




Ileal pouch-anal anastomosis provides good functional and quality of life outcomes following proctocolectomy: A 33-year single centre experience

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Key words

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Introduction

Inflammatory bowel disease (IBD) has an increasing incidence and is characterized by chronic relapsing intestinal inflammation, including Crohn's disease (CD) or ulcerative colitis (UC).¹

An Australian population-based IBD prevalence study has shown a rate of 315 per 100 000 (with CD 191 per 100 000 and UC 115 per 100 000).² Familial adenomatous polyposis (FAP), has a prevalence of 1 in 10 000 births.³

Restorative proctocolectomy (RP) with ileal pouch-anal anastomosis (IPAA) remains the gold standard treatment for the surgical management of patients with medically refractive UC, indeterminate colitis (IC), FAP and occasionally for CD.⁴ Pioneered by Parks

Abstract

Background: Restorative proctocolectomy (RP) with ileal pouch-anal anastomosis (IPAA) remains the gold standard for the surgical management of patients with medically refractive mucosal ulcerative colitis. We aimed to identify functional and quality of life (QOL) outcomes in RP and IPAA surgery patients at our institution.

Methods: A retrospective observational study was performed including all patients who had undergone RP and IPAA between August 1984 and November 2017 at Royal Prince Alfred Hospital (RPAH).

Results: 316 consecutive patients were identified, median age 39 (range 5 to 81) years. The median duration of disease was 60 (range 1 to 528) months. Ulcerative colitis was the main preoperative diagnosis with the main RP indication being failure of medical treatment. The median postoperative stay post-IPAA was 11 (range of 5 to 67) days. Pouchitis was the most common late complication (22.1%), bleeding pouch (3.5%) the earliest, with a 6.8% rate of symptomatic anastomotic leak. Visual analogue scale QOL measure (P -value <0.001), St Marks incontinence score (P -value = 0.001) and Cleveland clinic score (P -value = 0.002) all revealed significant improvement in functional outcomes and QOL.

Conclusion: QOL and functional outcomes following RP with IPAA in patients at our institution are excellent and comparable to institutions with larger patient numbers.

and Nicholls in 1978, RP-IPAA has had some technical adjustments with the development of new technology and increasing surgical experience and expertise.⁴

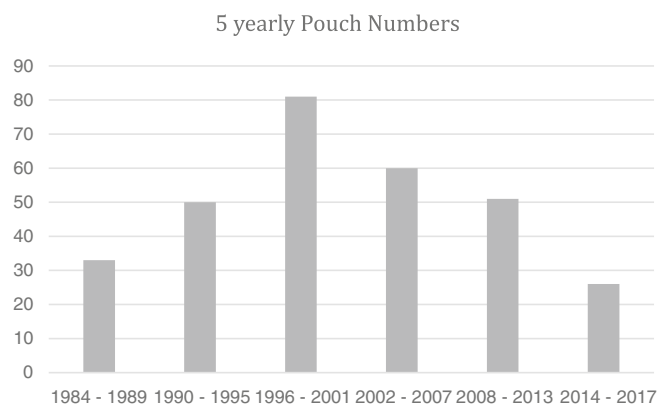
IPAA involves total proctocolectomy, which aims to resect the diseased colon with rectum and the anastomosis of the remaining small bowel to the remnant anus which provides gastrointestinal continuity.⁴ This can be a two-stage or three-stage procedure and historically involves a temporary diverting ileostomy.⁴ The pouch acts as an ileal reservoir, formed in the form of a J; using two loops of small bowel, S; with three loops of small bowel or W; with four loops of small bowel.⁴ Techniques of anastomosis, include hand sewn or stapling with a double stapled ileal J pouch-anal anastomosis being the preferred option.⁴ IPAA remains a technically

demanding procedure and can be associated with major morbidity in the postoperative period which can influence the function of the pouch, lead to failure of the pouch and importantly effect the quality of life (QOL) of patients.⁴ Functional outcomes and QOL outcomes after IPAA are considered to be good or excellent in 95% of patients and remains an excellent option for patients with UC, IC, FAP and a select few patients with CD. Functional outcomes often measured include stool frequency, nocturnal evacuation, incontinence and the need for anti-diarrhoeal. Morbidity with IPAA surgery includes early complications such as pouch leaks leading to pelvic and abdominal sepsis, small bowel obstruction (SBO), pouch fistula, wound infection and wound haemorrhage. Late complications may include anal stricturing disease, SBO, anastomotic leaks, pelvic sepsis, pouchitis and pouch failure.^{4,5} Sexual function (SF) and sexual restrictions post IPAA surgeries have paucity in the literature currently, although some QOL studies incorporate sexual restrictions as part of the QOL scores. The risk of sexual dysfunction is a reality in any form of pelvic surgery with potential damage to autonomic nerves during the proctectomy. For males there is a risk of impotence and retrograde ejaculation and for females; vaginal dryness and dyspareunia.⁶ For females, there are also the added issues of fertility and obstetric and gynaecological functional issues.⁶ Psychosocial factors and body image issues such as having surgical scars and a diverting ileostomy remain a factor in patients who have an IPAA.⁶ Damgaard *et al.* found in a prospective cohort study that there was a significant improvement in social and SF and QOL after ileal J-pouch anastomosis, when compared to living with UC and whilst having a diverting ileostomy.⁷ Another retrospective cohort study using validated questionnaires found that sexual function scores were equal or better than normal values for men but lower for women.⁸

The aim of this study was to identify QOL outcomes in RP and IPAA surgery patients at our institution.

Methods

Ethics approval was obtained from the Sydney Local Health District Ethics Committee (X17-0431 and HREC/17/RPAH/647). A retrospective, observational study included patients who had



Graph 1. Five yearly Pouch numbers.

undergone a RP and IPAA between August 1984 and November 2017 at Royal Prince Alfred Hospital (RPAH) in Sydney. Previous database audits were used to identify the study participants. These were published in 1999, 2007 and 2014⁹⁻¹¹ containing patient identification up to November 2011. Consultant's personal databases were used to identify cases from November 2011 onwards. Patients who had undergone a RP and IPAA were included. Deceased patients and those with logistical difficulties to return the survey were not included.

Current medical records were used to ascertain if a patient was alive, following which written informed consent was sought with a project explanation. On receipt of the written consent, a telephone interview was conducted with a standardized questionnaire by a single data collector.

Functional outcomes and their relationship with disease factors, patient factors and overall pouch function were statistically analysed using the paired samples *t*-test; McNemar Test *P*-value; Wilcoxon Signed Ranks Test *P*-value and McNemar-Bowker Test *P*-value with the aid of IBM, SPSS V25 and IBM, SPSS V28. Kaplan–Meier curves for pouch survival were generated and analysed with the statistical software SAS On Demand for Academics (SAS Institute Inc. 2021).

All reported *p* values were two-sided with a *P*-value <0.05 considered statistically significant.

Sexual function outcomes were measured in previous databases with the presence of dyspareunia, impotence and a subjective score of sex life postoperatively. Standardized scoring systems of female sexual function index (FSFI) and international index of erectile function for men (IIEF) were used in this study. The FSFI has six domains; desire, arousal, lubrication, orgasm, satisfaction and pain which are scored out of five. The overall score is the addition of each of the domain scores and is scored out of 30.⁸ The IIEF has five domains and their scoring includes erectile function out of 30, orgasmic function, overall satisfaction and sexual desire, all out of 10 and intercourse satisfaction out of 15.⁸

Results

Between August 1984 and November 2017, 316 consecutive patients underwent a RP and IPAA at RPAH in Sydney, NSW, Australia. 58% of patients were males (184) and 42% were females (132). The median age of the study population and their age at pouch creation was 39 years (range 5 to 81 years). [Graph 1](#) provides a five yearly breakdown of numbers.

A total of 45 new patients were identified between November 2014 and November 2017 for this focused qualitative functional assessment. Twenty patients returned the consent survey. Fifteen patients completed the surveys. Surveys were not conducted on two patients as they were deceased. Three patients were unavailable/unwilling to participate. Twenty-five patients did not return their consent forms therefore phone surveys could not be conducted due to strict ethics requirements.

The median duration of the disease was 60 months (range 1 to 528 months). The most common preoperative diagnosis was ulcerative colitis (224, 70.9%) followed by FAP (45, 14.2%) and

indeterminate colitis (25, 7.9%). A preoperative diagnosis of cancer was attributed to 11 cases (3.5%).

The most common indication for surgery was failed medical treatment (198, 62.7%) followed by dysplasia (34, 10.8%) and cancer (35, 11.1%). The remaining indications included multiple polyps (7%), cancer prevention (3.2%), bleeding and side effects of medications.

The most frequent operation performed was a total proctocolectomy (205, 64.9%). Thirty-two patients (10.1%) patients had their procedures performed laparoscopically. There were 107 completion proctocolectomies (33.9%) and 4 pouch revisions (1.3%). Our first pouch revision was done in 1998 with the remaining three occurring in 2002, 2004 and 2008. Of the 316 ileal pouch-anal anastomosis, 54 were handsewn (17.1%) and 262 were double-stapled (82.9%). In the formation of the J pouch, seven were handsewn (2.2%) and the majority were stapled (309, 97.8%) and varied, 15 to 20 cm in length. Prior to October 1990, IPAA's were handsewn and since May 1992 routinely double-stapled ileal pouch anal anastomosis were performed except for the select synchronous rectal cancer or severe dysplasia. The median operating time was 255 min. The median postoperative stay post-IPAA was nine (range 4 to 46) days. 315 of 316 patients had their ileostomy closed, 289 at RPAH, and 26 at the referring surgeons centre. Only one patient did not have their ileostomy closed due to preference and functional issues with pouchitis. The median postoperative stay post ileostomy reversal was 5 days with a range of 1–16 days. Follow-up was variable and occurred 3 to 6 months post-initial pouch operation and following ileostomy reversal. The median time for reversal ileostomy since pouch operation was 137 days (range 28–918).

There was 1 early (<30 days postoperatively) death (0.3%). There have been 14 deaths since surgery (4.5%). The median time to mortality, for these 14 patients who have died post IPAA was 58 months (range of 0–129 months).

Between November 2011 and 30th November 2017, there were three mortalities, all >30 days. The first mortality had a pan proctocolectomy + IPAA J pouch with a covering loop ileostomy with subsequent reversal for UC with a high-grade rectal lesion on surveillance colonoscopy. The second mortality had a laparoscopic pan proctectomy and IPAA with a defunctioning ileostomy for UC with a DALM (dysplasia-associated lesion or mass), complicated by a parastomal hernia which was repaired and an enterocutaneous fistula managed with success conservatively. Both above families wished not to disclose causes of death. The third mortality was palliated after an incidental finding of metastatic cholangiocarcinoma with pulmonary metastases on a background of UC refractive to treatment and primary sclerosing cholangitis following pan proctocolectomy with J pouch formation and a defunctioning ileostomy. He had an IPAA anastomotic leak and required multiple operative theatre visits for endosponge dressing changes. His last pouchoscopy and washout showed a resolving abscess cavity. Deteriorating LFT's prompted imaging revealing a metastatic cholangiocarcinoma.

The morbidity outcomes observed included ileostomy related complications (retraction or prolapse) and complications post closure of ileostomy. These are summarized in Table 1.

Table 1 Ileostomy related complications among 316 patients undergoing RP-IPAA

Ileostomy related complications	Number of patients, (%)	
	Early (<30 days):	Late (>30 days):
Retraction or prolapse	4, 1.3%	9, 2.9%
Post-closure of ileostomy		
Leak	2, 0.7%	
Wound infection	16, 5.5%	
SBO with or without laparotomy	21, 7.2%	
Other	43, 14.7%	

Between November 2011 and 30 November 2017, 1 patient had a post ileostomy closure anastomotic leak which was managed conservatively. Five patients had wound infections, four of these were managed conservatively and responded to antibiotics, one patient required drainage of an abdominal wall abscess.

In the same time period, six patients had SBO. The first patient had two, prior to ileostomy reversal, one 3 days postoperatively and another 14 days postoperatively which were both managed conservatively. The second patient had two SBO post ileostomy reversal requiring admission to hospital which were also managed conservatively. The third patient had a high-grade SBO which was managed conservatively, she required laparoscopic adhesiolysis 2 months following this in conjunction with ileostomy reversal. The fourth had a SBO 12 months following reversal ileostomy, he required a laparotomy as there was compromised small bowel adhered to the sacral promontory requiring adhesiolysis. The fifth required a diagnostic laparoscopy and adhesiolysis 13 months post ileostomy reversal for a partial SBO. The sixth had a SBO 12 months post ileostomy reversal which resolved with conservative management.

Pouch-specific morbidity outcomes are outlined in Tables 2 and 3 and other general morbidity outcomes measured outlined in Table 4. Pouch failure was assessed via Kaplan–Meier plots for time from pouch operation to pouch failure or date of last follow-up. Twenty patients had pouch failure. A Kaplan–Meier plot was then stratified by presence of pouchitis and then by elective or emergency surgery and then by age in years at pouch operation at 1 year. Pouch failure was 16.18% overall, 13.83% for patients without Pouchitis, 20.71% for patients with Pouchitis, 5.56% for elective patients, 13.08% for emergency patients, 9.27% for patients aged <39 years and 21.12% for patients ≥39 years. These are displayed in Kaplan–Meier Plots (Graphs 2–5).

Postoperative functional data was measured via standardized scoring systems including the Cleveland Clinic Score (CCIS) and the St Marks incontinence Score (SMIS). Patients reported a mean visual analogue scale of 40 preoperatively compared to 85 reported postoperatively. Table 4 provides functional data outcomes below. Dyspareunia and impotence rates were higher with 64% of patients reporting no change in their sex life. Diarrhoea improved postoperatively. The average bowel motions per day showed statistically significant improvement with *P*-value <0.01 with a reduction from 9 to 5 bowel motions per day. Similarly the number of bowel

Table 2 Leak/pouch specific complications among 316 patients undergoing RP-IPAA

Leak/pouch specific complications	Number of patients, (%)	
	Early (<30 days)	Late (>30 days)
Any leak – Clinical or radiological	20, 6.4%	
Clinical leak – parapouch abscess or peritonitis	5, 1.6%	10, 3.2%
Radiological only leak (no clinical signs)	2, 0.6%	5, 1.6%
Symptomatic leak from pouch with parapouch abscess or peritonitis or fistula	21, 6.8%	
Bleeding pouch	1, 3.5%	1, 0.3%
Pouch infarction	0, 0%	2, 0.6%
Pouch/anastomotic cutaneous fistula	0, 0.0%	5, 1.6%
Pouch/vaginal fistula	1, 0.3%	8, 2.6%
Anal stricture	1, 0.3%	29, 9.4%
Pouchitis	7, 2.3%	68, 22.1%
Dysfunctional pouch	0, 0.0%	8, 2.6%
Pouch removal	0, 0.0%	14, 4.5%

Table 3 Other non-pouch-specific outcomes among 316 patients undergoing RP-IPAA

Other morbidity outcomes	Number of patients, (%)	
	Early (<30 days)	Late (>30 days)
Small bowel obstruction	17, 5.5%	61, 19.6%
SBO post pouch and prior to ileostomy closure	28, 9.0%	
Post-IPAA laparotomy required for small bowel obstruction	3, 1.0%	13, 4.2%
SBO after ileostomy closure	49, 16.2%	
SBO after ileostomy closure and requiring laparotomy	19, 6.3%	
Wound infection	18, 5.8%	6, 1.9%
Incisional hernia	1, 0.3%	13, 4.2%

motions after sleep was reduced from 2 to 1, (P -value = 0.037). Incontinence to solids and flatus remained similar post-operatively, however, incontinence to liquids showed improvement, (P -value = 0.039). Lifestyle alterations due to faecal incontinence were reduced although not statistically significant (P -value = 0.09). Seepage remained similar post-operatively (P -value = 0.084). There was reduced use of anti-diarrhoea medications post-operatively which was statistically significant (P -value = 0.011).

Quality of life (QOL) assessment through visual analogue scale revealed an improvement from a mean preop score of 42.26 to a post-op score of 80.59 ($P < 0.001$, 95% CI 77.9 to 83.3). The SMSI revealed a significant improvement in pre- and post-operative incontinence scores ($P = 0.001$; (95% CI 2.3 to 3.98)). Mean CCIS improved from 3.13 to 1.78 ($P = 0.002$, (95% CI 1.28 to 2.28)).

Discussion

IPAA and RP is a technically demanding procedure with the chance of major morbidity in the postoperative period which can influence

the pouch function, and have significant impact on the quality of life of patients.⁴ Since our last data analysis in 2011 there has been a slight reduction in median post-operative stay (post pouch procedure) from 10 to 9 days. Although we report morbidity in our patients, the majority of patients reported a statistically significant improvement in their QOL. Functional outcomes measured via the SMSI and CCIS showed improvement in functional outcome. Statistically significant results were also seen with reduced bowel motions per day, reduced bowel motions after sleep, reduced incontinence to liquids and reduced use of anti-diarrhoea medications postoperatively.

We have persisted with two-stage (205) or three-stage procedures (107) and four redo operations with continued use of temporary ileostomy as per surgeon and institution preference. We have noted other approaches in other international and national units such as modified two-stage and single-stage pouches. This could perhaps be something we look to do in the future.

As described above our indications for pouch surgery included failure of medical treatment, dysplasia, cancer, multiple polyps, cancer prevention, bleeding and side effect of medications. Selection for pouch surgery was based on a multidisciplinary approach with patient-centred decisions involving the patient, their gastroenterologist and or surgeon and including allied health staff.

Only 10.1% of our patients had laparoscopic or hand-assisted surgery; as such our series cannot add to the available literature regarding laparoscopy in restorative proctectomy. Studies have supported laparoscopic procedures with evidence of faster recovery and improved postoperative outcomes. Conversely, there have been studies reporting nil significant changes.^{12–16} A systematic review and meta-analyses by Singh *et al.* in 2013 did show that a longer operating time, shorter hospital stay and reduced wound infection were noticed in laparoscopic surgery although no differences were observed in pouch failure.¹⁷

Pouchitis is the most commonly reported complication following IPAA.¹⁸ Reported frequencies have ranged from 25% to 73% with larger studies showing up to 25% among patients with UC as the indication for IPAA.¹⁸ Shannon *et al.* followed up patients over a 20-year period and found a rate of 45% up young adults and paediatric patients who underwent IPAA for UC.¹⁹ The morbidity outcomes measured such as pouchitis and anastomotic leak still remain low compared to larger studies. Our study demonstrated that 22.1% of patients had late pouchitis which is an increased amount compared to our previous analysis⁹ yet remaining lower than other institutions.⁴

Anastomotic leaks and pelvic sepsis are other known complications of IPAA surgery. Fazio *et al.* reported a 6.5% anastomotic leak rate in their large series of 3707 patients.⁴ A larger meta-analysis by Lovegrove *et al.* reported an anastomotic leak rate of 6.9%.¹⁸ Our rate of symptomatic anastomotic leak was 6.8% which is comparable to the other centres.

The nature of IPAA surgery can result in extensive intra-abdominal adhesions which puts patients at risk of developing SBO. Fazio *et al.* reported a 17.9% rate SBO with 40% of these patients eventually requiring operative intervention.⁴ This was very similar to the meta-analysis performed by Lovegrove *et al.* who demonstrated a 16.5% of SBO at the 2-year mark and 53.3% of

Table 4 Postoperative functional outcomes among 316 patients undergoing RP-IPAA

Functional outcome	Mean scores (95% CI) (response)		P-value
Cleveland clinic score	Pre-mean score: 3.13 (2.22 to 3.82) (129/316)	Post mean score: 1.78 (1.28 to 2.28) (125/316)	0.002****
St Marks incontinence score	Pre-mean Score: 4.11(3.78 to 6.12) (99/316)	Post mean Score: 2.14 (2.3 to 3.98) (213/316)	0.001****
Quality of life – visual analogue score	Pre-mean: 42.26 (37.6 to 47) (206/316)	Post mean: 80.59 (77.9 to 83.3) (206/316)	<0.001****
Dyspareunia – n (%)	Yes: 8 (23%) No: 27 (77%) (35/316)	Yes: 12 (68%) No:53 (82%) (65/316)	0.500*
Impotence – n (%)	Yes: 5 (9%) No: 51 (91%) (56/316)	Yes: 16 (16%) No: 86 (84%)	0.375*
Sex Life Post – n (%)		1 Better: 25 (16.3%) 2 Same: 100 (65.4%) 3 Worse: 28 (18.3%) (153/316)	
Diarrhoea	Yes: 211 (75%) No: 71 (25%) (282/316)	Yes: 16 (94%) No: 1 (6%) (17/316)	0.500*
Average bowel motions per day – Median (IQR)	9 (5, 12) (192/316)	5 (4, 7.25) (212/316)	<0.001**
Number of bowel motions after sleep – Median (IQR)	2.0 (0, 3.25) (98/316)	1.0 (0, 2.0) (211/316)	0.037**
Incontinence to solids	Never: 89 (89.9%) Rarely: 6 (6.1%) Sometimes: 2 (2.0%) Usually: 2 (2.0%) Always: 0 (0%) (99/316)	Never: 93 (95.9%) Rarely: 2 (2.1%) Sometimes: 1 (1.0%) Usually: 1 (1.0%) Always: 0 (0%) (97/316)	0.343***
Incontinence to liquids	Never 46(46.5%) Rarely: 19(19.2%) Sometimes: 9 (9.1%) Usually: 10 (10.1%) Always: 15 (15.1%) (99/316)	Never: 55 (56.7%) Rarely: 17 (17.5%) Sometimes: 18 (18.6%) Usually: 5 (5.2%) Always: 2 (2.1%) (97/316)	0.039***
Incontinence to flatus	Never: 79 (79.8%) Rarely: 4(4.0%) Sometimes: 4 (4.0%) Usually: 8(8.1%) Always: 4 (4.0%) (99/316)	Never 86 (88.7%) Rarely: 3(3.1%) Sometimes: 4 (4.1%) Usually: 2 (2.1%) Always: 2 (2.1%) (97/316)	0.277***
Lifestyle alterations due to faecal incontinence	Never: 61 (61.6%) Rarely: 2(2.0%) Sometimes: 4 (4.0%) Usually: 8 (8.1%) Always: 24 (24.2%) (99/316)	Never: 76 (78.4%) Rarely: 5(5.2%) Sometimes: 3 (3.1%) Usually: 5 (5.2%) Always: 8 (8.2%) (97/316)	0.099***
Seepage	Never: 15 (15.2%) Night only: 19 (19.2%) Day and night: 65 (65.7%) (99/316)	Never:108 (50.5) Night only: 42 (19.6%) Day and night: 64 (29.9%) (214/316)	0.084***
Anti-diarrhoea medication	Never: 66 (67.3%) Rarely: 2 (2.0%) Sometimes: 7 (7.1%) Usually: 7 (7.1%) Always: 16 (16.3%) (98/316)	Never: 108 (50.5%) Rarely: 6 (2.8%) Sometimes: 23 (10.7%) Usually: 3 (1.4%) Always: 74 (35.6%) (214/316)	0.011***

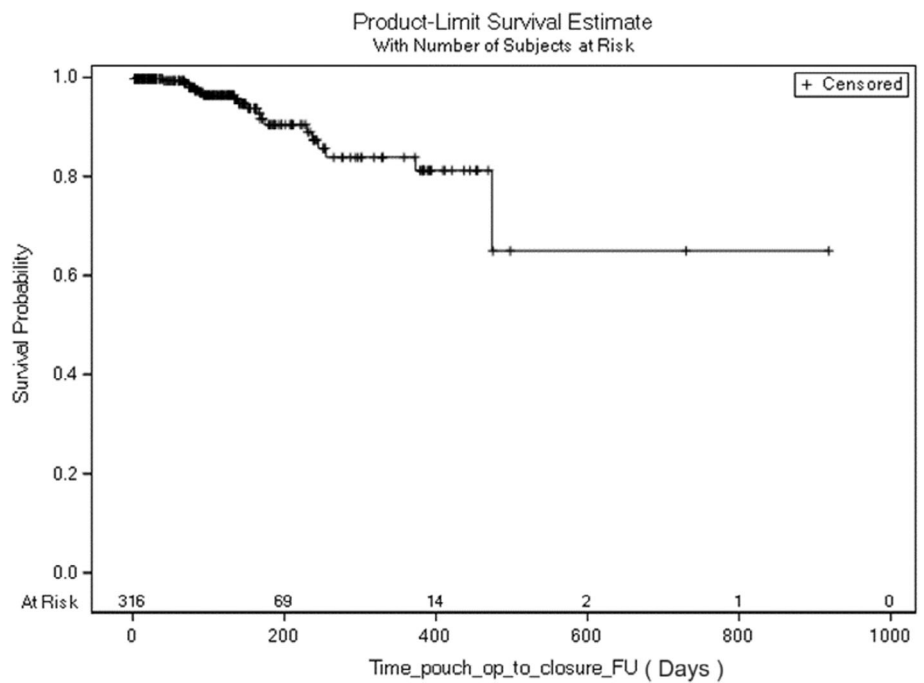
*McNemar test P-value; **Wilcoxon signed ranks test P-value; ***McNemar-Bowker test P-value; ****Paired samples P-value.

these patients also requiring operative intervention to relieve the obstruction.¹⁸ Our results are similar and comparable to the above larger studies with 17 patients (5.5%) of patients having early SBO (<30 days) of which three patients (1%) required operative management and 61 patients (19.6%) having late SBO (>30 days) of which 13 (4.2%) patients required operative management. A longer follow-up period may reveal a higher number as previously

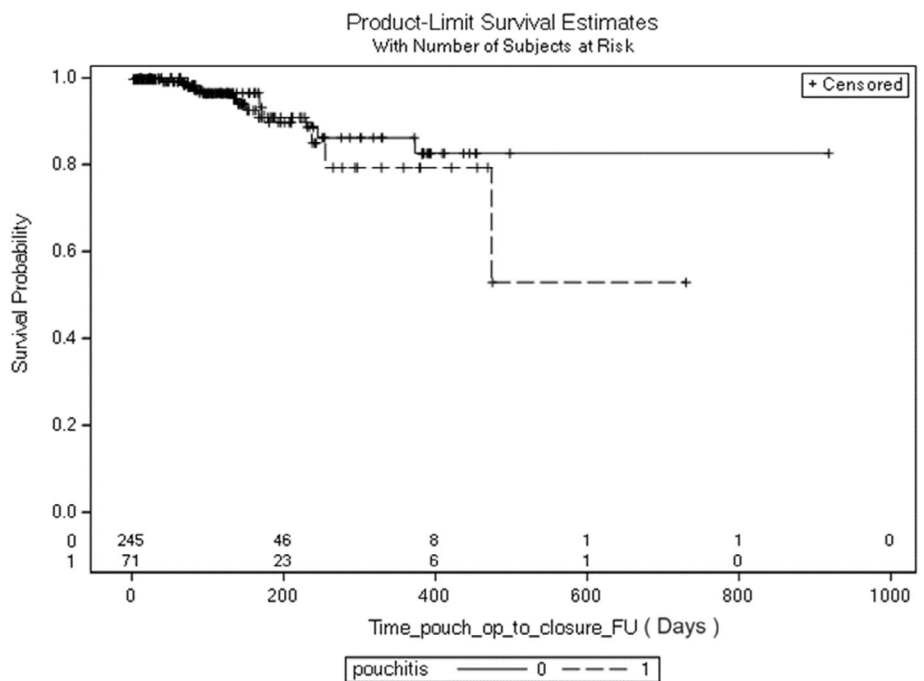
described by Hahnloser *et al.* describing a 40% rate with a 20 years follow-up.²⁰

Pouch failure following IPAA can occur in 6% to 12% at long-term follow-up as described in Reference 4. Fazio *et al.* in their series demonstrated 5.3% of pouches that failed with 3.6% requiring excision.⁴ Our study is comparable with 14 (4.5%) patients requiring late excision (>30 days) of their pouch. Although our

Graph 2. Kaplan–Meier survival plot 1 of time to pouch failure.



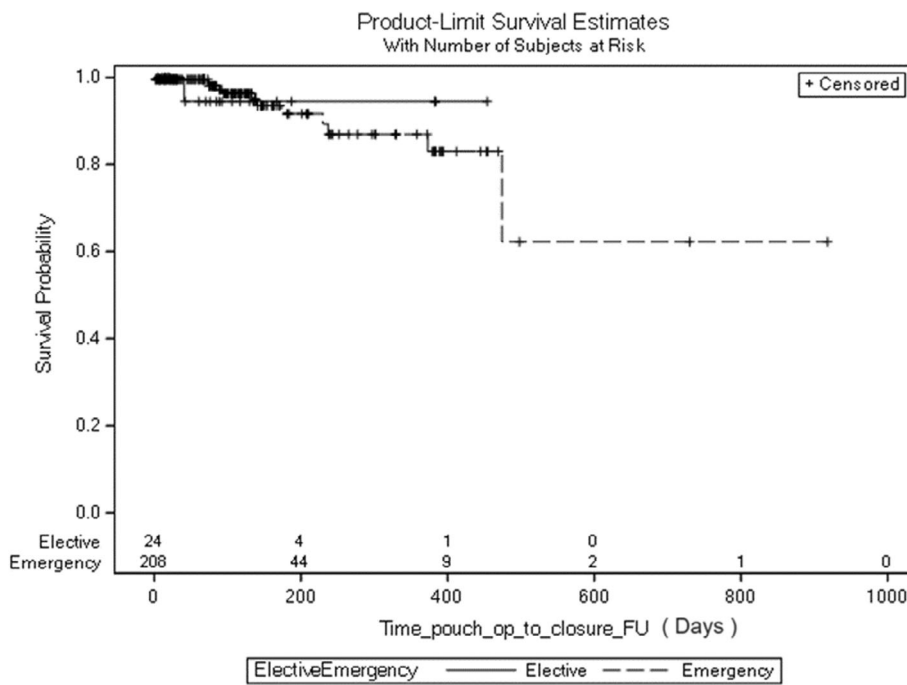
Graph 3. Kaplan–Meier survival plot 2 of time to pouch failure versus pouchitis.



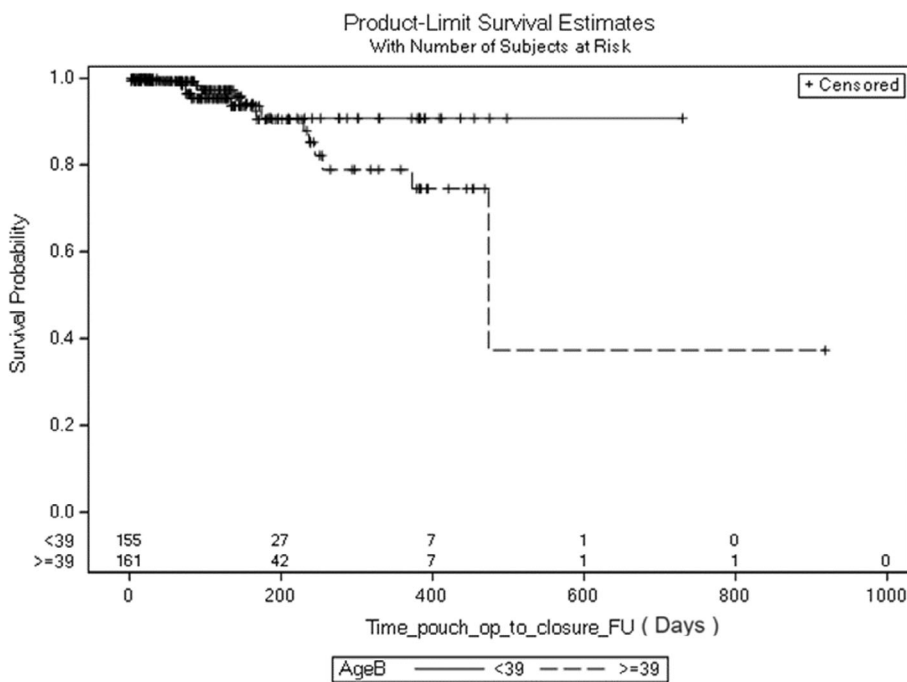
pouch failure rates are comparable to larger institutions worldwide, Kaplan-Meier plots did not yield statistically significant log-rank test *p* values for pouchitis, elective, emergency surgery and age. We can infer that pouch failure rates were higher in patients over age 39, for patients with pouchitis and for patients who required emergency surgery initially. At our institution, we have had up to a 60% pouch removal for postoperative CD diagnosis.⁹ Therefore, we have routinely excluded performing RP/IPAA for patients who

have a pre-operative diagnosis of CD. Regardless we continue to perform RP/IPAA on patients with UC and IC.

Sexual impairment and reduced fertility are potential complications post Ileal pouch-anal anastomosis.²¹ Hor *et al.* identified in a retrospective study involving 127 females that 64% had normal sexual function as determined by an FSFI >26.²¹ Age and nocturnal pouch activity were found to be independent factors of worse SF.²¹ Counihan *et al.* showed in a retrospective study with a cohort of



Graph 4. Kaplan–Meier survival plot 3 of time to pouch failure versus elective/emergency.



Graph 5. Kaplan–Meier survival plot 4 of time to pouch failure versus Age (binary).

206 females that postoperative pelvic cysts and persistent dyspareunia were underestimated although childbirth appeared safe.²²

Erectile dysfunction and retrograde ejaculation are important concerns for colorectal surgeons to warn male patients of; following pelvic surgery with a mean frequency of 43% in patients post-rectal excision and up to 25% after proctectomy for IBD.^{23,24} It occurs due to damage to parasympathetic nerves during surgery, anatomical alterations, fibrosis or psychological factors.^{23,24} Gorgun *et al.* reviewed a cohort of 122 males post-IPAA and found that despite

slightly increased erectile dysfunction rates there was statistically significant improvement in erectile function, sexual desire, intercourse satisfaction and overall satisfaction as assessed by the IIEF.²⁴

SF outcomes measured via the validated FSFI and IIEF did not show any difference. However, due to the small number of return surveys these results have been excluded. Anecdotally, there may have been a number of reasons for the limited return of consent forms from people having changed address, inability to return the

form due to physical reasons or being unable to reach the mailing service due to the recent lockdown regulations associated with the COVID-19 Pandemic.²⁵ The survey response rate was 33%. This response rate is low, yet common for mail-based surveys.

In conclusion, we have identified that the QOL outcomes and functional outcomes in RP and IPAA surgery patients at our institution are excellent and comparable to global high-volume institutions. Our current and future aim is to build on our current database and experience by setting up a prospective database to improve data accuracy, acquisition and quality to ultimately offer our patients beyond the standard of care, improve their functional outcomes and more-importantly their quality of life.

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Author contributions

Shaveen Kanakarathne: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; software; validation; writing – original draft. **Jonathan Hong:** Conceptualization; writing – review and editing. **Michael J. Solomon:** Conceptualization; writing – review and editing. **Christopher J. Young:** Conceptualization; data curation; formal analysis; resources; supervision; writing – review and editing.

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