

Quality of life after proctocolectomy and ileal pouch-anal anastomosis in patients with ulcerative colitis

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Abstract

Purpose While ileal pouch-anal anastomosis is performed in many patients with ulcerative colitis, conflicting data exist about its effects on quality of life. We aimed to determine quality of life and to identify risk factors for impaired quality of life in these patients.

Methods Forty-eight of 82 patients (59 %; median follow-up 57 months [range 21–93 months]) after ileal pouch-anal anastomosis for ulcerative colitis were compared to 48 matched healthy controls. Generic, health-, and disease-related, as well as symptom-specific quality of life was analyzed using five well-established quality of life instruments.

Results Although generic quality of life was comparable between groups, health-related quality of life was impaired after ileal pouch-anal anastomosis. While high stool frequency was associated with impaired health-related and disease-specific quality of life, fecal incontinence and history of pouchitis also caused a deterioration of generic and symptom-related quality of life. Seventy-seven percent of patients reported their quality of life to be better compared to the situation before surgery and 88 % would undergo ileal pouch-anal anastomosis again.

Conclusions Overall quality of life after ileal pouch-anal anastomosis is good. However, high stool frequency, fecal incontinence, and pouchitis are associated with impaired quality of life and should be prevented or treated to the best possible extent.

Keywords Ileal pouch-anal anastomosis · Proctocolectomy · Quality of life · Ulcerative colitis

Introduction

Proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the standard operation for patients with ulcerative colitis with documented or strongly suspected carcinoma or medically intractable disease [1–3]. Short-term outcome after IPAA is substantially affected by postoperative complications, such as anastomotic leakage and pelvic sepsis, while one of the most important determinants of long-term outcome is patients' quality of life (QoL) [4]. Although several studies indicate that QoL after IPAA for ulcerative colitis is in a large part, comparable with QoL in healthy controls, clinical practice teaches us that there are subgroups of patients who suffer from a significant deterioration of QoL after IPAA [5, 6]. In order to help these patients specifically, it is mandatory to identify the underlying mechanisms that cause this impairment of QoL. Therefore, our first aim was to compare the QoL of patients after IPAA with healthy controls by using different, validated QoL instruments that allow to discriminate between changes in generic, health-, disease-, and symptom-specific QoL. Second, we aimed to identify specific factors that may have detrimental effects on QoL in IPAA patients.

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Methods

Patients

Eighty-two consecutive patients with ulcerative colitis who underwent open, proctocolectomy with IPAA between January 1st 1996 and December 31st 2003 were identified in the computerized database of the Department of Surgery at the University Hospital Munich-Grosshadern. All patients

underwent an elective, open, two-stage operation with creation of a temporary loop-ileostomy, and stapled IPAA. A standardized, custom-made questionnaire evaluating general and disease-specific parameters (e.g., frequency and consistency of bowel movements, use of constipating drugs, fecal incontinence, pouchitis, and overall satisfaction) together with established QoL questionnaires were sent to all patients. If patients did not respond to the survey, the questionnaire was sent out two more times, before patients were contacted by a telephone call. Forty-eight patients (59 %) responded to this survey. At the time of follow-up, two patients had died due to a cardiac event and the current place of residence could not be determined in two other patients. All ostomies were closed in IPAA patients at the time of follow-up. Patients at least 12 months after uncomplicated, open appendectomy for acute appendicitis, served as “healthy controls” in order to characterize QoL of IPAA patients in general. Patients after appendectomy were matched for gender and age at time of surgery (“matched pairs”). Gender was neglected only when no gender-matched control patient with ± 5 years of age of the according IPAA patient was available. To identify risk factors for impaired QoL in IPAA patients, subgroup analyses were performed and groups of IPAA patients were generated depending on stool frequency, the presence of fecal incontinence, history of pouchitis, and the age at the time of IPAA. The study was approved by the Ethics Committee at the University of Munich, and written informed consent was received from all patients.

QoL questionnaires

The Short Form 36 (SF-36) was used to study generic QoL [7]. This instrument comprises 36 questions evaluating QoL on eight subscales: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. The Cleveland Global Quality of Life Instrument (CGQLI) was developed by Fazio et al. to study QoL in IPAA patients [8]. This instrument measures health-related QoL and consists of the three subscales current QoL, quality of health, and energy level, and an overall score is calculated from these three subscales. The Gastrointestinal QoL Index (GIQLI) is also measuring health-related QoL, but is more complex consisting of 36 questions focusing on gastrointestinal disorders [9, 10]. It consists of the five subscales gastrointestinal symptoms, emotional status, physical function, social function, and distress by medical treatment, that are all summarized in an overall score. Questions concerning gastrointestinal symptoms have the strongest effect on the final score as they represent 53 % of the questionnaire. The disease-specific Short Inflammatory Bowel Disease Questionnaire (SIBDQ) consists of 32 questions measuring QoL on the domain's bowel, systemic, emotional, and social functioning as well as an overall score. This instrument has

been used frequently to study QoL in patients with ulcerative colitis [11–13]. As this is a disease-specific questionnaire, this instrument could only be used in IPAA patients and not in the control group. The Fecal Incontinence Quality of Life Scale (FIQLS) by Rockwood et al. was used as a “symptom-specific score” to study the effect of fecal incontinence on QoL in IPAA patients [14]. This instrument comprises 28 questions and evaluates QoL on the four subscales lifestyle, coping/behavior, depression, and embarrassment.

Statistical analysis

For data analysis, IPAA patients were compared with control patients after appendectomy. To identify the effect of specific variables on patients' QoL, subgroups of IPAA patients were created according to age, frequency of bowel movements, history of pouchitis, and fecal incontinence as defined by Browning and Parks [15]. Patients' characteristics are reported as median [range] while results of the QoL questionnaires are given as mean \pm standard deviation. To facilitate data interpretation, the scores of the different scales are reported as percentages of the maximum possible score on each scale with 100 % representing “best” and 0 % “worst” possible QoL on each scale. Groups were compared by Mann–Whitney rank sum test or χ^2 -test. A *p* value of less than 0.05 was considered as statistically significant and a Bonferroni correction for multiple comparisons was performed when applicable.

Results

Patients' characteristics

Characteristics of IPAA patients (responders and non-responders) and controls, indication for IPAA, and postoperative complications are summarized in Table 1. There were no differences between responders and non-responders after IPAA and control patients and there was no postoperative mortality in all groups. Median follow-up was 57 months [range 21–93 months] in responding IPAA patients and 23 months [16–31 months] in controls. To determine differences in stool frequency between groups as well as the effect of stool frequency on patients' QoL, patients were categorized in patients with less than four, four to six, and more than six bowel movements per 24 h. Stool frequency was higher in IPAA patients with 17 IPAA patients (35 %) reporting four to six and 31 patients (65 %) reporting more than six bowel movements per day, while all control patients had only one to three bowel movements per 24 h (*p* < 0.05). Forty IPAA patients (83 %) reported a median of 1.9 [0–8] bowel movements at night while only one patient (2 %) in the control group had one bowel movement during night time (*p* < 0.05).

Table 1 Patients' characteristics

<i>n</i>	IPAA 48	Controls 48	Non-responders after IPAA 34	<i>p</i> Value
Gender	32 m:16 f	28 m:20 f	24 m:10 f	NS
Median age at surgery [range]	38 years [23–61 years]	41 years [16–73 years]	46 years [21–81 years]	NS
Median follow-up [range]	57 months [2–93 months]	23 months [16–31 months]	48 months [19–92 months]	NS
Time from stoma closure to survey	50 months [17–88 months]	–	42 months [15–84 months]	NS
Indication for IPAA				
Dysplasia	21 (43 %)	–	12 (35 %)	NS
Cancer	9 (18 %)	–	7 (22 %)	NS
Stenosis	3 (7 %)	–	2 (6 %)	NS
Refractory disease	15 (32 %)	–	13 (37 %)	NS
ASA status (I/II/III)	12:77:11 %	17:75:8 %	8:66:26 %	NS
Postoperative complications				
Wound infection	8 (16 %)	3 (6 %)	5 (14 %)	NS
Urinary tract infection	2 (4 %)	1 (2 %)	1 (3 %)	NS
Prolonged ileus	3 (6 %)	2 (4 %)	3 (9 %)	NS
Anastomotic leak	4 (8 %)	–	2 (6 %)	NS
Intraabdominal abscess	2 (4 %)	1 (2 %)	2 (6 %)	NS
Postoperative hemorrhage	1 (2 %)	0 (0 %)	0 (0 %)	NS
Stoma complications	3 (6 %)	–	2 (6 %)	NS
Revisional operation	4 (8 %)	0 (0 %)	3 (9 %)	NS
Anastomotic stricture requiring mechanical dilatation	9 (18 %)	–	5 (16 %)	NS

Mann–Whitney rank sum test or χ^2 test was used for statistical analysis comparing IPAA patients with controls

Twenty-two IPAA patients (46 %) were under one or more constipating drugs at time of follow-up (loperamide ($n=10$), tincture of opium ($n=14$), ispaghula ($n=9$)), while no patient in the control group was under constipating medication ($p<0.05$). For analysis of stool consistency, the numbers of IPAA patients and controls with either liquid, soft, semisolid, or solid were compared. Stool consistency was less solid in IPAA compared to control patients. Liquid, soft, semisolid, and solid stools were reported by 5 (10 %), 32 (67 %), 11 (23 %), and 0 (0 %) IPAA patients, respectively, while no control patients (0 %) reported liquid stools, 3 (6 %) reported soft, 17 (35 %) semisolid, and 28 (58 %) solid stools (all $p<0.05$). Fecal incontinence was measured according to the definition by Parks using four categories: continent for solid and liquid stool and for gas, continent for solid and liquid stool but incontinent for gas, continent for solid stool but incontinent for liquid stool and gas, and incontinent for solid stool [15]. The rate of fecal incontinence was higher in IPAA compared to control patients. Thirty-six (75 %) IPAA patients reported to be continent, while seven (15 %) reported incontinence for gas and five (10 %) for liquid stools. In the control group, 45 patients (94 %) reported normal fecal continence, while two patients (4 %) reported incontinence for gas and one patient (2 %) for liquid stools (all $p<0.05$). Thirty-one IPAA patients (65 %) experienced at least one episode of pouchitis

and all patients underwent successful medical treatment. No patient reported pouchitis at the time of the survey and the shortest interval from the last episode of pouchitis to follow-up was 8 months. When patients were asked about the subjective effect of IPAA on their QoL, 38 patients (79 %) reported their QoL to be better, eight patients (17 %) to be comparable, and two patients (4 %) to be worse compared to the situation before IPAA. Forty-two patients (88 %) would choose to undergo IPAA again in the same situation as before surgery.

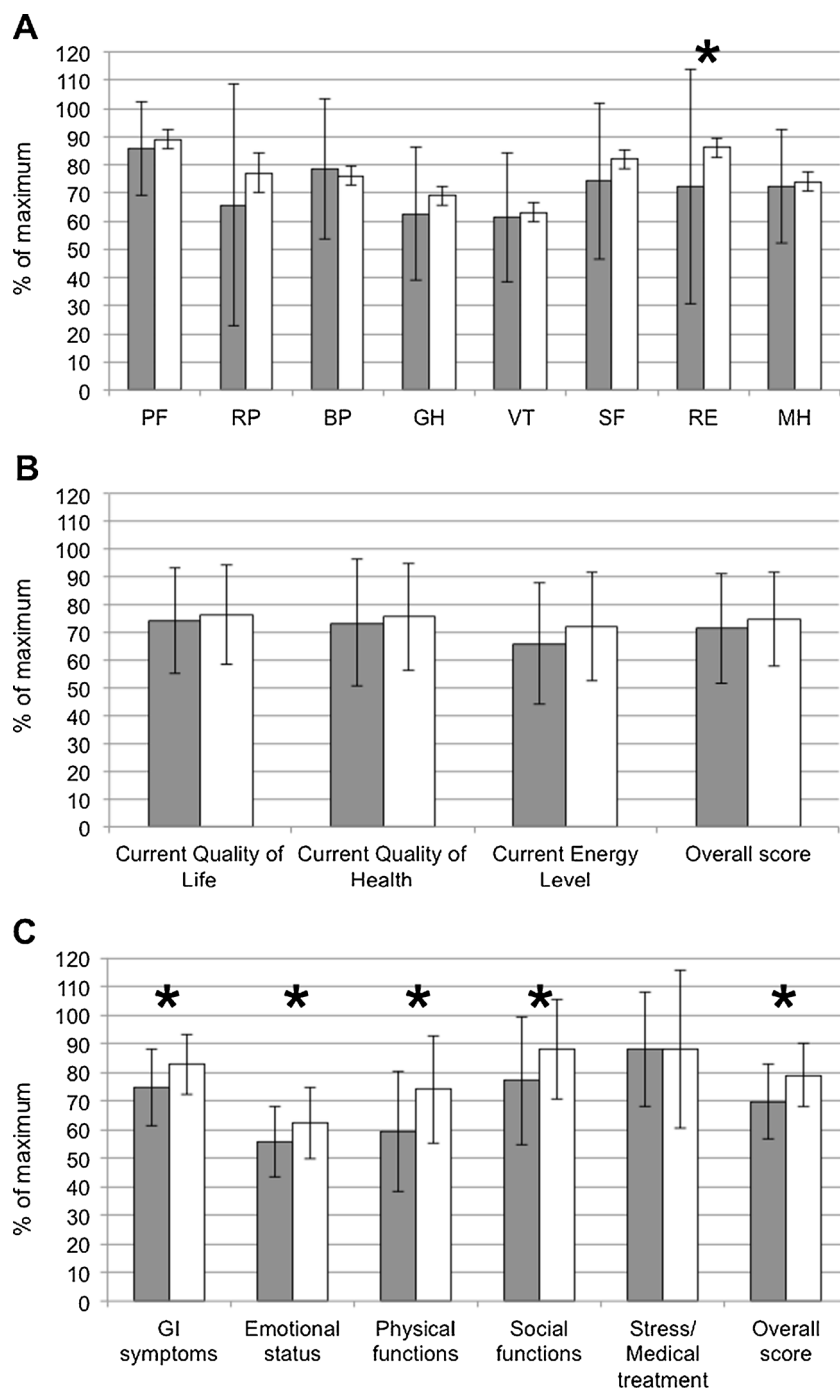
QoL in IPAA patients vs. healthy controls

Generic QoL (SF-36) was, in a large part, comparable between groups; however, QoL was impaired on the subscale “role emotional” in IPAA patients (72 ± 41 vs. 86 ± 3 ; $p<0.05$; Fig. 1a). While the CGQLI did not reveal any differences between groups (Fig. 1b), the GIQLI demonstrated impaired health-related QoL on all subscales and the overall score except on “stress/medical treatment” for IPAA patients (Fig. 1c).

Effect of stool frequency on QoL in IPAA patients

To determine the effect of the stool frequency on QoL, IPAA patients with four to six bowel movements ($n=17$; 35 %) were

Fig. 1 Comparison of QoL of IPAA patients (gray; $n=48$) and healthy control patients (white; $n=48$). **a** Generic quality of life (SF-36): IPAA patients experienced impaired QoL on the subscale “role emotional (RE)”. *PF* physical functioning, *RP* role physical, *BP* bodily pain, *GH* general health, *VT* vitality, *SF* social functioning, and *MH* mental health. **b** Health-related QoL measured by CGQLI: QoL was comparable between groups. **c** Health-related QoL measured by GIQLI: QoL was impaired in IPAA patients on all subscales except on the subscale “stress/medical treatment”. *GI* gastrointestinal



Comparison of QoL of IPAA patients (grey; $n=48$) and healthy controls (white; $n=48$); Mean \pm SD; * $p<0.05$

compared with IPAA patients with more than six bowel movements per 24 h ($n=31$; 65 %). Despite a trend towards impaired QoL of patients with more than six bowel movements per day on most subscales, stool frequency had no significant effect on generic (SF-36) and health-related QoL as measured by the CGQLI (Fig. 2a and b; $p=NS$). Differently, the GIQLI revealed impaired QoL on the subscales “gastrointestinal symptoms” (80 ± 9 vs. 71 ± 13) and

“physical functions” (67 ± 18 vs. 55 ± 19) in IPAA patients with more than six bowel movements per day when compared to IPAA patients with a lower stool frequency (both $p<0.05$; Fig. 2c). High stool frequency was also associated with impaired QoL on the subscales “emotional” (77 ± 15 vs. 66 ± 22) and “social” functioning (92 ± 10 vs. 82 ± 18) of the SIBDQ, resulting in impaired QoL also on the overall score (82 ± 12 vs. 73 ± 16 ; all $p<0.05$; Fig. 2d).

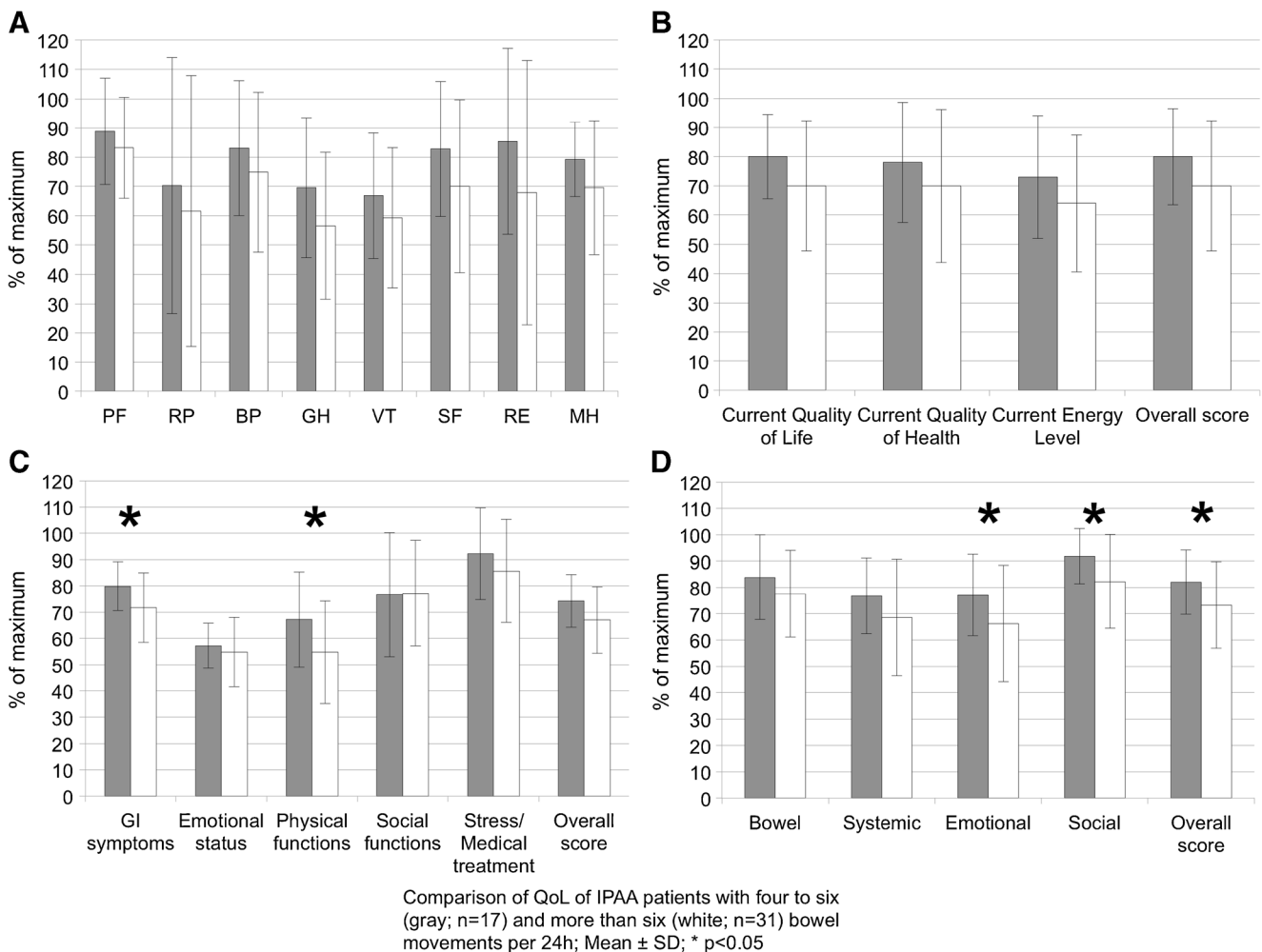


Fig. 2 Comparison of QoL of IPAA patients with four to six (gray; $n = 17$) and more than six (white; $n = 31$) bowel movements per 24 h. **a** Generic QoL (SF-36): There was a trend towards impaired QoL in patients with higher stool frequency on all subscales. *PF* physical functioning, *RP* role physical, *BP* bodily pain, *GH* general health, *VT* vitality, *SF* social functioning, *RE* role emotional, and *MH* mental health. **b** Health-related QoL measured by CGQLI: a trend towards impaired

QoL in patients with higher stool frequency was observed on all subscales and the “overall score”. **c** Health-related QoL measured by GIQLI: QoL was impaired on the subscales “gastrointestinal (GI) symptoms” and “physical functions”. **d** Disease-specific QoL (SIBDQ): Patients with more than six bowel movements per 24 h had impaired QoL on the subscales “emotional” and “social” function and the “overall score”

Effect of fecal incontinence on QoL in IPAA patients

Twelve IPAA patients (25 %) reported fecal incontinence for gas, liquid, or solid stools and were compared to IPAA patients who did not report any signs of fecal incontinence ($n = 36$; 75 %). Fecal incontinence had a negative effect on generic QoL (SF-36) on the subscales “physical functioning” (90 ± 13 vs. 72 ± 18), “role physical” (76 ± 38 vs. 32 ± 21), and “bodily pain” (83 ± 23 vs. 64 ± 26 ; all $p < 0.05$; Fig. 3a). Health-related QoL measured by the CGQLI was also impaired on all measured items: “current quality of life” (78 ± 19 vs. 63 ± 17), “current quality of health” (78 ± 21 vs. 58 ± 21), “current energy level” (70 ± 22 vs. 55 ± 20), and the “overall score” (80 ± 18 vs. 60 ± 17 ; all $p < 0.05$; Fig. 3b). Moreover, health-related and disease-specific QoL as measured by the GIQLI and SIBDQ were impaired on the subscales “gastrointestinal symptoms”

(78 ± 11 vs. 66 ± 12), “physical functions” (63 ± 20 vs. 47 ± 15) and “bowel” (85 ± 16 vs. 62 ± 22) resulting in impaired “overall scores” of both instruments (GIQLI: 72 ± 12 vs. 62 ± 9 ; SIBDQ: 80 ± 13 vs. 67 ± 5 ; Fig. 3c and d; all $p < 0.05$). The symptom-specific FIQLS showed impaired QoL on the subscales “lifestyle” (69 ± 3 vs. 54 ± 19), “coping/behavior” (68 ± 2 vs. 50 ± 20), and “embarrassment” (76 ± 1 vs. 59 ± 19 ; all $p < 0.05$), while there was only a trend towards impaired QoL on the subscale “depression” (73 ± 2 vs. 63 ± 18 ; $p = \text{NS}$; Fig. 3e).

Effect of pouchitis on QoL in IPAA patients

Sixteen IPAA patients (33 %) reported at least one episode of pouchitis in the past, while 32 IPAA patients (67 %) never experienced pouchitis so far. A history of pouchitis had a

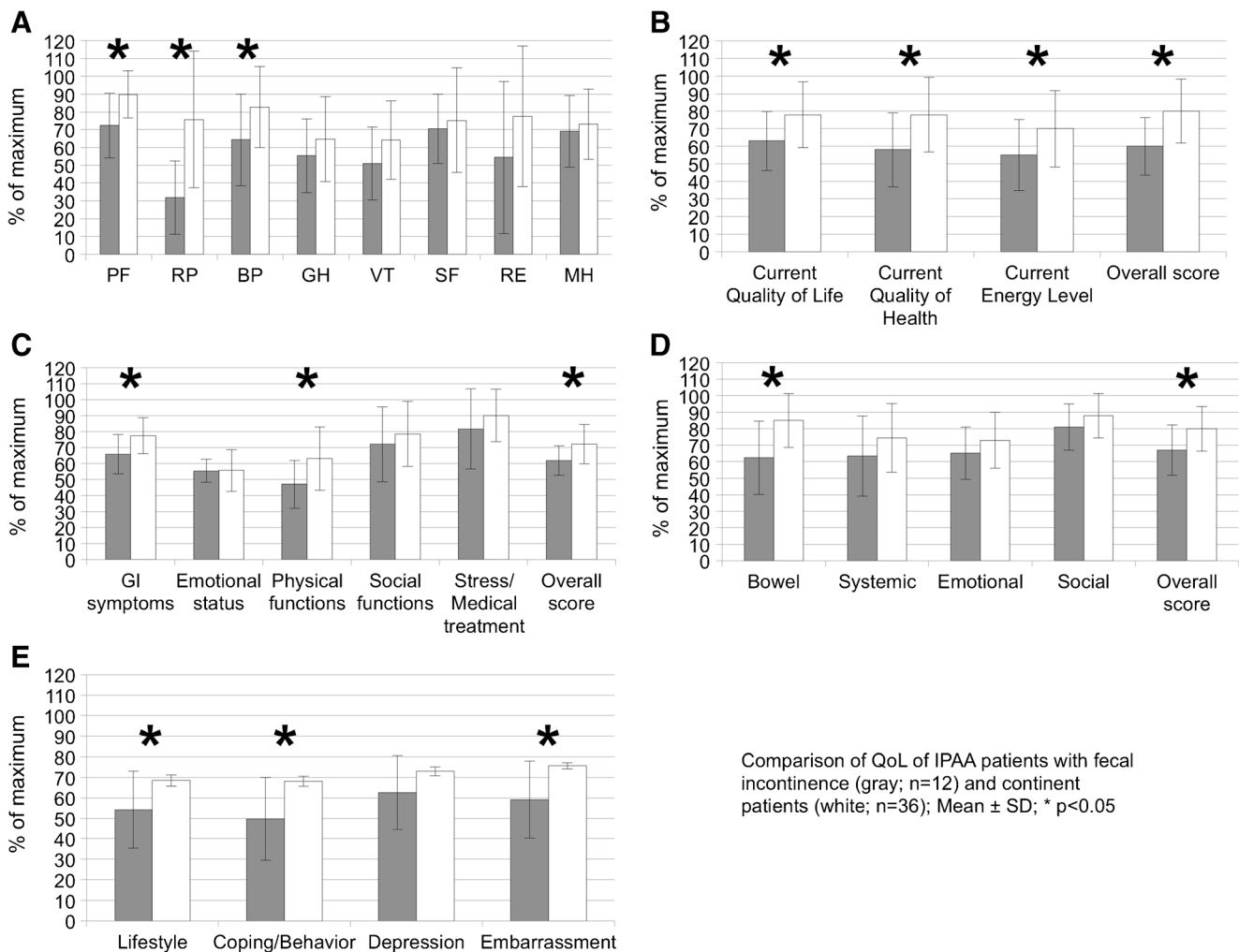


Fig. 3 Comparison of QoL of IPAA patients with fecal incontinence (gray; $n=12$) and continent patients (white; $n=36$). **a** Generic QoL (SF-36): Patients experiencing fecal incontinence reported impaired QoL on the subscales “physical functioning (PF)”, “role physical (RP)”, and “bodily pain (BP).” *GH* general health, *VT* vitality, *SF* social functioning, *RE* role emotional, and *MH* mental health. **b** Health-related QoL measure by CGQLI: QoL was impaired in incontinent patients on all subscales and the “overall score.” **c** health-related QoL measured by GIQLI:

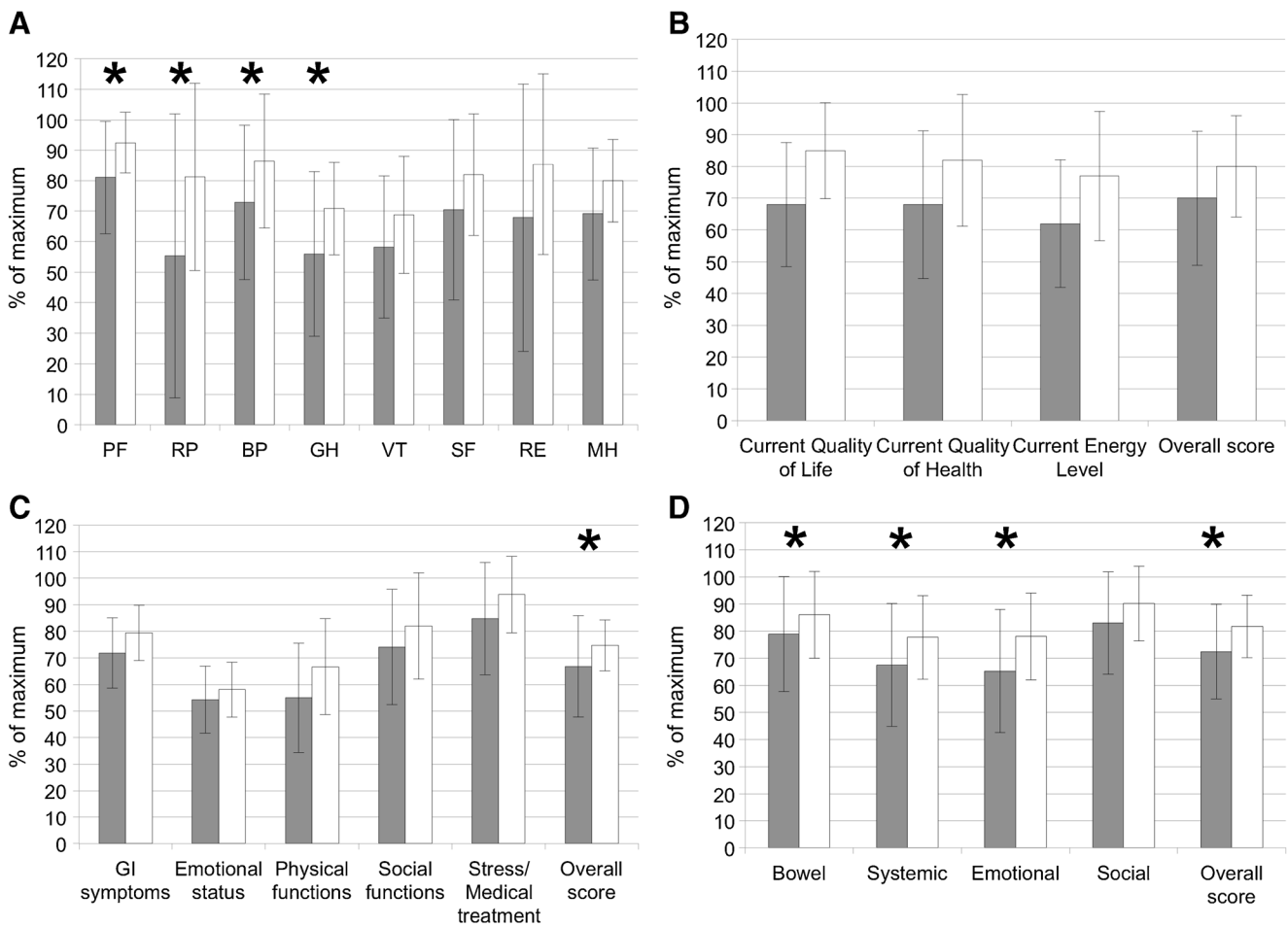
Incontinent patients reported impaired QoL on the subscales “gastrointestinal (GI) symptoms,” “physical functions,” and the “overall score.” **d** Disease-specific QoL (SIBDQ): Incontinent patients showed impaired QoL on the subscale “bowel” function and the “overall score.” **e** Symptom-specific QoL measured by FIQLS: patients with fecal incontinence reported impaired QoL on the subscales “lifestyle,” “coping/behavior,” and “embarrassment”

negative effect on generic QoL on the subscales “physical functioning” (93 ± 10 vs. 81 ± 19), “role physical” (81 ± 31 vs. 55 ± 47), “bodily pain” (87 ± 22 vs. 73 ± 25), and “general health” (71 ± 15 vs. 56 ± 27 ; all $p < 0.05$; Fig. 4a). Furthermore, QoL measured by the CGQLI was impaired on all measured items: “Current quality of life” (85 ± 15 vs. 68 ± 20), “current quality of health” (82 ± 21 vs. 68 ± 23), “current energy level” (77 ± 20 vs. 62 ± 20), and the “overall score” (80 ± 16 vs. 70 ± 21 ; all $p < 0.05$; Fig. 4b). Patients with a history of pouchitis showed a trend towards impaired QoL on all subscales of the GIQLI resulting in a significantly impaired “overall score” (75 ± 10 vs. 67 ± 19 ; $p < 0.05$; Fig. 4c). On the SIBDQ patients who reported a history of pouchitis showed impaired QoL

on the subscales “bowel” (86 ± 16 vs. 79 ± 21), “systemic” (78 ± 15 vs. 68 ± 23), and “emotional” functioning (78 ± 16 vs. 65 ± 23), resulting in an impaired “overall score” (82 ± 11 vs. 72 ± 17 ; all $p < 0.05$; Fig. 4d).

Effect of age at the time of IPAA on QoL

To identify the effect of age at the time of surgery on patients' long-term QoL, subgroup analysis was performed comparing IPAA patients who were 20–35 ($n=19$; 40%), 36–50 ($n=15$; 31%), and 51 years and older ($n=14$; 29%) at the time of IPAA. Generic QoL was impaired on the subscales “physical functioning” (93 ± 2 vs. 80 ± 5) and “role physical” (78 ± 8 vs.



Comparison of QoL of IPAA patients with a history of pouchitis (gray; n=16) and patients who never experienced pouchitis (white; n=32); Mean ± SD; * p<0.05

Fig. 4 Comparison of QoL of IPAA with a history of pouchitis (gray; n = 16) and patients who never experienced pouchitis (white; n = 32). **a** Generic QoL (SF-36): Patients with a history of pouchitis reported impaired QoL on the subscales “physical functioning (PF),” “role physical (RP),” and “bodily pain (BP),” and “general health (GH).” *VT* vitality, *SF* social functioning, *RE* role emotional, and *MH* mental health. **b** Health-related QoL measured by CGQLI: there was a trend towards

deteriorated QoL on all subscales and the “overall score” for patients with a history of pouchitis. **c** Health-related QoL measured by GIQLI: a trend towards impaired QoL on all subscales caused a significant impairment of QoL in patients with a history of pouchitis on the “overall score”. *GI* gastrointestinal. **d** Disease-specific QoL (SIBDQ): Patients with a history of pouchitis reported impaired QoL on all subscales and the “overall score” except on “social” function

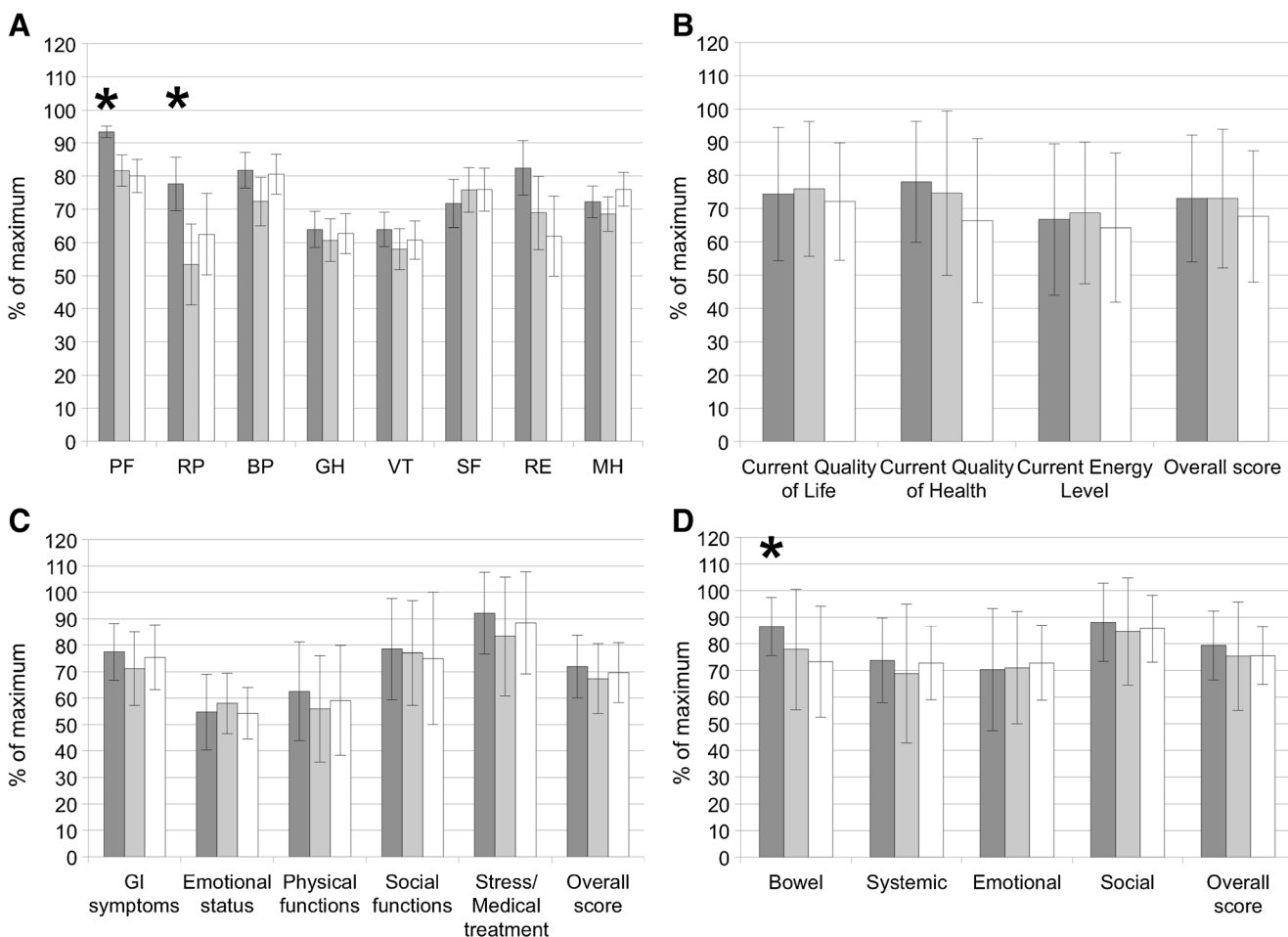
58±12; both *p* < 0.05; Fig. 5a) of the SF-36 in patients older than 35 years of age at the time of IPAA. There were no such differences on the health-specific CGQLI and disease-specific GIQLI (Fig. 5b and c). Differently, the SIBDQ revealed better QoL on the subscale “bowel” function in patients being 35 years or younger (86±11 vs. 76±20; *p* < 0.05; Fig. 5d). A similar comparison of age-dependent QoL in control patients did not reveal any significant differences between age-groups on any of the applied QoL instruments (data not shown).

Discussion

The aim of our study was to determine QoL in IPAA patients using different established and validated QoL instruments and to compare these patients with “healthy”

controls. Furthermore, we aimed to identify factors that are associated with impaired QoL in IPAA patients. We found that overall QoL of IPAA patients was comparable with QoL in healthy controls and that patients' satisfaction with IPAA was high. However, we were also able to demonstrate that high stool frequency, fecal incontinence, and a history of pouchitis are related with impaired health-related QoL, while age at time of the operation had only limited or no effect on patients' QoL.

The comparison of QoL of IPAA patients with control patients using the generic SF-36 and the health-related CGQLI showed a comparable QoL of both groups. This finding is supported by other studies using the same instruments [16–18], while Andersson et al. described impaired QoL in IPAA patients on the dimensions social functioning, mental health, vitality, and general health perception of the SF-36 [19]. However, patients in this particular study had a



The effect of age at time of IPAA on patients' QoL: age 20-35 years (gray; n=16); age 36-50 years (light grey; n=15); and >50 years (white; n=14); Mean ± SD; * p<0.05

Fig. 5 The effect of age at time of IPAA on patients' QoL (dark gray age 20–35 years (n = 19); gray age 36–50 years (n = 15); white age >50 years (n = 14)). **a** Generic QoL (SF-36): Patients with an age of 20–35 years at time of surgery reported better QoL on the subscales “physical functioning (PF)” and “role physical (RP)” compared to older patients. **BP** bodily pain, **GH** general health, **VT** vitality, **SF** social functioning, **RE** role

emotional, and **MH** mental health. **b** Health-related QoL measured by CGQLI: QoL was comparable between groups. **c** Health-related QoL measured by GIQLI: QoL was comparable between groups. **GI** gastrointestinal. **d** Disease-specific QoL (SIBDQ): patients being 35 years or younger showed better QoL on the subscale “bowel” function compared to older patients

significantly longer follow-up (12 years [2–22]) than our patients and follow-up after IPAA is known to be associated with an increase in stool frequency and incontinence, which may explain the difference between our and this particular study [19–22]. Since we demonstrated that QoL in IPAA patients, as measured by the more complex health-related GIQLI, was impaired on almost all dimensions when compared with healthy controls, our study supports the finding of others that health- and disease-specific QoL instruments are more sensitive to alterations of QoL in IPAA patients than generic questionnaires [20, 23]. This underlines the importance of choosing adequate instruments to measure QoL in these patients.

We found that high stool frequency is associated with impaired QoL in IPAA patients, as patients having more than

six bowel movements per 24 h reported impaired QoL on the subscales “gastrointestinal symptoms” and “physical functions” of the GIQLI and the subscales “emotional” and “social” functioning of the SIBDQ. This finding is in keeping with the study of Leowardi et al. who demonstrated that the GIQLI is impaired significantly in patients with seven and more bowel movements per day [20]. While many other studies in IPAA patients describe changes of stool frequency over time, there is only one study looking at the effect of stool frequency on QoL in these patients and this work from Richards et al. did not find any effects on patients' QoL [17]; however, this study did not use health-related or disease-specific questionnaires. Fecal incontinence for gas, liquid, and semisolid stool as reported by 25 % of our patients is within the range reported by others [18, 19, 22, 24, 25] and it

is of note that all IPAA in our study were stapled anastomosis, as it has been demonstrated that hand-sewn pouch-anal anastomosis are associated with impaired fecal continence and subsequent impairment of patients' QoL [26, 27]. While it is known that the rate of incontinence after IPAA increases over time, there is still controversial data about the effect of fecal incontinence on patients' QoL. While Kiran and Chapman et al. reported that the increase in fecal incontinence during follow-up has no effect on QoL [25, 28], others, and also our study, demonstrated a direct negative effect of fecal incontinence on patients' QoL [19, 26]. The different findings in these studies might result from different questionnaires used, as the first two studies did not apply symptom-specific instruments while Andersson et al. and we used the Wexner Score and the FIQLS to identify specific effects of fecal incontinence on patients' QoL.

Pouchitis is still a frequent problem after IPAA reported to occur in 25 up to 50 % of patients [4, 29] and the number of pouchitis episodes is associated with an increased risk of pouch failure [20, 30]. Our finding that pouchitis has a negative effect on patients' QoL supports the results of other studies [20, 30–32]. The negative effect on QoL, as well as the risk of pouch failure, encourages that pouchitis requires an immediate work-up and therapy including the exclusion of underlying anatomical alterations that might require surgical intervention.

When we tried to identify the effects of patients' age at the time of surgery on their long-term QoL, we found a deterioration of QoL on the two physical subscales of the SF-36, while age had no effect on any subscale of the health- and disease-specific instruments. Although we only detected insignificant negative effects of age on physical subscales of generic QoL in controls, we believe that the changes we found in IPAA patients using the generic instrument are rather a direct effect of age itself and are most likely independent of IPAA. While Leowardi et al. showed, that an age over 50 is associated with impaired QoL in IPAA patients as measured by the GIQLI [20], others reported an age-related impairment of pouch function and increase of fecal incontinence, but this had no negative effect on QoL in IPAA patients [17, 25, 28]. In contrast, Carmon et al. demonstrated that higher age at the time of IPAA and impaired functional outcome are associated with impaired QoL [33].

One difficulty in comparing QoL data between different studies is the use of a variety of different QoL instruments. It is a special feature of our study that we have chosen our instruments in order to discriminate between effects on generic, health-related, disease-specific, and symptom-related QoL. We believe that looking at these different dimensions of QoL is important in order to identify general effects of IPAA on QoL, effects of postoperative alterations in gastrointestinal function, as well as effects of detrimental symptoms, such as high stool frequency, fecal incontinence, or pouchitis on

patients' QoL. Most of the published studies used either a generic, a health-related, or a self-made and not validated QoL instrument. Therefore, our study adds important information on QoL in IPAA patients as we used different, appropriate, and validated questionnaires that are able to dissect out even small differences in various dimensions of QoL.

However, we have to consider the possibility of an underlying reporting and selection bias in our study, as only 59 % of patients responded to our survey. As no patient in our study reported pouch loss and pouch failure is known to occur in 7–12 % of patients [4, 20, 22], we have to consider that patient with a complicated course with detrimental effects on their QoL were lost on follow-up and QoL in IPAA patients might be, in fact, worse than described in our study. Furthermore, the retrospective design of our study as well as the missing preoperative QoL data should be considered as weaknesses of this work.

In conclusion, we demonstrated that health-related QoL after IPAA is impaired, while generic QoL is widely comparable with healthy controls and patients' satisfaction with IPAA is high. We identified high stool frequency, fecal incontinence, and pouchitis as factors with detrimental effects on patients' QoL. These findings can help surgeons to counsel patients with ulcerative colitis before IPAA and to identify problems that need to be treated to assure and maintain good long-term QoL in patients after IPAA.

References

1. Kornbluth A, Sachar DB (2010) Ulcerative colitis practice guidelines in adults: American College Of Gastroenterology, Practice Parameters Committee. *Am J Gastroenterol* 105:501–523, quiz 24
2. Dignass A, Preiss JC, Aust DE, Autschbach F, Ballauff A, Barretton G, Bokemeyer B, Fichtner-Feigl S, Hagel S, Herrlinger KR, Jantschek G, Kroesen A, Kruis W, Kucharzik T, Langhorst J, Reinshagen M, Rogler G, Schleiermacher D, Schmidt C, Schreiber S, Schulze H, Stange E, Zeitz M, Hoffmann JC, Stallmach A (2011) Updated German guideline on diagnosis and treatment of ulcerative colitis, 2011. *Z Gastroenterol* 49:1276–1341
3. Mowat C, Cole A, Windsor A, Ahmad T, Arnott I, Driscoll R, Mitton S, Orchard T, Rutter M, Younge L, Lees C, Ho GT, Satsangi J, Bloom S (2011) Guidelines for the management of inflammatory bowel disease in adults. *Gut* 60:571–607
4. de Zeeuw S, Ahmed Ali U, Donders RA, Hueting WE, Keus F, van Laarhoven CJ (2012) Update of complications and functional outcome of the ileo-pouch anal anastomosis: overview of evidence and meta-analysis of 96 observational studies. *Int J Color Dis* 27:843–853
5. Heikens JT, de Vries J, Goos MR, Oostvogel HJ, Gooszen HG, van Laarhoven CJ (2012) Quality of life and health status before and after ileal pouch-anal anastomosis for ulcerative colitis. *Br J Surg* 99:263–269
6. Somashekar U, Gupta S, Soin A, Nundy S (2010) Functional outcome and quality of life following restorative proctocolectomy for ulcerative colitis in Indians. *Int J Color Dis* 25:967–973

7. Ware JE, Jr., Snow KK, Kosinski M, Gandek B (1993) SF-36 health survey: manual and interpretation guide. The Health Institute, New England Medical Center
8. Fazio VW, O'Riordain MG, Lavery IC, Church JM, Lau P, Strong SA, Hull T (1999) Long-term functional outcome and quality of life after stapled restorative proctocolectomy. *Ann Surg* 230:575–584, discussion 84–6
9. Eypasch E, Williams JI, Wood-Dauphinee S, Ure BM, Schmullig C, Neugebauer E, Troidl H (1995) Gastrointestinal Quality of Life Index: development, validation and application of a new instrument. *Br J Surg* 82:216–222
10. Eypasch E, Wood-Dauphinee S, Williams JI, Ure B, Neugebauer E, Troidl H (1993) The Gastrointestinal Quality of Life Index. A clinical index for measuring patient status in gastroenterologic surgery. *Chirurg* 64:264–274
11. Han SW, Gregory W, Nylander D, Tanner A, Trewby P, Barton R, Welfare M (2000) The SIBDQ: further validation in ulcerative colitis patients. *Am J Gastroenterol* 95:145–151
12. Rose M, Fliege H, Hildebrandt M, Korber J, Arck P, Dignass A, Klapp B (2000) Validation of the new German translation version of the "Short Inflammatory Bowel Disease Questionnaire" (SIBDQ). *Z Gastroenterol* 38:277–286
13. Mennigen R, Senninger N, Bruewer M, Rijcken E (2012) Pouch function and quality of life after successful management of pouch-related septic complications in patients with ulcerative colitis. *Langenbecks Arch Surg* 397:37–44
14. Rockwood TH, Church JM, Fleshman JW, Kane RL, Mavrantonis C, Thorson AG, Wexner SD, Bliss D, Lowry AC (2000) Fecal Incontinence Quality of Life Scale: quality of life instrument for patients with fecal incontinence. *Dis Colon Rectum* 43:9–16, discussion -7
15. Browning GG, Parks AG (1983) Postanal repair for neuropathic faecal incontinence: correlation of clinical result and anal canal pressures. *Br J Surg* 70:101–104
16. Delaney CP, Fazio VW, Remzi FH, Hammel J, Church JM, Hull TL, Senagore AJ, Strong SA, Lavery IC (2003) Prospective, age-related analysis of surgical results, functional outcome, and quality of life after ileal pouch-anal anastomosis. *Ann Surg* 238:221–228
17. Richards DM, Hughes SA, Irving MH, Scott NA (2001) Patient quality of life after successful restorative proctocolectomy is normal. *Color Dis* 3:223–226
18. Wuthrich P, Gervaz P, Ambrosetti P, Soravia C, Morel P (2009) Functional outcome and quality of life after restorative proctocolectomy and ileo-anal pouch anastomosis. *Swiss Med Wkly* 139:193–197
19. Andersson T, Lunde OC, Johnson E, Moum T, Nesbakken A (2011) Long-term functional outcome and quality of life after restorative proctocolectomy with ileo-anal anastomosis for colitis. *Color Dis* 13: 431–437
20. Leowardi C, Hinz U, Tariverdian M, Kienle P, Herfarth C, Ulrich A, Kadmon M (2010) Long-term outcome 10 years or more after restorative proctocolectomy and ileal pouch-anal anastomosis in patients with ulcerative colitis. *Langenbecks Arch Surg* 395:49–56
21. Hahnloser D, Pemberton JH, Wolff BG, Larson DR, Crownhart BS, Dozois RR (2004) The effect of ageing on function and quality of life in ileal pouch patients: a single cohort experience of 409 patients with chronic ulcerative colitis. *Ann Surg* 240:615–621, discussion 21–3
22. Hahnloser D, Pemberton JH, Wolff BG, Larson DR, Crownhart BS, Dozois RR (2007) Results at up to 20 years after ileal pouch-anal anastomosis for chronic ulcerative colitis. *Br J Surg* 94:333–340
23. Steens J, Meijerink WJ, Masclee AA, van Hogezaand RA, Griffioen G, Post WJ, Bemelman WA (2000) Limited influence of pouch function on quality of life after ileal pouch-anal anastomosis. *Hepatogastroenterology* 47:746–750
24. Fichera A, Silvestri MT, Hurst RD, Rubin MA, Michelassi F (2009) Laparoscopic restorative proctocolectomy with ileal pouch anal anastomosis: a comparative observational study on long-term functional results. *J Gastrointest Surg* 13:526–532
25. Kiran RP, El-Gazzaz G, Remzi FH, Church JM, Lavery IC, Hammel J, Fazio VW (2011) Influence of age at ileoanal pouch creation on long-term changes in functional outcomes. *Color Dis* 13:184–190
26. Michelassi F, Lee J, Rubin M, Fichera A, Kasza K, Karrison T, Hurst RD (2003) Long-term functional results after ileal pouch anal restorative proctocolectomy for ulcerative colitis: a prospective observational study. *Ann Surg* 238:433–441, discussion 42–5
27. Silvestri MT, Hurst RD, Rubin MA, Michelassi F, Fichera A (2008) Chronic inflammatory changes in the anal transition zone after stapled ileal pouch-anal anastomosis: is mucosectomy a superior alternative? *Surgery* 144:533–537, discussion 7–9
28. Chapman JR, Larson DW, Wolff BG, Dozois EJ, Cima RR, Pemberton JH, Crownhart BS, Larson DR (2005) Ileal pouch-anal anastomosis: does age at the time of surgery affect outcome? *Arch Surg* 140:534–539, discussion 9–40
29. Brisinda G, Vanella S, Valenza V, Crocco A, Perotti G, Di Giuda D, Maria G (2011) Surgical prophylaxis of pouchitis in ulcerative colitis. *Dig Dis Sci* 56:1257–1265
30. Rokke O, Iversen K, Olsen T, Ristesund SM, Eide GE, Turowski GE (2011) Long-term follow-up with evaluation of the surgical and functional results of the ileal pouch reservoir in restorative proctocolectomy for ulcerative colitis. *ISRN Gastroenterol* 2011:625842
31. Schmidt C, Hauser W, Giese T, Stallmach A (2007) Irritable pouch syndrome is associated with depressiveness and can be differentiated from pouchitis by quantification of mucosal levels of proinflammatory gene transcripts. *Inflamm Bowel Dis* 13:1502–1508
32. Turina M, Pennington CJ, Kimberling J, Stromberg AJ, Petras RE, Galandiuk S (2006) Chronic pouchitis after ileal pouch-anal anastomosis for ulcerative colitis: effect on quality of life. *J Gastrointest Surg* 10:600–606
33. Carmon E, Keidar A, Ravid A, Goldman G, Rabau M (2003) The correlation between quality of life and functional outcome in ulcerative colitis patients after proctocolectomy ileal pouch anal anastomosis. *Color Dis* 5:228–232