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Original article

Oncological outcomes of laparoscopic nephroureterectomy with pluck method for distal ureter resection

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ABSTRACT

Objective: To report the oncologic outcomes of upper tract urothelial carcinoma treated with laparoscopic nephroureterectomy and pluck method for distal ureter resection.
Materials and methods: Between May 2004 and November 2015, 118 patients with upper urinary tract urothelial carcinoma received laparoscopic radical nephroureterectomy with endoscopic bladder cuff excision at our institution. The medical records were reviewed retrospectively for clinical and pathological results. Cox regression analyses were performed on factors related to oncological outcomes.
Results: The median follow-up was 26 months. Bladder recurrence was found in 27 patients (22.9%), extravesical retroperitoneal recurrence in four patients (3.4%), and metastases in 17 patients (14.4%). Multivariate analyses showed that male sex was associated with higher bladder recurrence [odds ratio (OR) = 2.2; 95% confidence interval (CI), 1.02–4.78; $p = 0.045$)], tumor size had significant correlation with locoregional recurrence (OR = 1.29; 95% CI, 1.07–3.43; $p = 0.029$), tumor stage was significantly correlated with subsequent metastasis (OR = 2.08; 95% CI, 1.21–3.56; $p = 0.008$) and overall survival (OR = 1.84; 95% CI, 1.06–3.22 ; $p = 0.031$), and tumor size correlated significantly with cancer-specific survival (OR = 2.57; 95% CI, 1.16–5.72; $p = 0.021$).
Conclusions: Tumor size and tumor stage were significantly associated with survival (cancer-specific and overall survival) in patients receiving nephroureterectomy with pluck method.

1. Introduction

Radical nephroureterectomy with bladder cuff excision is the gold standard treatment for upper tract urothelial carcinoma. Various different surgical procedures have been tried to manage the distal ureter and bladder cuff while performing radical nephroureterectomy. Each technique has its benefits and disadvantages. A study by Xylinas et al[1] reported a higher risk of bladder recurrence with the endoscopic approach to the bladder cuff (bladder recurrence rate: 34.1% in the endoscopic group vs. 21.1% in the transperitoneal/transvesical group). In the pluck method, endoscopic incision of the bladder cuff is performed to release the attachment at the ureterovesical junction, which may theoretically bear the risk of tumor cell spillage, causing bladder and pelvic region recurrence. To date, only small studies on the oncologic outcomes of radical nephroureterectomy with endoscopic approach of the distal ureter have been reported. At our institution, laparoscopic nephroureterectomy with endoscopic incision of the bladder cuff (pluck method) has been the major treatment of choice for upper tract urothelial carcinoma in the past decade. In this context, we analyzed the oncologic outcomes of patients undergoing this surgical treatment.

2. Materials and methods

From May 2004 to November 2015, 147 patients with upper urinary tract tumors received laparoscopic radical nephroureterectomy with pluck method bladder cuff excision at our institution. Their

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medical records were reviewed retrospectively. Patients who had received transurethral resection of bladder tumor within a year (10 patients), with the final diagnosis of nonurothelial carcinoma (9 patients), with concurrent bladder cancer (6 patients), who were lost to follow-up after the primary surgery (2 patients), and who died after primary surgical intervention (2 patients) were excluded from this study. The median follow-up duration was 26 months (range, 1–127 months).

2.1. Surgical technique

Patients were initially placed in the lithotomy position. After cystoscopic examination of the bladder, a resectoscope was introduced via the urethra with sterile distilled water irrigation. The ipsilateral ureteral orifice was identified. Monopolar electrosurgical cutting wire (Collins knife) was used to incise a circumferential cuff deep to the perivesical fat around the ureteral orifice. The patient was then placed in a lateral decubitus position for a retroperitoneoscopic approach or semidecubitus position for a transperitoneal approach. Ligation of the ureter distal to the tumor was first performed. Hand-port assistance was used in most of the cases. Location of the 7-cm hand-port wound was in the midline or the ipsilateral lower quadrant of abdomen, depending on access (transperitoneal or retroperitoneal) and laterality. The distal ureter along with the bladder cuff was extracted manually after complete dissection of the kidney and ureter. Urethral catheter was routinely retained for 7 days in all cases.

2.2. Pathologic analysis

All surgical specimens were examined thoroughly by pathologists at our institution. The histological grading was performed according to the World Health Organization/International Society of Urologic Pathology classification. The American Joint Committee on Cancer tumor size, lymph nodes, metastasis (TNM) classification was used for cancer staging. Additional data recorded included the largest diameter of the main tumor, presence of lymphovascular invasion, whether the surgical margin is free of tumor, and the presence of multifocal tumor masses.

2.3. Follow-up

The patients were followed every 3 months in the 1st year then every 6 months for 3 years and annually thereafter. Evaluations were consistent with those of the National Comprehensive Cancer Network guidelines. Renal ultrasound and cystoscopy were routinely arranged. Computed tomography (CT) scan or magnetic resonance imaging was performed in most patients at 6 months or 12 months postoperatively, depending on pathological stage and surgeon's discretion.

Recurrences were classified as bladder recurrence or locoregional recurrence. Mass lesions found localized in the ipsilateral pelvic region or retroperitoneal space by follow-up CT scan were regarded as locoregional recurrence. Metastases, including lymph node involvement or distal metastasis, and mortality were also recorded.

2.4. Statistical analysis

Intravesical recurrence, locoregional recurrence, metastasis, overall survival, and cancer-specific survival were determined using Cox regression. The risk factors that met statistical significance with univariate analysis underwent multivariate analysis using the Cox proportional hazard model. The factors analyzed included age, sex, tumor location (renal-pelvis, proximal, middle, and distal ureter), multifocality, tumor size, tumor stage, tumor grade, microscopic lymphovascular involvement, margin status, previous recorded bladder cancer, and hydronephrosis.

3. Results

The study cohort included 47 males and 71 females with a mean age of 69 years (range, 42–89 years). Tumor stages ranged from Tis to T4. The locations of the primary tumors were mostly in the renal pelvis (74 cases; 62.7%). Most of the tumors were high grade (91 cases; 77.1%) without microscopic lymph-vascular invasion (105 cases; 89.0%). Distal ureter tumors were not contraindicated for pluck method nephroureterectomy, and 23 tumors (19.5%) were located in the distal ureter.

Positive surgical margins were seen in seven cases, including three involving the bladder cuff and four involving soft tissue margins around the primary tumor. In the cases with positive bladder margin, primary tumors were located in the renal pelvis in two cases and in the distal ureter in only one case. Bladder recurrence occurred in 27 cases, whereas metastasis was found in 17 cases. Four retroperitoneal tumors developed after the primary surgery (Table 1).

3.1. Bladder recurrence

Of the 118 cases, 27 (22.8%) had bladder recurrence. The average time to recurrence was 14.6 months, and it occurred in 15 of 47 male patients and 12 of 71 female patients. Two patients with

Table 1
Patient characteristics.

	No. of patients	(%)
Total	118	100
Median age, y (range)	70.5	(42–89)
Sex		
Male	47	39.8
Female	71	60.1
Hydronephrosis		
No	24	20.3
Yes	94	79.6
Lymphovascular invasion		
No	105	88.9
Yes	13	11.0
Previous bladder cancer		
No	116	98.3
Yes	2	1.6
Pathologic T		
Tis	1	0.8
Ta	24	20.3
T1	33	27.9
T2	24	20.3
T3	30	25.4
T4	6	5.0
Pathologic N		
Nx	107	90.6
N0	10	8.4
N+	1	0.8
Grading		
Low	21	17.8
High	91	77.1
Undefined	6	5.0
Surgical margin		
Negative	111	94.0
Positive	7	5.9
Tumor location		
Renal pelvis	74	62.7
Proximal	12	10.1
Mid	9	7.6
Distal	23	19.4
Multifocality		
No	103	87.2
Yes	15	12.7