written to answer in the need for uniformity in treating patients suffering from rectal prolapse, especially regarding surgical techniques and the use of meshes. Although treatment decision-making should be individualized to each specific patient, this guideline can be a very useful tool in this process. However, levels of evidence appeared to be considerably low. There is a strong need for high-quality research regarding prolapse-related queries in randomized controlled studies. The panel has formulated six topics that were considered as most relevant for future high-quality research:

- the type of material that has the lowest risk on mesh-related complications in the short and longterm;
- randomized controlled trials looking at different surgical techniques, i.e., resection rectopexy versus LVR, Delorme's procedure versus LVR, and LVR versus robot-assisted LVR. A comparable trial has already been set-up in Germany (DeloRes trial), comparing Delorme's procedure versus resection rectopexy [60]. However, results have not been published yet;
- the incidence and characteristics of pain after LVR;
- sacral nerve stimulation versus LVR for patients with complaints of FI related to IRP;
- the outcome of redo-surgery in patients after LVR;
- development of a combined questionnaire that is more specific to functional complaints accompanying RP and that is validated for the Dutch population.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants performed by any of the authors.

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References

1. Wijffels NA, Collinson R, Cunningham C, Lindsey I (2010) What is the natural history of internal rectal prolapse? Color Dis 12:822–830. https://doi.org/10.1111/j.1463-1318.2009.01891.x
2. Dvorkin LS, Knowles CH, Scott MS et al (2005) Rectal intussusception: characterization of symptomatology. Dis Colon Rectum 48:824–831. https://doi.org/10.1007/s10350-004-0834-2
3. Podzemny V, Pescatori LC, Pescatori M (2015) Management of obstructed defecation. World J Gastroenterol 21:1053–1060. https://doi.org/10.3748/wjg.v21.i4.1053
4. Brouwers M, Kho M, Browman G et al (2010) AGREE next steps consortium. AGREE II: advancing guideline development, reporting and evaluation in healthcare. CMAJ 182:E839–E842. https://doi.org/10.1503/cmaj.090449
5. Roovers JP, Everhardt E, Dietz V et al (2014) Dutch national guideline prolapse. NVOG
6. Schünemann H, Brozk J, Guyatt G, Oxman A (2013) GRADE handbook. http://gdt.guidelinedevelopment.org/app/handbook/handbook.html. Accessed 1 Dec 2017
7. Goei R, van Engelshoven J, Schouten H et al (1989) Anorectal function: defecographic measurement in asymptomatic subjects. Radiology 173:137–141. https://doi.org/10.1148/radiology.173.1.2780999
8. Freimanis M, Wald A, Caruana B, Bauman D (1991) Evacuation proctography in normal volunteers. Invest Radiol 26:581–585
9. Selvaggi F, Pesce G, Scotto Di Carlo E et al (1990) Evaluation of normal subjects by defecographic technique. Dis Colon Rectum 33:698–702
10. Shorvon PJ, Mchugh S, Diamant NE et al (1989) Defecography in normal volunteers: results and implications. Gut 30:1737–1749
11. Faucheron JL, Barot S, Collomb D et al (2014) Dynamic cystocolpoproctography is superior to functional pelvic MRI in the diagnosis of posterior pelvic floor disorders: results of a prospective study. Color Dis 16:O240–O247. https://doi.org/10.1111/codi.12586
12. Beer-Gabel M, Carter D (2015) Comparison of dynamic transperineal ultrasound and defecography for the evaluation of pelvic floor disorders. Int J Colorectal Dis 30:835–841. https://doi.org/10.1007/s00384-015-2195-9
13. Steensma AB, Oom DM, Burger CW, Schouten WR (2010) Assessment of posterior compartment prolapse: a comparison of evacuation proctography and 3D transperineal

ultrasound. Colorectal Dis 12:533–539. https://doi.org/10.1111/j.1463-1318.2009.01936.x
14. Weemhoff M, Kluivers KB, Govaert B et al (2013) Transperineal ultrasound compared to evacuation proctography for diagnosing enteroceles and intussusceptions. Int J Colorectal Dis 28:359–363. https://doi.org/10.1007/s00384-012-1567-7
15. Regadas FSP, Haas EM, Abbas MA et al (2011) Prospective multicenter trial comparing echodefecography with defecography in the assessment of anorectal dysfunction in patients with obstructed defecation. Dis Colon Rectum 54:686–692. https://doi.org/10.1007/DCR.0b013e3182113ac7
16. Grasso RF, Piciucchi S, Quattrocchi CC et al (2007) Posterior pelvic floor disorders: a prospective comparison using introital ultrasound and colpocystodefecography. Ultrasound Obstet Gynecol 30:86–94. https://doi.org/10.1002/uog.4047
17. Perniola G, Shek C, Chong CCW et al (2008) Defecation proctography and translabial ultrasound in the investigation of defecatory disorders. Ultrasound Obstet Gynecol 31:567–571. https://doi.org/10.1002/uog.5337
18. 't Hoen LA, Utomo E, Schouten WR et al (2017) The fecal incontinence quality of life scale (FIQL) and fecal incontinence severity index (FISI): validation of the Dutch versions. Neurourol Urodyn 36:710–715. https://doi.org/10.1002/nau.23003
19. Bols EMJ, Hendriks HJM, Berghmans LCM et al (2013) Responsiveness and interpretability of incontinence severity scores and FIQL in patients with fecal incontinence: a secondary analysis from a randomized controlled trial. Int Urogynecol J Pelvic Floor Dysfunct 24:469–478. https://doi.org/10.1007/s00192-012-1886-9
20. Altomare DF, Spazzafumo L, Rinaldi M et al (2008) Set-up and statistical validation of a new scoring system for obstructed defaecation syndrome. Color Dis 10:84–88. https://doi.org/10.1111/j.1463-1318.2007.01262.x
21. Gosselink MP, Adusumilli S, Harmston C et al (2013) Impact of slow transit constipation on the outcome of laparoscopic ventral rectopexy for obstructed defaecation associated with high grade internal rectal prolapse. Color Dis 15:749–756. https://doi.org/10.1111/codi.12443
22. Sze EHM, Hobbs G (2009) Efficacy of methylcellulose and loperamide in managing fecal incontinence. Acta Obstet Gynecol Scand 88:766–771. https://doi.org/10.1080/00016340902993320
23. Ehrenpreis E, Chang D, Eichenwald E (2007) Pharmacotherapy for fecal incontinence: a review. Dis Colon Rectum 50:641–649. https://doi.org/10.1007/s10350-006-0778-9
24. Scarlett Y (2004) Medical management of fecal incontinence. Gastroenterology 126:S55–S63. https://doi.org/10.1053/j.gastro.2003.10.007
25. Santoro G, Eitan B, Pryde A, Bartolo D (2000) Open study of low-dose amitriptyline in the treatment of patients with idiopathic fecal incontinence. Dis Colon Rectum 43:1676–1682
26. Hicks C, Weinstein M, Wakamatsu M et al (2014) In patients with rectoceles and obstructed defecation syndrome, surgery should be the option of last resort. Surgery 155:659–667. https://doi.org/10.1016/j.surg.2013.11.013
27. Choi J, Hwang Y, Salum M et al (2001) Outcome and management of patients with large rectoanal intussusception. Am J Gastroenterol 96:740–744. https://doi.org/10.1111/j.1572-0241.2001.03615.x
28. Hwang YH, Person B, Choi JS et al (2006) Biofeedback therapy for rectal intussusception. Tech Coloproctol 10:11–16. https://doi.org/10.1007/s10151-006-0244-7
29. Rao SSC, Rao SC (2014) Current and emerging treatment options for fecal incontinence. J Clin Gastroenterol 48:752–764
30. Chan DSY, Saklani A, Shah PR et al (2012) Rectal irrigation: a useful tool in the armamentarium for functional bowel disorders. Color Dis 14:748–752. https://doi.org/10.1111/j.1463-1318.2011.02797.x
31. Cunin D, Siproudhis L, Desfourneaux V et al (2013) No surgery for full-thickness rectal prolapse: what happens with continence? World J Surg 37:1297–1302. https://doi.org/10.1007/s00268-013-1967-z
32. Mercer-Jones MA, D'Hoore A, Dixon AR et al (2014) Consensus on ventral rectopexy: report of a panel of experts. Color Dis 16:82–88. https://doi.org/10.1111/codi.12415
33. Young MT, Jafari MD, Phelan MJ et al (2015) Surgical treatments for rectal prolapse: how does a perineal approach compare in the laparoscopic era? Surg Endosc 29:607–613. https://doi.org/10.1007/s00464-014-3707-3
34. van Iersel JJ, Paulides TJC, Verheijen PM et al (2016) Current status of laparoscopic and robotic ventral mesh rectopexy for external and internal rectal prolapse. World J Gastroenterol 22:4977–4987. https://doi.org/10.3748/wjg.v22.i21.4977
35. Schwandner O, Hillemanns P (2016) Indikation, technik und ergebnisse der STARR-operation. Der Chir 87:909–917. https://doi.org/10.1007/s00104-016-0265-3
36. Mäkelä-Kaikkonen J, Rautio T, Klintrup K et al (2014) Robotic-assisted and laparoscopic ventral rectopexy in the treatment of rectal prolapse: a matched-pairs study of operative details and complications. Tech Coloproctol 18:151–155. https://doi.org/10.1007/s10151-013-1042-7
37. Ohazuruike NL, Martellucci J, Menconi C et al (2014) Short-term results after STARR versus internal Delorme for obstructed defecation: a non-randomized prospective study. Updates Surg 66:151–156. https://doi.org/10.1007/s13304-014-0247-2
38. Boccasanta P, Venturi M, Roviaro G (2011) What is the benefit of a new stapler device in the surgical treatment of obstructed defecation? Three-year outcomes from a randomized controlled trial. Dis Colon Rectum 54:77–84. https://doi.org/10.1007/DCR.0b013e3181e8aa73
39. Isbert C, Reibetanz J, Jayne DG et al (2010) Comparative study of contour transtar and STARR procedure for the treatment of obstructed defecation syndrome (ODS)—feasibility, morbidity and early functional results. Color Dis 12:901–908. https://doi.org/10.1111/j.1463-1318.2009.01932.x
40. Renzi A, Brillantino A, Di Sarno G et al (2016) Evaluating the surgeons' perception of difficulties of two techniques to perform STARR for obstructed defecation syndrome. Surg Innov 23:563–571. https://doi.org/10.1177/1553350616656281
41. Tou S, Brown SR, Nelson RL (2015) Surgery for complete (full-thickness) rectal prolapse in adults. Cochrane Database Syst Rev 11:CD001758. https://doi.org/10.1002/14651858.CD001758.pub3
42. Solomon MJ, Young CJ, Eyers AA, Roberts RA (2002) Randomized clinical trial of laparoscopic versus open abdominal rectopexy for rectal prolapse. Br J Surg 89:35–39. https://doi.org/10.1046/j.0007-1323.2001.01957.x
43. Boccasanta P, Rosati R, Venturi M et al (1998) Comparison of laparoscopic rectopexy with open technique in the treatment of complete rectal prolapse: clinical and functional results. Surg Laparosc Endosc 8:460–465
44. Deen K, Grant E, Billingham C, Keighley M (1994) Abdominal resection rectopexy with pelvic floor repair versus perineal rectosigmoidectomy and pelvic floor repair for full-thickness rectal prolapse. Br J Surg 81:302–304
45. Senapati A, Gray RG, Middleton LJ et al (2013) PROSPER: a randomised comparison of surgical treatments for rectal prolapse. Color Dis 15:858–868. https://doi.org/10.1111/codi.12177
46. Karas JR, Uranues S, Altomare DF et al (2011) No rectopexy versus rectopexy following rectal mobilization for full-thickness rectal prolapse: a randomized controlled trial. Dis Colon Rectum 54:29–34. https://doi.org/10.1007/DCR.0b013e3181fb3de3

47. Luukkonen P, Mikkonen U, Järvinen H (1992) Abdominal rectopexy with sigmoidectomy vs. rectopexy alone for rectal prolapse: a prospective, randomized study. Int J Color Dis 7:219–222
48. McKee R, Lauder J, Poon F et al (1992) A prospective randomized study of abdominal rectopexy with and without sigmoidectomy in rectal prolapse. Surg Gynecol Obs 174:148–148
49. Ramage L, Georgiou P, Tekkis P, Tan E (2015) Is robotic ventral mesh rectopexy better than laparoscopy in the treatment of rectal prolapse and obstructed defecation? A meta-analysis. Tech Coloproctol 19:381–389. https://doi.org/10.1007/s10151-015-1320-7
50. De Hoog DENM, Heemskerk J, Nieman FHM et al (2009) Recurrence and functional results after open versus conventional laparoscopic versus robot-assisted laparoscopic rectopexy for rectal prolapse: a case–control study. Int J Color Dis 24:1201–1206. https://doi.org/10.1007/s00384-009-0766-3
51. Mehmood RK, Parker J, Bhuvimanian L et al (2014) Short-term outcome of laparoscopic versus robotic ventral mesh rectopexy for full-thickness rectal prolapse. Is robotic superior? Int J Colorectal Dis 29:1113–1118. https://doi.org/10.1007/s00384-014-1937-4
52. Youssef M, Thabet W, El Nakeeb A et al (2013) Comparative study between Delorme operation with or without postanal repair and levateroplasty in treatment of complete rectal prolapse. Int J Surg 11:52–58. https://doi.org/10.1016/j.ijsu.2012.11.011
53. Chun SW, Pikarsky AJ, You SY et al (2004) Perineal rectosigmoidectomy for rectal prolapse: role of levatorplasty. Tech Coloproctol 8:3–9. https://doi.org/10.1007/s10151-004-0042-z
54. Evans C, Stevenson A, Sileri P et al (2015) A multicenter collaboration to assess the safety of laparoscopic ventral rectopexy. Dis Colon Rectum 58:799–807. https://doi.org/10.1097/DCR.0000000000000402
55. Rickert A, Kienle P, Kuthe A et al (2012) A randomised, multicentre, prospective, observer and patient blind study to evaluate a non-absorbable polypropylene mesh vs. a partly absorbable mesh in incisional hernia repair. Langenbeck's Arch Surg 397:1225–1234. https://doi.org/10.1007/s00423-012-1009-6
56. Li J, Ji Z, Zhang W, Li L (2015) The comparison of lightweight mesh and standard mesh in incisional hernia repair with the open sublay technique: the results of a meta-analysis. Surg Laparosc Endosc Percutan Tech 25:238–244. https://doi.org/10.1097/SLE.0000000000000144
57. Conze J, Krones CJ, Schumpelick V, Klinge U (2007) Incisional hernia: challenge of re-operations after mesh repair. Langenbeck's Arch Surg 392:453–457. https://doi.org/10.1007/s00423-006-0065-1
58. Ladurner R, Chiapponi C, Linhuber Q, Mussack T (2011) Long term outcome and quality of life after open incisional hernia repair-light versus heavy weight meshes. BMC Surg 11:25. https://doi.org/10.1186/1471-2482-11-25
59. Schmidbauer S, Ladurner R, Hallfeldt K, Mussack T (2005) Heavy-weight versus low-weight polypropylene meshes for open sublay mesh repair of incisional hernia. Eur J Med Res 10:247–253
60. Rothenhoefer S, Herrle F, Herold A et al (2012) DeloRes trial: study protocol for a randomized trial comparing two standardized surgical approaches in rectal prolapse—Delorme's procedure versus resection rectopexy. Trials. https://doi.org/10.1186/1745-6215-13-155