

CASE REPORT

Nagoya J. Med. Sci. 85. 836–843, 2023
doi:10.18999/nagjms.85.4.836

Three cases of open surgical procedures on ileal conduits for the repair of benign ureteroenteric anastomotic strictures after total pelvic exenteration of rectal tumors

Koji Komori, Takashi Kinoshita, Yusuke Sato, Akira Ouchi, Seiji Ito, Tetsuya Abe, Kazunari Misawa, Yuichi Ito, Seiji Natsume, Eiji Higaki, Tomonari Asano, Masataka Okuno, Hironori Fujieda, Satoshi Oki, Tsukasa Aritake, Kakeru Tawada, Satoru Akaza, Hisahumi Saito, Kiyoshi Narita, Hiroki Kawabata and Yasuhiro Shimizu

Department of Gastroenterological Surgery, Aichi Cancer Center Hospital, Nagoya, Japan

ABSTRACT

Ureteroenteric anastomotic strictures (UEAS) are typical complications after creating an ileal conduit for total pelvic exenteration (TPE) of rectal tumors. We report the ileal conduit for reconstruction in three patients, in the age-range of 47–73 years. Case 1 was when a left-sided UEAS had sufficient length of ureter for anastomosis, Case 2 was a right-sided UEAS with sufficient length of ureter for anastomosis, and Case 3 was a left-sided UEAS with insufficient length of ureter for anastomosis. There were no complications after operation and no recurrence of UEAS. It is important to learn the open surgical procedures for repair of a benign UEAS after TPE of rectal cancers. This has fewer complications and is safe in the long term.

Keywords: ureteroenteric anastomotic strictures (UEAS), total pelvic exenteration (TPE), ileal conduit

Abbreviations:

UEAS: ureteroenteric anastomotic strictures

TPE: total pelvic exenteration

CT: computed tomography

This is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

INTRODUCTION

Ureteroenteric anastomotic strictures (UEAS) are typical complications after the creation of an ileal conduit.¹ Especially for gastroenterological surgeons, a benign UEAS is a worrisome complication after total pelvic exenteration (TPE). Interventional radiological methods such as percutaneous nephrostomy have generally been performed for a benign UEAS²; however, this method is inconvenient for patients. While research on laparoscopic or robotic surgery as a

Received: October 24, 2022; accepted: January 4, 2023

Corresponding Author: Koji Komori, MD, PhD

Department of Gastroenterological Surgery, Aichi Cancer Center Hospital,

1-1 Kanokoden, Chikusa-ku, Nagoya 464-8681, Japan

Tel: +81-52-762-6111, Fax: +81-52-763-5233, E-mail: kkomori@aichi-cc.jp

treatment for a benign UEAS has recently been reported,^{3,4} reports on an open surgical procedure for its repair are rare. Thus, we report three cases of reconstruction of an ileal conduit on the preexisting ileal conduit in open surgical procedure for benign UEAS.

SURGICAL TECHNIQUE

We employed a step-wise strategy for the reconstruction of UEAS. The reconstruction of an ileal conduit was classified into three cases as follows: Case 1 was when a left-sided UEAS had sufficient length of ureter for anastomosis, Case 2 was when a right-sided UEAS with sufficient length of ureter for anastomosis, and Case 3 was a left-sided UEAS with insufficient length of ureter for anastomosis (Fig. 1). In three cases, the recurrent tumor was suspected preoperatively, thus the urologist did not take part in these operation on purpose.

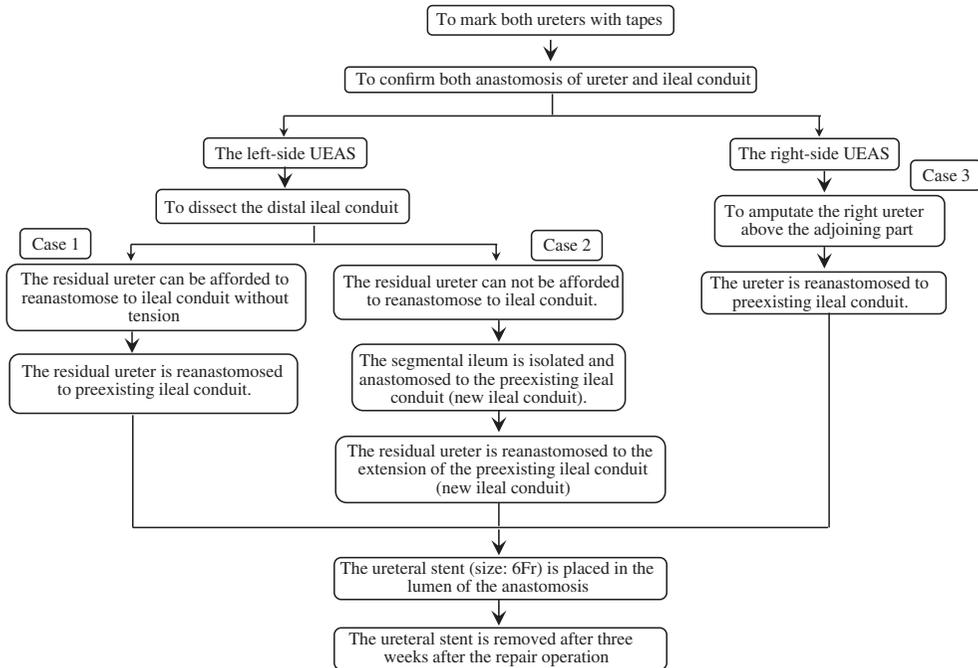


Fig. 1 The strategy of open surgical procedures on ileal conduits for the repair of benign ureteroenteric anastomotic strictures (UEAS)

Case 1 was when a left-sided UEAS had sufficient length of ureter for anastomosis.

Case 2 was a left-sided UEAS with insufficient length of ureter for anastomosis.

Case 3 was when a right-sided UEAS with sufficient length of ureter for anastomosis.

CASE REPORT

Case 1

A 55-year-old male underwent low anterior resection of rectal cancer (cStage I: T1bN0M0) at our hospital in February 2009. The local recurrence was detected at 62 years and TPE was

done in December 2015. At 66 years, the patient suffered from left hydronephrosis. The local re-recurrence was suspected at anastomotic site of left ureter and the ileal conduit by computed tomography (CT) and positron emission tomography (PET) (Fig. 2). The surgical technique failure and the ischemia of ureter were negative from the perspective of CT.

Surgical technique. First, the ileal conduit and each bilateral ureters were identified from

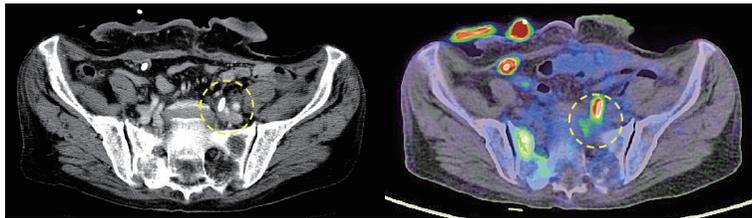


Fig. 2 The local re-recurrence was suspected at anastomotic site of left ureter and the ileal conduit by CT and PET

Left side: The local recurrence was suspected on CT (yellow dotted circle).

Right side: The local recurrence was suspected on PET (yellow dotted circle).

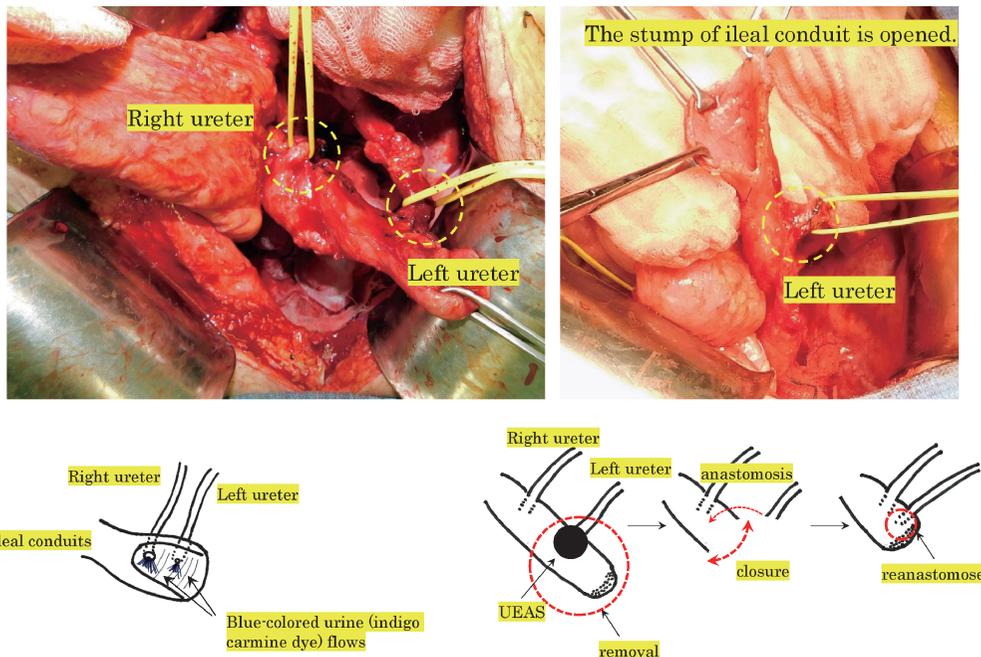


Fig. 3 Case 1 (a left-sided UEAS [ureteroenteric anastomotic strictures] had sufficient length of ureter for anastomosis)

Left upper side: First, the ileal conduit and each bilateral ureters are identified from the peripheral tissue and marked bilateral ureters with tapes.

Right upper side: The stump of the ileal conduit is opened.

Left lower side: The flow of blue-colored urine is identified at the orifice of bilateral ureters on the inner lumen of the ileal conduit.

Right lower side: The residual ureter can be afforded to reanastomose to the ileal conduit without tension, the residual left ureter is directly reanastomosed to the preexisting ileal conduit.

the peripheral tissue, and the bilateral ureters were marked with tapes. Second, both the site of the UEAS, and the other site of anastomosis of the ureter and ileal conduit without stricture were confirmed. The methods for confirming the site of UEAS were as follows: under direct view, and opening the stump of the ileal conduit, administering 5 mL of indigo carmine dye into peripheral veins,⁵ and noting the flow of blue-colored urine at the orifice of bilateral ureters on the inner lumen of the ileal conduit. Third, the left-side UEAS was detected, the distal ileal conduit with the anastomotic stricture including the opened portion was removed. The length of circumferential resection margin (CRM) namely surgical margin of was more than 1 cm ensured.⁶ The proximal ileal conduit seems to be appropriate. Subsequently, if the residual ureter could be used to reanastomose to the ileal conduit without tension, the residual left ureter was directly reanastomosed to the preexisting ileal conduit (Fig. 3). The ureteral stent (size: 6Fr) was placed in the lumen of the anastomosis.

Case 2

A 74-year-old female underwent TPE for rectal cancer (cStage IIC: T4bN0M0) at our hospital in August 2018. After four months, the patient suffered from left hydronephrosis. The local recurrence was suspected at anastomotic site of left ureter and the ileal conduit by CT and PET. The surgical technique failure and the ischemia of ureter were negative from the perspective of CT.

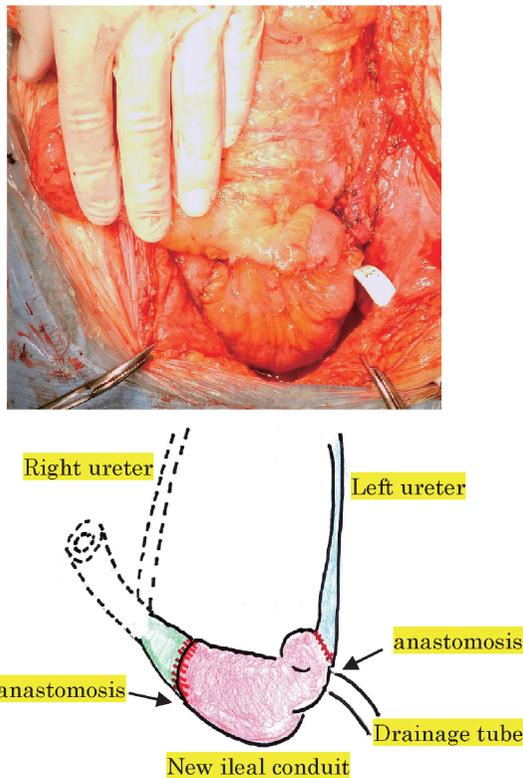


Fig. 4 Case 2 (a left-sided UEAS [ureteroenteric anastomotic strictures] with insufficient length of ureter for anastomosis)

The segmental ileum is isolated and anastomosed to the stump of the preexisting ileal conduit. The left ureter is anastomosed onto the extended ileal conduit, ie, “new ileal conduit”.

Surgical technique. The residual left ureter could not be used to reanastomose to the ileal conduit directly, the segmental ileum was isolated and anastomosed to the stump of the pre-existing ileal conduit. This formed an extension of the preexisting ileal conduit, ie, “new ileal conduit”. The left ureter was then anastomosed onto the “new ileal conduit” (Fig. 4). The length of “new ileal conduit” was decided upon the length of the residual left ureter for anastomosing without tension. The ureteral stent (size: 6Fr) was placed in the lumen of the anastomosis.

Case 3

A 47-year-old man was admitted to another hospital with rectal gastrointestinal stromal tumor and had undergone abdominoperineal resection (APR) in November 2006. However, about 10 years later, he developed local recurrence in the pelvis. The patient was subsequently referred to our hospital (Aichi Cancer Center Hospital, Nagoya, Japan). The local recurrence was adjacent to the prostate. TPE was done in March 2018. Ileal conduit necrosis was suspected the following day and we resected the necrotic ileum about 10 cm from the orifice and reconstructed an ileal conduit. The ureterointestinal anastomotic site was opposite the orifice and was not necrotic. At 49 years, the patient suffered from left hydronephrosis. The local re-recurrence was suspected at anastomotic site of right ureter and the ileal conduit by CT and PET. The surgical technique failure and the ischemia of ureter were negative from the perspective of CT.

Surgical technique. The right ureter was therefore amputated above the adjoining part. The blood flow was confirmed by the indocyanine green test.^{7,8} Subsequently, distilled water was injected into the ileal conduit, and the efflux of the distilled water from only the hole in the amputated right ureter was confirmed. The residual right ureter was then directly anastomosed with the ileal conduit and the hole in the amputated right ureter was thus closed (Fig. 5). The ureteral stent (size: 6Fr) was placed in the lumen of the anastomosis.

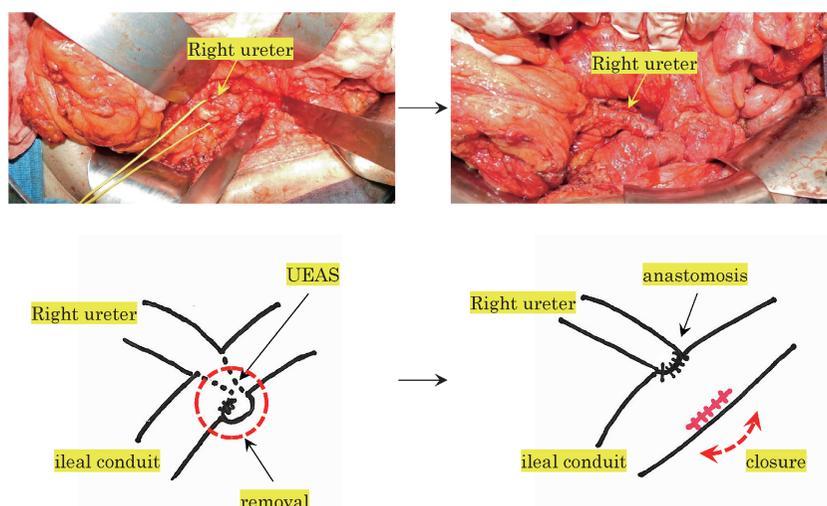


Fig. 5 Case 3 (a right-sided UEAS [ureteroenteric anastomotic strictures] with sufficient length of ureter for anastomosis)
Then the residual right ureter is directly anastomosed with the ileal conduit and closed the hole in the amputated right ureter.

Postoperative course

All resected specimen did not contain the malignant lesion histopathologically. The ureteral stent was removed after three weeks of the repair operation. We performed short term follow up of the three cases. The average duration of hospital stay after operation was 29 ± 5 (mean \pm standard error) days. In all patients, the ureteral stent (size: 6Fr) placed in the lumen of the anastomosis were removed. There were no postoperative complications and no recurrence of UEAS was observed with follow-up periods of 30 ± 12 (mean \pm standard error) months. The gold standard markers of kidney function, ie, the serum creatinine (Cr) and the estimated glomerular filtration rate (eGFR) went better postoperative than preoperative data (Table 1).

Table 1 Clinicopathological factors and postoperative course

Case	Age (year)	Gender	Operative time (min)	Operative bleeding (mL)	Hospital stay after operation (days)	Extraction of urethral stent (size: 6Fr)	Complications after operation	Re-ureteroenteric anastomotic strictures	Cr (mg/dL)		eGFR (mL/min)	
									Pre	Post	Pre	Post
1	66	Male	191	200	36	Done	Negative	Negative	0.83	0.68	51.3	63.6
2	49	Male	406	1120	26	Done	Negative	Negative	1.21	0.97	47.3	60.3
3	74	Female	297	380	24	Done	Negative	Negative	1.12	0.75	56.1	87.0
Mean \pm SE			63 \pm 13	298 \pm 108	567 \pm 488	29 \pm 5			1.05 \pm 0.20	0.8 \pm 0.15	51.6 \pm 4.4	70.3 \pm 14.6

SE: standard error

Cr: creatinine

eGFR: estimated glomerular filtration rate

DISCUSSION

In recent years, the repair of UEAS has been reported with a variety of new procedures except for open surgery. Gomez et al reported that an endourologic procedure is a reasonable option for first-line treatment of UEAS and has promising functional outcomes and limited morbidity,⁹ while Rosales et al reported that the laparoscopic technique is feasible for management with good results and without long-term complications.³ In a review by Xun Lu et al, it was concluded that endoscopic operation is feasible and associated with a moderate success rate along with a relatively low incidence of perioperative complications in the treatment of UEAS, especially with a stricture length ≤ 1 cm and on the right side; however, there is still no consensus regarding the endoscopic technique for UEAS regarding balloon dilatation, stent insertion, and laser vaporization.¹⁰ Greg et al also reported that robotic surgery might reduce the morbidity of open surgery in the management of strictures after urinary diversion,⁴ and Barbieri et al reported that the complication rates of intraluminal anastomosis of ureters to the ileal conduit segment were favorably satisfactory compared with other methods.¹ The technique of laser incision, triamcinolone injection, balloon dilation, and temporary stent placement was reported to have a success rate of over 80% by Katims et al, and it is unique in that long-term data confirms the durability of this endoscopic procedure.¹¹ Conversely, open surgery has been less commonly reported, and there are only a few reports of UEAS after TPE. Generally, reoperation for local recurrence is not performed after TPE, and almost all of these cases are treated with chemotherapy. The reason for this is that reoperation after TPE is considered to be very difficult due to the risk of injury to the ileal conduit. However, from our practical experience, the reoperation after TPE was not very difficult. Thus, if minimally invasive approach will be unsuccessful or local recurrence

will be suspected, the open surgery for UEAS must be considered actively. Additionally, the severe adhesion was recognized in the recurrent operation, laparoscopic and robotic surgery was unsuitable, thus the open surgery for UEAS must be needed.

We reported not only the right-side UEAS but also the left-side UEAS with both sufficient and insufficient length of the residual left ureter; thus, a broad range of UEAS was described. On this front, our paper is highly useful for assessing the complications of surgery after TPE for advanced rectal cancer. Especially in “Case 2” UEAS, the method used to elongate the preexisting ileal conduit making a “new ileal conduit” is an absolutely novel method. Additionally, the typical complications like restenosis and urinary tract infection were not observed for a long period of time. The voiding function carried a good prognosis. The above-described repair procedures, except the open surgery, must be referred to the specialist, namely the urologist. In almost all the hospitals in the world, an ileal conduit of TPE is performed by a urologist, but our open surgical procedure could be carried out by us, namely the gastroenterological surgeons, and went successfully. Thus, our surgical repair procedures could be learned by gastroenterological surgeons.

A question that must be raised is when exactly a benign UEAS must be repaired. There are no clearly described reports to answer this. However, a general consensus is that it must be repaired before renal function worsens; hence, at the earliest. The reason for this is the irreversible nature of renal damage. There are various methods for UEAS repair. Almost all methods for UEAS were open surgery, laparoscopic, and robotic surgery. The second question is whether the UEAS is malignant or benign. If malignant, then the volume of resection must be large, and if benign, the site of UEAS may be left, and only anastomosis may be performed. However, as this is very difficult to diagnose preoperatively, rapid histopathologic diagnosis is very important and must be inevitably done intraoperatively.

It is clinically significant to learn the open surgical procedures for the repair of a benign UEAS after TPE of rectal cancers. Open surgical procedures have fewer complications and long-term safety.

DISCLOSURE STATEMENT

All authors certify that they have no personal financial or institutional interest in the subject matter, materials, or drugs in this article.

REFERENCES

- 1 Barbieri CE, Schwartz MJ, Boorjian SA, Lee MM, Scherr DS. Ureteroileal anastomosis with intraluminal visualization: technique and outcomes. *Urology*. 2010;76(6):1496–1500. doi:10.1016/j.urology.2010.01.035.
- 2 Kamiyama Y, Matsuura S, Kato M, et al. Stent failure in the management of malignant extrinsic ureteral obstruction: risk factors. *Int J Urol*. 2011;18(5):379–382. doi:10.1111/j.1442-2042.2011.02731.x.
- 3 Rosales A, Emiliani E, Salvador JT, et al. Laparoscopic Management of Ureteroileal Anastomosis Strictures: Initial Experience. *Eur Urol*. 2016;70(3):493–498. doi:10.1016/j.eururo.2016.02.045.
- 4 Gin GE, Ruel NH, Parihar JS, et al. Ureteroenteric anastomotic revision as initial management of stricture after urinary diversion. *Int J Urol*. 2017;24(5):390–395. doi:10.1111/iju.13323.
- 5 Takahashi T, Shiojima S, Hamano T, Konno H, Yamada S. Laparoscopic resection of a non-communicating uterine rudimentary horn using intra-operative indigocarmine injection: A case report. *Int J Surg Case Rep*. 2021;81:105743. doi:10.1016/j.ijscr.2021.105743.
- 6 Komori K, Kimura K, Kinoshita T, et al. Adequate Margins to Prevent Local Re-recurrence of Rectal Cancer: Viewpoint of Pathological Findings. *Anticancer Res*. 2015;35(12):6747–6754.
- 7 Degett TH, Andersen HS, Gögenur I. Indocyanine green fluorescence angiography for intraoperative assessment of gastrointestinal anastomotic perfusion: a systematic review of clinical trials. *Langenbecks Arch*

- Surg.* 2016;401(6):767–775. doi:10.1007/s00423-016-1400-9.
- 8 Komori K, Okuno N, Kinoshita T, et al. Ileal conduit necrosis after total pelvic exenteration for recurrence of gastrointestinal stromal tumor. *Nagoya J Med Sci.* 2019;81(3):529–534. doi:10.18999/nagjms.81.3.529.
 - 9 Gomez FD, Thomas A, Sempels M, et al. Outcomes Following First-line Endourologic Management of Ureteroenteric Anastomotic Strictures After Urinary Diversion: A Single-center Study. *Urology.* 2017;102:38–42. doi:10.1016/j.urology.2016.10.009.
 - 10 Lu X, Wang Y, Chen Q, Xia D, Zhang H, Chen M. Endoscopic Procedures in the Treatment of Ureteroenteric Anastomotic Strictures: A Systematic Review and Meta-Analysis. *Front Surg.* 2021;8:626939. doi:10.3389/fsurg.2021.626939.
 - 11 Katims AB, Edelblute BT, Tam AW, Zampini AM, Mehrazin R, Gupta M. Long-Term Outcomes of Laser Incision and Triamcinolone Injection for the Management of Ureteroenteric Anastomotic Strictures. *J Endourol.* 2021;35(1):21–24. doi:10.1089/end.2020.0593.