Minimally invasive management of a patient with a tumor in the right urothelium and left renal exclusion

Sánchez-López Héctor Manuel, 1 Galeana-Ruiz Rodolfo, 2 Carvajal-García Román, 3 Gutiérrez-Hernández Roberto. 4

ABSTRACT

Urothelial carcinoma of the upper urinary tract (UC-UUT) is rare and represents 5% to 10% of the urothelial carcinomas. Nephroureterectomy with bladder cuff resection continues to be the treatment of choice. However, endoscopic tumor resection, whether by means of urerorendoscopy (semirigid or flexible) or percutaneous approach, is being carried out more frequently in selected cases.

An 82-year-old woman presented with gross hematuria secondary to an ~2 cm tumor in the urothelium of the upper collecting system of the right kidney and a functionally excluded contralateral kidney. The minimally invasive approach of percutaneous endoscopic bipolar resection was performed. Six months after the resection, the tumor showed radiologic evidence of a lesion that was suggestive of a metachronic tumor in the left excluded kidney. Hand-assisted laparoscopic nephroureterectomy was performed.

RESUMEN

Los carcinomas uroteliales de las vías urinarias superiores (CU-VUS) son infrecuentes y representan 5% a 10% de los carcinomas uroteliales. La nefroureterectomía con rodete vesical sigue siendo el tratamiento de elección, sin embargo, la resección tumoral endoscópica ya sea por ureterorrenoscopia (semirrigida o flexible) o por abordaje percutáneo, cada vez se realiza con mayor frecuencia en casos seleccionados.

Se presenta el caso de una paciente femenina de 82 años de edad, con cuadro de hematuria macroscópica secundario a tumoración de urotelio de 2 cm aproximadamente en sistema colector superior en riñón derecho, con riñón contralateral funcionalmente excluido, por lo que se realizó un abordaje mínimamente invasivo: resección bipolar endoscópica vía percutánea. En los seis meses posteriores a la resección del tumor radiológicamente se evidenció lesión sugestiva de tumor metacrónico en riñón izquierdo.
was carried out and the patient has been disease-free for five years.

Individualized patient treatment is essential in medicine today. The case presented herein illustrates the current tendency to consider nephron-sparing surgery in those patients in whom radical surgery is contraindicated. This type of procedure should be considered in selected patients with normal contralateral kidneys that are candidates for kidney preservation.

**Keywords:** Upper urinary tract carcinoma, percutaneous nephroureterectomy, ureteroscopy, Mexico.

**INTRODUCTION**

Urothelial carcinoma of the upper urinary tract (UC-UUT) is rare and represents 5% to 10% of urothelial carcinomas. The frequency of pyelocaliceal tumors is double that of ureteral tumors and they coexist with bladder cancer in 8% to 13% of cases.

The annual UC-UUT incidence is one to two new cases per 100 000 inhabitants. There is recurrence in the bladder in 30% to 51% of cases and in the contralateral upper urinary tract in 2% to 6%. Clinical symptoms are generally nonpainful hematuria in 70% to 80% of cases. At the time of diagnosis 60% of the UC-UUTs are invasive, whereas only 15% of bladder cancer cases are. Bilateral synchronous tumors are very rare and their incidence is 1.6%, and 80% of those patients already have bladder cancer. The mean age is 75 to 79 years.

Tobacco smoke and occupational exposure to aromatic amines have been identified as risk factors.

Diagnosis through imaging studies can be with excretory urography and pyelography. However, the criterion standard is still urography.

The treatment of choice is nephroureterectomy with bladder cuff resection in conventional cases, whether it is open, laparoscopic, or hand-assisted. However, in special cases, minimally invasive or endoscopic treatments through different approaches, including the percutaneous approach, are becoming stronger therapeutic options.

Transitional cell carcinoma of the upper urinary tract (TCC-UUT) is an aggressive disease, especially when high grade tumors are discovered. The majority of urothelial tumors are grade II (18.5% to 48.2%) or grade III (42.5% to 47%). A close relation between disease grade and stage has been established, together with a tendency of high grade tumors to progress to invasive muscle disease with poor outcome. Tumor stage, grade, and location (ureter or renal pelvis) are considered the most important prognostic factors, more so than an extensive surgical resection.

A very detailed lifetime follow-up is an essential requirement after ureteroscopy or the percutaneous approach for tumor treatment because there can be recurrence at five years.1

**CASE PRESENTATION**

An 82-year-old woman stated that she had never smoked or been exposed to wood smoke, solvents, or aromatic amines.

She had a past medical history of uterine myomatosis with large elements in the year 2000 that was histopathologically confirmed and she required the transfusion of two packs of red blood cells.

The patient said disease onset began in 2006 with sporadic episodes of gross hematuria that resolved on their own in one or two days. She was admitted to our
hospital from the emergency service in March 2007 presenting with total and frank gross hematuria with no clotted. She had suprapubic colicky pain accompanied with weakness and dizziness. There were no other relevant data.

Her vital signs were: BP 110/78 HR: 102 RR: 16 Temperature: 36.7°C. Physical examination revealed paleness of the skin and teguments. The patient was neurologically intact. Precordium was rhythmic but tachycardic and there were no murmurs or additional noises. The abdomen was soft and depressible with mild pain upon deep palpation of the hypogastrium that radiated to both iliac fossae. There was no other pain. Bilateral costovertebral angle percussion was negative. Vaginal examination revealed grade II cystocele with no changes in the vaginal wall or dome. There was no evidence of bleeding or exudate.

Laboratory results upon admittance were: Hb: 10.3, Hct: 33.5, Erythrocytes: 3.94, MCV: 85.8, MCH: 28.9, Platelets: 206 000, Leukocytes: 7.5, Glucose: 76, Creatinine: 0.9, Urea: 35.7, Na: 142, K: 4.2, Cl: 113, PT: 10.5, PTT: 10.5, INR: 0.88


Renal and bladder ultrasound images reported: left kidney with severe hydronephrosis, right kidney with a non-echogenic image of regular edges with posterior enhancement, not trabeculated, in the upper pole. The bladder had a regular contour and thin walls and its interior was non-echogenic.

In the elimination phase at 30 minutes, excretory urography showed a filling defect in the major calyx with no dilatation in the right collecting systems. No contrast medium uptake was observed in the left ones even after 60 minutes (Figure 1).

A urine sample for urinary cytology was obtained and retrograde pyelography confirmed the filling defect in the major calyx of the right kidney with the characteristic “bitten apple” image (Figure 2). The cytology report was negative.

Urotomography was ordered to complete the diagnostic protocol and it revealed the same filling defect of the upper pole of the right kidney with 46 HU and approximately 22 mm and a hydronephrotic sac on the left side (Figure 3).

A kidney TcDPA scintigram was ordered and reported a glomerular filtration rate of 72.11 mL/min, right 64.11 mL/min (89%), left 8 mL/min (11%), and left renal exclusion was confirmed.

Before choosing the therapy, the protocol was completed with cystoscopy that identified: a normal urethra, orthotopic meatuses in the A position, in

horseshoe with ejaculation of urine from the right meatus, and mild peritrigonal erythema. The walls were examined and no evidence of tumor lesions or fronds was found.

And so, faced with left UC-UUT with a functionally excluded contralateral kidney confirmed through imaging studies and scintigraphy, nephron-sparing surgery with bipolar segment percutaneous endoscopic resection was performed. A pathology sample was obtained and the tumor was completely resected.

No surgical incidences or accidents were reported and the procedure took one hour and 20 minutes (Figures 4 and 5). Postoperative intrahospital stay was 4 days and the nephrostomy catheter in the percutaneous tract was removed on the third day.

The histopathologic report (2995/07) was received and its macroscopic description was three fragments from 1.5 to 2.0 cm. Diagnosis was non-infiltrating grade II urothelial carcinoma.

During patient follow-up, the control abdominal pelvic tomography scan showed an important reduction in cortical volume and markedly reduced perfusion and

Figure 1. Excretory urogram in the emptying phase in which the filling defect in the major calyx and absence of contrast medium uptake in the left kidney can be seen.
elimination. In addition there was an image that was suggestive of a metachronic tumor in the proximal portion of the left ureter that conditioned severe ectasia of the ipsilateral kidney.

Confronted with the radiologic suspicion of a metachronic tumor and a functionally excluded kidney, a hand-assisted laparoscopic left nephroureterectomy was performed in July 2008. The final histopathologic report was negative for malignancy and so we concluded that ureteropelvic junction stricture was the cause.

At five years from the first surgery, the patient’s general condition is currently good. Laboratory tests with conserved urea and creatinine were done, liver function tests had no changes, and BH and ESR were normal. UA had no hematuria and serial urinary cytology was negative. Imaging studies that included chest x-ray and tomography showed no pathologic or abnormal data of importance.

Renal ultrasound and bladder with kidney ultrasound showed chronic degenerative changes. Bladder edges were regular with no wall thickening and the interior was non-echogenic. The bone scintigram revealed a degenerative osteoarticular and an inflammatory articular process and was negative for malignancy.

And the last control cystoscopy reported surgical scarring in the left hemitrigone. The right ureteral meatus ejaculating urine was normal, the bladder had grade II trabeculations, there was no appreciable bleeding or tumor fronds, and the control flexible ureteroscopy showed no evidence of tumor recurrence.

**DISCUSSION**

This case clearly illustrates treatment individualization in the context of a patient with two types of alternative therapies: first the local percutaneous endoscopic resection followed by the standard approach: hand-assisted laparoscopic nephroureterectomy with bladder cuff resection. It also reinforces the current tendency of considering kidney-sparing surgery in those patients in whom radical surgery is contraindicated and sustains the idea that today, patients with normal contralateral kidneys can also be considered for kidney conservation.

The traditional treatment option has always been open nephroureterectomy (ONU); together with this case we present a review of the indications for and results of the different minimally invasive and preserving treatment alternatives for UC-UUT patients.
Laparoscopic nephroureterectomy, ureteroscopy, and percutaneous treatment make up the available treatment options that provide adequate oncologic control results according to the specific characteristics of each patient. The continuing development of more sophisticated endoscopic equipment has led to a change in daily practice and to a tendency for conservative management. However, a significant number of patients require radical treatment because of the aggressive nature of the TCC-UUTs and the probability of bladder recurrence, of ipsilateral metachronic metastasis (between 30% and 70%), and even contralateral metachronic metastasis. 

As mentioned above, the traditional treatment option has always been open nephroureterectomy (OUN) with bladder cuff resection; the question is whether ONU will remain the treatment of first choice now that the advances in laparoscopic surgery provide a very attractive alternative.

Kidney-sparing surgery was initially proposed for those patients in whom radical surgery is contraindicated. Today, however, patients with normal contralateral kidneys may be considered for renal preservation when they present with small, low grade tumors or with associated comorbidities, keeping in line with the current tendency toward conservative treatment without jeopardizing patient oncologic safety. However, in order to consider this as a guideline, studies in large centers with large patient series need to be carried out. 

The first alternative to ONU is the laparoscopic approach (LNU).

Clayman et al. reported on the first LNU more than 15 years ago. This technique was adopted by numerous centers and so oncologic safety became the field of interest.

The first multicenter LNU study was conducted by Fettouh et al. in 2002; it included 116 patients from five centers in Europe and the United States and the disease-specific survival (DSS) at two years was 87%.

A follow-up of more than seven years was reported in a case series that compared LNU and ONU with a DSS of 72% for LNU vs 82% for ONU ($p=0.26$); these results were not statistically significant and verified the oncologic effectiveness of LNU.

In addition, there was no statistically significant difference in the data derived from LNU and hand-assisted LNU.

Extraction bags should be considered mandatory, especially when there is suspicion or certainty of high grade tumors.

The major and minor complication rates for LNU are lower than for ONU, at 0% to 19% and 0% to 40%, respectively.

The alternative to the open approach is endoscopic treatment, which can be through ureteroscopy or through percutaneous approach. Significant changes have been made in these treatment modalities. They were initially proposed for patients requiring...
conservative surgery (solitary kidney, renal failure) or when a significant comorbidity contraindicates radical surgery.

The endoscopic approach should replace ONU without jeopardizing oncologic results. Ureteroscopic management has been satisfactory in a large number of patients. Comparable results have been obtained with the percutaneous approach, especially in selected low grade tumors.

1. Ureteroscopy for UC-UUT
Flexible ureteroscopy represents a great advance in the treatment of UUT tumors. These instruments were initially used for diagnostic purposes and are now being used for therapeutic ends, destroying the tumor with an electroscalpel or laser. The advantages are low morbidity, outpatient treatment, and the maintenance of urothelial continuity. The disadvantages include the inability to treat large lesions in one session, access difficulty, and staging errors.

Ureteroscopy should be reserved for cases of low grade TCC-UUT < 1.5 cm in diameter because high grade tumors are associated with elevated local recurrence and disease progression rates. The major therapeutic advance in flexible ureteroscopy has been made through the use of holmium laser (Ho:YAG), with 200 to 365 mm optic fibers and also the Nd:YAG laser; both have been used to cauterize and resect UC-UUT and the results are comparable to those of open resection in relation to disease-free survival.

The complication rate is from 8 to 13% and is basically lower, with a 1% to 4% perforation rate and 9% ureteral narrowing (tumor recurrence can be up to 40%).

Recurrence was related to tumor size, location, grade, and multifocality.

2. Percutaneous treatment for TCC-UUT
Percutaneous treatment should only be offered to patients with large tumors of the renal pelvis (>1.5 cm), large tumors of the proximal ureter, or those that are inaccessible by means of ureteroscopy.

Visualization is much better with the percutaneous approach, enabling the resection of large tumors in a single session; adjuvant treatment can be administered through a nephrostomy tube, despite the fact that it should be delayed for at least two weeks.

The transfusion rate is > 20% in many case series, whereas pyeloureteral junction stenosis and tract seeding are less common.

A recent study that compares endoscopic treatment with ONU found no statistically significant differences in survival for low grade tumors.6

Adjuvant therapy for the endoscopic approach has not been standardized.7 The majority of series prefer mitomycin C, with good results. Another controversial aspect is whether patients with TCC-UUT should use intravesical therapy due to the risk of vesical implants.

CONCLUSIONS
The indications for TCC-UUT minimally invasive treatment are growing. LNU is comparable to ONU insofar as effectiveness and oncologic efficacy are concerned, especially for low grade tumors. Long-term survival data for more than seven years showed that disease-free survival and recurrence rates are comparable to ONU. In patients in whom kidney preservation is an objective, ureteroscopy is only used for treating low grade ureteral tumors of up to 1.5 cm, but a good preoperative stage is always required. Percutaneous treatment can be used for tumors > 1.5 cm that are located in the kidney, in the minor calyx, for large masses in the proximal ureter, and in tumors that are inaccessible by means of other alternatives, with similar results to those obtained with ureteroscopy.

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

FINANCIAL DISCLOSURE
No financial support was received in relation to this study.
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REFERENCES


Figure 5. A) and B) Images of the surgery with percutaneous approach; cold tumor frond extraction with a foreign body tweezers, resection, and hemostasis of the tumor base with a bipolar resectoscope.