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**Effect of laparoscopic surgery on quality of life in ulcerative colitis**

**Running title: Quality of life after laparoscopy for UC**

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## **ABSTRACT**

**AIM:** To evaluate quality of life after surgery for ulcerative colitis (UC) the gastroenterological and psychological conditions were examined.

**METHODS:** Between 1 January 2005 and 1 March 2016, surgery was performed for UC in a total of 75 patients. Our examinations were performed in 58 cases. Quality of life was examined with questionnaires. Functional Scoring System, Gastrointestinal Quality of Life Index (GIQLI) and Short Inflammatory Bowel Disease Questionnaire (SIBDQ) were used for testing gastroenterological conditions; Spielberger's State-Trait Anxiety Questionnaire, Beck Depression Inventory and Brief Illness Perception Questionnaire (BIPQ) were performed to consider psychological status.

**RESULTS:** Trait anxiety and the incidence of abdominal pain were significantly lower in patients having undergone laparoscopic surgery. No difference was found between the minimally invasive and conventional methods in the early complications. There were significantly more late complications developing after 30 days in patients who had undergone open surgery. Differences were found in personal control between patients with a stoma and patients without a stoma. Patients with a stoma felt they had less control over their disease. A significant correlation was found between the results of the psychological and gastrointestinal questionnaires.

**CONCLUSIONS:** Minimally invasive technique provides a better long-term outcome for patients with UC, fewer complications and a more balanced emotional condition. Favourable gastroenterological condition leads to better psychological status, which is negatively influenced by stoma or complications.

**Key words:** Colitis, ulcerative; Laparoscopy; Quality of life; Psychology, clinical; Stomas, surgical

## INTRODUCTION

Ulcerative colitis (UC) is a chronic inflammatory disease affecting the whole large intestine. The incidence of UC has risen recently. The incidence of inflammatory bowel diseases (IBD) is 11.3/100,000 in Eastern Europe, 14.0/100,000 in Western Europe, and it is estimated to be 24/100,000 in Hungary [1]. Treatment of the disease is primarily drug therapy; however, surgical intervention is required in the case of patients not responding to conservative therapy or in the case of complications.

The gold-standard surgical treatment is proctocolectomy and ileal pouch-anal anastomosis (IPAA), using standard, open and laparoscopic methods [2]. The aim of surgical intervention is to improve long-term quality of life by removing the target organ, the whole large intestine [3, 4]. The benefits of the minimally invasive method in the surgical treatment of UC are the following: length of hospital stay is shorter, postoperative pain is reduced, passage resolves rapidly, and cosmetic results are beneficial [5]. The importance of surgical treatment is supported by two studies that show that patients treated with conservative methods experienced a worse long-term quality of life compared to those receiving surgical treatment [6, 7]. As a result, it can be concluded that surgery provides successful treatment for UC in the long term and it is therefore important to inform the patients about it. Limited data are available on quality of life in patients with UC undergoing surgery. Our working group was the first to publish mid- and long-term results on laparoscopic treatment of UC in Hungary, which proved the success of the method [8, 9].

The purpose of our study is to evaluate quality of life for patients who have had surgery due to UC. Quality of life was studied in patients who had undergone laparoscopic and open surgeries, in patients with or without stoma, regarding early and late complications, and in the case of elective and emergency indications. We were looking for a connection between gastroenterological and psychological conditions, daily activities.

## **MATERIALS AND METHODS**

Between 1 January 2005 and 1 March 2016, surgery was performed due to UC in a total of 75 patients, the open method was used in 25 cases and the minimally invasive technique in 50. All procedures performed in present study involving human participants were conducted with the approval of the Ethics Committee at the University of Szeged, Hungary (194/2015-SZTE) and were in accordance with the Helsinki Declaration of 1975 (1983) and its later amendments or comparable ethical standards. Our examinations were carried out in 58 of the 75 patients. Questionnaires could not be completed for various reasons for 17 patients (death in three cases, language problems occurred in the case of two foreign patients, and 12 patients refused to participate in the study or could not be contacted).

The average duration of the follow-up was 46 (1-124) months. Fifty-eight patients (29 females and 29 males) participated in our study; 41 patients had undergone laparoscopic surgery, and 17 patients had had open surgeries. Thirty-nine cases were elective interventions, while 19 were emergency surgery due to unsuccessful conservative treatment or fulminant, septic or toxic

condition. No significant difference was found in the case of the body mass index (BMI) ( $24.85 \pm 5.12$  vs.  $26.82 \pm 5.57$ ) or the American Society of Anesthesiologists (ASA) score ( $2.25 \pm 0.54$  vs.  $2.13 \pm 0.74$ ). There was an average 8.2 years from diagnosing the disease to surgery. In the laparoscopic group, 25 proctocolectomies with IPAA and ileostomy were performed, 13 patients had a total colectomy with end ileostomy and mucous fistula, and three rectum extirpations were carried out. In the open group, a pouch was created in four cases, nine patients had a total colectomy with mucous fistula, and four other colon resections were performed. 17 patients had a stoma during the study. In order to homogenize the groups, six patients, who were operated dissimilarly from the standard surgical technique (n=3 rectum extirpation, n=3 other colon resection) were excluded during the comparison of laparoscopic and open surgery groups, and during the analysis of complications.

## *Questionnaires*

### *Functional Scoring System*

The functional scoring system is a questionnaire consisting of twelve questions on patients' bowel movements (number of bowel movements during the day and at night, urgency and perianal soreness), incontinence (during the day and at night and use of protective pads), diet, drug therapy and potential social disadvantages [10].

### *Gastrointestinal Quality of Life Index (GIQLI)*

The GIQLI studies gastroenterological condition (abdominal pain, epigastric fullness, bloating, flatulence, eructation, increased bowel movements, urgency,

diarrhoea, constipation, nausea, blood in the stool, heartburn and bowel incontinence), alimentation (appetite, eating speed and swallowing a bite), physical condition, daily activities, social activities and psychological condition for two weeks before completing the questionnaire [11].

#### *Short Inflammatory Bowel Disease Questionnaire (SIBDQ)*

The SIBDQ studies gastrointestinal symptoms and their effect on social and physical well-being for two weeks before completing the questionnaire based on ten questions [12].

#### *Spielberger's State-Trait Anxiety Questionnaire and the Beck Depression Inventory*

Spielberger's State-Trait Anxiety Questionnaire and the Beck Depression Inventory were used to measure the level of anxiety and mood [13, 14].

#### *Brief Illness Perception Questionnaire (BIPQ)*

Illness perceptions and attitude towards healing were studied using the BIPQ, consisting of eight subscales (consequences, timeline, personal control, treatment control, identity, concern, coherence and emotional representation) [15].

#### ***Biostatistics***

Patients were examined retrospectively, and statistical analysis was performed with the SPSS program (IBM SPSS Statistics, Version 20.0 2014, Chicago, IL, USA). Pearson and Spearman correlations were used to determine relationships between variables. The independent samples t-test, Mann-Whitney test, ANOVA and Chi-square test were used to compare the groups. Values were considered to be statistically significant if  $P$  was lower than 0.05.

## RESULTS

### *Representation of Illnesses*

92.3% of the patients enrolled in the study considered a psychological factor (psychological causes, family or work stress) to be in the background of their disease. 42.3% of the patients pointed to genetic factors, 46.2% of them mentioned environmental hazards (such as inappropriate diet), and 1 patient noted the Chernobyl nuclear disaster as the cause of the disease.

Patients viewing genetic factors as being in the background of the disease reached significantly higher scores on the BIPQ ( $44.14 \pm 11.64$  vs.  $35.73 \pm 13.35$ ;  $P = 0.022$ ), so they are more threatened by their disease and know less about the nature of it (coherence subscale:  $2.14 \pm 1.58$  vs  $1.10 \pm 1.32$ ;  $P = 0.013$ ).

### *Psychological Consequences of Having a Stoma*

There were differences in personal control between patients with a stoma ( $n=17$ ) and patients without a stoma ( $n=41$ ) ( $6.12 \pm 3.33$  vs.  $4.12 \pm 2.88$ ;  $P = 0.045$ ).

Patients with a stoma felt they had less control over their disease. No difference was found between the two groups during gastroenterological follow-up examinations.

### *Results for Emotional State and Mood*

There was a significant connection between depression and the functional scoring system ( $P = 0.002$ ;  $r = 0.419$ ), the GIQLI ( $P < 0.001$ ;  $r = -0.867$ ), the SIBDQ ( $P < 0.001$ ;  $r = -0.795$ ) and the BIPQ ( $P < 0.001$ ;  $r = 0.751$ ), as well as the consequences, personal and treatment control, identity, concern and emotional representation subscales ( $P < 0.05$  in all cases). State anxiety significantly



correlated with the total score for the GIQLI ( $P < 0.001$ ,  $r = -0.624$ ), the SIBDQ ( $P < 0.001$ ,  $r = -0.579$ ) and the BIPQ ( $P < 0.001$ ,  $r = 0.615$ ), as well as with the consequences, personal and treatment control, identity, concern and emotional representation subscales ( $P < 0.05$  in all cases). There was a significant connection between trait anxiety and the functional scoring system ( $P = 0.012$ ;  $r = 0.344$ ), the GIQLI ( $P < 0.001$ ;  $r = -0.682$ ), the SIBDQ ( $P < 0.001$ ;  $r = -0.684$ ) and the BIPQ ( $P < 0.001$ ;  $r = 0.608$ ), as well as the consequences, personal and treatment control, identity, concern and emotional representation subscales ( $P < 0.001$ ) (Table 1).

### *Comparing Laparoscopy and Open Surgery*

Trait anxiety was significantly lower in patients having undergone laparoscopic surgery ( $n=38$ ) compared with patients who had had open surgery ( $n=14$ ) ( $P = 0.018$ ) (average value of trait anxiety in patients with open surgery was 48.71,  $SD=10.91$ ; this value was 40.22,  $SD=9.82$  in the laparoscopic group). Both patient groups had  $>5$  stools in the daytime and  $>1$  at night per week, with no significant difference observed between the groups. No difference was noted between the two surgical methods based on the total score on the gastroenterological questionnaires, although the following statistical differences were found when evaluating each questionnaire item individually. Incontinence was registered during the day (25% vs. 27%) and at night (39.28% vs. 54%) in both patient groups (Table 2). The incidence of abdominal pain was significantly less common ( $1.895 \pm 1.034$  vs.  $2.769 \pm 0.927$ ;  $P = 0.024$ ) in the laparoscopic group based on the GIQLI.

### *Complications*

No difference was found between the minimally invasive and conventional methods in cases requiring early reoperation (ileus, stoma correction, bleeding and sepsis) and in cases not requiring reoperation (subileus, bleeding, septic condition, pancreatitis and dehydration). There were significantly more late complications developing after 30 days (septic condition, intestinal obstruction, postoperative hernia and "other" complications, such as bleeding, anastomosis stenosis, pouch-vaginal fistula, perforation and disruption of the abdominal wall) in patients who had undergone open surgery ( $P = 0.001$ ), of whom the incidence of intestinal obstruction and "other" complications were significantly higher ( $P \leq 0.001$ ) (Figure ). Pouchitis was detected in 17 cases (35.41% of patients with a pouch). Cuffitis occurred in 13 (27.08%) cases. The personal control ( $3.43 \pm 2.35$  vs.  $5.57 \pm 3.31$ ;  $P = 0.024$ ) was higher in patients with no late complication.

## DISCUSSION

Our study confirmed the long-term positive effect of laparoscopic surgery on quality of life in the surgical treatment of UC. A favourable gastroenterological condition leads to a better psychological state, which can be negatively influenced by the presence of stoma or complications. By positively influencing these factors, using a minimally invasive technique results in better quality of life compared with open surgery.

In the case of a benign, non-neoplastic disease, the success of the surgical intervention is determined by the quality of life. In the case of UC, abdominal complaints, a high number of bowel movements a day, surgical interventions

and their consequences are very demanding somatically and psychologically. The social integration of patients, their quality of life and their daily routine activities may often be difficult.

Limited data is available on quality of life after surgical treatment of UC. Incidence of the disease is increasing, and performing IPAA after a proctocolectomy has become the gold-standard intervention in surgical treatment [16-18]. It is a safe technique with low mortality and morbidity [19]. Our Department was the first in Hungary to examine the minimally invasive technique in the treatment of UC. This method was successful in elective and acute cases as well. Moreover, the occurrence of complications was low compared with the open technique [8, 9]. After successful surgical interventions, quality of life improved continuously, and pouchitis was considered the main problem [4].

Patients having undergone a surgical intervention between 1 January 2005 and 1 March 2016 due to UC were enrolled in our study. Quality of life was examined with questionnaires considering gastroenterological and psychological conditions and daily activities. Results were analyzed in the laparoscopic group and in patients undergoing open surgery, in patients with or without a stoma, in the case of acute and elective interventions, and with regard to early and late complications. The average duration of the follow-up was 46 months.

In terms of disease representation, 92.3% of our patients considered their disease to be caused by psychological factors, 42.3% thought that genetic factors lay behind the disease, and 46.2% felt that environmental hazards were to

blame. In conclusion, patients with UC are well informed and are aware of the nature and characteristics of their disease.

The consequences of wearing a stoma were examined as well. It showed a significant correlation with the BIPQ personal control subscale, meaning that patients with a stoma felt they had less control over their condition. Therefore, the presence of an anus prae, either temporary or permanent, was psychologically demanding for the patients; it made healing and daily activities more difficult. In addition to these results, no difference was found in quality of life among patients living with an ileostoma or a pouch in a prospective cross-sectional observational study [20].

Quality of life was examined with regard to laparoscopic surgery and open surgery as well. An examination of psychological differences between the two groups showed that trait anxiety was significantly different; that is, patients undergoing open surgery were more anxious. Based on the total score on the gastroenterological questionnaires, there was no difference between the two surgical methods, abdominal pain was more favourable in the laparoscopic group based on the functional scoring system, the SIBDQ and the GIQLI. An Irish and a German study with a ten-year follow-up found a favourable quality of life after IPAA surgery [21, 22], and an Indian study concluded that the IPAA was a suitable procedure with regard to functionality and quality of life [23]. Nutritional difficulties, bowel movement problems, and daily and night-time incontinence were noted in both groups. Incontinence, increased number of bowel movements at night and urgency were determined to be negative prognostic factors of quality of life in the literature [24]. Our patients reported >5

stools during the day and >1 stool at night weekly in the postoperative period. Fischera et al. observed high rates of continence and an average of 6 bowel movements a day after laparoscopic IPAA [25]. Polle et al. detected no difference in quality of life, functionality and morbidity between the groups [26]. Pouchitis was reported in 17 (35.41%) cases, and cuffitis occurred in 13 (27.08%) cases. According to a meta-analysis, there was no difference between the two surgical methods with regard to the number of bowel movements a day and pouchitis [27], while a Swedish study described long-term problems regarding pouchitis [28]. Several other studies noted good quality of life after proctocolectomy [29-31].

No difference was found between the two groups with regard to early complications. Late complications occurred significantly more often with emergency and open surgeries. With regard to the psychological factors, the values for the BIPQ personal control and coherence subscales were higher in patients with no late complications, meaning that they felt they had more control over their disease. A significant correlation was found between the results of the psychological and gastrointestinal questionnaires. Consequently, a negative emotional condition and mood resulted in lower quality of life. Moreover, more anxious and depressed patients had a negative idea of their disease and less faith in the success of surgical interventions (Figure ).

An IBD study reported that psychological symptoms have a significant effect on the primary disease and that anxiety increases and social function deteriorates in correlation with the severity of the disease. In addition, it was shown that patients with more control over their disease enjoy a better gastroenterological condition [32].

## **CONCLUSION**

Our study is the first to examine quality of life among patients operated on for UC with regard to psychological and gastroenterological conditions. As a result, it can be concluded that a minimally invasive technique provides a better long-term outcome for patients with UC, fewer complications and a more balanced emotional condition. Patients who undergo surgery with the standard method have a greater psychological burden and a negative image of their disease. Our study confirmed that a better gastroenterological condition gives rise to a better psychological condition. These factors result in a better quality of life for patients. Successful treatment of UC should be performed in centres with close gastroenterological and surgical co-operation. Psychological guidance is essential; thus, psychologists and social workers may have to be involved in the treatment of these patients.

## **DISCLOSURE STATEMENT**

No competing financial interests exist.

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## FIGURE LEGENDS

### **Figure 1.** Late postoperative complications

Among late complications the incidence of intestinal obstruction ( $***P \leq 0.001$ ) and "other" complications ( $*P \leq 0.05$ ) were significantly higher in patients who had had open surgery than in patients who had undergone laparoscopic surgery.

### **Figure 2.** Effect of gastroenterological and psychological conditions and surgical technique on quality of life

Deterioration of gastroenterological condition shows connection with decreased psychological status; anxiety, reduced personal and treatment control are more frequent. Furthermore, psychological condition is negatively influenced by the use of open surgical technique and the presence of a stoma. All these factors result in decreased quality of life.

## TABLE LEGENDS

**Table 1.** Pearson's or Spearman's correlation between clinical and psychological variables and Gastrointestinal Quality of Life Index (GIQLI) (\* $P < 0.05$ ; \*\* $P < 0.01$ ; NS: non significant)

**Table 2.** Total values from the functional scoring system (Based on Ref. <sup>[10]</sup>)

## **Abbreviations**

ASA = American Society of Anesthesiologists

BIPQ = Brief Illness Perception Questionnaire

BMI = Body Mass Index

UC = Ulcerative Colitis

GIQLI = Gastrointestinal Quality of Life Index

IBD = Inflammatory Bowel Disease

IPAA = Ileal pouch-anal anastomosis

SIBDQ = Short Inflammatory Bowel Disease Questionnaire