4 Laparoscopic Radical Nephroureterectomy for Upper Tract Transitional Cell Carcinoma

Juan Palou, Antonio Rosales, Nico De Graeve, Humberto Villavicencio

Contents

Introduction 71
Indications and Contraindications 71
Preoperative Preparation 72
Patient Positioning and Operating Room Configuration 72
Access and Trocar Placement 72
Surgical Technique 72
  Management of the Lower Ureter 72
    The Open Method 73
    The Pluck Procedure 74
    Extravesical Stapling 75
    Intussusception 77
  Laparoscopic Nephrectomy 78
    Pure Laparoscopic Transperitoneal Approach 78
    Hand-Assisted Transperitoneal Approach 78
  Retroperitoneal Approach 78
  Lymphadenectomy Technique 78
Ending of the Procedure and Extraction of the Specimen 78
  The Open Method 78
  The Pluck Procedure 81
  Extravesical Stapling 81
Postoperative Considerations 81
General Comments 82
Surgical Procedure 82
  Approach 82
  Management of the Distal Ureter 82
  Lymphadenectomy 83
  Extraction of the Specimen 83
  Morbidity 83
Oncological Follow-up 84
Summary 84
References 84

Introduction

The standard treatment for most patients with upper tract transitional cell carcinoma (TCC) is open complete nephroureterectomy (NU) with excision of a cuff of the bladder and intact removal of the entire specimen [1]. This usually requires one long incision or two separate incisions resulting in significant morbidity and prolonged convalescence [2–8].

Currently minimally invasive techniques allow for other management options. In selected cases, such as in solitary kidney, renal insufficiency, bilateral tumours or in patients with high anaesthetic risk, antegrade or retrograde nephroscopy/ureteroscopy with excision and ablation of the tumour can be an option [9–15]. Most patients, however, require nephroureterectomy. It was Clayman et al. [16] who in 1991 described the technique of laparoscopic nephroureterectomy (LNU). In that time it was a very long surgery with concerns about the oncological outcome.

After more than a decade, progressive acceptance and apprenticeship of laparoscopy in different centres all over the world have led to several publications (Tables 2–4). Transperitoneal (TP) or retroperitoneal (RP) laparoscopic or laparoscopic hand-assisted (HA) nephroureterectomy has become another minimally invasive option for the definitive surgical management of upper tract TCC [2, 3, 17–21]. Compared with open nephroureterectomy, this approach results in decreased morbidity, better hospital recovery, and briefer convalescence [2–8].

Indications and Contraindications

The indications for laparoscopic and laparoscopic-assisted NU are the same as those for an open procedure. TCC of the renal collecting system or the ureter is the most common indication. In patients at risk for renal failure following nephrectomy and with an early-stage and low-grade TCC, one should consider a renal-sparing approach. An uncorrected bleeding diathesis is the only absolute contraindication to the procedure. Chronic renal inflammation is a relative contraindication, since risk of complication and conversion is potentially increased.
Previous major open abdominal surgery can be better managed by the RP approach, and therefore is no longer a contraindication.

In patients with previous pelvic surgery, one should better proceed to laparoscopy of the kidney and then an open approach to the lower ureter.

**Preoperative Preparation**

The diagnoses of upper tract TCC should be confirmed by urography or a computed tomography scan or, as an alternative, by ureteroscopic evaluation and biopsy. Concomitant TCC should be excluded with cystoscopy and radiographic evaluation of the contralateral collecting system. In high-grade lesions, depending on the clinical extension, further staging can include chest radiography, computed tomography scan of the abdomen, bone scan and liver function tests.

When there is a risk of renal failure after nephrectomy, a preoperative nephrological evaluation will favour the postoperative management and eventual dialysis. A mechanical bowel preparation is not necessary in most patients. Prophylactic antibiotics should be given.

**Patient Positioning and Operating Room Configuration**

The intervention consists of two parts in our centre. In the first part, the management of the distal ureter, the patient is placed in a dorsal lithotomy position. In the second part, the NU itself, the patient is placed in a semilateral decubitus position (60° oblique position) with the operative table flexed. Pressure points are padded. The patient is secured to the table at the chest, lower hip, and knee level with wide cloth tape to ensure that no patient movement will occur during the procedure. The bottom leg is flexed and bent while the top leg is kept straight. Pneumatic stockings are placed on both legs.

The semilateral decubitus position, with the ipsilateral shoulder and hip rotated approximately 20–30° upwards, allows for the patient to be rotated from the flank position to a modified supine position without having to be repositioned on the table when initiating an eventual open distal ureterectomy.

Prior to insufflation, all patients are put under general endotracheal controlled anaesthesia, a nasogastric tube and, after a cystoscopic component, if necessary, a three-way Dufour catheter is inserted.

In a TP approach, the surgeon and his assistant stand on the contralateral side to the tumour. The scrub nurse with the instrument table is positioned on the ipsilateral side at the end of the table. Alternatively, an AESOP robot (Computer Motion, Santa Barbara, CA, USA) can be fixed to the ipsilateral side at the head of the operating table to hold the camera.

In the RP approach, the patient is placed on the operating table in a standard flank position with the pathology side facing up. The surgeon and the assistant are positioned facing the patient's back. The scrub nurse stands on the opposite side at the end of the table.

Two monitors, one on both sides of the patient, allow the operative team to view the procedure.

**Access and Trocar Placement**

In our institution, a TP approach with four trocars is utilized. Intraperitoneal access is initially obtained with the placement of a 10/12-mm trocar using the open-access technique at the level of the umbilicus but lateral to the rectus fascia depending on the obesity of the patient. A pneumoperitoneum is created by applying 10–15 mmHg of CO₂ pressure. Then two 10/12-mm trocars, one just above the iliac crest in the midclavicular line and another at the level of the umbilicus in the anterior axillary line, and a 5-mm trocar, substernal in the midclavicular line, are inserted under view. Additional trocars may be placed as needed for retraction of the liver, colon, ureter or kidney.

**Surgical Technique**

**Management of the Lower Ureter**

The development of endoscopic techniques (pluck or intussusception) at first allowed an improvement in the management of the lower ureter in open radical surgery [22, 23]. The incorporation of laparoscopic surgery in the radical treatment of TCC of the upper urinary tract has led to the new approaches in order to improve technical and oncological results [24–26]. Long-term comparative outcomes will ultimately solve the dilemma of the distal ureter [27] (Table 1).