Renal & Ureter Oncology

Video

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V397
THREE-DIMENSIONAL MAPPING AND VIRTUAL SURGICAL PLANNING FOR ROBOTIC ASSISTED PARTIAL NEPHRECTOMY

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INTRODUCTION AND OBJECTIVES: The use of three-dimensional maps and virtual surgical planning is well documented in the literature, however, not in regard to partial nephrectomy. For centrally located lesions where collecting system and vascular involvement is suspected, virtual surgical planning can be invaluable in assessing the feasibility of nephron sparing surgery in patients with complex renal masses. In this video, we review our experience with virtual surgical planning and the implications of using this technology for partial nephrectomy.

METHODS: Over the last year, we have encountered thirteen patients who have had centrally located endophytic renal lesions involving the collecting system. Each patient is sent for ultra thin cut CT (0.625 cm), and from those images a three-dimensional map of the patient's anatomy is generated. Using the three- dimensional map, the lesion is examined with respect to its collecting system and vascular involvement. Additionally, a mock resection bed is generated to evaluate if the resection can be tolerated, or if radical nephrectomy is indicated.

RESULTS: Of the thirteen patients who had three- dimensional mapping created, ten of the patients underwent partial nephrectomy whereas three patients had lesions that were deemed not amenable to nephron sparing surgery. All patients (partial or radical nephrectomy) had uncomplicated post operative courses.

CONCLUSIONS: Three-dimensional mapping and virtual surgical planning allow surgeons to evaluate patients for nephron sparing surgery for lesions they might have otherwise treated with radical nephrectomy. The three-dimensional map allows the surgeon to survey the patient's anatomy prior to the operation, guides the surgeon during the nephrectomy, and allows the surgeon to anticipate the resulting defect. Additionally, virtual surgical planning helps filter out those patients whose lesions are not amenable to nephron sparing surgery.

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ROBOTIC ZERO-ISCHEMIA PARTIAL NEPHRECTOMY FOR HILAR TUMORS

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INTRODUCTION AND OBJECTIVES: A significant concern with robotic partial nephrectomy (RPN) is the warm ischemia time (WIT) and the technical challenge associated with hilar tumors. Recently we have described a novel zero-ischemia laparoscopic/robotic partial nephrectomy (PN) technique. We detail our zero-ischemia RPN for hilar tumors and present the peri-operative outcomes.

METHODS: From May 2010 to May 2011, over 100 patients underwent minimally invasive zero-ischemia PN (21 RPN). Of these, there were 7 RPN for hilar tumors. The zero-ischemia technique consists of hilar micro dissection and applying superselective microbulldogs to sub segmental arterial branches in order to eliminate the blood supply to the tumor, without causing global renal ischemia. The procedure was offered to all patients, irrespective of tumor complexity, vascular anatomy or renal function.

RESULTS: Zero-ischemia RPN was successful in all seven cases without hilar clamping, conversion to open surgery or radical nephrectomy. Mean age (years), tumor size (cm), C-index, and R.E.N.A.L. score were 59, 3.8, 1.5 and 9.4 respectively. Mean operative time (min), WIT (min), estimated blood loss (cc), percent kidney spared, hospital stay (days) were, 237, zero, 228, 74 and 4.1 respectively. Transfusion was required in one patient. There were two complications of Clavien grade I and II. Pathology demonstrated renal cell carcinoma in 6 cases with all margins negative for tumor. Mean pre-operative and discharge serum creatinine (mg/dl) and eGFR were 1.1, 1.3 ($p=0.38$) and 66, 67 ($p=0.83$) respectively.

CONCLUSIONS: Zero-ischemia RPN for hilar tumors is safe and feasible. The added dexterity provided by the robot allows for optimal dissection around the hilum. Eliminating global renal ischemia seems to maximally preserve renal function.

Number of patients	7
Age (mean)	59.3
Gender female	4
Tumor size (mean)	3.8
C-index (mean)	1.5
R.E.N.A.L. score (mean)	9.4
Operative time (min)	237
Estimated blood loss (ml)	229
WIT (min)	0
Percent kidney spared (%)	74.2
Transfusion	1
Complications Clavien I/II	1/1
Hospital stay (days)	4.1
Renal Cell Carcinoma	6
Margins negative	7
Stage T1a/T1b/T3a	4/1/1
Preoperative eGFR (mean)	65.6
Discharge eGFR (mean)	67

Source of Funding: None

V399
INTRAOPERATIVE USE OF FLUORESCENCE IMAGING DURING ROBOTIC PARTIAL NEPHRECTOMY

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INTRODUCTION AND OBJECTIVES: Indocyanine green (ICG) is an injectable optical agent that generates a fluorescent image when excited by near-infrared laser light. Recently this agent has been used during robotic partial nephrectomy to aid in tumor identification. In this video we demonstrate a novel use for ICG by utilizing it to confirm ischemia to the target area of the kidney when performing selective arterial clamping during partial nephrectomy.

METHODS: In this video, three patients with renal parenchymal tumors were taken to the operating room for robotic partial nephrectomy. The standard techniques demonstrated previously for robotic partial nephrectomy were employed. After careful dissection of tertiary and quaternary branches of the renal artery and selective clamping, ICG was given to patients intravenously. An upgraded software system and laparoscope for the da Vinci Robot system were used to visualize the renal vessels and renal parenchyma. The performing surgeon then employed and evaluated this technology in demonstrating the location of vessels, effectiveness of clamping, and degree and location of ischemia during partial nephrectomy.

RESULTS: ICG infusion enabled clear, unequivocal visual confirmation of ischemia to the target area of the kidney containing the tumor. This allowed the operating surgeon to visually confirm ischemia in only the area of the kidney affected by the tumor, while confirming maintained perfusion to the remainder of the uninvolved renal paren-

chyma. In all cases, effective ischemia allowed for minimal blood loss and good visualization during tumor excision and renorrhaphy while the remainder of the kidney continued to be perfused.

CONCLUSIONS: Intraoperative fluorescence imaging can be effectively employed for selective arterial clamping. This technology provides real-time, intraoperative feedback regarding the effectiveness of intended ischemia, which allows the operating surgeon to excise the tumor with minimal blood loss and good visualization while the remainder of the kidney is perfused.

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V400

OPEN PARTIAL NEPHRECTOMY IN THE CENTRAL-HILAR RENAL MASSES: TECHNICAL REFINEMENTS THAT FACILITATE THE PROCESS

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INTRODUCTION AND OBJECTIVES: Partial removal of the central hilar renal masses is quite difficult. The results and facilitative technical refinements are presented in this study.

METHODS: Between 2004 and 2011, 13 patients (8 male, 5 female) with central hilar renal mass underwent open partial nephrectomy. Mean size of the renal mass was 5 cm (range; 3-8 cm). Three patients had solitary kidney. Thoracoabdominal incision with the removal of 9, 10 or 11 ribs and extrapleural- extraperitoneal approach applied to all patients. After the liberalization of the kidney, partial nephrectomy was performed with cold and warm ischemia in 5 and 8 patients, respectively. Tumor was dissected with 5- 10 mm healthy parenchyma, and segmental arteries encountered during parenchymal dissection instantly stitched and cut. Bleeding control by stitching segmenter arteries was simultaneously performed with dissection of the tumor. Renal pelvis immediately repaired. Parenchyma was attached by continuous or U suture with no:1 vicryl. Operation time, amount of blood loss, preoperative and postoperative creatinine values, perioperative and postoperative complications and recurrence of the tumor was recorded.

RESULTS: Average warm and cold ischemia time was 13 and 37 minutes, respectively. Mean blood loss was 300 cc (range: 70-600). DJ stent was placed to 7 patients in whom pelvicalyceal system was repaired. Average hospital stay was 4.8 days (range: 2-7). Pathology results were reported as renal cell carcinoma, angiomyolipoma and oncocytoma in 11, 1 and 1 patients, respectively. Local recurrence or systemic metastasis were not detected during a mean of 25 months (range: 9-50) follow-up. Creatinine level did not exceed 1.9md/dl during postoperative controls.

CONCLUSIONS: Immediate stitching of segmenter arteries during dissection of central hilar tumor is a facilitative technique in difficult cases.

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V401

ROBOTIC RADICAL NEPHRECTOMY WITH RESECTION OF INFERIOR VENA CAVA THROMBUS

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INTRODUCTION AND OBJECTIVES: Management of renal cell carcinoma with vascular invasion can be challenging. Extension of Renal Cell Carcinoma to the level of the Inferior Vena Cava occurs between 4%-10% on initial presentation. We present our technique of resection of Renal Cell Carcinoma with Inferior vena caval thrombus resection and subsequent reconstruction.

METHODS: After the renal artery was ligated, laparoscopic ultrasound was used to delineate the distal extent of the thrombus. It was noted that in the 2 weeks from imaging to surgery, the tumor had grown an additional 2 cm cephalad within the IVC, but still was infrahepatic, a level II IVC thrombus. A vessel loop is passed circumferentially around the caudal extent of the thrombus in order to prepare the Rommel tourniquet. A Satinsky clamp is placed above the thrombus. Using the Potts scissors, the IVC is incised and the thrombus is shelled out. A 4-0 Prolene was used in running fashion to repair the IVC.

RESULTS: EBL was 200cc, final pathology was papillary renal cell carcinoma with sarcomatoid change, Fuhrman nuclear grade 3, Stage T3AN0M0. The patient was discharged on post operative day #2.

CONCLUSIONS: Robotic radical nephrectomy with resection of IVC thrombus presents a challenging approach to vascular invasion of the IVC. However, repair and reconstruction of the IVC with thrombus extraction can be accomplished with the use of Rommel tourniquets and Satinsky clamps.

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V402

A LAPAROSCOPIC APPROACH FOR MANAGEMENT OF A LEFT RENAL CELL CARCINOMA WITH RENAL VEIN THROMBUS

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INTRODUCTION AND OBJECTIVES: Laparoscopic radical nephrectomy has been established as the ideal modality of surgical resection of organ-confined renal masses not amenable to partial nephrectomy. However, renal masses with a renal vein thrombus present a technically challenging situation for getting adequate control of the vein and achieving negative surgical margins. Left sided tumors present an additional challenge as getting adequate exposure and access to the junction of the vein with the vena cava is difficult from a standard left laparoscopic approach.

METHODS: In this video, we present our technique of managing a renal vein thrombus in a left sided renal mass through a laparoscopic approach using a patient case as an example. Patients with a preoperatively identified renal vein thrombus should undergo renal angiography with angioembolization to allow for control of the vein prior to taking the renal artery. The case should be started in a standard right lateral position, with the goal of dissecting the vena cava and left renal vein. Using Doppler ultrasound, the proximal extent of the thrombus should be determined and once it is confirmed that the thrombus does not extend into the vena cava, a laparoscopic stapler can be used to transect the renal vein. The patient can then be repositioned into a left lateral position for the remainder of the radical nephrectomy in standard fashion.

RESULTS: This technique has been used in two patients so far, with estimated blood loss ranging from 100-150 mL, total operative time ranging from 6-8 hours, and length of hospital stay being 4 days. This data suggests that positioning the patient in a standard right approach and getting venous control first, with later repositioning to a left approach for the completion nephrectomy is a safe and efficacious way to approach this challenging situation while adhering to oncologic principles.

CONCLUSIONS: Having a renal vein thrombus should not preclude laparoscopic surgery in patients, even for a left sided mass. Getting venous control and then repositioning the patient for removal of the mass is an oncologically sound method of removing a left renal mass with renal vein thrombus. Future studies still need to be performed to confirm these initial results.

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