Health related quality of life in inflammatory bowel disease: The impact of surgical therapy

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Abstract

Over the past 30 years, health related quality of life (HRQOL) has developed into a scientific index of subjective health status. Measurement of HRQOL is now clearly a mandatory component in evaluating interventions and management of medical and surgical diseases. In designing comprehensive and meaningful clinical studies particular attention ought to be made of measures of HRQOL. This is clearly very important in inflammatory bowel disease. Both ulcerative colitis (UC) and Crohn’s disease (CD) have a major impact on HRQOL. The chronic and unrelenting nature of these diseases, the often early age of onset, and the impact on social and sexual aspects of life significantly change patient’s perception, body image and quality of life. This manuscript is an overview of the available published data on HRQOL in UC and CD patients focusing on the impact of surgical therapy. While these two diseases may have some similarities in their management, clearly their impact on quality of life and the effects of are significantly different. Hence we are presenting the data separately.

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Key words: Inflammatory bowel disease; Quality of life; Gastrointestinal surgery; Surgical outcome

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INTRODUCTION

Over the past 30 years, health related quality of life (HRQOL) has developed into a scientific index of subjective health status. Measurement of HRQOL is now a mandatory component in evaluating interventions and management of medical and surgical diseases. In designing comprehensive and meaningful clinical studies particular attention ought to be made of measures of HRQOL. This is clearly very important in inflammatory bowel disease (IBD). Both ulcerative colitis (UC) and Crohn’s disease (CD) have a major impact on HRQOL. The chronic and unrelenting nature of these diseases, the often early age of onset, and the impact on social and sexual aspects of life significantly change patient’s perception, body image and quality of life. Many IBD patients will require surgery at some point in their disease course. With the evolution of newer surgical treatment modalities, it is paramount to establish the effect of surgical interventions on HRQOL. This in turn can allow both the patients and the practitioners to have an
understanding of the anticipated changes in HRQOL when selecting a treatment plan.

Even though CD and UC share several clinical and therapeutical similarities, their impact on HRQOL is significantly and vastly different. This is clearly evident from the available data in the literature\(^1\). For CD, fluctuations in HRQOL are common and strongly correlate with the activity of the disease. Surgery, often only temporarily, may improve it. While surgery is curative for UC, medical and surgical interventions in CD are palliative at best. It is, therefore, expected to see an improvement in HRQOL with definitive surgical treatment in UC as compared to patients with active UC\(^9\).

The currently available HRQOL instruments are a global measure of the patient's perceptions, illness experience, and functional status that incorporates social, cultural, psychological, and disease related factors\(^3\). Measurements of HRQOL are a quantification of the patient's subjective perception of physical, emotional, and social function. Typically these measurements include social and sexual activity, ability to work, attend school, sports and recreation and finally body image. Multiple HRQOL instruments, both general and IBD specific instruments, have been utilized in literature\(^3\)\(^-\)\(^12\).

It is obvious, by reviewing the literature, that there is no single general or IBD specific HRQOL instrument that satisfactorily covers all of the critical aspects of a comprehensive assessment of quality of life in IBD. Only by using a combination of general and IBD specific instruments is it possible to capture and properly evaluate HRQOL prospectively in interventional studies of IBD patients.

This is a comprehensive overview of the available literature on HRQOL in patients with UC and CD with an emphasis on the effect of surgical therapy on HRQOL. We took into account the effects of various surgical therapies on HRQOL in patients with IBD. While the instruments used in various studies might be individually inadequate to capture the complexity of the impact of these therapies on patients with IBD, we sought to integrate the available data to provide a comprehensive and accurate assessment. For the many reasons mentioned above, we present the data separately. While these two diseases may have some similarities in their management, clearly their impact on quality of life is significantly different.

**SURGICAL THERAPY AND HEALTH RELATED QUALITY OF LIFE IN ULCERATIVE COLITIS**

Physicians treating UC patients currently have at their disposal an array of medical and surgical options. The patients with UC who become refractory to medical management ultimately are referred for surgical evaluation. It is at the time of surgical consultation that an extensive discussion of the available surgical options takes place. The decision to choose one operation vs another is highly individualized and rests on the discussion between the patient and the treating physician. This decision is largely based on the extensive evaluation of the risks and benefits of various approaches as well as expected changes in quality of life, body image, sexual and reproductive function. Consideration is also given to the age of the patient. While younger patients are more concerned with body image, long term pouch function, sexual and reproductive health, older patients often fear the possibility of becoming incontinent, and dealing with potential complications.

**HRQOL in UC patients: surgical vs medical treatment**

There is a general consensus among physicians that UC refractory to medical management requires surgical intervention with colectomy. The issue becomes more complex in patients who are currently in remission, but are troubled by flares with the need for frequent hospital admissions. There is a paucity of studies addressing HRQOL in this situation. Cohen et al\(^3\) evaluated intravenous cyclosporine (CSA) as a medical alternative to colectomy in severe, steroid-refractory UC patients. Quality-of-life analyses were conducted using the IBDQ, a visual-analog scale (VAS), and the Oresland scale. The patients treated with CSA reported a better ability to sleep, better stool consistency, less abdominal or rectal pain (VAS), and fewer daytime, nighttime (Oresland), and daily trips to the toilet (VAS) than the surgical patients. The mean number and rate of hospitalizations within the first year was also lower in the CSA patients. Surgical patients, however, reported fewer initial visits to their treating physician and less medication use (Oresland). Sagar et al\(^3\) compared HRQOL in UC patients after a restorative proctocolectomy with ileal pouch anal anastomosis (IPAA) with UC patients on long-term medical treatment. The authors developed a scoring system based on a questionnaire described by Oresland et al\(^3\). It consisted of questions that related to bowel function, work, social life, and sexual activity. The questionnaire also aimed to identify restrictions the condition had imposed on diet, leisure, and social pursuits. The technique of restorative proctocolectomy with IPAA included both mucosal proctectomy and pull through IPAA in the earlier part of the series and a stapled anastomosis constructed 1.5 to 2.0 cm above the dentate line in the later phase. Each patient received a temporary ileostomy that was closed 8 to 12 wk later. The authors found that HRQOL after IPAA was good and appeared to be no worse than that of patients with long-standing UC on medical treatment in remission. Although the frequency of bowel movements was greater in patients with IPAA than in patients with medically treated colitis, patients with pouches experienced significantly less urgency on defecation, fewer symptoms of anxiety or depression, and were less restricted socially than their medically treated counterparts. Patients with medically treated colitis required less antidiarrheal medication but many continued to require steroids. This study suffers from obvious limitations of
comparing patients who chose to continue with medical management versus those who elected to proceed with IPAA.

**HRQOL after total proctocolectomy with end ileostomy**

Despite the wide acceptance of IPAA as the definitive surgical treatment of UC, a total proctocolectomy (TPC) and conventional end ileostomy (EI) is still considered a viable alternative when an IPAA is contraindicated. Although the patient is left with a permanent, incontinent stoma, it is a safe operation with a low complication rate. To evaluate HRQOL of patients who had this operation compared with that of the general population Camilleri-Brennan and Steele\(^\text{(3)}\) conducted a mail survey using quality of life questionnaire SF-36 version 2 (SF-36 II)\(^\text{(16-17)}\). Despite this being a generic questionnaire designed for comparing quality of life across patient populations and disease groups it allowed the authors to compare the TPC and EI patient scores to those obtained from the general population in United Kingdom of similar age and gender. The authors evaluated the difference between patients and the general population for all dimensions and summary scores including physical function, role limitations due to physical problems, energy and vitality, body pain, role limitations due to emotional problems, social function, mental health, general health perception, physical component summary and mental component summary. The scores directly relating to physical well-being as well as the Physical Component Summary were similar to the general population. Similar results were also achieved for the energy and vitality dimension and the pain scores. The scores in the mental health and role-emotional dimensions, as well as in the social functioning dimensions, and general health perceptions were similar to that of the general population. This study suggested that despite the presence of a permanent ileostomy HRQOL was very similar to that of the general population. The results clearly underscore the notion supported by other authors that perceived negative impact of the ileostomy does not appear to affect HRQOL. Therefore, TPC and EI remains a viable option for the patients requiring surgery for UC and should always be brought to discussion when counseling the patient regarding surgery.

Patients with fulminant UC or those refractory to medical management frequently require urgent or emergency colectomy. While colectomy clearly improves the quality of life there are no studies to address the changes in HRQOL following emergency colectomy. This is likely due to the fact that patients who are failing medical management or becoming progressively ill cannot be adequately captured by surveys. This in turn results in HRQOL evaluations being based predominantly on the patient populations undergoing elective surgery for UC.

**HRQOL after ileorectal anastomosis**

Total colectomy with ileorectal anastomosis (IRA) was a rather common operation for UC before the development of IPAA. It was primarily offered to patients who were not willing to have a permanent ileostomy. Because IRA is a less complex operation with comparatively low morbidity it is still performed in selected UC patients. da Luz Moreira et al\(^\text{(8)}\) reviewed their experience with IRA to determine the fate of the rectum, functional results and quality of life after ileorectal anastomosis in UC. Seventy-four UC patients after an IRA were matched by age, sex and follow up duration with 66 patients who underwent IPAA. The patients were contacted by telephone to evaluate functional outcomes and HRQOL. Functional outcomes were assessed by determining the number of bowel movements per day, daytime and nighttime seepage, incontinence, urgency and use of protective pads. Quality of life was determined by Cleveland Clinic Global Quality of Life (CGQOL) score. Thirty patients (44%) continued to have a functioning IRA after a median follow-up of 11 years. The rectum was removed in 46 patients. The indication for completion proctectomy included refractory proctitis, rectal dysplasia, and cancer. The patients with IRA had significantly fewer bowel movements per day and less nighttime seepage but had greater urgency than those with IPAA. Even though HRQOL was similar between groups, patients with IRA had significantly more dietary and work restrictions. The authors concluded that while IRA is not the definitive operation for patients with ulcerative colitis, a significant number of patients were able to keep their rectum after 10 years within acceptable functional outcome and the quality-of-life.

**HRQOL after continent ileostomy**

Continent ileostomy (CI) was initially described by Nils Kock in 1969\(^\text{(19)}\). Since then, the Kock pouch became an option for patients for whom the only alternative was an end ileostomy. It was developed and modified to provide physical and psychosocial benefits over the end ileostomy but had many complications, mainly attributed to the valve mechanism, which maintains continence. Nessar et al\(^\text{(20)}\) reviewed the Cleveland Clinic continent ileostomy experience comparing HRQOL in CI patients and those whose Kock reservoir failed, was removed and converted to an EI. Results were evaluated using the continent ileostomy surgery follow-up questionnaire and the Cleveland Global Quality of Life (CGQOL) scale. Patients with an EI were more than twice as likely to report social, work, and sexual restrictions and to require a higher antidiarrheal medication and fiber intake compared with patients with CI. A higher percentage of patients with CI reported having a better appetite. Patients with CI reported less abdominal pain than the EI group, and rated a higher score for overall happiness. CGQOL measurements were better on all scales as well as the summary scale in the CI group. With experience, early and late complications of the technique have declined, however the procedure did not gain a wide acceptance by the surgical community. At present, continent ileostomy is performed only by dedicated surgeons in a few specialized centers.
HRQOL after IPAA

Early in the evolution of the IPAA there was some skepticism whether IPAA would offer advantages over medical management alone. In an elegant prospective study Berndtsson and Oresland[21] evaluated HRQOL before and after restorative proctectomy with IPAA. The authors used the General Quality-of-Life according to Kajang (GQL) instrument, as well as the Visual Analogue Scale (VAS), and a modified disease specific Olbrisch adjustment scale (OAS). These instruments were supplemented by a set of open ended questions. The authors subdivided the patients based upon the presence or absence of ileostomy prior to IPAA. The results indicated that the operation did not influence the general quality-of-life as measured by specific quality-of-life instruments or a visual analogue scale. In the open ended questions, however, the patients reported improved relations with their friends. Even though there was no clear improvement in HRQOL IPAA gave patients greater freedom in role function, improved body image, and reduced the negative effects caused by colitis or life with ileostomy.

Our group evaluated the functional outcomes and HRQOL in a large prospective series of patients who underwent IPAA[22]. A total of 391 consecutive patients were included in the study. The ileoanal anastomosis was constructed either by hand sewn or stapled technique. When a hand sewn anastomosis was selected a complete mucosectomy was performed. A protecting ileostomy was fashioned in the majority of patients. HRQOL was assessed by a validated questionnaire that consisted of two parts. The first part consisted of a list of questions designed to assess the use of pharmacological aids and diet restrictions to reduce the number of bowel movements and improve the quality of continence. The second part included questions related to oral intake, sleep pattern, bowel activity, and daily continence over one week. The patients were asked to complete the questionnaire at 3, 6, 9, 12, 18, and 24 mo after the surgical procedure and yearly thereafter. Over a 10 year follow up the patients who underwent IPAA had on average six bowel movements in a 24-h period. The majority of the patients were able to postpone a bowel movement until a convenient time. Only 18% of patients were able to consistently distinguish flatus from stool and this finding was similar between handsewn and stapled IPAA. The percentage of fully continent patients was higher following stapled anastomosis. Complete daytime and nighttime continence was achieved by 53% to 76% of patients and improved over time. Five years following IPAA 81.4% of patients judged their quality-of-life was much better or better. An impressive 97% of patients reported overall satisfaction and overall adjustment following IPAA as being excellent or good. Our results were similar to those reported by the Cleveland Clinic[23]. In their study, the authors used a validated instrument short form 36 (SF36) as well as their own scoring system Cleveland Global Quality-of-Life (CGQL). The quality-of-life was shown to increase two years following IPAA and there was no deterioration thereafter. The fecal continence improved from 75.5% before surgery to 82.4% following surgery. Even though there was late deterioration of continence, it never became worse than the preoperative function.

Based on these results and the results of other groups, the double stapled IPAA became the preferred anastomotic technique except in situations where mucosectomy is required because of dysplasia or malignancy[24]. In these situations a hand sewn anastomosis is constructed. Anastomotic leak, a dreaded complication of IPAA, has been evaluated by Lian et al[25] comparing hand-sewn and stapled anastomosis. The primary endpoint of the study was pouch failure. Functional outcomes were determined by the number of daytime and nighttime bowel movements, incontinence, urgency, and daytime and nighttime seepage. HRQOL was assessed with the CGQL. The authors concluded that the functional outcomes following stapled anastomotic technique were significantly better compared to those occurring after handsewn anastomotic leak.

Despite various instruments used to evaluate the HRQOL, there appears to be significant disparity in results based on the instrument used. In an interesting study by Scarpa et al[26] the authors addressed the fact that there appears to be distinct types of HRQOL outcomes depending on the type of the instrument used. The analysis based on CGQL reports excellent long-term functional results of IPAA suggesting that an IPAA offers patients long-term HRQL comparable to that of healthy controls. Conversely, other researchers report long-term HRQOL similar only to that of patients with mild UC or remission disease activity. The authors used a cohort of patients consisting of patients with UC, healthy controls, and those who underwent IPAA. A combination of Italian version of the CGQL and the Padova Inflammatory Bowel Disease Quality of Life (PIBDQL) were administered to all patients. According to the Italian CGQL the patient with IPAA had scores similar to healthy controls and patients with mild UC or UC in remission, while the PIBDQL scores of patients who underwent IPAA were significantly worse than those of healthy controls and similar to those of patients with UC in remission or mild UC. The authors concluded that PIBDQL had significantly better discriminative ability compared to the Italian CGQL and, therefore, allowed to more accurately evaluate HRQL.

HRQOL in IPAA in patients with compromised anal sphincter

Poor anal sphincter function has always been considered a contraindication to IPAA. However, in selected patients with sphincter defects that are continent to liquid stools an IPAA should still be considered. Gearhart and colleagues[27] prospectively evaluated 42 women with anorectal manometry and endo-anal ultrasound. Even though all patients were continent at the time of evaluation, endo-anal ultrasound revealed significant sphincter defects in 19 of them. Of these, 4 individuals had significant sphincter defects that involved both internal and
external anal sphincter, a complication of an obstetric trauma. The findings of the endo-anal ultrasound correlated with anal physiology studies that revealed significantly decreased resting pressures, squeeze pressures, and shorter anal canal length. All patients underwent an IPAA (40 stapled, 2 handsewn). The participants were surveyed postoperatively with Cleveland Clinic Florida scale (Wexner score), Fecal Incontinence Severity Index (FISI), or Fecal Incontinence Quality of Life (FIQOL) scale comparing those with or without sphincter defects. The authors did not find a correlation between the size of the sphincter defects and incontinence. Despite the fact that almost all responders reported episodes of seepage, there was no significant difference found in Wexner score, FISI, or FIQOL between the patients with and without sphincter defects. Interestingly, out of 4 patients who reported perfect continence, 2 had significant preoperative sphincter defects. Six patients were dissatisfied with the functional outcome of the IPAA and said they would not undergo this procedure again. Of these patients three had significant sphincter defects. This study demonstrates that, despite careful selection of the candidates for an IPAA, approximately 1/4 of the individuals will suffer from various degrees of stool leakage and up to 5% of them will undergo pouch excision. The authors believe, however, that women with known sphincter defects can obtain a satisfactory continence following an IPAA. Although this study suffers from small size and has limited statistical power, it suggests that when used selectively in highly motivated patients restorative proctocolectomy with an IPAA can provide a satisfactory HRQOL even in those patients who have a sphincter defect but are fully continent preoperatively.

HRQOL following IPAA failure

Lepistö et al.28 evaluated HRQOL after pouch failure. From a cohort of 486 patients the authors identified 26 patients. The overall pouch failure in the study was 5.3%. The patients who suffered from pouch failure, controls with functioning pouches as well as normal controls were sent an SF-36 quality-of-life questionnaire. The pouch was excised in 24 patients, 2 patients died from perianal pain, and major anastomotic disruption. Compared with a healthy population, patients in the failure group reported significantly worse physical function, social functioning, energy level and the physical role function. All of these findings were statistically significant. The scores for general health, emotional well-being, bodily pain, emotional role function did not differ significantly between the two groups. Similarly, when compared to a control group with well functioning IPAA, the pouch failure group had significantly lower scores for physical function, energy level, and physical role function. Pouch excision following restorative proctocolectomy and ileal pouch anal anastomosis is a rather distressing experience for the patients. Tan and colleagues29 compared HRQOL in IPAA patients and required pouch excision with patients with an initial TPC and EL. A questionnaire addressing bowel symptoms, systemic symptoms, functional impairment, social empowerment, and emotional impairment was used. Mean scores for bowel and systemic symptoms, as well as for functional, social and emotional impairment, were lower following pouch excision. The difference, however, was only statistically significant for bowel symptoms. This particular difference was due to frequency of emptying of the ileostomy bag and perception of this being disruptive of family life. The higher ileostomy output was a result or shorter length of small bowel due to a pouch loss.

HRQOL for salvage surgery in failed IPAA

In selected patients with pouch complications such as recurrent strictures, pouch emptying disorders, long efferent limb of an S-pouch and disabling pouchitis salvage pouch surgery can be performed. Baxauli et al.28 assessed functional outcomes, HRQOL and pouch salvage rates from a prospectively maintained database. In addition the patients were asked to complete a self administered structured questionnaire during their follow-up visits. Assessment of HRQOL was performed using the CGQL score. A total of 40% of patients with pouch failure were eventually diagnosed with CD. Those patients with CD who retained their pouches had similar HRQOL and functional scores to those with UC. Of 101 patients with an attempted pouch salvage procedure, 13 had to have the pouch excised. The overall 5-year pouch salvage rate was 74% (79% in UC and 53% in CD). No differences were seen between those having repeat ileal pouch-anal anastomosis procedure for septic or non-septic indications, or whether using a new or repaired pouch. In those patients in whom new pouch had to be constructed high-frequency of defecation was noted, in addition to increased number of bowel movements at night. However this was similar to those patients who had their pouches repaired and re-anastomosed. Despite the complications associated with initial IPAA, 97% of patients said they would undergo repeat ileal pouch-anal anastomosis again, and 99% would recommend it to others. The authors concluded that salvage procedure for failed IPAA is a valid alternative to pouch excision in cases where pelvic sepsis is controlled.

HRQOL in IPAA at end of the age spectrum

Older patients have not been traditionally considered good candidates for IPAA. However, in selected septuagenarians IPAA can be a valid option. Delaney et al.31 evaluated functional outcomes and HRQOL in 17 patients older than 70 at the time of surgery using CGQL scoring system. The patients’ responses were also collected using SF-36 analysis comparing it with United States population 65 years of age and older. The authors found no significant difference between patients with IPAA older than 70 years and healthy individuals older than 65 years. In particular there was no difference in mental and physical components. Unfortunately, in their
series 4 patients (23.5%) had major morbidity and 1 patient died of septic complications of an intra-abdominal abscess. The overall quality-of-life, health and levels of energy and happiness were perceived as good by the patients. Most patients would recommend IPAA to others and 82% said that they would undergo pouch surgery again. While the results of the HRQOL and functional outcomes were encouraging, the authors underscored the importance of patient selection.

At the other end of the spectrum is IPAA performed in children younger than 18 years of age. In the study by Lillehei et al[32] the authors included 75 children with UC who underwent IPAA. The results compare favorably to those reported in literature in regards to stool frequency and fecal continence. The average number of daily bowel movements was 5. The rates of daytime and nighttime fecal continence were found to be excellent. Ninety percent of the patients were able to distinguish flatus from stool. The rate of pouchitis in this young patient population was, however, quite high. Of 75 children with UC, 35 (47%) had at least one episode of pouchitis and 10 patients required prolonged treatment. Pouchitis had a significant impact on HRQOL in this group, but the reasons for such a high incidence in pediatric population remain unknown.

HRQOL after laparoscopic IPAA

With the advent of laparoscopic surgery, there was a gradual shift to performing IPAA with laparoscopic assistance. Our group reported on a long-term functional results in a prospective observational study on laparoscopic assisted IPAA[33]. The patients were asked to complete a previously validated two-part questionnaire used by our group. The overall average number of daily bowel movements was similar between laparoscopic and open groups. There was a trend in the laparoscopic group to report improved stool consistency with mostly pasty bowel movements. There were no significant differences in fecal continence between the groups. In the laparoscopic group only 20.8% compared to 21.9% of patients in the open group reported some degree of incontinence. Significantly fewer patients in the laparoscopic group used pads during the daytime and nighttime. The quality-of-life was similar between the groups. The majority of the patients rated their quality of life as better or much better compared to before their IPAA or before ileostomy closure. Similar findings were reported by other groups. Larson et al[34] reported the Mayo Clinic experience comparing laparoscopic and open IPAA. Three separate surveys were mailed to the patients: the validated SF-8, female sexual function index (FSFI), and international index of erectile function (IIEF). In addition the authors used non-validated body and cosmetic evaluation instrument. Similar to our study the authors found the quality-of-life to be comparable between open and laparoscopic patients. Short-term benefits were noted in the laparoscopic group; however, long-term outcomes likely reflect the function of the pouch and not the surgical technique used. Alterations in female sexual function were noted to be similar whether laparoscopic or open IPAA was performed. The male sexual function was less affected.

Because laparoscopic surgery has advantages over open surgery by primarily improving appearance and body image, but not included in the quality-of-life questionnaire, Dunker et al[35] developed a body image questionnaire consisting of a body image scale and cosmetic scale. Similar to the previous studies, no significant differences were found in functional outcomes and in HRQOL. Satisfaction with cosmetic result, however, was significantly higher in laparoscopic assisted group as compared to the conventional group. Accordingly, body image scores were higher in the laparoscopic assisted group when compared with open group, although this difference was not significant. Even though the functional impact on HRQOL in IPAA has not been shown to be significantly different between laparoscopic and open group, better patient acceptance and improved cosmesis combined with the decreased risk of hernia formation makes laparoscopic IPAA the preferred surgical approach to UC at the present time.

Sexual function and reproductive health after an IPAA

Proctocolectomy with IPAA is frequently performed in young and active men and women. Sexual dysfunction is a potential risk for both men and women who undergo pelvic surgery. Damage to the autonomic nerves can occur resulting in impotence, retrograde ejaculation in men or vaginal dryness and dyspareunia in women. Davies and colleagues[36] prospectively evaluated male and female sexual function before and after IPAA. The authors used the IIEDF, a validated instrument that evaluates erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. The female sexual function was evaluated with the FSFI which addresses six domains of female sexual function (desire, arousal, lubrication, orgasm, satisfaction, and pain). The authors asked 59 patients to complete a preoperative questionnaire. These patients were then mailed questionnaires at 6 and 12 mo after surgery. There were 33 men and 26 women who underwent IPAA. The IIEDF scores in men did not change following IPAA while in women the FSFI scores significantly improved following surgery. The authors noted a high proportion of women with abnormal sexual function preoperatively (73.1%). This proportion decreased significantly to 25% at 12 mo after surgery. Improved overall physical well-being after surgery has been suggested as the reason for such improvement. On the other hand, dyspareunia, vaginal dryness, and incontinence have been reported in a small portion of women. In contrast to previous studies that used retrospective surveys relying on the patients’ recall of their preoperative sexual function, Davies and colleagues used a validated tool and eliminated the recall bias by administering a prospective survey. This study, however, didn’t address the effect of complications such as anastomotic leaks on sexual function.

Despite advances in operative technique, proctocolectomy with IPAA is still associated with a significant...
decrease in female fertility. Because many women with UC are diagnosed at a young age, it has been reported that 45% of them will attempt to become pregnant following surgery. In the study by Olson and colleagues, the cumulative incidence of pregnancy in women following conventional IPAA was only 36% whereas 80% of women in the general population and 90% of women with UC who had not had surgery were successful in becoming pregnant. It is thought that the infertility problems are likely due to adhesion formation following rectal dissection. This notion is supported by the fact that patients who undergo total abdominal colectomy with either an IRA or an EI have essentially unaltered fertility compared to patients with UC who did not undergo surgery. While many strategies to preserve fertility have been proposed, such as oophoropexy and use of anti-adhesion substances in the pelvis, currently there is no evidence that they have a proven benefit. There is still insufficient data on the impact of the laparoscopic approach on fertility and fecundity. For women with active disease in need of a colectomy the recommendation is to perform a colectomy with an end ileostomy and defer an IPAA until a woman completes her family.

Pregnancy following IPAA has been shown to be safe and not associated with increased maternal or fetal complications. Additionally, pregnancy does not result in pouch related complications. Most authors advocate a caesarian section and discourage vaginal delivery. This is based on the fact that sphincter disruption that might occur during vaginal delivery can result in significant deterioration of the functional results of IPAA particularly in patients who already have liquid stools. This recommendation is reflected by 38% to 78% rate of caesarian sections following an IPAA compared to 22% average in North America. In a study by Hahnloser and colleagues a total 135 female patients were prospectively followed. Seventy two percent of them had uncomplicated pregnancies and were able to carry to term. The pregnancy complications in IPAA patients did not occur more frequently than in the general population. In this study 56% of women gave birth vaginally after IPAA. The authors noted that vaginal delivery did not have significant impact on long-term pouch function compared to women who had a cesarean section. After delivery pouch related complications in patients with IPAA increased. It is unclear whether the increased pouch related complication rate was due to the delivery or to the natural history of the pouch. Despite this finding the authors recommended vaginal delivery unless there are obstetrical concerns that mandate a cesarean section. The summary of included articles for HRQOL in UC was shown in Table 1.

**SURGICAL THERAPY AND HEALTH RELATED QUALITY OF LIFE IN CROHN’S DISEASE**

There are many characteristics of CD that make HRQOL measurements of particular importance in this entity, such as the recurrent and panintestinal nature of the disease, the young age of onset, impact on productivity, body image and sexual life. While it is important to correlate HRQOL with disease activity, it is also important to recognize that traditional measurements of disease activity correlate poorly with patient assessment in CD. HRQOL has been shown to correlate with disease activity in CD in a variety of studies. Standard disease activity indices, such as the Crohn’s Disease Activity Index (CDAI) and the Harvey Bradshaw index, have been shown to correlate with IBDQ the short IBDQ, the Korean-translated IBDQ, the TTOT, the Spanish IBDQ and the Dutch-translated IBDQ.

Furthermore, when evaluating HRQOL in CD patients after surgery it is important to consider the type of surgery performed. A difference in HRQOL is expected between CD patients undergoing a simple ileocolic resection versus having a permanent end ileostomy after a total proctocolectomy. Due to the importance of HRQOL in CD, formal HRQOL questionnaires are now routinely included as secondary outcomes in clinical trials. This review will focus on HRQOL in surgically treated CD patients, comparing it with medically treated CD patients, and correlating it with CD activity.

It is important to keep in mind that CD patients have been shown to have significantly impaired HRQOL compared to healthy controls. Even patients in the least severe health state, who are in remission and receiving minimal medical therapy, have a measurable decrease in HRQOL relative to healthy individuals. If HRQOL scores in CD patients are compared with those of patients with other chronic diseases, they are worse than that of individuals with severe angina, but better than those patients with chronic renal failure undergoing haemodialysis, or those with ulcerative colitis before a colectomy.

Surprisingly there are very few studies that compare HRQOL in medically and surgically treated CD patients. We speculate that it is due to the heterogeneity of these patient populations that it is very difficult to compare taking into account the multiple sites of disease, the extreme variability of severity and type of associated complications and the multiple surgical options available. Thirlby et al. in a series of 36 primary CD patients showed postoperative improvement at various time points using the Health Status Questionnaire (HSQ)

Preoperative measures of HRQOL of the patients were low, with values well below the general population in all 8 scales of the HSQ. Postoperatively, HRQOL measures improved significantly to reach scores equal to the general population in most parameters, for example the average raw scores for general health (74 in the general population vs 54 and 73 preoperatively and postoperatively, respectively, in the study group). Tillinger et al. (which included utility studies) showed an advantage at 3 and 6 mo, but not at 24 mo postoperatively in the presence of chronic disease. In this prospective study 16 CD patients (mostly with terminal ileal diseases) were investigated within 1 wk before surgery and 3, 6 and 24 mo postoperatively. CDAI decreased significantly after surgery and 10...
patients remained in remission for 24 mo. Two patients had postoperative relapses and went into remission after prednisolone treatment. Four patients developed chronic active disease. HRQOL was significantly improved in all patients 3 and 6 mo postoperatively. Except for the 4 patients with chronic active disease, all other 12 patients also had significantly improved HRQOL after 24 mo. Thus, in patients with active CD, HRQOL appears to improve in the immediate post-operative period, but not in the long term. This is consistent with the natural history of CD, which gradually recurs postoperatively in most patients.\textsuperscript{15,56}

Meyers at Mount Sinai interviewed 51 patients with CD 5-10 years after elective surgery.\textsuperscript{57} Patients were asked to retrospectively assess 5 areas of psychosocial functioning (personal relations, school and job performance, recreation, sexual function, and body image) 6 mo preoperatively, 1 year postoperatively, and at the time of interview. As expected, patients reported significantly less severe symptoms at interview than preoperatively with large differences given the fact that this was a surgical series; 100% of patients were symptomatic at surgery and only approx-

| Study | Patient population | HRQOL instruments | Study conclusions |
|-------|-------------------|-------------------|------------------|
| Cohen et al\textsuperscript{[22]} | Steroid-refractory UC patients treated with CSA vs colectomy | IBIDQ visual-analog scale, Oresland | CSA patients had similar HRQOL compared to colectomy group. CSA can be alternative to surgery in selected patients. |
| Sagar et al\textsuperscript{[23]} | UC patients after IPAA vs UC patients on long-term medical treatment based on a questionnaire by Oresland et al | | HRQOL after IPAA is no worse than that of patients with long-standing UC on medical treatment in remission. |
| Camilleri-Bennanan et al\textsuperscript{[24]} | UC patients with TPC and EI vs general population | SF-36 version 2 (SF-36II) | HRQOL of TPS and EI patients very similar to that of the general population. TPC and EI remains a viable option for patients with UC. |
| da Luz Moreira et al\textsuperscript{[25]} | UC patients with IRA vs IPAA | CGQL | HRQOL similar between groups, but IRA is inferior to IPAA because of dietary and work restrictions. |
| Nessar et al\textsuperscript{[26]} | CI (Kock) vs EI | CGQL | HRQOL significantly better with CI, but complications are common in CI group. |
| Berndtsson et al\textsuperscript{[27]} | UC patients before and after IPAA | GQL, VAS, OAS open ended questions | IPAA had no impact on HRQOL, but improved relations with friends, freedom in role function, and body image reduced the negative effects caused by colitis or life with ileostomy. |
| Michelassi et al\textsuperscript{[28]} | 10 yr prospective study of UC patients with IPAA | Two part questionnaire | Excellent long term functional outcomes after double stapled IPAA. |
| Fazio et al\textsuperscript{[29]} | UC patients with IPAA | SF 36 CGQL | HRQOL increase following IPAA; no deterioration with time. |
| Lian et al\textsuperscript{[30]} | UC patients with hand sewn vs stapled IPAA complicated by anastomotic leak | Italian CGQL vs PIBDQL | Functional outcomes following anastomotic leak better in stapled IPAA compared to handsewn IPAA. |
| Scarpa et al\textsuperscript{[31]} | UC patients, UC patients after IPAA, and normal controls | FISI, FIQL Wexner score | PIBDQL has significantly better discriminative ability compared to the Italian CGQL. |
| Gearhart et al\textsuperscript{[32]} | UC female patients with sphincter defects | SF-36 (SF-36II) | IPAA can provide a satisfactory HRQOL in patients with sphincter defect who are fully continent preoperatively. |
| Lepistö et al\textsuperscript{[33]} | HRQOL after pouch failure vs well functioning IPAA | SF-36 | IPAA failure group with significantly lower scores for physical function, energy level, and physical role function. |
| Tan et al\textsuperscript{[34]} | UC patients following pouch excision vs initial TPC and EI | SF-36 | HRQOL similar between the pouch excision and initial IPAA groups. |
| Baixauli et al\textsuperscript{[35]} | IPAA patients with pouch failure | CGQL | CD is common cause of pouch failure. HRQOL similar in UC or CD pouch failure patients. |
| Delaney et al\textsuperscript{[36]} | IPAA patients 70 yr and older | CGQL | Good HRQOL, health, levels of energy and happiness. However, IPAA associated with high rate of morbidity and mortality. |
| Lillehei et al\textsuperscript{[37]} | Pediatric UC patients with IPAA | Standardized questionnaire | Excellent functional outcomes. High rate of pouchitis. |
| Ficher et al\textsuperscript{[38]} | Laparoscopic vs open IPAA | Two part questionnaire | HRQOL was similar between the groups. Better patient acceptance and improved cosmesis in laparoscopic IPAA. |
| Larson et al\textsuperscript{[39]} | Laparoscopic vs open IPAA | FSFI, IIEF body and cosmetic evaluation | HRQOL comparable between open and laparoscopic patients. |
| Dunker et al\textsuperscript{[40]} | Laparoscopic vs open IPAA | Body image questionnaire | HRQOL similar between groups. |
| Davies et al\textsuperscript{[41]} | Prospective evaluation of sexual function before and after IPAA | FSFI, IIEF | Improved sexual function in women. Unchanged sexual function in men. |
| Ording Olsen et al\textsuperscript{[42]} | Reproductive health of women with UC undergoing IPAA vs UC vs general population | | Significant decrease in fecundity (36% vs 80%-90%) following IPAA compared to UC and general population. |
| Hahnloser et al\textsuperscript{[43]} | Pregnancy following IPAA vs general population | | No increase in pregnancy complications following IPAA. Vaginal delivery not contraindicated. |

HRQOL: Health related quality of life; UC: Ulcerative colitis; CSA: Cyclosporine A; VAS: Visual-analog scale; IPAA: Ileal pouch anal anastomosis; EI: End ileostomy; TPC: Total proctocolectomy; CGQL: Cleveland Clinic Global Quality of Life; CI: Continent ileostomy; IRA: Ileorectal anastomosis; CGQL: Cleveland Global Quality of Life; PIBDQL: Padova Inflammatory Bowel Disease Quality of Life; GQL: General Quality-of-Life according to Kajang; FSI: Fecal Incontinence Severity Index; FIQL: Fecal Incontinence Quality of Life; IIEF: International index of erectile function.
imately half at follow-up, which may support an effect of the intervention on itself. Exceptions were patients with an ileostomy and patients with recurrent illness. Overall 92% felt the surgery had been helpful.[7]

The study by Casellas et al.[48] looked at the impact of disease activity on HRQOL in the surgical CD patient. In this study the determining factor was whether the patient had active disease and not whether he or she had undergone previous CD, in part confirming Tillinger’s findings.[46] They looked at the outcomes of 29 CD patients in remission with a previous bowel resection compared with 42 clinically active CD patients and 48 patients with medically induced remission. The control group was composed of 63 healthy individuals. HRQOL was measured by IBDQ, the Psychological General Well Being Index[38], and the EuroQol.[39] Not surprisingly they showed that active CD patients scored the lowest on the IBDQ. Both operated and non operated inactive CD patients had lower HRQOL scores than controls in overall IBDQ and in all 5 domains. They concluded that HRQOL is impaired in active CD and improves during remission irrespective of whether it had been achieved medically or surgically.

Cooper and colleagues reported 42 patients with CD sparing the rectum undergoing colectomy and ileorectal anastomosis.[34] Problems with this study were the high mortality rate (7%) due to anastomatic breakdown and the need for reoperation (48%). Unrestricted social activity and regular employment was reported by 85% of the 14 patients questioned who continued to have a functioning anastomosis 1 to 14 years postoperatively.

In a provocative study by Halme, 98 patients treated for CD for a mean period of ten years showed a substantial difference in HRQOL in favor of patients with large bowel involvement treated with proctocolectomy and ileostomy compared to all other treatment groups (ileocolic resection, colectomy with ileorectostomy, and colostomy with proctectomy). Furthermore the ability to work was greatest in the nonsurgical group and the ileostomy group.[47]

Restorative proctocolectomy with IPAA is generally contraindicated in patients with preoperative diagnosis of CD. On the other hand, in approximately 10% of patients with a diagnosis of UC, signs and symptoms of CD may develop in the pouch. CD following IPAA can manifest itself as inflammation of the pouch with fibrostenotic or fistulizing characteristics. Shen and colleagues[25] evaluated 73 patients with CD of the pouch. Twenty five of them were found to have inflammatory CD, 17 fibrostenotic, and 31 fistulizing disease. HRQOL was assessed using three instruments: Cleveland Clinic global quality-of-life, the irritable bowel syndrome quality-of-life, and the short inflammatory bowel disease questionnaire. The irritable bowel syndrome quality-of-life tool was used to address the functional aspects of symptoms in patients with IPAA because the patients with IBD frequently have IBS-like symptoms. The symptomatology correlated closely with the disease phenotype. Patients who developed inflammatory CD in their pouch predominantly suffered from diarrhea and/or pain. Those with fibrostenotic disease had predominantly obstructive symptoms. Patients with fistulizing CD of their pouches had significant fistular drainage symptoms. There was no statistically significant difference in HRQOL scores between the three phenotypes of CD when adjusted for disease activity. Fistulizing CD appeared to be associated with a higher risk of pouch failure. The risk factors for development of CD in the pouch include intentional construction of IPAA in patients with known CD, patients with indeterminate colitis at the time of IPAA, or patients with long-standing pouchitis. Patients who were diagnosed with CD of the pouch often required long-term maintenance therapy. The majority of the patients responded to infliximab infusion. A total 33% of patients with CD of the pouch required pouch excision. The remaining 67% had an adequate pouch function. Overall the patients who developed CD following an IPAA have a perception of the poor quality of life since it requires sustained pharmacologic therapy, sometimes surgery, and is complicated by frequent exacerbations and gastrointestinal and extra intestinal complications.

While in UC the use of validated HRQOL instruments in surgical studies is routine, the vast majority of studies addressing surgical treatment of CD are uncontrolled, and very few used a validated HRQOL instrument. Assessment of the surgical management of CD is greatly limited by the use of physician rated scales that arbitrarily assign patients to levels of HRQOL. Physician ratings cannot truly measure HRQOL, which is by definition the patient’s subjective opinion. The insensitivity of these scales provides quite limited support for the value of surgery and no convincing argument for the superiority of any particular surgical approach.

Thus in IBD it is misleading to place too much confidence in uncontrolled studies. Any chronic illness that waxes and wanes and often recurs will yield large discrepancies in the assessment of severity, which depend largely on the time of sampling. A comparison of current function to preoperative function will predictably show better function currently because the time when a person chooses palliative surgery presumably marks a nadir in satisfaction and function, as opposed to the more arbitrarily determined date of follow-up when some proportion of patients will be in remission by chance. Further controlled studies are needed to better understand HRQOL in IBD.

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