Clinical benefits of tubeless umbilical cutaneous ureterostomy

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Abstract

Introduction: We assess a novel technique of tubeless bilateral cutaneous ureterostomy, with a single umbilical stoma, for bladder cancer patients with short ureters after cystectomy. The benefit of cutaneous ureterostomy is equal to other incontinent urinary diversions, when the tubeless procedure is successfully achieved. This simple technique makes it easy to monitor the upper urinary tract (UUT) and is beneficial to patients with a high risk of UUT recurrence.

Methods: This old and new surgical technique was used to perform total cystectomy and urinary diversion on three patients with bladder cancer at a high risk of UUT recurrence.

Results: Two men and one woman (mean age: 73 years) underwent this surgery and the mean follow-up period was 8.3 years. The surgical approaches were laparotomy (n = 2) and laparoscopy (n = 1). One case developed para-stomal erosion, whereas another developed ureteral stenosis requiring catheter reinsertion. Although postoperative hydronephrosis was observed in all cases, the mean preoperative and postoperative serum creatinine levels were 0.70 and 0.76, respectively. UUT recurrence was not observed during the follow-up period.

Conclusion: This tubeless umbilical cutaneous ureterostomy procedure greatly improves the outcome of urinary diversion for cancer patients with short ureters at a high risk of UUT recurrence. The benefits are equivalent to other urinary diversions when the tubeless procedure is successfully achieved.

Introduction

The treatment of invasive bladder cancer generally involves radical cystectomy, followed by ileal conduit or orthotopic ileal neobladder reconstruction. Although cutaneous ureterostomy is less preferred compared with other permanent urinary diversions, it is more appropriate for urinary diversion in elderly patients, patients with poor performance status, and when an intestinal segment cannot be used to form the internal reservoir.[1] When tubeless cutaneous ureterostomy is successfully performed, this procedure is as efficient as the other types of incontinent diversions.[2] However, the ureter should be long enough to position the stoma site in the lower quadrant of the abdominal wall. In the 1960s, Higgins reported the initial 6 experiences with umbilical cutaneous ureterostomy as a solution for insufficient ureter length.[3] However, few studies followed to confirm the long-term safety and efficacy of this procedure. We modified this procedure with a less invasive incision, including laparoscopic approach, and a cutaneous ureterostomy using the Toyoda method; this methods recently reported a high catheter-free rate.[4] This is our case series of 3 bladder cancer patients who were successfully treated by bilateral tubeless umbilical cutaneous ureterostomy.

Case 1

A 70-year-old man presented with gross hematuria. He had had no major medical history. He was diagnosed with carcinoma in situ (CIS) of the bladder and right upper urinary tract (UUT) based on transurethral resection of bladder tumour and urine cytology, respectively. Intravesical bacillus Calmette-Guerin therapy was initiated by inserting a double-J stent into the right UUT. After 6 weeks, bladder biopsy specimens and urine cytology were negative for malignancy.

Four years later, he was readmitted with recurrent gross hematuria. Based on bladder random biopsy and bilateral retrograde pyelography, he was diagnosed with invasive urothelial carcinoma of the bladder. In addition, we suspected bilateral UUT malignancy based on the cytology (right: class IIIa, left: class III). The patient underwent radical cystectomy, urethrectomy, and bilateral umbilical cutaneous ureterostomy construction. The bilateral lower walls of the ureter were properly resected to remove excess thickness.

The surgical technique of umbilical tubeless cutaneous ureterostomy was conducted as follows. A lower abdominal midline incision, dividing the rectus muscles and laterally splitting the muscles and fascia, was made 6 cm away from the umbilicus not to interfere with the subsequent attachment of a collecting device. Because abdominal examination determined that the colon could be made to descend below the umbilicus, an opening was created in the omentum into the lesser sac through which both ureters would later run. In addition, an incision was made in the posterior peritoneum on each side near the renal pelvis. After the ureters were exposed and divided, the tip of the ureter was sutured to preserve longitudinal blood supply. Abdominal wall tunnels were created to guide the ureters from the area of the renal pedicle under the gonadal vessels into the lesser peritoneal cavity. On the left side, the tunnel passed lateral and superior to the beginning of the jejunum. On the right side, it passed inferior and anterior to the duodenum. Care must be taken not to tear the vessels of the colon or spleen while bluntly creating an adequate tunnel of at least one finger diameter. Constricting bands of peritoneum were released and obstructing blood vessels were divided. Each ureter could be drawn through its tunnel into the lesser sac and out through a common opening in the omentum to the umbilicus. The tunnel must be adjusted to individual anatomical variations to establish the most direct course between the kidney and the umbilicus. At the umbilicus, 5 × 4 cm^2 of corium was incised (Fig. 1, part A), and the posterior rectus sheath was cranially incised (forward) to allow one finger to go through easily. The bilateral ureteral route up to the stoma was straight and intra-abdominal. This procedure ensures that the ureters run through the peritoneal cavity surrounded by the posterior peritoneum. Furthermore, the bilateral ureter was raised to the abdominal wall and a ureteral stoma was constructed using the Toyoda method.[4] The distal end of the ureters was pulled out 2 to 4 cm above the skin surface and longitudinally incised 2 cm from their terminal end (Fig. 1, part B). The ureters were fixed to the peritoneum and the posterior rectus sheath with stiches. Sutures were performed between the incised ureter and the skin using 4-0 vicryl (Fig. 1, part C) and 6 French splint catheters were inserted in both ureters. After wound closure, a collecting bag was placed on the skin at the umbilicus.

The pathological diagnosis was urothelial carcinoma of the bladder (high grade; pT4pN0), with negative surgical margins in both ureters. The patient refused to receive adjuvant chemotherapy. Three weeks after the operation, the splint catheters were removed (Fig. 1, part D). Ten months after the operation, he was admitted to the emergency department for left pyelonephritis and hydronephrosis due to

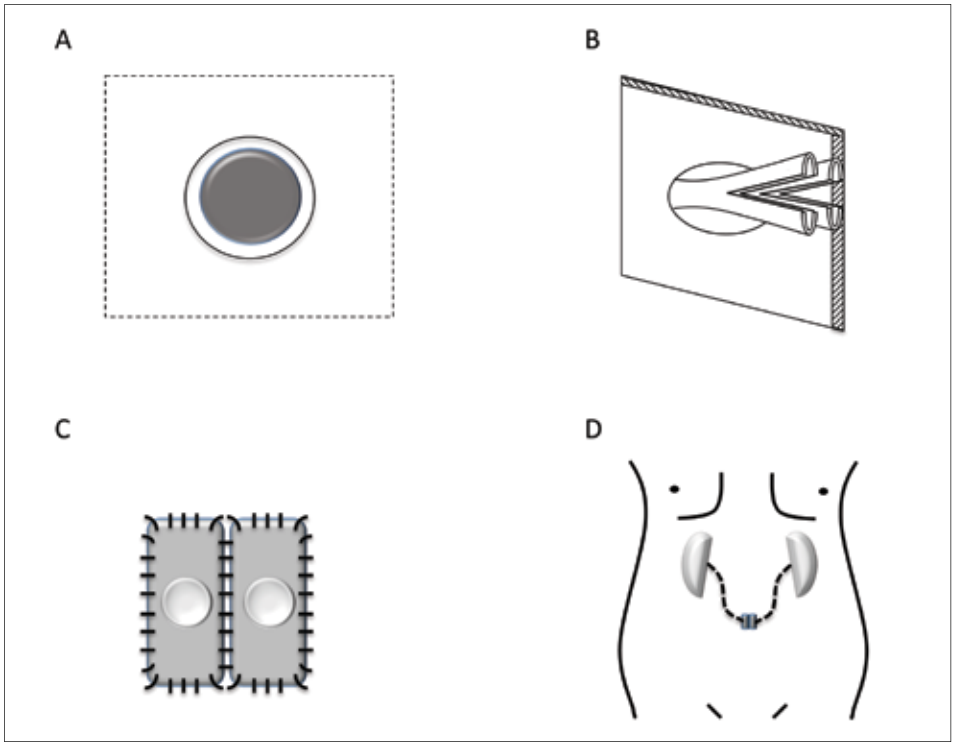

Fig. 1. Procedure of umbilicus cutaneous ureterostomy. (A) At the umbilicus, a corium segment (5 × 4 cm) was incised, and the posterior rectus sheath was incised cranial (forward) to allow one finger to go through easily. (B) The distal tip of the ureters was pulled out, and incised 2 cm longitudinally from the tip. (C) Sutures between incised ureter and skin were performed using 4-0 vicryl. (D) Umbilical tubeless cutaneous ureterostomy.

ureteral stenosis of the fascia. Because transureteral dilation failed to resolve the stenosis, a 6 French splint catheter was reinserted by left ureterostomy. After 3 years of follow-up, no tumour recurrence was observed and acceptable renal function was maintained (serum creatinine [sCre] 1.10 mg/dL) without hydronephrosis.

Case 2

A 65-year-old woman with no major medical history underwent radical cystectomy and bilateral umbilical cutaneous ureterostomy for bladder CIS with bilateral invasion of the lower ureters. The surgical technique was the same as in Case 1. The surgery was uneventful. The pathological diagnosis was urothelial carcinoma of the bladder (high grade; pT4pN0), with negative surgical margins in both ureters. She received three courses of adjuvant chemotherapy containing methotrexate, vinblastine, doxorubicin, and cisplatin (high dose intensity MVAC).[5]

No tumour recurrence was observed over the following 11 years. The patient developed grade 2 bilateral hydronephrosis, but she remained catheter-free, with good renal function (sCre: 0.46 mg/dL) and no urinary tract infection. She developed para-stomal erosion 4 months after the operation, but improved under conservative therapy.

Case 3

An 83-year-old male without no major comorbidity underwent laparoscopic radical cystectomy and umbilical cutaneous ureterostomy construction for a contracted bladder induced by intravesical pirarubicin therapy and right lower ureteral carcinoma.

The surgical procedure was completed as follows. The surgical table was set in the lithotomy position for a 5-port fan-shaped transperitoneal approach. The first camera port was placed 3 cm above the umbilicus by open laparotomy. The other 4 ports were placed under endoscopic control. The peritoneal pouch of Douglas was incised and dissected up to the ureters. The proximal isolation of the ureters was limited because they were dilated and adhered to the surrounding tissue. The distal ureters were clamped using an endoscopy stapler and cut, and the resected tissue was frozen for analysis. The remaining cystectomy was conducted as previously reported.[6] The resected specimens were retrieved through the perineal incision without difficulty. The bilateral umbilical cutaneous ureterostomy was constructed as described in Case 1.

After 6 years of follow-up, the patient was still in remission and catheter-free, with good renal function (sCre: 0.71 mg/dL) and no stoma-related complication. Grade 2 hydronephrosis was detected in the right ureter by ultrasonography, but no intervention was necessary.

Fig. 2. Postoperative appearance of umbilical cutaneous ureterostomy.

Results

There was no mortality related to the operation. The average operating time, including the extirpative procedure, was 385 minutes. The average intraoperative blood loss was 1991 mL (Table 1). Two of the 3 patients were alive January 2014, whereas 1 patient died of unrelated causes 7 years after the operation.

Stoma-related complications were observed in all patients. One case developed unilateral ureter stenosis, hydronephrosis, and pyelonephritis, which required placement of an indwelling ureteral catheter. The two other cases had bilateral hydronephrosis, without additional complications, and were able to remain catheter-free (Fig. 2). One case showed parastomal erosion, but she improved under conservative therapy. Hydronephrosis was observed in all cases, but the mean preoperative and postoperative serum creatinine levels were 0.70 and 0.76, respectively (Table 2). Overall, renal function remained stable during the entire follow-up period. The urine drained through the stoma was sterile in 1 case, had transient pyuria in 1 case, and bacteriuria in another case. No cloudy urine was detected by macroscopic inspection. Clinical observation confirmed persistent urinary tract infection in 1 case and pyrexia related to urinary tract infection in another case.

Discussion

The most common procedure for permanent urinary diversion is the ileal conduit and the orthotopic ileal neobladder. However, this procedure uses intestinal segments, which is related to several major complications.[7] Therefore, in our cases we avoided urinary diversion using intestinal segments for complicated patients (i.e., advanced age, comorbidity, low performance status). The simplest alternative for permanent urinary diversion was cutaneous ureterostomy.

Tubeless umbilical cutaneous ureterostomy is not indicated for all patients,[3,8] because laparotomy involves a long midline incision, and the central position of the wound makes pouching and patient management difficult.[9] However, this procedure is attractive for patients with inadequate ureter length and at a high risk of UUT tumour recurrence.

With bilateral umbilical cutaneous ureterostomy, our success rate of catheter-free outcome (5/6 ureters) was comparable with previous reports with regular cutaneous ureterostomy.[10] Only one ureter (16.7%, 1/6) required catheter reinsertion. Surgical resection of bladder cancer with ureteral invasion or concomitant ureteral lesion does not preserve adequate ureter length and blood supply to the ureter. In such cases, the usual site of cutaneous ureterostomy (lower quadrant of the abdominal wall) may be too remote to achieve a catheter-free state.[11] More than 50% of the patients develop stenosis and require periodic dilation or long-term intubation.[12]

Alternatively, an umbilical cutaneous ureterostomy avoids the long midline scar and reconstruction is easier compared with that in urinary diversions using intestine. This technique is feasible with ureters at least 12 cm long to avoid excess tension.[3] This length is available by displacement of the kidney sutured to the surrounding psoas tendon, or by adjusting the tunnel for each individual to establish the most direct course between the kidney and the umbilicus. All our patients maintained good renal function and sterile urine, except for those with a catheter-inserted ureter. In this regrettable case, the last few centimeters of the mobilized portion likely lacked blood supply. The ureters should be carefully mobilized, and the periureteral soft tissue should be attached to the ureter as much as possible, to preserve the longitudinal vessels providing blood supply. Furthermore, a recent single-centre retrospective study on 175 consecutive patients reported good clinical outcomes to laparoscopic and robotic-assisted radical cystectomy, which was therefore accepted as a feasible alternative.[13]

Bladder cancer with invasion into the ureteral orifice has a 3 times higher recurrence rate of UUT after radical cystectomy than non-invasive bladder cancer.[14] The recurrence of UUT is associated with poor survival because metastases are often detected at the time of diagnosis.[15] After cystectomy, the patients are usually monitored by computed tomography (CT) and urine cytology, but the efficacy of this approach

Table 1. Patient characteristics and perioperative data

Case	A	B	C
Age (year)	70	65	83
Gender	Male	Female	Male
Reason why patient received cystectomy	High grade, over T1	BCG refractory CIS	Multiple BC with right ureter tumour
Operative time (minutes)	395	339	424
Blood loss (mL)	1615	2375	1983
pT	4a	4	0 (right ureter cancer pT1)
pN	0	0	0
Grade	3	3	2

CIS: carcinoma in situ; BC: bladder cancer.

Table 2. Postoperative clinical outcomes

Case		A	B	C
sCre	Preoperation	0.80	0.60	0.70
	Postoperation	1.10	0.46	0.71
Catheter-free achieved		Hemi (left)	Bilateral	Bilateral
Hydronephrosis		Right: Grade 2	Bilateral: Grade2	Bilateral: Grade 2
Urine analysis		Bacteriuria	Sterile	Transient pyuria
Complication		None	Para-stomal erosion	None
Adjuvant therapy		Doxifluridine	HD-MVAC	None

sCre: serum creatinine; HD-MVAC: methotrexate 30 mg/m day 1, vinblastine 3 mg/m^2 day 2, adriamycin 30 mg/m^2 day 2, and cisplatin 70 mg/m^2 day 2 with granulocyte colony stimulating factor administered on days 3–7 every 15 days.

remains debatable. Urine cytology is considered an inadequate screening tool after radical cystectomy and ileal conduit because the test does not distinguish the cancer cells from degenerated intestinal epithelial cells.[16] Concomitant diagnostic by CT revealed a high number of false positives by urine cytology. Alternatively, CT urography is associated with a high detection rate of all recurrences after cystectomy.[17] However, half of the positive signals were benign lesions. The application of ureteroscopy for the diagnosis of UUT recurrence would be a better option. This conservative endoscopic technique has been proposed to monitor and manage recurrent low-grade upper urinary tract lesions.[18]

There are limitations in this series due to its retrospective nature and the fact that there are only 3 cases described. The surgeons and surgical techniques are not entirely identical, which could influence the outcome. The decision to perform umbilical cutaneous ureterostomy must be cautiously taken by weighing the pros and cons for each patient, as an alternative and not a recommendation.

Conclusion

This small case series supports tubeless umbilical cutaneous ureterostomy as an alternative procedure for urinary diversion in patients with short ureters and at high risk of UUT recurrence after cystectomy. The modified tubeless method that we propose is a safe, simple, and reliable urinary diversion. Despite the inadequate ureter length, the stoma remained tubeless in 5 of the 6 ureters, with the maintenance of good renal function and no serious complications.

Competing interests: The authors declare no competing financial or personal interests.

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