

# Conservative treatment of urinary fistula: Case report

ZHAOJUAN WANG<sup>1\*</sup>, YUJIE QIN<sup>2\*</sup>, CHANGJUN YANG<sup>3,4</sup>,  
XIAOYI WEI<sup>3,4</sup>, JUN QIAN<sup>4</sup>, SONG TU<sup>3,4</sup> and JIAXI YAO<sup>3,4</sup>

Departments of <sup>1</sup>Pharmacy, <sup>2</sup>Endoscopy Center and <sup>3</sup>Urology, Hexi University Affiliated Zhangye People's Hospital;  
<sup>4</sup>Institute of Urology, Hexi University, Zhangye, Gansu 734000, P.R. China

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**Abstract.** Radical cystectomy is the gold standard treatment for muscular invasive bladder cancer. Bricker surgery is the most common technique used for urinary diversion; however, troublesome complications such as postoperative anastomotic stenosis or fistula may occur. The case of a patient who had a urinary fistula after Bricker surgery performed at our hospital, is described. The patient was successfully treated with continuous double-cannula negative-pressure drainage and avoided a second surgery. The patient recovered well and is on regular follow-up. This case highlights the importance of timely and relevant treatment for patients with postoperative urinary fistula to avoid more invasive surgery.

## Introduction

In the United States, 83,730 patients were diagnosed with bladder cancer and 17,200 patients succumbed to bladder cancer in 2021 (1). Bladder cancer is the fourth most common cancer among men in the United States. The incidence of bladder cancer is also high in China (2). Radical cystectomy is the gold standard treatment for muscular invasive bladder cancer. Total cystectomy and urinary diversion are complicated procedures with a perioperative morbidity rate of nearly 40% (3). Urinary fistula rarely occurs after ileal conduit urinary diversion; Vetterlein *et al* reported that the incidence of urinary fistula was 3% among 506 patients who underwent total bladder surgery, but its management is challenging (4). There is no satisfactory treatment for urine leakage, and a second surgery may be required, which may be painful and increase the financial burden on the patient (5). Ureteral stent

implantation is sometimes used to treat urine leakage, but it is very difficult to locate the anastomosis and insert the guide wire and ureteral stent (6). Furthermore, urine leakage may occur before the stent is removed, and this is even more difficult to manage. Negative-pressure drainage systems (NPS) are generally used to treat complicated wounds (7). They have been widely used with favorable results in patients with abdominal trauma and postoperative intestinal fistula. Negative-pressure suction helps to keep the fistula relatively dry and clean, which aids healing. Therefore, NPS was used to treat patients with urine leakage after Bricker surgery at our institution. Herein, the case of a patient who received this treatment and was cured, is reported.

## Case report

A 63-year-old woman visited Hexi University Affiliated Zhangye People's Hospital (Zhangye, China) due to gross hematuria. Computed tomography urography revealed posterior bladder wall thickening, but no obvious upper urinary tract abnormalities were noted. Cystoscopy examination revealed the presence of a tumor in the bladder. The patient was subsequently hospitalized for biopsy and transurethral resection of the bladder tumor. The tumor size was 1.5 cm. The pathological diagnosis was high-grade muscular invasive urothelial carcinoma with vascular tumor thrombus and without nerve invasion.

The patient was advised to undergo radical cystectomy. Antibiotics were administered on the day before the surgery, and the patient was routinely administered an enema preoperatively. Intraoperatively, adhesions between the left side of the bladder and the uterus and ovaries of the patient were found, and a conventional ureteroileal anastomosis scheme was used. Two 8-mm incisions were made at the proximal end of the ileum, and the distal ends of the left and right ureters were cut by 5 mm. The ureter was then implanted into the ileum with a 5-0 absorbable thread and indwelling the ureteral stent and the uterus was removed and an indwelling ileostomy drainage tube was placed during the surgery. No abnormalities were noted on postoperative lymph node examination. A ureteral stent was placed during the anastomosis and found no leakage of urine. Postoperatively, the patient received routine antibiotic therapy, and no other special medication was administered. However, 1 week postoperatively, the drainage tube in the ileum was routinely removed and urine leakage from the

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*Correspondence to:* Dr Jiaxi Yao or Dr Song Tu, Department of Urology, Hexi University Affiliated Zhangye People's Hospital, 67 Xihuan Road, Ganzhou, Zhangye, Gansu 734000, P.R. China  
E-mail: 1611210057@fudan.edu.cn  
E-mail: zytusong@126.com

\*Contributed equally

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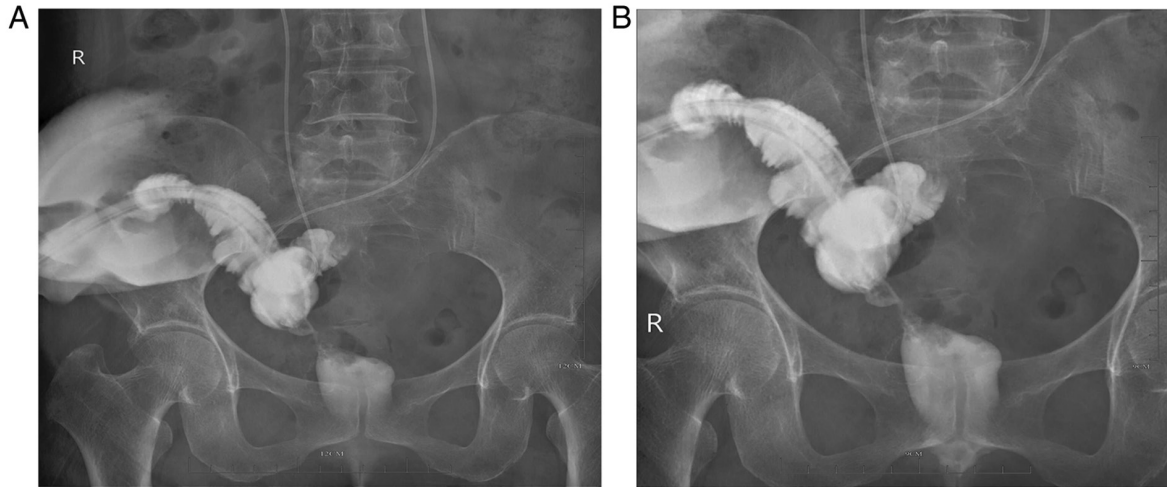


Figure 1. (A) Contrast agent was injected from the ileostomy drainage tube for an upright abdominal radiograph. (B) Partial magnification of the fistula visibly connecting ileum and vagina.

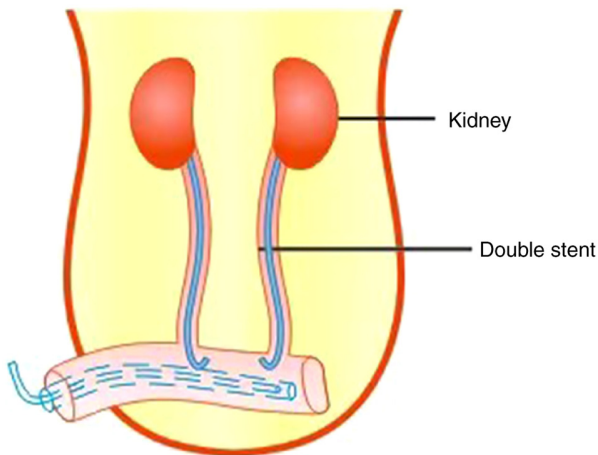


Figure 2. Pattern diagram. A double cannula was inserted and a continuous NPS was set up.

vagina was found (Fig. 1). The ureteral stent was not replaced. There was a large amount of leakage, and the patient used three diapers per day. The patient was in severe pain due to the urine leakage and requested to undergo reoperation. Percutaneous nephroscopy was performed to determine the leakage site by examining the vagina without using anesthesia. Upon checking the vaginal fistula, methylene blue was injected from the double cannula, and the vagina was observed. Methylene blue was observed flowing out of the vaginal fistula. A fistula was observed in the vaginal wall (Video S1), and a double-cannula negative-pressure drainage was performed. The outer tube of the double cannula is a soft rubber drainage cannula (F24) and the inner tube is a sputum suction cannula (F12). The cannula is inserted through the ileostomy without anesthesia.

The double ureteral stent (double-J stent) could then be observed in the proximal ileum. The double cannula was successfully inserted and fixed using a zebra guide wire and a continuous NPS was set up (Fig. 2). The patient was then transferred to the general ward. Subsequently, the urine leakage per day gradually decreased. There was no urine leakage after 3 weeks. One week later, the catheter and double cannula were

removed. After the issue of urine leakage was completely resolved, the ureteral stent 3 months after the surgery was removed (no replacement). The patient recovered well as noted during the regular follow-up examinations. Physical examination conducted at the 3-month, 6-month and 1-year follow-up revealed that the patient has recovered well.

## Discussion

In women, radical cystectomy involves total pelvic resection, which includes the removal of the anterior vaginal wall and urethra. Urinary fistula after ileal conduit urinary diversion is quite rare and its treatment is challenging, especially in patients who have undergone complicated pelvic organ resection and urinary diversion (8). The treatment of urinary fistula should be as less invasive as possible. Surgical treatment is usually avoided as it may lead to postoperative complications and stickiness. In recent years, urologists have developed several methods, including the retrograde ureteral approach and percutaneous nephrostomy, to treat this complicated condition; however, if complications of Clavien-Dindo classification grade III or higher occur, anesthesia surgery is required for treatment, and such treatment is challenging (4,9). Vacuum-assisted closure and NPS have been used in the treatment of persistent abdominal wounds for numerous years. They involve the use of negative pressure to remove edema fluid, improve circulation, promote the growth of granulation tissue, and inhibit bacterial growth (10).

Inspired by this, these techniques are used on our patients for the conservative treatment of urine leakage after Bricker surgery. The present patient, who had a urinary fistula following ileal conduit urinary diversion, was successfully treated with intra-conduit NPS. Although the duration of treatment was long, the technique used was extremely simple, safe, minimally invasive, and well-tolerated. Intraoperatively, percutaneous nephroscopy was performed to view the vagina and ileostomy. The patient did not require anesthesia. After inserting the double cannula using the guide wire, the nephroscope was reinserted to confirm the location of the fistula. The present technique undertaken by the authors of this study, is more reliable than surgery

performed in the ward. Ileal catheter leakage after urinary diversion is most commonly caused by a ureteral anastomotic fistula or high pressure in the intestine. Therefore, timely drainage of urine and decompression is key to treating urine leakage. The use of an NPS is a favorable method to achieve this. In recent years, an increasing number of studies in the field of endourology have shown that upper urinary tract lesions can be treated. In clinical practice, endoscopy has been found to be feasible and relatively safe for treating ureteral anastomotic stricture (11,12). However, patients with urine leakage after ileal conduit urinary diversion often have no ureteral obstruction. Retrograde stent placement is much safer than nephrostomy, but it is time-consuming and mucosal edema in the ileum and ureter renders the surgery difficult to perform. In addition, there is a risk of abdominal infection. Intraductal NPS is less invasive and more convenient than urological interventions and transperitoneal surgery. The fistula and double-J stent can be clearly visualized using a prostate resectoscope and percutaneous nephroscope. Furthermore, the double cannula is inserted under endoscopic guidance to ensure successful implantation and to avoid placing the silicon tube too superficially as it may lead to insufficient drainage and treatment failure.

Currently, the use of an NPS is contraindicated in patients with non-enteric fistulas such as urinary fistulas. During treatment with an NPS, the suction pressure is adjusted to ensure that there is no discomfort to the patient. Thereafter, it is necessary to observe the patient carefully to confirm that the patient does not display urine leakage. Simultaneously, the lowest negative pressure value must be observed to ensure that the patient does not leak urine at that point; the lowest negative pressure value should be used in the continuation of suction. In the present patient, a nephroscope was inserted through the ileostomy to clearly observe the position of the double-J stent and the double cannula of the NPS was placed under direct vision to ensure that it is accurately positioned near the ureteral and ileal anastomosis and away from the mucosa. A continuous low-intensity negative pressure suction was started, and urine flowed through the ileostomy instead of into the vagina. This kept the fistula relatively dry and the microenvironment clean. Therefore, it is considered that it will not hinder the recovery of the fistula. The fact that the patient was successfully treated indicates that NPS may be a favorable alternative to surgery for treating urinary fistula following ileal conduit urinary diversion. At present, the cause of the urine leakage is unclear. It is surmised that it did not leak from the ureteroileal anastomosis because it was sutured tightly during the surgery. Combined with the angiography, it is considered that the leakage came from the proximal ileum and vaginal remnants since there was a connection between those two parts when the leakage occurred. Therefore, treatment was actively carried out and favorable results were achieved. It is our aim to gain more insight into this treatment method in future research.

Intra-conduit NPS is less invasive than other methods, and it should be used in clinical practice. Since urine leakage is rare, this technique could not be performed on more patients. Furthermore, as NPS is a new technique for treating urine leakage following ileal conduit urinary diversion, further research and long-term follow-up are required. Intra-conduit NPS is minimally invasive and suitable for the conservative

treatment of urine leakage after ileal conduit urinary diversion in specific patients.

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### Availability of data and materials

All data generated or analyzed during this study are included in this published article.

### Authors' contributions

ZJW and YJQ provided substantial contributions to the conception and design of the work and drafting and revision of the manuscript. CJY and XYW contributed substantially to conceptualization and assisted in the completion of the surgery. JQ collected clinical information and assisted with the drafting of the manuscript. ST and JXY provided substantial contributions to the design of the work, drafting, confirmed the authenticity of all raw data and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors have read and approved the final manuscript.

### Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of Hexi University Affiliated Zhangye People's Hospital (Zhangye, China) and informed consent was obtained from the patient.

### Patient consent for publication

Consent was obtained for publication of the patient's data/images in this case report.

### Competing interests

The authors declare that they have no competing interests.

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