

Laparoscopic continent cutaneous urinary diversion using a modified Yang–Monti technique in an adult: A case report including 5-year follow-up

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Abstract

Continuous cutaneous urinary diversion is challenging when the appendix is physically unavailable. The Yang–Monti channel is an alternative to the tunneled appendix for urinary diversion. We present a case involving a 49-year-old man who underwent total urethrectomy and cystostomy 10 months previously. No tumor recurrence was observed; however, the patient experienced severe catheter-related bladder irritation after the procedure. The patient was readmitted to the authors' hospital and underwent laparoscopic continent cutaneous urinary diversion using extracorporeal construction of a modified Yang–Monti channel. The operation lasted 232 minutes, with an estimated blood loss of 10 mL. The patient was discharged from hospital 6 days after surgery and removal of the cystostomy tube. After this, clean intermittent catheterization was performed every 3 hours for 4 weeks. Five years after the procedure, the modified Yang–Monti channel was still used for clean intermittent catheterization without any stomal stenosis being observed. The patient was satisfied with his postoperative quality of life.

Keywords: Cutaneous urinary diversion; Yang–Monti channel; Laparoscopy

1. Introduction

After total urethrectomy with bladder preservation, permanent drainage using a cystostomy tube can disrupt patient quality of life. A surgically created continent cutaneous urinary diversion may provide an alternative route for bladder emptying that can restore urinary continence, preserve the upper urinary tract, and improve patient quality of life.^[1] The appendix is considered an ideal channel for cutaneous urinary diversion based on the Mitrofanoff principle.^[2] However, it is not always a feasible option, owing to previous appendectomy or insufficient appendix length. In recent decades, the Yang–Monti principle has been developed to create a long narrow channel from a short segment of the ileum.^[3,4] This channel is commonly used for cutaneous urinary diversion in the pediatric population and has achieved outcomes similar to those observed when using the appendix.^[5,6] However, the Yang–Monti channel is seldom used in adults.^[7,8] Technical difficulties associated with intracorporeal construction have hindered its widespread adoption in laparoscopic and robotic procedures, and stoma-related complications associated with cutaneous urinary diversion remain unclear. To simplify the surgical procedure and decrease the risk of stomal stenosis, we present a case

involving laparoscopic continent cutaneous urinary diversion bridge using a modified Yang–Monti technique and assess its feasibility. Further, we describe the surgical technique(s) and our initial experience.

2. Case presentation

The patient was a 49-year-old man who underwent total urethrectomy and cystostomy for the treatment of a urethral tumor 10 months previously. Histopathological analysis indicated high-moderate urethral squamous cell carcinoma with pathological tumor stage 1. The patient had diabetes and hypertension, which were well-controlled with medication. No tumor recurrence was observed during the 10-month follow-up. The patient experienced severe bladder irritation after surgery due to the cystostomy tube, leading to a poor quality of life. Thus, he desired to undergo continent cutaneous urinary diversion to remove the cystostomy tube. The patient was readmitted to our hospital on May 2, 2018.

After induction of general anesthesia, the patient was placed in the 45-degree lateral decubitus position with the right side up. A 1-cm skin incision was made immediately below the umbilicus for initial access to the peritoneal space, and subsequently as a camera port. Two 1-cm incisions were made next to the rectus abdominis, approximately 2 finger widths below the umbilicus, and a 5-mm incision was made over the medial superior aspect of the right anterior superior iliac spine.

After adhesiolysis of the intestine and peritoneum, the appendix was located around the ileocecum, and the bladder was freed from its attachment. An incision was made in the right superior wall of the mucosa to receive the conduit. Considering the insufficient length of the existing appendix as an outflow tract, an ileal segment constructed using the Yang–Monti technique was used for cutaneous urinary diversion. The ileum was marked 20 cm away from the

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ileocecum using sutures. An incision approximately 4 cm in length was made along the midline for extracorporeal channel preparation. After this, 3 adjacent, 3-cm segments of ileum were isolated, with the mesenteric branch proximal to the marking suture (Fig. 1A). Continuity of the ileum was restored using a gastrointestinal stapler in a side-to-side manner.^[9] Ileal segments were longitudinally detubularized. Incisions made in the most proximal and distal segments were close to the mesenteric attachments rather than at the antimesenteric border (Fig. 1B). The resulting flaps of the 2 proximal segments were attached using 3-0 absorbable sutures. The distal ileal segment was then connected to the other segments with its proximal transverse margin. The excess ileal wall of the distal segment was removed longitudinally, while preserving the ileal wall at the distal-most end. Thus, the distal segment was sutured longitudinally into a trumpet-shaped tube. The remaining ileum segments were retubularized transversally surrounding a 20F drainage tube for the creation of the Yang–Monti channel, with a length of approximately 10 cm (Fig. 1C). Subsequently, the channel was placed into the abdominal cavity, and pneumoperitoneum was reestablished. The proximal end of the channel was anastomosed to the bladder muscle layer using 3-0 absorbable sutures. Finally, the distal end of the channel was connected to the right lower abdominal port using an everted nipple.

The total operative duration was 232 minutes, with an estimated blood loss of 10 mL. Four days after surgery, the patient was started on a liquid diet. He was discharged from hospital 6 days after surgery and after removal of the cystostomy tube. Four weeks postoperatively, the catheter inside the conduit was removed; subsequently, clean intermittent catheterization (CIC) using a 14F/16F catheter was performed every 3 hours. Follow-up visits were scheduled at 3, 6, 9, and 12 months, and every 6 months thereafter. No major complications were observed during the 5-year follow-up period. Without bladder irritation, the patient's quality of life significantly improved after surgery. The patient was continent at the final follow-up, and the modified Yang–Monti channel continued to be used for CIC without stomal stenosis (Fig. 2). The patient was satisfied with his postoperative quality of life.

3. Discussion

The creation of a continent cutaneous urinary diversion remains a challenge for urological surgeons. A suitable channel is crucial, and this channel should be easily catheterized with an associated blood supply and a low rate of complications. Since the appendix was first used as a catheterizable channel into the bladder by Mitrofanoff in 1980,^[2] it has been widely used for continent cutaneous urinary diversion. Its minimal absorption function may have resulted in fewer metabolic side effects, and its diameter and length are ideal for cutaneous urinary diversion.

However, the appendix is not always an available option when it is too short or is physically absent. To create a smaller-caliber but longer tube, a short ileal segment was isolated, detubularized, and then retubularized transversally along the antimesenteric border. Yang et al. and Monti et al. developed and popularized this reconfigured ileal segment.^[3,4] The Yang–Monti channel has also been used for ileal ureter replacement^[10] and cutaneous urinary diversion.^[5,6] As an alternative to the tunneled appendix, the Yang–Monti channel plays an important role in pediatric cutaneous urinary diversion. Lemelle et al.^[5] reported that Yang–Monti channels (42.8%) had similar conduit-related complication rates as the appendix (47.8%) in Mitrofanoff vesicostomies and Malone antegrade continent enema stomas. This was demonstrated in another study including 179 channels during long-term follow-up.^[6] In adult patients, the Yang–Monti channel and its adaptation to the right colon pouch were used for continent cutaneous urinary diversion in 8 patients using an open procedure.^[7]

With the development of minimally invasive surgical techniques, laparoscopic and robot-assisted cutaneous urinary diversion using the Yang–Monti channel has been successfully performed, with the benefits of a smaller incision, reduced bleeding, less pain, and improved cosmesis.^[8,11] Further, complete intracorporeal construction of the Yang–Monti channel using a robotic platform has been attempted.^[12] Although this procedure is minimally invasive, it requires extensive experience and skilled surgical technique, and incurs extra medical costs due to the robotic platforms used in

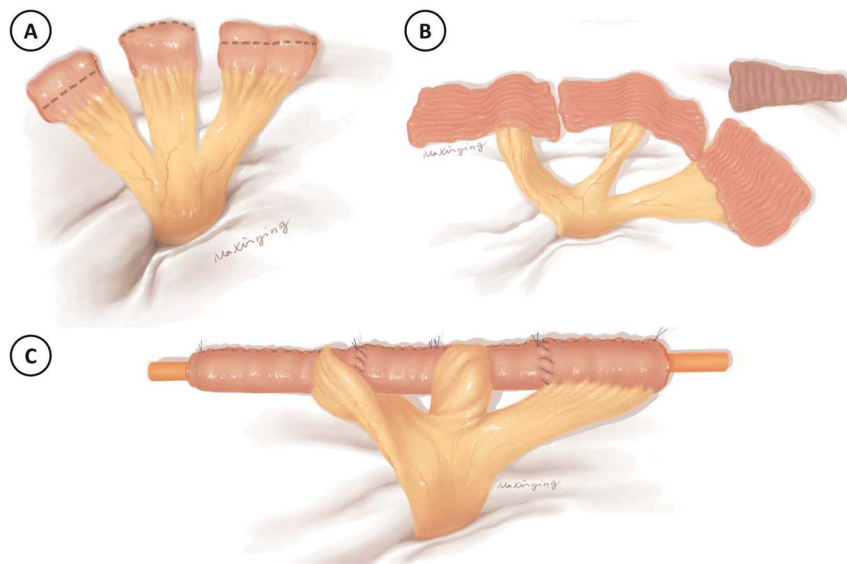


Figure 1. Surgical technique for the construction of the modified Yang–Monti channel. (A) A 9-cm ileal segment was isolated and divided into 3 adjacent, 3-cm segments. (B) Ileal segments were detubularized longitudinally. (C) Ileal segments were retubularized and connected.



Figure 2. Clean intermittent catheterization through the modified Yang–Monti channel.

surgery. To simplify the surgical technique and minimize surgical invasion, we designed a laparoscopic continent cutaneous urinary diversion with extracorporeal construction of a modified Yang–Monti channel, which required an incision only 4 cm in length. Although it has a minor cosmetic disadvantage, this small incision enables a more accurate incision and anastomosis during the construction of the modified Yang–Monti channel, which can be technically challenging and time-consuming intracorporeally. Further, it can ensure secure and expeditious bowel anastomoses during ileal segment isolation and reestablishment of bowel continuity, and the risk for enteric anastomotic leakage can be decreased using extracorporeal procedures. In addition, this procedure was economical for this patient, with a shorter operative duration and fewer high-value medical consumables.^[13]

Based on our initial experience, we offer some technical considerations for our modified Yang–Monti channel. First, retubularization of the distal ileal segment was performed longitudinally instead of transversely. Maximal preservation of the mesentery using this modified technique helped maintain good blood supply to the distal segment. Second, the distal segment of the channel was sutured to a trumpet-shaped tube. A wide outflow with a trumpet-shaped design is recommended because it can facilitate catheterization and reduce the incidence of long-term stomal stenosis.

The feasibility and safety of continent cutaneous urinary diversion in the adult population have been questioned due to reported high complication and revision rates.^[14] However, with our modification to the Yang–Monti technique, the patient was continent 5 years after surgery, and the channel was still used for CIC without any stomal stenosis. No major or stoma-related complications were observed during follow-up. The patient was satisfied with the surgery, and experienced a vastly improved quality of life. Long-term follow-up demonstrated the feasibility and effectiveness of the modified Yang–Monti channel.

The main limitations of this study were its small sample size and retrospective design. Further studies with larger patient cohorts are required to evaluate the long-term outcomes of this technique.

4. Conclusions

Laparoscopic continent cutaneous urinary diversion using a modified Yang–Monti technique was feasible and effective in an adult patient and during long-term follow-up. Extracorporeal construction of this channel may decrease technical difficulty and operative duration.

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Statement of ethics

The authors are accountable for all aspects of this work and ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures were performed in accordance with the Declaration of Helsinki (revised in 2013) and were approved by the Institutional Review Board of Peking University First Hospital (approval number: 2019-134). Written informed consent was obtained from the patient for the publication of anonymized details in this case report.

Conflict of interest statement

XL is an associate editor of *Current Urology*. This article was accepted after a normal external review. No conflict of interest has been declared by the other authors.

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Author contributions

SC: Data collection and manuscript writing;
 YW: Data collection and manuscript writing;
 PZ: Analysis of data;
 ZL1: Analysis of data;
 XL1: Analysis of data;
 ZL2: Analysis of data;
 XL2: Conceptualization, supervision and manuscript revision;
 KY: Conceptualization, supervision and manuscript revision.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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