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MP-3.1

Sensitivity and specificity of renal mass biopsy for small renal masses using repeat biopsy as a pathological surrogate to nephrectomy

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Introduction: Studies have explored the use of renal mass biopsy (RMB) for the management and surveillance of small renal masses (SRM), given that 20–25% are benign. However, concerns remain regarding its accuracy; while a definitive diagnosis can be confirmed by nephrectomy, there is a surgical selection bias not to operate in negative cases, resulting in an unknown rate of true- vs. false-negatives on RMB. We hypothesized that patients undergoing repeat RMB would demonstrate lower selection bias and evaluated its role as a pathological surrogate to determine initial RMB sensitivity and specificity.

Methods: Clinical and pathological covariates for patients with a SRM receiving initial RMB, repeat RMB, and nephrectomy were extracted from our institutional database (1994–2020). After categorizing benign and malignant lesions, the primary outcome was to calculate sensitivity and specificity of the initial biopsy against each of: 1) repeat biopsy; and 2) surgical pathology.

Results: A total of 977 patients with SRMs had ≥1 biopsy, of which 216 had ≥2 biopsies (after a median of 119 days) and 442 underwent nephrectomy. Only 3% of cases were benign at nephrectomy, confirming a strong surgical selection bias, vs. 17% of repeat RMB. Using repeat RMB as a pathological surrogate, the sensitivity and specificity of initial RMB were 98.1% and 89.5%, respectively (vs. 99.2% and 100% when calculated against nephrectomy). In particular, 1.5% of cases were identified as false-negatives on repeat RMB compared to none by nephrectomy.

Conclusions: By studying repeat RMB as a novel pathological surrogate, this study overcomes the surgical selection bias in the nephrectomy gold standard. The conventional approach using final surgical pathology revealed an extremely low benign/negative rate and resulted in an inflated specificity. This effect is largely corrected by repeat RMB, suggesting that it may be a preferable gold standard in certain diagnostic scenarios. Furthermore, our results confirm that false-negatives on initial biopsy are rare (1.5%) and reinforce the accuracy of RMB.

MP-3.2

Clinical outcomes of patients with metastatic renal cell carcinoma with or without sarcomatoid differentiation treated with systemic therapy in a real-world Canadian setting

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Introduction: The objective of this study was to evaluate the impact of first-line systemic therapy on survival of metastatic renal cell carcinoma (mRCC) patients (pts) with or without sarcomatoid differentiation (SD) using real-world data.

Methods: The Canadian Kidney Cancer information system database was used to identify mRCC pts diagnosed from January 2011 to September 2021. Only pts with synchronous primary and metastatic disease, treated within 12 months from initial diagnosis, International Metastatic RCC Database Consortium (IMDC) intermediate-/high-risk, and a confirmed histology of RCC with documentation of presence/absence of SD were included. Pts were classified in two groups according to the presence or absence of SD defined at the time of nephrectomy. Within each of these groups, pts were compared by initial treatment received for mRCC: 1) vascular endothelial growth factor receptor (VEGFR) targeted treatment alone (TT) (sunitinib or pazopanib), or 2) immunotherapy-based treatment (IO). Inverse probability of treatment weighting using propensity scores was used to balance the groups for sex, age, Charlson comorbidity score, clear-cell histology, cytoreductive nephrectomy (before or after TT/IO), IMDC risk, sites, and number of organs with metastasis. Cox proportional hazards models were used to assess the impact of initial TT vs. IO on overall survival (OS) in pts with or without SD.

Results: A total of 470 pts were included in the study cohort: 352 pts were treated with TT and 118 pts were treated with IO. Median age was 62 years, 72% were male, and the majority had cytoreductive nephrectomy before ST (79%). In weighted analysis of the SD pts (40 IO and 94 TT patients), treatment with IO was associated with an increase in OS compared to TT (48 vs.18 months, hazard ratio [HR] 0.52, 95% confidence interval [CI] 0.29–0.92). In the non-SD pts (78 IO and 258 TT patients), the difference in survival was not proven between groups (60 vs. 36 months, HR 0.76, 95% CI 0.51–1.12).

Conclusions: Our study supports the hypothesis that, compared with targeted therapy alone, the magnitude of survival benefit with immunotherapy-based first-line systemic therapies is greater in pts with mRCC with SD.

MP-3.3

Evolution of BIIF renal cysts and the impact of the 2019 Bosniak classification

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Introduction: The followup of Bosniak BIIF renal cysts is associated with significant costs, radiation, and anxiety. Recent studies suggest a risk of malignancy and upgrading lower than previously reported. New radiological definitions of the Bosniak categories were introduced in 2019. We aimed to determine the radiological and clinical evolution of BIIF cysts diag-

nosed at our institution and to establish the impact of the 2019 Bosniak classification on the diagnosis of such lesions.
Methods: We identified all radiology reports with the diagnosis of a BIIF cyst at our institution between January 2000 and December 2018. Diagnostic and followup imaging were reviewed by trained radiologists to confirm the diagnosis and determine progression. Radiological and clinical characteristics were established, and the 2019 Bosniak criteria were retrospectively applied.
Results: Of 252 cysts initially reviewed, 55 (22%) were re-classified as BII upon revision. A total of 181 BIIF cysts were included for final analysis. The median imaging followup was 50 months. Only four cysts (2%) progressed to BIII or BIV. Five patients (3%) underwent surgical interventions, with only one malignant pathology being reported. No patient had a radiological progression without a confirmed benign pathology beyond 36 months. When applied to our cohort, the 2019 Bosniak classification would have led to a 76% decrease in BIIF diagnoses, with no increase in BIII or BIIV diagnoses, and identical classification of the confirmed malignant pathology.
Conclusions: The rate of upgrading and malignancy among BIIF renal cysts was markedly lower than traditionally reported. No patient had a significant progression beyond 36 months. More than 20% of BIIF cysts were initially overdiagnosed by radiologists. The 2019 Bosniak classification may help to reduce the overdiagnosis of BIIF lesions requiring followup, avoiding important costs/harm to patients.

MP-3.4

Association between the sarcomatoid status and percentage of sarcomatoid on the clinical outcomes of localized renal cell carcinoma post-nephrectomy

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Introduction: Renal tumors with sarcomatoid component account for only 5% of all renal cell carcinoma (RCC). Yet, sarcomatoid dedifferentiation is present in 1/5th of metastatic RCC, and the majority of patients harboring it are metastatic at diagnosis. We sought to compare the outcomes of localized RCC patients with and without a sarcomatoid component and the impact that the sarcomatoid percentage (SrcP) component has on recurrence.
Methods: The Canadian Kidney Cancer information system database was used to identify patients with localized RCC between January 2011 and September 2021. Patients with pT1-T3 stage and documented sarcomatoid status (SrcS) were included. Patients were classified into two groups according to the SrcS at the time of nephrectomy. Patients with sRCC were subclassified according to the SP (≤15% vs. >15%). Inverse probability of treatment weighting using propensity scores was used to balance the groups (sarcomatoid vs. not, and SP) for sex, age, Charlson comorbidity score, clear-cell carcinoma, pathological stage, grade, and size of the tumor. Cox proportional hazards models were used to assess the impact of SrcS and SrcP on recurrence-free survival (RFS) and overall survival (OS).
Results: A total of 205 sarcomatoid and 5217 non-sRCC patients were included. The SrcP was available for 157 patients (56 patients >15% and 101 ≤15%). Median age was 62 years and patients were comprised mostly of men (67%). The weighted analysis revealed that the SrcS was associated with an increased risk of developing metastasis and of mortality compared to non-sarcomatoid patients (RFS hazard ratio [HR] 2.48, 95% confidence interval [CI] 1.92–3.21; and OS HR 2.66, 95% CI 1.95–3.63). A sarcomatoid involvement of >15% was associated with an increased risk of developing metastasis and of mortality compared to ≤15% (RFS HR 1.94, 95% CI 1.26–3.00; OS HR 2.00, 95% CI 1.18–3.38).
Conclusions: Our study comprises one of the largest cohorts of patients with localized sRCC. Patients with SrcS or a SrcP >15% have worsened OS and RFS. SrcP component could represent an important criterion in the risk assessment for adjuvant therapy.

MP-3.5

Comparison of 99mTc-DTPA plasma clearance and estimated glomerular filtration rate in the renal hypothermia trial

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Introduction: The gold standard test to measure glomerular filtration rate (GFR) is a 99mTc-DTPA plasma clearance renal scan, however, these tests are cumbersome for patients and expensive compared to GFR estimation using serum creatinine concentrations. In this study, we aimed to compare measured GFR based on 99mTc-DTPA plasma clearance (mGFR) and estimated GFR using the CKD-EPI equation (eGFR) in order to assess the need for expensive renal scans in surgical urology trials.
Methods: We performed a post-hoc analysis of the randomized controlled renal hypothermia trial. This trial was conducted at five Canadian academic centers and showed no benefit of renal hypothermia during open partial nephrectomy. Renal function was assessed preoperatively and one-year postoperatively using the 99mTc-DTPA plasma clearance (mGFR) and using the CKD-EPI creatinine equation (eGFR). Statistical comparison of mGFR and eGFR was performed and interpreted using Pearson correlation coefficient. Subgroup analyses were performed according to baseline kidney function, age, patient sex, and ethnicity. Differences between mGFR and eGFR were categorized as small (less than 10 ml/minute/1.73 m^2) moderate (10–20 ml/minute/1.73 m^2), and large (>20 ml/minute/1.73 m^2).
Results: Overall, the comparison of 341 mGFR and eGFR assessments demonstrated a strong correlation (0.81, $p<0.0001$). Subgroups analyses based on kidney function, age, sex, and ethnicity remained highly correlated. One hundred ninety-two (56%) patients had small differences between mGFR and eGFR, 98 (28.7%) had moderate differences, and 52 (15.3%) had large differences.
Conclusions: This study showed that eGFR using serum creatinine is adequate in partial nephrectomy clinical trials and expensive assessments of plasma clearance are unnecessary. This information should improve the feasibility of future partial nephrectomy clinical trials without compromising validity.

MP-3.6

A prospective, randomized, parallel-controlled pilot trial of stereotactic body radiation therapy vs. radiofrequency ablation for the management of small renal masses

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Introduction: The potential of ablative technologies in replacing surgery for the treatment of small renal masses (SRMs) ≤4 cm is unclear. Our objective was to evaluate the feasibility and toxicity of stereotactic body radiation therapy (SBRT) and radiofrequency ablation (RFA) for SRMs to determine the utility of a future full-scale multicenter trial.

Methods: Patients scheduled for SRM treatment at a single academic center were approached for this pilot trial, with the aim of recruiting 24 patients. Participants were randomized to SBRT or RFA. Imaging (computed tomography or magnetic resonance imaging) is completed at three, six, nine, and 12 months post-procedure. Crossover, if ineligible for treatment after randomization, was allowed. Biopsies were completed prior to the procedure and at 12 months. SBRT included an initial simulation session and a single image-guided treatment session with a prescribed dose of 25 Gy. RFA was conducted by either percutaneous or laparoscopic access with two cycles of eight minutes duration each upon reaching target temperature.

Results: Twenty-four patients were recruited and randomized over 18 months (SBRT=11; RFA=13). Fourteen had SBRT, eight RFA, and two became ineligible. The median age for all patients was 67 years (53,85) and 17 were male. Seventeen patients had clear-cell renal cell carcinoma (RCC), six had papillary RCC, and one had chromophobe RCC. All patients had T1a disease. Mean procedure length (minutes) for SBRT and RFA was 15.5±7.4 and 10.5±3.9, respectively. Two of five patients (four SBRT, one RFA) who had a 12-month biopsy demonstrated viable tumor (two SBRT). An additional five patients (one RFA, four SBRT) had nine-month imaging demonstrating no tumor growth. Additional data are not yet available for the remaining patients. An early grade 2 flareup occurred in one SBRT patient.

Conclusions: Recruitment and randomization of patients with SRMs is feasible on a timeline that allows for regular followups and imaging. Thus far, both treatments have been shown to have an excellent short-term safety profile.

MP-3.7

A matched analysis of active surveillance vs. nephrectomy for small renal masses

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Introduction: While studies have shown that patients with a small renal mass (SRM) managed on active surveillance (AS) maintain excellent metastasis-free (MFS) and cancer-specific survival (CSS), observed differences in overall survival (OS) may be explained by older/more comorbid patients selecting AS. Few studies have evaluated the outcomes of AS vs. primary intervention in clinically balanced patient groups.

Methods: Patients with a SRM (≤4 cm T1a) aged 55–75 were identified from our institutional database (2000–2020). Those with a prior cancer history/family history or undergoing radiofrequency ablation were excluded. Demographic and clinical information were extracted to assess OS and a composite event-free survival (EFS) outcome, which included OS, CSS, MFS, progression, or systemic therapy, using Cox proportional hazards models. To better adjust for clinical characteristics, patients receiving AS versus nephrectomy were exact-matched on age, sex, Eastern Cooperative Oncology Group (ECOG) score, biopsy status, and histology.

MP-3.7. Table 1. Demographic and clinical characteristics and outcomes of active surveillance (AS) and nephrectomy in the full and exact match cohorts

	Full cohort		After exact match	
	AS	Nephrectomy	AS	Nephrectomy
n	205	172	53	57
Demographic and clinical covariates				
Age (years), mean	65.1	63.1	63.1	64.3
Sex, male (%)	67.3	65.1	77.2	77.2
ECOG (%)				
0	56.6	65.7	75.4	75.4
≥1	9.8	7.0	3.5	3.5
Unknown/ missing	33.7	27.3	21.1	21.1
Biopsy, yes (%)	59.5	72.7	47.4	47.4
Histology				
Clear-cell (%)	20.5	66.4	38.6	38.6
Papillary (%)	14.8	13.6	5.3	5.3
Chromophobe (%)	0	6.4	0	0
Benign (%)	45.9	0.8	0	0
Other (%)	4.9	6.4	0	0
No histology/ Non-diagnostic/No biopsy (%)	13.9	6.4	56.1	56.1
Outcomes				
Overall survival				
Dead	7	3	2	2
5-year overall Survival Probability (%)	96.0	98.1	94.8	95.7
Event-free survival (composite)				
Event (n)	8	9	2	4
5-year survival Probability (%)	96.0	95.4	96.0	92.7

AS: active surveillance; ECOG: Eastern Cooperative Oncology Group.

Results: We identified 377 SRM patients, of which 205 were managed by AS and 172 by nephrectomy. The cohort was balanced after matching (n=110) (Table 1): age 64 years, 77% male, and 75% ECOG 0. In each arm, 47% of patients had a biopsy, with predominantly clear-cell histology. In the matched cohort, the predicted five-year OS was 95.7% for nephrectomy and 94.8% for AS (p=0.84; hazard ratio [HR] nephrectomy vs. AS 0.83, 0.13–5.32), while the EFS was 92.7% and 96.0%, respectively (p=0.47; HR nephrectomy vs. AS 1.88, 0.35–10.15).

Conclusions: In SRM patients well-matched for age and comorbidity, we observed much higher five-year OS and EFS rates for AS than those previously reported, with point estimates that were comparable to nephrectomy. Furthermore, our matched characteristics approximate the treatment arms of contemporary cohorts (i.e., the patient population equally eligible for AS or primary intervention), suggesting that AS is a safe management strategy in younger, healthier patients.

MP-3.8

Surgeon-level vs. hospital-level quality variance in kidney cancer surgery

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Introduction: Despite the use of quality indicators (QIs) as markers of high-quality surgical care, minimal data exist to inform their most effective implementation into real-world quality improvement programs. The objective of this study was to determine whether variance in kidney cancer surgery QIs is most impacted by surgeon-level or hospital-level factors in order to inform quality improvement initiatives.

Methods: The ICES and Veterans Affairs (VA) databases were queried for patients undergoing surgery for kidney cancer. Kidney cancer surgery QIs were defined within each cohort. Quality of care was benchmarked at a surgeon- vs. hospital-level to identify statistical outliers, using available clinicopathological data to adjust for differences in case-mix. The variance between surgeons and hospitals was calculated for each QI using a random-effects model.

Results: The QI with the greatest amount of variance explained by hospital- and surgeon-level factors was the proportion of cases performed with minimally invasive surgery (MIS). The majority of this variance was due to surgeon-level factors for both the VA and ICES cohorts. The proportion of MIS cases was also the QI with the greatest number of outlier hospitals and surgeons compared to the average performance. The proportion of partial nephrectomies performed for patients at risk of chronic kidney disease was the QI with the greatest amount of variance due to hospital-level factors for the ICES cohort.

Conclusions: The proportion of localized kidney cancer cases performed using an MIS approach is the QI requiring the greatest attention. Quality improvement initiatives should focus on surgeon-level factors to increase the number of MIS cases being performed for patients with localized renal masses.

MP-3.9

Outcomes of partial nephrectomy for non-metastatic cT2 renal tumors: Results from a Canadian, multi-institutional collaborative

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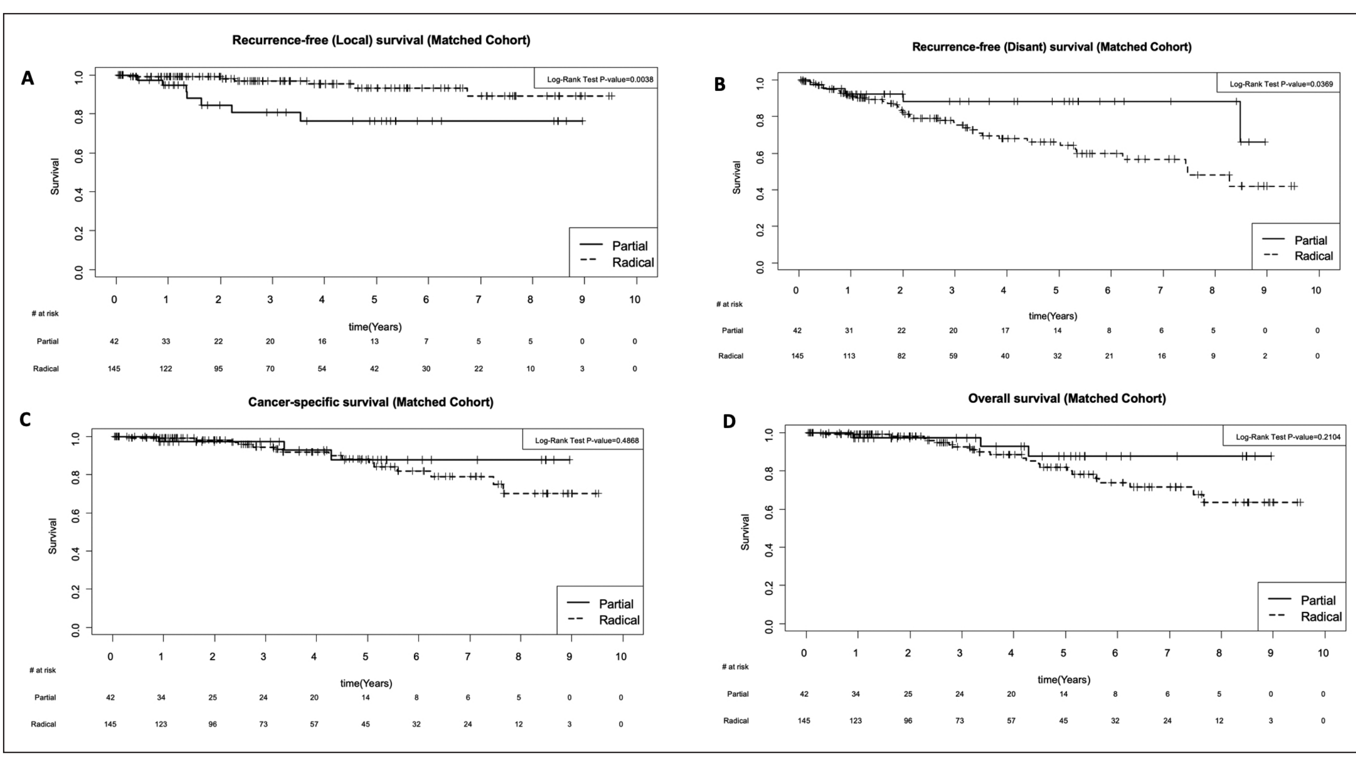
Support: CKCis database and support staff

Introduction: The role of partial nephrectomy (PN) is not well-defined for cT2 renal cell carcinoma (RCC) as compared to radical nephrectomy (RN). The aim of this study was to examine oncological outcomes of PN as compared to RN for non-metastatic cT2 RCC.

Methods: The Canadian Kidney Cancer information system was used to define patients who underwent surgery for non-metastatic cT2 RCC from January 2011 to October 2021. Patients with clear-cell, papillary, and chromophobe RCC were included. Other histology, multiple tumors, and



MP-3.9. Figure 1. Kaplan-Meier curves showing local and distant recurrence-free survival, cancer-specific survival, and overall survival between groups.

hereditary RCC syndrome patients were excluded. Each PN patient was individually matched to RN up to 1:4 depending on the availability of patients based on tumor size (±1 cm), histology, grade (clear-cell and papillary), and necrosis (clear-cell). Matched patients were analyzed as clusters.
Results: A total of 1347 patients were identified and 42 PN patients met study criteria, who were then matched to 145 RN patients. Both groups had similar age, gender, smoking status, body mass index, Charlson comorbidity index score, symptoms at presentation, baseline estimated glomerular filtration rate (eGFR), hemoglobin, and pathological characteristics. PN patients had smaller tumors (7.6 cm, interquartile range [IQR] 7.2, 9.2 vs. 8.5 cm, IQR 7.6, 10.3, p=0.048), had higher likelihood of undergoing open surgery (75% vs. 30%, p<0.0001), less likely received adrenalectomy (0 vs. 21%, p=0.0001), and had higher likelihood of positive surgical margin (PSM) (10% vs. 1%, p=0.025). Median followup was not significantly different in either group (3.7 years, IQR 1.1, 5.4 in PN vs. 2.8 years, IQR 1.2, 5.6 in RN, p=0.79). During the followup period, PN patients had a higher risk of local recurrence (hazard ratio [HR] 4.38, 95% confidence interval [CI] 1.51–12.71), lower risk of metastasis (HR 0.39, 95% CI 0.16–0.95), improved cancer-specific survival (HR 0.65, 95% CI 0.22–1.87) and improved overall survival (HR 0.47, 0.17–1.27) as compared to RN (Figure 1).
Conclusions: In this multi-institutional, Canadian cohort of patients with non-metastatic cT2 RCC undergoing surgery, PN was associated with a higher likelihood of PSM and local recurrence as compared to RN, and a lower risk of distant metastasis, cancer-related death, or death from any cause. Despite individual patient matching, there is likely unadjusted selection bias resulting in superior cancer survival associated with PN.

MP-3.10

Intermediate-term outcomes for active surveillance of biopsy-proven oncocytomas

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Introduction: Oncocytomas account for 3–7% of all solid renal masses. Renal mass biopsy (RMB) can accurately diagnose oncocytomas and facilitate active surveillance (AS) of these lesions. We sought to characterize the natural history and intermediate-term outcomes for oncocytomas undergoing AS at our institution.
Methods: This was a single-center, retrospective study of a prospectively maintained database of AS patients with biopsy-proven oncocytomas undergoing serial imaging and followup between 2004 and 2021. Time on AS was calculated at the first followup appointment after RMB. We extracted demographic and clinical information to assess conversion to active treatment (surgical excision or radiofrequency ablation [RFA]), metastasis, and survival.
Results: We included 123 patients with a median age at diagnosis of 66.7(56.9–74.4) years and tumor size of 2.9 (1.8–3.4) cm. The median time on AS was 4.5 (2.8–8.0) years. Conversion to active treatment occurred in 22 patients (18%), with 18 undergoing nephrectomy and four undergoing RFA. Reasons for treatment included provider concern regarding growth rate (n=12, 55%), worrisome features of renal cell carcinoma (RCC) on followup (n=7, 32%), and patient preference (n=3, 14%). Among operated patients, the overall concordance rate from original RMB to nephrectomy pathology was 79% (14/18). In the four discordant patients, final surgical pathology revealed: 1) eosinophilic RCC (pT1a); 2) succinate-dehydrogenase-deficient RCC (pT1b); 3) mixed oncocytic, chromophore, and eosinophilic RCC (pT3a); and 4) unclassified RCC (pT3a). No patients had evidence of metastasis or disease-specific mortality in followup for AS or after treatment.
Conclusions: AS for biopsy-proven renal oncocytomas is oncologically safe in the intermediate-term. The majority of patients in our cohort remained on AS for years, with approximately 18% undergoing treatment. Of these, only four patients had discordant final surgical pathology. No metastases or disease-specific mortality were observed.

MP-3.11

Efficacy of selective angioembolization of renal angiomyolipoma short- and long-term outcomes

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Introduction: Renal angiomyolipomas (AML) are the most common benign renal tumor, often found incidentally on cross-sectional imaging. While generally asymptomatic, AMLs have the potential to cause severe and life-threatening bleeding, with their risk proportionate to their size. Selective angioembolization (SAE) may be used to prophylactically treat large renal AMLs and thus reduce their risk of bleeding. We aimed to evaluate the efficacy of SAE for size reduction of large renal AMLs.
Methods: Data were retrospectively collected from the Royal Prince Alfred radiology database, from a 10-year period from July 2011 to July 2021. Patients were included if: AML was diagnosed on computed tomography abdomen or renal tract ultrasound, size >4 cm, patient underwent subsequent SAE. Followup imaging and reports were obtained and analyzed to calculate the mean reduction in AML diameter and volume. Clinical notes were reviewed to analyze post-procedural complications.
Results: Twenty-seven patients were identified and included in the analysis. Interval followup imaging ranged from 1–60 months post-SAE. The mean reduction in AML diameter was 43% at three months post-SAE (confidence interval [CI] 24.19–62.14, p=0.0004) and 60% at 12 months (CI 27.97–92.03, p=0.0065). The study also showed that after initial reduction, AMLs reduced in size further by an average of 16% per year. Twenty-six patients underwent elective SAE; one patient had emergency SAE for life-threatening hemorrhage. Complications were uncommon: three patients had small infarcts to adjacent renal parenchyma and one patient was found to have a pseudoaneurysm six months post-SAE, which was coiled. No deterioration of renal function was observed post-procedure in our cohort.
Conclusions: SAE is a safe and effective procedure that can reduce the size of renal AMLs over both short- and long-term periods. SAE could be considered a minimally invasive alternative to partial nephrectomy in renal AMLs at high risk of hemorrhage. Followup imaging is useful to document the success of treatment.

MP-3.12

Long-term evaluation of recurrence in patients undergoing radiofrequency ablation for renal tumors

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Introduction: Current guidelines recommend that patients who have undergone radiofrequency ablation (RFA) for renal cell carcinoma (RCC) should be monitored for up to five years; however, long-term recurrence data beyond five years are lacking. The objective of this study was to evaluate RCC recurrence rates, time to, and predictors of recurrence in patients up to 10 years post-RFA.
Methods: This was a single-center, retrospective chart review of patients undergoing RFA for any size renal tumor between 2004 and 2012. Patients with non-diagnostic tumors and cases requiring repeat RFAs or surgery were excluded. All tumors and recurrences were confirmed via imaging. Univariate and multivariate Cox proportional hazards regression and Kaplan-Meier analyses were conducted to determine predictors of recurrence and effects of variables on recurrence-free survival.
Results: A total of 142 RFAs were identified, with 58 patients included; 72.4% were male, the mean age at treatment was 67.3 (±11.2, median 65.5). The percutaneous approach was used in 40 (69%) patients, and 72.4% had clear-cell histology. The median time to recurrence was 15.7 months (range 1.0–120.0), with 14 (24.1%) patients experiencing recurrence. Mean tumor size was 2.7 cm (±0.80, range 1.4–4.5), and nine (15.5%) patients had minor complications. The mean RENAL nephrometry score was 6.6 (±1.8, median 7, range 4–10), indicating low-moderate

complexity. The majority of recurrences (12) were between three and 12 months post-RFA. Fifteen patients who were not lost to followup were recurrence-free at 10 years. Analyses revealed no statistically significant predictors of recurrence.

Conclusions: A recurrence rate of 24.1% was found in this sample of 58 patients, the majority occurring in year 1 post-RFA. While there were no significant predictive variables for recurrence in this sample, evaluating data on these patients over time can aid in establishing parameters for routine followup, such as imaging and decision-making for continuing care.

MP-3.13

Partial nephrectomy for large renal masses: Lessons we learned

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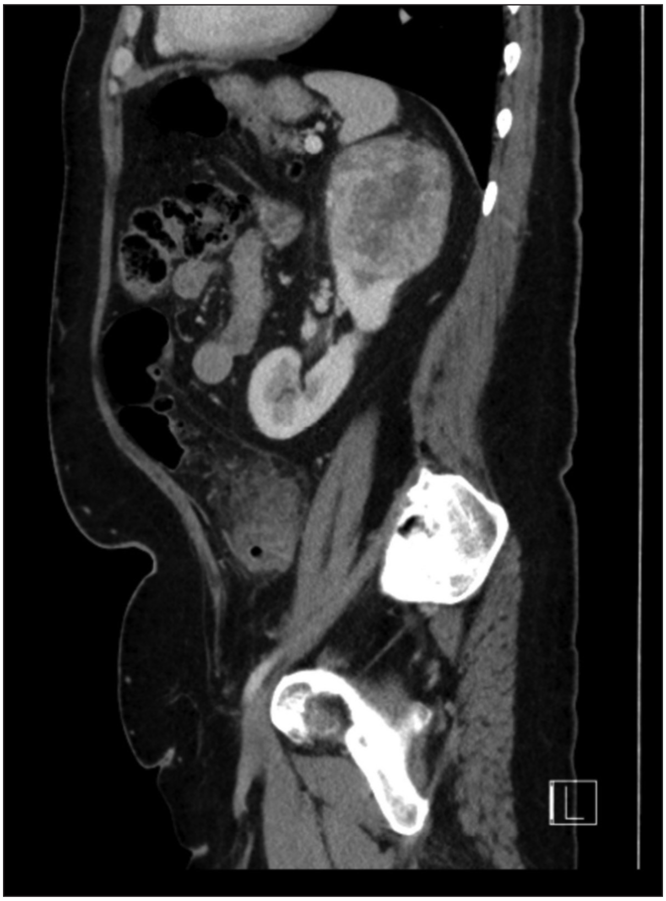
Introduction: The aim of our study was to show our experience in managing large renal masses (cT1b/ T2) through partial nephrectomy (PN) over the last three years.

Methods: We collected retrospective data for all patients managed by PN for masses larger than 4 cm over the last three years, including surgical, biochemical, radiological, and pathological data.

Results: We identified 47 patients managed by PN for >4 cm renal masses. The mean age of the patients was 55.7±13.4, including 29 males and 18 females. The tumor was located on the right and left sides in 30 and 17 patients, respectively. Forty-four and three patients had solid mass and Bosniak 3/4 renal cysts, respectively. Masses were T1b and T2 in 40 and seven patients, respectively. The mean tumor size was 6.2±1.5 cm (4.5–10.5). Using renal nephrometry score, eight (17%), 28 (60%), and 11 (23%) had low, moderate, and high complexity, respectively. All cases were managed by open surgery. The median warm and cold ischemic times were 10 minutes (10–29). Hospital stay was 48–72 hours. One patient (2%) developed grade 3 complications, presenting one week post-surgery with hypotension and low hemoglobin. Computed tomography angiogram confirmed a bleeding pseudoaneurysm and was successfully embolized. RCC was identified in 42 patients, while five patients had oncocytoma and angiomyolipoma. Two patients (4%) had positive surgical margins. Five patients out of 42 cancerous cases (12%) had pathological T3 RCC. The mean preoperative and postoperative estimated glomerular filtration rates were 89.09±12.41 and 88.50±10.50, respectively (p=0.2). The median followup was 14 months and no patient had evidence of cancer recurrence. Figures 1–4 demonstrate some of our successfully managed cases.

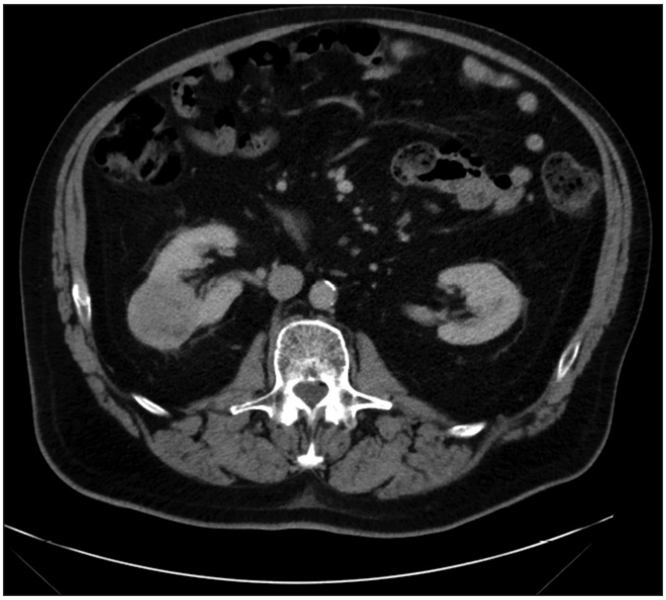
Conclusions: Partial nephrectomy for large renal masses is safe in experienced hands and should be attempted on a higher percentage of patients, regardless of the tumor complexity. No cancer recurrence or significant deterioration of renal function was observed within our short-term followup.



MP-3.13. Figure 1.

MP-3.13. Figure 2.

MP-3.13. Figure 3.



MP-3.13. Figure 4.

MP-3.14

Radical nephrectomy with caval tumor thrombectomy: An Australian experience

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Introduction: Inferior vena cava (IVC) tumor thrombus is seen in up to 10% of renal cell carcinoma (RCC) and greatly complicates surgical management. We aimed to assess perioperative morbidity and long-term oncological outcomes after radical nephrectomy with caval tumor thrombectomy.

Methods: This was a retrospective review of radical nephrectomy with caval tumor thrombectomy from 2011–2021. Continuous variables were reported as median (range). Kaplan-Meier survival curves were compared using the log-rank test.

Results: We identified 22 patients; 15 (68.2%) were male and the median age was 63.5 years (34–75). There were three (13.6%) level III and eight (36.4%) level IV tumor thrombi. RCC size was 11.2 cm (2.7–21.0), with 13 (59.1%) right-sided. Nine (40.9%) patients had metastatic disease. Operative time was nine hours (5–18.8); seven (31.8) cases were performed emergently and nine (40.9%) underwent cardiopulmonary bypass. One (4.5%) patient died intraoperatively and four (18.2%) died in-hospital. Length of stay was 12.5 days (5–66) and 9 (40.9%) patients experienced Clavien-Dindo IV complications. Nineteen (86.4%) tumors were of clear-cell variant and 17 (77.3%) had positive margins. Excluding in-hospital deaths, median followup was 20 months (4–65). Five (27.8%) patients received adjuvant therapy and cancer recurrence occurred in six (33.3%). Overall survival (OS) was 66.7% (n=12) over a duration of 17 months (4–65) and recurrence-free survival (RFS) was 50% (n=9) over seven months (4–65). Time-to-recurrence and time-to-death were 9.5 months (2–19) and 13.5 months (1–33), respectively. On survival analysis, there were significant differences in OS (p=0.006) and RFS (p=0.006) with regards to metastatic status. Tumor thrombus level showed a difference in RFS only (p=0.006). Cardiopulmonary bypass was not predictive of OS (p=0.54) or RFS (p=0.82).

Conclusions: Although radical nephrectomy with caval tumor thrombectomy is associated with significant morbidity and mortality, it remains an effective procedure in the treatment of advanced RCC.

MP-3.15

Surgical treatment of tumors involving horseshoe kidneys

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Introduction: Horseshoe kidney (HK) is the most common renal fusion anomaly, with an estimated incidence of 1/666.[1] Tumors arising from HK are rare and management guidance is sparse. This study aimed to report on the surgical management and oncological outcomes of patients treated for HK tumors.

Methods: We retrospectively reviewed the medical records of nine patients treated at a single institution for tumors involving HKs between 2000 and 2020. Demographics, operative details, pre/postoperative course, histopathology, and oncological information were collected.

Results: The study cohort included six male and three female patients (Table 1). Five patients underwent radical heminephrectomy; two underwent open partial nephrectomy, nephroureterectomy was performed on two patients. Tumor histologies were clear-cell renal cell carcinoma (ccRCC) in five patients, papillary RCC (pRCC) in two patients, and high-grade non-invasive urothelial carcinoma (UC) in two patients. One patient had a concomitant, localized, low-grade kidney leiomyosarcoma with hilar lymph node metastasis of ccRCC (following a previous partial nephrectomy of ccRCC). Tumor size ranged from 3.5–8 cm. All cases had negative surgical margins. Additional preoperative imaging was performed in 7/9, and accessory blood vessels were identified in 7/9

MP-3.15. Table 1. Patient characteristics of the study cohort (n=9)

Patient no.	Age (years)	Sex	Symptoms	Tumor location	Tumor size (cm)	Tumor histology	Tumor stage	Surgical margins
1	51	F	Gross hematuria	Right + isthmus	8	ccRCC	T3NxM0	Negative
2	72	F	Abdominal pain	Isthmus	NA	ccRCC	T1NxM0	Negative
3	74	M	Gross hematuria	Left	NA	UC grade II/III	TaNxM0	Negative
4	75	M	Microscopic hematuria	Right	6.8	ccRCC	T1bNxM0	Negative
5	63	M	Gross hematuria	Right	3.4	UC HG+CIS	TaNxM0	Negative
6	48	M	Incidental finding	Left	4.2	ccRCC	T3aNxM0	Negative
7	61	M	Incidental finding	Left	3.5	pRCC	T1NxM0	Negative
8	70	F	Radiological finding during oncological followup	Right	3.6	Kidney – Leiomyosarcoma low-grade and 2/4 positive LNs for ccRCC*	Leiomyosarcoma T1N0M0; ccRCC TxN1M0	Negative
9	79	M	Incidental finding	Right	5	pRCC type I	T1bNxM0	Negative

*Previous partial nephrectomy for ccRCC. cc: clear cell; CIS: carcinoma in situ; HG: high-grade; LN: lymph node; NA: not available; p: papillary; RCC: renal cell carcinoma; UC: urothelial carcinoma.

MP-3.15. Table 2. Surgical management of the study cohort (n=9)

Patient no.	Surgical approach	Side	Incision type	Operative time (min)	Estimated blood loss (mL)	Preparatory imaging/ procedures for surgery	Kidney blood supply (no.)	Complication (Clavien grade)
1	Open RN	Right + isthmus	Lower midline transperitoneal	NA	NA	Angiography	3A	None
2	Open PN	Isthmus	Midline transperitoneal	NA	NA	Angiography with preoperative percutaneous selective embolization of the tumor	3A	None
3	Open NU	Left	Flank incision extraperitoneal	NA	NA	IVP	NA	Death (5), due to massive myocardial infarction
4	Open RN	Right	Midline, transperitoneal	122	NA	CT angiography	4A	Paralytic ileus (1), delirium (1)
5	Open NU	Right	Chevron + Gibson, extraperitoneal	286	300	CT angiography	4A	Aspiration pneumonia (2)
6	Open RN	Left	Midline, transperitoneal	221	NA	CT angiography	6A	None
7	Laparoscopic RN	Left	NA	154	300	None	3A	None
8	Open RN	Right	Chevron bilateral transperitoneal	312	750	None	6A	Wound hematoma (1)
9	Open PN*	Right	Midline transperitoneal	207	300	MRI	NA	Paralytic Ileus (1), delirium (1)

*Additional procedures: left dismembered pyeloplasty, right hemicolectomy for colon neoplasm. A: artery; CT: computed tomography; IVP: intravenous pyelogram; MRI: magnetic resonance imaging; NA: not available; NU: nephroureterectomy; PN: partial nephrectomy; RN: radical nephrectomy.

patients. Five patients had a postoperative complication, including one major (Clavien grade 5, death due to acute myocardial infarction) and four minor (Clavien grade ≤2) complications (Table 2). During a median followup of 39 months (range 8–67), three ccRCC patients developed distant metastasis and one patient with UC developed a bladder recurrence. None of the patients developed new-onset chronic kidney disease.

Conclusions: Treatment of tumors in HKs can be managed by partial and hemi-nephrectomy. This can be done safely with acceptable operative and oncological outcomes. Preoperative imaging of the blood vessels is necessary, as most patients have an accessory blood supply.

Reference

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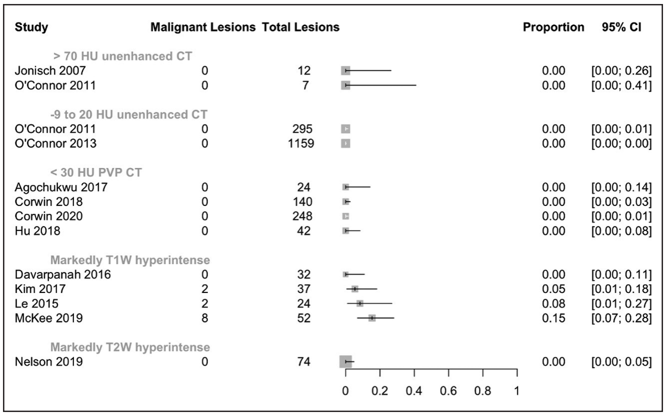
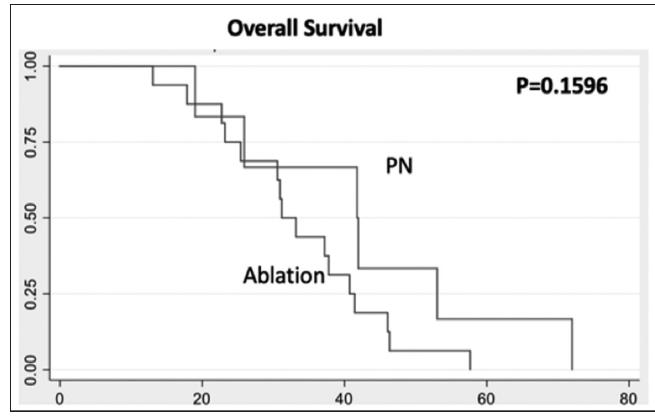


UP-3.1. Figure 1. Forest plot of proportion on non-benign lesions within class 2 criteria.



UP-3.2. Figure 1. Kaplan-Meier curves of overall survival stratified by treatment arm.

UP-3.1

Proportion of malignant masses in newly included Bosniak version 2019 class 2 cystic renal masses: A systematic review

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Introduction: In 2019, a major revision of the Bosniak classification was proposed to address several shortcomings. The purpose of this systematic review is to determine the proportion of malignant renal masses within newly described Bosniak v2019 class 2 cystic masses for CT and MRI.

Methods: Multiple databases were searched. Studies were eligible for inclusion if they evaluated malignancy rate of cystic renal masses using any of the Bosniak v2019 class 2 subtypes. Risk of bias and applicability was assessed. Proportion of malignant renal masses for each included study was calculated.

Results: 12 studies met inclusion criteria. 2146 renal masses were evaluated within five Bosniak class 2 subtypes reporting rates of malignancy as follows: 1)'homogeneous hyperattenuating (≥ 70 HU) masses at noncontrast CT'; 0% in all studies 2)'homogeneous masses -9 to 20 HU at noncontrast CT'; 0% in all studies 3)'homogeneous masses 21 to 30 HU at portal venous phase CT'; 0% in all studies, 4)'homogeneous masses markedly hyperintense at T1-weighted imaging (approximately 2.5 normal parenchymal signal intensity) at noncontrast MRI'; range of 0% to 15% and 5) 'homogeneous masses markedly hyperintense at T2-weighted imaging (similar to CSF) at noncontrast MRI'; 0% in one study. No studies evaluated the other Bosniak class 2 subtypes: 'cystic masses with thin (≤ 2 mm) and few (1–3) septa; septa and wall may enhance; may have calcification of any type' for either CT or MRI and 'homogeneous low-attenuation masses that are too small to characterize' for CT. Forest plot of results summarized in Figure 1.

Conclusions: Bosniak v2019 class 2 cystic renal masses are highly likely to be benign cysts with similar or lower proportion of malignancy compared to the original Bosniak classification. Relatively few studies evaluated renal masses within each class 2 subtype, and some were at risk of bias, necessitating future validation of each subtype described in class 2 of the Bosniak v2019 update.

UP-3.2

Percutaneous ablation vs. partial nephrectomy for clinical T1a renal masses

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Introduction: Management options for small renal masses (SRM) include surgery, thermal ablation (TA), and active surveillance.[1] Although recurrence and retreatment rates are higher for TA compared to partial nephrectomy (PN), cancer-specific survival and overall survival (OS) rates are comparable.[2] This study compares functional and oncological outcomes of TA and PN for SRMs at our center.

Methods: Patients (pts) who underwent TA or PN for SRM at UWO from 2010–2017 were retrospectively reviewed. TA included radiofrequency ablation, cryoablation, and microwave ablation. PN was performed via an open or robotic approach. Patients with cT1a with recorded followup (FU) >12 months were included. Pts with simultaneous multiple renal lesions, known metastatic disease, or ablation for recurrences were excluded. Oncological and functional outcomes were compared between groups.

Results: A total of 269 pts were included, 112 in the PN and 157 in the TA group. The PN pts were younger, had a lower Charlson comorbidity index and a higher estimated glomerular filtration rate (eGFR). Tumor size was comparable between groups (Table 1). Complication rates were higher with PN: 31.25% vs. 7% for TA. Mean postoperative eGFR decline was significantly lower (8.7 and 18.7, $p<0.001$), in the TA group vs. PN group. Retreatment rate was 12.1% in the TA group. Recurrence rate (beyond three months) was higher in the TA group, 8.9% vs. 2.7% for PN ($p=0.038$) (Table 2). No significant difference in OS was found between groups ($p=0.16$) (Figure 1). Being non-randomized and from a single center are the main limitations of this series.

Conclusions: Recurrence and retreatment rates were higher in the TA group compared to PN, but there were more complications with PN. TA could be repeated with safety and relative ease. Ablation therapy is a viable alternative for non-surgical candidates and those who prefer a minimally invasive option. Outcome differences should be discussed in a shared decision-making when counselling patients with SRM.

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UP-3.2. Table 1. Clinical characteristics

	TA	PN	p
Patients, n	157	112	
	RFA 104 (66.2%)	Robotic 86 (76.8%)	
	CA 46 (29.3%)	Open 26 (23.2%)	
	MWA 7 (4.5%)		
Age (years), mean (±SD)	68 (±10.44)	58.6 (±11.34)	0.0001
CCI, mean (±SD)	5.42 (±1.99)	3.82 (±1.38)	0.0001
Preop eGFR (mL/min/1.73m^2), mean (±SD)	86.0 (±41.7)	107.9 (±38.5)	0.0001
Tumor size (cm), mean (±SD)	2.51 (±0.77)	2.6 (±0.81)	0.324
RENAL score, mean (±SD)	6.03 (±1.69)	6.45 (±1.73)	0.055
Histology, n (%)			0.21
Clear-cell RCC	78 (49.7)	6 (59.8)	
Papillary RCC	30 (19.9)	14 (12.5)	
Chromophobe RCC	9 (5.7)	6 (5.4)	
Oncocytoma	7 (4.5)	12 (10.7)	
AML	-	7 (6.3)	
Not done	17 (10.8)	-	
Not diagnostic	16 (10.2)	-	
Other benign	-	6 (5.4)	

AML: angiomyolipoma; CA: cryoablation; CCI: Charlson comorbidity index; MWA: microwave ablation; PN: partial nephrectomy; RCC: renal cell carcinoma; RFA; radiofrequency ablation; TA: tumor ablation.

UP-3.2. Table 2. Functional and oncological outcome

	TA (n=157)	PN (n=112)	p
Preop Cr (µmol/L), mean (±SD)	100.3 (±68.3)	74.3 (±17.2)	0.0001
Preop eGFR (mL/min/1.73m^2), mean (±SD)	86.0 (±41.7)	107.9 (±38.5)	0.0001
eGFR change pre-postop, mean (±SD)	8.7 (±12.6)	18.7 (±19.2)	<0.0001
Complication, n (%)			<0.0001
Any	11 (7)	35 (31.25)	
Clavien grade I-II	9 (5.7)	28 (25)	
Clavien grade ≥ III	2 (1.3)	7 (6.25)	
Repeat ablation for persistent disease, n	19 (12.1)	-	
Requiring nephrectomy, n (%)	2 (1.3)	2 (1.8)	NS
Renal replacement therapy, n (%)	8 (5.1)	1 (0.9)	0.059
Recurrence at > 3 months, n (%)	14 (8.9)	3 (2.7)	0.038
Death any cause, n (%)	18 (11.5)	7 (6.25)	0.146

PN: partial nephrectomy; TA: tumor ablation.

UP-3.3

Ureteral reconstruction during posterior and or lateral pelvic exenteration for locally advanced and recurrent malignancy

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Introduction: Pelvic exenteration (PE) is an established treatment modality for locally advanced and recurrent malignancy. Concurrent resection and reconstruction of the urinary tract are often required. Urinary diversion with ileal conduit is typically indicated in complete soft tissue PE. In less extensive disease, posterior and/or lateral exenteration (PLE) may only require segmental ureterectomy and reconstruction. This study evaluated postoperative outcomes of ureteral reconstruction in patients who underwent PLE.

Methods: We conducted a retrospective review of our prospective database of 920 PE patients; 491 patients were managed with PLE between 1994 and 2021 at Royal Prince Alfred Hospital, Sydney, Australia. Of these 491, 158 patients required urological intervention (UI). Twenty-six patients required total cystectomy and three patients underwent concurrent nephrectomy for synchronous renal cell carcinoma. Both of these groups were excluded from the study.

Results: Of the 129 patients requiring UI, the mean age of patients was 60.9 years. PLE was predominately performed for colorectal malignancies (77%); 86 of the 129 patients required partial cystectomies, 26 required ureteral resection and reconstruction, and 17 patients had prophylactic ureteral stenting for extensive ureterolysis. Ten patients had a urine leak after ureteral reconstruction (Table 1). Urine leaks were associated with preoperative hydronephrosis, ureteral resection proximal to common iliac vessels, and postoperative urinary tract infection (UTI). Prior radiotherapy, type of reconstruction performed, or medical comorbidities did not increase the risk of urine leak. UI was associated with an increased risk of complications (Clavian Dindo III or higher) compared to all PLE (21.4% vs. 14.3%, p=0.063).

Conclusions: The extent of ureteral resection and postoperative UTI may be associated with higher rates of urine leaks in ureteral reconstruction. Ureteral reconstruction may also increase postoperative morbidity in PLE.

UP-3.6

The historical origins and contemporary role of endoluminal treatment for urethral stricture disease

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Introduction: We explored the historical origins of and developments in dilation and urethrotomy for the treatment of urethral stricture disease (USD).

Methods: Primary and secondary source documents relating to USD were reviewed and put into perspective within current practices.

Results: The earliest known treatment for USD is from the Ayurveda, when in 600 BC, Sushruta of India used metal and wooden dilators lubricated with ghee. By 200 BC, Erasistratus of Greece had developed S-shaped metal catheters. This was adapted and modernized by the Romans, who used lead and bronze dilators. It was not until the first recorded epidemic of gonorrhea in 1520 AD that a renewed focus on USD arose and a primitive form of internal urethrotomy was developed. By 1730 AD, Ledran of France performed the first recorded successful external urethrotomy, lending credence to the role of diversion in USD. Near the end of the 1700s AD, Desault of France first described using a fine guide with a larger following instrument. The development of the lancellated catheter in 1795 AD successfully allowed for internal urethrotomy and paved the future for the development of later internal urethrotomes. It was only in

UP-3.3. Table 1. Factors affecting urological complications in ureteral resection and reimplantation			
	Urine leak (n=10)	**No urine leak (n=16)**	**p**
Age (mean)	59.2	62.0	0.60
Sex			0.42
Male	6	7	
Female	4	9	
Preoperative risk			
Prior RTx	5	6	0.53
Hydronephrosis	4	3	0.23
Smoker	1	5	0.21
ASA	2.4	2.57	0.71
Charlson comorbidity index	6.2	7.9	0.19
Intraoperative risk			
Operative duration (min)	648	574	0.33
Transfusion	9	13	0.55
Ureter divided proximal to common iliac	4	2	0.067
Ureter divided distal to common iliac	3	10	
Type of urological intervention			
Uretero-ureterostomy	1	2	0.85
Ureteroneocystostomy	9	14	0.84
Postoperative			
Infection	6	7	0.42
Urine infection	5	2	0.036*
Length of stay (days)	46.2	26.9	0.025*

1996 AD when Freid and Smith of America described using a guidewire to cannulate the urethra and then dilate overtop using a Seldinger technique. In 1997 AD, Steenkamp, Heyns, and de Kock of South Africa published a landmark trial demonstrating equivalent outcomes between filiform dilation and direct visual internal urethrotomy. Ten years later, Herschorn of Canada introduced S-shaped coaxial urethral dilators, and four years after that, Gelman, Liss, and Cinman of America described direct vision balloon dilation. More recently, drug-coated balloon dilation is being investigated.

Conclusions: The origins of endoluminal treatment of USD can be traced back to nearly twenty-six centuries ago. Current guidelines rely on limited and dated evidence. We demonstrate that this field is ripe for further advancements.