PARTIAL NEPHRECTOMY FOR RENAL TUMORS

CHANGES IN FUNCTIONAL RENAL VOLUME AND USE OF MAGNETIC RESONANCE RENOGRAPHY TO EVALUATE

INTRODUCTION AND OBJECTIVES: Volume of functional renal parenchyma (FRP) is an important factor in glomerular filtration rate (GFR) following partial nephrectomy (PN), but is commonly overlooked. The loss of FRP may occur secondary to a variety of causes including surgical excision as well as ischemic/reperfusion injury and acute tubular necrosis following PN. Conventional imaging studies (CT and MRI) can estimate kidney volumes, but cannot measure FRP. Magnetic resonance renography (MRR) is a novel, clinically practical method of measuring single kidney GFR (SK-GFR) as well as the volume of FRP. In this study, we aim to investigate the impact of operative factors and tumor characteristics on FRP and SK-GFR loss as measured by MRR.

METHODS: Between October 2009 and August 2011, 15 patients (mean age 54.5, range 33-73) receiving PN for kidney tumors underwent pre-op and early (48 hours) post-op MRR in an IRB-approved, prospective study. MRR was performed at 1.5 T using coronal 3D imaging with TWIST after administration of 4mL of gadolinium contrast. Semi-automated in-house software was used to generate FRP volume and signal curves of the aorta, cortex and medulla, with conversion to SK-GFR using a tracer kinetic model as previously described. Linear regression and unpaired t-tests were utilized for statistical analysis. Tumor characteristics were quantified using nephrometry score.

RESULTS: Mean decrease in FRP volume was significantly correlated with mean decrease in SK-GFR (r=0.51, p=0.031). Nephrometry score did not have a significant correlation with FRP loss and decrease in SK-GFR (r=0.4, 0.35), however, nearness to the collecting system had the strongest association with SK-GFR decrease (p=0.002) in the immediate post-op period. Volume loss of FRP was a mean of 17 cc greater with warm ischemia compared to cold ischemia (p=0.031), and demonstrated moderate correlation with ischemia time (r=0.46, p<0.05).

CONCLUSIONS: A significant correlation exists between loss of FRP and decrease in SK-GFR immediately after PN. Nearness to the collecting system appears to be associated with an increased loss of FRP and SK-GFR. Pre-operative MRR to assess baseline SK-GFR and tumor characteristics may be useful in preventing unnecessary FRP loss by appropriately modifying surgical technique as well as factors such as ischemia type and time.

Source of Funding: RSNA Research Seed Grant (RSD0911) and Urology Seed Grant

1432 COMPARISON OF RENAL FUNCTION AFTER LAPAROSCOPIC RADICAL AND PARTIAL NEPHRECTOMY; 1 YEAR FOLLOW-UP RESULTS

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INTRODUCTION AND OBJECTIVES: To compare the 1 year follow-up results of renal function outcomes of laparoscopic radical nephrectomy (LRN) and laparoscopic partial nephrectomy (LPN) for renal tumor.

METHODS: From March 2008 to December 2010, we performed 145 cases of laparoscopic nephrectomy. Among these, we excluded patients received laparoscopic nephroureterectomy, laparoscopic simple nephrectomy, perioperative immunotherapy or target therapy and patients with preoperative GFR <60 mls/min. A total of 27 patients with LPN and 75 patients with LRN were enrolled. We retrospectively reviewed the changes of GFR (eMDRD method) - preoperative, postoperative 1 week, 1 month, 6 months, and 12 months.

RESULTS: Mean tumor size was smaller in the LPN group (3.2 vs 4.1 cm, p<0.05). However, mean age, BMI, preoperative GFR, operating time, estimated blood loss were not significantly different between two groups. Mean warm ischemia time of LPN group was 22 minutes (range, 0-47 min). Postoperative GFR of 1 week, 1 month, 6 months, 12 months were 73.3, 79.2, 71.7, 72.1 in the LPN group and 52.1, 52.8, 53.4, 52.4 in the LRN group, retrospectively. After 1 year of operation, 7.4% (2 patients) of LPN and 74.7% (56 patients) of LRN were developed to chronic renal insufficiency (GFR <60mls/min).

CONCLUSIONS: Despite of the concern for warm ischemia, LPN can preserve the renal function better than LRN. LPN should be considered for highly selected patients to preventing chronic renal insufficiency.

Source of Funding: None

1431 USE OF MAGNETIC RESONANCE RENOGRAPHY TO EVALUATE CHANGES IN FUNCTIONAL RENAL VOLUME AND GLOMERULAR FILTRATION RATES IN KIDNEYS FOLLOWING PARTIAL NEPHRECTOMY FOR RENAL TUMORS

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INTRODUCTION AND OBJECTIVES: Volume of functional renal parenchyma (FRP) is an important factor in glomerular filtration rate (GFR) following partial nephrectomy (PN), but is commonly overlooked. The loss of FRP may occur secondary to a variety of causes including surgical excision as well as ischemic/reperfusion injury and acute tubular necrosis following PN. Conventional imaging studies (CT and MRI) can estimate kidney volumes, but cannot measure FRP. Magnetic resonance renography (MRR) is a novel, clinically practical method of measuring single kidney GFR (SK-GFR) as well as the volume of FRP. In this study, we aim to investigate the impact of operative factors and tumor characteristics on FRP and SK-GFR loss as measured by MRR.

METHODS: Between May 2008 and September 2010, after protocol design and patient consent, we prospectively collected clinical data for 40 patients who concurrently underwent either en bloc stapling of renal hilum (n=20) or standard method (n=20) in LRN for renal cell carcinoma by an individual experienced surgeon. Clinical data included sex, age and BMI. Operative data included operative time, and estimated blood loss (EBL). Postoperative outcomes included hospital stay and pathologic results. To evaluate of arteriovenous fistula formation, patients with LPN and 75 patients with LRN were enrolled. We retrospectively reviewed the changes of GFR (eMDRD method) - preoperative, postoperative 1 week, 1 month, 6 months, and 12 months.

RESULTS: Mean tumor size was smaller in the LPN group (3.2 vs 4.1 cm, p<0.05). However, mean age, BMI, preoperative GFR, operating time, estimated blood loss were not significantly different between two groups. Mean warm ischemia time of LPN group was 22 minutes (range, 0-47 min). Postoperative GFR of 1 week, 1 month, 6 months, 12 months were 73.3, 79.2, 71.7, 72.1 in the LPN group and 52.1, 52.8, 53.4, 52.4 in the LRN group, retrospectively. After 1 year of operation, 7.4% (2 patients) of LPN and 74.7% (56 patients) of LRN were developed to chronic renal insufficiency (GFR <60mls/min).

CONCLUSIONS: Despite of the concern for warm ischemia, LPN can preserve the renal function better than LRN. LPN should be considered for highly selected patients to preventing chronic renal insufficiency.

Source of Funding: None
RESULTS: Operative time and EBL is lower in the en bloc group (Operative time: en bloc: 57.95±9.076 minutes, standard: 71.50±7.964 minutes, p-value <0.001; EBL: en bloc: 36.00±13.53 ml, standard: 50.50±29.82 ml, p-value=0.012). Postoperatively, no statistically significant differences in either of the variables relating to the cardiovascular system (BP and HR) occurred and no instances of bruits or other clinical evidence of AVF were found after 12 month follow-up after operation.

CONCLUSIONS: En bloc stapling of renal hilum for LRN has been favorable in terms of operating time, EBL, and facility. The AVF formation after en bloc ligation was not observed on the clinical follow-up and radiological evaluation.

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Source of Funding: None

1434
IDENTIFYING COLLECTING SYSTEM ENTRY AND THE INTEGRITY OF REPAIR DURING OPEN PARTIAL NEPHRECTOMY: COMPARISON OF TWO TECHNIQUES
Sammy Moussly, Sandhya R. Rao*, Michelle Pacheco, Philippe E. Spiess, Wade J. Sexton, TAMPA, FL

INTRODUCTION AND OBJECTIVES: Nephron sparing surgery is the current treatment standard for most small renal masses. The resection of deep endophytic tumors often entails entry into the collecting system which if not recognized and repaired may lead to the development of a postoperative urinary fistula. Some investigators advocate the placement of an externalized ureteral catheter with retrograde dye injection to recognize calyceal entry and/or to test the integrity of the repair whereas others use needle injection of dye directly into the proximal ureter. This study compares the two techniques with regard to perioperative outcomes.

METHODS: We retrospectively reviewed the records of 259 consecutive patients who underwent open partial nephrectomy from 2005 to 2010. Patients undergoing laparoscopic or robotic assisted partial nephrectomy were not included in the review. Externalized ureteral catheters were placed preoperatively in 110 patients (Group 1) and needle injection of methylene blue was used in 120 patients (Group 2). No assessment of collecting system integrity was performed in 29 patients (Group 3). We compared intraoperative parameters including tumor size, EBL, ischemia time, operative time, recognized entry into the collecting system as well as the incidence of postoperative urinary leaks.

RESULTS: The average tumor size was 3.1 cm in Group 1, 3.6 cm in Group 2 and 3.8 cm in Group 3 (p=0.04 between groups 1 and 2); mean EBL was 320 cc, 351 cc and 376 cc (p =0.5); mean warm ischemia time was 19.6 mins, 27 mins and 22.5 mins (p<0.001); mean operative time was 193.5 mins, 221 mins and 290 mins (p<0.001); and the mean hospital stay was 5 days in each of the groups. Collecting system entry was recognized in 69 cases (63%) in Group 1 compared to 91 (76%) in Group 2 and 11 (38%) in Group 3 (p=0.07). Postoperative urine leak requiring any form of management (prolonged JP drain, JJ stent, Foley catheter) occurred in 11 patients from group 1 and 6 from group 2. (p=0.07). None of the patients in group 3 developed a urinary leak.

CONCLUSIONS: The perioperative leak rate in patients undergoing partial nephrectomy is unaffected by the intraoperative technique of identifying calyceal entry and the integrity of subsequent collecting system repair. Postoperative urine leaks are uncommon (6.6% in this series) despite recognized entry into the collecting system in the majority of patients (66%, 171 of 259).

Source of Funding: None

1435
IMPACT OF ISCHEMIA TIME AND MODALITY ON RENAL FUNCTIONAL OUTCOME AFTER OPEN PARTIAL NEPHRECTOMY
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INTRODUCTION AND OBJECTIVES: Renal functional decline after nephron sparing surgery (NSS) may be related to a variety of nonmodifiable and modifiable factors, such as ischemia time and ischemia technique. We sought to determine the impact of these factors on renal functional degeneration after NSS.

METHODS: Multicenter retrospective analysis (n=347), identifying patients who underwent open NSS using warm, cold, and nonischemic technique. Patient demographics, RENAL nephrometry scores, pathologic, and peri-operative outcomes were compared using Chi2, Fisher’s exact test, ANOVA, Kruskal-Wallis test, and Mann-Whitney U test. Primary outcome was development of de novo CKD 6 months after surgery (eGFR <60 ml/min/1.73 m2, MDRD equation). Multivariate analysis (MVA) was performed examining factors associated with the development of de novo eGFR<60.

RESULTS: Median follow-up 34.7 months (IQR, 18.8-64.2), 241 patients underwent warm ischemia, 31 cold ischemia, and 75 no-ischemia. All 3 groups were similar in mean age (p=0.385), sex (p=0.876), race (p=0.536), mean BMI (p=0.322), hypertension (p=0.159), smoking (p=0.253), and diabetes (p=0.542). All 3 cohorts also had similar proportions of benign/malignant pathology (p=0.711) and pathologic T1/T2+ tumors (p=0.192). The cold ischemia cohort had longer median ischemia times than the warm ischemia cohort (50 vs. 25 min, p=0.003). The no-ischemia group had lower mean RENAL scores (6.4±1.6) than cold (7.9±1.7, p=0.005) and warm (7±1.8, p=0.037) groups. There were no significant differences in percentage of patients who developed de novo eGFR<60 (warm 14.9%, cold 15%, and no-ischemia 8.7%, p=0.422). MVA demonstrated that ischemic time >20 minutes is an independent risk factor of de novo CKD 6 months (OR 2.63, p=0.041) and RENAL score >9 (OR 4.40, p<0.001) were factors associated with developing de novo eGFR<60.

CONCLUSIONS: RENAL nephrometry score >9 and ischemia time >20 minutes are independent risk factors associated with de novo eGFR<60 post-NSS. Further investigation is requisite to elucidate the complex differential effects of these factors.

Source of Funding: None

1436
ONCOLOGICAL LONG-TERM OUTCOME OF PATIENTS PRESENTING WITH CHROMOPHOBIC, PAPILLARY AND CLEAR-CELL RENAL CELL CARCINOMA
Sebastian Frees*, Lisa Knöchlein, Christopher Ziesel, Walburgis Brenner, Christian Thomas, Christian Hampel, Joachim W. Thüroff, Frederik C Roos, Mainz, Germany

INTRODUCTION AND OBJECTIVES: Renal cell carcinoma (RCC) accounts for 3% of all solid tumors and consist of three main...
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