

## Video Article



# Single-incision Robotic Total Proctocolectomy With Ileal Pouch Anal Anastomosis for Rectal Cancer in Ulcerative Colitis

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### Conflict of Interest

No potential conflict of interest relevant to this article was reported.

### Author Contributions

Conceptualization: Kim HS, Noh GT; Data curation: Kim HS, Noh GT; Investigation: Kim HS; Project administration: Noh GT; Resources: Noh GT; Software: Kim HS, Noh GT; Supervision: Noh GT; Visualization: Kim HS, Noh GT; Writing - original draft: Kim HS; Writing - review & editing: Kim HS, Noh GT.

## ABSTRACT

With the widespread use of robotic techniques in colorectal surgery, robotic total proctocolectomy (TPC) with ileal pouch-anal anastomosis (IPAA) has gained usage in patients with familial adenomatous polyposis, colorectal cancer, and inflammatory bowel diseases such as ulcerative colitis (UC). However, multiport application and redocking are required because of the nature of conventional robotic surgical platforms and the colorectal anatomy throughout the abdomen. Recently, robotic single-incision surgery using the da Vinci SP (dVSP) surgical system (Intuitive Surgical) has gained acceptance among patients with colorectal diseases. This new robotic system can provide multi-quadrant anatomical access with a single-port application without requiring redocking to another abdominal location. This video article demonstrates robotic single-incision TPC with IPAA for rectal cancer in a UC patient using the dVSP surgical system. We believe that this minimally invasive technique offers a novel approach to robotic surgery.

**Keywords:** Single incision; Robotic surgery; Ulcerative colitis; Rectal cancer; da Vinci SP

## INTRODUCTION

Total proctocolectomy (TPC) with ileal pouch-anal anastomosis (IPAA) is a standard surgical approach for familial adenomatous polyposis, colorectal cancer, and inflammatory bowel diseases, such as ulcerative colitis (UC) [1]. Since minimally invasive colorectal surgery gained wide usage, a laparoscopic surgical approach was adopted for TPC with IPAA, with a safety profile comparable to that of the open approach [2]. Additionally, in a recent meta-analysis, robotic TPC with IPAA showed outcomes comparable to those of the laparoscopic approach [3,4]. However, to our knowledge, no study has reported on the application of single-incision robotic surgery with this procedure. Herein, we present robotic single-incision TPC with IPAA using the da Vinci SP (dVSP) surgical system (Intuitive Surgical, Sunnyvale, CA, USA) for the treatment of rectal cancer in a UC patient.

## CASE

### Patient

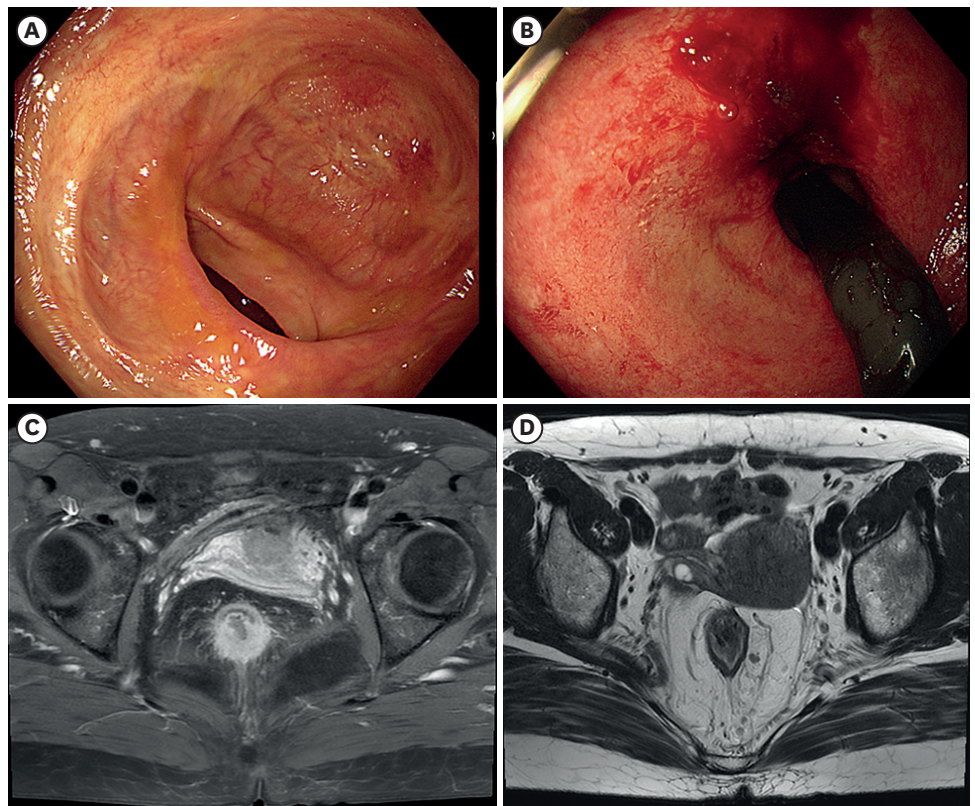
A 48-year-old woman was diagnosed with distal rectal cancer without distant metastases. The patient had been diagnosed with UC 4 years prior, but was lost to follow-up during the surveillance period for UC treatment. A colonoscopy revealed typical endoscopic features, such as decreased vascular markings throughout the colon. Magnetic resonance imaging revealed distal rectal cancer, 4 cm from the anal verge. The preoperative clinical stage was T3N+ without extramural venous invasion (**Fig. 1**).

### Surgical procedure

Following careful multidisciplinary discussions regarding treatment, a radical surgical approach for UC and rectal cancer, followed by adjuvant chemotherapy, was planned, and single-incision robotic surgery using the dVSP surgical system was performed.

The procedures were performed as follows: 1) perineal phase with intersphincteric resection, 2) robotic phase using the transumbilical approach, 3) specimen resection and ileal pouch construction after bowel extraction through an umbilical incision, 4) hand-sewn IPAA, and 5) protective ileostomy formation.

The video shows the robotic phase of the procedure, which was performed as follows: 1) medial and lymph node dissection of the left colon, 2) splenic flexure mobilization, 3)



**Fig. 1.** Preoperative colonoscopy and magnetic resonance imaging. (A) Colonoscopy showing lower vascular marking throughout the colon. (B) A lesion observed in the distal rectum. (C) Magnetic resonance imaging revealing distal rectal cancer located 4 cm from the anal verge. (D) Suspected lymph node metastasis.

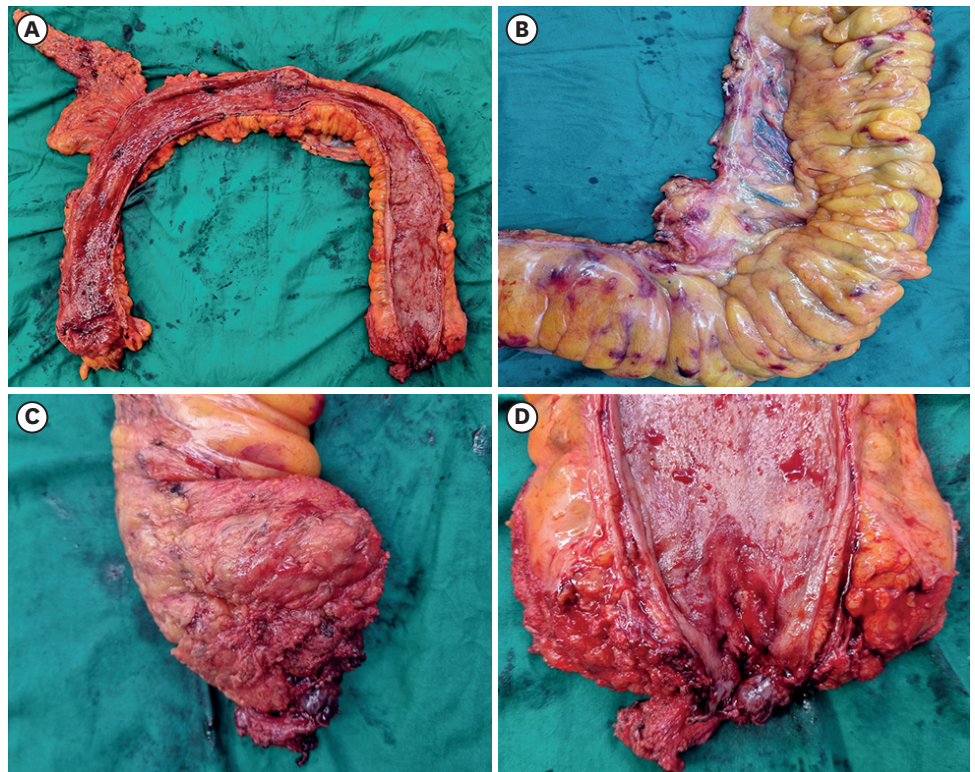
lateral dissection of the left colon, 4) total mesorectal excision, 5) right colon mobilization using an inferior approach, and 6) transverse colon mobilization from the greater omentum (Supplementary Video 1).

### Postoperative outcomes

The docking, console, and total operation times were 10, 295, and 440 minutes, respectively. The estimated blood loss was 100 mL and the surgery involved no intraoperative events. The patient's postoperative recovery was uneventful and she was discharged on the 11th postoperative day. The final pathological result revealed a stage T3N2b lesion. The numbers of harvested and positive lymph nodes were 47 and 7, respectively. Lymphovascular and perineural invasion were also observed. *KRAS*, *NRAS*, and *BRAF* mutations were not observed, and microsatellite status was stable. The distance from the tumor to the distal resection margin was 0.7 cm, and the circumferential radial margin was 0.4 mm (Fig. 2). The patient underwent 12 cycles of adjuvant oxaliplatin-based chemotherapy, and no recurrence was detected during a one-year follow-up period (Fig. 3). Ileostomy reversal was performed after completing the chemotherapy regimen.

## DISCUSSION

The single-incision robotic platform had advantages, including minimizing parietal trauma and avoiding unnecessary redocking for multiquadrant anatomical access, which is inevitable for the multiport conventional robotic approach to this procedure. As we used the umbilicus as a single entry site, the entire colon and rectum could be approached through a single



**Fig. 2.** Gross specimen findings. (A) Whole specimen. (B) Mesenteric lymph node dissection. (C) Total mesorectal excision quality. (D) Distal margin.



**Fig. 3.** Picture of the surgical wound taken one year, postoperatively.

incision without redocking. A position change is occasionally necessary to arrange the bowel, and gravity is used for traction on different surgical targets. As we simultaneously moved the boom and table, redocking for bowel arrangement was not necessary (**Supplementary Video 2**). Owing to a lack of advanced robotic energy instruments and staplers in the current dVSP model, concerns about adverse events such as bleeding and prolonged operative times certainly exist, and surgeons may be hesitant to choose this approach. The present video reveals the possibility of a safe operation for colorectal disease using the dVSP platform. In the future, developing accessory devices could make single-incision robotic colorectal surgery easier and faster.

## CONCLUSION

TPC with IPAA can be safely performed using single-incision robotic surgery. Although additional reports are needed to establish the feasibility of this approach, this may be a novel and minimally invasive technique for treating patients who require TPC with IPAA.

## SUPPLEMENTARY MATERIALS

### Supplementary Video 1

Robotic phase of total proctocolectomy with ileal pouch–anal anastomosis using the da Vinci SP surgical system for treating rectal cancer in a patient with ulcerative colitis.

[Click here to view](#)

### Supplementary Video 2

Simultaneous movement of boom and table to change the patient's position.

[Click here to view](#)

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