Poster Session 4: Kidney Cancer
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MP-04.01
The renal nephrometry score is a predictor of pathologic upstaging in clinical T1 renal cancer

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Introduction and Objectives: To utilize pre-operative anatomic imagining characterization with the R.E.N.A.L. Nephrometry Score (RNS) to predict pathologic upstaging of clinical T1 (cT1) lesions to pathologic T3 (pT3) in partial and radical nephrectomy specimens.

Methods: We retrospectively reviewed all patients undergoing radical and partial nephrectomies between January 1, 2011 and June 30, 2014 for cT1 renal masses. All pre-operative imaging scans were reviewed and the R.E.N.A.L. Nephrometry score (radius for tumor size as maximal diameter, exophytic/endophytic tumor properties, nearness of deepest portion of tumor to collecting system or sinus, anterior/posterior descriptor and location relative to polar line) was applied to each scan. Chi-square, Fisher exact test, and Student t test were utilized to examine associations.

Results: A total of 229 patients underwent surgery and 124 (54%) underwent partial nephrectomy. On pathologic review, 195 (85%) patients had malignancy and 154 (79%) of these tumors were clear cell carcinoma. Twenty-six (13%) patients were pathologically upstaged to pT3 with the majority attributable to renal sinus/fat (35%) or perinephric fat (31%) involvement. A high RNS (>10) was significant in predicting pathologic T3 upstaging (p=0.039) but did not predict high grade (Furhman grade 3-4) disease (p=0.803). While a high nephrometry score trended toward predicting malignancy vs. benign disease (p=0.086), a higher mean nephrometry score (7.81 vs. 6.84) significantly predicted malignancy (p=0.015). Overall upstaging to pT3 was more common with patients treated with radical nephrectomy (23 vs. 8%, p=0.005); however, this was not statistically significant when controlled for RNS >10 (p=0.313). When controlled for cT1a lesions, tumor location relative to polar lines (L=3 vs. L1+2) was predictive of pT3 upstaging (24 vs. 6%, p=0.03). Age >65 was significantly associated with upstaging (26 vs. 7%, p=0.0001).

Conclusions: Older age and a high renal nephrometry score predicted upstaging of cT1 lesions to pT3. Mean nephrometry score predicted malignancy. For cT1a lesions, a high score of location relative to polar lines significantly predicted upstaging. Radical nephrectomy specimens were more likely to be pathologically upgraded but this was not statistically significant when controlled for RNS.

MP-04.02
Evaluation of the non-neoplastic kidney as a predictor of renal insufficiency in radical nephrectomy specimens

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Introduction and Objectives: To identify predictors of post-operative (PsO) renal insufficiency by analyzing clinical co-morbidities and pathologic changes in the non-neoplastic kidney (NNK) parenchyma of patients undergoing radical nephrectomy (RN) for suspected renal malignancy.

Methods: We retrospectively reviewed all patients who underwent RN between January 1, 2011 - May 31, 2014. All slides were independently reviewed by a dedicated pathologist for any glomerular, tubulointerstitial, arterial/arteriolar changes (GTA). Statistical analysis using Chi-square and Student t test were utilized to examine associations. Estimated glomerular rate (eGFR) was calculated using chronic kidney disease epidemiology collaboration formula.

Results: Of the 147 patients undergoing RN, 111 (75%) had NNK changes. Of these patients, 66 had moderate/severe changes to any part of their GTA architecture; 52% had changes in all three areas. Patients with severe GTA changes were not more likely to have declines in PsO renal function when compared to those with mild or unremarkable kidneys (p=0.101). However, those with combined severe arterial and glomerular changes had worse PsO renal function (p=0.007). Those pre-operative (PrO) eGFR > 60 ml/min/1.73m2 had a greater decrease PsO renal function than those with a PrO eGFR of <60 (30 vs 16ml/min/1.73m2, p<0.0001). Patients with tumor size <10 cm had a greater decrease in PsO renal function compared with tumor size > 7 cm (29 vs 22 ml/min/1.73m2, p=0.029). Diabetes and age >68, hypertension, nor smoking status were associated with greater decreases in post-operative renal function.

Conclusions: Tumor size, pre-operative eGFR, age, and severe arterial-glomerular changes were significant predictors of declines in post-operative renal function. Further investigation with special stains of NNK may aid in prediction and have significant clinical implications.

MP-04.03
National research prioritization in kidney cancer in Canada using a priority setting partnership (PSP) model

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Introduction and Objectives: Global research funding is facing austere times. The processes of research prioritization are complex and rarely reflect direct patient engagement. Using an established four-step methodology developed by the James Lind Alliance (JLA; www.jameslind.org), the Kidney Cancer Research Network of Canada (KCRNC) formed a priority setting partnership (PSP) which aims through a collaborative consensus-based approach to identify the ten most important unanswered research questions (or uncertainties) about the management of kidney cancer from the perspective of Canadian patients, carers, and health care providers.

Methods: The 4-step methodology included: (1)An anonymized online/paper-based survey with 10 domains covering every aspect of kidney cancer was administered across Canada via the KCRNC asking patients, carers, health-care professionals(HCPs) what they thought were important unanswered uncertainties. (2)Detailed literature search was performed to sieve out answered uncertainties. (3)An interim ranking process by the steering committee, the long-list was short-listed to 30. (4)These 30 were presented

to a national kidney cancer forum workshop attended by patients, carers and HCPs who deliberated on the list and agreed on the final 10.
Results: From 225 respondents (59% patients, 27% HCPs, 14% carers), 2004 individual questions were posed. These were reduced to 451 after removing duplicates. The domains included prevention /prediction, diagnosis, management of localised/locally advanced disease, management of metastatic disease, prognosis /follow up, survivorship, impact of disease, health economics, community of practice/ information, miscellaneous. Thirty per cent pertained to metastatic RCC, 25% to survivorship. These were edited to 246 after filtering out answered uncertainties, and subjected to discussion by the steering group to produce a short-list of the top 30 unanswered queries. These were presented at a national kidney cancer forum where consensus of the top 10 research uncertainties was reached.
Conclusions: This study highlights the importance and feasibility of research prioritization in kidney cancer in Canada and the key tenet of patient-centred research which translates to patient-centred care.

MP-04.04

Perioperative outcomes from radiofrequency ablation of renal masses: Associations with RENAL nephrometry scores

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Objectives: Radiofrequency ablation (RFA) is an accepted treatment option for select patients with renal cell carcinoma (RCC). Risks of RFA include incomplete tumour ablation, hemorrhage, and collecting system injury. The RENAL Nephrometry score classifies renal tumour complexity. We explored associations between RENAL Nephrometry scores and periprocedural RFA outcomes in a large single-institution cohort.
Methods: We retrospectively analyzed patients who underwent percutaneous RFA for localized RCC at Massachusetts General Hospital from 1998-2012. The primary outcomes were clinically significant complications (Clavien grade ≥ 3) within 60 days of RFA and incomplete tumor ablation necessitating repeat RFA within 6 months. Multivariable logistic regression models were fitted accounting for baseline patient and tumor characteristics to explore associations between RENAL scores with periprocedural outcomes.
Results: A total of 374 RFAs were performed on 338 patients. Grade ≥ 3 complications occurred in 5.1% and included collecting system injury (2.4%), hemorrhage/pseudoaneurysm (2.1%), bowel injury (0.8%) and sepsis (0.3%). Among patients with low (≤ 6) and high (≥ 10) RENAL scores, grade ≥ 3 complications occurred in 3.1% and 11.9% and incomplete tumor ablations occurred in 4.5% and 37.2%, respectively. Adjusting for baseline age, gender, and Charlson comorbidity index, high RENAL score was independently associated with grade ≥ 3 complications (OR:2.17, p=0.03) and incomplete tumour ablation (OR: 13.3, p<0.0001).
Conclusions: Complications from RFA are uncommon but increase significantly in tumors with high RENAL Nephrometry scores. These findings may facilitate patient counselling, particularly when considering the relative merits of RFA versus active surveillance in high-risk patients with RCC.

MP-04.05

Needs Assessment Survey for the Management of Renal Cell Carcinoma

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Introduction and Objectives: The purpose of this study was to determine self-perceived kidney cancer knowledge gaps and continuing medical education (CME) preferences of urologists and medical oncologists.
Methods: A needs assessment survey was created using standardized methodological survey design and an iterative feedback process with the Quality Initiative group of the Kidney Cancer Research Network of Canada. It was then emailed to all Canadian urologists and medical oncologists. The survey content was based on 23 previously validated quality indicators of kidney cancer care. Topics covered included: screening, diagnosis/prognosis, surgical management, systemic therapies, and follow-up care.
Results: Of the 164 respondents who treated kidney cancer, 121 (74%) were urologists and 43 (26%) were medical oncologists. The majority of respondents practice in academic or large urban community centers and had some level of sub-specialty training. Twelve of the 23 quality indicators examined were identified as priority topics based on perceived knowledge gaps and/or high CME interest including: determination of performance status, selection of patients for screening for hereditary kidney cancer, selection of appropriate patients for cytoreductive nephrectomy, surgical resection of non-regional metastatic disease, and management of metastatic disease with systemic therapy. Urologists and medical oncologists preferred to attend CME activities directed by local/national experts at regional meetings using evidence based standardized cases.
Conclusions: Canadian urologists and medical oncologists reported similar knowledge gaps and CME preferences regarding kidney cancer care. Knowledge gaps were predominantly related to screening for hereditary kidney cancer as well as surgical and systemic management of advanced disease. A CME program has been developed and is being administered to target these priority topics.

MP-04.06

Conservative management of biopsy proven oncocytomas: Is it safe?

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Introduction: Despite the recognition that a large proportion of small renal masses (SRMs) are benign, the vast majority are still being managed by upfront ablative approaches. Many centers have demonstrated that renal tumor biopsies (RTBs) is a safe and accurate alternative to preoperatively identify the histology of SRMs, including oncocytomas. However, non-invasive methods to reliably differentiate oncocytomas from their malignant counterparts are still lacking. Moreover, studies on the natural history on oncocytomas are lacking. The objectives of this study were to evaluate the growth rate of histologically proven oncocytoma and to improve our understanding of the natural history of these benign lesions.
Methods: This is single-center retrospective study in which we identified 110 patients diagnosed with an oncocytoma following RTB or surgery between 2003 and 2014. Masses with less than 12 months of imaging

follow-up were excluded, leaving 80 (72 patients) available for analysis. The average growth rate was estimated using mixed effect linear model adjusted for individual clustering. Patient demographics and lesion characteristics were also tested for association with growth rate.
Results: Among the 80 lesions, 95.0% were diagnosed following RTBs. After a median imaging follow-up of 33.4 months, the lesions had grown by a median of 0.5cm. The average annual growth rate was 0.15cm (95% CI:0.07-0.23). Baseline lesion size was significantly associated with growth rate on multivariable analysis (p<0.001). Three patients had a repeat RTB during the follow-up period. The initial diagnosis was confirmed in all three. One of them opted for surgery despite the reassuring histology and the surgical pathology confirmed the benign entity. Overall, 4 patients had died at the time of analysis, all from non-renal related causes.
Conclusion: Despite being benign, the majority of oncocytoma will grow over time. Regardless of this, oncocytomas can be safely managed with regular imaging following a diagnosis based on RTB. Nonetheless, patients opting for a surveillance strategy should be made aware that a diagnosis of oncocytoma based on RTB is associated with a certain degree of uncertainty due to the difficulty of differentiating them from chromophobe renal cell carcinoma and the possibility of hybrid tumors.

MP-04.07
Ex vivo tumor invasion predicts clinically aggressive subtype in non-clear cell renal cell carcinoma
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Introduction and Objectives: Renal cell carcinoma (RCC) is the most frequent neoplasm of the kidney. While most RCC is of clear cell (cc-RCC) histology, up to 25% of patients will be affected by non-clear cell cancer (ncc-RCC). Furthermore, the optimal therapy for ncc-RCC is not well established. Ex vivo models of tumor growth and invasion may provide an opportunity to study non-clear cell cancers. We report the successful growth and differential invasion pattern of ncc-RCC in an ex vivo invasion assay.
Methods: Institutional review board approved our study. Viable portions of tumor were obtained from radical nephrectomy specimens and implanted into wells containing collagen type I gel. Microscopic tumor invasion was measured over 5 days. Invasion distance was recorded for 4 histologic subtypes of ncc-RCC: papillary type I, papillary type II, chromophobe and collecting duct.
Results: 64 samples from 15 tumors demonstrated viability and were successfully grown in collagen media. Tumor fragments in the chromophobe group (n = 13) demonstrated a minimal mean invasion distance of 96 +/- 35.1 μm. Type II papillary RCC (n = 21) demonstrated greater distance of invasion (1011 +/- 535 μm) than type I papillary (n = 19, distance = 621 +/- 209 μm, $p < 0.001$). Tumor fragments from collecting duct cancer (n = 11) had a similar invasion distance (950 +/- 220 μm) as type II papillary.
Conclusions: Non-clear cell RCC tumor invasion can be evaluated in an ex vivo assay. Tumor behavior in this model is consistent with known clinical aggressiveness of the various ncc-RCC subtypes. Distance of invasion is dependent on histologic type, with more aggressive subtypes (type II papillary and collecting duct) demonstrating farther tumor invasion than less aggressive subtypes. Our data suggest that an ex vivo invasion assay may be a valuable method to study tumor growth. This is an opportunity to determine the impact of systemic therapies on tumor growth and invasion in a laboratory setting.

MP-04.08
Heterogeneity of tumor invasion and response to therapy in clear cell renal cell carcinoma with tumor thrombus: An ex vivo analysis
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Introduction and Objectives: Intra-tumor heterogeneity is a known biologic phenomenon in the progression of clear cell renal cell carcinoma (ccRCC). Such heterogeneity can contribute to therapeutic resistance in subpopulations of tumor cells. While genetic variation can exist between a primary tumor and an associated venous tumor thrombus, the variation in growth and response to treatment has not been well characterized. We report the heterogeneity of tumor invasion and therapeutic response using an ex vivo assay of primary tumors and venous tumor thrombi.
Methods: Institutional review board approved our study. Viable portions of tumor were obtained from the primary tumor and venous tumor thrombus of radical nephrectomy specimens and implanted into wells containing collagen type I gel. Microscopic tumor invasion was measured over 5 days. Invasion distance was recorded for control wells (untreated) and wells treated with sorafenib (vascular endothelial growth factor inhibitor), sirolimus (mammalian target of rapamycin inhibitor) or cisplatin (platinum chemotherapy).
Results: 47 samples from 3 ccRCC renal tumors and 55 samples from corresponding venous tumor thrombi demonstrated viability. Tumor fragments in the tumor thrombus group demonstrated a marked propensity for invasion over the primary tumor group (679 +/- 409 μm vs. 327 +/- 216 μm mean invasion distance of 950 +/- 220 μm, $p < 0.05$). Tumor invasiveness was inhibited by sorafenib (-19%), sirolimus (-20%), and cisplatin (-42%) in samples from tumor thrombi. Samples from primary tumors demonstrated only a modest inhibition by sirolimus (-9%) and increased invasion with cisplatin (+28%) and sorafenib (+72.5%).
Conclusions: Samples of ccRCC from both primary tumors and venous tumor thrombi can be successfully cultured using a collagen type I assay. Venous tumor thrombi have a greater propensity for invasion and a greater response to therapy than the primary clear cell tumors. Our data is hypothesis generating. While platinum-based chemotherapy has not been globally useful in the management of metastatic ccRCC, there may be an opportunity for downstaging of IVC thrombus level in the neoadjuvant setting. Further study is needed.

MP-04.09
Hepatotoxicity rates among Alberta patients treated with Pazopanib for metastatic renal cell carcinoma
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Introduction and Objectives: Pazopanib is a multi-tyrosine kinase inhibitor (TKI) approved in the first line setting for metastatic renal cell carcinoma (mRCC). Although it has similar efficacy compared to sunitinb (another approved 1st line therapy for mRCC), it also carries an increased risk of hepatotoxicity (Kapadia S et al, *Acta Oncol* 2013;**52**:1202-12) (Iacovelli R et al, *Br J Clin Pharmacol* 2014;**77(6)**:929-38) Clinical trials have documented incidences of high-grade liver enzyme (LE) and total bilirubin (TB) elevations of 6.9-9.4% and 3.4% respectively (Kapadia S et al, *Acta Oncol* 2013;**52**:1202-12). We sought to investigate the incidence, severity, and resolution rate of drug induced liver toxicity in patients who were exposed to pazopanib for mRCC in Alberta.
Methods: We conducted a retrospective review of patients diagnosed with mRCC treated with pazopanib between 2012-2014 in Alberta. The variables collected included patient age, prior TKI exposure, pazopanib start date and dose, as well as the date and reason for dose modification or medication discontinuation. The alanine transaminase (ALT), aspartate

aminotransferase (AST), and TB trend was documented starting at baseline prior to exposure and then at each follow up interval. For patients with elevated LE and TB, we tracked the trend following medication discontinuation to assess for resolution.
Results: A total of 38 patients across Alberta were exposed to pazopanib over the two-year study interval. Nine (23.6%) patients received pazopanib as first line treatment, while 29 (76.3%) were switched to pazopanib post sunitinib exposure due to sunitinib intolerance. Overall, 16 patients (42.1 %) experienced elevation in liver enzymes, with incidence of all-grade toxicity of AST, ALT, and TB of 10 (26.3%), 11 (28.9%), and eight patients (21.0%) respectively. On pazopanib discontinuation, nine patients (56.2%) had complete LE resolution and two patients (12.5%) experienced a partial resolution in toxicity. In total, four out of nine patients (44.4%) with LE resolution were re-challenged with pazopanib with two patients (50%) experiencing re-emergence of hepatoxicity.
Conclusions: Our data suggests that hepatotoxicity is common with pazopanib and is reversible with pazopanib discontinuation. Re-challenge with dose reductions may lead to reoccurrence of hepatotoxicity.

MP-04.10

A propensity-matched analysis of laparoscopic vs. open surgery for pT3a renal cell carcinoma

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Objectives: Laparoscopic renal surgery (LRS) offers reduced morbidity compared to open renal surgery (ORS) and is an established method for treating pT1-2 renal cell carcinoma (RCC). However, the role of laparoscopic surgery for more advanced lesions is less known, and may be underutilized due to a concern that ORS provides more favorable oncological outcomes. Using a propensity-matched comparison, we compared outcomes for LRS and ORS in the treatment of pT3a RCC.
Methods: The Canadian Kidney Cancer Information System is a prospectively maintained database for patients diagnosed with RCC from 15 Canadian institutions. Patients treated for non-metastatic pT3a RCC between 2008-2014 were included. Propensity score matching for age, gender, tumor size, grade, histology and surgical approach were performed to compare LRS (laparoscopic radical (LRN) and partial nephrectomy (LPN)) with ORS (open radical and partial nephrectomy (ORN and OPN)). The primary endpoint was progression-free-survival (PFS), defined as the development of metastatic disease or local recurrence. The Kaplan-Meier method was used to estimate survival.
Results: 337 patients were identified, of which 150 (45%) underwent LRS (88% LRN and 12% LPN) and 187 (55%) underwent ORS (76.5% ORN and 23.5% OPN). Each LRS patient was matched with a patient undergoing ORS based on the closest propensity score. After a median follow-up of 15 months, 78 patients had progressed (metastasized or recurred). The median time to progression was not significantly different between LRS vs. ORS (46 months vs. not reached, p=0.8). The 2-year PFS was 73% in both the LRS and ORS groups. On subgroup analyses, the time to progression was not significantly different between LRN vs. ORN (p=0.8, median time to progression of 45 months vs. not reached) or LPN vs. OPN (p=0.9, median time to progression not reached for either). The 2-year PFS was 71% vs. 70% in the LRN vs. ORN groups, and 88% vs. 94% in the LPN vs. OPN groups, respectively (Fig. 1).
Conclusions: This study is the largest matched analysis comparing laparoscopic and open extirpative renal surgery for locally advanced disease. LRS (radical or partial) for pT3 RCC was not inferior to ORS with short-term oncological follow-up.

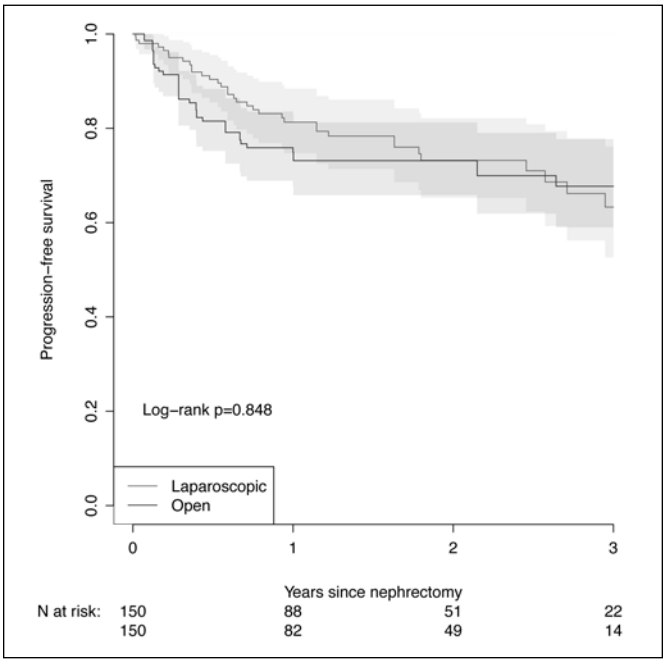

Fig. 1. MP-04.10.

MP-04.11

Estimate the clinical and economic impact of urologists' adherence to the follow-up guidelines after radical or partial nephrectomy for localized and locally advanced renal cell carcinoma in Canada

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Introduction and Objective: To estimate the clinical and economic impact of urologists' adherence to the Canadian Urology Association (CUA) guidelines related to the follow-up after radical or partial nephrectomy in Canada as approved in 2009.
Methods: The study cohort was based on the Canadian Kidney Cancer Information System including six Canadian provinces. Our cohort includes patients having had radical or partial nephrectomy between Jan2011 and Jan2014. Kaplan-Meier method was used to evaluate the recurrence rate by urologists' adherence to the CUA follow-up guidelines. Cox proportional hazard model was used to evaluate association between time to recurrence and adherence level adjusted for pathological stage.
Results: A cohort of 1,030 patients with an average age of 61 years old has been selected. The mean follow-up was 12 months. During the

follow-up, 34.7% of patients had the exact number of abdominal CT or ultrasound tests as dictated by the CUA guidelines, whereas 58.9% of patients had more tests and 6.5% less tests, respectively. Two-year recurrence rate was 27% in patients with more abdominal CT or ultrasound than recommended by guidelines, and 20% in the others (p-value < 0.0001). When adjusted for pathological stage, a hazard ratio of 3.1 (95%CI: 2.1-4.5) was estimated for patients with more abdominal CT or ultrasound than recommended by guidelines compared to the others. At a Canadian level the mean observed cost of surveillance of each annual cohort was estimated at $3,8M while the expected cost following CUA guidelines was estimated at $1,2M, over a mean follow-up of 12 months.
Conclusions: The results suggest that clinicians have performed a more intense surveillance in patients with poor clinical outcomes. Further analysis should be performed after a longer duration of follow-up to evaluate survival in these patients. A more intense surveillance increased the economic burden of follow-up after radical or partial nephrectomy at the Canadian level.

MP-04.12

Early clamp release during laparoscopic partial nephrectomy: Implications for preservation of renal function

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Introduction: Partial nephrectomy is the gold standard for management of small renal tumors. Intra-operative warm ischemic time (WIT) is a known, reversible risk factor for short and long-term renal dysfunction. We describe a new technique for laparoscopic partial nephrectomy to reduce WIT and assess impact upon renal function and bleeding.
Methods: We retrospectively assessed patients who underwent either robot-assisted, hand-assisted, or traditional laparoscopic partial nephrectomy from May 2012 to March 2015 at our center, by a single surgeon. We compared the standard procedure to our modified early clamp release (ECR) technique. We evaluated WIT, estimated blood loss (EBL), change in estimated glomerular filtration rate (eGFR) and change in differential function as demonstrated by nuclear renograms. Follow-up lab work and renograms were done at 6-12 weeks post-operatively and compared to baseline in 56 patients (28 ECR: 28 control). Patients with solitary kidneys, missing data and those undergoing open, and clamp-free partial nephrectomy procedures were excluded from analysis. All patients had both artery and vein clamped without the use of ice slush.
Results: The ECR group and control groups were similar in age, sex, and tumor size. There was no difference in ratio of robotic: pure laparoscopic: hand assisted cases in between groups. Although patient weight was higher in the ECR group (96.7 vs. 80.8 kg; p<0.05), WIT was significantly lower in ECR group compared to control (18.4min vs. 30.5min; P < 0.05). There was no significant difference in EBL in the two groups (310ml vs. 292ml; p = NS). Although there was no significant difference in change from baseline eGFR in the early post-operative period (day 3) or in follow-up (6-12 weeks), the control group had a significantly greater loss of differential renal function from baseline compared to the ECR group (8% versus 3% change; P < 0.05).
Conclusions: The ECR technique offers a safe, reproducible alternative that reduces WIT during laparoscopic partial nephrectomy. This is accompanied by reduction in overall ipsilateral renal dysfunction, without increasing bleeding risk. Lack of eGFR change at 6-12 weeks may imply lack of sensitivity of the assay, small patient numbers in the study, or limited clinical impact of the technique.

MP-04.13

Population-based assessment of cancer specific mortality after local tumor ablation or expectant management for small renal masses: A competing risk analysis

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Introduction: Local tumor ablation (LTA) and expectant management (EM) represent competing treatment options for patients with small renal masses (SRMs). We relied on competing risks regression to examine the potential difference in cancer specific mortality (CSM) that could distinguish between these two alternative treatment modalities.
Methods: The study focused on 1860 patients with cT1a kidney cancer treated with either LTA or EM between 2000 and 2009 in the Surveillance Epidemiology and End Results-Medicare database. Propensity-score matching was used to reduce potential measured differences between LTA and EM patients. CSM represented the study outcome. Multivariable competing risks regression analyses adjusting for other-cause mortality as well as patient (including comorbidities) and tumor characteristics were fitted.
Results: Prior to propensity-score matching, fewer patients had LTA vs. EM (30% vs. 70%; n=553 vs. n=1070). Compared to EM patients, LTA patients were younger (median age 77 vs. 78 years; p<0.001), more frequently Caucasian (84 vs. 78%; p=0.005), more frequently married (59 vs. 52%; p=0.02) and more frequently of high socio-economic status (54 vs. 45%; p=0.001). After propensity-score matching, 553 LTA and 553 EM patients remained for subsequent analyses. The mean standardized differences of patient characteristics between the two groups were <10%, indicating a high degree of similarity. After LTA or EM, the 5-years CSM estimates from Poisson regression derived smoothed plots were 3.5 and 9.1%, respectively. In multivariable competing risks regression analyses, LTA use resulted in a protective effect on CSM (HR 0.47; 95% confidence interval 0.25-0.89; p=0.02).
Conclusions: After adjustment for comorbidity and tumor characteristics in elderly patients with SRMs, LTA exerted a very important and highly statistically significant protective effect on CSM, compared to EM. This advantage of LTA should be strongly considered at informed consent.

UP-04.01

Sociodemographic disparities in the nonsurgical management of small renal masses

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Introduction and Objectives: Local tumor ablation (LTA) and expectant management (EM) represent competing treatment modalities for patients with small renal masses (SRMs) that are unfit for surgery or represent suboptimal candidates for surgery. We sought to examine the potential social discrepancies in the access of LTA and EM.
Methods: 1860 patients with cT1a kidney cancer treated with either LTA (n=553) or EM (n=1307) between 2000 and 2009 were selected from the Surveillance Epidemiology and End Results-Medicare database. Baseline patient (including age, comorbidity status, defined as Charlson Comorbidity Index (CCI), and several sociodemographic variables) and tumor characteristics were examined. A multivariable analysis predicting the access to LTA compared to EM was fitted. Subgroup analyses focused on patients aged ≥75 years old with CCI ≥2.
Results: Compared to LTA patients, EM patients were significantly older (median age 78 vs. 77, p<0.001), more frequently unmarried (43% vs. 37%, p=0.02), of African American ethnicity (14% vs. 8%, p=0.005) and of low socioeconomical status (SES) (55% vs. 46%, p=0.001). There

were no differences according to gender, residency status, CCI or tumor size. In multivariable analysis predicting access to LTA over EM, older age, AA ethnicity, male gender, low SES, unmarried status were associated with lower access to LTA (all p<0.05). In the sub-group of older and sicker patients, none of the previous sociodemographic characteristics represented barriers to LTA access (all p≥0.1).
Conclusions: Sociodemographic characteristics may represent barriers to LTA access in patients with SRMs that are not managed surgically. However, these associations vanish when older and sicker individuals are examined. Further studies should be made to better understand the reasons for those discrepancies.

UP-04.02
Mortality, morbidity and healthcare expenditures after local tumor ablation or partial nephrectomy for T1a kidney cancer
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Introduction and Objectives: Local tumor ablation (LTA) may yield better perioperative outcomes than partial nephrectomy (PN), however the impact of each treatment on perioperative mortality and health care expenditures is unknown.
Methods: A population based assessment of 2471 patients with cT1a kidney cancer treated with either LTA or PN, between 2000 and 2009, in the Surveillance Epidemiology and End Results–Medicare database was performed. After propensity score matching to control for measurable selection bias, multivariable logistic and linear regression models predicting 30-day mortality, overall and specific complication rates, length of stay, readmission rates and health care expenditures according to LTA or PN were fitted.
Results: 510 patients (21%) were treated with LTA, while 1961 (79%) were treated with PN. Patients treated with LTA were older, more frequently unmarried, sicker, more frequently diagnosed with larger tumors and more frequently diagnosed with non-clear cell histology (all p<0.05). In patients treated with LTA, surgical approach was open, laparoscopic and percutaneous in 7, 54 and 39% of the cohort, respectively. In patients treated with PN, surgical approach was open, laparoscopic and robotic in 71, 24 and 5% of the cohort, respectively. Following a 1:1 ratio propensity score matching for all the covariates, 510 LTA and 510 PN patients remained. The 30-day mortality was <2% after either LTA or PN (OR 2.27 p=0.2). The overall complication rate was 21% after LTA and 40% after PN (OR 0.38 p<0.001). Blood transfusions, infection/sepsis, wound infections, respiratory complications, gastrointestinal complications, acute kidney injury, and accidental puncture or laceration/foreign body left during procedure rates resulted lower after LTA relative to PN (all p<0.05). Similarly, length of stay (-2.6 days p<0.001) and health care expenditures (-5921 U.S. $ p=0.02) resulted lower after LTA relative to PN. Conversely, readmission rate was not significantly different in LTA relative to PN (6 vs. 9.6% p=0.07).
Conclusions: Despite similar perioperative mortality, LTA is associated with lower complications rate, shorter length of stay and lower health care expenditure relative to PN.

UP-04.03
Comparison of renal function detriments after local tumor ablation or partial nephrectomy for renal cell carcinoma
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Introduction and Objectives: Local tumor ablation (LTA) and partial nephrectomy (PN) represent treatment alternatives for patients diagnosed with small renal mass and both may result in renal function detriments. The aim of the study was to compare renal function detriments after LTA or PN.
Materials and Methods: A Surveillance Epidemiology and End Results-Medicare-linked retrospective cohort of 2850 T1 kidney cancer patients who underwent LTA or PN was abstracted. Short-term outcomes consisted of 30-day acute kidney injury (AKI) and 30-day dialysis rates. Long-term outcomes consisted of episodes of AKI, mild (EGFR 90-60) and moderate-severe (EGFR<60) chronic kidney disease (CKD), end-stage renal disease, hemodialysis and anemia in CKD. After propensity score matching to control for measurable selection bias, multivariable models addressing the impact of LTA vs. PN on short-term (logistic regression) and long term (Cox regression) renal function detriments were fitted.
Results: Median follow-up was 35 months among survivors. Fewer patients (n=561) were treated with LTA, while most (n=2289) were treated with PN. Patients treated with LTA were older, more frequently unmarried, sicker (higher CCI, higher prevalence of CKD, past episode of AKI, diabetes mellitus, hypertension, hyperlipidemia, cardiovascular disease and hypercalcemia), more frequently diagnosed with T1a stage (all p<0.05). Following a 1:1 ratio propensity score matching for all covariates, 561 LTA and 561 PN patients remained. The 30-day incidence of AKI was 4.6% after LTA and 9.4% after PN. In multivariable analyses (MVA), LTA was associated with a lower AKI rate (OR 0.42, p=0.001). The 30-day incidence of any dialysis was <2% after either LTA or PN. In MVA, LTA was not associated with a lower rate of any dialysis (OR 0.43, p=0.2). At long-term assessment, both the unadjusted and adjusted rates of all six examined endpoints were not different between LTA and PN (all p>0.5). Similar results were recorded in a sub-analysis of patients with stage T1a.
Conclusions: LTA offers short-term protective effect from AKI. The short-term rates of any dialysis treatment are similar after either LTA or PN. At long-term assessment, LTA and PN renal function detriment rates are not different. Concern for long-term functional outcomes should not be a barrier for PN.

UP-04.04
Prediction of complications following partial nephrectomy: Implications for ablative techniques candidates
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Introduction and Objectives: Current guidelines recommend local tumor ablation [LTA] over partial nephrectomy [PN] in patients at risk of complications. However, objective definitions of these candidates are lacking. In this study we tested the hypothesis that specific patients would benefit from LTA, and that the potential benefit varies based on patient's characteristics.
Methods: A population based assessment of 2476 patients with cT1a kidney cancer treated with either LTA or PN, between 2000 and 2009, in the Surveillance Epidemiology and End Results–Medicare database was performed. The outcome of the study was relevant perioperative complications rate. A multivariable logistic regression model was fitted to predict the risk of complications after PN. Model-derived coefficients

were used to calculate the risk of complication in case of PN among patients treated with LTA. Locally weighted scatterplot smoothing method was used to plot the observed complication rate against the predicted risk of complication in case of PN.
Results: Patients treated with LTA were older, sicker, diagnosed with larger tumors, more frequently diagnosed with non-clear cell histology and more frequently treated with minimally invasive approach (all p<0.05). At multivariable logistic regression age (OR 1.04 p<0.001), CCI (OR 1.14 p<0.001), episode of acute kidney injury (OR 1.91 p=0.04) or chronic kidney disease (OR 2.16 p=0.002), tumor size (OR 1.02 p=0.01) and minimally invasive approach (OR 0.77 p<0.03) emerged as significant predictors of complications. When LTA was chosen over PN, the reduction in the risk of complications was greatest in high-risk patients, intermediate in intermediate-risk patients and lowest in low-risk patients.
Conclusions: When postoperative complications are evaluated, the benefit of choosing LTA is not the same in all patients diagnosed with T1a kidney cancer. Specifically, patients at high risk of complications in case of PN benefit the most from LTA and represent ideal LTA candidates.

UP-04.05

Comparison of perioperative adverse events after partial or radical nephrectomy in patients with T1b renal cell carcinoma

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Introduction: Partial nephrectomy (PN) relative to radical nephrectomy (RN) is considered as complex surgical procedure. We compared perioperative complications, 30-day mortality, length of stay and total hospital charges between PN and RN patients treated for T1b RCC.
Methods: Using the Surveillance Epidemiology and End Results (SEER)-Medicare-linked database, 3,268 patients treated with PN or RN for T1bN0M0 were identified between years 2000- 2009. Propensity score matching and multivariable logistic regression and linear analyses were used to test whether PN predisposes to higher rates of adverse outcomes.
Results: After propensity matching, 313 (33%) PN and 626 (67%) RN patients remained. The unadjusted rates of overall (54 vs. 44.2%; P=0.006), medical (39.9 vs. 31.3%; P=0.01) and blood transfusions (17.3 vs. 12.3%; P=0.05) were higher after PN than RN. Additionally, longer length of stay (median 5 vs. 4 days; P=0.01) and increased total hospital charges (median 21,289 vs. 18,614 dollars; P=0.001) were recorded after PN. Conversely, surgical complications (16.3 vs. 14.7%; P=0.6) and 30-day mortality (0.6 vs. 1.4%; P=0.5) were not different between PN and RN. Multivariable logistic regression analyses showed that PN patients are at 1.5- and 1.4-fold higher risk of overall (P=0.008) and medical complications (P=0.02) than RN patients. No differences in any other outcomes were recorded.
Conclusions: Despite its established role in renal function preservation, PN may predisposes to somewhat higher rates of complications than RN. However, it does not increase surgical complications rates, length of stay, mortality or total hospital charges.

UP-04.06

Comparison of long-term renal function outcomes after either partial or radical nephrectomy for T1b renal cell carcinoma

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Introduction: Partial nephrectomy (PN) represents a treatment option in patients with stage T1b renal cell carcinoma (RCC). This recommendation was based on data showing equivalent cancer control between PN and radical nephrectomy (RN). Our objective was to compare renal function outcomes between PN and RN in patients with T1b RCC.
Methods: Using the Surveillance Epidemiology and End Results (SEER)-Medicare-linked database, 4,675 patients treated with PN or RN for T1bM0 were identified between years 1990- 2009. Propensity-based match analyses were used to adjust for treatment selection biases. The primary outcomes of interest were the onset of mild, moderate-severe chronic kidney disease (CKD) and end-stage renal disease (ESRD). The secondary outcomes were the onset of acute kidney injury (AKI), the use of hemodialysis and anemia in CKD. Multivariable Cox regression models (MVA) were fitted in the matched cohort.
Results: Post-propensity matching resulted in 329 (33%) PN and 658 (67%) RN patients. In MVA, all the six renal function outcomes failed to achieve statistical significant difference between PN and RN: mild CKD (HR: 1.24; P=0.3), moderate-severe CKD (HR: 0.94; P=0.6), ESRD (HR: 1.12; P=0.6) as well as AKI (HR: 1.06; P=0.6), hemodialysis (HR: 1.27; P=0.2) and anemia in CKD (HR: 1.04, P=0.8). Similarly, all the six examined endpoints were not statistically significant in five different sub-analyses according to recent year of surgery (2000- 2009), younger patients (age≤73), older patients (age>73), smaller tumor (tumor size 4.1-≤5 cm) and larger tumor (tumor size >5- 7 cm).
Conclusions: PN and RN are comparable with respect to renal function preservation in patients with T1b RCC, within the community. In consequence, further analyses are needed to assess whether PN is warranted in T1b RCC, for purpose of renal function preservation.

UP-04.07

Cryoablative therapy of small renal masses in Québec: Indications and safety

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Introduction and Objectives: Renal cell carcinoma (RCC) is the most lethal urological cancer. Recently, liberal use of abdominal imaging has led to increased incidental diagnosis of small renal masses (SRM). Nephron-sparing techniques are now the standard of care for SRM. Thermal ablative (TA) therapies, such as radiofrequency ablation (RFA) and cryoablation, are an interesting therapeutic option in aging patients with significant comorbitity. However, long-term efficacy with TA is less established than with surgical excision.
In Québec, the Centre Hospitalier Universitaire de Sherbrooke is the only center offering renal cryoablation. Our aim is to determine a target population, and expose our data on safety and efficacy of this technique.
Methods: We reviewed the charts of 19 patients who underwent cryoablation of SRM at the CHUS. 3 patients had multiple masses, totaling 22 treatments. Median age was 76 years (56 – 89 years), and 17 patients (89%) had an American Society of Anesthesiologist physical status score of 3. Mean mass size was 27.6mm (15 – 40mm). All procedures were done percutaneously, under sedation and local anesthesia, by an interventional radiologist. Biopsies were done in 14 patients (64%), all of which revealed malignant pathology. Follow-up imagery was at 3 months, 6 months, then yearly.
Results: No per-operative complications were experienced. One treatment was aborted due to bowel interposition. Early post-operative complications were rare, with two patients experiencing hematuria. One patient developed myocardial infarction during the immediate post-operative period. One case of acute pyelonephritis required re-hospitalization.
Median follow-up was 29 months (1 – 66 months). 4 patients (18%) required repeat treatment for recurrent disease. Median time to re-treatment was 14 months. No patients developed metastatic disease, nor died of cancer-related causes. Glomerular filtration rates remained stable during follow-up.
Conclusion: In select elderly and high surgical risk patients, renal cryoablation is a safe and well-tolerated modality for proactive treatment of small neoplasms. However, repeat treatment may be necessary in up to 20% of cases. Long-term efficacy and recurrence rates remain a topic for further research.

UP-04.08

An ex vivo invasion assay of collecting duct carcinoma: Developing a chemotherapeutic response profile for a rare urologic malignancy

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Introduction and Objectives: Collecting duct carcinoma is a rare and aggressive form of renal cancer. While patients often present with advanced disease, the optimal systemic treatment is unknown. We report the utility of an ex vivo invasion assay of human collecting duct carcinoma in the evaluation of tumor growth and response to therapy.

Methods: Institutional review board approved our study. Viable portions of tumor were obtained from radical nephrectomy specimens and implanted into wells containing collagen type I gel. Microscopic tumor invasion was measured over 5 days. Invasion distance was recorded for control wells (untreated) and wells with one of 11 chemotherapeutic regimens.

Results: 104 samples from 2 collecting duct carcinoma specimens demonstrated viability. Tumor fragments in the control group demonstrated a mean invasion distance of 950 +/- 220 um. While all tumor fragments in treated wells demonstrated a modest response to chemotherapy, this was most pronounced in the wells treated with paclitaxel alone (85%) and paclitaxel/sirolimus combination (89%). Inhibition of invasion was less effective in wells treated with sorafenib (38%) or sirolimus (42%).

Conclusions: Collecting duct carcinoma can successfully be evaluated in an ex vivo invasion assay. Our data suggest that these rare tumors may respond better to paclitaxel-based therapy regimens than to targeted therapy. While ex vivo data provide valuable insight into the chemosensitivity of rare tumors, studies of clinical effectiveness are needed.

UP-04.09

En-bloc radical nephrectomy with partial hepatectomy for locally advanced non-metastatic kidney cancer: Lessons learned

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Introduction and Objectives: Locally advanced renal cancer occasionally presents with direct hepatic invasion. In the era of targeted therapies, and in the context of a multi-disciplinary team (MDT) approach, these cancers can potentially be cured with aggressive surgical excision along with neo-adjuvant and adjuvant therapies. Herein we describe technique and key elements of en bloc radical nephrectomy with partial hepatectomy in 2 patients, aiming to illustrate the utility of radical approach in the management of these challenging cases.

Materials and Methods: In addition to contiguous liver involvement, one patient (69y.o. F) had IVC tumour thrombus and the second (73 y.o. F) had direct invasion of ascending colon. MDT treatment strategic planning took place among urologic oncology (UO), hepatopancreatico-biliary (HPB) surgery, vascular surgery (VS), medical and radiation oncology, interventional radiology and anesthesiology. Pre-operative renal artery embolization was carried out in the first case. Intraoperative transesophageal echocardiogram was used for continuous monitoring in both cases. UO, HPB and VS intraoperatively assessed resectability and feasibility of partial hepatectomy. Liver mobilization and hepatectomy (segments 6 and 7) were carried out first in both cases using the harmonic scalpel, prior to kidney mobilization and vascular exposure. In the first IVC thrombectomy was performed, while in the second case, right colectomy and ileo-cecum anastomosis was carried out.

Results: Surgery times were 7h26m. and 6h15ms; blood loss was <800cc and patients were admitted to ICU for monitoring. No intraoperative complications were recorded. The first patient was discharged on 7th POD and had no complications, while unfortunately the second patient developed an anastomotic bowel leak and succumbed 4 weeks later to its complications, unrelated to the nephrectomy and the liver resection.

Conclusions: En-bloc nephrectomy and partial hepatectomy is technically challenging but worthwhile for potential cure justified in selected cases. Requisites include commitment from several surgical and medical disciplines, advanced technical adjuncts and vigilant perioperative monitoring.

UP-04.10

The effect of obesity on perioperative outcomes in patients with localized kidney cancer

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Introduction and Objectives: Obesity is a risk factor for renal cell carcinoma and a well-known predictor for complications after surgery. We assessed the impact of obesity on the perioperative outcomes for patient that underwent partial or radical nephrectomy for kidney cancer. We hypothesised that obese patients are at higher risk for unfavourable perioperative events.

Methods: We retrospectively reviewed all surgically managed cases of kidney cancer at our institution between 2006 and 2009. Patients were classified into two groups; BMI <30 and ≥30. We compared perioperative events between the groups, namely, total operative time (min), estimated blood loss (mL) and complication rate [Clavien classification]). Secondary end points consisted of rate of conversion from planned partial nephrectomy to radical nephrectomy and length of stay. Statistics relied on chi-square and independent T-test for categorical and numerical data, respectively. Statistical tests were performed using SPSS version 22.0. Moreover, all tests were two-sided, with a significance level set at 0.05.

Results: A total of 164 patients were identified (112 with BMI <30 and 52 with BMI ≥30). No significant difference were recorded between the groups for age, gender, pathological stage, tumor size, ASA score, Charlson comorbidity index and surgical approach. For BMI <30 vs. ≥30 median operative time was 140 vs. 160 min (P = 0.3), median estimated blood loss was 100 vs. 125 mL (P = 0.8) and overall complication rate 21.4% vs. 15.4% (P = 0.6). Grade I /II complications were more commonly recorded (BMI <30, 70.8% and BMI ≥30, 87.5%). Median length of stay was 4 days for both groups. Conversion rates from partial to radical laparoscopic nephrectomy were low and similar between the groups. Limitations of our study consisted of small sample size and consequently underpowered analyses.

Conclusion: Obesity is not associated with decreased perioperative outcomes in patients with kidney cancer.

UP-04.11

Short term morbidity following laparoscopic radical nephrectomy and laparoscopic nephroureterectomy: A historical cohort study using the NSQIP database

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Introduction and Objectives: The purpose of this study is to characterize and compare short-term complications following laparoscopic radical nephrectomy (LRN) and laparoscopic nephroureterectomy (LNU). Although there have been studies looking at each of these procedures separately, very few have compared short term morbidity between the two, given their similar anatomical and technical considerations.

Methods: We examined a historical cohort of patients from the National Surgical Quality Improvement Program (NSQIP) database who received either LRN or LNU between 2006 and 2012. Patient characteristics, surgical characteristics, and perioperative outcomes up to 30-day post-operatively were collected. Unadjusted and adjusted associations between patient and surgical factors with surgical outcomes for each procedure (LRN or LNU) were determined by using log-binomial regression to calculate relative risks.

Results: 4904 patients met study inclusion criteria. 4159 (85%) received a LRN while 745 (15%) received a LNU. Overall, 651 (13%) experienced at least one short-term post-operative complication; of these, LNU was associated with more complications than LRN (21% and 13%, respectively). The most common complications overall were: bleeding requiring blood transfusions in 318 (6.5%), urinary tract infections in 97 (2.0%), wound infections in 85 (1.7%), and unplanned intubations in 56 (1.1%). After adjusting for possible confounders, having a LNU versus LRN (RR 1.41, 95% CI 1.16-1.72) was still associated with a higher incidence of experiencing any complication. Other variables also associated with an increased incidence of experiencing any complication included: increased patient age (RR 1.01, 95% CI 1.01-1.02), ASA classification >3 (RR 1.34, 95% CI 1.10-1.63), higher pre-operative creatinine (RR 1.11, 95% CI 1.06-1.17), bleeding requiring >4 units of blood within 72 hours pre-operatively (RR 1.93, 95% CI 1.29-2.86), and operative time >6 hours (RR 2.17, 95% CI 1.71-2.75).
Conclusions: Post-operative complications within 30 days of surgery are common after LNU and LRN. Despite having technical similarities, LNU carries a significantly higher risk of developing short term complications than LRN.

UP-04.12

Does teaching of robotic partial nephrectomy affect renal function?

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Objectives: Partial nephrectomy (PN) represents the treatment of choice for localized renal tumor less than 7 cm. Teaching robotic PN (RPN) remains challenging with regards to maintaining acceptable outcomes, specifically warm ischemic time (WIT) which, if increased, could negatively impact renal function. The goal of the present study was to assess the impact of teaching on WIT and renal function in patients undergoing RPN.
Materials and Methods: Consecutive patients undergoing standardized RPN for T1-T2 renal tumors were included. RENAL nephrometry score was used to assess the tumor complexity. Serum creatinine and glomerular filtration rate (GFR) were determined preoperatively, at day 2 and after 3-6 months of follow-up. Patients in whom the attending surgeon (staff) performed the mass resection and renorraphy were compared to those in whom the fellow performed these steps under supervision. Primary outcomes were WIT and GFR decrease at follow-up visit (3-6 months). Complication rate and surgical margin positivity were considered as secondary outcomes.
Results: Sixty-nine patients (25 women, mean age 61±13yr) were included in the final analysis. Of those, 46 were operated on by the staff urologist and 23 by the fellow. Patients characteristics did not differ significantly between the two groups. Of note, the degree of tumor complexity, as assessed by the RENAL nephrometry score, as well as preoperative GFR were similar between both groups. Mean WIT was 22±9 in the "staff" group and 24±7 in the " fellow " group (p=0.09). There was no statistical difference as far as operating room time, console time, blood loss and length of stay were concerned. Preoperative GFR were similar in both groups (88±14 versus 85±22 ml/min/1.73m2, respectively (p=0.83)). At the time of follow-up, a reduction of 8±9 in GFR was observed in the "staff" group (-9%), while a GFR reduction of 11±12 (-13%) was observed in the "fellow" group (p=0.38). Complication rate (13% versus 17%, p=0.63) and positive margin rate (8% versus 4%, p=0.47) did not differ significantly between staff and fellow, respectively.
Conclusions: Complex robotic procedures such as RPN can be safely taught, provided a strict staff supervision and stepwise standardization of the procedure. Teaching does not negatively affect GFR after a follow up of 3-6 months.

UP-04.13

A decade's experience with management of Bosniak cysts: The natural history of a change in diagnosis

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Introduction and Objectives: To explore the management including surgical and active surveillance of bosniak renal cysts and to identify predictors of change in classification.
Methods: We retrospectively reviewed all consecutive referrals of patients with complex renal cysts between January 1, 2003 – Aug 31, 2014. Every radiologic image was reviewed as were the charts and pathology reports. Conflicting cases were independently reviewed with a dedicated Uroradiologist. Multivariate logistical regression analysis was performed to identify predictors of malignancy and predictors of Bosniak classification change.
Results: A total 1104 images were reviewed in the 129 patients were included in the study. This included 807 scans (CT, MRI, ultrasound) of 163 lesions. A total of 31 patients underwent surgery. Upon the conclusion of the study 53 patients were maintained on surveillance. Bosniak 3 lesions were 50% likely to harbor malignancy. Bosniak stage changes were common 10% of bosniak 4 lesions were ultimately downstaged while 32% of bosniak 3 lesions were downstaged and 13% upstaged. In multivariate analysis bosniak 3 cysts were 20-fold more likely to be upstaged if there was an enhancing mural nodule. Over the study interval Bosniak 3 cysts grew at 1.1% while Bosniak 2F cysts grew at 5.5%.
Conclusions: Stage changes in Bosniak lesions is common. Active surveillance of small lesions can help accurately characterize lesions. Perceived cyst complexity can be a function of lesion size and location relative to surrounding parenchyma or cysts. Many Bosniak 3 and 4 cysts ultimately underwent stage changes. Presence of mural nodularity was more predictive of upstaging compared to enhancing septations.

UP-04.14

Contemporary trends in High-dose Interleukin-2 utilization for metastatic renal cell carcinoma in the United States

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Background: The targeted therapies (TT) have revolutionized treatment of metastatic renal cell carcinoma (mRCC) over the past decade. Despite improved progression-free survival, disease progression is inevitable. High-dose interleukin-2 (HD IL-2) is the only agent proven to elicit durable complete responses but is associated with major toxicities. We evaluated trends in HD IL-2 use for mRCC in the TT era.
Methods: Our cohort comprised a weighted sample representing an estimate of all patients undergoing HD IL-2 treatment for mRCC from 2004 to 2012 from the Premier Hospital Database (Premier Inc., Charlotte, NC), a nationally representative hospital discharge database. We employed descriptive statistics and fitted multivariable regression models accounting for clustering and weighting to identify predictors of treatment toxicity and tolerability.
Results: An estimated 2351 patients were treated with HD IL-2 for mRCC in the United States from 2004 through 2012. HD IL-2 use decreased from 2004 to 2008 with a subsequent partial rebound. HD IL-2 was increasingly concentrated in academic centers, from 24% of treatments in 2004 to 89.5% in 2012. Most HD IL-2 patients were men (75.3%), Caucasian (70.7%) and aged <60 (59.6%), had lung metastases (60.9%) and were otherwise healthy (64.7% Charlson comorbidity index=0). Toxicities were common, with 53.4%, 33.0%, and 7.1% requiring vasopressors, ICU admission, and hemodialysis respectively. Factors associated with

toxicities on multivariable analyses included being unmarried, male, and having multiple metastatic sites. African Americans and patients with multiple metastatic sites were less likely to receive >1 treatment cycles.
Conclusions: HD IL-2 is used infrequently for mRCC in the United States. Its use has been increasingly restricted to academic centers since 2004, posing a possible barrier to patient access. Toxicities are common despite preferential selection of younger patients without comorbidities.

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Contrast-enhanced ultrasound for surveillance of radiofrequency-sblated renal tumors: A blinded prospective study

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Objectives: To prospectively evaluate the performance of contrast-enhanced ultrasound (CEUS) for surveillance after radiofrequency ablation (RFA) of small renal masses (SRM) by comparing CEUS to the current gold standard.
Subjects and Methods: Patients underwent surveillance after RFA of SRMs (<4cm) consisting of contrast-enhanced computed tomography (CECT) scans at 3, 6, and every 6 months thereafter. Participants additionally underwent >1 CEUS within 90 days prior to CECT. Independent blinded radiologists interpreted CEUS and CECT. Intermodality agreement was evaluated with the kappa coefficient.
Results: In total, 37 pairs of CEUS and CECT were performed. Median follow-up from RFA to CEUS was 25 months. Renal tumor recurrences were diagnosed in 3 patients which were managed with 2 repeat RFAs and 1 radical nephrectomy; 34 CECTs were negative for recurrence. The diagnostic rate of CEUS was 94.6%; 2 CEUS were non-diagnostic due to patient body habitus. Among diagnostic CEUS, arterial enhancement was present in 3 and absent in 32. We observed perfect concordance between CEUS and CECT for tumor recurrence (k=1.0, p<0.0001).
Conclusions: Our findings suggest CEUS may ultimately be incorporated into RFA surveillance protocols. The operator-dependency of CEUS is a possible barrier to its widespread adoption and posed a limitation to this study, as inter-observer reliability was not assessed. These findings require external validation.

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Diagnostic accuracy of needle biopsies in non small renal masses

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Introduction and Objectives: The role of percutaneous biopsy of small renal masses has been well established with diagnostic accuracy rates over 90% with high specificity. However, the accuracy of needle biopsies in larger kidney tumors has yet to be evaluated. Considering the requirement of a tissue diagnosis prior to the initiation of targeted therapies in the metastatic setting and the increasingly elderly and infirm patient population being diagnosed with renal masses larger than 4 cm, further study is required to inform clinicians on the diagnostic accuracy of renal mass biopsies in this patient population.
Methods: Six consecutive patients with renal masses greater than 6 cm undergoing radical nephrectomy were recruited. An 18 gauge biopsy needle was used to systematically sample the kidney tumor in 2X2 cm increments. The biopsies were sent for standard H&E staining. Pathologic interpretation was blinded by a dedicated GU pathologist. The biopsies were recorded in terms of histologic type and Fuhrman grade (FG) if carcinoma was detected. Biopsy results were correlated with the final nephrectomy specimen. For statistical analysis the concordance correlation coefficient was used to determine the strength of agreement between histologic grades.
Results: The median size of renal tumors was 8.8 cm (IQR 7.4 -9.2 cm). The median number of biopsies was 18 per specimen (IQR 13-23). Overall, 106 core biopsies were obtained. All renal tumors were determined to be clear cell renal cell carcinoma (ccRCC) on final pathologic interpretation. 56% of biopsies were determined to be ccRCC (56/106). Of the 56 biopsies determined to be ccRCC, the FG failed to correctly classify tumors into low (FG 1-2) or high (FG 3-4) in 41% (23/56) where the biopsy uniformly undergraded the tumors. The Pearson correlation coefficient of the biopsy FG compared to the final nephrectomy specimen FG was -0.01, p=0.9, 95%CI (-0.3 to 0.2), indicating poor correlation.
Conclusions: While the role of renal mass biopsy in the management of small renal tumors is well established, caution is suggested in interpreting results in larger tumors. There was excellent correlation of histologic subtype however only 56% of biopsies were diagnostic. Furthermore, there was poor correlation of FG compared to the final pathology report.

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The changing face of kidney cancer: Demographic and tumor characteristic changes over time in individuals with newly diagnosed kidney cancers

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Introduction and Objectives: The incidence of kidney cancer has been increasing at a rate of 2-2.5% per year, due mostly to more frequent use of axial/abdominal imaging. This increase also likely corresponds to changes in demographic and cancer specific characteristics among individuals newly diagnosed with kidney cancer. Specifically, this study evaluated significant changes in the size of tumors, age of those diagnosed with kidney cancer, staging of cancer and proportion of patients who received a surgical management.
Methods: All analyses were performed on the publically available Surveillance, Epidemiology, and End Results Program (SEER) 13 dataset, which captures United States population data (~90% population coverage) on newly diagnosed cancers from state-level cancer registries. The population consisted of 92,771 individuals diagnosed with kidney cancer (ICD-O-3 code: C64.9) from 1992-2011. All statistical analyses were performed using SEER*Stat 8.15 and SPSS 13.
Results: The age adjusted kidney cancer incidence trend between 1992-2011 has increased from 10.4/100,000 in 1992 to 14.6/100,000 in 2011. The average annual percent change was calculated at 2.3% per year (CI: 2.0-2.6) and was significant (p<0.05). The proportion of tumors less than 4 cms has increased between 2004-2011, rising from 39% to 43% of all tumors. The proportion of individuals under the age of 65 diagnosed with kidney cancer has also increased, rising from 50% in 2004 to 53% in 2011. The proportion of tumors by grade has remained stable over time, with the greatest proportion at grade 2 (49%), followed by grade 3 (30%), grade 1(12%) and grade 4(8%) in 2011. The proportion of individuals undergoing surgery has also remained stable, with approximately 20% of individuals with newly diagnosed kidney cancer having surgery between 2004-2011.
Conclusions: The incidence of kidney cancer continues to increase in North America. Tumor size and age have decreased over time, while grade and proportion of patients undergoing surgery have remained stable.

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Who watches the watchmen? Systematic underestimation of the incidence of kidney cancer in cancer registry data

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Introduction and Objectives: Increasing numbers of small renal cell carcinomas (RCC) are being incidentally detected and followed longitudinally without surgical intervention. As cases of kidney cancer are identified, we need to ensure that methods of identifying these individuals in regional cancer registries are timely and reflect clinical practice. The objective of this study was to identify if a gap exists in kidney cancer surveillance

infrastructure which leads to a systematic underestimation of the true incidence of RCC as reported by cancer registries (CR).
Methods: In Phase I of our study, data from 638 patients with a physician billing code for RCC in 2008 (ICD-9: 189.0) was linked to the CR. In Phase II of our study, a prospectively maintained database of 95 patients on active surveillance with presumed RCC in 2012 were linked with the CR. These years were chosen to allow for lag time of cancer registry data capture. Data linkage between the billing data and cancer registry data are presented.
Results: Phase I revealed 184 individuals (29%) with administratively coded RCC who were not captured in the CR. 95 (52%) of these patients were not linked as per the current cancer registry inclusion criteria or patients resided out of province. The remaining 89 patients (48%) were registered with a non-kidney cancer. Phase II showed that 19 patients (20%) had been identified in the CR with RCC. Of the remaining patients, 48 (52%) were eligible to be entered into the registry data. The remaining 25 individuals (27%) did not meet current cancer registry inclusion criteria. Thus, we confirmed our hypothesized gap between CR reported and the true incidence of kidney cancer in both phases of our study.
Conclusions: When utilizing administrative data, we identified 29% of patients with presumed RCC who were not captured in the CR. When the system is challenged further by comparing it with a prospectively collected surveillance series, the gap is much greater at 79%. Traditionally, CR's have relied heavily on histological confirmation for identification of patients as gold-standard cases of RCC. This work demonstrates the need for CR's to identify appropriate alternative sources of diagnostic data for non-pathologically confirmed cancers. This will allow for the accurate quantification of the true incidence and burden of kidney cancer.