

Laparoscopic total proctocolectomy with ileal pouch-anal anastomosis for ulcerative colitis

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Abstract

AIM: The aim was to study the feasibility of the laparoscopic approach in the management of ulcerative colitis, to assess the functional results at 1-year and to review of literature on the topic. **MATERIALS AND METHODS:** All patients presenting for surgical management of histopathologically proven ulcerative colitis during the study period were included in the study. All patients presenting in a non-emergency setting were offered a two-stage procedure (Group A). The first-stage consisted of laparoscopic total proctocolectomy (TPC) with ileal pouch-anal anastomosis (IPAA) with a diverting split end ileostomy. Ileostomy was closed in the second stage. For patients presenting in acute setting (Group B), the first-stage consisted of laparoscopic TPC with end ileostomy followed by IPAA with diverting split end ileostomy in the second-stage and finally ileostomy closure in the third-stage. The technique is described. **RESULTS:** A total of 31 cases underwent laparoscopic TPC-IPAA, of which 28 belonged to Group A and 3 were included in Group B. All surgeries were successfully completed laparoscopically without need for conversion. The average operating time was 375 min in Group A (range: 270-500 min) and 390 min in Group B (range: 250-480 min). Oral diet was resumed at a mean of 3.4 days (range: 1.5-6 days) and the mean hospital stay was 8.2 days (range: 4-26 days). Overall morbidity rate was 16.2%; re-operation rate was 9.7% while mortality was nil. **CONCLUSIONS:** Laparoscopic TPC-IPAA is feasible in acute as well as non-acute setting in patients needing surgical management of ulcerative colitis.

Key words: Functional outcome, ileal pouch-anal anastomosis, ileal pouch, laparoscopic total proctocolectomy, ulcerative colitis

INTRODUCTION

Patients of ulcerative colitis are initially managed medically. However, some patients develop complications like haemorrhage, perforation or near perforation and toxic megacolon that may require surgery on an emergent basis.^[1] Around 12-25% of patients present with acute severe exacerbations of their disease that are more difficult to manage.^[2] They can have three distinct outcomes: They can respond to aggressive medical management, they can worsen and develop perforation or toxic megacolon, requiring emergent surgery with a high resultant morbidity and mortality, or they may partially improve to relapse later on and require surgery on a less emergent basis. Appropriate management of these patients requires experience and sound surgical acumen. A majority of these patients will respond to aggressive medical management.^[2] With advance in medical therapies, the mortality of severe acute ulcerative colitis has reduced, but the emergency colectomy rate has remained fairly stable between 25% and 30% over the last 30 years.^[3] Almost another third of patients require colectomy later on resulting in a cumulative colectomy rate of 65%.^[3]

In addition to the above, there is a subgroup of patients with ulcerative colitis who require surgery on a nonemergency basis. These are the patients who have developed malignancy or have developed multiple pseudopolyps, which are a harbinger of malignancy.^[4]

The ultimate goal of the surgeon should be to achieve a total proctocolectomy (TPC) with ileal pouch-anal anastomosis (IPAA), which has become a gold surgical standard for ulcerative colitis.^[5,6] In this era of minimal access surgery,

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this procedure can be performed laparoscopically, with or without using a hand-assist device.^[7] Such an approach confers the advantages of early return to routine activity, better cosmesis and, possibly, lower long-term wound and adhesion related complications as compared with the open procedure.^[8] However, there are conflicting reports with regards to parameters such as post-operative return of bowel function, analgesia requirement, hospital stay, duration, and cost of surgery for the laparoscopic approach.^[9] Moreover, while there is adequate data on the long-term outcomes after conventional open TPC-IPAA, the same cannot be stated for the laparoscopic variant, with just a few small case series and prospective randomised trials.^[8,9]

Over this background, we would like to present our data of laparoscopic management of ulcerative colitis.

MATERIALS AND METHODS

All cases presenting to us for surgical management of ulcerative colitis between October 2006 and September 2013 were offered laparoscopic surgery as an initial approach of management. All patients where the histopathological report had identified the inflammatory bowel disease like Crohn's colitis or indeterminate colitis were excluded from the study. Similarly, all patients who were unfit for general anaesthesia due to cardiopulmonary compromise were also excluded from the study.

The surgeries were planned as either two-stage or three-stage procedures, depending on whether they were planned (Group A) or emergency surgeries (Group B), respectively. For planned surgeries, laparoscopic TPC with IPAA with diverting split end ileostomy was carried out in the first-stage. Six to eight weeks later, after confirming pouch integrity using a contrast enema study, ileostomy closure was performed. For the emergency management of these patients, laparoscopic TPC with end ileostomy was performed in the first-stage. Once the patient stabilised, any time after 2 weeks, IPAA with split end ileostomy was performed as a second stage. Then, 6-8 weeks later, after contrast study, ileostomy closure was carried out.

For the first-stage of the procedure, pre-operative bowel preparation was carried out on the day prior to surgery. The patient was catheterised; Ryle's tube was inserted and placed in a modified lithotomy position with both thighs parallel to the body. The surgery was performed in four phases. First phase consisted of mobilisation of terminal ileum, cecum, ascending colon, hepatic flexure, and the right half of transverse colon and lengthening of root of mesentery. The

pedicles divided were the ileocolic, right colic, and middle colic vessels. The second phase consisted of mobilisation of the rectum, sigmoid colon and descending colon and transection of the rectum deep in the pelvis. The inferior mesenteric pedicle was divided into the process. The third phase consisted of mobilisation of the splenic flexure and left half of the transverse colon. The fourth phase consisted of specimen extraction, ileal J-pouch construction and pouch anal anastomosis and construction of split end ileostomy.

The ports placement is depicted in Figure 1a-c are 10 mm ports used for telescope for the different phases of the operation. Port C is also used for deploying the stapler for ano-rectal transection. D and E are 5 mm ports used for working instruments and for retraction. For the first phase, the operating surgeon stands on the left of the patient; the camera surgeon between the patients legs with the telescope placed through port B, and an assistant surgeon on the right side of the operating surgeon. The monitor is placed near the right shoulder of the patient, facing the operating surgeon. The bowel is divided near the ileocecal junction, and the root of the mesentery is divided almost up to the duodenojejunal flexure to lengthen the mesentery. Dissection is carried out using ultracision. In patients with thick mesentery and mesocolon, a vessel-sealing device may be more effective. The operation table is tilted right side up and head low for the initial part of the dissection. The dissection is begun by mobilising the cecum (a) and appendix (b), lifting up the ascending colon from the retroperitoneum and dividing its lateral attachments [Figure 2]. For the dissection of the hepatic flexure and the right half of the transverse colon, the table is tilted head up. Port A [Figure 1] is the camera port while ports D and C are the working ports. The hepatic flexure and the right half of the transverse colon are mobilised, and its mesocolon divided [Figure 3, a: Hepatic flexure, b: Liver, c: Second part of the duodenum]. Using For the second phase,

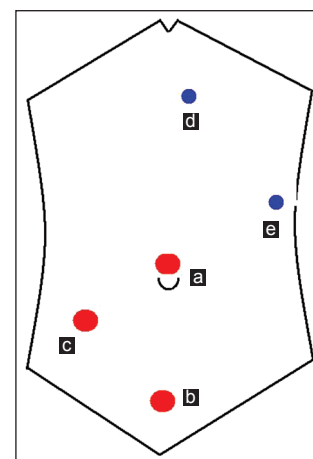


Figure 1: (a-e) Port positions

the operating surgeon stands on the right side of the patient, the camera surgeon on his left and the assistant remain on the left side of the patient. The monitor is placed near the left thigh of the patient, facing the operating surgeon. The patient is placed in a steep Trendelenburg position. Deep pelvic circumferential dissection of the rectum may be facilitated by the assistant applying cranial pressure externally over the anus. Figure 4 shows the completeness of the pelvic dissection as viewed from the right side; 'a' marks the sacrum, 'b' the rectum with the mesorectum. The arrows point to the inner dissected margin of the pelvic diaphragm. Transection of the distal rectum/anal canal is carried out using a reticulating stapling device with 4.5 mm staples (green load) [Figure 5]. In female patients, it may be helpful to suspend the uterus to the lower anterior abdominal wall by a sling suture passing through a broad ligament on each side and brought out over the abdominal wall, just above the symphysis pubis. For the third phase, the operating surgeon stands between the legs of the patient, with the camera surgeon on his left, an assistant surgeon on his right and the monitor facing him near the left shoulder of the patient.

The patient is tilted head up and left side up for this phase of the surgery. For the last phase, the operating team is oriented as in phase two. A circular piece of skin is excised at the previously marked ileostomy site, which incorporated trocar C, the muscle is split and peritoneum opened. The TPC specimen is extracted through a plastic sheath to protect the wound margins, and the distal end of the ileum is brought out. For surgeries performed in emergency setting, the terminal ileum is fashioned into an ileostomy. For planned surgeries, sufficient length of ileum is brought out to enable construction of 15 cm limbed J-pouch. The apex of the pouch is opened and the anvil of 31 mm circular stapler is inserted and fixed with a purse-string suture. The bowel is replaced into the abdomen, port re-inserted and pneumoperitoneum established. Pouch anal anastomosis is constructed, keeping a check to see that the bowel is not rotated, to prevent torsion of the mesentery [Figure 6]. A pelvic drain is placed; loop of ileum is brought out through the designated opening and ports are closed. A split end ileostomy is constructed with the distal closed end just beneath the peritoneum, to enable easy identification during later ileostomy closure.

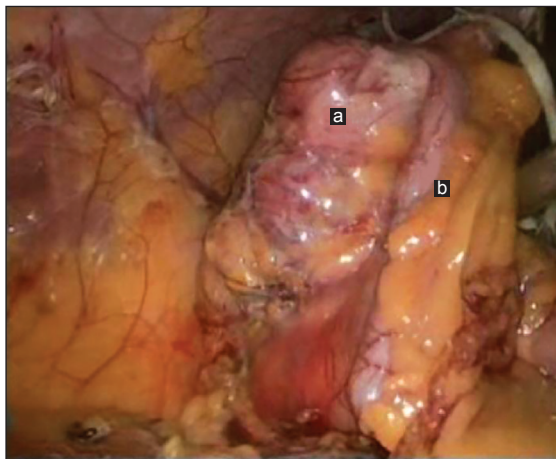


Figure 2: (a and b) Right colon mobilization

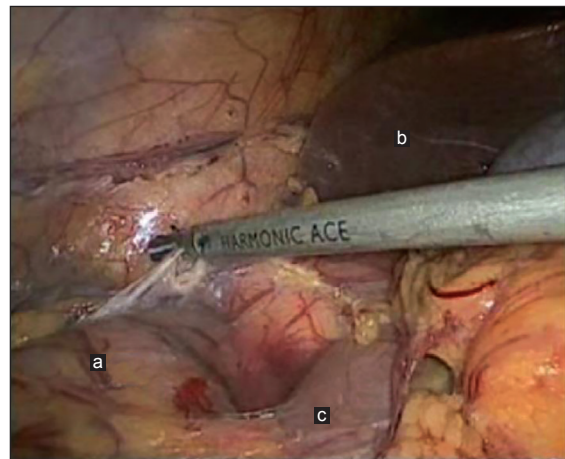


Figure 3: (a-c) Hepatic flexure mobilization

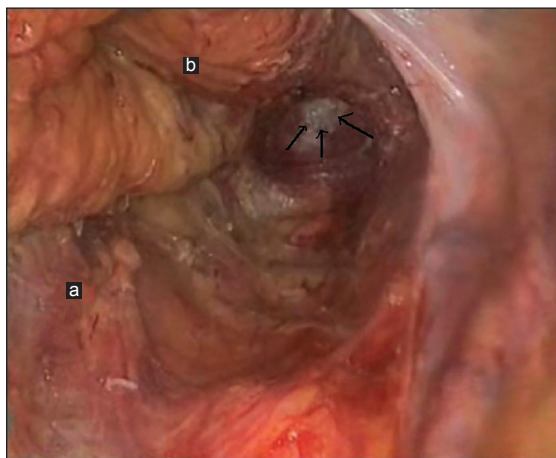


Figure 4: (a and b) Pelvic dissection

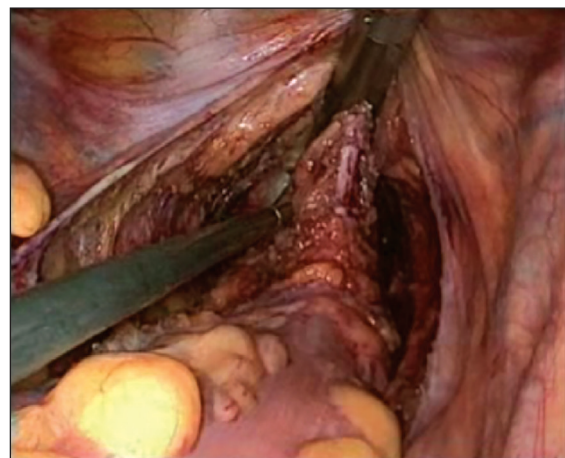


Figure 5: Distal transection

Post-operatively, the patient is started orally as soon as the ileostomy functioning starts and the patient is discharged once he or she is mobile, and the ileostomy is functioning properly. The second stage of the two-stage process is performed after confirming pouch integrity by a contrast study after 6-8 weeks and ileostomy closure is performed. For patients undergoing the three-stage procedure, once the patient has stabilised, any time after 2 weeks, the second stage is performed wherein the ileostomy is freed. Through the same opening, the terminal bowel is exteriorised, a J-pouch is constructed, anvil place and the bowel replaced intra-peritoneally. Then, the port is placed through that opening, pneumoperitoneum is established and two more ports place at prior sites A and E [Figure 1] pouch anal anastomosis is performed using a circular stapler and split end ileostomy created. The third stage is performed exactly, in the same way, as the second stage of the two-stage procedure.

Thereafter, the patients are called for a follow-up at 1 week, 15 days, 1 month, 3 month and yearly. During the follow-up, the number of bowel movements per day, presence of blood in the stool, fever and abdominal pain are especially looked for. All patients are given Tab VSL#3 (Sun Pharmaceuticals, Mumbai, India) 1 b.d. If bowel frequency is more than 5-7/day, racecadotril 100 mg up to 2 tid is given. If patient develops hypokalaemia, oral potassium supplementation is given.

RESULTS

Between October 2006 and September 2013, a total of 31 cases of ulcerative colitis presented to us for surgical management. The patient characteristics and indications for surgery are summarised in Table 1.

There was a slight male preponderance in our series. A little less than half of our patients were on systemic steroids for their disease at the time of surgery. All patients had

undergone multiple colonoscopies and colonic biopsies prior to the surgery. Three patients were taken for surgery on an emergent basis due to toxic megacolon with sepsis in two patients and persistent haematochezia in spite of 5 days of conservative management and multiple blood transfusions in the third patient. The rest of the patients were taken as planned surgeries after adequate bowel preparation. One of the patients operated for toxic megacolon was a 52-year-old male with sepsis, acute renal failure, long-standing diabetes and hypertension, and chronic obstructive pulmonary disease. He was on daily nebulizer therapy for the latter. He had a stormy post-operative course with the development of adult respiratory distress syndrome and had to be kept in Intensive Care Unit and on a ventilator for a prolonged period. He remained in the hospital for 26 days, the longest in our series. One of the indications of surgeries was development of polyps (around 32% of our patients). One of these patients was reported to have a moderately differentiated adenocarcinoma in the polyps during routine colonoscopic biopsy and post-operatively, the histopathological final staging of his tumour was T2N0M0. Pre- and post-operative carcinoembryonic antigen levels were normal.

All patients were offered laparoscopic approach for their surgery. The three patients operated under emergency condition were subjected to a three-stage procedure consisting of TPC with ileostomy in the first stage, pouch anal anastomosis and ileostomy in the second stage and ileostomy closure in the third stage (Group B). The remaining patients underwent a two-stage procedure consisting of TPC with

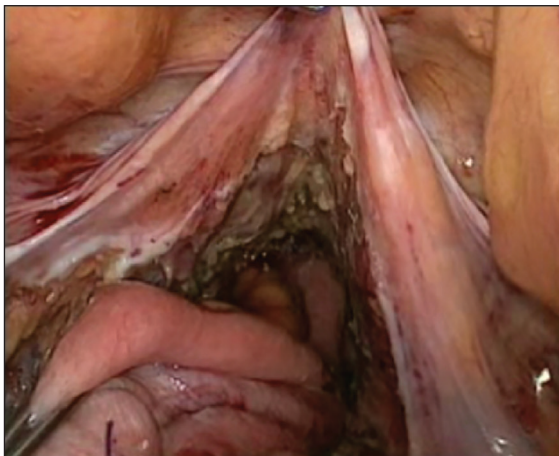


Figure 6: Pouch anal anastomosis completed

Total number of patients (n)	31 (100)
Male:female	19:12 (61:39)
Range of ages	31-70 years
Average age	44.6±11 (mean±SD)
Comorbidities	
Diabetes mellitus	9 (29.0)
Hypertension	4 (12.9)
COPD	2 (6.5)
Steroid use at time of surgery	14 (45)
Stratification of ulcerative colitis	
Moderate	15 (48.4)
Severe	13 (42)
Fulminant	03 (9.6)
Type of surgery	
Planned (Group A)	28 (90.3)
Emergency (Group B)	3 (9.7)
Indications of surgery	
Poorly controlled symptoms on medication	17 (54.8)
Multiple pseudopolyposis/dysplasia	10 (32.3)
Malignancy	1 (3.2)
Toxic megacolon	2 (6.5)
Excessive continuing hemorrhage from lesions	1 (3.2)

SD: Standard deviation, COPD: Chronic obstructive pulmonary disease

IPAA and ileostomy in the first stage and ileostomy closure in the second stage (Group A).

Using SPSS 14.0 (SPSS Inc., Chicago, IL, USA), *t*-tests were used for analysing continuous variables and Pearson's Chi-square test for categorical variables. Statistical significance was considered to have been reached for results with $P < 0.05$.

The operative and peri-operative findings are summarised in Table 2.

Group B surgery involved less operative steps, but was slower due to obscured anatomy due to inflammation and oozing from the inflamed tissues. The surgery in the patient operated for persistent haematochezia was, in fact, the fastest in the entire series as less operative steps were involved (Group B surgery), and there was no inflammation to obscure the planes of surgical anatomy. Three patients required re-operation, two for peritonitis. One of these had developed a proximal jejunal perforation on the 5th post-operative day (Group A) and subsequent generalised peritonitis. The biopsy of the perforation showed changes of ischemia; however, we could not arrive at a diagnosis for the cause of the perforation. The patient subsequently made an uneventful recovery. The second patient belonging to Group B had developed bilateral sub-diaphragmatic and right sub-hepatic abscesses, which were not accessible to percutaneous drainage and underwent laparoscopic drainage after re-admission. The third patient (Group A) had recurrent bouts of sub-acute intestinal obstruction, each managed conservatively. She underwent laparoscopic adhesiolysis at the time of the second stage of ileostomy closure after 6 weeks. The mean time to resumption of oral fluids was 3.4 days for the entire sample. The mean hospital stay for the index surgery was 7.4 days in Group A. In Group B, the median stay was 12 days.

Table 2: Pre-operative and post-operative behavior

Operative time	
Group A	Mean: 375 min (range: 270-500)
Group B	Median: 390 min (range: 250-480)
Time to resumption of fluids	
Group A	Mean: 3.2 days (range: 1.5-4 days)
Group B	Median: 5 days (range: 3-6 days)
Reoperation	3 (9.7)
Morbidity	5 (16.2)
Mortality	0
Hospital stay for index surgery	
Group A	Mean: 7.4 days (range: 4-10)
Group B	Median: 12 days (range: 6-26)
Number of patient with completed 12 months follow-up	21
Functional results at 1-year follow-up	
Total number of stools/24 h	Median: 6 (range: 2-10)
Number of stools in night	Median: 2 (range: 1-3)

The mean hospital stay for the entire sample for the index surgery was 8.2 days (range: 4-26 days). Twenty-one of our patients have completed 1 year's follow-up. All patients have reported satisfaction with the number of stool frequency, and all have confirmed that nocturnal frequency has reduced as compared with before surgery. Two patients, both aged more than 60 years, report occasional soiling and urgency, but overall they are satisfied with the outcome.

DISCUSSION

Restorative proctectomy with IPAA is now considered as a gold standard in the surgical management of ulcerative colitis.^[10] When they finally end up on the operation table, often these patients are debilitated, hypoproteinemic and immunosuppressed owing to the severity of their disease or the medications that they are taking to control it.^[11] This patient population is at high-risk of morbidity resulting from the extent of surgical trauma incurred with conventional surgeries. They can derive the maximum benefit from minimal access technique, with a reduced rate of post-operative morbidity, faster recovery and earlier return to normal activity.^[12] We have performed laparoscopic TPC-IPAA, both electively and in emergency setting, for patients suffering from moderate to fulminant ulcerative colitis as per the Truelove and Witts criteria.^[13] Indications for surgery in our series included failure of medical therapy to adequately control the disease, progression of the disease in spite of medical therapy, development of malignancy and acute complications of ulcerative colitis. Other authors have also reported performing this surgery for similar indications.^[14] Laparoscopic TPC-IPAA represents a cure for these patients, conferring relief from symptoms, freedom for medications that have a propensity to cause significant side-effects and reduction of risk from malignancy.

Total proctocolectomy-IPAA is a major surgery, associated with a significant re-operative rate for various consequences such as adhesions, sub-acute intestinal obstruction, and wound dehiscence.^[15] The risk of small bowel obstruction after open TPC-IPAA is estimated to be as high as 30-35%.^[16] Moreover, it may also contribute towards post-operative infertility due to adhesions in females and pelvic sympathetic nerve injury in males.^[17] Using minimally invasive techniques, it may be possible to reduce the chances of these complications.

There was no mortality in our series, which has been also the experience of other authors.^[15] We did not have to convert any of our patients. The extremely favourable conversion rate is probably not attributable to the degree of skills of

the surgeon, but rather to the preponderance of non-acute cases in our series. Other series, with a larger proportion of emergency setting surgeries have reported a conversion rate of 6-8%.^[18]

Overall morbidity rate in our series was 16.5%. This is comparable to the complication rates reported in other laparoscopic and open series.^[19] Since all patients in our series had a covering ileostomy, frank anastomotic leakage was not present in any patient. One patient did develop post-operative sub-diaphragmatic abscesses. However, since this patient belonged to Group B and did not have any anastomosis, but rather an end ileostomy, anastomotic leakage could also be ruled out in her case. Other series have reported anastomotic leakage rates between 0% and 10%.^[20]

Our re-operation rate following the index surgery was 9.7%, which is comparable to the rate of 0-14% reported in other series.^[21] The time to resumption of fluids was higher in Group B, as is to be expected, than in Group A. For the entire sample, the mean time to resumption of oral diet was 3.4 days. Various comparative studies have documented a faster return of bowel movements with laparoscopic approach as compared with the open approach.^[22] Our mean hospital stay of 8.2 days compared favourably to those reported in these series, which had values ranging from 9 to 28 days. Though the mean time to return of bowel function was a little over 3 days, the mean hospital stay was around 8 days, which appears higher than expected. A similar discrepancy between reduced time to return of bowel function, but a hospital stay similar to patients operated by open techniques has been commented upon by other investigators.^[22]

Of the 21 patients who have completed 1 year follow-up in our series, none has reported wound dehiscence or incisional hernia. This benefit of minimal access approach has also been appreciated by other authors.^[22]

All the major complications in our series occurred in patients who were on steroid therapy at the time of surgery. Steroid use is strongly linked to major surgical complications in patients with ulcerative colitis.^[23] A dosage of <20 mg of prednisolone/day is associated with five times higher risk of major surgical complication. Increasing the dosage to 60 mg/day raises the risk to 18 times.^[24]

At 1 year follow-up, the median stool frequency was six/day. Literature shows that though post-operatively patients may have a relatively high frequency of stools, including soiling sometimes, overall quality of life is much improved and this change is enduring.^[25] The majority of patients in our series

underwent two-stage surgery with three-stage surgery being performed <10% of cases. However, Hicks *et al.* have contended that the three-stage surgery may be redundant and a two-stage procedure may be performed in all cases.^[26]

Prior to ileostomy closure, we performed radiological assessment of pouch integrity. None of our patients had a pouch leak. Pouch leak has been reported in 5-15% of cases.^[27] Moreover, at 1 year of follow-up, none of our patients had shown any signs of the pouch dysfunction. Pouchitis has been reported in 12-50% of patients following TPC-IPAA, with 5-19% requiring chronic treatment resulting into loss of pouch in a little <10% if patients.^[28] There may be some role of probiotics, specifically VSL#3 in the prevention as well as management of pouchitis.^[29]

Overall, laparoscopic TPC-IPAA is certainly feasible in patients with ulcerative colitis. There are controversies regarding its impact on the length of hospital stay, overall morbidity and mortality. However, literature supports its positive impact on patient satisfaction, cosmesis, positive body image, and overall satisfaction.^[30] Carrying the march of technological advances further, case series have already been reported of the performance of TPC-IPAA using single incision laparoscopic surgery techniques and robotic surgery.^[31,32]

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