



# Feasibility of Pure Conventional Retroperitoneal Laparoscopic Radical Nephrectomy With Level II Vena Caval Tumor Thrombectomy

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<b>OBJECTIVE</b>	To report our surgical outcomes and experiences with pure conventional retroperitoneal laparoscopic nephrectomy and tumor thrombectomy for patients with right renal tumors and level II inferior vena caval tumor thrombus.
<b>MATERIALS AND METHODS</b>	From February 2012 to June 2014, five patients underwent pure conventional retroperitoneal laparoscopic nephrectomy and tumor thrombectomy. After the inferior vena cava was blocked using tourniquet loops above and below the thrombus with the contralateral renal vein being clamped, the inferior vena cava was opened, and the tumor thrombus was fully extracted.
<b>RESULTS</b>	The mean patient age was 57 years (43-71 years) and the mean body mass index was 22.44 kg/m <sup>2</sup> (20-25 kg/m <sup>2</sup> ). The mean operative time was 241 minutes (180-300 minutes) and the mean estimated blood loss was 290 ml (50-1000 mL). The mean tumor size was 6.9 cm (3.5-9 cm) and the mean tumor thrombus length was 5.5 cm (4-10 cm). One patient needed an intraoperative transfusion, and the patient encountered bilateral lower limb deep vein thrombus. With a mean follow-up of 11.5 months (5-30 months), one patient was identified with lung metastasis 4 months postoperatively.
<b>CONCLUSION</b>	Although pure conventional laparoscopic nephrectomy and tumor thrombectomy for level II tumor thrombus are challenging, they are feasible in carefully selected patients. More studies are needed to confirm their superiority and oncologic outcomes. UROLOGY 90: 101–105, 2016. © 2016 Elsevier Inc.

Since laparoscopic radical nephrectomy (LRN) was initially performed by Ralph Clayman in 1990,<sup>1</sup> LRN has gained popularity and became a standard approach for the treatment of early stage renal tumors. As experience and techniques have advanced, urologists have turned their attention to cases once earlier considered to have relative contraindications to the laparoscopic approach.

Renal cell carcinoma has a propensity to develop tumor thrombus in 4-10% of cases.<sup>2</sup> Glazer and Novick reported that radical nephrectomy with caval thrombectomy provides the best chance of a long-term cure in the absence of nodal or metastatic disease.<sup>3</sup> With increasing experience and improved surgical techniques, many reports have shown successful performance of LRN in patients with

level 0 and I tumor thrombus.<sup>4-6</sup> However, outcome data on pure LRN with higher level tumor thrombectomy have been limited.<sup>7-9</sup>

Here, we report our surgical outcomes and experiences with pure conventional LRN with level II inferior vena cava (IVC) thrombectomy.

## MATERIALS AND METHODS

From February 2012 to June 2014, five patients underwent pure LRN with level II IVC thrombectomy in this study. All patients had clinically localized disease without metastasis. Renal tumors and IVC tumor thrombus (IVTT) were preoperatively evaluated by computed tomography and abdominal vascular magnetic resonance imaging (Fig. 1). The IVTT level was classified according to the Mayo Classification.<sup>10</sup> The renal cell carcinoma (RCC) was classified based on the American Joint Committee on Cancer 2010 tumor, lymph nodes, and metastasis staging criteria and the Fuhrman grading system. All tumors were right sided. Perioperative data were collected with institutional review board approval.

## Surgical Technique

All surgeries were performed in retroperitoneal approach as we described before.<sup>8</sup> Following general anesthesia and Foley

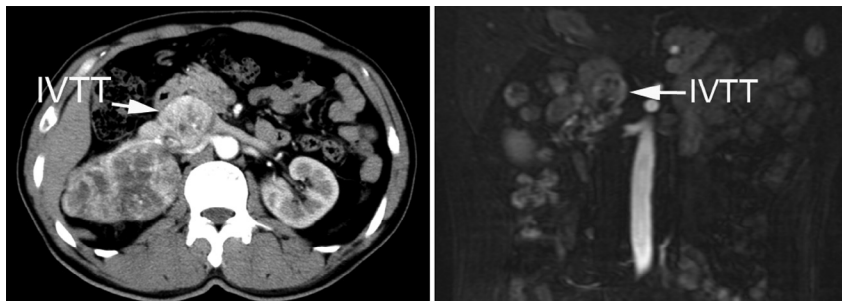
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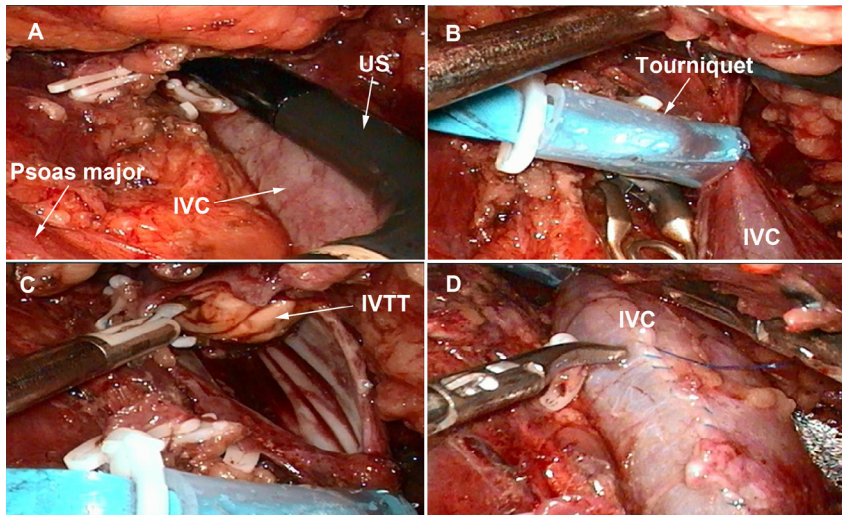
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**Figure 1.** An inferior vena cava tumor thrombus (IVTT) was identified in computed tomography and abdominal vascular magnetic resonance imaging scanning.



**Figure 2.** (A) Mobilizing the IVC and detecting the extent of the IVTT using laparoscopic ultrasound. (B) Blocking the IVC with tourniquet loops above and below the IVTT and securing the contralateral renal vein with a bulldog clamp at the same time. (C) Opening the IVC and dragging out the IVTT. (D) Suturing the IVC. IVC, inferior vena cava; IVTT, inferior vena cava tumor thrombus; US, ultrasound. (Color version available online.)

catheter placement, each patient was firmly secured to the operating table in a 90° full flank position. The right kidney bridge was elevated moderately, and the operating table was flexed to increase the space between the lowermost rib and the iliac crest. During the procedure, four trocars were utilized. Firstly, a 2 cm incision was made below the 12th rib in the posterior axillary line, and a 12 mm trocar was placed in the incision at the end of the trocar placement procedure. A limited retroperitoneal space was created with the index finger followed by a balloon dilator inflated with 800 mL air. Then, a 5 mm port was placed 2 cm below the costal margin in the anterior axillary line guided by the forefinger. One 10 mm port for a 30° camera was placed in the midaxillary line one fingerbreadth cephalad to the iliac crest, and one 12 mm port was inserted 3 cm anterior to the camera port.

Gerota's fascia was incised longitudinally in the general area of the renal hilum. Lifting the kidney, careful dissection in this area was performed to identify renal arterial pulsations, which could indicate the location of the renal artery. After complete mobilization of the renal artery, three Hem-o-lok clips were applied and the artery was transected (Fig. 2). Enlarged hilar lymph nodes were removed during dissection of the renal pedicle. Dissection continued toward the renal vein, which was lying posterior to the renal artery. As the renal vein was dilated by the thrombus,

it was easy to identify the renal vein and IVC. Any lumbar veins were clipped and severed. Then, dissection was continued upwards toward the adrenal gland as far as the diaphragm. The adrenal gland was isolated and the adrenal vein was clip-ligated and divided. After the kidney was fully mobilized, the IVC could be exposed, only connecting to the renal vein in the renal hilum area. The IVC was isolated upwards as far as possible, and intraoperative laparoscopic ultrasound was employed to identify the extent of the IVTT. A modified Rummel tourniquet technique was used in the next procedure. A tourniquet was fashioned by passing a rubber tape around a vessel and bringing both ends through a short rubber catheter, and the tourniquet was tightened and secured with a Hem-o-lok at the end of the catheter farthest from the vessel. Tourniquets were placed and tightened around the IVC above and below the IVTT, whereas the contralateral renal vein was secured with a bulldog clamp or a tourniquet (Fig. 2, Supplementary Video S1). Then, part of the IVC wall where the renal vein joins was resected, and the tumor thrombus was dragged out entirely (Fig. 2, Supplementary Video S2). The specimen was put into an endoscopic extraction bag as soon as possible to avoid tumor seeding. The IVC was stitched with a running 4-0 polypropylene suture (Fig. 2, Supplementary Video S3), and additional 5-0 polypropylene suture could be

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