

New Aspects of Surgical Therapy of Recurrent Crohn's Disease

Anton J. Kroesen and Heinz J. Buhr

Abstract

Crohn's disease can neither be cured by surgery nor by medical therapy. Surgical therapy of recurrent Crohn's disease requires special precautions. The recurrence rate is 60% after 15 years. There are no certain data of the risk factors influencing the recurrence rate. The only clear facts are that wide resection out of the resection margins and smoking negatively influence recurrence. Hence, the major principle of therapy is a minimally-resected surgery. This mainly concerns strictures and stenosis. Strictures should be treated by stricturoplasty and stenosis by limited resection with Crohn-free resection margins. Just in case of interenteric and enterocutaneous with a concomitant short bowel syndrome, in blind-ending fistulas with an abscess or in enterovesical fistulas, we recommend immediate operation. The therapy of recurrent anorectal Crohn's disease underlies the same rules as primary therapy. If necessary, proctectomy remains the last option. Also, emergency surgery in recurrent Crohn's disease follows the same rules as in elective surgery.

Key Words: Review-Recurrent Crohn's disease-principles of surgery

INTRODUCTION

In contrast to ulcerative colitis which can be cured by colectomy with formation of an ileoanal pouch,¹⁻⁶ there is no cure for Crohn's disease. Neither medical nor surgical therapy can avoid a recurrence of the disease. Crohn's disease primarily has to be treated conservatively. Surgery is only necessary when complications occur. Nevertheless, 80% to 90% of all Crohn patients have to undergo surgery at least once.⁷ Rutgeerts et al. found one year after ileocecal resections an endoscopic recurrence in 73% of cases, 20% of which had clinical symptoms.⁸ After 3 years, recurrence increased to 85% with clinical symptoms in 34%. According to these two studies, there is macroscopical evidence for recurrent Crohn's disease very early after operation. However, the cumulative recurrence rate, defined as the number of patients who require reoperation, is considerably lower (33-58% after 10 years) (Table 1).⁹⁻¹⁵

DEFINITION OF RECURRENCE

As mentioned above, recurrence in Crohn's disease has different forms and can be defined as follows:

Endoscopic recurrence: Specific macroscopical alterations as defined by Rutgeerts¹⁵ found during planned postoperative endoscopy. Additional histological examination facultative.

Radiological recurrence: Stenosis or irregularities of the intestinal mucosal surface seen in contrast images of the small intestine or in enemas or other techniques.

Clinical recurrence: Crohn-specific symptoms as judged (e.g.) by the Crohn's Disease Activity Index.

Reoperation: Indication for operation due to one of the first three types of recurrence with histological confirmation of the diagnosis.

These four definitions have different values. The most severe criteria for recurrence represents the indication to reoperate. However, the indication for surgery is based on the criteria of clinical symptoms, endoscopy and radiology, as well as on the subjective decision of the gastroenterologist and surgeon. Thus even this is not always comparable between different institutions.

Clinical symptoms, which are the most visible signs of recurrence for the patient, are difficult to quantify. The commonly used Crohn's Disease

Received August 14, 1999
Accepted December 16, 1999
Department of Surgery, University Hospital Benjamin Franklin,
Freie Universität, Berlin, Germany.

Address reprint request to Dr. H. J. Buhr, University Hospital Benjamin Franklin, Department of Surgery I, Hindenburgdamm 30, 12200 Berlin, Germany. Tel: 49-30-8445-2543, Fax: 49-30-8445-2740, E-mail: kroesen@ukbf.fu-berlin.de

Table 1. Cumulative Recurrence Rates

| Author | n | Follow-up (years) | | | | cumulative recurrence rate (%) |
|----------------------------------|-----|-------------------|----|----|----|--------------------------------|
| | | 5 | 10 | 15 | 20 | |
| Greenstein et al. ⁹ | 100 | 8 | 43 | 65 | 87 | — |
| Cooke et al. ¹⁰ | 167 | 24.5 (20–45) | 38 | 56 | 66 | 71 |
| Higgins and Allan ¹¹ | 180 | 16 (0.6–49) | 18 | 36 | 51 | 55 |
| Lock et al. ²⁰ | 391 | 11.5 (<25) | 19 | 33 | 42 | 48 |
| Trnka et al. ¹² | 113 | 19.5 (0–49) | 22 | 38 | 55 | 66 |
| Frikker and Segall ¹³ | 105 | 7.5 (0.5–17) | 22 | 32 | 48 | — |
| Whelan et al. ¹⁴ | 432 | 13 (>10) | 38 | 57 | 70 | — |

Activity Index (CDAI) has low sensitivity for scary stenosis, and the bowel movements of patients with enterostomies cannot be assessed. Endoscopy and radiology have a high sensitivity for morphological changes, but they are of limited value for the diagnosis of clinically relevant recurrence.^{15,16}

FACTORS INFLUENCING RECURRENCE

Several factors have been suggested to influence recurrence. This discussion, however, is the most controversial.

Age at onset of the disease

Greenstein et al. found a recurrence rate of up to 50% within a 5-year follow-up in patients younger than 25 years at disease onset. In the long-term, however, most investigators report comparable recurrence rates.⁹ Some studies did not even find an increased recurrence rate.^{9,12,16}

Gender

Some studies could not find gender-specific differences, although an influence of smoking in female patients has been discussed.^{15,17}

Duration of Crohn's disease before resection

Some authors have suggested that recurrence is more frequent in patients with a history of Crohn's disease of 2 years or less before resection.^{18–20} Sachar et al. reported a significantly higher recurrence rate in patients who had Crohn's disease for less than 10 years compared with patients with disease for more than 10 years.²¹ Cumulative recurrence rates for a short history compared to a long history were different in other studies.^{22,23}

How can these different findings be explained? First, the duration of Crohn's disease before resection is generally easy to measure. However, symptoms are usually present for a variable period of time before the diagnosis is made. This interval is often hard to appraise. Second, the length of the preoperative history is a continuous variable and most studies have divided the group of patients into two roughly equal halves, based on an arbitrary period which varies from study to study.

Smoking

Some authors could show a five-fold increase of recurrence rates for smokers compared to non-smokers.^{24–26} Likewise, Sutherland et al. found increased postoperative recurrence rates for smokers.²⁷ Hence every operated patient should be informed about an increased risk of recurrence in case of smoking.

Site of involvement in the bowel

Farmer et al.²⁸ identified different patterns of Crohn's disease based on three main sites of intestinal involvement: (1) ileocolic with involvement of the distal ileum and right colon; (2) small intestine, with disease confined to the small bowel; and (3) colonic, with disease confined to the colon. These three clinical types of involvement were associated with significant differences with regard to symptoms, complications and the necessity of surgery. The highest recurrence rate was found in ileocolic Crohn's disease (44%), 33% in small bowel Crohn's and 18% for the colon. Patients after segmental colonic resections had higher recurrence rates than after proctocolectomy.^{29,30} The risk of recurrence after a second resection was different in studies with small numbers of patients,^{9,12} but not significantly different in a larger series.

Type of disease

In one of the most discussed studies of the last decade, Greenstein et al. worked out two different types of Crohn's disease. They differed between a perforating and a non-perforating type.³¹ Greenstein postulated a higher recurrence rate for patients with a perforating Crohn's disease. But these results were not confirmed by many other studies.³²⁻³⁴ Hence, a prediction of recurrence based on this differentiation is not possible.

Involvement of disease at the resection margins

The influence of disease at the resection margin on recurrence rates has been one of the more contentious areas in surgery of Crohn's disease. Lower recurrence rates have been claimed for radical resections with macroscopically normal resection margins, compared with non-radical resection where the margins were involved.³⁵ Particularly Lindhagen, Fazio, Kotanagi and Wolff demonstrated that a microscopical involvement at the resection margin has no influence on the recurrence rate.³⁶⁻³⁹ At least it is generally accepted that a free distance of 1-2 cm is sufficient.

As far as the colon is concerned, a higher recurrence rate has been demonstrated after ileorectal anastomosis to a macroscopically normal rectum.⁴⁰⁻⁴² Although proctocolectomy has lower recurrence rates, the permanent stoma should be avoided as long as

possible. The value of minimal surgery in a segmentally diseased colon is questionable at present.

SURGICAL PRINCIPLES IN RECURRENT CROHN'S DISEASE

Basically, surgery in recurrent Crohn's disease follows the same principles as in primary surgery.

Preparation

Preoperatively a complete Crohn-staging should be performed including endoscopy, radiological imaging of the small intestine and in the case of anorectal Crohn's disease, anal manometry and endosonography.⁴³⁻⁴⁹

An improved nutritional status should be provided by preoperative parenteral nutrition in case of malnutrition.

Prior to operation, the surgeon has to study the protocol of previous resectional surgery. Special emphasis should be given to the length of the resection, the nature of the anastomosis and the total length of the remaining intestine.^{50,51}

Surgery

The high recurrence rates of Crohn's disease, especially after reoperations, require minimal surgery. During every step of the operation, the next possible recurrence should be kept in mind.

Prior to resection, the total length of the gut must be measured and noted in the operation report.

Ewe et al. demonstrated an increased risk of recurrence after radical resection with lymphadenectomy. The median recurrence-free interval after radical resection compared to non-radical resection was 15 vs. 36 months.⁵² This result and those of many other studies which demonstrated the need for only a 1-2 cm macroscopically disease-free resection margin led to a specific surgical strategy.

Radical resection has no place in contrast to carcinoma surgery. There is no indication for lymphadenectomy. Only the diseased gut has to be resected. The preparation of the vessels should be performed close to the gut. In our experience, end-to-end anastomosis should be performed to prevent blind-loops. Also, we prefer resorbable sutures to prevent fistulas. However, there is no prospective data

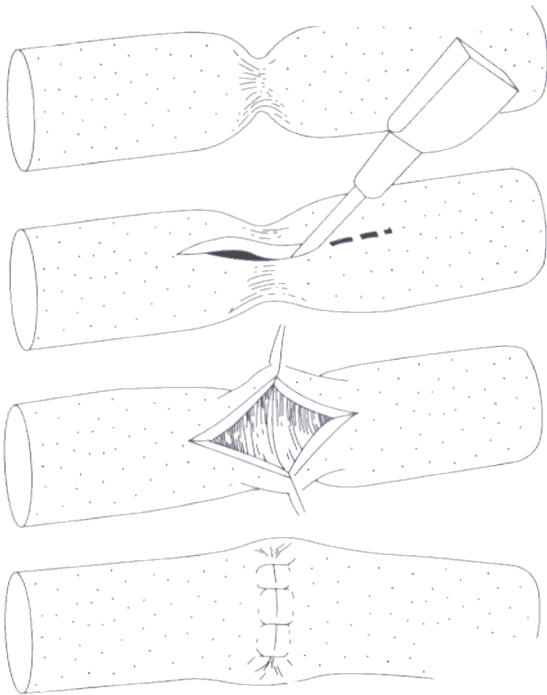


Fig. 1. Schematic drawing of the operative principle of strictureplasty.

confirming this.

Conservative Crohn-surgery also involves the application of strictureplasty (Fig. 1) techniques for short stenosis. The advantage of this method is preservation of the continuity without loss of intestine. Many authors have demonstrated the great clinical implication of this surgical technique, including a low recurrence rate of 10–18% after a median period of 3 years.^{53,54}

A special problem in Crohn-surgery is the presence of a diseased segment within a conglomerate-tumor. In this case, the whole intestinal conglomerate has to be adhesiolysed to identify the diseased segment.

Transabdominal drains should be avoided in Crohn surgery due to the high risk of enterocutaneous fistula formation.

The basic principles of Crohn's disease surgery have been worked out in the previous chapter. Nevertheless there are some special features concerning recurrence.

Enterocutaneous fistulas: In unoperated patients, enterocutaneous fistulas arise from blindly-ending fistulas to the abdominal wall in fistulizing disease. Whereas in recurrent Crohn's disease, they arise more likely from former anastomosis in the sense of a late

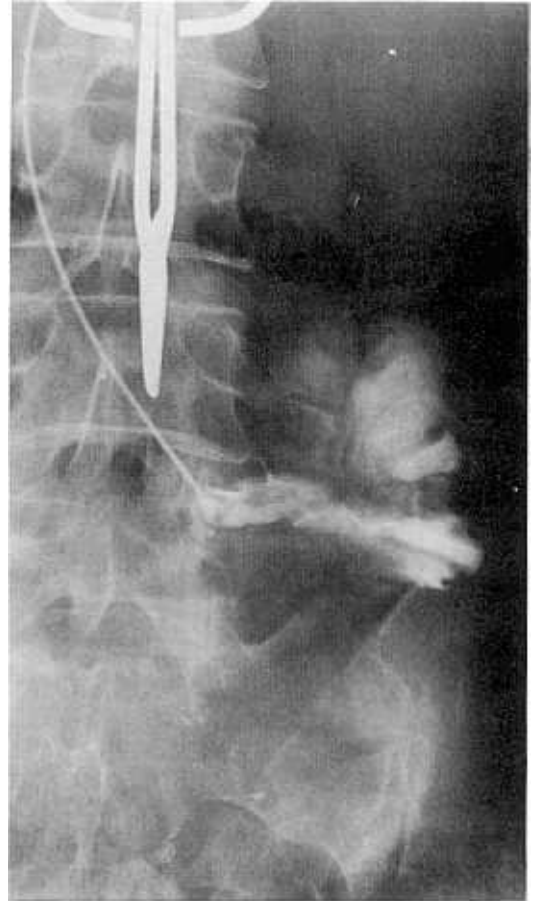


Fig. 2. Radiological image of an enterocutaneous fistula to the small bowel.

leakage. Surgery is indicated in the case of abdominal wall abscesses, skin damage due to highly active secretion and in functional short bowel syndrome. The operative therapy consists of limited resection of the diseased segment with primary end-to-end anastomosis (Fig. 2).

Blindly-ending fistulas in recurrent Crohn's disease: As in enterocutaneous fistulas the origin of these fistulas are usually from former anastomosis in the sense of a late leakage. They go to the retroperitoneal tissue and form abscesses there. This situation has to be considered as an absolute emergency. For surgery, the diseased segment again must be resected and the fistula tract and abscess consequently debrided.

Anorectal Crohn's disease: As with almost no other site of Crohn's disease affection, anorectal Crohn's disease has a very high recurrence rate. Here

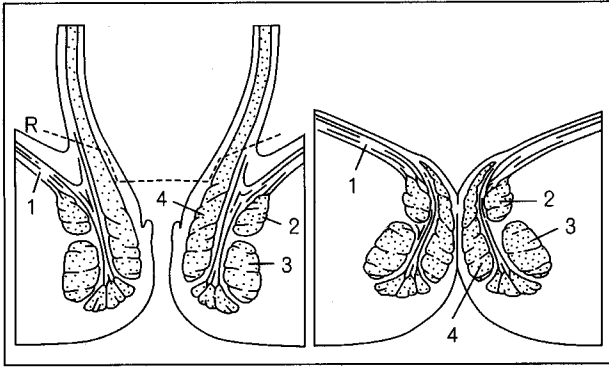


Fig. 3. Closure of the muscular pelvic floor in Crohn's disease.

each recurrence can lead to a progressive destruction of the anal sphincter and the necessity of proctectomy with a permanent stoma. According to Wolff et al.⁵⁵ the cumulative risk of proctectomy in anorectal Crohn's disease is 8.4% after 10 years and 17.5% after 20 years. The indications for proctectomy in anorectal Crohn's disease include; (1) severe perianal fistula tracts with destruction of the anal sphincter; (2) lacerations of the anal sphincter due to former fistula operations; (3) fistula associated carcinomas; and (4) a intractable proctitis. In the case of surgery, the proctectomy is performed under preservation of the pelvic floor and as far as possible from the anal sphincter (Fig. 3).

CONCLUSION

Most patients will develop overt recurrence after resection of Crohn's disease if they are followed for a long time. Subclinical changes, suggestive of recurrence, may develop soon after surgery. Radical resection does not appear to sufficiently protect against recurrence, therefore conservative resections should be performed to preserve intestinal length. What predisposes certain intestinal sites to the development of recurrent disease remains unexplained. Finding the answer to this conundrum will probably result in a better understanding of recurrence and may result in specific treatment aimed at preventing it.^{56,57}

REFERENCES

1. Setti Carraro PG, Talbot IC, Nicholls JR. Patterns of distribution of endoscopic and histological changes in the

ileal reservoir after restorative proctocolectomy for ulcerative colitis. A long-term follow-up study. *Int J Colorectal Dis* 1998;13:103-7.

2. Tan HT, Connolly AB, Morton D, Keighley MRB. Results of restorative proctocolectomy in the elderly. *Int J Colorectal Dis* 1997;12:319-22.
3. Korsgen S, Keighley MRB. Causes of failure and life expectancy of the ileoanal pouch. *Int J Colorectal Dis* 1997; 12:4-8.
4. Kuhbacher T, Schreiber S, Runkel N. Pouchitis: pathophysiology and treatment. *Int J Colorectal Dis* 1998;13: 196-207.
5. Tonelli F, Batignani G, Ficari B, Mazzoni B, Garcea A, Monaci I. Straight ileoanal anastomosis with multiple ileal myotomies as an alternative to pelvic pouch. *Int J Colorectal Dis* 1997;12:261-6.
6. Watanabe T, Kubota Y, Muto T. Substance P containing nerve fibers in ulcerative colitis. *Int J Colorectal Dis* 1998; 13:61-7.
7. Mekjhan HS, Switz DM, Watts HD, Deren JJ, Katon RM, Beman FM. National cooperative Crohn's disease study: Factors determining recurrence of Crohn's disease after surgery. *Gastroenterology* 1979;77:907-13.
8. Rutgeerts P, Geboes K, Vanztrappen G, Beyls J, Sachar DB, Wolfson DM, et al. Risk factors for postoperative recurrence of Crohn's disease. *Gastroenterology* 1983;85: 917-21.
9. Greenstein AJ, Sachar DB, Pasternack BS, Janowitz HD. Reoperation and recurrence in Crohn's colitis and ileocolitis. *N Engl J Med* 1975;293:685-90.
10. Cooke WT, Mallas E, Prior T, Allan RN. Crohn's disease: Course, treatment and long-term prognosis. *Q J Med* 1980;49:363-84.
11. Higgins CS, Allan RN. Crohn's disease of the distal ileum. *Gut* 1980;21:933-40.
12. Trnka YM, Glotzer DJ, Kasdon EJ. Long-term outcome of restorative operation in Crohn's disease. *Ann Surg* 1982;196:345-55.
13. Frikken MJ, Segall MM. The resectional reoperation rate for Crohn's disease in a geneneral community hospital. *Dis Colon Rectum* 1983;26:305-9.
14. Whelan G, Farmer RG, Fazio VW, Goormastic M. Recurrence after surgery in Crohn's disease. *Gastroenterology* 1985;88:1826-33.
15. Rutgeerts P, Geboes K, Vanztrappen G, Beyls J, Kerremans R, Hiele M. Predictability of the postoperative course of Crohn's disease. *Gastroenterology* 1990;99:956-63.
16. Hellers G. Crohn's disease in the Stockholm County (1955 - 1974). *Acta Chir Scand (Suppl)* 1979;490:5-81.
17. Post S, Herfarth C, Bhm E, Timmermanns G, Schumacher H, Schumann G, et al. The impact of disease pattern, surgical management, and individual surgeons on the risk of relaparotomy for recurrent Crohn's disease. *Ann Surg* 1996;223:253-60.
18. Lennard-Jones JE, Stadler GA. Prognosis after resection of chronic regional ileitis. *Gut* 1971;8:332-6.
19. Higgins CS, Allan RN. Crohn's disease of the distal ileum.

- Gut 1980;21:933-40.
20. Lock M, Farmer RG, Fazio VW. Recurrence and reoperation for Crohn's disease: the role of disease location in prognosis. *N Engl J Med* 1981;304:1586-8.
 21. Sachar DB, Wolfson DM, Greenstein AJ. Risk factors for postoperative recurrence of Crohn's disease. *Gastroenterology* 1983;85:917-21.
 22. Speranza V, Simi M, Leardi S, Del Papa M. Recurrence of Crohn's disease: are there any risk factors? *J Clin Gastroenterol* 1986;8:640-6.
 23. De Dombal FT, Burton I, Goligher JC. Recurrence of Crohn's disease after primary excisional surgery. *Gut* 1971;12:519-27.
 24. Persson PG, Ahlborn A, Hellers G. Inflammatory bowel disease and tobacco smoke - a case control study. *Gut* 1990;31:1377-81.
 25. Tobin MV, Logan RF, Langman MJ, McConnell RB, Gilmore IT. Cigarette smoking and inflammatory bowel disease. *Gastroenterology* 1987;93:316-21.
 26. Vessey M, Jewell D, Smith A, Yeates D, McPherson K. Chronic inflammatory bowel disease, cigarette smoking, and use of oral contraceptives: findings in a large cohort study of women childbearing age. *Br Med J Clin Res* 1986;292:1101-3.
 27. Sutherland LR, Ramcharan S, Bryant H, Fick G. Effect of cigarette smoking on recurrence of Crohn's disease. *Gastroenterology* 1990;98:1123-8.
 28. Farmer RG, Hawk WA, Turnbull RB. Clinical patterns in Crohn's disease: a statistical study of 615 cases. *Gastroenterology* 1975;68:627-35.
 29. Lockhart-Mummery HE, Ritchie JK. Large intestine. In: Allan RN, Keighly MRB, Alexander-Williams J, Hawkins C, editors. *Inflammatory bowel disease*. Edinburgh: Churchill Livingstone; 1983. p.462-74.
 30. Kerremans R, Hiele M. Predictability of the postoperative course of Crohn's disease. *Gastroenterology* 1990;99:956-63.
 31. Greenstein AJ, Lachman P, Sachar DB, Springhorn J, Heiman T, Janowitz HD, et al. Perforating and non-perforating indications for repeated operations in Crohn's disease: evidence for two clinical forms. *Gut* 1988;29:588-92.
 32. Caprilli R, Corrao G, Taddei G, Tonelli F, Torchio P, Viscido A. Prognostic factors for postoperative recurrence of Crohn's disease. *Dis Colon Rectum* 1996;39:335-41.
 33. McDonald PJ, Fazio VW, Farmer RG, Jagelman DG, Lavery IC, Ruderman WB, et al. Perforating and non-perforating Crohn's disease. An unpredictable guide to recurrence after surgery. *Dis Colon Rectum* 1989;32:117-20.
 34. Olaison G, Smedh K, Sjåhl R. Natural course of Crohn's disease after ileocolic resection: endoscopically visualised ileal ulcers preceding symptoms. *Gut* 1992;33:331-5.
 35. Hamilton SR, Reese J, Pennington L. The role of resection margin frozen section in the surgical management of Crohn's disease. *Surg Gynecol Obstet* 1985;160:57-62.
 36. Kotanagi H, Kramer K, Fazio VW, Petras RE. Do microscopic abnormalities at resection margins correlate with increased anastomotic recurrence in Crohn's disease? Retrospective analysis of 100 cases. *Dis Colon Rectum* 1991;34:909-16.
 37. Lindhagen T, Ekelund G, Leandor L. Recurrence rate after surgical treatment of Crohn's disease. *Scand J Gastroenterol* 1983;18:405-9.
 38. Wolff BG, Beatr AW, Frydenberg HB. The importance of disease-free margins in resections for Crohn's disease. *Dis Colon Rectum* 1983;26:239-43.
 39. Fazio VW, Marchetti F, Church M, Goldblum JR, Lavery C, Hull TL, et al. The effect of resection margins on the recurrence of Crohn's disease in the small bowel. A randomized controlled trial. *Am Surg* 1996;224:563-71.
 40. Goligher JC. The long-term results of excisional surgery for primary and recurrent Crohn's disease of the large intestine. *Dis Colon Rectum* 1985;28:51-5.
 41. Andrews HA, Lewis P, Allan RN. Prognosis after surgery for colonic Crohn's disease. *Br J Surg* 1989;76:1184-90.
 42. Longo WE, Ballantyne GH, Cahow CE. Treatment of Crohn's colitis. Segmental or total colectomy? *Arch Surg* 1988;123:588-90.
 43. Geoghegan JG, Carton E, O'Shea AM, Astbury A, Sheahan K, O'Donoghue DP, et al. Crohn's colitis: the fate of the rectum. *Int J Colorectal Dis* 1998;13:256-9.
 44. Scholefield JH, Berry DP, Armitage NC, Wastie ML. Magnetic resonance imaging in the management of fistula in ano. *Int J Colorectal Dis* 1997;12:276-9.
 45. Oliver DW, Booth MW, Kernick VF, Irvin TT, Campbell WB. Patient satisfaction and symptom relief after anal dilatation. *Int J Colorectal Dis* 1998;13:228-31.
 46. Horsch D, Kirsch JJ, Weihe E. Elevated density and plasticity of nerve fibres in anal fissures. *Int J Colorectal Dis* 1998;13:134-40.
 47. Ryhammer AM, Laurberg S, Sorensen FH. Effects of age on anal function in normal women. *Int J Colorectal Dis* 1997;12:225-9.
 48. Engel AF, Lunniss PJ, Kamm V, Phillips RK. Sphincteroplasty for incontinence after surgery for idiopathic fistula in ano. *Int J Colorectal Dis* 1997;12:323-5.
 49. Matzel KE, Stadelmaier U, Muehldorfer S, Hohenberger W. Continence after colorectal reconstruction following resection: impact of level of anastomosis. *Int J Colorectal Dis* 1997;12:82-7.
 50. Memon MA, Devine J, Freney J, From SG. Is mechanical bowel preparation really necessary for elective left sided colon and rectal surgery? *Int J Colorectal Dis* 1997;12:298-302.
 51. Nordgren S, McPheeters G, Svaninger G, Oresland T, Hultén L. Small bowel length in inflammatory bowel disease. *Int J Colorectal Dis* 1997;12:230-4.
 52. Ewe K, Herfarth C, Malchow H, Jesdinsky HJ. Postoperative recurrence of Crohn's disease in relation to radicality of operation and sulfasalazine prophylaxis. *Digestion* 1989;42:224-32.
 53. Lee ECG, Papaioannou N. Minimal surgery for chronic obstruction in patients with extensive or universal Crohn's disease. *Ann R Coll Engl* 1982;64:229-33.
 54. Buhr HJ, Kroesen AJ, Herfarth C. Morbus Crohn Rezidiv-Chirurgische therapie. *Chirurg* 1995;66:764-73.

55. Wolff BG, Culp CE, Beart RW, Ilstrup DM, Ready RL. Anorectal Crohn's disease - A long-term perspective. *Dis Colon Rectum* 1985;28:709-11.
 56. Terzioglu T, Yalti T, Tezelman S. The effect of prostaglandin E1 on experimental colitis in the rat. *Int J Colorectal Dis* 1997;12:63-6.
 57. Hampe J, Hermann B, Bridger S, MacPherson AJ, Mathew CG, Schreiber S. The interferon-gamma gene as a positional and functional candidate gene for inflammatory bowel disease. *Int J Colorectal Dis* 1998;13:260-3.
-