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Complications in Uretero-Ureterocutaneostomies: An Update

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Abstract

Background: To update the feasibility and outcome of previously reported modified uretero-ureterocutaneostomies (UUCS) with special regard to the complications encountered during follow-up.

Methods: Between November 2002 and July 2007, 27 patients underwent radical cystectomy with subsequent modified UUCS. The decision to perform an UUCS was based on the presence of a high-risk bladder cancer defined as any T3 / T4 or any T in conjunction with an ASA score ≥3 and an expected limited life expectancy. Patients with dilated, thick walled ureters and a BMI<30 were eligible for an UUCS. Complications were recorded as diversion related and unrelated complications and divided into major complications requiring surgical re-intervention and minor complications, treated conservatively. Additionally, complications were divided into peri-operative, short-term and long-term complications.

Results: Median age was 75.7 years (range 53-86). Patients were followed-up for a median of 16 months (range 5-60) with an overall re-operation rate of 11%. Diversion unrelated complications were observed in 48%. Diversion unrelated major complications requiring a surgical intervention were observed in 7%. Diversion related minor complications were found in 67%, whereas only one diversion related major complication was observed.

Discussion: An uretero-ureterocutaneostomy without involvement of the intestinal tract is less traumatic. This diversion can be recommended in elderly high-risk patients. UUCS has not been widely used because it has been complicated frequently by postoperative stomal stenosis. Several modifications of the implantation technique improved clinical results. Several authors supported its use in a selected group of patients.

Conclusions: Modified UUCS can be safely performed using dilated, thick walled ureters with a low diversion related re-operation rate. Moreover, it allowed food intake and ambulation on the first day after surgery in most patients. If complication rates remain stable this technique will represent a promising option also for patients with a longer life expectancy.

Key words: radical cystoprostatectomy, anterior pelvic exenteration, uretero-ureterocutaneostomy, complications, surgical technique

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Original article

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BACKGROUND

Uretero-ureterocutaneostomy (UUCS) is the simplest form of all incontinent urinary diversions. Formation of the stoma in cutaneous uretero-ureterostomy is an important step towards a successful diversion. The avoidance of ureteral compression within the abdominal wall and a sufficient blood supply to the distal ureter are crucial for its viability, avoiding the development of tissue necrosis and stomal stenosis. In 1967, Roth introduced a new promising technique wrapping the mobilized ureters by omentum adapted to a midline umbilical stoma [1]. This technique was further modified by Lodde et al. using a retroperitoneal crossover manoeuvre of the right ureter to the left side [2]. The objective of the current study was to update the feasibility and outcome of this previously reported modified UUCS with special regard to the complications encountered during follow-up.

METHODS

Between November 2002 and July 2007, twenty-seven patients underwent UUCS and were included into the study. Indications for surgery were bladder cancer in 26 patients (96%) and a vesico-vaginal fistula after radiation therapy for cervical cancer in 1 patient (4%). The physical status was assessed using the American Society of Anesthesiologists (ASA) scoring system. The decision to perform a UUCS was based on the presence of a high-risk bladder cancer defined as any T3 / T4 or any T in conjunction with an ASA score ≥ 3. Also in old patients with a high rate of comorbidities and therefore a compromised life expectancy, the modified UUCS was the preferred diversion. Patients with non-dilated ureters and a BMI > 30 were not eligible for an UUCS.

Surgical technique

From 2004 onwards, patients received thoracic epidural application of local anesthetics and opioids intra-operatively and postoperatively for pain management. A nasogastric tube was placed intraoperatively and removed immediately after the procedure. After undergoing radical cystoprostatectomy (RCP) or anterior pelvic exenteration (APE) the modified UUCS as incontinent urinary diversion was performed beginning with the mobilization of the right ureter up to the pelvi-ureteral junction carefully preserving the arterial gonadal branches supplying the middle and distal ureter. The ureter was crossed over to the left side and together with the mobilized left ureter they were pulled through the incised rectus sheath, wrapped by omentum and connected in a butterfly fashion to the skin [3]. Ureteric splints (6-8 F) were inserted for 21 days. For a comprehensive description of the surgical procedure see [2, 3]. After cystectomy a fast track alimentation was attempted. Patients were scheduled for stoma care and for oncologic follow-up as recommended by the EAU guidelines [4].
Complications were recorded as diversion related and unrelated complications and divided into major complications requiring surgical re-intervention and minor complications treated conservatively.

Diversion related complications

Diversion related complications were defined as stomal complications, urinary tract infections and postoperative urinary tract dilatation in conjunction with renal impairment identified by a rise in serum creatinine and blood urea nitrogen values.

Diversion unrelated complications

Diversion unrelated complications were defined as those atributable to the cystectomy procedure including postoperative complications not related to the urinary diversion.

Additionally, complications were divided into **peri-operative** (< 30 days), **short-term** (30-90 days) and **long-term** complications (> 90 days).

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RESULTS

Median patient age was 75.7 years (range 53-86). Patients were followed-up for a median of 16 months (range 5-60). ASA 1 was observed in 3 patients, ASA 2 in 10 patients, ASA 3 in 12 patients and ASA 4 in 2 patients. The median operative time defined as the duration from the beginning to the end of the surgical procedure was 5.0 hours (range 4-7 hours). Although 52% of the patients were classified as ASA 3+4, postoperatively only 37% (n=10) of the patients were observed at the intensive care unit up to 24 hours. 63% (n=17) returned to the regular ward immediately after RCP. The pathologic outcome of high grade bladder cancers was pT1 (n=3), pT2 (n=12), pT3 (n=9), pT4 (n=2) and one vesico-vaginal fistula. Lymph node metastases were found in 30% (n=8), N2 in 22% (n=6) and N3 in 8% (n=2) of patients. Eight percent (n=2) harboured distant metastases (M1). During follow-up nine patients died due to tumor progression.

Table 1. Peri-operative, short-term and long-term complications

Type of complications \ Time of complications	peri-operative	short-term	long-term
Diversion related	6 (22.2%)	5 (18.5%)*	8 (29.6%)
Diversion unrelated	13 (48.2%)**	-	1 (3.7%)†

*one patient had to undergo surgical revision, **two patients had to undergo surgical revision, †one patient died

Complications

Diversion related and unrelated complications were subdivided into peri-operative (<30days), short-term (30-90 days) and long-term (>90 days) complications (table 1).

Diversion unrelated complications were observed in 48% (n=13) (table 2). Major diversion unrelated complications were observed in two patients. One patient required a surgical re-intervention for a wound abscess three weeks after surgery. Four patients developed wound dehiscence of which one had to be revised two weeks post-operatively. The remaining complications were treated conservatively.

Only three patients required intestinal stimulation with distigmin (Ubretid®) for a prolonged intestinal rest. Although a fast track alimentation was attempted, food intake in those patients started the third day after surgery. One patient died of bilateral pneumonia.

Table 2. Diversion unrelated complications

Type of complications \ Time of complications	peri-operative	short-term	long-term
pulmonal	4 (14.8%)	-	1 (3.7%)†
neurological	1 (3.7%)	-	-
intestinal	3 (11.1%)	-	-
wound dehiscence	4 (14.8%)*	-	-
wound infection	1 (3.7%)*	-	-
total	13 (48.2%)	-	1 (3.7%)

*one patient had to undergo surgical revision, †one patient died

Diversion related minor complications were found in 67% (n=18) (table 3). Only one major complication, a stomal stenosis needed stomal revision. All other UUCS related complications were treated conservatively. One patient developed a minimal necrosis of the stomal edges on postoperative day 10, which requested a prolonged stenting. Eight patients demonstrated a grade 1-2 urinary tract dilatation with unchanged serum creatinine values compared to baseline.

Table 3. Diversion related complications

Type of complications \ Time of complications	peri-operative	short-term	long-term
stomal	1 (3.7%)	1 (3.7%)*	-
hydronephrosis	3 (11.1%)	1 (3.7%)	4 (14.8%)
urinary tract infection	2 (7.4%)	3 (11.1%)	4 (14.8%)
total	6 (22.2%)	5 (18.5%)	8 (29.6%)

*one patient had to undergo surgical revision

Nevertheless, stent insertion was performed prophylactically. One patient presented with a severe urinary tract dilatation due to tumor progression necessitating a percutaneous nephrostomy. Nine patients developed a urinary tract infection and were treated with an appropriate antimicrobial drug.

Re-intervention rate

The overall re-operation rate was 11% (n=3). Of those, only one complication was diversion related due to stomal stenosis. The other two cases were revisions of a wound dehiscence and abscess drainage.

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DISCUSSION

An uretero-ureterocutaneostomy without involvement of the intestinal tract, compared to an ileal conduit, is less traumatic and includes a convenient approach to both upper urinary tracts. This diversion can be recommended in elderly high-risk patients or when the long-term benefit of a more complex diversion is questionable [5-7]. Despite its described advantage UCS has not been widely used because it has been complicated frequently by postoperative stomal stenosis. Using different techniques high stomal stenosis rates have been reported limiting the widespread application of UCS [8]. Nevertheless, several modifications of the implantation technique improved clinical results, several authors supported its use as a practical diversion in a selected group of patients [9-11]. To overcome high stomal stenosis rates, Toyoda et al. presented a new technique for a catheter-free transuretero-ureterostomy. The ureter was spatulated longitudinally and implanted as a stoma to the corresponding skin area previously deprived of its epidermis and dermis. Unfortunately, as stated by the author, patient numbers were too low to define the stomal stenosis rate [9]. Therefore, Yoshimura et al. re-evaluated this method in 2001 in 61 patients achieving catheter-free rates of 89% after a median follow-up of 18 months [10]. Similarly, Chul Jang et al. performed a modified Toyoda ureterocutaneostomy in 48 patients after cystectomy of which 38 underwent unilateral stomal creation. They postulated that the main cause for postoperative stenosis was the compression of the ureters in the abdominal wall tunnel not only decreasing the blood supply to the distal ureters but also interfering with urine flow in the abdominal tunnel. After modifying the tunnel with a fixation between the anterior and posterior rectus sheath the catheter-free rate reached 89.8% [11]. Similarly, although in a small group of only 12 patients Hirokawa et al. reported a stomal stenosis rate of only 8.3% using bilateral ureters sutured together forming a side-to-side distal anastomosis [12]. Of interest, neither of them could support the finding of stricture enhancement using non-dilated ureters [10-12]. In contrast several other authors reported an unfavourable outcome using non-dilated ureteral systems [13-18]. The responsible factor for that difference is not obvious but it seems that blood supply of the distal ureter is a substantial factor, since ureteral obstruction leads to an increase of the anastomotic plexus, enhancing the blood supply of the entire ureter [19].

It is our believe that an ureterocutaneostomy is best done with obstructed, thick walled ureters. Similar to our results, Rainwater et al. reported their successful experience using dilated ureters in transuretero-ureterostomies to avoid stomal stenosis with a reported stenosis rate of only 4.5% comparable to our 4% stenosis rate [18]. Another postulated cause for stomal stenosis is the increased tension of the distal ureters. Therefore, obesity was thought to negatively affect outcome [20]. Referring to Chul Jang et al. the body mass index (BMI) did not alter the stenosis rate [11]. However, the average BMI was only 21.2 and hence, is hardly comparable with American or western European indices. In our experience the technique of uretero-ureterocutaneostomy becomes more difficult in patients with a BMI of ≥30. Therefore, we recommend that if supravesical diversion is required in patients with non-dilated ureters or in patients with a BMI of ≥30 it is best done with an ileal or colon conduit.

In 2005 Lodde et al. evaluated the outcome of UUCS wrapped by omentum for palliative cystectomy in a small series of symptomatic elderly high-risk patients with high-stage bladder cancer. Their concept was based on the hypothesis that the viability of the distal ureter is supported by an angiogenic process that takes place at the level of the omento-ureteral contact enhanced by the lipid angiogenic factor contained in the omentum [2, 3, 21]. Additionally, the omentum sheath acts as a buffer between the skin and ureter possibly preventing skin contraction and protecting the ureter from compression within the abdominal wall [22, 23, 11]. Moreover, since a divided distal ureter has a tendency to slough and narrow at the skin

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level a "butterfly-like" ureteric flap was created [14]. The omentum was wrapped up to the distally created "butterfly" ureteric flaps and fixed to the subcutis in order to achieve an adequate blood supply and to avoid stomal stenosis. With a median follow-up of 15 months no stomal stenosis was observed [2].
The current study represents an update of the study by Lodde et al. demonstrating in additional 27 patients (54 renal units) that the modified UUCS following cystectomy is a simple and safe permanent urinary diversion remaining a viable option for elderly, high-risk patients. The procedure is associated with a low diversion related complication rate, requiring surgical re-intervention. Only one major complication occurred with consecutive high grade urinary tract dilatation and an increased serum creatinine level necessitating surgical revision of the stoma. However, eight patients were identified with an increased dilatation of the upper urinary tract compared to baseline and although no stomal stenosis and no increase of serum creatinine were observed, patients were stented prophylactically. The decision to stent patients was based on the avoidance of possible complications such as urinary tract infections and a possible deterioration of kidney function or the development of a stomal stenosis. And indeed, none of the stented patients experienced another complication. However, this raises the question whether stenting in dilated renal units after performing a UUCS is necessary especially as some authors reported favourable results without stenting dilated renal systems in patients with normal serum creatinine levels [9-11]. Nevertheless, our experience with the modified UUCS demonstrated that the occurrence of stomal stenosis, at present the greatest drawback for widespread use, could be reduced to 4%. Moreover, it allowed food intake and ambulation on the first day after surgery in most patients.

CONCLUSIONS

Modified UUCS can be safely performed using dilated, thick walled ureters with a low diversion related and unrelated re-operation rate. Moreover, it allowed food intake and ambulation on the first day after surgery in most patients. If complication rates remain stable this technique will represent a promising option also for patients with a longer life expectancy.

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Conflict of interest

C. Seitz: advisory board member urolithiasis, Astellas Pharma GmbH. The authors declare that there are no conflicts of interest.

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