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Gokul Sridharan, MD, PhD, Associate Professor, Oral Pathology and Microbiology, YMT Dental College and Hospital, Navi Mumbai, Mumbai 400018, Maharashtra, India. drgokuls@gmail.com

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Retroperitoneal laparoscopic partial resection of the renal pelvis for urothelial carcinoma: A case report

Yan-Long Wang, Hong-Lin Zhang, Hao Du, Wei Wang, Hai-Feng Gao, Guang-Hai Yu, Yu Ren

ORCID number: Yan-Long Wang 0000-0002-5882-1958; Hong-Lin Zhang 0000-0001-8248-6080; Hao Du 0000-0001-5987-8799; Wei Wang 0000-0002-6256-662X; Hai-Feng Gao 0000-0002-9304-6504; Guang-Hai Yu 0000-0003-2358-2800; Yu Ren 0000-0001-8572-5489.

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Yan-Long Wang, Hao Du, Wei Wang, Hai-Feng Gao, Guang-Hai Yu, Yu Ren, Department of Urology, Dalian Municipal Central Hospital Affiliated of Dalian Medical University, Dalian 116033, Liaoning Province, China

Hong-Lin Zhang, Center for Reproductive Health, Dalian Maternity Hospital Affiliated of Dalian Medical University, Dalian 116033, Liaoning Province, China

Corresponding author: Yu Ren, MD, Professor, Department of Urology, Dalian Municipal Central Hospital Affiliated of Dalian Medical University, No. 826 Southwest Road, Shahekou District, Dalian 116033, Liaoning Province, China. 15509850654@163.com

Abstract

BACKGROUND

The standard treatment of transitional cell carcinoma of the upper urinary tract consists of radical nephroureterectomy with bladder cuff removal, which can be performed either in open or laparoscopy or robot-assisted laparoscopy. Treatment of chronic renal insufficiency patients with upper urothelial tumor is in a dilemma. Urologists weigh and consider the balance between tumor control and effective renal function preservation. European Association of Urology guidelines recommend that select patients may benefit from endoscopic treatment, but laparoscopic treatment is rarely reported.

CASE SUMMARY

In this case report, we describe a case of 79-year-old female diagnosed with urothelial carcinoma of the renal pelvis and adrenal adenoma with chronic renal insufficiency. The patient was treated with retroperitoneal laparoscopic partial resection of the renal pelvis and adrenal adenoma resection simultaneously.

CONCLUSION

Retroperitoneal laparoscopic partial resection of the renal pelvis is an effective surgical procedure for the treatment of urothelial carcinoma of the renal pelvis.

Key Words: Transitional cell carcinoma; Kidney sparing; Chronic renal insufficiency; Laparoscopy; Partial resection of the renal pelvis; New effective surgical method

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Core Tip: For patients with chronic renal insufficiency diagnosed with renal pelvic urothelial carcinoma, retroperitoneal laparoscopic partial resection of the renal pelvis is a new effective surgical method and an alternative method for endoscopic treatment, especially for surgeons with rich experience in laparoscopic surgery and patients with other diseases for which laparoscopic surgery is needed simultaneously.

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INTRODUCTION

The proportion of cases of transitional cell carcinoma of the upper urinary tract (UUT-TCC) is approximately 5% of all urothelial tumors^[1], although renal pelvis tumors are relatively rare.

With the increase in many chronic diseases, such as hypertension, diabetes mellitus and medicinal renal injury, the number of patients with chronic renal insufficiency (CRI) is gradually increasing clinically. Overall, treatment of patients with upper urothelial tumors and chronic renal insufficiency remains a dilemma, and urologists must weigh and consider the balance between tumor control and renal function preservation.

The standard treatment for UUT-TCC consists of radical nephroureterectomy (RNU) with bladder cuff removal, which can be performed either in open surgery or laparoscopy, including robot-assisted laparoscopy^[2,3].

In patients with organ-confined UUT-TCC, laparoscopic nephroureterectomy has the advantages of minimal invasiveness and oncologic outcomes comparable to those of open nephroureterectomy^[4], with all the benefits of minimally invasive surgery including less blood loss, shorter hospital stays, reduced postoperative pain, and shorter convalescence time^[5]. In some selected cases of renal insufficiency, solitary kidney, bilateral tumors, high risk of complications associated with nephroureterectomy or low grade/low stage tumors, conservative treatment such as endoscopic resection or ablation may also be performed^[5,6].

CASE PRESENTATION

Chief complaints

A 79-year-old female with a history of intermittent painless gross hematuria for 15 d.

History of present illness

The patient had intermittent painless gross hematuria but had no other symptoms such as flank or abdominal mass, weight loss, anorexia, fatigue, or bone pain.

History of past illness

The patient had no previous medical history.

Personal and family history

Her family history was unremarkable.

Physical examination

The patient's temperature was 36.7 °C, heart rate was 78 beats per min, respiratory rate was 18 breaths per min, blood pressure was 118/78 mmHg, and oxygen saturation in room air was 97%. Clinical physical examination revealed no abnormalities.

Laboratory examinations

Urinalysis, routine blood tests, coagulation and liver function were normal; however,

serum creatinine was 150 $\mu\text{mol/L}$ and blood urea nitrogen (BUN) 10.04 mmol/L , and urinary cytology revealed heterocyte positivity. The level of adrenal gland hormone was in the normal range.

Imaging examinations

Ultrasound examination revealed a right renal pelvic mass located above the ureteric junction of the renal pelvis. The diameter of the tumor was 7 mm $\times$ 7 mm. A right adrenal gland mass was also found, the size of which was 12 mm $\times$ 12 mm. A computed tomography (CT) abdominal scan showed a mildly enlarged pelvis–calyceal system and right adrenal gland solitary mass. There was a pathological lesion visible in the right pelvis with dimensions of 10 mm $\times$ 8 mm, which was enhanced from 20 to 80 Hounsfield units after injection of contrast medium (Figure 1). The size of the right adrenal gland solitary mass was 14 mm $\times$ 14 mm (Figure 2). Preoperative rigid cystoscopy revealed normal mucosa in the bladder.

FINAL DIAGNOSIS

The patient was diagnosed with UUT-TCC complicated CRI and right adrenal gland adenoma. The patient underwent rigid ureteroscopy, which identified a cauliflower-like mass in the right renal pelvis.

TREATMENT

The prognostic indicators of UUT-TCC included tumor diameter, pT stage and tumor necrosis, which were independent predictors of metastasis-free and disease-free survival. The patients with advanced-stage tumors, extensive necrosis, and a tumor diameter of 3 cm were significantly impaired by increasing pT stage^[7]. We considered the renal pelvic tumor as a low grade based on ureteroscopy. Based on our medical center's considerable experience in retroperitoneal laparoscopic surgery, the option of a retroperitoneal laparoscopic approach was offered to the patient. After induction of general anesthesia, the patient was placed in the left lateral position. The retroperitoneal approach was performed using the conventional three-hole approach according to a technique described previously^[8]. The right adrenal gland was first explored, and a right adrenal gland solitary mass was found located in the medial branch, consistent with the change in adenoma. Tumor resection was performed. Next, the right ureter, renal pelvis, lower pole of the kidney and genital vein were routinely freed. After releasing the ureter, the right renal pelvis was opened, and a cauliflower-like tumor was visualized (Figure 3). When the tumor was resected, a margin of approximately 0.5 cm of healthy renal pelvis tissue was preserved as much as possible; to avoid tumor implant metastasis, the tumor specimen was placed in a specimen bag immediately after resection. The renal pelvis was reconstructed with interrupted sutures.

OUTCOME AND FOLLOW-UP

Postoperative recovery was good, with no complications. Renal function was stabilized 1 wk after the surgery, with levels of serum creatinine 200 $\mu\text{mol/L}$ and BUN 10.57 mmol/L . The pathology report showed renal pelvis TCC pTaG1 and right adrenal adenoma. Two years after the surgery, the patient underwent ultrasound and CT scan follow-up examinations, revealing no tumor recurrence or right renal hydronephrosis. The treatment was safe and efficient, but longer follow-up is still needed.

DISCUSSION

Nephro-ureterectomy with bladder cuff removal is the gold standard for the treatment of UUT-TCC. Some patients may benefit from endoscopic treatment (ET), such as holmium laser tumor ablation with a flexible ureteroscope or percutaneous nephrostomy tumor resection. For example, patients with unifocal, < 2 cm, and low-



Figure 1 Computed tomography scan of the excretory urography stage. The arrow indicates a right renal pelvic tumor.

grade lesions without local invasion are considered to have low-risk disease^[9]. In the case of low-grade/low-stage TCC of the renal pelvis, open surgery is being replaced by endoscopic surgery^[10,11]. However, ureteroscopic tumor ablation remains associated with a high risk of disease recurrence and progression due to inadequate assessment of risk stratification by imaging or tumor biopsy^[9]. Moreover, the risk of perioperative bleeding with the percutaneous approach is higher than that with laparoscopic surgery, and the risk of needing dialysis after nephrectomy is extremely high in patients with isolated kidney or renal insufficiency if bleeding occurs. Tumor recurrence or trocar metastasis after percutaneous access has also been reported, as indicated in [Table 1](#).

European Association of Urology (EAU) guidelines recommend offering kidney-sparing management to patients with solitary kidney and/or impaired renal function. Kidney-sparing surgery for low-risk upper urinary tract urothelial cell carcinoma reduces the morbidity associated with the loss of renal function without affecting oncologic outcomes^[12]. In low-risk cancers, kidney-sparing management is the preferred approach, as survival rates are similar to those after RNU^[13]. Furthermore, kidney preservation is advantageous if adjuvant or salvage chemotherapy is required. It also eliminates the possibility of overtreatment^[14].

Our patient was treated with retroperitoneal laparoscopic partial resection of the renal pelvis. One previous case was reported by Wojtarowicz *et al*^[14] worldwide, but there were no long-term follow-up results. In the present case, the patient was followed up for 2 years and showed stabilized renal function without tumor recurrence and progression. We believe that retroperitoneal laparoscopic partial resection of the renal pelvis is an alternative method for suitable patients and for surgeons with rich experience in laparoscopic surgery.

The advantages of retroperitoneal laparoscopic partial resection of the renal pelvis are as follows. (1) It can ensure the resection depth and scope and reduce residual tumor. (2) Completely resected tissue can offer tumor staging and grading. (3) There is no possibility of tumor implantation and metastasis caused by renal pelvic lymph and venous reflux under high pressure by endoscopic treatment. And (4) The operation does not damage the renal parenchyma, with less bleeding and damage to the kidney.

However, this method does have limitations and shortcomings. It is only suitable for patients whose extrarenal pelvic tumors are confined to the renal pelvis, and it cannot be applied for tumors in the renal calyx. In addition, when the closed collection

Table 1 Tumor recurrence or trocar metastasis after the percutaneous approach

Ref.	Number	Operation	Tumor grade
Rastinehad <i>et al</i> ^[16]	1	PCN tumor resection	N/A
Treuthardt <i>et al</i> ^[17]	1	PCN tumor resection + BCG perfusion therapy	High grade
Wang <i>et al</i> ^[18]	1	Radical nephroureterectomy after PCN biopsy 1 wk	High grade
Oefelein <i>et al</i> ^[19]	1	PCN tumor resection	Low grade
Fuglsig <i>et al</i> ^[20]	1	PCN tumor resection	High grade
Sharma <i>et al</i> ^[21]	1	PCN tumor resection	N/A

BCG: Bacillus Calmette-Guerin; N/A: Not applicable; PCN: Percutaneous nephrostomy.

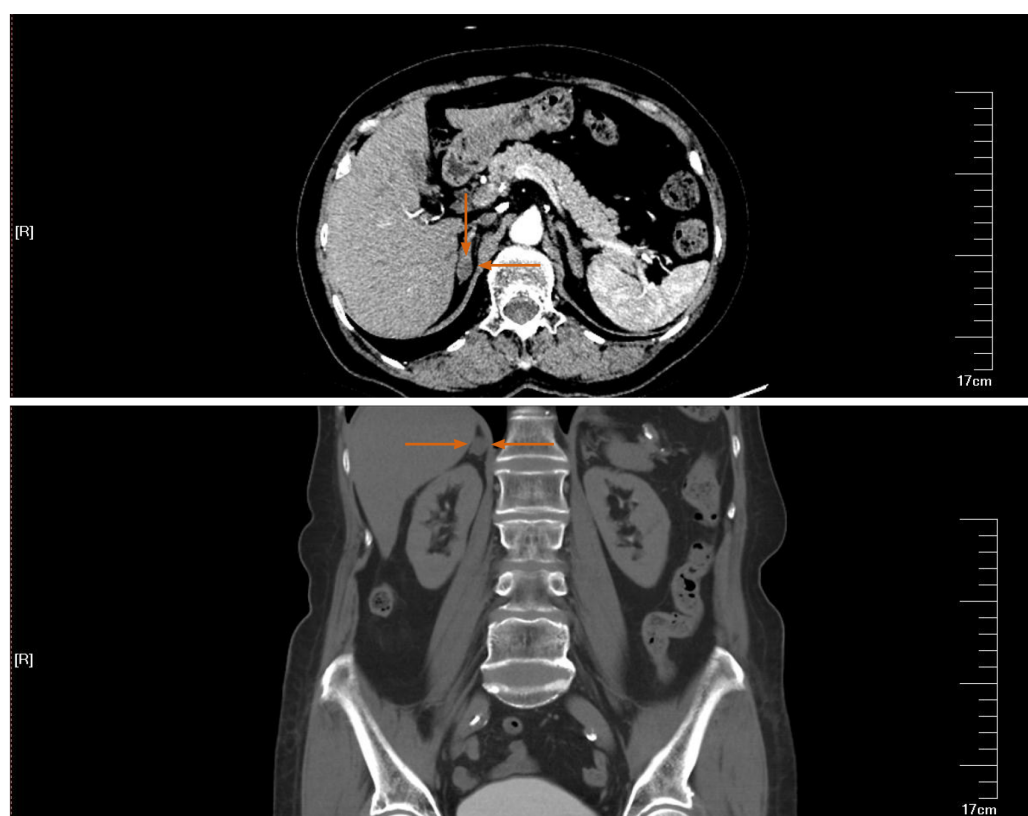


Figure 2 Computed tomography scan in the artery phase. The arrow indicates a right adrenal gland adenoma.

system is opened, there is concern that the tumor may overflow into the urine, leading to tumor implantation and metastasis. Therefore, the following methods are recommended to reduce the possibility of tumor implantation and metastasis. (1) Dry gauze is placed around the incision of the renal pelvis to reduce pollution of surrounding tissues by the urine after the incision is made. And (2) Direct contact of surgical instruments with the tumor during the operation is avoided. After resection, the tumor should be placed into a specimen bag that is sealed to prevent the tumor from contacting the surrounding tissues. The operation should be carried out under low pneumoperitoneum pressure as much as possible. The incision should be tightly sutured to fix the trocar, and the trocar should be pulled out after deflation to avoid the “chimney effect” and reduce trocar tumor planting. The wound should be washed with effective chemotherapeutic drugs.

When performing a kidney-sparing procedure, the ipsilateral upper urinary tract requires careful follow-up due to the high risk of disease recurrence^[15]. Patients undergoing kidney-sparing surgery should be followed more frequently and rigorously than those undergoing RNU, and repeated endoscopic procedures are

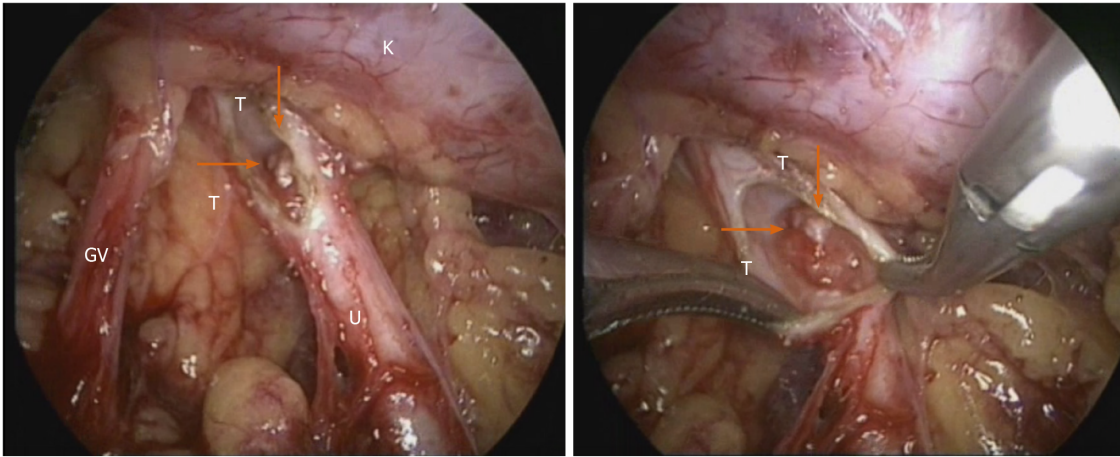


Figure 3 Intraoperative view of the right retroperitoneal space. GV: Genital vein; K: Kidney; T: Tumor; U: Ureter.

necessary. EAU guidelines recommend ureteroscopy for low-risk tumors at 3 mo, followed by cystoscopy and CT urography at 3 and 6 mo and then annually for 5 years.

CONCLUSION

In conclusion, retroperitoneal laparoscopic partial resection of the renal pelvis is an effective surgical procedure for the treatment of urothelial carcinoma of the renal pelvis. It is indicated for patients with isolated kidneys or renal insufficiency, but its safety needs to be further evaluated. The procedure should not be routine but rather used as a supplement to ET, especially for surgeons with extensive experience in laparoscopic surgery and medical centers lacking flexible ureteroscopy equipment.

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