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Restorative Proctocolectomy in Elderly IBD Patients: A Multicentre Comparative Study on Safety and Efficacy

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Abstract

Background and Aims: Restorative proctocolectomy in elderly inflammatory bowel disease [IBD] patients is controversial and limited data are available on the outcomes of surgery. The aim of this study was to evaluate the safety, efficacy, and long-term results of ileal-pouch-anal anastomosis in elderly patients, in a multicentre survey from European referral centres.

Methods: The International Pouch Database [IPD] combined 101 variables. Patients aged ≥ 65 years were matched on the basis of open versus laparoscopic surgery with a control group of consecutive younger unselected patients with a ratio of 1:2. Statistical analysis was performed using two-tailed t test, chi square and Fisher's exact tests, Kaplan-Meier function, and log-rank tests where appropriate.

Results: In the IPD, 77 patients aged ≥ 65 years [Group A] and 154 control patients [Group B] were identified. Elderly patients had more comorbidities [$p = 0.0001$], longer disease duration [$p = 0.001$], less extensive disease [$p = 0.006$], more previous abdominal operations [$p = 0.0006$], surgery for cancer or dysplasia more frequently [$p = 0.0001$], fewer single-stage procedures [$p = 0.03$], more diversions after ileal pouch-anal anastomosis [IPAA] [$p = 0.05$], and a higher laparoscopic conversion rate [$p = 0.04$]. Postoperative complications and pouch failure were similar between the groups, but Group A had more Clavien-Dindo IV-V complications [$p = 0.04$], and longer length of stay [$p = 0.007$]. Laparoscopy was associated with a shorter duration of surgery [$p = 0.0001$], and length of stay [$p = 0.0001$], and the same complication rate as open surgery.

Conclusions: Restorative proctocolectomy can be performed in selected elderly patients, but there is a higher risk of postoperative complications and longer length of stay in this group. Laparoscopy is associated with shorter operating time and length of stay.

Key Words: Crohn's disease; ulcerative colitis; elderly; surgery, proctocolectomy; pouch; IPAA; complications; laparoscopy

1. Introduction

An increasing proportion of patients with inflammatory bowel disease [IBD] can be over the age of 65 years. Current estimates suggest 12–15% of patients with new diagnosis of Crohn's disease [CD] or ulcerative colitis [UC] are over the age of 65 years.[1,2] As there is no increased risk of mortality associated with IBD, the prevalence of IBD in the population over the age of 65 is also increasing.[3,4]

Ileal pouch-anal anastomosis [IPAA], first described by Parks and Nicholls in 1978,[5] has become the surgical approach of choice in medically refractory UC, indeterminate colitis, familial adenomatous polyposis [FAP], and selected CD patients.[6] Up to the 1990ss, the complexity of the surgical procedure and the high complication rate, together with the possibility of poor functional outcome, resulted in some patients over 50 years of age not being offered a restorative procedure. More recently, some studies have reported better outcomes in elderly patients, and the American Society of Colon and Rectal Surgeons has suggested that 'chronologic age should not itself be an exclusion criterion for IPAA'.[7] There are insufficient data that compare treatment safety and efficacy in younger and older patients, and the total number of patients over 65 treated with restorative proctocolectomy is very small.[3,8–16] Furthermore, little is known about the impact of laparoscopy in this patient population.

The aim of this study was to compare the safety and efficacy of restorative proctocolectomy in patients aged over 65 years when compared with patients under 65 years in an audit of six European tertiary referral centres.

2. Patients and Methods

The prospective databases from 'Luigi Sacco' University Hospital [Milano, Italy], Academisch Medisch Centrum [AMC; Amsterdam, The Netherlands], Universitaire Ziekenhuizen [UZ; Leuven, Belgium], Hopital Beaujon [Clichy, France], St Marks Hospital [Harrow, UK], and Sourasky Medical Centre [Tel Aviv, Israel] were merged and standardised. The study was conducted with the endorsement and the financial contribution of the Surgical Committee of the European Crohn's and Colitis Organisation [S-ECCO]. The International Pouch Database [IPD] was created with 101 variables including demographic data, medical history, comorbidities, disease characteristics, medical therapy, intraoperative data, perioperative complications, and postoperative results. Based on the World Health Organization [WHO] criteria, the elderly patients were defined as those aged ≥ 65 years. Patients over 65 years of age, who had an IPAA created between January 1995 and January 2015, were identified and compared with a control group of consecutive younger unselected patients treated in the same period, matched on the basis of surgical technique [laparoscopic versus open surgery], on the basis of a 1:2 ratio. All perioperative and postoperative variables refer to the IPAA procedure.

Demographic data included: age, gender, smoking habit, family history of IBD, extraintestinal manifestations, the American Society of Anaesthesiologists physical status classification system [ASA score], diagnosis, disease extension, previous abdominal surgeries, and systemic comorbidities [cardiological, pulmonary, renal, hepatic, thromboembolic, and diabetes].

The preoperative medical treatment was recorded based on dose and total duration of steroids, immunomodulators, anti-tumour necrosis factor [TNF]α agents, and combined therapies. Patients were considered as having preoperative treatment if they had received steroids in the past month and immunomodulators or anti-TNFα agents in the past 3 months before the IPAA surgery.

Other preoperative variables included: blood profile results (haemoglobin [Hb, g/dl], white cell count [WCC, u/l], C-reactive protein [CRP, mg/dl], and albumin [U/l]). The presence of incisional hernia, and the type and site of any neoplastic transformation, were also recorded.

The decision to operate was at a multidisciplinary meeting [MDM] in all the centres. Indications for surgery were defined as follows: colitis refractory to medical treatment [persistent symptoms such as diarrhoea, abdominal pain, rectal bleeding, and weight loss despite maximal medical therapy, with or without steroid dependency, including acute severe colitis], toxic megacolon, perforation, uncontrollable bleeding, and malignant transformation [dysplasia, dysplasia-associated lesion or mass [DALM], or cancer].

Surgery was performed in 1, 2, or 3 stages depending on the patient's clinical presentation. The three-stage approach is described as follows: abdominal colectomy with end ileostomy followed by completion proctectomy, formation of IPAA and loop ileostomy, and finally closure of ileostomy; the two-stage approach: total proctocolectomy with IPAA and loop ileostomy followed by closure of ileostomy; the single-stage approach: total proctocolectomy and IPAA without a temporary ileostomy. Completion proctectomy with IPAA, but without diverting ileostomy, was defined as a 'modified two-stage' procedure. None of the six centres performed preoperative screening of the anal function with rectal manometry. In selected cases, a postoperative examination has been performed for planning pelvic floor rehabilitation [< 2%].

Intraoperative details included: the type of surgical access; type of laparoscopic approach; specimen delivery; length and design of the pouch; type of pouch construction and mesenteric orientation; type of pouch-anal anastomosis; rectal dissection; mesenteric lengthening; intraoperative blood loss; and operative time. Rectal dissection was described based on the plane of dissection, and the types of dissection were described as follows: total mesorectal excision [TME]; or incomplete TME, where the dissection is carried out close to the rectum in the anterior and lateral planes; and close rectal dissection, where the mesorectum is preserved.

Perioperative complications and mortality were defined as events occurring between surgical intervention and discharge. Readmission was defined as that occurring within 30 days of discharge. Perioperative complications after IPAA were categorised using the Clavien-Dindo classification.[17,18] Data on IPAA leakage, IPAA, pouch or ileal strictures, pouchitis, and pouch failure were collected. Pouchitis was diagnosed on the basis of clinical symptoms, together with endoscopic and histological findings. According to the European evidence-based consensus on surgery for ulcerative colitis, pouch failure was defined as excision or indefinite defunctioning of the pouch, and re-doing ileal pouch-anal anastomosis [IPAA] was defined as an operation for malfunctioning pouch or pelvic septic complications, with pelvic dissection, pouch disconnection, pouch revision, reconstruction or advancement, and rea-nastomosis.[6] Follow-up visits were performed at 3, 6 and 12 months and then annually or based on clinical need.

Statistical analysis was performed using the two-tailed t test, chi-square test and Fisher's exact test where appropriate. Significance [*p*-value] was set at 0.05. Time-to-event estimates were performed using Kaplan-Meier estimates and compared using the log-rank test. All calculations were made using statistical software [Stat Soft, Inc., Statistica 8.0].

3. Results

We identified 77 patients older than 65 years [Group A] and 154 patients under the age of 65 [Group B]. Centre contributions were as follows: Milan Group A 27, Group B 54; Amsterdam Group A 13, Group B 26;

Leuven Group A 13, Group B 26; Tel Aviv Group A 11, Group B 22; Clichy Group A 10, Group B 20; St Mark's Group A 3, Group B 6. The mean age at time of pouch surgery was 69.48 ± 3.47 years for those aged over 65 years [Group A] and 36.03 ± 13.12 years for the control group [Group B]. The majority of patients in the two groups had a preoperative diagnosis of UC. Two patients in each group presented with indeterminate colitis [IC] [Group A 2,5%, Group B 1.2%], and one patient in Group A [1 2%] and two patients in Group B [1.2%] had a diagnosis of CD. Demographic data are described in Table 1. Surgery for acute or chronic colitis unresponsive to medical treatment was performed in 50 patients from Group A [65%] and 124 patients from Group B [80.5%] [p = 0,01]. Emergency procedures for toxic colitis, acute bleeding, or perforation were performed in one patient [1.2%] in Group A and 12 [7.6%] of patients in Group B [p = 0,06]. Colectomy was performed in 22 [28.5%] and nine [11.6%] patients in Group A, and 28 [18.1%] and 23 [14%] patients in Group B, by open or laparoscopic surgery respectively [p = 0.1].

Preoperative medical treatments are reported in Table 2. There was no significant difference in the therapeutic strategies between the two groups. The duration of therapy however, was significantly longer in Group B, with the exception of anti-TNFα agents and immunomodulators which were administered for a longer period in Group A.

The comparisons between surgical approaches and operative variables are reported in Table 3. Based on the selection criteria, laparoscopic surgery was performed in 41 patients [53.2%] from Group A and 80 patients [52%] from Group B. Operating time was similar in the two groups, but the conversion rate was significantly higher in elderly patients. IPAA procedures were performed by a senior consultant in 88.3% patients from Group A and in 89.7% patients from Group B. A pouch procedure without diverting ileostomy was performed in 19 patients from Group A [24.6%] and 58 patients from Group B [37.6%]. There was no difference in the rate of 'modified two-stage' procedures between the two groups, but Group B had more 'single-stage' restorative proctocolectomy [23.4% versus 11.7%; p = 0.03]. All the patients had a J pouch[19] and no differences were found in pouch length, type of IPAA, or need for mesenteric lengthening. A right-sided mesenteric orientation was more frequent in Group A. The rectal dissection was performed using an imprecise TME more frequently in the young patients and a close rectal dissection was more common in the elderly group. In the younger patients, transanal drainage was the preferred approach for pelvic drainage. The duration of hospitalisation was significantly longer in the elderly group.

Postoperative complications are listed in Table 4. Both general and specific complications were similar in the two groups, including

Table 1. Preoperative characteristics.

		Group A: *n* 77 Patients > 65 years old	Group B: *n* 154 Patients < 65 years old	*p*-Value
Gender	M	53 [68%]	94 [61%]	0.24
	F	24 [32%]	60 [39%]	
Smoking habit		5 [6.5%]	12 [7.7%]	0.72
Family history of IBD		5 [6,5%]	19 [12.3%]	0.17
Extraintestinal manifestations		13 [16.8%]	13 [8.4%]	0.05
Cardiac comorbidity		24 [31%]	5 [3.2%]	0.0001
Thromboembolic comorbidity		3 [3.8%]	4 [2.5%]	0.58
Essential hypertension		21 [27.2%]	9 [5.8%]	0.0001
Hepatic comorbidities		4 [5%]	4 [2.5%]	0.15
Pulmonary comorbidities		11 [14.2%]	2 [1.2%]	0.0001
Renal comorbidities		6 [7.7%]	3 [1.9%]	0.01
Diabetes mellitus		17 [22%]	3 [1.9%]	0.0001
ASA score	ASA 1	5 [6.5%]	31 [20.1%]	
	ASA 2	50 [65%]	113 [73.4%]	
	ASA 3	22 [28.5%]	10 [6.5%]	0.0001
Disease duration [years]		13.5 ± 12.4	9.04 ± 8.5	0.001
Disease extension	Proctitis	5 [6.5%]	1 [0.6%]	
	Left-sided	10 [13%]	10 [6.5%]	
	Pancolitis	62 [80.5%]	143 [92.9%]	0.006
Previous abdominal surgeries		28 [36,3%]	24 [15.5%]	0.0006
Previous uc surgery	Open colectomy	22 [28.5%]	28 [18.1%]	
	Laparoscopic colectomy	9 [11.6%]	23 [14.9%]	0.2
Preoperative haemoglobin [g/dl [a]		11,53 ± 2,2	10.6 ± 2.66	0.0004
Preoperative C reactive protein [mg/][a]		44,8 ± 91,8	37.7 ± 54.2	0.4
Preoperative white cell count [u/l][a]		7990 ± 2760	7977 ± 2825	0.9
Preoperative albumin [u/l][a]		3,5 ± 0,93	3.5 ± 0.771	1
Preoperative dysplasia [including DALM[b]]		14 [18%]	15 [9.7%]	
Preoperative cancer		12 [15%]	3 [1.9%]	0.0001
Dysplasia or cancer site	Rectum	9 [11.6%]	3 [1.9%]	
	Left colon	12 [15.5%]	13 [8.4%]	
	Right colon	4 [5.1%]	1 [0.6%]	
	Transverse colon	1 [1.2%]	1 [0.6%]	0.0006

M, male; F, female.

[a]Blood values before pouch surgery.

[b]Dysplasia-associated lesion or mass.

Table 2. Preoperative medical treatment.

	Group A: *n* 46[a] Patients > 65 years old	Group B: *n* 103[a] Patients < 65 years old	*p*-Value
Systemic steroids	18 [39.1%]	36 [34.9%]	0.8
Duration [weeks]	8.7 ± 17.3	24 ± 18.04	0.0001
Immunomodulators	7 [15.2%]	18 [17.4%]	0.9
Azathioprine	3	10	0.0001
6-Mercaptopurine	1	2	
Methotrexate	1	2	
Thalidomide	1	1	
Cyclosporine	1	3	
Duration [months]	28.2 ± 7.4	19.1 ± 12.2	
Anti-TNFα	5 [10.8%]	19 [18.4%]	0.3
Duration [months]	8.9 ± 3.2	7.4 ± 1.8	0.002
Combined therapy			
Steroids and immunomodulators	11 [23.9%]	16 [15.5%]	0.3
Duration [months]	3.3 ± 2.1	4.1 ± 2.9	0.005
Steroids and anti-TNFα	3 [6.5%]	8 [7.7%]	0.5
Duration [months]	2.9 ± 1.9	3.7 ± 3	0.001
Immunomodulators and anti-TNFα	2 [4.3%]	6 [5.8%]	0.5
Duration [months]	3.1 ± 1.1	5.1 ± 6.7	0.001

TNF, tumour necrosis factor.

[a]Number of patients treated with total proctocolectomy and pouch surgery without previous abdominal colectomy.

the re-operation rate, mortality, and long-term pouch failure [Figure 1]. On stratifying the Clavien-Dindo classification, Group A had higher Grade II, IV, and V complication rates, and less Grade III complications. Complications were also analysed in relation to preoperative therapy. Fourteen patients [30.4%] in Group A and 34 [33%] patients in Group B were having medical treatment at time of the surgery for IPAA [$p = 0.4$]. In Group A, 19 [39.6%] patients were on steroid treatment, nine [18.7%] on immunomodulator treatments, six [12.5%] on anti-TNFα agents, and 14 [29.2%] were receiving combined therapy. In Group B, 32 [31.7%] patients were on steroid treatment, 16 [15.5%] on immunomodulators, 18 [17.8%] on anti-TNFα agents, and 35 [34.7%] on combined therapy. None of these treatments was associated with an increased risk of complications.

Sub-group analysis of the surgical approach did not show an increased risk of complications between the 121 patients treated by laparoscopy and the 110 patients treated by open surgery. In particular, IPAA leakage was 11.5% versus 10% [$p = 0.8$]; re-operation rate was 9% versus 8.2% [$p = 1$]; readmission rate at < 30 days was 12.4% versus 12.7% [$p = 0.8$]; and complications after ileostomy closure were 6.6% versus 11% [$p = 0,3$] between laparoscopic and open surgery. Operating time [283 ± 54.4 min versus 376 ± 138 min, $p = 0,0001$] and length of stay were significantly shorter [8.5 ± 3.5 days versus 10.5 ± 3.5 days, $p = 0.0001$] in the laparoscopic group.

4. Discussion

The ileoanal pouch was first described in 1978[5] and, despite many iterations of the pouch and considerable international experience in this procedure, IPAA in the elderly remains controversial. There is a wide variation in the accepted age range for elderly patients requiring this procedure, as described in the literature. The maximum range can vary from 50 to 80 years and there is no accepted age at which IPAA is considered not advisable based on the risk of failure or postoperative morbidity or mortality.[9,10,13,14,20,21] Only a few cases in patients over the age of 65 years have been reported in retrospective series from high -olume centres mainly located in North America, and the status in Europe [EU] is largely unknown.[8,11,15,22,23]

As expected and previously reported, elderly patients present with a higher incidence of comorbidities, in particular cardiovascular and respiratory diseases, but also diabetes and renal insufficiency. As a consequence, a significant proportion of elderly patients were classified as having an ASA score of 3. Some authors have attributed the presence of comorbid conditions to an increase in the postoperative complications, hospital stay, and operating time.[10,13,14,24] More recent reports reveal no increase in surgical morbidity and mortality after restorative proctocolectomy.[8,10,15,22] Almogy *et al.* reported a mortality rate lower than 3% and a significant decrease in morbidity from 50% during 1960–84 to 27% in more recent years for UC patients older than 65 years.[11] Delaney *et al.*, reporting the experience of the Cleveland Clinic Ohio between 1985 and 1999 in 42 patients aged > 65 years and 17 patients aged > 70 years of age, showed comparable perioperative and long-term functional results regardless of age, with a major morbidity rate of 23.5%.[8,25] Pellino *et al.* have reported similar results in 27 patients over 70 and 10 patients over 80 years of age.[21,26] Cohan *et al.*, examining the American College of Surgeons National Surgery Quality Improvement Program database from 374 centres, identified that after adequate multivariate risk adjustment, a similar mean number of complications but a longer hospital stay in 254 patients > 60 years when compared with patients aged < 50 years.[22]

In our series, we also found longer hospital stay in elderly patients, and comorbidities did not influence postoperative complications. In this study, elderly patients required more pharmacological treatment for complications [44% versus 28.5% Clavien-Dindo Grade II] and experienced more serious complications [20% versus 4.7% Grade IV and V] than younger patients. This highlights the important point that elderly patients may need admission to intensive care more frequently than younger patients. Although the risk of complications may not be increased in this group, the consequences of such complications may be different from those in younger patients and this should be part of any preoperative discussion on restorative surgery in this group.

Table 3. Surgical data.

	Group A: *n* 77 Patients > 65 years old	Group B: *n* 154 Patients < 65 years old	*p*-Value
Pouch procedure			
Proctocolectomy + IPAA	46 [59.8%]	103 [67.9%]	
Completion proctectomy + IPAA	31 [40.2%]	51 [33.1%]	0.3
Single-stage proctocolectomy + IPAA	9 [11.7%]	36 [23.4%]	0.03
Modified two-stage [without ileostomy]	10 [13%]	15 [9.7%]	0.4
Defunctioning ileostomy	58 [75.3%]	97 [62.9%]	0.05
Pouch operating time [min]	285.8 ± 99.2	284.9 ± 94.64	0.9
Surgical approach			
Open	36 [46.8%]	74 [48%]	
Single-port	/	4 [2.5%]	
Multiport	41 [53.2%]	76 [49.5%]	0.4
Conversion rate	4 [5%]	1 [0.6%]	0.04
Length of the J-pouch			
10 cm	8 [10.3%]	27 [17.5%]	0.09
15 cm	35 [45.4%]	86 [55.8%]	
18 cm	4 [5.2%]	14 [9%]	
20 cm	22 [28.5%]	27 [17.5%]	
Mesenteric orientation	1 [1.2%]	3 [2%]	0.0004
Anterior	69 [89.6%]	151 [98%]	
Posterior	7 [9%]	/	
Right side			
Type of IPAA			
Stapled	74 [96.2%]	146 [94.9%]	
Hand-sewn	3 [3.8%]	8 [5.1%]	0.4
Pelvic dissection			
TME	19 [24.7%]	24 [15.6%]	
Incomplete TME	18 [23.3%]	85 [55.2%]	
Close rectal dissection	40 [52%]	45 [29.2%]	0.0001
Drainage positioning	72 [93%]	131 [85%]	0.003
Pelvic	6 [7.7%]	43 [27.9%]	
Transanal	2 [2.5%]	6 [3.8%]	
Other			
Mesenteric lengthening	6 [7.7%]	11 [7.1%]	0.8
Specimen delivery			
Open	36 [46.7%]	72 [46.7%]	
Stoma Site	8 [10.3%]	23 [14%]	
Transanal	3 [3.8%]	1 [0.6%]	
Suprapubic	26 [33.7%]	56 [36.3%]	
Transumbilical	4 [5%]	1 [0.6%]	0.4
Perioperative blood transfusion	9 [11.6%]	24 [15.5%]	0.4
Pathology report			
Dysplasia	13 [16.8%]	14 [9%]	
Cancer	12 [15.6%]	3 [2%]	0.04
Hospitalisation [days]	13.3 ± 6.8	11.5 ± 5.6	0.007

IPAA, ileal pouch-anal anastomosis; TME, total mesorectal excision.

These results underline the importance of finding a better and more accurate classification of elderly patients in terms of frailty and predictability of postoperative morbidity. There is no current consensus on the appropriate measure of frailty in the elderly, and any such measure has to take on the added burden of inflammatory diseases such as IBD and their potential impact on other comorbidities such as cardiovascular or respiratory disease.

Operating time was similar between younger and older patients, but the conversion rate was higher for laparoscopic procedures in the elderly group. This is due to the high frequency of previous abdominal surgery for reasons other than UC, which was also reported by Dayton *et al.*[13] Despite the higher incidence of conversion after laparoscopic surgery in the elderly group of patients in this series, we suggest that this is lower than the published rate of 0–25% for complex laparoscopic surgery.[27] Sub-group analysis of patients who had laparoscopic surgery showed that laparoscopy was associated with shorter hospital stay and shorter operating times. The shorter operating times in the laparoscopic patients are probably attributed to the fact that this series comes from referral centres where the learning curve has been exceeded and laparoscopic IPAA is well standardised and performed by senior consultants in nearly 90% of cases.[27-29]

Most studies have shown that the disease duration before surgery is longer in elderly patients and as a consequence there is an increased risk of dysplasia and malignancy. In this series, a third of the patients had surgery for dysplasia or cancer. Our study also showed that proctitis and left-sided colitis were more frequent in the elderly population and this is similar to what is reported in other series, but as this is a series on patients who required surgery for UC, the frequency of pancolitis is higher than that described in series

Table 4. Postoperative complications.

	Group A: *n* 77 Patients > 65 years old	Group B: *n* 154 Patients < 65 years old	*p*-Value
Complications after IPAA	25 [32.4%]	42 [27.2%]	0.4
ClavienDindo classification			
Grade I	6 [24%]	13 [31%]	
Grade II	11 [44%]	12 [28.5%]	
Grade III	3 [12%]	15 [35.7%]	
Grade IV	4 [16%]	2 [4.7%]	0.04
Grade V	1 [4%]	/	
IPAA and pouch leakage	9 [11.6%]	16 [10.3%]	0.7
Treatment			
Antibiotics	4 [44.5%]	5 [31.2%]	
Antibiotics and percutaneous drainage	5 [55.5%]	10 [62.5%]	
Re-operation	/	1 [6.3%]	0.7
Re-operation after IPAA	7 [9%]	13 [8.4%]	0.8
Re-admission after IPAA [< 30 days]	12 [15.5%]	17 [11%]	0.3
Ileostomy closure complications	9 [11.6%]	11 [7.1%]	0.2
Postoperative strictures	7 [9%]	11 [7.1%]	0.6
Sites			
IPAA	6 [85.7%]	9 [81.8%]	
Afferent loop	1 [14.3%]	2 [18.2%]	0.6
Pouchitis	10 [12.9%]	31 [20.1%]	0.2
Type			
Acute	2 [20%]	13 [42%]	
Relapsing	2 [20%]	7 [22.5%]	
Chronic	6 [60%]	11 [35.5%]	0.3
Treatment			
None	3 [30%]	4 [13%]	
Antibiotics	5 [50%]	23 [74.1%]	
Other	2 [20%]	4 [12.9%]	0.3
Pouch failure			
Number of failures	4 [5.1%]	8 [5.1%]	0.85[§]
Cumulative proportion of failures	7%	4.3%	
5 years	7%	6.1%	
10 years	7%	15.2%	0.4
15 years			
Treatment			
Re-do pouch	/	2 [25%]	
Permanent defunctioning	4 [100%]	6 [75%]	
Overall mortality	1 [1.2%]	0 [0%]	0.3

IPAA, ileal pouch-anal anastomosis.

[a]Log-rank test for Kaplan-Meier survival plot.

with patients receiving medical treatments only. In this series, there were malignancies found in the right and transverse colon, highlighting the importance of ongoing surveillance in patients with UC irrespective of age and extent.[10,13,14,22,30]

There was no difference in the inflammatory and nutritional status between the groups, but younger patients presented with lower haemoglobin levels and had emergency surgery more frequently [7.6% versus 1.2%]. These patients also had a longer duration of treatment with steroids and combined therapies before surgery. There was no increase in the duration of treatments with anti-TNFα agents and immunomodulators.

Rectal dissection was performed by TME or incomplete TME, instead of close rectal dissection, more frequently in younger patients, probably because significant inflammation of the rectum made this approach more feasible. Finally, younger patients experienced more Grade III ClavienDindo complications [35.7% versus 12%], but the elderly group had more Grade IV complications, suggesting that the impact of the complications is more severe in the elderly group. It is also possible that early referral for surgery and a more conservative approach to surgery, such as increased use of defunctioning stomas, may reduce the risk of serious complications.

Perioperative complications were not affected by preoperative medical treatment, in particular anti-TNFα therapy. The study design was not set to accurately assess this but, in a recent meta-analysis of 1427 patients from eight studies, there was no difference in the rate of complications between patients treated with anti-TNFα agents compared with those who were not.[31]

The surgical data offer a real-life snap shot of IPAA surgery in the European Union [EU]. Single-stage procedures were performed in 25% of the patients and modified two stages in 10%; therefore 35% of the patients in this series received IPAA without diversion. Fazio *et al.* reported the Cleveland Clinic experience from 1984 to 2010 with 3707 patients treated with IPAA where the single-stage procedures accounted for 11.8% of surgeries. Bauer *et al.* reported the omission of loop ileostomy after IPAA in nearly 50% of the patients operated on at the Mount Sinai Hospital, New York.[10] Tan *et al.*, from Birmingham, reported a single-stage procedure in 40% of the patients under the age of 50 years and 54% in older patients.[9] At the Mayo

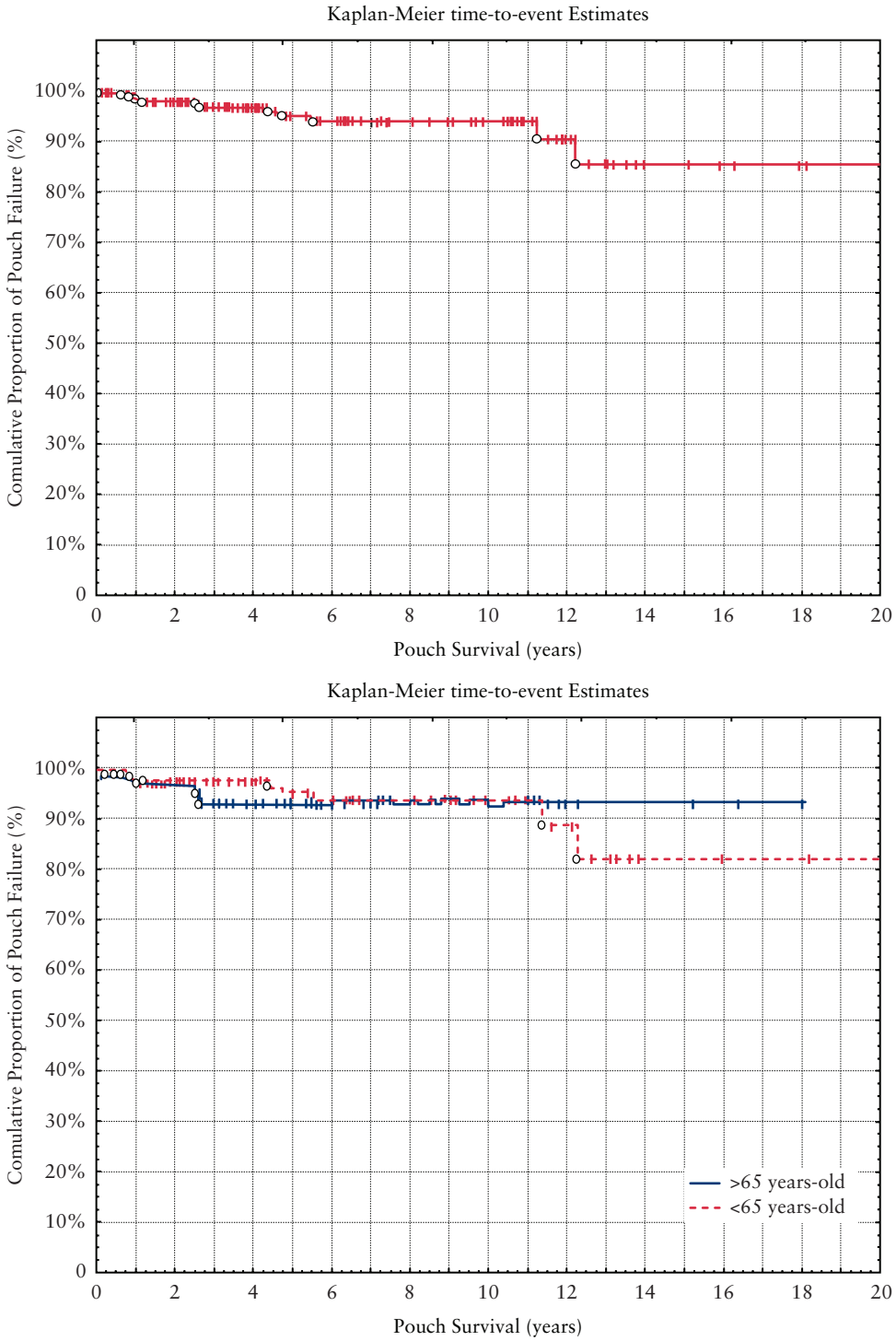

Figure 1. Kaplan-Meier time-to-event estimates of pouch failure. Log-Rank test for Kaplan and Meier survival plot: $P = 0{,}85$.

Clinic, Rochester, less then 5% of the IPAA are performed as a single-stage procedure.[32-34] It is important to observe that most of these series include patients affected by familial adenomatous polyposis [FAP] or colorectal cancer [CRC], in which the single-stage procedure can be recommended. However, other authors favour the creation of a temporary defunctioning loop ileostomy in all the patients.[13,14,21,26]

All patients had a J-pouch configuration,[19] with the majority of pouches measuring between 15 and 20 cm. Stapled IPAA was performed in nearly 95% of the patients, with the rest having hand-sewn anastomosis [3.8–5.1%]. These results are in line with the recent recommendation from the European evidence-based consensus on surgery for ulcerative colitis of the European Crohn's and Colitis Organisation.[6] There has been a recent trend to formation of a J-pouch rather than an S-pouch with mucosectomy. This configuration is associated with better functional results in terms of major and minor, nocturnal and diurnal incontinence, due to the preservation of the anal transitional zone and the ease of construction and emptying.[8,11,14,23,25,35–38] Lengthening of the mesentery was needed in

about 7% of patients in the two groups. A number of different techniques have been proposed for the difficult-to-reach IPAA, but the need for this is quite low and virtually all the pouches can reach the anal canal.[39–43] A right-sided mesenteric orientation was preferred in older women in order to avoid anterior pouch sutures on the posterior vaginal wall. Transanal drainage was more frequent in younger patients due to a higher number of single-stage procedures. Single-incision laparoscopic surgery [SILS] has been recently proposed as an alternative to traditional laparoscopy, but in our series 2.5% of procedures were performed by this technique and probably this reflects its the recent adoption.[28,44–46]

Pouch anastomotic leakage is the most dreaded complication of IPAA surgery, leading to pelvic sepsis and eventually to pouch failure. The incidence is quite variable in the reported literature, ranging from 0% to 25%, depending on definition and time of onset.[23,36,44–49] In our series, all the complications related to technical issues such as anastomotic leak [10.3–11.6%], re-operation [8.4–9%], postoperative strictures [7.1–9%], complications after ileostomy closure [7/1–9%], and pouch failure [5.1%] were similar in the two groups. These results are in keeping with other major published series and appear to be more related to the complexity of the procedure than the patient's age and comorbidities.[9,10,13,22,23,47]

The long-term cumulative proportion of pouch failures seemed to be slightly higher [not statistically significantly] in younger patients, but this could be due to the lower life expectancy of the patients over 65. The pouch survival rates are comparable to those reported by Fazio *et al*. at 20 years.[23] In our series, where there was pouch failure, re-do pouch surgery was attempted only in young patients, whereas permanent defunctioning of the pouch was the preferred approach in older patients.

In this series we have shown that pouch surgery is safe and effective in selected elderly patients. Although the procedure is safe, it has to be taken into account that our series showed that complications often manifest as more serious, requiring admission to intensive care and longer hospital stay, in the elderly patients; but the overall complication rate remains similar between the groups.

This study has highlighted the safety of pouch surgery in the elderly population and forms the basis for discussion of the risks and benefits of such surgery in the elderly population. The study has several drawbacks. It is a retrospective analysis of different prospectively maintained databases, which has its limitations in terms of some definitions and data fields. We did not perform a quality of life analysis, which is an important part of any such analysis on pouch surgery, but comparison between these groups may be difficult as the expectations of the young and the elderly may be different and as such a comparison may not have adequate weight. Finally, we were unable to use a validated tool to identify the frail and elderly patients in this group. However, using existing measurement tools and multidisciplinary discussion, we conclude that we have selected appropriate patients for this surgery, as the risks of complications were similar and the mortality from the surgery was very low even in the presence of complications.

Based on this series, restorative surgery can be offered as a reasonable approach for elderly patients, and the benefits of such surgery can be weighed against ongoing medical treatment. Laparoscopic surgery is associated with significant benefits and should be offered as first-line treatment.

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Conflict of Interest

None of the authors has a conflict of interest to declare.

Author Contributions

Data collection: FC, SS, AO, HT, CAL. Study design: AD, YP, WB, GMS. Data analysis and interpretation: FC, ID, DF, GMP. Writing: FC, GMS. English review: JW.

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References

1. Loftus CG, Loftus EV Jr, Harmsen WS, *et al*. Update on the incidence and prevalence of Crohn's disease and ulcerative colitis in Olmsted County, Minnesota, 1940–2000. *Inflamm Bowel Dis* 2007;**13**:254–61.
2. Robertson DJ, Grimm IS. Inflammatory bowel disease in the elderly. *Gastroenterol Clin North Am* 2001;**30**:409–26.
3. Stallmach A, Hagel S, Gharbi A, *et al*. Medical and surgical therapy of inflammatory bowel disease in the elderly—prospects and complications. *J Crohns Colitis* 2011;**5**:177–88.
4. Taleban S, Colombel JF, Mohler MJ, Fain MJ. Inflammatory bowel disease and the elderly: a review. *J Crohns Colitis* 2015;**9**:507–15.
5. Parks AG, Nicholls RJ. Proctocolectomy without ileostomy for ulcerative colitis. *Br Med J* 1978;**2**:85–8.
6. Øresland T, Bemelman WA, Sampietro GM, *et al*.; European Crohn's and Colitis Organisation [ECCO]. European evidence-based consensus on surgery for ulcerative colitis. *J Crohns Colitis* 2015;**9**:4–25.
7. Cohen JL, Strong SA, Hyman NH, *et al*.; Standards Practice Task Force American Society of Colon and Rectal Surgeons. Practice parameters for the surgical treatment of ulcerative colitis. *Dis Colon Rectum* 2005;**48**:1997–2009.
8. Delaney CP, Fazio VW, Remzi FH, *et al*. Prospective, age-related analysis of surgical results, functional outcome, and quality of life after ileal pouch-anal anastomosis. *Ann Surg* 2003;**238**:221–8.
9. Tan HT, Connolly AB, Morton D, Keighley MR. Results of restorative proctocolectomy in the elderly. *Int J Colorectal Dis* 1997;**12**:319–22.
10. Bauer JJ, Gorfine SR, Gelernt IM, Harris MT, Kreel I. Restorative proctocolectomy in patients older than fifty years. *Dis Colon Rectum* 1997;**40**:562–5.
11. Almogy G, Sachar DB, Bodian CA, Greenstein AJ. Surgery for ulcerative colitis in elderly persons: changes in indications for surgery and outcome over time. *Arch Surg* 2001;**136**:1396–400.
12. Page MJ, Poritz LS, Kunselman SJ, Koltun WA. Factors affecting surgical risk in elderly patients with inflammatory bowel disease. *J Gastrointest Surg* 2002;**6**:606–13.
13. Dayton MT, Larsen KR. Should older patients undergo ileal pouch-anal anastomosis? *Am J Surg* 1996;**172**:444–7; discussion 447–8.
14. Pinto RA, Canedo J, Murad-Regadas S, Regadas SF, Weiss EG, Wexner SD. Ileal pouch-anal anastomosis in elderly patients: is there a difference in morbidity compared with younger patients? *Colorectal Dis* 2011;**13**:177–83.
15. Delaney CP, Dadvand B, Remzi FH, Church JM, Fazio VW. Functional outcome, quality of life, and complications after ileal pouch-anal anastomosis in selected septuagenarians. *Dis Colon Rectum* 2002;**45**:890–4; discussion 894.
16. Fazio VW, Kiran RP, Remzi FH, *et al*. Ileal pouch anal anastomosis: analysis of outcome and quality of life in 3707 patients. *Ann Surg* 2013;**257**:679–85.
17. Clavien PA, Barkun J, de Oliveira ML, *et al*. The Clavien-Dindo classification of surgical complications: five-year experience. *Ann Surg* 2009;**250**:187–96.
18. Clavien PA, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. *Surgery* 1992;**111**:518–26.

19. Utsunomiya J, Iwama T, Imajo M, *et al*. Total colectomy, mucosal proctectomy, and ileoanal anastomosis. *Dis Colon Rectum* 1980;**23**:459–66.
20. Lewis WG, Sagar PM, Holdsworth PJ, Axon AT, Johnston D. Restorative proctocolectomy with end to end pouch-anal anastomosis in patients over the age of fifty. *Gut* 1993;**34**:948–52.
21. Pellino G, Sciaudone G, Candilio G, *et al*. Restorative proctocolectomy with ileal pouch-anal anastomosis is safe and effective in selected very elderly patients suffering from ulcerative colitis. *Int J Surg* 2014;**12**[Suppl 2]: S56–9.
22. Cohan JN, Bacchetti P, Varma MG, Finlayson E. Outcomes after ileoanal pouch surgery in frail and older adults. *J Surg Res* 2015;**198**:327–33.
23. Fazio VW, Kiran RP, Remzi FH, *et al*. Ileal pouch anal anastomosis: analysis of outcome and quality of life in 3707 patients. *Ann Surg* 2013;**257**:679–85.
24. Ananthakrishnan AN, McGinley EL, Binion DG. Inflammatory bowel disease in the elderly is associated with worse outcomes: a national study of hospitalizations. *Inflamm Bowel Dis* 2009;**15**:182–9.
25. Delaney CP, Dadvand B, Remzi FH, Church JM, Fazio VW. Functional outcome, quality of life, and complications after ileal pouch-anal anastomosis in selected septuagenarians. *Dis Colon Rectum* 2002;**45**:890–4.
26. Pellino G, Sciaudone G, Candilio G, *et al*. Complications and functional outcomes of restorative proctocolectomy for ulcerative colitis in the elderly. *BMC Surg* 2013;**13**[Suppl 2]:S9.
27. Ahmed Ali U, Keus F, Heikens JT, *et al*. Open versus laparoscopic [assisted] ileo pouch anal anastomosis for ulcerative colitis and familial adenomatous polyposis. *Cochrane Database Syst Rev* 2009;**1**:CD006267.
28. Buskens CJ, Sahami S, Tanis PJ, Bemelman WA. The potential benefits and disadvantages of laparoscopic surgery for ulcerative colitis: A review of current evidence. *Best Pract Res Clin Gastroenterol* 2014;**28**:19–27.
29. Spinelli A, Sampietro GM, Bazzi P, Sacchi M, Montorsi M. Surgical approach to ulcerative colitis: when is the best timing after medical treatment? *Curr Drug Targets* 2011;**12**:1462–6.
30. Gisbert JP, Chaparro M. Systematic review with meta-analysis: inflammatory bowel disease in the elderly. *Aliment Pharmacol Ther* 2014;**39**: 459–77.
31. Billioud V, Ford AC, Tedesco ED, Colombel JF, Roblin X, Peyrin-Biroulet L. Preoperative use of anti-TNF therapy and postoperative complications in inflammatory bowel diseases: a meta-analysis. *J Crohns Colitis* 2013;**7**: 853–67.
32. Selvasekar CR, Cima RR, Larson DW, *et al*. Effect of infliximab on short-term complications in patients undergoing operation for chronic ulcerative colitis. *J Am Coll Surg* 2007;**204**:956–62; discussion 962–3.
33. Meagher AP, Farouk R, Dozois RR, Kelly KA, Pemberton JH. J ileal pouch-anal anastomosis for chronic ulcerative colitis: complications and long-term outcome in 1310 patients. *Br J Surg* 1998;**85**:800–3.
34. Chapman JR, Larson DW, Wolff BG, *et al*. Ileal pouch-anal anastomosis: does age at the time of surgery affect outcome? *Arch Surg* 2005;**140**:534–9; discussion 539–40.
35. Michelassi F, Hurst R. Restorative proctocolectomy with J-pouch ileoanal anastomosis. *Arch Surg* 2000;**135**:347–53.
36. Bach SP, Mortensen NJ. Revolution and evolution: 30 years of ileoanal pouch surgery. *Inflamm Bowel Dis* 2006;**12**:131–45.
37. Choi HJ, Saigusa N, Choi JS, *et al*. How consistent is the anal transitional zone in the double-stapled ileoanal reservoir? *Int J Colorectal Dis* 2003;**18**:116–20.
38. Gemlo BT, Belmonte C, Wiltz O, Madoff RD. Functional assessment of ileal pouch-anal anastomotic techniques. *Am J Surg* 1995;**169**:137–41; discussion 141–2.
39. Martel P, Majery N, Savigny B, Sezeur A, Gallot D, Malafosse M. Mesenteric lengthening in ileoanal pouch anastomosis for ulcerative colitis: Is high division of the superior mesenteric pedicle a safe procedure? *Dis Colon Rectum* 1998;**41**:862–6; discussion 866–7.
40. Metcalf DR, Nivatvongs S, Sullivan TM, Suwanthanma W. A technique of extending small-bowel mesentery for ileal pouch-anal anastomosis: report of a case. *Dis Colon Rectum* 2008;**51**:363–4.
41. Thirlby RC. Optimizing results and techniques of mesenteric lengthening in ileal pouch-anal anastomosis. *Am J Surg* 1995;**169**:499–502.
42. Burnstein MJ, Schoetz DJ Jr, Coller JA, Veidenheimer MC. Technique of mesenteric lengthening in ileal reservoir-anal anastomosis. *Dis Colon Rectum* 1987;**30**:863–6.
43. Chu DI, Tognelli J, Kartheuser AH, Dozois EJ. Strategy for the difficult-to-reach ileal pouch-anal anastomosis: technical steps of an in vivo application of a mesenteric-lengthening technique. *Tech Coloproctol* 2015;**19**:705–9.
44. Geisler DP, Condon ET, Remzi FH. Single incision laparoscopic total proctocolectomy with ileopouch anal anastomosis. *Colorectal Dis* 2010;**12**:941–3.
45. Bulian DR, Knuth J, Krakamp B, Heiss MM. Restorative restproctectomy as single-port surgery through the ostomy site in a three-stage procedure. *Surg Endosc* 2012;**26**:3688–90.
46. Gash KJ, Goede AC, Kaldowski B, Vestweber B, Dixon AR. Single incision laparoscopic [SILS] restorative proctocolectomy with ileal pouch-anal anastomosis. *Surg Endosc* 2011;**25**:3877–80.
47. Farouk R, Dozois RR, Pemberton JH, Larson D. Incidence and subsequent impact of pelvic abscess after ileal pouch-anal anastomosis for chronic ulcerative colitis. *Dis Colon Rectum* 1998;**41**:1239–43.
48. Meagher AP, Farouk R, Dozois RR, Kelly KA, Pemberton JH. J ileal pouch-anal anastomosis for chronic ulcerative colitis: complications and long-term outcome in 1310 patients. *Br J Surg* 1998;**85**:800–3.
49. Sagar PM, Pemberton JH. Intraoperative, postoperative and reoperative problems with ileoanal pouches. *Br J Surg* 2012;**99**:454–68.