

Moderated Poster Session II: Kidney Cancer Thursday, September 23, 4:00-5:00 p.m.

P18

Targeted Modulation of Integrin Expression Increases Freeze Sensitivity of Androgen-Insensitive Prostate Cancer

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Introduction and Objective: Cryoablation has emerged as a primary therapy to treat prostate cancer. While effective, the assumption that freezing serves as a ubiquitous lethal stress is challenged by clinical experience and experimental evidence demonstrating time-temperature related cell death dependence. The age-related transformation from an androgen-sensitive (AS) to an androgen-insensitive (AI) phenotype is a major challenge in the management of prostate cancer. AI cells exhibit morphological changes and treatment resistance to many therapies. This resistance has been linked with $\alpha 6 4$ integrin overexpression as a result of androgen receptor (AR) loss. As such, we investigated the influence of increased $\alpha 6 4$ integrin expression as a result of AR loss, on the reported increased freeze tolerance of AI prostate cancer. Further, we evaluated the targeted modulation of integrin expression in combination with cryoablation on human prostate cancer cell death.

Methods: A series of studies using AS (LNCaP LP and PC-3 AR) and AI (LNCaP HP and PC-3) cell lines were designed to investigate the cellular mechanisms contributing to variations in freezing response. Samples were frozen, thawed, and temporally assessed using fluorescence microscopy, flow cytometry and immunoblotting.

Results: Investigation into $\alpha 6 4$ integrin expression revealed that AI cell lines overexpressed this protein, thereby altering morphology and increasing adhesion characteristics. For instance, following freezing to -15°C , AI cells were found to exhibit increased resistance to freezing injury compared to AS cells (55% vs. 18%, respectively). Molecular investigations revealed a significant decrease in caspase 8, 9, and 3 levels in AI cells following freezing. Inhibition of $\alpha 6 4$ integrin in AI samples resulted in increased caspase activity and enhanced cell death.

Conclusions: These studies demonstrate that integrin expression significantly influences cell tolerance to cryoablation. The data demonstrate that the inhibition of $\alpha 6 4$ integrin function results in a significant increase in freeze sensitivity of AI prostate cancer cells. The results show that understanding the role of androgen-receptor related integrin expression in cell response to freezing may lead to novel options for neo-adjuvant approaches to treat prostate cancer.

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Synchronous Presence of Renal Pelvic and Ureteral Tumors is Independently Prognostic of Survival Following Radical Nephrectomy

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Background: There remains disagreement as to whether the location of upper urinary tract cancer affects prognosis. We examined the significance of ureteral and renal pelvic upper tract urothelial carcinoma (UTUC) in a large multi-institutional study.

Methods: We collected and pooled a database of 700 patients with UTUC who underwent radical nephroureterectomy. Univariate and multivariate models examined the effect of tumor location on recurrence-free (RFS) and cancer-specific survival (CSS) rates. Collected variables included age, gender, race, presence of lymphovascular invasion, concomitant carcinoma in situ, pathological stage/nodal status, lymph node dissection and type of surgery (open vs. laparoscopic).

Results: The median follow-up for patients alive was 42 months (IQR: 20-76). With regards to location, 34% of tumors were ureteral, 59% pelvic and 7% were multifocal. Tumor location was significantly associated with lymphovascular invasion ($p = 0.035$), pathological stage ($p = 0.014$), race ($p < 0.001$), tumor necrosis ($p = 0.017$) and type of surgery ($p = 0.038$). It was, however, not associated with age ($p = 0.206$), gender ($p = 0.858$), grade ($p = 0.511$), lymph node dissection ($p = 0.259$), number of nodes resected ($p = 0.084$), nodal status ($p = 0.422$), concomitant CIS ($p = 0.296$), or follow-up duration ($p = 0.508$). On multivariate analyses adjusting for age, gender, race, surgical type, stage, grade, nodal status, lymphovascular invasion and concomitant CIS, ureteral tumor location when associated with multifocal disease remained an independent predictor of both RFS ($p = 0.004$) and CSS ($p = 0.035$).

Conclusions: Contrary to recent data, our results show that ureteral tumor location in association with multifocal disease is an independent prognostic factor for both RFS and CSS.

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Renal Cell Carcinoma in the Elderly: Is Partial Nephrectomy the Right Surgical Option?

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Background: Data are scarce on literature describing surgical outcomes in elderly patients undergoing treatment for renal cell carcinoma (RCC). The goals of this study were to determine overall- and cancer-specific survival, use of radical versus partial nephrectomy, and complication rates in elderly patients with RCC.

Methods: 532 patients who underwent extirpative surgery for clinically diagnosed RCC between 1994 and 2009 were identified using a single-institution IRB-approved database. Of these patients, 127 (24%) were 75 years of age or older. These patients were further separated into groups based on surgical type and incidence of complications and were stratified by gender, tumor stage, and tumor grade. Preoperative and postoperative creatinine clearances and length of stay were compared among the groups. Cox proportional hazard modeling and Kaplan-Meier analyses were used to determine overall- and cancer-specific survival among the cohorts.

Results: Older patients were more likely to undergo laparoscopic radical than partial nephrectomy than their younger counterparts ($p = 0.003$), and

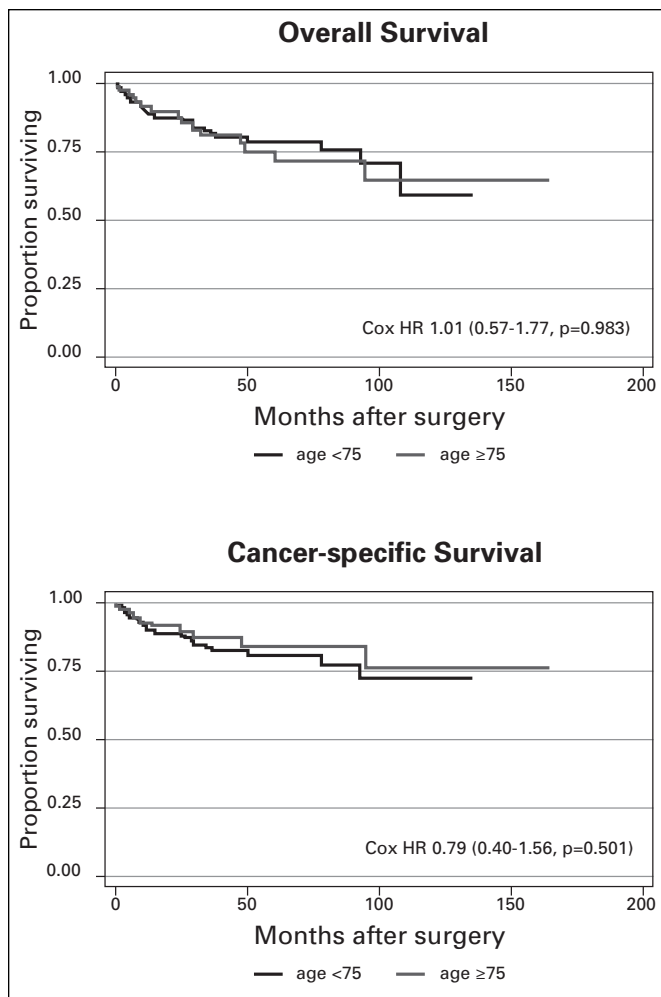


Fig. 1. P20.

had longer average hospital stays (4.0 vs. 2.7 days, $p < 0.001$). Older patients were 3.4 times more likely to experience an immediate (within 24 hours) complication (95% CI 1.37-8.30, $p = 0.008$), and there was a trend toward a higher overall complication rate in elderly patients. Complication rates, however, were similar after radical or partial nephrectomy. Calculated creatinine clearance in the radical nephrectomy group (18.9 mL/min/m²) decreased more than in the partial nephrectomy group (8.0 mL/min/m², $p < 0.0001$). Despite this, there was no significant difference in overall or cancer-specific survival between younger and older patients. Median length of followup were 13.3 (0-135) and 19.2 (0-164) months for younger and older patients, respectively (Fig. 1).

Conclusions: Extirpative surgery is safe in elderly patients with RCC. The risk of immediate complications is increased in older than younger patients, but risk appears unrelated to type of surgery. Partial nephrectomy should be advocated when feasible in order to maintain renal function.

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Laparoscopic Partial Nephrectomy Guided by Near Infrared Fluorescence (NIRF) of Intravenous Indocyanine Green (ICG)

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Background: The established role of partial nephrectomy in the management of renal cancer is removal of the entire tumor with negative margins and preservation of normal parenchyma. We investigated whether renal cortical tumors can be differentiated from normal parenchyma by NIRF of intravenous (IV) ICG during laparoscopic partial nephrectomy.

Methods: Thirteen patients undergoing laparoscopic partial nephrectomies had intraoperative NIRF imaging of their 13 renal cortical tumors. Following renal exposure, 4-10cc (2.5mg/ml) of ICG was injected intravenously and NIRF was detected using SPY Scope™ system (Novadaq Technologies Inc, Canada). ICG uptake and deposition was recorded.

Results: Average age of patients undergoing laparoscopic partial nephrectomy using intraoperative SPY Scope™ was 53.6 years (30-76) and mean follow up was 7.8 months (2-11). Tumor size averaged 3.2 cm (0.9-6.5). Tumors were peripheral and exophytic in 8 and hilar in 5 patients. Average R.E.N.A.L. nephrometry score was 7.7 (5-11). A total of 13 lesions were found in 13 patients, 11 solid and 2 cystic. All malignant tumors (clear cell (6) and chromophobe (3) carcinomas) were seen as hypo or non-fluorescent areas clearly demarcated from highly fluorescent normal parenchyma. Oncocytoma (1) was seen as mildly hypofluorescent, with minimal difference between the tumor and surrounding tissue. AML (1) and benign cysts (2) were characterized as having increased fluorescence compared to the normal parenchyma. All surgical margins were negative. No immediate allergic or systemic side effects occurred and no postoperative changes in kidney function were observed.

Conclusions: Laparoscopic NIRF after IV ICG permits accurate intraoperative detection of renal cortical tumors during partial nephrectomy. This modality has unique properties that may allow urologists to decrease positive surgical margins rates, diagnose additional lesions, and spare unnecessary resection of normal parenchyma, thereby preserving renal function.

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Small Renal Mass Needle Biopsy: Outcomes of Non-Diagnostic Percutaneous Biopsy and Rate of Repeat Biopsy

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Background: Percutaneous needle core biopsy is becoming established in the management of small renal masses (SRMs) that were <4cm in diameter, mainly solid and enhancing. Numerous series have reported success rates of ≥80% with excellent accuracy. Indeterminate or non-diagnostic results continue to be a problem. We present our results of a large biopsy series with outcomes of these non-diagnostic biopsies.

Methods: A prospective database of patients undergoing SRM biopsy was analyzed. Pathology reports of "indeterminate" included insufficient material, normal kidney or non renal tissue. We have recently recommended repeat biopsy in these cases. The success rate and pathological findings were analyzed.

Results: Three hundred and forty-five (345) biopsies were performed from 2000 to 2008 inclusive. The biopsy was diagnostic in 278 cases (80.6%) and non-diagnostic in 67 (19.4%). Among diagnostic biopsies, 221 (79.8%) were malignant, 94.1% of which were renal cell carcinoma (RCC). Histologic subtyping and grading of RCC was possible in 88% and 63.5% of cases respectively. Seventeen of the non-diagnostic (25.3%) were taken at the time of radiofrequency ablation. Repeat biopsy was performed in 12 of the 67 non-diagnostic cases and a diagnosis was possible in 10 (83.3%). Eight lesions were malignant and 2 were oncocytic neoplasms. Larger tumor size and a more solid nature were found to predict for success of repeat biopsy. Minor complications were

experienced in 10.4% of cases but no major bleeding or tumor seeding was experienced.

Conclusions: Percutaneous biopsy can be performed safely and accurately for the investigation of SRMs. In those cases in which the biopsy is indeterminate, repeat biopsy can be performed with a similar success rate as for initial biopsy which provides a diagnosis in the majority of these patients.

P23

Patterns of Non-surgical Management of Small Renal Masses: A Population-based Analysis

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Background: Non-surgical management (NSM) represents a treatment option for select individuals with small renal masses. We examined the patterns of NSM patients with histologically proven renal cell carcinoma within the 17 registries of the Surveillance, Epidemiology, and End Results (SEER) database

Methods: Between 1988 and 2006, 26 844 individuals with histologically proven small renal masses were identified within the 17 SEER registries database. Trends, proportions, and multivariable analyses assessed the use of NSM relative to other types of treatment modalities.

Results: Overall, 2191 (8.2%) individuals were managed non-surgically. The rate of NSM increased from 5.7 to 8.0% over the study period (X2 trend, $p = 0.003$). The majority of the individuals who were non-surgically managed were aged 80 years and older (32.8%) vs. 30.4% in 70-79-year-olds vs. 18.6% in 60-69-year-olds vs. 10.9% in 50-59-year-olds vs. 7.4% in individuals younger than 50 years old. Most were male (62.8%) and Caucasian (79.2%). In multivariable analyses, African American patients were twice as likely to be treated non-surgically relative to Caucasians ($p < 0.001$). Multivariable logistic regression showed that NSM relative to other types of treatment was 15 times more likely in octogenarians, 1.3 times more likely in males, 2.2 times more likely in African Americans, and 1.4 times higher in contemporary years (all $p < 0.001$)

Conclusions: Non-surgical management of histologically proven small renal masses gained in popularity over the past decade. In accordance with the National Comprehensive Cancer Network guidelines, it is mostly offered to individuals with limited life expectancy and its use accounts for up to only 8% of all patients with small renal masses.

P24

A Population-based Analysis of Perioperative Complications and Mortality Associated with Cytoreductive Nephrectomy for Metastatic Renal Cell Carcinoma

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Background: Cytoreductive nephrectomy (CNT) may improve survival of patients with metastatic RCC (mRCC). However, it may be associated with higher morbidity and mortality rates relative to nephrectomy in non-mRCC patients. We assessed the perioperative outcomes of CNT in patients with mRCC and compare these to the outcomes of individuals who underwent a nephrectomy for non-mRCC in a large population-based dataset.

Methods: Between 1988 and 2008, 1985 and 27 037 patients underwent a nephrectomy for respectively mRCC and non-mRCC in the state of Florida. We examined patient characteristics, complications and perioperative mortality rates of patients with mRCC who underwent a CNT and we compared those with the characteristics and outcomes of individuals with non-mRCC.

Results: Relative to non-mRCC individuals, a larger proportion of mRCC patients were males (67.9 vs. 61.6%; $p < 0.001$) and represented emergency admissions (27.5 vs. 19.4%; $p < 0.001$). Length of stay was statistically significantly longer in patients with mRCC relative to their non-mRCC counterparts (9.5 vs. 6.7 days; $p < 0.001$). The overall complication rate was also higher in mRCC patients (29.6 vs. 22.8%; $p < 0.001$). Specifically, the rates of accidental intraoperative lacerations (5.6 vs. 3.6%; $p < 0.001$), postoperative cardiac complications (4.2 vs. 2.4%; $p < 0.001$), vascular complications (2.5 vs. 0.8%; $p < 0.001$), respiratory complications (8.4 vs. 6.4%; $p = 0.001$), hemorrhage (2.6 vs. 1.4%; $p < 0.001$), and postoperative infections (2.0 vs. 1.4%; $p = 0.02$) were higher in patients with mRCC. Perioperative in-hospital mortality rate was also higher in mRCC patients (3.0 vs. 1.2%; $p < 0.001$). In multivariable logistic regression models, after adjusting for patient age, gender, race, insurance type, average annual surgical and hospital volume, mRCC was a statistically significant predictor of any complication type (OR: 2.7 [95% CI: 2.0-3.5]; $p < 0.001$), and predicted higher perioperative mortality (OR: 1.4 [95% CI: 1.3-1.6]; $p < 0.001$).

Conclusions: Nephrectomy in individuals with mRCC is associated with higher complication and perioperative mortality rates relative to nephrectomy performed in patients with non-mRCC. This information should be included in informed consent. Moreover, careful patient selection is critical to minimize morbidity and mortality after CNT.

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Percutaneous Radiofrequency Ablation of Small Renal Tumors: McGill University Initial Experience

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Background: Although surgical resection is still the gold standard therapy for localized renal tumors, patients with multiple bilateral tumors and/or significant comorbidities present a clinical challenge. Percutaneous radio frequency ablation (RFA) provides an alternative to minimize morbidity in selected patient cohort. The goal of the current study was to evaluate the role of RFA in the management of renal tumors in an academic center.

Methods: A retrospective chart review of all renal tumor patients treated with RFA was performed. Patients were followed with CT and/or MRI according to their renal function. Procedure success was assessed by the absence of tumor enhancement and progression on imaging.

Results: From 2005, a total of 27 patients (19 males and 8 females) with 32 renal tumors underwent CT guided RFA under general anesthesia by a single operator. Median tumor size was 2.8 cm (mean 3.1, range: 1.4-5.4 cm). Five patients required a 2nd RFA procedure. Patients received from 1 to 5 ablations per tumor. Median age was 72 years (range 39-95). All patients had either solitary kidney, bilateral disease or considered unfit for surgery due to significant comorbidities. Mean patient follow-up was 2.7 years. A total of 24 (88%) patients had no evidence of disease. One patient had no response and a nephrectomy was performed. Two (7%) patients had residual disease and are followed up. Post-RFA complications were; minor bleeding and hematoma ($n = 5$), worsening renal functions ($n = 2$) of which one required permanent dialysis, pneumothorax ($n = 2$), splenic injury ($n = 1$), hepatic puncture ($n = 1$), duo-

denal fistula (n = 1), urinoma (n = 2), perirenal abscess and emphysematous pyelonephritis (n = 1), renal cortical infarction (n = 1), deep cutaneous burn (n = 1), wrist drop (n = 1) and psoas injury (n = 1).

Conclusions: Even though RFA can be a reasonable successful management modality for a selected patient cohort with renal tumors, it can still carry a significant risk for serious complications.

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Renal Cell Carcinoma in Octogenarians: Comprehensive Analysis Using the SEER Database

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Background: Little data exist about clinical outcomes in octogenarians who undergo surgery for renal cell carcinoma (RCC). The goal of this study was to determine overall and cancer-specific survival, and the use of partial versus radical nephrectomy in elderly patients.

Methods: Utilizing the Surveillance, Epidemiology, and End Results (SEER) database, 60,693 patients in the years 1988 and 2005 were identified who underwent either partial or radical nephrectomy for RCC. Patients were separated into two groups - those younger than age 80, and those 80 years of age or older - and were stratified by the aforementioned variables. Chi-squared and Kaplan-Meier analyses were used to determine differences amongst the cohorts in terms of surgical approach and overall and cancer-specific survival.

Results: Four-thousand two-hundred twenty seven patients (7.5%) were over the age of 80. Octogenarians were more likely to undergo radical nephrectomy than their younger counterparts (87% vs. 92%, $p < 0.0001$). At a median follow-up of 37 months (range 0-215) in patients <80 years, and 27 months (range 0-203) in patients ≥ 80 years, octogenarians were more likely to die of all causes (HR 2.32, 95% CI 2.22-2.42, $p < 0.001$) than their younger counterparts. Octogenarians were also more likely to die of RCC (HR 1.33, 95% CI 1.23-1.43, $p < 0.001$), but at a lower hazard ratio than for overall mortality. These cancer-specific differences in survival persisted throughout individual pathologic stages, with the exception of pathologic stage pT4 and metastatic disease. Octogenarians who underwent partial nephrectomy were 0.39 times less likely to die of RCC (95% CI 0.26-0.60, $p < 0.001$) than older patients who underwent radical nephrectomy.

Conclusions: Octogenarians who undergo partial nephrectomy have improved overall and cancer-specific survival than those who undergo radical nephrectomy, yet they are less likely to undergo partial nephrectomy than their younger counterparts. Octogenarians experience a decreased overall and cancer-specific survival benefit from extirpative surgery than younger patients. This data should be considered when treating the renal mass in the "elderly" patient.

P27

Utilization Rates of Open Partial Nephrectomy and Laparoscopic Radical Nephrectomy in Patients with Non-metastatic Renal Cell Carcinoma

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Introduction and Objectives: Open partial nephrectomy (OPN) and laparoscopic radical nephrectomy (LRN) may be underutilized. We explored the rates of the two surgeries relative to open radical nephrectomy (ORN) in a large population-based database.

Methods: Between 1998 and 2008, a total of 17690 nephrectomies for non-metastatic renal cell carcinoma were performed in the state of Florida. Of these, 2528 (14.3%), 1379 (7.8%) and 13783 (77.9%) respectively represented OPN, LRN and ORN. We examined the proportion of patients who underwent a OPN, LRN and ORN throughout the study period.

Multivariable logistic regression analyses addressed predictors of either OPN or LRN after adjusting for patient age, gender, race, Charlson comorbidity index, insurance type and year of surgery.

Results: Overall the rate of OPN increased from 8.1 to 18.7% over the study period vs. from 0.2 to 12.3% for LRN (\ddagger trend: $p < 0.001$). OPN and LRN rates ranged respectively from 9.6 to 25.1% and from 0.3 to 12.2% in individuals 70 years-old. Similarly, OPN and LRN rates ranged from 13.0 to 24.2% and from 0.3 to 11.7% in the highest annual hospital volume tertile vs. from 4.7 to 14.7% and from 0.2 to 10.4% in the lowest annual hospital volume tertile. In multivariable logistic regression analyses, high hospital volume and high surgical volume were independent predictors of the use of OPN and of the use of LRN ($p < 0.001$).

Conclusions: OPN and LRN are performed significantly less frequently than ORN. Both hospital and surgical volume represented important determinants of OPN and LRN use. This implies that the likelihood of being treated with either OPN or LRN is the highest when the surgery is performed at high volume centers and by high volume surgeons.

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A Population-based Analysis of the Perioperative Outcomes of Open Partial Versus Open Radical Nephrectomy

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Background: Open partial nephrectomy (OPN) has gained an increasingly important role in the surgical management of patients with renal cell carcinoma (RCC). We examined the differences in length of stay and complication rates between OPN and open radical nephrectomy (ORN) in patients with non-metastatic RCC.

Methods: Overall, 2528 (15.5%) OPNs and 13783 (84.5%) ORNs were performed in the state of Florida for non-metastatic RCC between 1998 and 2008. We examined the proportion of patients who underwent LRN vs. ORN throughout the study period, as well as the perioperative outcomes of the two surgical procedures.

Results: The rate of OPN constantly increased from 8.1 to 21.3% over the study period (chi-square trend: $p < 0.001$). Patients treated with OPN were statistically significantly younger (mean age: 61.6 vs. 64.7 years; $p < 0.001$) and had a lower Charlson comorbidity index (CCI) (61.6 vs. 57.4% patients with CCI=0; $p < 0.001$) than patients treated with ORN. Length of stay (LOS) was statistically significantly shorter in patients treated with OPN (mean LOS: 5.3 vs. 6.0 days; $p < 0.001$). Total hospital charges were also lower in OPN patients (mean hospital charges: 36680 vs. 39330\$; $p < 0.001$). The proportion of patients with postoperative complications was comparable between the two surgeries (22.8 vs. 23.3% for respectively OPN and ORN; $p = 0.7$). Similarly, no statistically significant differences were recorded for specific complications, except for higher blood transfusions rates in ORN patients (11.8 vs. 9.1%; $p < 0.001$). In multivariable logistic regression models addressing the overall complication rate, after adjustment for patient age, gender, race, CCI, insurance type, average annual hospital and surgical volume, type of surgery (OPN vs. ORN) did not achieve the independent predictor status (OR: 1.03 [95% CI: 0.93-1.15]; $p = 0.5$).

Conclusions: Despite higher surgical complexity of OPN, the length of stay and complication rates associated with this type of surgery are not more elevated than those recorded for ORN. In consequence, OPN should be given high priority when it is indicated.

P29**The Rates of Metastatic Renal Cell Carcinoma are Decreasing Over Time: A Population-based Analysis**

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Introduction and Objectives: We assessed the rate of metastatic renal cell carcinoma (mRCC) at diagnosis in a large population-based tumor registry.

Materials and Methods: Between 1988 and 2006, 87 842 patients were identified within 17 Surveillance, Epidemiology and End Results (SEER) registries with tissue-proven diagnosis of RCC of all stages. We examined the rates of mRCC at diagnosis throughout the study period. Multivariable logistic regression models examined the impact of year of diagnosis quartiles (1988-1992 vs. 1993-1997 vs. 1998-2002 vs. 2003-2006) on mRCC rates after adjusting for patient age, gender, race and socioeconomic status.

Results: The overall rate of mRCC was 19.1% and it decreased from 23.8% in the first year quartile to 16.5% over the study period (χ^2 trend: $p < 0.001$). The decrease in mRCC rates was more pronounced in females (-8.6%) than in males (-6.9%), in older individuals (-12.3% in ≥ 80 years) than in younger patients (-7.0% in < 50 years), in African-American (-9.7%) than in Caucasian patients (-7.3%), and in patients within the highest socioeconomic status quartile (-8.9%) relative to individuals within the lowest socioeconomic status quartile (-7.3%). In multivariable logistic regression models more advanced age ($p < 0.001$), male gender ($p < 0.001$), race other than Caucasian and African-American ($p = 0.02$) and lower socioeconomic status ($p < 0.001$) represented independent predictors of mRCC diagnosis. Finally, more contemporary year of diagnosis remained the foremost predictor of lower rate of mRCC at initial diagnosis ($p < 0.001$).

Conclusions: Our findings are highly encouraging and suggest that a larger proportion of patients will harbor curable or highly treatable stages of RCC. Conversely, an increasingly smaller proportion of mRCC will hopefully contribute to the overall RCC patient population. The increased use of imaging studies may represent an explanation for the observed results.

P30**Percutaneous Ablation of Renal Masses: The Albany Medical Center Experience**

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Background: Recently, nephron-sparing surgery (NSS) has become the preferred treatment for small renal masses. Open and laparoscopic partial nephrectomy can preserve renal function and have become the gold-standard for oncological outcomes. Percutaneous radiofrequency ablation (RFA) and cryotherapy ablation are non-ischemic, minimally-invasive procedures that can be performed as outpatient procedures without general anesthesia. We present our five-year experience at Albany Medical Center in patients treated with curative intent and in difficult cases in which we believed percutaneous ablation was preferred.

Methods: This is a retrospective review of consecutive cases of radiofrequency or cryotherapy ablation of renal masses performed at our center. Pre-operative data including demographics, body mass index (BMI), comorbidities, renal function, and biopsy results were recorded. Follow-up information consisted of last available imaging, date of last follow-up, and latest GFR, calculated by the Modification of Diet in Renal Disease equation. Change in GFR was calculated for all patients. We defined curative intent as a procedure performed for an initial presentation of stage T1a renal cell carcinoma (RCC). Recurrence was defined as an enhancing lesion on CT or MRI when a confirmatory biopsy was not obtained.

Results: From January 2005 to December 2009, our center performed 52 percutaneous ablation procedures for renal masses. Thirty-eight (73%) were cryoablation procedures. Median patient age was 73.5 years, median BMI 30.5, and median tumor size was 2.5 cm (range 1.6-7.3 cm). Fifty-eight percent of patients were obese, including 30% who were morbidly obese. Forty-one patients (79%) had stage T1a disease and 37 (71%) were treated with curative intent. Sixty-three percent had biopsy-proven RCC, and an additional five patients had a previous history of RCC. Of patients treated with curative intent, 32 (86%) had no evidence of disease at a median follow-up of 12 months. No patients with normal renal function pre-operatively developed renal insufficiency, and only four patients had a decrease in GFR by more than 10. There were two major complications early in our series with RFA including a bowel perforation, and development of acute renal failure in a patient with a solitary kidney. There was one major complication of bilateral pleural effusions following cryotherapy.

Discussion: Percutaneous ablation of renal masses resulted in short-term oncological outcomes that approach reported success rates of NSS with no effect on renal function. For patients with advanced age, morbid obesity or history of RCC, percutaneous ablation provides a relatively safe surgical option.

P31**Advanced Techniques in Renal Radiofrequency Ablation**

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Background: The increased use of percutaneous radiofrequency ablation (RFA) for the treatment of small renal tumors has presented new challenges for safe and effective tumor control. Adjacent organs such as the colon, liver, and spleen may interfere with a clear window for probe placement. Patient habitus may prevent the typical prone positioning during treatment. Nearby renal cysts or arterial branches may also create a heat-sink effect, lowering temperatures at the treatment site and possibly reducing the effectiveness of cancer control. We report our experience with techniques to overcome these concerns.

Methods: Twenty-two cases employing atypical treatment approaches during percutaneous RFA of renal tumors were identified from hospital records and retrospectively reviewed. All patients were treated with the LeVein CoAccess™ Electrode System and RF 3000® Radiofrequency Ablation System (Boston Scientific, Natick, MA). Electrodes were placed under computed tomography (CT) guidance. All lesions were biopsied immediately before treatment. Patients were monitored in the hospital overnight for complications. Preoperative and postoperative images were reviewed for treatment effectiveness and complications.

Results: Atypical treatment characteristics included injection of sterile water between organs (hydrodisplacement) to facilitate probe placement (13 patients), supine or lateral positioning (4 patients), transhepatic approach (3 patients), transrenal approach (1 patient), and arterial embolization or cyst aspiration prior to percutaneous embolization (1 patient each). Mean length of follow up was 19.2 months, and mean tumor size was 2.3 cm. There were no immediate complications. Three biopsies were non-diagnostic. Renal function remained unchanged for all patients reviewed. There was no evidence of disease recurrence or progression from the treated lesion. One patient underwent subsequent nephrectomy due to concern for recurrent disease but the tumor was entirely necrotic on final pathology, and another patient had bilateral nephrectomy prior to renal transplant.

Conclusions: Percutaneous RFA of small renal tumors can be accomplished safely, even in cases that were previously not amenable to a standard approach. These techniques may facilitate cancer control in an extended number of patients who would otherwise be high-risk surgical candidates.

P32**Selective Arterial Embolizations (SAE) of Renal Angiomyolipomas (AML): A Single Institution Experience**

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Background: Treatment of renal AML is indicated for symptomatic lesions and those at a high risk of bleeding (size over 4 cm). SAE is a minimally invasive treatment option that may prevent spontaneous bleeding, preserve renal function, and obviate the need for surgery. Despite demonstration of cessation of blood flow during initial treatment, repeat angiography for lesions that enhance on follow up imaging may demonstrate alternative feeding vessels that can be embolized. Here we report our experience with SAE of classic AML over the past twenty years.

Methods: Patients who had received SAE for AML from 1989-2009 were identified and analyzed. Patient data recorded included age, gender, tumor size, type of embolization material used, treatment complications, renal function before and after treatment, and need for future surgical management. The diagnosis of AML was based on radiologic features.

Results: Eight SAE treatments were performed in six patients at an average age of 46.2 years. One had tuberous sclerosis and five were female. Prior to treatment the mean tumor size was 6.5 cm. Average length of follow up was 15 months. The mean reduction in tumor size was 1.1 cm on follow up imaging. Varying combinations of absolute ethanol, microparticles, and embolization coils were used. Two patients had incomplete embolization discovered at repeat angiography, which was done for stable lesion size and continued enhancement on follow up CT. These patients underwent repeat SAE. Minor complications developed in 2 patients – one had renal arterial vasospasm requiring intra-arterial administration of nitroglycerin, while another developed transient flank pain and fevers following treatment. Renal function was unchanged after primary and repeated SAE. Three patients eventually underwent partial or radical nephrectomy, either due to concern for malignancy or because lesion size remained stable and there was continued concern about spontaneous hemorrhage. All three demonstrated hypovascular AML on final pathology with an average size of 8.8 cm.

Conclusions: SAE and repeated SAE are safe methods of treatment for patients with renal AML. If follow up imaging demonstrates continued enhancement or increasing tumor size, repeat SAE may be indicated. Otherwise, in our experience hypovascular AML is the typical pathologic finding if subsequent partial or radical nephrectomy is performed. This may indicate that despite stability in lesion size, a completely embolized AML may no longer be at a high risk of bleeding.

P33**Predictors of Health-Related Quality of Life Recovery Following Laparoscopic Simple, Radical and Donor Nephrectomy**

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Purpose: Laparoscopic surgery has been shown to portend a number of advantages over open surgery in terms of more rapid recovery and decreased morbidity. Despite this, there is a great deal of clinical variability in patients' post-operative recovery. The purpose of this study is to objectively quantify the recovery of health-related quality of life (HRQL) in patients undergoing laparoscopic nephrectomy, and determine which factors are predictive of a more expedited recovery.

Methods: Patient recovery was prospectively measured among patients undergoing laparoscopic simple (n = 12), radical (n = 42) and donor (n = 95) nephrectomy. All procedures were performed using a 3- or 4-trocar, transperitoneal fully-laparoscopic technique with intact specimen extraction using impermeable sacs for simple and radical nephrectomy, and hand extraction for donor nephrectomy. Post-operative recovery and quality of life were measured using the Postoperative Recovery Scale (PRS) administered preoperatively, immediately postoperatively and as an outpatient at 4, 8, 12, and 16 weeks postoperatively. ANOVA and Pearson's Chi Squared tests were performed on demographic data,

and multivariate logistic regression analysis was used to calculate odds ratios for factors predictive of recovery.

Results: There were statistically significant differences at baseline with respect to age ($p = 0.02$), gender ($p < 0.01$), body mass index (BMI; $p = 0.03$), surgical side ($p < 0.01$) and activity-based lifestyle ($p = 0.04$) across the three groups. Minimal adverse events were seen. Factors predictive of a more expedited recovery include age less than 50 years (OR: 2.1, $p < 0.01$), BMI $< 30 \text{ kg/m}^2$ (OR: 1.7, $p < 0.01$), active lifestyles (OR: 1.3, $p < 0.01$) and those patients undergoing nephrectomy for benign or malignant indications rather than for organ donation (OR: 1.4, $p < 0.01$). There was a significant delay in the donor group versus the non-donor group with respect to the median number of days both groups took to recover 75% and 90% of their baseline PRS scores (11 days, $p = 0.02$; 20 days, $p = 0.02$, respectively).

Conclusions: Predictive factors of recovery from laparoscopic nephrectomy include age, BMI, lifestyle and surgical indication. The differences between HRQL recovery following donor versus non-donor laparoscopic nephrectomy is significant, and suggests the possible interplay of underlying psychological factors.

P34**Transumbilical Laparoendoscopic Single-Site (U-LESS) Nephrectomy: Initial Experience of 16 Cases**

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Background: Laparoscopic nephrectomy requires 3 to 5 small incisions for port placement. Specimen extraction requires elongation of one of those small incisions. Transumbilical laparoendoscopic single-site (U-LESS) surgery employs only one small paraumbilical incision for multiple instrument entry and specimen extraction with advantages to further minimize minimally-invasive surgery. In this report, we present our experience and technique of U-LESS nephrectomy and bilateral nephrectomy.

Methods: Patients were positioned in a modified lateral decubitus position. A 2.5 to 5 cm skin incision (based on the size of the specimen) was made along the skin crease of the umbilicus. A 12-mm port and two 5-mm small-profile conventional ports were placed through separate fascial insertion along the incision. No specially designed single port device was used. The instruments used in these procedures including 10-mm flexible tip HD EndoEye and 5-mm 30 degree EndoEye laparoscope (Olympus), articulating laparoscopic Marilyn dissector and ThermoSeal (Novare), 5-mm LigaSure (Valleylab), and a set of conventional laparoscopic instruments. Renal arteries and veins were controlled with large Hem-o-lok clips or Endo GIA vascular staplers. For bilateral nephrectomies, repositioning was required after one side was done and both kidney specimens were extracted at the end of the entire procedure.

Results: From November 2008 to January 2010, a total of 16 cases (6 male and 10 female) with age ranging from 8 to 81 yrs (Median 45) were performed, including nonfunctioning atrophic kidneys (7 cases) and kidney masses (9 cases, one of these cases was palliative due to known C-spine metastasis). All kidney masses were not suitable for partial nephrectomy. Three of these cases were bilateral nephrectomies. All cases were performed uneventfully without needs for additional port placement. Operative times for unilateral nephrectomy ranged from 60-203 minutes, with an average of 155 minutes. Operative times for the three bilateral nephrectomies were 320, 163, and 239 minutes, respectively. Estimate blood loss ranged from 5-150 cc, with an average of 51 ml. Hospital stay ranged from 1-4 days (median 2 days). The length of followup ranged from 2-15 months and no short-term complications were observed in our patients.

Conclusions: U-LESS nephrectomy and bilateral nephrectomies can be safely performed for selected patients with currently available laparoscopic instruments though with increased technical challenges.