

Quality of life after surgery for rectal cancer with special reference to pelvic floor dysfunction

P. Varpe*, H. Huhtinen*, A. Rantala*, P. Salminen*, P. Rautava†, S. Hurme‡ and J. Grönroos*§

*Department of Surgery, Turku University Hospital, †Turku City Hospital, ‡Department of Biostatistics, University of Turku and §Department of Emergency, Turku University Hospital, Turku, Finland

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Abstract

Aim Conventional outcomes such as survival, tumour recurrence and complication rates after surgery for rectal cancer have been rigorously assessed, but the importance of maintaining quality of life (QOL) after surgery for rectal cancer has received less attention. The aim of the current study was to analyse QOL and the occurrence of pelvic dysfunction after the surgical treatment of rectal cancer.

Method Between May 2005 and May 2008, 150 patients with rectal cancer underwent abdominoperineal resection (APR) or anterior resection (AR). Seventy-four answered two preoperative questionnaires. At a follow up of 1 year, 65 were alive without sign of recurrence and answered the same questionnaires: (a) validated RAND 36-item health survey QOL questionnaire; and (b) self-administered disease-related questionnaire with special reference to anorectal and urogenital function.

Results The postoperative general QOL was similar after surgery, and mental functioning was better ($P < 0.001$).

Problems with physical functions were associated with anal dysfunction after AR ($P < 0.001$) and problems with social functioning were associated with urinary dysfunction ($P = 0.038$). At 1 year after surgery, urinary incontinence was worse ($P = 0.026$) after all operations, and the incidence of dysuria was higher after APR than AR ($P = 0.001$). Male sexual function also worsened ($P = 0.060$). Anorectal dysfunction caused more inconvenience among patients who underwent AR ($P = 0.028$). Preoperative radiation was associated with postoperative ejaculation problems ($P = 0.028$) and anal incontinence ($P = 0.012$).

Conclusion Factors affecting QOL and pelvic floor function should be taken into account when making treatment decisions in rectal cancer.

Keywords Anorectal dysfunction, quality of life, rectal cancer, sexual dysfunction, urinary dysfunction

Introduction

Conventional outcomes such as survival, tumour recurrence and complication rates after surgery for rectal cancer have been rigorously assessed [1–3]. The importance of maintaining quality of life (QOL) after operation for rectal cancer has, however, received much less attention. Some earlier studies have indicated that a permanent stoma impairs QOL [4,5], but recent studies found equal or even better QOL in patients after

abdominoperineal resection (APR) than anterior resection (AR) [6,7].

Advances in surgical technique have improved function for patients treated for rectal cancer [8]. After the introduction of the nerve-preserving total mesorectal excision (TME) technique [9], the incidence of urogenital dysfunction has decreased, with percentages between 0 and 40% for bladder dysfunction and between 10 and 70% for sexual dysfunction having been reported [10–12]. The most common symptoms of urinary dysfunction are stress incontinence, urgency, elevated frequency of voiding, difficulty in emptying the bladder, loss of bladder fullness sensation and overflow incontinence. In male patients, sexual dysfunction includes impotence and retrograde ejaculation [12]. The former is often permanent [13]. Information on female sexual function is not easily obtained, but women do have some problems

Correspondence to: Pirita Varpe, Department of Surgery, Turku University Hospital, Luulavuorentie 2, FIN-20700 Turku, Finland.
E-mail: pirita.varpe@tyks.fi

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following colorectal surgery [11]. Bowel dysfunction occurs in 30–70% of patients after AR [7], which is associated with increased frequency, irregular defaecation, urgency, obstructed defaecation and impairment of continence [14,15]. The last of these is multifactorial and is influenced by diminished rectal capacity and compliance, impaired internal anal sphincter tone, and loss of the inhibitory recto-anal reflex [16]. Intersphincteric resection of the rectum leads to impaired postoperative continence and has been shown to cause daytime anal incontinence in 15–54% and nocturnal incontinence in 20–76% of patients [17,18], with impairment of QOL compared with conventional colo-anal anastomosis [19].

We conducted this prospective analysis to assess the influence of rectal cancer surgery regarding general QOL and with a special view to possible anorectal, urinary and sexual dysfunction.

Method

Patients

Between May 2005 and May 2008, a total of 150 patients with histologically proved rectal cancer underwent either APR or AR at Turku University Hospital. The intention was to give two QOL questionnaires to all patients undergoing a radical operation for rectal cancer. Many patients declined to participate owing to the intimacy of some of the questions, a few patients were not Finnish speaking and some did not complete the questionnaire preoperatively, preventing the comparison of pre- and postoperative QOL scores. A total of 74 radically operated patients answered the preoperative questionnaire. Four patients died during the first postoperative year, one with hereditary nonpolyposis colorectal cancer underwent subtotal colectomy and was thus excluded from the analysis, and three were excluded at 1 year after surgery owing to the occurrence of metastatic disease. Preoperative questionnaires were completed in the department before the operation, and the follow-up questionnaires were completed 1 year after the operation during the annual postoperative visit.

At 1 year, 66 patients (33 male patients and 33 female patients; mean age 68 years, range 42–86 years) out of the 69 patients who met the inclusion criteria were alive without any signs of recurrent disease. All but one completed the second questionnaire. Forty-four of these patients had had AR and 21 an APR. Patient and tumour characteristics related to both operations are shown in Table 1. There were no significant differences between the operation groups regarding age, gender or tumour stage. Thirty-two (46%) patients did not receive preoperative radiotherapy because of higher tumour level, stage I

Table 1 Patient and rectal tumour characteristics according to operation ($n = 69$).

	AR ($n = 47$)	APR ($n = 22$)	P-value
Gender: M/F	21/26	12/10	0.444
Mean age (range; years)	68 (42–86)	69 (44–84)	0.722
Level of tumour			
Upper rectum (11–15 cm)	10 (21%)	0	< 0.001
Middle rectum (7–11 cm)	19 (40%)	0	
Lower rectum (0–7 cm)	18 (39%)	22 (100%)	
Tumour classification			
Stage 1 (T1–2N0M0)	10 (21%)	5 (23%)	0.565
Stage 2 (T3–4N0M0)	21 (45%)	7 (32%)	
Stage 3 (T1–4N1–2M0)	16 (34%)	10 (45%)	
Stage 4 (M1)	0	0	
Preoperative radiotherapy			
No radiotherapy	27 (57%)	5 (23%)	0.004
Short course (25 Gy)	13 (28%)	10 (45%)	
Long course (50 Gy) chemoradiation	7 (15%)	7 (32%)	

AR, anterior resection; APR, abdominoperineal resection.

tumour or earlier pelvic radiotherapy (Table 1). The postoperative complication rate did not differ between the operation groups. There were also no significant differences between nonparticipant ($n = 76$) and participant patients ($n = 74$) regarding age, tumour stage, the operation (APR *vs* AR) or mortality within the first postoperative year.

Questionnaires

Quality of life was measured using a validated Finnish version [20] of the RAND 36-item health survey QOL questionnaire [21]. A second self-administered, disease-related questionnaire (Appendix) was used to assess bowel, urinary and sexual function.

The RAND-36 is a multidimensional questionnaire consisting of 36 questions that assess eight dimensions of health from the patient's viewpoint. These measure role limitations as a result of physical (RP) or emotional problems (RE), physical functioning (PF), energy and vitality (EV), mental functioning (MF), social functioning (SF), body pain (BP) and general health perception (HP). The scoring scale ranges from 0 to 100, with high scores indicating a high level of functioning and good QOL. The RAND-36 has been validated for use in postoperative patients, and its reliability and validity have been proved [22].

Function was measured with a self-administered, disease-related questionnaire (see Appendix). Anorectal symptoms included defaecation frequency, presence of hard stools, diarrhoea, the use of laxatives, difficult evacuation and faecal incontinence. Urinary symptoms included incomplete bladder emptying, urgency, dysuria and incontinence. Questions on satisfaction with sex life and dyspareunia were asked of both genders. In male patients, sexual problems were divided into ejaculatory (missing or retrograde ejaculation) and erectile dysfunction (impotence and need for medication to improve erection). Pelvic pain after the operation was evaluated by symptom frequency and the effect on the patient's daily life.

Open AR and APR with TME [9] were used. For a low colorectal anastomosis, side-to-end technique was used where possible. If a temporary stoma was used, it was closed 6–8 months after the initial operation. The intersphincteric technique or cylindrical abdominoperineal excision were not used. Preoperative radio- or radiochemotherapy was routinely offered to patients with a T3 or T4 rectal cancer in the low or mid rectum. The standard radiotherapy was short-course treatment (5 × 5 Gy fractions; 25 Gy total). For locally fixed tumours, we used long-course radio- or radiochemotherapy (for 5 weeks; 50.4 Gy). Surgery was performed within 1 week after the short course and within 5–8 weeks of long-course treatment. Postoperative adjuvant treatment was offered to patients without severe comorbidity who had stage III or IV disease.

Statistical analysis

Continuous variables are given using median and range and categorical variables as frequency and percentage. The association between categorical variables was statistically tested using Pearson's χ^2 test, and the differences between time points in categorical variables were determined using McNemar's test or Bowker's test of symmetry. Differences of age between the operation groups were tested using the *t*-test. When parametric analysis was appropriate, differences in QOL between time points, operation groups, anorectal, urinary and sexual dysfunction groups were analysed using repeated measurements [ANOVA (PF, EV, HP)]. Where the distribution was nonparametric, the Mann–Whitney *U*-test and Wilcoxon's signed rank test were used for single and paired data. Bonferroni's method was used to correct the *P*-values when appropriate. A *P*-value less than 0.05 was considered to be statistically significant. Statistical analyses were performed using SAS System for Windows, Version 9.2 (SAS Institute Inc., Cary, North Carolina, USA).

Results

The general QOL at 1 year was similar when compared with preoperative QOL, and MF was better ($P < 0.001$; Fig. 1). There was no difference in the QOL between the operation groups (Fig. 2). Preoperative radiation had no influence on the QOL. At 1 year, there were no significant differences between anorectal symptoms of frequency, presence of hard stools, diarrhoea and the use of laxatives among patients who underwent AR compared

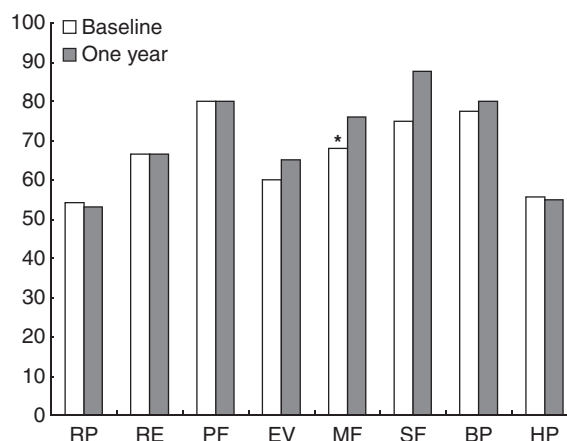


Figure 1 Quality of life in patients with rectal cancer surgery pre- and 1 year postoperatively ($n = 69$ and 65 , respectively). (The median values of different RAND-36 QOL scores.) RP, role limitations as a result of physical problems; RE, role limitations as a result of emotional problems; PF, physical functioning; EV, energy and vitality; MF, mental functioning; SF, social functioning; BP, body pain; HP, general health perception (* represents statistical significance).

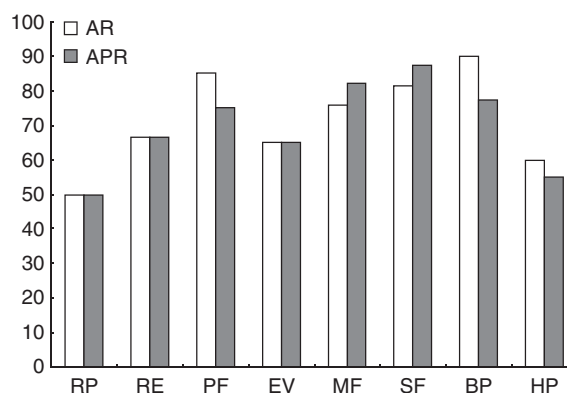


Figure 2 Quality of life 1 year after abdominoperineal resection (APR; $n = 21$) and anterior resection (AR; $n = 44$). (The median values of different RAND-36 QOL scores.) RP, role limitations as a result of physical problems; RE, role limitations as a result of emotional problems; PF, physical functioning; EV, energy and vitality; MF, mental functioning; SF, social functioning; BP, body pain; HP, general health perception.

with the preoperative evaluation. Sixteen (36%) of the AR patients had major anal dysfunction such as anal incontinence, urgency, daily constipation or frequency > 5 times per day after 1 year, but 15 (34%) patients already had dysfunction preoperatively ($P = 0.491$). One year after surgery, patients having had preoperative radiation suffered from more severe faecal incontinence than those without ($P = 0.012$). When AR patients were asked whether defaecation-related symptoms disturbed their daily life, worse symptoms were reported at 1 year ($P = 0.028$). In QOL analysis, problems with physical function were associated with anal dysfunction after AR ($P < 0.001$).

Thirty-three (51%) patients reported a degree of urinary dysfunction at 1 year, but 27 (42%) had already reported these symptoms preoperatively. There was no significant difference between incomplete bladder emptying, urgency or dysuria, but urinary incontinence worsened ($P = 0.026$). Gender had no significant impact on urinary incontinence (seven female patients, six male patients). The incidence of dysuria was higher after APR compared with AR ($P = 0.001$). Preoperative radiation seemed to be associated with incomplete bladder emptying ($P = 0.076$; Fig. 3). Problems with SF were associated with urinary dysfunction ($P = 0.038$).

Fifty-six (86%) patients (30 male patients, 26 female patients) answered the questions regarding sexual func-

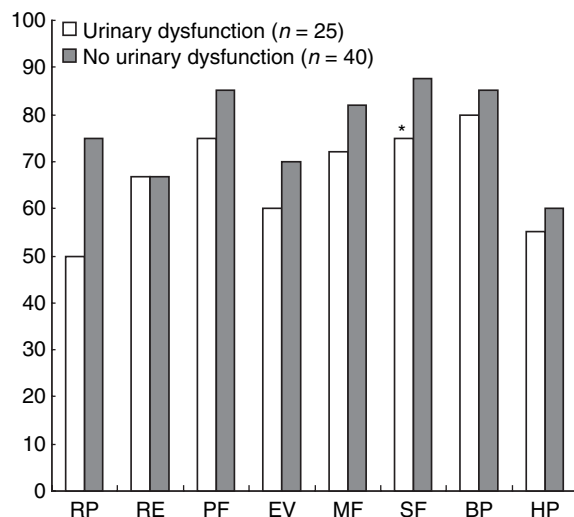


Figure 3 Quality of life after rectal cancer surgery with respect to urinary dysfunction. (The median values of different RAND-36 QOL scores.) RP, role limitations as a result of physical problems; RE, role limitations as a result of emotional problems; PF, physical functioning; EV, energy and vitality; MF, mental functioning; SF, social functioning; BP, body pain; HP, general health perception (* represents statistical significance).

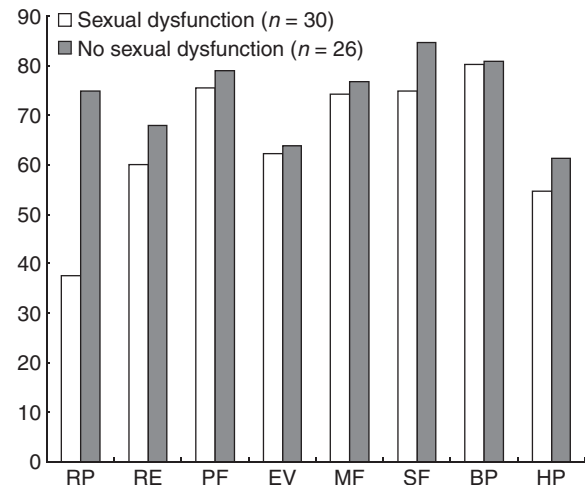


Figure 4 Quality of life after rectal cancer surgery with respect to sexual dysfunction. (The median values of different RAND-36 QOL scores.) RP, role limitations as a result of physical problems; RE, role limitations as a result of emotional problems; PF, physical functioning; EV, energy and vitality; MF, mental functioning; SF, social functioning; BP, body pain; HP, general health perception.

tion. Of these, 48 (86%) were sexually active preoperatively. Twelve (46%) women were satisfied with their sex life preoperatively and 10 (38%) after surgery ($P = 0.531$). Twenty men (67%) reported satisfactory preoperative sex life, but only 11 (37%) were satisfied postoperatively ($P = 0.039$). At 1 year, there was a trend towards worse sexual function ($P = 0.06$). Male patients having preoperative radiation had more problems with ejaculation ($P = 0.028$). Four men referred to physical problems and three to emotional problems, while the remainder ($n = 12$) found no association between disturbances of sexual function. Sexual dysfunction did not cause a statistically significant worsening of QOL (Fig. 4).

The occurrence of pelvic pain was similar between APR and AR ($P = 0.788$). Patients with a stoma reported no major stoma-related problems.

Discussion

Recent developments have decreased morbidity and mortality in patients with rectal cancer [1–3]. Advances in surgical technique have improved functional results [8], and the importance of maintaining QOL after operation has been emphasized. In the present study, there was no difference between pre- and postoperative general QOL, and MF was even better postoperatively. Postoperative pelvic dysfunction was associated with an impaired QOL in some dimensions, including SF, with

urinary dysfunction after both operation and PF with anorectal dysfunction after AR.

The explanation of the similarity regarding pre- and postoperative general QOL may be preoperative symptoms and distress in addition to the 'response shift' phenomenon at 1 year after the operation. The 'response shift' means that patients who have survived a life-threatening disease seem to develop a conscious awareness leading to positive appreciation of everyday life [23].

Major bowel dysfunction (urgency, frequency, incontinence or constipation) is reported to occur in 30–70% of patients after AR [7]. In our study, 16 (36%) of 44 AR operated patients had major anal dysfunction at 1 year after the operation. There was no statistically significant difference between the pre- and postoperative occurrence of bowel dysfunction. This may be explained by the time point of completion of the first questionnaire, as at that time the patients suffered from anorectal dysfunction caused by their rectal tumour. Comparable to the earlier studies [5,7], the patients with a permanent stoma had a similar QOL to AR patients.

Permanent major urinary dysfunction has been uncommon after the introduction of nerve-preserving TME. However, the incidence of minor urinary dysfunction has decreased slightly and varies between 0 and 40% [10–12]. In our study, 33 (51%) patients reported some degree of urinary dysfunction at 1 year postoperatively, but 27 (42%) had already reported these symptoms preoperatively. Postoperative urinary incontinence has been reported to be associated with preoperative incontinence and female sex [24]. In our study, urinary incontinence worsened at 1 year after operation, but was not associated with gender.

Eighteen (27%) patients in the study were either sexually inactive or unwilling to answer the questions about sexual function and therefore could not be included in this part of the analysis. After rectal cancer surgery, impotence rates range from 20 to 46%, and 20–60% of potent patients are unable to ejaculate [12]. In our study, 21 (70%) patients reported sexual dysfunction at 1 year postoperatively, but 17 (57%) had already experienced this preoperatively. At 1 year there was a trend towards worse sexual function, but this did not attain statistical significance. The various reasons for sexual dysfunction advanced by the male patients is in line with the multifactorial nature of sexual dysfunction after the surgical treatment of rectal cancer [25]. In the current study, female patients reported no changes in their sex life after surgery for rectal cancer. Information on female sexual function is not easily obtained [11]. It may be clinically important that sexual dysfunction did not impair QOL in our study. This may be due, however, to the relatively weak correlation between sexual function and

RAND-36 possibly underestimating the effect of sexual dysfunction on the overall QOL [22].

Preoperative short-course radiotherapy has been shown to increase the risk of urinary dysfunction [26], impair anorectal function [27,28] and increase the incidence of sexual dysfunction [25]. However, there are also controversial reports in the literature regarding these issues [29]. In the present study, there was a trend towards impaired bladder emptying in the patients who underwent preoperative radiation therapy. Similarly, preoperative radiation was associated with more severe anal incontinence, and male patients with preoperative radiation had more problems with ejaculation.

The weakness of the present study is a relatively small number of patients, resulting in an underpowered comparison of small subgroups. In addition, more significant differences might be found by using more detailed, validated questionnaires for urinary, anorectal and sexual dysfunctions. Despite these weaknesses of our study, pelvic dysfunction caused by radiation and surgery was shown to cause impairment of QOL in rectal cancer patients at 1 year after the operation.

Conclusion

Factors affecting QOL and pelvic floor function must be taken into account when making treatment decisions in rectal cancer. Adequate preoperative information is important in increasing patient tolerance regarding these postoperative symptoms.

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Appendix Questionnaire with special reference to pelvic floor dysfunction

Anorectal function

1. How often do you defecate? _____ Times/day
2. Please answer the questions by circling the number that best applies to you.

	Never	Sometimes	Often
Have you had constipation?	1	2	3
Have you used laxatives?	1	2	3
Have you had diarrhoea?	1	2	3
Have you had anal incontinence?	1	2	3
Have you had flatal incontinence?	1	2	3
Have you had pain when you defecate?	1	2	3
Have you had difficulties to evacuate?	1	2	3
Have anorectal difficulties disturbed your daily life?	1	2	3
Have you had pelvic pain?	1	2	3
Has pelvic pain disturbed your daily life?	1	2	3

Urinary function

3. Please answer the questions by circling the number that best applies to you.

	Never	Sometimes	Often
Have you had problems with bladder emptying?	1	2	3
Have you had incomplete bladder emptying?	1	2	3
Have you been 'in a hurry' with bladder emptying?	1	2	3
Have you had urinary incontinence?	1	2	3
Have you had pain associated with bladder emptying?	1	2	3

Sexual function

4. Are you satisfied with your sex life? ____ yes ____ no

5. Have you had dyspareunia? ____ yes ____ no

Next questions are only for men

6. Please answer the questions by circling the number that best applies to you.

	Never	Sometimes	Often
Have you had impotence?	1	2	3
Have you had erection problems?	1	2	3
Have you used medicines for erection problems?	1	2	3
Have you got any other treatment for erection problems?	1	2	3
Have you had ejaculation problems?	1	2	3
Have you had ejaculation too early?	1	2	3