Tumor Recurrence Incidence Following Hand-Assisted Laparoscopic Nephroureterectomy

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ABSTRACT

Background and Objectives: We evaluated the incidence of tumor recurrence following hand-assisted laparoscopic nephroureterectomy (HALNU) for the treatment of upper tract urothelial carcinoma.

Methods: The medical records of consecutive patients who underwent HALNU by a single surgeon (CW) between October 2001 and May 2005 were reviewed. The ureter was clipped before kidney dissection to prevent distal migration of tumor. Following liberation of the kidney, the bladder cuff and intramural ureter were excised by using a Collings knife under cystoscopic guidance.

Results: Ten patients were identified. The primary location of disease was confined to the intrarenal collecting system. Eight high-grade (HG) and 2 low-grade (LG) tumors were removed, with pT3 (6), pT2 (1), pT1 (1), and pTa (2) disease. The patient having a LG pTa urothelial carcinoma developed pulmonary metastasis 20 months following surgery and survived an additional 26 months. Two patients, each having a HG pT3 tumor, developed a urothelial carcinoma in the bladder contralateral to the site of ureteral excision. At a mean follow-up of 41 months, there has been no evidence of tumor recurrence in the pelvis.

Conclusion: Our technique of HALNU does not appear to harbor an increased risk for urothelial carcinoma recurrence.

Key Words: Hand-assisted laparoscopic nephroureterectomy, Urothelial carcinoma, Upper urinary tract, Transitional cell carcinoma.

INTRODUCTION

Upper tract urothelial carcinoma is a relatively rare disease, accounting for 5% of all urothelial tumors. Open nephroureterectomy with excision of the bladder cuff has been the gold standard for treatment of this condition. It is a major operation that requires 1 or 2 long abdominal incisions and is associated with significant postoperative morbidity and lengthy convalescence.

In the past decade, major advances have been made in technology for minimally invasive surgery. Laparoscopy for urologic oncologic surgery has gained wider acceptance. Laparoscopic nephroureterectomy (LNU) experience was first reported in 1995 by McDougall et al. Since then, various institutions have described their experiences. Convalescence, as measured by analgesic medication requirements and length of hospital stay, is significantly better with laparoscopy, and the operative time and specimen size for the 2 approaches are similar. Despite this, some urologists remain reluctant to adopt this technique for treating upper tract urothelial carcinoma due to its aggressive nature and the lack of controlled trials comparing laparoscopy with open surgery. Randomized trials to evaluate the optimal method of managing the distal ureter and bladder cuff have not been performed. Our technique of hand-assisted laparoscopic nephroureterectomy (HALNU) with cystoscopic en bloc excision of the distal ureter and bladder cuff has been described. It duplicates open surgical excision of these structures and obviates bladder trocar placement and midprocedural patient repositioning. The risk of tumor seeding during HALNU/LNU is questioned. Herein, we evaluate the incidence of tumor recurrence following HALNU for the treatment of upper tract urothelial carcinoma.

METHODS

The medical records of consecutive patients who underwent HALNU by a single surgeon (CW) between October 2001 and May 2005 were reviewed. Details of the technique have been previously described. In brief, the ureter is isolated and clipped before kidney dissection to prevent distal migration of tumor. Following liberation of the kidney, the bladder cuff and intramural ureter are excised.
using a Collings knife under cystoscopic guidance. With the bladder left open, a urethral catheter is placed for drainage. A gravity cystogram is obtained 7 days after surgery; if normal, the urethral catheter is removed. Routine surveillance, consisting of cystoscopy, urine cytology, computed tomography (abdomen and pelvis), and chest radiography, at 3- (year 1–2), 6- (year 3–4) and 12-month intervals after surgery is performed.

RESULTS

Ten patients were identified for study inclusion. Their average age was 69 years (range, 49 to 83). Four (40%) patients had a history of bladder urothelial carcinoma, but there were no cases of ureteral disease. Visual confirmation of urothelial carcinoma was established by ureteroscopy in 10 (100%) patients. The pathologic diagnosis was confirmed in 9 (90%) cases prior to surgery. No carcinoma in situ was identified.

All cases were completed successfully without open conversion. The mean estimated blood loss (EBL) was 210cc (range, 100 to 500). Three immediate complications (2 major and 1 minor) occurred in 2 patients. One patient (No. 2) required a blood transfusion postoperatively secondary to thrombocytopenia and coagulopathy. This patient had multiple blood transfusions for gross hematuria before surgery. It was felt that the combination of multiple blood transfusions and the surgical insult induced these conditions, despite an EBL of 200 mL. The patient also had diabetic nephropathy (creatinine 1.5 mg/dL) and developed acute on chronic renal failure (creatinine 3.5 mg/dL) postoperatively. The creatinine peaked at 2.3 mg/dL without the need for dialysis. His hospital stay was extended to 11 days. One patient (No. 3) had a skin dehiscence that did not require surgical intervention. No other immediate or delayed complications occurred. All urethral catheters were removed 7 days after surgery.

The primary location of disease was mostly confined to the intrarenal collecting system. One patient had multifocal disease involving the renal pelvis and proximal ureter, while another had a tumor in the proximal ureter only. Eight high-grade (HG) and 2 low-grade (LG) tumors were removed, with pT3(6), pT2(1), pT1(1), and pTa(2) disease. The mean tumor size was 3.1 cm (range, 0.8 to 8).

At a mean follow-up of 41 months (range, 19 to 63), 8/10 patients remain tumor free. The patient having an LG pTa urothelial carcinoma developed pulmonary metastasis 20 months following surgery (No. 6). With cisplatin-based chemotherapy, this patient survived an additional 26 months before succumbing to the disease. Two patients had tumor recurrence in the bladder [HG pT1(1), LG pTa(1)] contralateral to the site of ureteral excision (No. 8 and 10). Both patients had a 6-week course of intravesical BCG instillation. The patient having HG pT1 disease (No. 8) had a subsequent tumor recurrence (HG pTa) following the initial course of BCG. A second 6-week course of BCG treatment was provided. To date, both patients remain tumor free. One patient died from a noncancerous process 35 months following surgery (No. 5). There has been no evidence of tumor recurrence in the pelvis as confirmed by serial computed tomography. Patient demographics and results are summarized in Table 1.

DISCUSSION

Laparoscopy has many reported advantages compared with open surgery. These include decreased postoperative use of parenteral narcotics, shorter hospitalization, earlier time to oral intake, and earlier return to normal activity. There is also no significant increase in operative time for LNU versus open surgery.5–11

Despite these benefits, concerns have been raised over the possibility of higher recurrence rates of urothelial carcinoma when nephroureterectomy is performed laparoscopically versus open surgery. The issue is how to manage the distal ureter and bladder cuff. Many variations of LNU and HALNU have been reported. Some centers perform LNU or HALNU and utilize a Gibson incision to manage the distal ureter. Recurrence rates from this approach have not been demonstrated to be significantly increased.12,15 Gill et al5 described a laparoscopic approach with the use of 2 needlescopic bladder ports and a cystoscopically placed Collings knife for bladder cuff excision with endoloop occlusion before manipulation of the upper tract. The recurrence rate for this technique with a 2-year follow-up was no different than that of an open approach.14–16 Another method is the “pluck” method as described by Keeley and Tolley.17 There was no difference in local recurrence rates and long-term outcomes compared with that of the open nephroureterectomy.18,19

In summary, there appears to be no significant difference in local tumor control and recurrence rates between open and laparoscopic nephroureterectomy. The only method that appears to have a higher risk of tumor recurrence is the one that utilizes a laparoscopic extravesical stapling device to address the distal ureter. Matin et al15 recently reported that the use of a laparoscopic extravesical stapler is associated with a higher incidence of tumor recurrence and positive surgical margin.
At our institution, HALNU is performed with circumferential excision of the distal ureter using a cystoscopically placed Collings knife without primary closure of the bladder. This technique is similar to that of the University of Miami as described by Wong and Leveillee. We, however, do not require an indwelling ureteral stent. Thus, the ureter can be completely occluded with Hem-O-Lok (Teleflex, Raleigh-Durham, NC) or titanium clips. The bladder recurrence rate for this approach was recently reported to be 49%, decreasing to 34% when corrected for a history of bladder cancer.

There appears to be no increased risk of bladder tumor recurrence with this technique compared with open nephroureterectomy. This technique is similar to that of the University of Miami as described by Wong and Leveillee. We, however, do not require an indwelling ureteral stent. Thus, the ureter can be completely occluded with Hem-O-Lok (Teleflex, Raleigh-Durham, NC) or titanium clips. The bladder recurrence rate for this approach was recently reported to be 49%, decreasing to 34% when corrected for a history of bladder cancer.

There appears to be no increased risk of bladder tumor recurrence with this technique compared with open nephroureterectomy. This is likely due to the early identification and clipping of the distal ureter before laparoscopic manipulation of the upper tract, which has the potential to result in distal seeding of tumor cells. Despite leaving the bladder cuff open, there also appears to be no increased risk of tumor recurrence in the pelvis or port sites. This may be explained by the fact that all of our patients had intrarenal or proximal upper tract lesions.

Our HALNU technique has the advantage of eliminating the need for patient repositioning during the procedure. In addition, bladder ports are unnecessary. Finally, it simplifies the management of the bladder cuff by eliminating the need for primary closure of the resected site.

There are several limitations to our study. One drawback is the small number of patients. All of the tumors were located in the intrarenal collecting system or proximal ureter. The recurrence rate may not be reflective of cancers occurring more distally. Our technique would not be appropriate for distal ureteral tumors without compromising the oncologic principles of surgery.

**CONCLUSION**

Our HALNU technique with cystoscopic en bloc excision of the distal ureter and bladder cuff for the management of upper tract urothelial carcinoma appears to harbor no increased risk for bladder or pelvic recurrence compared with other laparoscopic or open techniques, despite leaving the bladder open following bladder cuff excision. By clipping the ureter prior to kidney dissection, risk of tumor spillage is minimized. Despite the small number of patients, the finding that this HALNU technique has no increased risk of urothelial carcinoma recurrence lends further support to the use of laparoscopic techniques for the treatment of this condition.

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**Table 1. Patient Demographics**

| Patient No. | Gender | Age (yrs) | ASA* | EBL* (min) | OR Time (min) | Complications | Tumor Grade | Site of Tumor | Tumor Size (cm) | Pathologic Stage | Location of Recurrence | Follow-Up Period (mo) |
|-------------|--------|-----------|------|------------|---------------|--------------|-------------|--------------|-----------------|------------------|---------------------|-----------------------|
| 1           | F      | 58        | 2    | 150        | 487           | None         | Low         | Renal pelvis | 2.2             | T2NxMx           | None                | 19                    |
| 2           | M      | 83        | 3    | 200        | 284           | Coagulopathy, Thrombocytopenia, ARF | High | Lower calyx | 0.8             | T3NxMx           | None                | 21                    |
| 3           | F      | 70        | 3    | 350        | 221           | Wound dehiscence | High | Renal pelvis, Proximal ureter | 4.5             | T3NxMx           | None                | 24                    |
| 4           | F      | 59        | 2    | 100        | 310           | None         | High        | Proximal ureter | 2.1             | T2NxMx           | None                | 25                    |
| 5           | M      | 68        | 3    | 250        | 268           | None         | High        | Renal pelvis | 1.0             | T1NxMx           | None                | 35†                  |
| 6           | F      | 49        | 1    | 500        | 240           | None         | Low         | Renal pelvis | 2.2             | T2NxMx           | Pulmonary           | 46†                  |
| 7           | M      | 78        | 2    | 200        | 280           | None         | High        | Renal pelvis | 4.0             | T3NxMx           | None                | 63                    |
| 8           | F      | 72        | 3    | 100        | 300           | None         | High        | Renal pelvis | 4.5             | T3NxMx           | Bladder             | 58                    |
| 9           | M      | 71        | 2    | 100        | 277           | None         | High        | Renal pelvis | 2.0             | T3NxMx           | None                | 59                    |
| 10          | M      | 80        | 3    | 150        | 303           | None         | High        | Renal pelvis | 8.0             | T3NxMx           | Bladder             | 62                    |

Summary: M (5) F (5)

| Complication | Major (2) | Minor (1) | High (8) | Low (2) |
|--------------|-----------|-----------|----------|---------|
| Tumor Grade  | Renal pelvis (7) | Proximal ureter (1) | Lower calyx (1) | Multiple (1) |
| Stage        | T3 (6) | T2 (1) | T1 (1) | Ta (2) |
| Location     | Pulmonary (1) | Bladder (2) |         |         |
| Follow-Up Period (mo) | 41† |

* ASA = American Society of Anesthesiologists risk index; EBL = estimated blood loss.
† Mortality.
‡ Mean.
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