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ORIGINAL ARTICLE

Ileal pouch–anal anastomosis in ulcerative colitis: outcomes, functional results, and quality of life in patients with more than 10-year follow-up

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Abstract

Purpose Ileal pouch–anal anastomosis (IPAA) has become the surgical procedure of choice for patients with ulcerative colitis (UC). IPAA was incorporated into our institution in 1984, and thereafter, more than 200 procedures have been performed. The functional results and morbidity of this surgery have been reported previously. However, long-term functional outcomes and quality of life have not been evaluated.

Methods As a cohort study, we identified all consecutive patients who underwent IPAA for UC between 1984 and 2017 and selected those with more than 10-year follow-up. Demographic data, morbidity, and pouch survival information were obtained. Long-term functional results and quality of life were evaluated through an e-mail survey using the Öresland score and the Cleveland Global Quality of Life scales, respectively.

Results Of 201 patients, 116 met the inclusion criteria. Median follow-up was 20 (10–34) years. Early post-operative complications (30 days) were observed in 19 (16.4%) patients and 66 (56.9%) presented adverse events. The IPAA preservation rate at 10 and 20 years was 96.5% and 93.1%, respectively. Long-term functional scores presented a median of 6 (1–15) points. IPAA function was satisfactory in 11 (20.0%) patients, acceptable in 18 (32.7%), and deficient in 26 (47.3%). The median score for global quality of life was 0.8 (0.23–1.0) points.

Conclusion IPAA as treatment for UC meets the expectations of cure of the disease, maintaining adequate long-term intestinal functionality associated with a good quality of life in most patients.

Keywords Ulcerative colitis · Ileal pouch–anal anastomosis · Quality of life

Introduction

Proctocolectomy with terminal ileostomy or Kock's pouch was the surgical alternative for ulcerative colitis (UC) up to the late 1970s. In 1978, Parks and Nicholls introduced the ileal pouch–anal anastomosis (IPAA) technique which entails resection of the entire colon and mid-upper rectum, mucosectomy of the distal third of the rectum, and anastomosis of the ileal pouch to the anal canal at the level of the pectinate line. This procedure allows resection of the diseased organ, maintains continence, and prevents the development of colorectal cancer [1–4]. Although the original technique has undergone certain variations, IPAA has since become the surgery of choice for patients with UC. IPAA presents high patient satisfaction [5–7], good functional results, and acceptable morbidity [7–11].

The IPAA technique was incorporated into our institution in 1984, and thereafter, more than 200 procedures have been performed. The functional results and morbidity of this surgery have been reported previously [12]. However, long-term functional outcomes and quality of life have not been evaluated.

The aim of this study is to evaluate pouch preservation rate, morbidity, functional outcomes, quality of life, and satisfaction of patients that underwent IPAA for UC in our institution with more than 10-year follow-up.

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Method

Cohort study Using our institution's prospectively maintained database of inflammatory bowel diseases, we identified all consecutive patients who underwent IPAA for UC between January 1984 and December 2017. To evaluate the long-term functional outcomes of IPAA patients, we selected those with 10 or more years since ileostomy closure, without any exclusion criteria.

Demographic data were collected. Early morbidity was defined as within 30 days after IPAA. The presence of a pelvic collection diagnosed by images, with or without septic symptoms or leak, was classified as pelvic sepsis. Ileus was defined as a delay of seven or more days in the recovery of adequate intestinal motility for oral hydration and feeding. Any infection (bacteriologically certified) of the laparotomy wound, trocar sites, or ileostomy was defined as surgical site infection. Any disease derived from the presence of an IPAA that required medical or surgical attention after 30-day follow-up was considered an adverse event. Failure of IPAA was defined as the need for a defunctionalizing ileostomy indefinitely or necessary removal of the IPAA with definitive ileostomy [13].

Long-term follow-up was completed through review of medical records and contacting patients. A survey was sent via e-mail to evaluate patients' long-term functional results and quality of life. Patients with IPAA failure were excluded from the survey. Death certificates, when appropriate, were collected.

Procedures

All procedures were performed by certified colorectal surgeons as the first surgeon or directly supervising colorectal fellows.

Patients were operated in two or three stages according to their surgery indication. Patients suffering an acute, severe attack due to failure of medical treatment or as an emergency due to toxic megacolon, massive bleeding, or perforation were submitted to a three-stage procedure. The first stage consisted of total abdominal colectomy with terminal ileostomy and preservation of the rectum. The second stage included proctectomy and creation of an IPAA with a protecting loop ileostomy. The third stage consisted of ileostomy closure. The rest of the patients were operated in two stages. The first stage consisted of proctocolectomy with IPAA and loop ileostomy, followed by ileostomy closure in the second stage.

Most of the pouches were executed in a "J" shape, with the exception of the first four that were "S." All IPAAs were protected by a loop ileostomy. The ileostomy closure was scheduled 2 to 3 months later, after contrast and endoscopic study of the pouch [12]. In the last part of the series, according to the surgeon's preference, a laparoscopic approach was used.

Functional results and quality of life

After initial contact and informed consent via telephone, a survey was conducted via e-mail. Functional results were measured using the Öresland scale [14]. Results were classified as satisfactory (0–3 points), acceptable (4–6), or deficient (7–16). The Cleveland Global Quality of Life scale [15] was also used. This scale includes three categories: quality of life, quality of health, and energy level. Each category is rated from 1 to 10, 0 being the worst and 10 the best possible evaluation. The final score is calculated by dividing the sum of the three categories by 30.

In a separate online survey, dichotomous questions (yes or no) were added regarding acceptance of the IPAA pouch and whether patients would recommend it to third parties.

Statistical analysis

The data were collected using Microsoft Excel and analyzed with SPSS v22.0. Descriptive and analytical statistics of the series were performed. The data are presented as mean and standard deviation once normality was verified using the Kolmogorov–Smirnov test, or in median and range if the data showed a non-parametric distribution. Kaplan–Meier survival curves and Cox regression analysis were performed to evaluate patients who maintain a functional IPAA in the long term. Logistic regression analysis was performed in search of IPAA failure risk factors and to identify variables that could influence the long-term functional results and quality of life. Univariate logistic regression was performed by direct entry method. Only significant variables were included in a multivariable model if possible.

A comparison of functional results and quality of life was made between patients with more or less than 20 years since IPAA surgery, using chi-square, *t* student, or Mann–Whitney as appropriate. Statistical significance was considered when $p < 0.05$. The study was reviewed and approved by our institutional ethics committee. All patients provided informed consent to participate in the study before answering the questionnaires applied.

Results

Of 201 patients with IPAA for UC performed to date in our institution, 116 met the inclusion criteria. The general characteristics of the series are summarized in Table 1. Postoperative complications (30 days) were observed in 19 (16.4%) patients, detailed in Table 2. Two patients required early re-operation, at 24 and 72 h post-operatively: one patient due to intra-abdominal bleeding and the other due to ischemic necrosis of the pouch. Patients who presented pelvic sepsis responded successfully to antibiotic treatment without the

Table 1 Demographic and operative data

Variable	$n = 116$
Sex, *n* (%)	
Male	49 (42.2%)
Female	67 (57.8%)
Age at UC diagnosis (years, SD)	31 ± 9.8
Age at IPAA (years, SD)	35 ± 10.3
Surgical approach, *n* (%)	
Open	105 (90.52%)
Laparoscopic	11 (9.48%)
IPAA shape, *n* (%)	
"J"	112 (96.5%)
"S"	4 (3.5%)
IPAA stages	
2 stages	31 (26.8%)
3 stages	85 (73.2%)

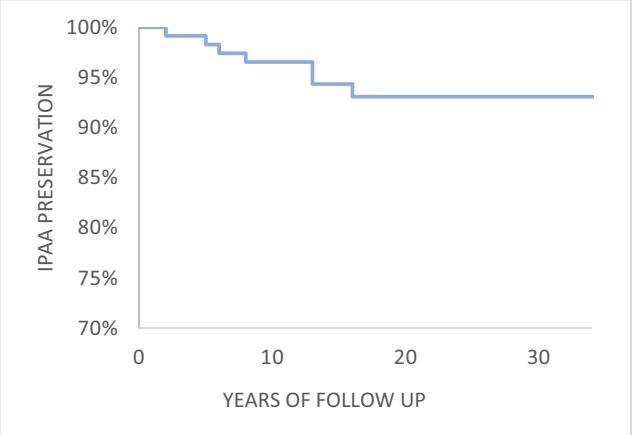

Fig. 1 Long-term pouch preservation

need of percutaneous or operative drainage, except for one patient who was required for the removal of the pouch due to almost complete anastomotic dehiscence and presence of pelvic abscesses. There was no operative mortality. The median follow-up was 20 (10–34) years. The rate of preservation of the IPAA was 96.5% at 10 years and 93.1% at 20 years, Fig. 1. Sixty-six (56.9%) patients presented late adverse events. The most frequent adverse events were chronic pouchitis, in 27 patients (23.3%); intestinal obstruction, in 20 (17.2%); and perianal fistula, in 15 (13%). Upon follow-up, in nine (7.8%) patients, a change in the behavior of the disease occurred, based on clinical manifestations. These patients were reclassified as Crohn's disease (CD), Table 3.

A total of nine (7.5%) IPAAs failed during follow-up. The causes were perianal or rectovaginal fistulas (6); adenocarcinoma of the rectal remnant (2); and necrosis of the pouch (1). During follow-up, 10 patients died: nine due to causes unrelated to the IPAA and one due to an adenocarcinoma of the remaining rectal cuff. Logistic regression analysis was performed in search of IPAA failure risk factors. No association was found with early surgical complications. Among adverse events, perianal and recto-vaginal fistulas were the only variables associated independently with the loss of an IPAA, HR 5.77 (95% CI 1.38–25.62), $p = 0.016$.

Table 2 Early morbidity after IPAA procedure

Complication	*n* (%)
Pelvic sepsis	10 (8.6%)
Ileus	7 (6%)
Surgical site infection	5 (4.3%)
Dehydration	3 (2.6%)
Deep vein thrombosis	1 (0.9%)
IPAA necrosis	1 (0.9%)
Hemoperitoneum	1 (0.9%)

Long-term functional results

Of the 116 patients included, 97 (83.6%) met the criteria to answer the functional outcomes and quality of life survey. Of these, 14 (14.4%) were impossible to contact via phone and five (5.2%) rejected participation in the study. A total of 78 surveys were sent. Fifty-five (70.5%) surveys were answered and therefore included in the analysis, Fig. 2.

There was no statistically significant difference between the respondents and the rest of the cohort regarding demographic, surgical variables, or morbidity, as seen in Table 4.

The functional results according to the Öresland scale presented a median of 6 (1–15) points. IPAA functionality was satisfactory in 11 patients (20.0%), acceptable in 18 (32.7%), and deficient in 26 (47.3%).

Only 42% of patients have four or less daily bowel movements and 62% less than six. Most patients have nocturnal evacuations without urgency and maintain continence. One-third of patients present soiling and use pads whilst sleeping. Most patients suffer from periods of perianal irritation and the need to avoid some foods. However, 75% believe that their social life is not compromised, Table 5.

Table 3 Adverse events after IPAA procedure

Complication	*n* (%)
Chronic pouchitis	27 (23.3%)
Intestinal obstruction	20 (17.2%)
Perianal fistula	15 (12.9%)
Evolution to CD	9 (7.8%)
Recto-vaginal fistula	7 (6%)
Ileitis	6 (5.2%)
IPAA cancer	2 (1.7%)
Incisional hernia	2 (1.7%)

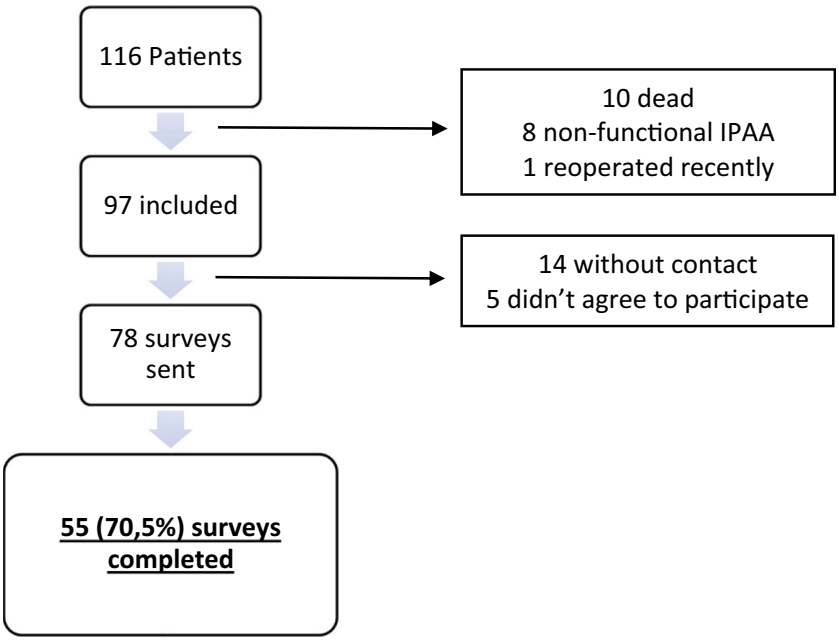

Fig. 2 Selection of patients for the e-mail survey

The presence of any early or late surgical morbidity was compared with long-term functional status. There was no association with early morbidity. Pelvic sepsis was not associated with a worse Öresland score in the long term (p = 0.49). Instead, adverse events were significantly related. Patients without adverse events had a median of 5 (1–12) points in the Öresland functional score whereas those who presented any adverse events during follow-up had a median of 8 (1–15) points (p = 0.034).

After logistic regression, time from IPAA surgery was not associated with worse functionality, OR 1.06 (95% CI 0.35–3.19). Each variable of the Öresland score was compared between patients with less than 20 (n = 28) and more than 20 (n = 27) years from IPAA surgery. The only variable that showed a significant difference between groups was the use of night dressings, where patients with more than 20 years of follow-up had a higher use of dressings (17.8% vs 43.5%, p = 0.023).

Table 4 Characteristics of responders vs not responders

Variable	Not responder	Responder	p value
Sex, n (%)			
Male	28	21	0.454
Female	33	34	
Age at UC diagnosis (years, SD)	31 ± 10.9	30 ± 8.7	0.696
Age at IPAA (years, SD)	35 ± 11.8	35 ± 8.5	0.806
Surgical approach, n (%)			
Open	56	49	0.754
Laparoscopic	5	6	
IPAA shape, n (%)			
"J"	58	54	0.62
"S"	3	1	
IPAA stages			
2 stages	15	16	0.832
3 stages	46	39	
Early morbidity	12	7	0.319
Late morbidity	31	35	0.325

Quality of life and satisfaction

The median score for global quality of life was 0.8 (0.23–1.0) points. Specifically, the scores were 8 (3–10) for quality of life, 8 (2–10) for quality of health, and 8 (2–10) for energy level (Fig. 3). There was no statistically significant association between surgical morbidity and time from IPAA surgery (less than 20 years versus 20 years or more) and long-term quality of life.

Regarding satisfaction with surgery, 51 (92.7%) patients reported being satisfied with the decision to have undergone IPAA and 51 (92.7%) would recommend it to other patients with UC who might need surgical treatment.

Discussion

Restorative proctocolectomy with IPAA has become the standard surgical therapy for patients with UC. This is mainly because it removes diseased tissue, prevents the development of cancer, and maintains continence. The complexity of the pelvic dissection, the construction of the pouch, and the anal anastomosis may cause major and minor post-operative complications. These complications can lead to indefinite

Table 5 Functional results according to Öresland scale

Variable	*n* (%)
Number of stools/day	
< 4	23 (41.8%)
5	12 (21.8%)
≥ 6	20 (36.4%)
Number of stools/night	
0–1/week	17 (30.9%)
> 1/week	5 (9.1%)
≥ 2/night	33 (60.0%)
Defecatory urgency	
No	28 (50.9%)
Yes	27 (49.1%)
Difficult stool evacuation	
No	21 (92.7%)
Yes	4 (7.8%)
Soiling/day	
No	41 (74.5%)
Yes	14 (25.5%)
Use of dressings/day	
No	36 (65.5%)
Yes	19 (34.5%)
Soiling/night	
No	37 (67.3%)
Yes	18 (32.7%)
Use of dressings/night	
No	36 (70.6%)
Yes	15 (29.4%)
Incontinence/gas	
No	31 (56.4%)
Yes	24 (43.6%)
Perineal irritation	
No	10 (18.2%)
Occasionally	38 (69.1%)
Permanently	7 (12.7%)
Dietary restrictions	
No	13 (23.6%)
Yes	42 (76.4%)
Use of medications	
No	38 (69.1%)
Yes	17 (30.9%)
Alteration of social life	
No	42 (76.4%)
Yes	13 (23.6%)

defunctionalization, affect IPAA function, or even lead its necessary removal [16].

In this series, the incidence of post-operative complications reached 16%, similar to other published series [13, 17, 18]. Among complications, pelvic sepsis is the most feared when performing an IPAA as it may adversely impact IPAA functionality or even lead to its necessary removal [18]. The incidence of pelvic sepsis in this series was 9%. In our study, there was no significant impact of early surgical morbidity on long-term pouch function, according to the assessment of 47% of the patients exposed. Similar findings have been reported in other series [19–21]. In contrast, other studies communicate contradictory results, showing that pelvic sepsis leads to worse pouch function [22]. Common sense dictates the expectation of a negative effect of pelvic sepsis on long-term pouch function. However, some drawbacks in these reports make a definitive answer difficult, to name a few: the retrospective design of studies; different definitions of pelvic sepsis and its severity; presence of leak; small numbers of cases with sepsis; duration of follow-up; and methods for assessment of functional results. In other words, comparison of treatment and outcomes without exact clinical criteria may lead to confusing results.

During long-term follow-up, one or more adverse events were observed in 57% of patients. The most frequent included chronic pouchitis, observed in 27 patients (23.3%); intestinal obstruction (due to adhesions) in 20 (17.2%); and perianal fistulas in 15 (12.9%). Nine patients (7.8%) evolved to CD, similar to what is reported in the literature [13, 15, 18, 23]. Patients who presented an adverse event had a higher risk of loss of IPAA and a significantly lower median functional quality compared with those who did not suffer these events.

Incidence of IPAA failure varied between 3 and 17% [13]. In this series, most of the failures occurred late in the follow-up. The IPAA preservation rate was 96.5% and 93% at 10 and 20 years, respectively. There were two (1.7%) cases with an early loss of IPAA. It is important to note that patients with perianal fistulas had a higher risk of IPAA loss, and this presentation is strongly associated with evolution to CD.

In this series, two patients developed adenocarcinoma of the rectal cuff. Both presented as pancolitis and more than 10 years of disease before the IPAA surgery. This finding has been reported in other series and highlights the importance of endoscopic survey of the remnant rectal mucosa, particularly in patients with more than 10 years of evolution of UC. Of notice, neither of these patients had dysplasia in the resected colon. One of these patients was rescued by performing an abdominoperineal resection. The other patient developed gastric cancer simultaneously, dying due to a progression of both diseases.

Unfortunately, there is no standard score for evaluating the functional outcomes in patients with an IPAA. The existence of several different scores, such as the "Inflammatory Bowel Disease Questionnaire" (IBDQ) [23] or the "Ileoanal Anastomosis Survey" used by the Mayo Clinic [10], makes comparison of results difficult and may be the reason why our functional outcomes are not favorable.

In this study, the Öresland scale was selected given its simplicity to use and our center's previous experience with this scale [12]. However, it is necessary to emphasize that this scale is particularly demanding and stringent in its evaluation. For

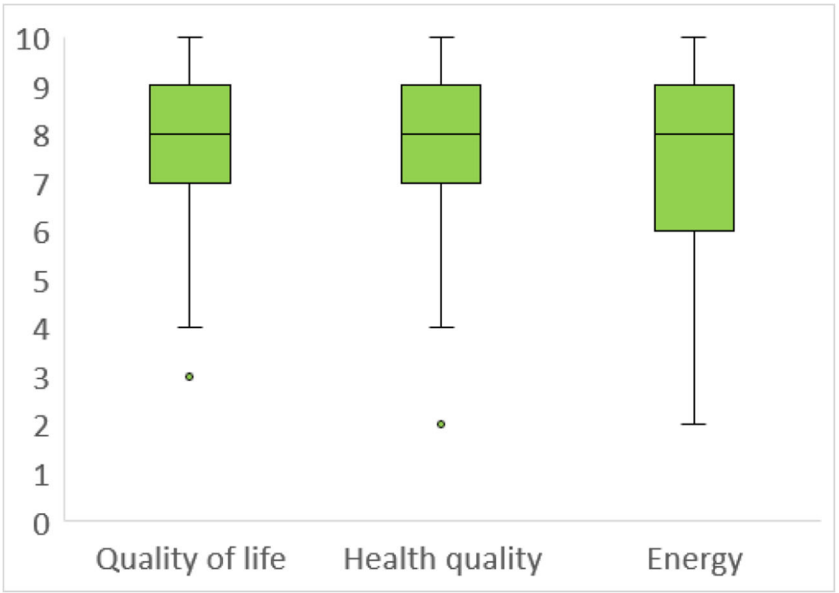

Fig. 3 Quality of life results according to Cleveland score

example, when looking at Fig. 1, a patient who presents a frequency of five evacuations during the day and only two episodes of nocturnal evacuations per week obtains a score of 4, which is not considered satisfactory but would satisfy the expectations of most colorectal surgeons. If we associate this with the need to use dressings, the patient could easily obtain a poor functional score. Similarly, in our series, despite only 52.7% of patients presenting a satisfactory or acceptable functional outcome score, the quality of life and satisfaction after surgery was positively assessed up to two decades later and the vast majority would recommend the surgery to third parties. It is widely accepted that patients with IPAA generally have an increased number of daily bowel movements; occasional episodes of day or nighttime incontinence; use of pads; failure to discriminate (gas/stools); dietary restrictions; and perineal irritation. However, patients do not perceive these defects as a detriment to their quality of life. What is more, if this attitude is influenced by a comparison with pre-operative experience or even, in some cases, comparison with a period with an ileostomy (IPAA in two or three stages), quality of life is even more subjective and difficult to define. Similar findings have been demonstrated in other series reporting long-term functional results and quality of life of IPAA [24–26].

The present study has limitations. Its main limitation is its retrospective nature, as failures in the registry can underestimate post-operative complications and adverse events observed throughout follow-up. Also, since this study goes back to 1984, it may be argued that the treatment of UC has evolved enough as to influence results significantly. However, over the time elapsed, indications for surgery and the main aspects of the surgical technique remain basically unchanged. Another limitation is that upon long-term follow-up, the method of a non-face-to-face functional survey, after more than 10 years, makes a high response rate challenging to achieve due to the loss of contact. Moreover, as participants underwent IPAA surgery over a long period (33 years), the assessment of functionality and quality of life took place at different points over in time, which may influence the results. This problem was handled by assessing the functional outcomes at different times of follow-up, where it was observed that the functional outcomes were not affected by the time from IPAA surgery in most of the items studied.

In conclusion, in this series, IPAA surgery as treatment for UC meets the expectations of cure of the disease, maintaining adequate long-term intestinal functionality associated with a good quality of life in most patients.

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Compliance with ethical standards

The study was reviewed and approved by our institutional ethics committee. All patients provided informed consent to participate in the study before answering the questionnaires applied.

Disclaimer All authors fulfill the four criteria for authorship stated by the International Committee of Medical Journal Editors.

Conflict of interest The authors declare that they have no conflicts of interest.

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References

1. Mark W, Onaitis CM (2003) Ileal pouch-anal anastomosis for ulcerative colitis and familial adenomatous polyposis: historical development and current status. Ann Surg 238(6S). https://doi.org/10.1097/01.sla.0000098115.90865.16

2. Scarpa M (2007) Quality of life after restorative proctocolectomy for ulcerative colitis. Arch Surg 142(2):158–165. https://doi.org/10.1001/archsurg.142.2.158
3. Parks AG, Nicholls RJBP (1980) Proctocolectomy with ileal reservoir and anal anastomosis. Br J Surg 67(8):533–538. https://doi.org/10.1002/bjs.1800670802
4. Parks A, Nicholls R (1978) Proctocolectomy without ileostomy. Br Med J 2(July):85–88. https://doi.org/10.1136/bmj.2.6130.85
5. Heikens JT, de Vries J, van Laarhoven CJHM (2012) Quality of life, health-related quality of life and health status in patients having restorative proctocolectomy with ileal pouch-anal anastomosis for ulcerative colitis: a systematic review. Color Dis 14(5):536–544. https://doi.org/10.1111/j.1463-1318.2010.02538.x
6. Murphy PB, Khot Z, Vogt KN, Ott M, Dubois L (2015) Quality of life after total proctocolectomy with ileostomy or IPAA: a systematic review. Dis Colon Rectum 58(9):899–908. https://doi.org/10.1097/DCR.0000000000000418
7. Lightner AL, Mathis KL, Dozois EJ, Hahnsloser D, Loftus EV Jr, Raffals LE, Pemberton JH (2017) Results at up to 30 years after ileal pouch-anal anastomosis for chronic ulcerative colitis. Inflamm Bowel Dis 23(5):781–790. https://doi.org/10.1097/MIB.0000000000001061
8. 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(2):221–228. https://doi.org/10.1097/00000658-200308000-00010
9. 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(3):333–340. https://doi.org/10.1002/bjs.5464
10. Farouk R, Pemberton JH, Wolff BG, Dozois RR, Browning S, Larson D (2000) Functional outcomes after ileal pouch-anal anastomosis for chronic ulcerative colitis. Ann Surg 231(6):919–926. https://doi.org/10.1097/00000658-200006000-00017
11. Michelassi F, Lee J, Rubin M et al (2003) Long-term functional results after Ileal pouch anal restorative proctocolectomy for ulcerative colitis. Trans Meet Am Surg Assoc 121(3):127–139. https://doi.org/10.1097/01.sla.0000086658.60555.ea
12. Zárate CA, Zúñiga Díaz Á, Pinedo MG, López KF, Molina PME, Viviani GP (2008) Reservorio ileal con anastomosis reservorio anal por colitis ulcerosa: omplicaciones y resultados funcionales a largo plazo. Rev Med Chil 136(4):467–474. https://doi.org/10.4067/S0034-98872008000400007
13. Fazio VW, Kiran RP, Remzi FH et al (2013) Ileal pouch anal anastomosis. Ann Surg 257(4). https://doi.org/10.1097/SLA.0b013e31827d99a2
14. Öresland T, Fasth S, Nordgren S, Åkervall S, Hultén L (1990) Pouch size: the important functional determinant after restorative proctocolectomy. Br J Surg 77(3):265–269. https://doi.org/10.1002/bjs.1800770310
15. Fazio VW, O'Riordain MG, Lavery IC et al (1999) Long-term functional outcome and quality of life after stapled restorative proctocolectomy. Ann Surg 230(4):575–584; discussion 584-586. https://doi.org/10.1097/00000658-199910000-00013
16. McCombie A, Lee Y, Vanamala R, Gearry R, Frizelle F, McKay E, Williman J, Eglinton T (2016) Early postoperative complications have long-term impact on quality of life after restorative proctocolectomy. Medicine 95(27):e3966. https://doi.org/10.1097/MD.0000000000003966
17. 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. Langenbeck's Arch Surg 395(1):49–56. https://doi.org/10.1007/s00423-009-0479-7
18. Berndtsson I, Lindholm E, Öresland T, Börjesson L (2007) Long-term outcome after ileal pouch-anal anastomosis: function and health-related quality of life. Dis Colon Rectum 50(10):1545–1552. https://doi.org/10.1007/s10350-007-0278-6
19. Hallberg H, Stahlberg D, Akerlund J-E (2005) Ileal pouch-anal anastomosis (IPAA): functional outcome after postoperative pelvic sepsis. A prospective study of 100 patients. Int J Color Dis 20(6):529–533. https://doi.org/10.1007/s00384-004-0717-y
20. Chessin DB, Gorfine SR, Bub DS, Royston A, Wong D, Bauer JJ (2008) Septic complications after restorative proctocolectomy do not impair functional outcome: long-term follow-up from a specialty center. Dis Colon Rectum 51(9):1312–1317. https://doi.org/10.1007/s10350-008-9413-2
21. De Zeeuw S, Ali UA, Donders RART, Hueting WE, Keus F, Van Laarhoven CJHM (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(7):843–853. https://doi.org/10.1007/s00384-011-1402-6
22. Kiely JM, Fazio VW, Remzi FH, Shen B, Kiran RP (2012) Pelvic sepsis after IPAA adversely affects function of the pouch and quality of life. Dis Colon Rectum 55(4). https://doi.org/10.1097/DCR.0b013e318246418e
23. Guyatt G, Mitchell A, Irvine EJ, Singer J, Williams N, Goodacre R, Tompkins C (1989) A new measure of health status for clinical trials in inflammatory bowel disease. Gastroenterology. 96(3):804–810. https://doi.org/10.1016/S0016-5085(89)80080-0
24. 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(3):228–232. https://doi.org/10.1046/j.1463-1318.2003.00445.x
25. Richards DM, Hughes SA, Irving MH, Scott NA (2001) Patient quality of life after successful restorative proctocolectomy is normal. Color Dis 3(4):223–226. https://doi.org/10.1046/j.1463-1318.2001.00228.x
26. Scarpa M, Angriman I, Ruffolo C, Ferronato A, Polese L, Barollo M, Martin A, Sturniolo GC, D'Amico DF (2004) Health-related quality of life after restorative proctocolectomy for ulcerative colitis: long-term results. World J Surg 28(2):124–129. https://doi.org/10.1007/s00268-003-7047-z