

# Surgery in Ulcerative Colitis: Indication and Timing

Peter Andersson · Johan D. Söderholm

Department of Surgery, Linköping University Hospital, Linköping, Sweden

## Key Words

Inflammatory bowel disease · Acute colitis ·  
Reconstructive surgery · Ileal pouch-anal anastomosis ·  
Ileorectal anastomosis · Dysplasia

## Abstract

Surgery continues to play an important role in the therapeutic arsenal in ulcerative colitis. In acute colitis, close collaboration between the gastroenterologist and the surgeon is pertinent. Absolute indications for surgery include toxic megacolon, perforation, and severe colorectal bleeding. In addition, surgery should always be considered upon deterioration during medical therapy. The recommended operation in acute colitis is colectomy and ileostomy, with the rectum left in situ; reconstruction is not an option in the acute setting. In chronic continuous colitis, often with long-term steroid therapy, healing conditions are poor. A staged procedure is preferred also in these cases. In cases with dysplasia, surgery should be done after verifying the dysplasia since these patients often have little symptoms from their colitis. The proctocolectomy should in these cases include total mesorectal excision. Ileal pouch-anal anastomosis is the standard bowel reconstruction in ulcerative colitis. The various options should, however, always be thoroughly discussed, considering the pros and cons in each individual patient, before a choice is made. Ileorectal anastomosis is a temporary alternative in select cases (e.g. young women not having had children). Reconstructive surgery is best done approximately 6 months after primary surgery. Surgery for ulcerative colitis should be seen as complementary to med-

ical treatment and may prevent complications, improve the patients' quality of life and occasionally be life-saving. Correct assessment and optimised medical treatment are prerequisites for surgery on accurate indications and good surgical results. Therefore, close interactions between gastroenterologists and colorectal surgeons are mandatory for optimal patient outcome.

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## Introduction

Although medical therapy has advanced during the past decades and colectomy rates may be decreasing [1], surgery continues to play an important role in the therapeutic arsenal in ulcerative colitis (UC). In most epidemiological studies, cumulative risks for bowel surgery of 25–30% were found [2–4], with higher numbers for extensive and active disease [5]. As much as 10% of the patients will need surgery during the first year of illness [3], in many cases as emergency procedures. The patients with UC therefore need combined careful attention from the gastroenterologist and the colorectal surgeon. It is also important to see surgery as an additional therapeutic alternative and not as a 'failure of medical therapy' to achieve optimal outcome over the lifetime of the individuals hit with UC.

The four main groups of indications for surgery in UC remain: (1) acute colitis with severe complications or not responding to medical therapy; (2) chronic continuous disease causing steroid dependency in adults or impaired

growth and/or delayed puberty in children and adolescents; (3) dysplasia and/or cancer of the colon, and (4) reconstruction after previous colectomy. The timing of the surgery is always essential, with the time span ranging from hours to days in acute colitis, weeks in continuous disease, to weeks to months in the cases of dysplasia/cancer. In reconstructive surgery, the timing and the choice of method of reconstruction have to take into account the whole life situation of the affected individual.

### Acute Colitis

In the cases of acute colitis, a close collaboration between the medical gastroenterologist and the colorectal surgeon is pertinent. Preferentially, the surgical team should be contacted in every case of severe colitis admitted to the hospital to be able to evaluate the patient and follow the course of the attack. The patient should at an early stage be informed that colectomy is an alternative should the colitis be refractory to medical treatment. To be able to make the correct decision about colectomy, the colorectal surgeon *must* be consulted at any deterioration during i.v. steroid therapy and/or before rescue treatment with anti-TNF or ciclosporin is started.

The absolute indications for surgery are toxic megacolon, perforation, and severe colorectal bleeding. However, in most acute cases surgery will be performed because of non-response to i.v. steroids and rescue therapy and/or deterioration during medical treatment. It is recommended that the response is assessed objectively on day 3–4 [6] by stool frequency, CRP levels and abdominal imaging (plain abdominal or CT scan) and using for example the Oxford index [7] or Sweden index (no. of daily stools + 0.14 × CRP (mg/l) on day 4; Index ≥ 8: predictor of need for colectomy) [8]. By using these indices on day 3–4, it is possible to make an evidence-based decision for early introduction of rescue therapy. The ECCO guidelines advocate colectomy if there is no improvement within a further 4–7 days [6]. Thereby, an appropriate assessment for need of colectomy can and should be done within 7–10 days of medical therapy [9], a treatment period shown not to be associated with increased postoperative morbidity [10, 11]. A third line of medical therapy (rescue of rescue) was recently shown to be associated with a high risk of severe complications [12] and should normally not be considered in front of colectomy in acute UC.

The recommended operation in acute colitis is colectomy and ileostomy, with the rectum left in situ [6]. In the

trained surgeon's hands this operation is quick, easy and safe [13], and leaves all options open for reconstruction. There is some controversy about the handling of the rectal stump in the severely inflamed colo-rectum. The alternative techniques are division of the rectum at the level of the promontory (warrants transanal rectal drainage to prevent blowout due to retention) or to bring the rectosigmoid up through the abdominal fascia (closed in the subcutaneous fat or as a mucous fistula). The latter options are considered very safe as no closed bowel is left within the abdomen [14, 15]. Colectomy with an ileostomy allows the patients to recover from the colitis, with quick return of health and nutritional status, and allows tapering of steroids. The operation can however seldom be considered as a final solution, and to optimize bowel function the patients will have to go through additional surgery with additional risks and costs.

### Chronic Continuous Colitis

In chronic continuous colitis, i.e. active disease despite optimized maintenance therapy and often involving steroid dependency, the conditions for healing are far from optimal. Even if these patients are usually in a better general condition than the acute colitis cases, they have often been under steroid therapy for along time period, incurring a high risk of septic complications and poor conditions of anastomotic healing [16, 17]. Because of the compromised healing, a staged procedure is preferred also in these cases [6], i.e. primary surgery with colectomy and ileostomy, leaving the rectum intact (preferentially with the stump brought up through the abdominal fascia because of the impaired healing) to consider the options of reconstruction at a later stage. Pending surgery attempts should be made to optimize the patient from a nutritional point of view and the steroid dose should be kept at a minimum.

### Dysplasia and Cancer

A diagnosis of cancer of the colon or rectum in a patient with UC is an absolute indication for surgery, which implies proctocolectomy and usually ileal pouch-anal anastomosis (IPAA). The case of dysplasia in UC is, however, often a more delicate situation. Dysplasia, both high-grade and low-grade, does entail an increased risk for cancer development [18] that warrants action, but the diagnosis of dysplasia in UC is sometimes difficult,

and interobserver variation is a significant concern [19]. Moreover, these patients often have little or no symptoms from their colitis, and proctocolectomy with IPAA is a procedure with not negligible risks of postoperative morbidity and impact on quality of life (see below). Surgery for dysplasia should therefore be done only after dysplasia can be confirmed by at least two experienced GI pathologists [20], and decision-making in multidisciplinary teams is pertinent. With a single finding of low-grade dysplasia, a more vigorous colonoscopy follow-up program is often suggested as an acceptable compromise [21, 22].

Proctectomy for cases with dysplasia and cancer should include total mesorectal excision [20], which increases the risk for pelvic nerve damage compared to the technique usually used for proctectomy in IBD. There is some debate about the best *modus operandi* for the pouch-anal anastomosis. Mucosectomy of the rectal mucosa with a hand-sewn anastomosis to the dentate line is often recommended. However, this procedure is technically difficult and might damage the anal transitional zone, which is important for anal function, and does not guarantee removal of all rectal mucosa. Therefore the double-stapled technique, often leaving a rectal cuff, is acceptable because of its better functional results [23], even in the presence of inflammation in the remaining anorectal cuff [24]. The remaining rectal cuff should, however, be no more than 1–2 cm above the dentate line to minimize the mucosal surface at risk of malignant transformation. Although the risk for development of dysplasia (<5% after 10 years) and cancer (only case reports) of the cuff and pouch mucosa is low [25, 26], it is advocated that patients operated for dysplasia/cancer should be kept under endoscopic surveillance [26], irrespective of the technique used for the pouch-anal anastomosis.

## Reconstructive Surgery

Ileal pouch-anal anastomosis (IPAA) has been the standard bowel reconstruction in ulcerative colitis for the last 25 years. IPAA offers the patients an unchanged body image since no permanent stoma is needed and is in most cases a very good way out, but it is not always the ideal solution. The pouch is most commonly constructed as a J-pouch of the distal ileum anastomosed to the anal canal. In recent years, laparoscopic surgery has been shown to be feasible for pouch surgery [27, 28], but with no proven benefits so far [29–31]. It is generally recommended to

do the restorative surgery as a two-stage procedure with a temporary covering loop ileostomy during the healing period of the pouch [6]. A temporary ileostomy adds a second operation with complication risks [32], but severe septic complications from anastomotic leaks from the pouch are avoided [33–35]. The anal route of defecation is preserved by using the IPAA. However, function is often less than perfect, with incontinence to flatus and soiling in 10–20% during daytime and in 50–60% at nighttime [36], often requiring pads. Moreover, there is a considerable risk of pouchitis, with 50% of patients having sporadic bouts and 10–15% having more severe chronic inflammation in cohort studies [37]. Functional or technical failure necessitating excision of the pouch (pouch failure) still ranges around 5–15% in various series [38, 39]. Pelvic scarring and nerve damage is a risk with the surgery and sexual problems might occur [40]; dyspareunia and sexual uneasiness (fright of incontinence during intercourse) in women, whereas retrograde ejaculation and, more seldom, impotence may arise in men. A less-recognized problem with the pelvic pouch has been the diminished ability of operated women becoming pregnant. It has now been convincingly demonstrated in cohort studies that female fecundity is reduced after IPAA, with a 3- to 5-fold longer time period needed for pregnancy and a lower number of children in total [40, 41].

In select cases, ileorectal anastomosis (IRA) can be an alternative [6, 20]. IRA is historically burdened with poor results because of persistent rectal inflammation and a high risk of later cancer [42]. More recent series have, however, shown better functional results and relatively low risks for cancer [43, 44], presumably due to better selection of patients and a consequent use of anti-inflammatory treatment. Moreover, because of no need for pelvic dissection during the operation, IRA seems to have less impact on sexual function and fertility than IPAA, as has been clearly shown in surgery for familial adenomatous polyposis [41, 45]. A modification in practice could therefore be considered, offering fertile female (and male) patients, not having had their children, an IRA as a temporary alternative (leaving the pelvis and pelvic nerves intact and with better anorectal function) with a view to later pouch surgery when the family is complete. To consider this option, however, at follow-up 3–6 months after colectomy the rectum should not be grossly inflamed and the proctitis must be easily kept in remission with basic medical treatment (e.g. mesalamine suppositories).

Permanent ileostomy is a valid option if the patient tolerates the stoma, particularly in elderly patients. In

**Table 1.** Summary of the pros and cons of the alternatives for reconstructive surgery after (procto)colectomy for UC

| Technique              | Pros                                                                                       | Cons                                                                                                                         |
|------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| IPAA                   | Transanal defecation<br>No follow-up needed                                                | Pouchitis<br>Risk for incontinence<br>Fertility/fecundity<br>Dyspareunia/sexual problems<br>Impotence/retrograde ejaculation |
| Ileorectal anastomosis | Less effect sexual/fertility<br>Good anorectal function                                    | Medication needed<br>Dysplasia/cancer risk<br>Follow-up needed                                                               |
| Ileostomy              | 'Cured' from colitis<br>No medication needed<br>No follow-up needed<br>Rectal stump issues | Ostomy problems<br>Body image<br>Sexual initiative                                                                           |
| Kock pouch             | Less ostomy problems<br>No follow-up needed<br>Improved body image                         | Multiple revision surgery<br>Risk for pouchitis                                                                              |

It is pertinent to discuss these issues with the patient before a decision on restorative surgery is made.

case of intolerance to a regular ileostomy in the presence of contraindications to restorative surgery, for example severe proctitis with perianal fistulas or previous sphincter lesions due to childbirth, a continent ileostomy (Kock pouch) is an option. This is, however, demanding surgery not seldom requiring repeat revisions of the continent nipple [46]. Management of the rectal remnant in those cases where colectomy and ileostomy is considered as definitive surgery is an issue. If left in place, the rectal stump must be kept in surveillance as if the patient still was having an extensive colitis; if this is not possible or if there are severe symptoms with bleeding or anal discharge, the rectum should be removed. In this context it is important to remember that removal of the rectum in fertile women may lead to backward tilting of the vagina causing retention of vaginal discharge and sexual dysfunction [47].

The best choice for reconstruction is not always obvious and may differ depending on the circumstances of life, occupation, age, gender, etc. Therefore, the alternative options (table 1) with IPAA, IRA, Kock pouch or remaining ileostomy should always be thoroughly discussed with the patient, considering the pros and cons in each individual case over a lifetime perspective, before a final decision is made.

### Medication and Surgery

While there is no doubt that corticosteroid use increases the risk for septic and anastomosis-related complications in elective UC surgery [16], there is less consensus regarding immunomodulators. It seems that purine analogues are safe to use perioperatively [6], whereas current studies on the effects of anti-TNF treatment (infliximab) on postoperative complications show contradictory results. Two recently presented series (n = 141 and 151, respectively) show no increase in complication risks with infliximab [48, 49], although the combination with cyclosporine did [49]. On the other hand, two large cohort studies (n = 301 and 523, respectively) [50, 51], where the outcome was adjusted for disease severity, showed increased risk of postoperative complications in pouch surgery for at least 4 months after i.v. therapy with infliximab. This is important to consider since many cases of severe acute colitis currently have been treated with high-dose steroids combined with rescue therapy with infliximab or cyclosporin. In addition, the experience from the Cleveland Clinic [52] showed an increased risk for intraoperative and postoperative complications if the restorative surgery was done within 6 months after acute colectomy. In our practice, reconstruction is done approximately 6 months from primary surgery, when the patient is back in a good general condition, medication has been discontinued or tapered to a minimum, and the rectal mucosa has been preoperatively assessed for the various surgical options.

### Concluding Remarks

Surgery for UC should be seen as complementary to medical treatment and will, when used in the right situations, prevent complications, improve quality of life and occasionally even be life-saving. Correct diagnosis and assessment and optimized medical treatment are prerequisites for surgery on accurate indications and to achieve good surgical results. Therefore, close interactions between the gastroenterologist and the colorectal surgeon are needed for optimal patient outcome over a life-long perspective.

### Disclosure Statement

The authors declare that no financial or other conflict of interest exists in relation to the content of the article.

## References

- 1 Solberg IC, Lygren I, Jahnsen J, et al: Clinical course during the first 10 years of ulcerative colitis: results from a population-based inception cohort (IBSEN Study). *Scand J Gastroenterol* 2009;44:431–440.
- 2 Henriksen M, Jahnsen J, Lygren I, et al: Ulcerative colitis and clinical course: results of a 5-year population-based follow-up study (the IBSEN study). *Inflamm Bowel Dis* 2006;12:543–550.
- 3 Langholz E, Munkholm P, Davidsen M, Binder V: Colorectal cancer risk and mortality in patients with ulcerative colitis. *Gastroenterology* 1992;103:1444–1451.
- 4 Leijonmarck CE, Persson PG, HELLERS G: Factors affecting colectomy rate in ulcerative colitis: an epidemiologic study. *Gut* 1990;31:329–333.
- 5 Cottone M, Scimeca D, Mocciaro F, Civitavecchia G, Perricone G, Orlando A: Clinical course of ulcerative colitis. *Dig Liver Dis* 2008;40(suppl 2):S247–S252.
- 6 Travis SP, Stange EF, Lemann M, et al: European evidence-based Consensus on the management of ulcerative colitis: current management. *J Crohns Colitis* 2008;2:24–62.
- 7 Travis SPL, Farrant JM, Ricketts C, et al: Predicting outcome in severe ulcerative colitis. *Gut* 1996;38:905–910.
- 8 Lindgren SC, Flood LM, Kilander AF, Lofberg R, Persson TB, Sjobahl RI: Early predictors of glucocorticosteroid treatment failure in severe and moderately severe attacks of ulcerative colitis. *Eur J Gastroenterol Hepatol* 1998;10:831–835.
- 9 Hancock L, Windsor AC, Mortensen NJ: Inflammatory bowel disease: the view of the surgeon. *Colorectal Dis* 2006;8(suppl 1):10–14.
- 10 Hyde GM, Jewell DP, Kettlewell MG, Mortensen NJ: Cyclosporin for severe ulcerative colitis does not increase the rate of perioperative complications. *Dis Colon Rectum* 2001;44:1436–1440.
- 11 Jarnerot G, Hertervig E, Friis-Liby I, et al: Infliximab as rescue therapy in severe to moderately severe ulcerative colitis: a randomized, placebo-controlled study. *Gastroenterology* 2005;128:1805–1811.
- 12 Maser EA, Deconda D, Lichtiger S, Ullman T, Present DH, Kornbluth A: Cyclosporine and infliximab as rescue therapy for each other in patients with steroid-refractory ulcerative colitis. *Clin Gastroenterol Hepatol* 2008;6:1112–1116.
- 13 Hyman NH, Cataldo P, Osler T: Urgent subtotal colectomy for severe inflammatory bowel disease. *Dis Colon Rectum* 2005;48:70–73.
- 14 Carter FM, McLeod RS, Cohen Z: Subtotal colectomy for ulcerative colitis: complications related to the rectal remnant. *Dis Colon Rectum* 1991;34:1005–1009.
- 15 McKee RF, Keenan RA, Munro A: Colectomy for acute colitis: is it safe to close the rectal stump? *Int J Colorectal Dis* 1995;10:222–224.
- 16 Aberra FN, Lewis JD, Hass D, Rombeau JL, Osborne B, Lichtenstein GR: Corticosteroids and immunomodulators: postoperative infectious complication risk in inflammatory bowel disease patients. *Gastroenterology* 2003;125:320–327.
- 17 Lake JP, Firoozmand E, Kang JC, et al: Effect of high-dose steroids on anastomotic complications after proctocolectomy with ileal pouch-anal anastomosis. *J Gastrointest Surg* 2004;8:547–551.
- 18 Thomas T, Abrams KA, Robinson RJ, Mayberry JF: Meta-analysis: cancer risk of low-grade dysplasia in chronic ulcerative colitis. *Aliment Pharmacol Ther* 2007;25:657–668.
- 19 Odze RD, Goldblum J, Noffsinger A, Alsaigh N, Rybicki LA, Fogt F: Interobserver variability in the diagnosis of ulcerative colitis-associated dysplasia by telepathology. *Mod Pathol* 2002;15:379–386.
- 20 Biancone L, Michetti P, Travis SP, et al: European evidence-based Consensus on the management of ulcerative colitis: special situations. *J Crohns Colitis* 2008;2:63–92.
- 21 Befrits R, Ljung T, Jaramillo E, Rubio C: Low-grade dysplasia in extensive, long-standing inflammatory bowel disease: a follow-up study. *Dis Colon Rectum* 2002;45:615–620.
- 22 Lim CH, Axon AT: Low-grade dysplasia: nonsurgical treatment. *Inflamm Bowel Dis* 2003;9:270–272.
- 23 Lovegrove RE, Tilney HS, Heriot AG, et al: A comparison of adverse events and functional outcomes after restorative proctocolectomy for familial adenomatous polyposis and ulcerative colitis. *Dis Colon Rectum* 2006;49:1293–1306.
- 24 Silvestri MT, Hurst RD, Rubin MA, Michelassi F, Fichera A: Chronic inflammatory changes in the anal transition zone after stapled ileal pouch-anal anastomosis: is mucosectomy a superior alternative? *Surgery* 2008;144:533–537.
- 25 Remzi FH, Fazio VW, Delaney CP, et al: Dysplasia of the anal transitional zone after ileal pouch-anal anastomosis: results of prospective evaluation after a minimum of ten years. *Dis Colon Rectum* 2003;46:6–13.
- 26 Scarpa M, van Koperen PJ, Ubbink DT, Hommes DW, Ten Kate FJ, Bemelman WA: Systematic review of dysplasia after restorative proctocolectomy for ulcerative colitis. *Br J Surg* 2007;94:534–545.
- 27 Marcello PW, Milsom JW, Wong SK, et al: Laparoscopic restorative proctocolectomy: case-matched comparative study with open restorative proctocolectomy. *Dis Colon Rectum* 2000;43:604–608.
- 28 Dunker MS, Bemelman WA, Slors JF, van Duijvendijk P, Gouma DJ: Functional outcome, quality of life, body image, and cosmetics in patients after laparoscopic-assisted and conventional restorative proctocolectomy: a comparative study. *Dis Colon Rectum* 2001;44:1800–1807.
- 29 Tan JJ, Tjandra JJ: Laparoscopic surgery for ulcerative colitis: a meta-analysis. *Colorectal Dis* 2006;8:626–636.
- 30 Maartense S, Dunker MS, Slors JF, Gouma DJ, Bemelman WA: Restorative proctectomy after emergency laparoscopic colectomy for ulcerative colitis: a case-matched study. *Colorectal Dis* 2004;6:254–257.
- 31 Ahmed AU, Keus F, Heikens JT, et al: Open versus laparoscopic (assisted) ileo pouch anal anastomosis for ulcerative colitis and familial adenomatous polyposis. *Cochrane Database Syst Rev* 2009;1:CD006267.
- 32 Wong KS, Remzi FH, Gorgun E, et al: Loop ileostomy closure after restorative proctocolectomy: outcome in 1,504 patients. *Dis Colon Rectum* 2005;48:243–250.
- 33 Williamson ME, Lewis WG, Sagar PM, Holdsworth PJ, Johnston D: One-stage restorative proctocolectomy without temporary ileostomy for ulcerative colitis: a note of caution. *Dis Colon Rectum* 1997;40:1019–1022.
- 34 Tjandra JJ, Fazio VW, Milsom JW, Lavery IC, Oakley JR, Fabre JM: Omission of temporary diversion in restorative proctocolectomy: is it safe? *Dis Colon Rectum* 1993;36:1007–1014.
- 35 Matthiessen P, Hallbook O, Rutegard J, Simert G, Sjobahl R: Defunctioning stoma reduces symptomatic anastomotic leakage after low anterior resection of the rectum for cancer: a randomized multicenter trial. *Ann Surg* 2007;246:207–214.
- 36 Tjandra JJ, Fazio VW, Church JM, Oakley JR, Milsom JW, Lavery IC: Similar functional results after restorative proctocolectomy in patients with familial adenomatous polyposis and mucosal ulcerative colitis. *Am J Surg* 1993;165:322–325.
- 37 Stahlberg D, Gullberg K, Liljeqvist L, HELLERS G, Lofberg R: Pouchitis following pelvic pouch operation for ulcerative colitis: incidence, cumulative risk, and risk factors. *Dis Colon Rectum* 1996;39:1012–1018.
- 38 Leowardi C, Hinz U, Tariverdian M, et al: Long-term outcome 10 years or more after restorative proctocolectomy and ileal pouch-anal anastomosis in patients with ulcerative colitis. *Langenbecks Arch Surg* 2009 DOI: 10.1007/s00423-009-0479-7.
- 39 Ferrante M, Declercq S, De Hertogh G, et al: Outcome after proctocolectomy with ileal pouch-anal anastomosis for ulcerative colitis. *Inflamm Bowel Dis* 2008;14:20–28.

- 40 Cornish JA, Tan E, Teare J, et al: The effect of restorative proctocolectomy on sexual function, urinary function, fertility, pregnancy and delivery: a systematic review. *Dis Colon Rectum* 2007;50:1128–1138.
- 41 Ording OK, Juul S, Berndtsson I, Oresland T, Laurberg S: Ulcerative colitis: female fecundity before diagnosis, during disease, and after surgery compared with a population sample. *Gastroenterology* 2002;122:15–19.
- 42 Aylett SO: Diffuse ulcerative colitis and its treatment by ileo-rectal anastomosis. *Ann R Coll Surg Engl* 1960;27:260–284.
- 43 Leijonmarck CE, Lofberg R, Ost A, Hellers G: Long-term results of ileorectal anastomosis in ulcerative colitis in Stockholm County. *Dis Colon Rectum* 1990;33:195–200.
- 44 Elton C, Makin G, Hitos K, Cohen CR: Mortality, morbidity and functional outcome after ileorectal anastomosis. *Br J Surg* 2003;90:59–65.
- 45 Olsen KO, Juul S, Bulow S, et al: Female fecundity before and after operation for familial adenomatous polyposis. *Br J Surg* 2003;90:227–231.
- 46 Nessar G, Fazio VW, Tekkis P, et al: Long-term outcome and quality of life after continent ileostomy. *Dis Colon Rectum* 2006;49:336–344.
- 47 Sjodahl R, Nystrom PO, Olaison G: Surgical treatment of dorsocaudal dislocation of the vagina after excision of the rectum. The Kylberg operation. *Dis Colon Rectum* 1990;33:762–764.
- 48 Ferrante M, D’Hoore A, Vermeire S, et al: Corticosteroids but not infliximab increase short-term postoperative infectious complications in patients with ulcerative colitis. *Inflamm Bowel Dis* 2009;15:1062–1070.
- 49 Schluender SJ, Ippoliti A, Dubinsky M, et al: Does infliximab influence surgical morbidity of ileal pouch-anal anastomosis in patients with ulcerative colitis? *Dis Colon Rectum* 2007;50:1747–1753.
- 50 Selvasekar CR, Cima RR, Larson DW, et al: Effect of infliximab on short-term complications in patients undergoing operation for chronic ulcerative colitis. *J Am Coll Surg* 2007;204:956–962.
- 51 Mor IJ, Vogel JD, da Luz MA, Shen B, Hammel J, Remzi FH: Infliximab in ulcerative colitis is associated with an increased risk of postoperative complications after restorative proctocolectomy. *Dis Colon Rectum* 2008;51:1202–1207.
- 52 Dinnewitzer AJ, Wexner SD, Baig MK, et al: Timing of restorative proctectomy following subtotal colectomy in patients with inflammatory bowel disease. *Colorectal Dis* 2006;8:278–282.