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# Laparoscopic Sugarbaker repair of parastomal hernia following radical cystectomy and ileal conduit: a single-center experience

Xiaojian Fu<sup>1</sup>, Minglei Li<sup>1</sup>, Rong Hua<sup>1</sup>, Qiyuan Yao<sup>2\*</sup> and Hao Chen<sup>1\*</sup>

## Abstract

**Purpose** Parastomal hernia (PH) is a frequent complication following radical cystectomy and ileal conduit. The purpose of this study was to summarize the clinical experience and technical characteristics of laparoscopic Sugarbaker repair of PH following radical cystectomy and ileal conduit.

**Methods** We retrospectively evaluated all patients who underwent laparoscopic treatment of PH following radical cystectomy and ileal conduit at Huashan Hospital, Fudan University from May 2013 to December 2022.

**Results** Thirty-five patients were included in the study. Median follow up was 32 months (IQR, 25–38 months). Three patients presented with a recurrence (8.6%), with a median time to recurrence of 14 months. Out of the 35 patients, Thirty-two underwent totally laparoscopic repair using the Sugarbaker technique, Three patients required open surgery to repair the intestinal injury after laparoscopic exploration. One patient died 9 months post-surgery due to COVID-19. During the follow-up period, two patients developed a peristomal abscess, and one patient experienced partial intestinal obstruction 10 days after surgery.

**Conclusion** Surgical management of PH following radical cystectomy and ileal conduit is challenging. The laparoscopic Sugarbaker technique for repairing PH following radical cystectomy and ileal conduit has low complication and recurrence rate.

**Keywords** Ileal conduit, Laparoscopic surgery, Parastomal hernia, Retrospective, Sugarbaker technique

## Introduction

The ileal conduit (IC), a prevalent approach for urinary diversion subsequent to radical cystectomy, has been utilized for more than six decades [1]. Despite enhancements in its application and surgical methods, parastomal hernia (PH) remains a common issue post-IC, impacting roughly 30% of patients [1, 2]. This condition can mar the aesthetics of the abdominal wall and lead to various discomforts such as bloating and occasional discomfort around the stoma. It may also impair the stoma's function, potentially escalating to severe complications like incarceration. Approximately one-third of individuals with PH require surgical intervention [3, 4].

\*Correspondence:

Qiyuan Yao

hs\_stevenyao@163.com

Hao Chen

hsyy\_ch@163.com

<sup>1</sup>Department of General Surgery, Huashan Hospital, Fudan University, Wulumuqi Mid Road 12, Jing'an District, Shanghai 200040, China

<sup>2</sup>Center for Obesity and Hernia Surgery, Huashan Hospital, Fudan University, Wulumuqi Mid Road 12, Jing'an District, Shanghai 200040, China



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Addressing PH post-IC poses a significant surgical challenge due to the high recurrence and complication rates, coupled with the lack of a standardized treatment protocol [5]. Surgeons have adopted diverse techniques, ranging from open to laparoscopic and robotic methods [2, 6, 7]. The current consensus favors laparoscopic repair as being safer and more efficacious than open procedures [6, 8].

This study offers a comprehensive review of the surgical practices, techniques, and complications associated with laparoscopic Sugarbaker repair for PH following radical cystectomy and ileal conduit, drawing from the experiences of 35 patients treated between May 2013 and December 2022.

## Methods

### Data collection

A retrospective analysis was conducted on all 35 patients who underwent laparoscopic Sugarbaker repair for PH following radical cystectomy and ileal conduit at Huashan Hospital, Fudan University, spanning from May 2013 to December 2022. According to the classification of parastomal hernia types based on EHS (European Hernia Society) [9], there were 16 cases of Type I, 13 cases of Type II, 5 case of Type III and 1 case of Type IV. A thorough review of patient records was performed, capturing demographic details such as age, gender, and body mass

index, along with intraoperative conditions, hospital stay duration, and postoperative complications.

### Definition and diagnosis

The senior surgeon determined the necessity for hernia repair following a clinical review. Prior to surgery, all patients underwent a preoperative CTU (computed tomography urography) scan to ascertain the postoperative status of the bladder tumor and to identify the presence of the hernia and its surrounding anatomy. A senior radiologist reviewed all imaging. A PH was characterized by the protrusion of a peritoneal sac through the fascia adjacent to the ileal conduit [6].

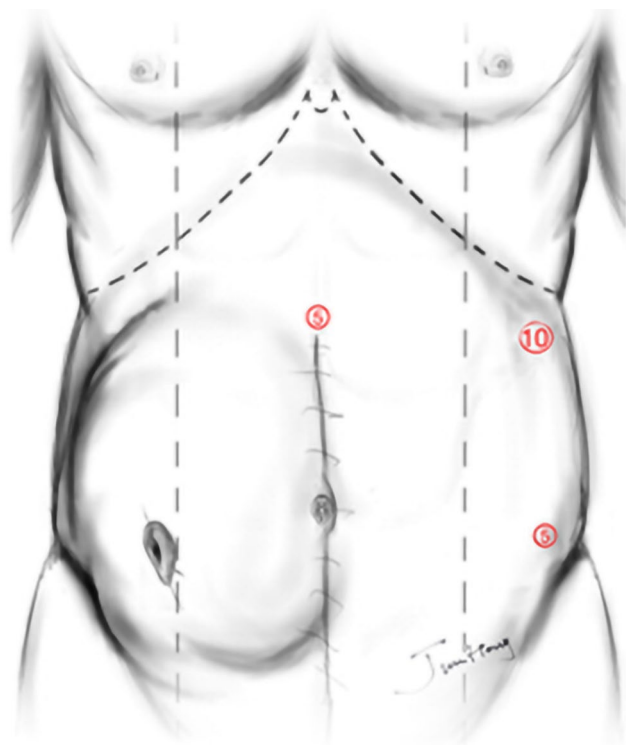
### Surgical technique

Preoperative preparations included a bowel cleansing procedure with an oral polyethylene glycol the day before the surgery. The patient was positioned supine under general anesthesia. Prophylactic antibiotics (cephalosporin or quinolones) were administered at the commencement of the procedure. The surgical site was meticulously prepared, starting with the cleaning of the peripheral areas and concluding with the sterilization of the stoma region. A Foley catheter was inserted into the ileal conduit to facilitate identification during the surgery, with the catheter's balloon inflated with 10 ml of water to ensure a secure seal and prevent urine leakage.

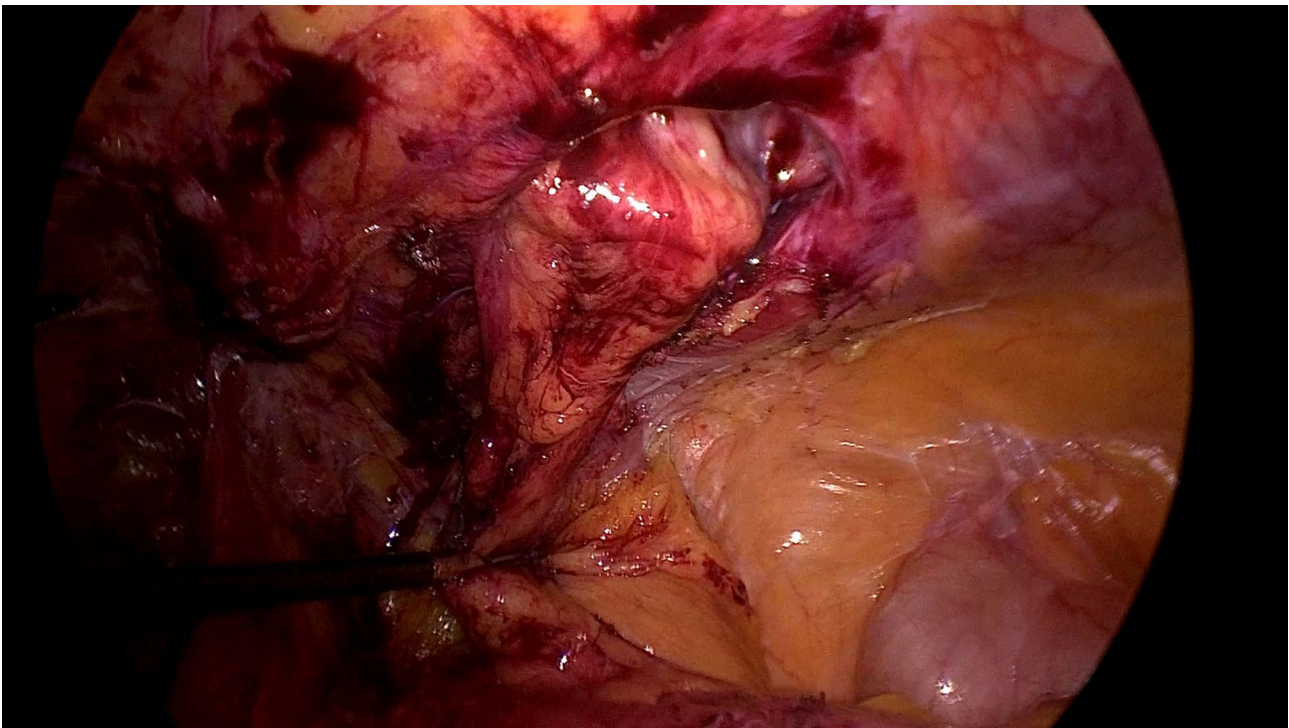
The surgeon and assistant were sited on the patient's left, opposite the side of the PH. The first puncture hole will be located at the intersection of the left costal margin and the anterior axillary line. A 10 mm trocar will be used to puncture directly into the abdomen under laparoscopic visualization, with an intra-abdominal pressure set at 12mmHg. Two further trocars (5 mm) were then sited under direct visualization, one at the level of the left anterior axillary line and the stoma, and another one between the xiphoid process and the umbilicus (Fig. 1).

The position of the stoma intestine and its mesentery needs to be confirmed during surgery. Adhesions between the stoma intestine and the surrounding intestine and abdominal wall, as well as adhesions between the stoma intestine and other tissues, are gradually separated with ultrasonic knife. The stoma defect is exposed, and the hernia contents were reduced into the peritoneal cavity (Fig. 2).

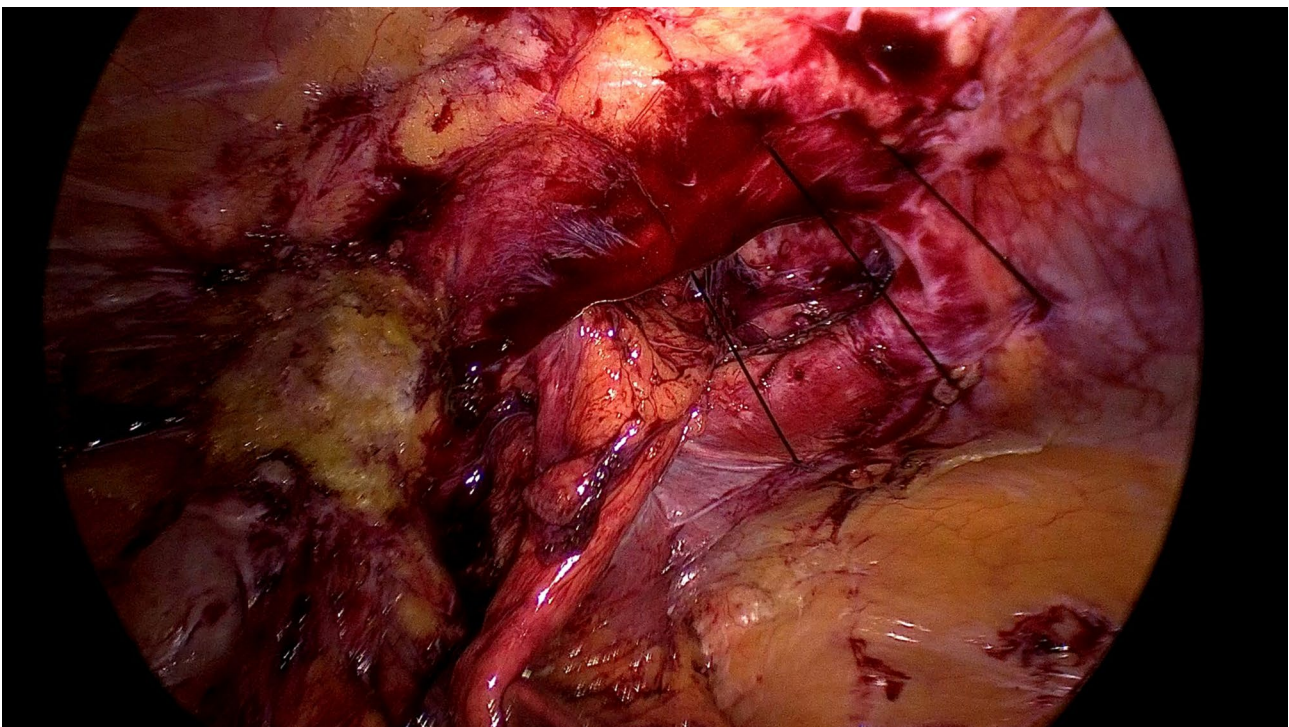
The defect was closed using a laparoscopic hernia needle grasper with 1–0 Surgilon braided nylon. We reduce the hernia ring to a space just large enough to accommodate the stoma intestine plus one finger's width which would not impede the function of the stoma intestine (Figs. 3 and 4). A mesh was selected based on the size of the hernia defect, which should fully cover the area, extend at least 3 cm beyond the defect's edge, and provide at least 6 cm of coverage over the stoma intestine.



**Fig. 1** Trocars distribution



**Fig. 2** Expose the stoma intestine and hernia ring

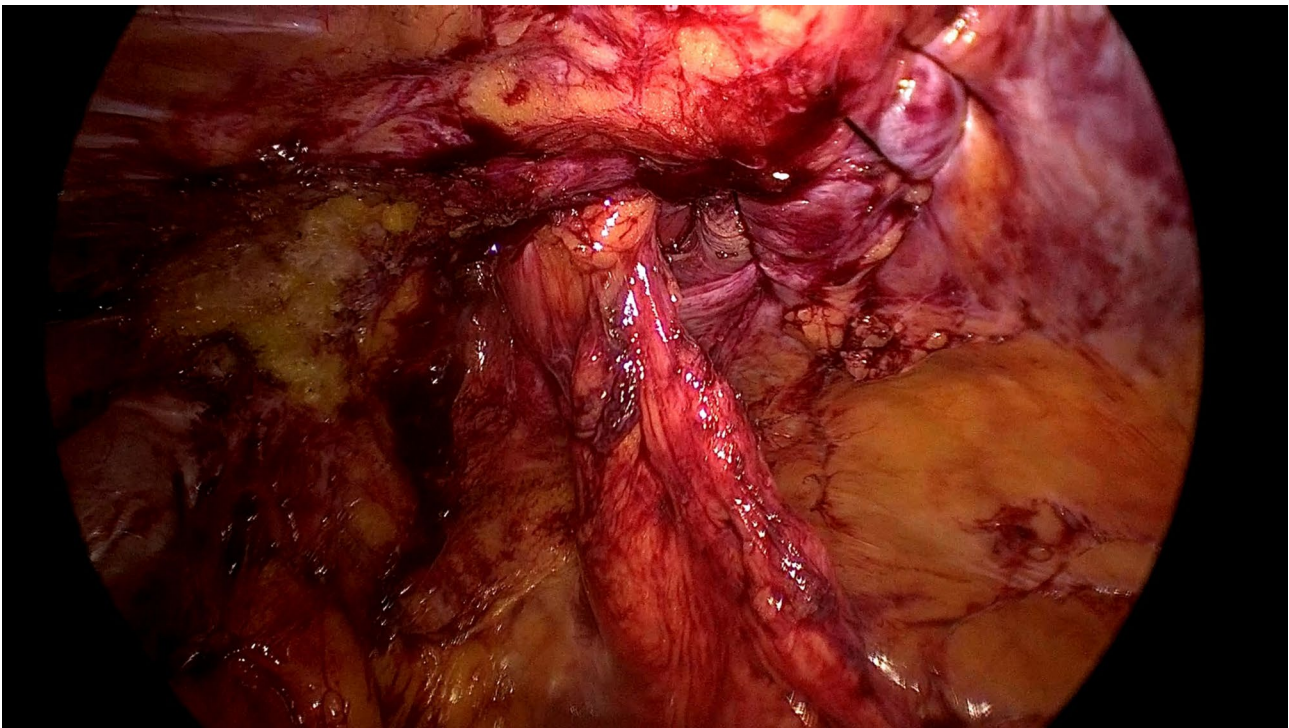


**Fig. 3** Close the abdominal wall detect (before)

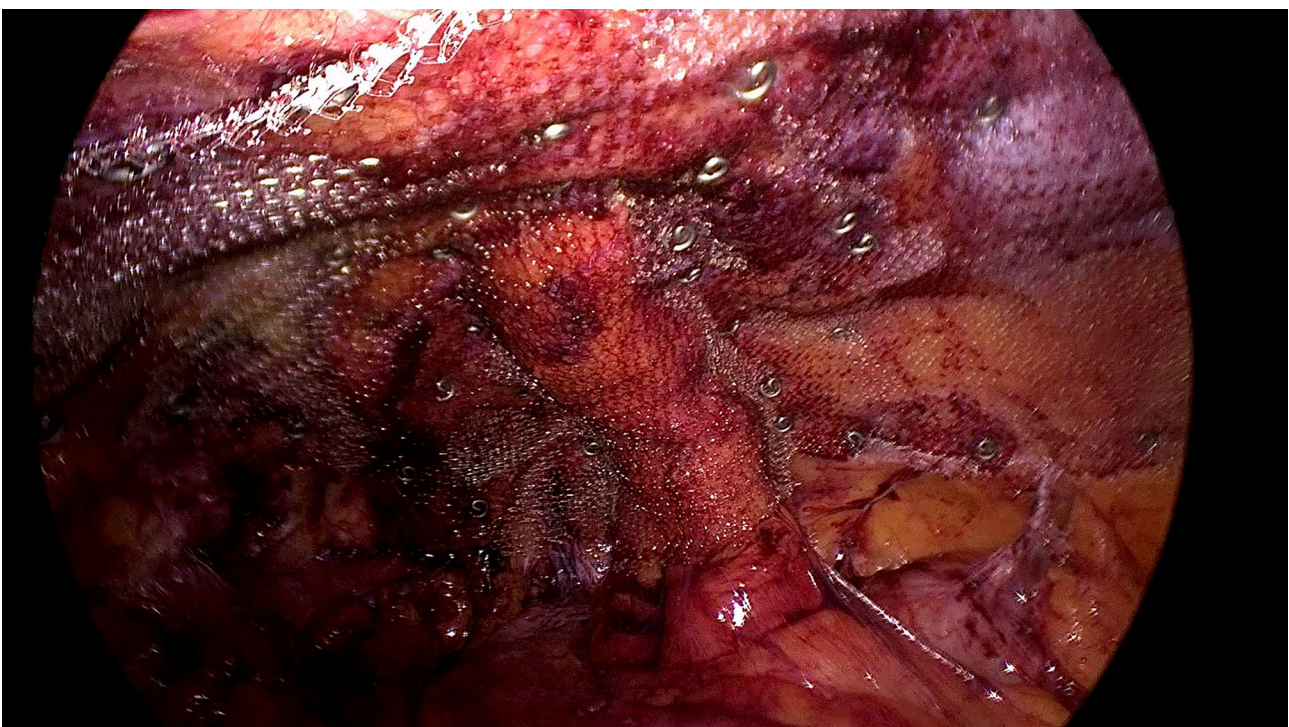
Typically, a 15×15 cm or 15×20 cm DynaMesh®-IPOM [10] patch was chosen according to the specific requirements. The DynaMesh®-IPOM features a

dual-component structure with 88% anti-adhesive polyvinylidene difluoride (PVDF) and 12% polypropylene (PP).





**Fig. 4** Close the abdominal wall defect (after)



**Fig. 5** Final placement of the intra-peritoneal mesh

The mesh was rolled and introduced to the peritoneal cavity via the 12 mm port. Then we do the Laparoscopic Sugarbaker repair and the mesh is fixed using a Covidien 5 mm Protack device requiring the placement of two

rows of screws along the stoma, every 1-2 cm until the patch is completely laid flat and secured (Fig. 5). A negative pressure drainage tube will be placed in the abdominal cavity.

### Statistical analyses

Median and interquartile ranges were used for nonparametric continuous variables. For categorical variables, frequency and percentages were used. Statistical analyses were performed using the SPSS software, version 27.0 (IBM Corp., Armonk, NY) software.

### Results

A total of Thirty-five cases of parastomal hernia were reported following ileocecal bladder conduit surgery. The profile of patients is listed in Table 1. Among these cases, 25 were males and 10 were females, with median age of 69 years (IQR, 64.5–71 years). The median BMI was 25.1 kg/m<sup>2</sup> (IQR, 23.3–27.4 kg/m<sup>2</sup>). The distribution of Body Mass Index (BMI) was as follows: 16 cases had a BMI < 25, 16 cases had a BMI between 25 and 30, and 3 cases had a BMI ≥ 30.

All patients underwent radical cystectomy as the primary surgery. Four patients had recurrent PH with two underwent suture repair and two underwent open mesh repair. The median time from index surgery to repair was 3 years. Two repair was carried out as an emergency; all other cases were elective surgery.

Out of the 35 cases, 32 cases underwent totally laparoscopic repair using the Sugarbaker technique. There were 3 cases experienced intestinal injury during adhesion separation and required open exploration, among which 2 cases underwent small bowel suture and 1 case underwent small bowel resection. No significant contamination was observed in the surgical field, allowing the 3 cases to proceed with laparoscopic Sugarbaker procedures. The median operative time was 90 min (IQR, 65–120 min). The median time to discharge was 5 days (IQR, 4–7 days).

One patient died 9 months post-surgery due to COVID-19 and the Median follow up was 32 months (IQR, 25.5–38 months). During the follow-up period, Three patients presented with a recurrence (8.6%) based on CT imaging, with a median time to recurrence of 14

months. They refused further surgery because the recurrence did not have significant impact on the quality of life. Two patients developed a peristomal abscess which was resolved after drainage and antimicrobial therapy, and one patient experienced partial intestinal obstruction 10 days after surgery which was resolved with fasting and fluid support. In all cases where mesh repair was performed, there was short-term pain at the repair site after surgery, which gradually subsided within three months.

### Discussion

Bladder cancer ranks as the ninth most frequently-diagnosed cancer worldwide, and Bricker surgery is an important procedure for treating it [11]. Parastomal hernia (PH) following radical cystectomy and ileal conduit (IC) remains a common complication, and occur in approximately 30% of patients [1, 2]. PH affects the appearance of the abdominal wall, causing discomfort, bloating, and intermittent pain around the stoma. It also impacts the function of the stoma and can lead to more severe issues such as incarceration. The treatment of PH include hernia support appliances, weight loss, avoidance of heavy lifting, patient education and surgery [6, 12]. Surgical management of PH following radical cystectomy and ileal conduit is challenging, with a high risk of recurrence and complications. The surgical approach for repairing PH following radical cystectomy and ileal conduit is similar to paracostomy hernia, including suture repair, re-siting and mesh repair. The suture repair has been gradually abandoned due to its high recurrence rate up to 50% [8, 13]. Stoma relocation and redo repair are difficult due to the limited length and displacement of the ureter, as well as the potential complications of incisional hernia and new parastomal hernia [6, 8, 14]. Mesh repair, performed by open, laparoscopic or robotic approaches, remains the primary choice [5, 7, 14]. It is widely accepted that laparoscopic repair is superior to open repair in terms of operative time, length of hospital stay, postoperative complications, and recurrence rate for colostomy-related hernia repair [6, 8].

The European Guidelines for Parastomal Hernia Treatment recommends the Sugarbaker technique based on its lower recurrence rate than the Keyhole technique for colostomy-related hernia repair. But previous reports of the keyhole and Sugarbaker techniques regarding ileal conduit parastomal hernias are few and there were more reports about Keyhole repair than the Sugarbaker [5, 6, 15–18]. Some surgeon concerned the Sugarbaker repair was not feasible for ileal conduits due to the length of the conduit and torsion of the anastomosed ureter by the mesh [2, 17]. But we think laparoscopic Sugarbaker technique is highly suitable for repairing PH following radical cystectomy and ileal conduit and there are several important recommendations for the surgeon:

**Table 1** Profile of patients

	Laparoscopic repair
No. of patients	35
Male/Female	25/10
Median age	69
Median BMI	26.7
No. of patients BMI < 25	16
No. of patients 25 ≤ BMI < 30	16
No. of patients BMI ≥ 30	3
EHS classification	
I	16
II	13
III	5
IV	1
Primary/Recurrent	31/4

BMI, body mass index ; EHS, European Hernia Society



1) Preoperative bowel preparation and prophylactic antibiotics. Preoperative bowel preparation and prophylactic antibiotics is crucial to prevent postoperative infections. A clean bowel can minimize the contamination of intestines damage during adhesion separation.

2) safe adhesion separation poses a challenge and requires careful manipulation. There are numerous small bowel adhesions to the lower abdomen due to the radical cystectomy and pelvic lymph node dissection of the previous surgery. During adhesion separation, we placed a Foley catheter helping us identify the conduit bowel and the bilateral ureters. Exposing the ureter can be challenging. The right ureter generally has minimal anatomical displacement and the left ureter may be partially exposed in the abdominal cavity as it needs to be pulled to the right side for anastomosis with the intestinal tract. The site where both ureters join the enterostomy is located far from the enterostomy end. Surgeons should be cautious not to damage the ureter when dealing with adhesions related to the enterostomy. As long as an adequately covered intestinal segment is freed, it is not necessary to overly pursue the complete mobilization of the enterostomy segment. It is crucial to identify the mesenteric structures based on the location of the enterostomy, because the blood vessels that supply the intestines within the mesentery are unique. By carefully identifying the enterostomy and its mesenteric structures, damage to the enterostomy and its blood supply can be minimized during adhesion separation. It is preferable to use scissors for separation to avoid thermal damage from ultrasonic or electric knives. In this study, three patients experienced multiple bowel injuries which can not repaired under laparoscopy, leading to open conversion for thorough examination and repair before the laparoscopic procedure for Sugarbaker repair. But it doesn't affect the outcome of the surgery.

3) close the defect using unabsorbable stitches. There are multiple ways to close the defect. Our approach is using a laparoscopic hernia needle grasper ensuring that the puncture site is outside the area where the stoma bag is attached to avoid contamination or interference. We can also perform the closure under laparoscopy using unabsorbable barbed stitching. We recommend using unabsorbable barbed stitching because there is higher tension in pneumoperitoneum state and barbed stitch can help achieve a better closure for certain defects.

4) Use a large enough patch. We recommend using a composite patch that is large enough to cover approximately 6 cm of the intestinal tube and extend at least 3 cm beyond the edges of the defect [19, 20]. Some surgeons consider the use of slow resorbing mesh in order to theoretically reduce the risks of intestinal complication, digestive fistula, or bowel obstructions [21]. But we still use unabsorbable synthetic patch and in our study, there

were no long-term complications related to mesh placement following radical cystectomy and ileal conduit PH repair. The patch can be secured using spiral tacks, starting with fixing the edges of the intestinal tube and gradually moving outward to secure and flatten the patch.

Although there were more reports about Keyhole repair, more and more surgeons recommend Sugarbaker in recent years [5, 21, 22]. The intestine covered by the mesh is just related to urinary function instead of defecation and there is less passive dilation and peristalsis Comparing to para-colostomy hernia. This may explain the lower recurrence rate of the Sugarbaker technique in PH following radical cystectomy and ileal conduit than para-colostomy hernia.

In this case study, three patients presented with a recurrence (8.6%), but they refused further surgery because the recurrence did not have significant impact on the quality of life. Many patients could be managed through nonoperative treatments [21]. Two patients developed a peristomal abscess and one patient experienced partial intestinal obstruction, and they were all relieved through non-surgical treatment. This is the largest study report about Sugarbaker technique in PH following radical cystectomy and ileal conduit so far, with a maximum of 16 cases reported before [5, 21, 22] and our study established that the laparoscopic Sugarbaker technique was associated with low complication and recurrence rate. The Sandwich techniques was considered as promising techniques with a low rate of recurrence in PH following radical cystectomy and ileal conduit [22] but entails increased surgical risks and associated costs. We believe that the laparoscopic Sugarbaker procedure is a more appropriate choice than the Sandwich technique in PH following radical cystectomy and ileal conduit.

However, it is important to note that this study has certain limitations. Firstly, it is a retrospective study conducted at a single center, which may introduce bias. Additionally, there was no control group included in this study, as none of the patients underwent open repair or laparoscopic repair using alternative methods. As a result, no statistical analyses could be performed. It is recommended that international studies and registries be conducted to compare different repair methods for PH following radical cystectomy and ileal conduit, given its relative rarity.

## Conclusion

Surgical management of PH following radical cystectomy and ileal conduit is challenging. The laparoscopic Sugarbaker technique for repairing PH following radical cystectomy and ileal conduit has low complication and recurrence rate. Dedicated research and collaboration is required to improve the management of parastomal hernia after ileal conduit.

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### Author contributions

Study conception and design: Hao Chen, Xiaojian Fu Acquisition of data: Xiaojian Fu, Minglei Li Analysis and interpretation of data: Xiaojian Fu, Minglei Li Drafting of manuscript: Xiaojian Fu, Rong Hua Critical revision of manuscript: Qiyuan Yao, Hao Chen.

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### Data availability

No datasets were generated or analysed during the current study.

### Declarations

#### Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Ethics Committee (full name: Regional Ethics Committee of Huashan hospital, Fudan University) (reference number KY 2019–369, ChiCTR2000034104) to the Department of General Surgery, Huashan hospital, Fudan University.

#### Consent for publication

NA.

#### Informed consent

Informed consent was obtained from all individual participants included in the study.

#### Competing interests

The authors declare no competing interests.

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