A SINGLE DOSE OF INTRAOPERATIVE ANTIBIOTICS IS SUFFICIENT TO PREVENT URINARY TRACT INFECTION DURING URETEROSCOPY.

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Background: AUA Best Practice Guidelines for ureteroscopic stone treatment recommend antibiotics coverage for less than 24 hours after the procedure. The purpose of this study was to evaluate if the rate of post-operative urinary tract infection (UTI) differed in patients receiving a single dose of antibiotics pre-operatively compared to those patients who also received post-operative antibiotics.

Methods: A retrospective review was performed of consecutive patients at two institutions, University of British Columbia and Massachusetts General Hospital, Harvard. All patients were given a single dose of antibiotics prior to ureteroscopic stone treatment. A subset of patients were also given postoperative antibiotics ranging in time and selection of antibiotic. Patients who displayed symptoms of infection had a urine culture performed for speciation and antibiotic sensitivity.

Results: Eighty one patients underwent ureteroscopy for renal calculi. Patients with pre and post operative antibiotics were compared to those receiving only pre-operative antibiotics. Eight (9.9%) patients in total (2 from pre-operative antibiotic and 6 from the pre and post-operative antibiotic group, P=0.219) developed UTI's in the post-operative period. Surgical factors such as ureteral access sheath, bilateral procedures, use of basket or laser was not associated with rates of infection or whether the surgeon prescribed post-operative antibiotics. Risk factors such as pre-operative stenting, nephrostomy tubes, and foley catheters did not differ between groups or predispose patients to post operative infections.

Conclusions: Our data suggests that post-operative antibiotics do not decrease infection rates following ureteroscopic stone treatment, even among patients with risk factors for infection. A single pre operative dose is sufficient.
Military service is associated with increased risk of advanced stage renal cell carcinoma status post nephrectomy

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(Presentation to be made by Dr. Mark Tyson)

Objectives: Military status has been suggested to be a risk factor for renal cell carcinoma (RCC). Given the paucity of data, we investigated whether military service was associated either with earlier onset of disease or stage of disease for renal cell carcinoma status post nephrectomy.

Materials and Methods: An IRB approved nephrectomy database was retrospectively reviewed. Of 1374 patients who underwent a nephrectomy (partial or radical) between 1996 and 2013, 60 patients had served in the military at some point in the past. This military cohort was compared with 60 randomly selected lifelong civilians who underwent nephrectomy during the same time period. Pathologic stage +/- sarcomatoid features, age at time of surgery, ethnicity, ASA status, tobacco history and body mass index (BMI) were analyzed. Analysis was performed using t-tests and chi-2 methods.

Results: Approximately 32% (n=19) of patients with military service had T3 or higher on final path compared to 13% (n=7) of lifelong civilians (p=0.02). However, no differences were noted in the age at presentation (66.5 years for lifelong civilians vs 64.9 years for military [p=0.36]). No differences were noted in BMI, ASA score, BMI or ethnicity.

Conclusions: Military status may be associated with higher stages of RCC, but we did not observe an earlier age of onset of disease in our study. It is unclear whether the higher stage reflects a more aggressive RCC biology, delays in presentation or other environmental exposures. Further study evaluating the association of military service with RCC in a larger, population-based cohort is warranted.

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ROBOT ASSISTED PARTIAL NEPHRECTOMY FOR COMPLEX RENAL MASSES
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Purpose: To determine whether the approach for partial nephrectomy is influenced by tumor complexity and if the introduction of robotic techniques has allowed us to treat more complex tumors minimally invasively.

Materials and Methods: Data from 292 patients who underwent PN for renal masses from November 1999 to July 2013 at a tertiary referral center were retrospectively reviewed. Nephrometry scores and perioperative outcomes were stratified based on when robotic techniques were introduced. Mean follow up time was 2.6 years. Pre-operative RENAL nephrometry scores, perioperative outcomes and cancer recurrence rates were analyzed.

Results: Of the 292 patients, 31.5% underwent RAPN, 46.2% LPN and 22.9% OPN. RAPN mean nephrometry score was significantly higher than LPN (p = 0.002) and equivalent to OPN. Significant perioperative differences were EBL (p=0.0001), length of stay (p=0.0001) and Clavien score (p=0.0069), all favoring RAPN. Recurrence rates were significantly higher for OPN in the pre-robotic era (p = 0.006) but no significant differences existed between approaches in the robotic era. Limitations include retrospective design and single center data.

Conclusions: RAPN is a safe and effective surgical modality that allows for complex renal tumors that were previously reserved for OPN in the pure laparoscopic era to be managed with a minimally invasive approach.

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OUTCOMES OF PERCUTANEOUS RENAL ABLATION FOR SMALL RENAL MASSES
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Objectives: Partial nephrectomy (PN) currently is considered the contemporary standard for treatment of T1 renal tumours. However, complications associated with PN and the significant incidence of benign histology have led to interest in both surveillance and less invasive techniques, such as radiofrequency ablation (RFA) and cryoablation (CA). We sought to describe the oncological outcomes and efficacy of ablation therapies performed for patients with small renal masses between 2005 and 2012. Furthermore, we sought to compare the outcomes of CA and RFA and to identify the factors associated with the success or failure of each therapeutic strategy

Patients and Methods: We retrospectively analyzed 127 consecutive patients who underwent 129 percutaneous ablation procedures (86 CA and 43 RFA) for presumed renal tumours at UCSF between 2005 and 2012. Sociodemographic factors, tumour characteristics, histopathology, and oncological outcomes were compared between patients treated with RFA and CA. Post-ablation outcome was assessed using serial imaging. Recurrence was defined as either tumour enhancement on imaging or salvage therapy. Outcomes were evaluated with life tables and Cox proportional hazards regression adjusted for age, BMI, type of ablation procedure, maximum tumour size, and number of comorbidities.

Results: At first ablation, median age was 69 years for 72 (57%) men and 55 (43%) women. Pathology was benign in 24% of patients. Patient and tumour characteristics did not differ by type of ablation. Complications were reported in 7 procedures (5.4%): burn, lower extremity DVT, intraoperative atrial fibrillation, abortion of ablation, and 3 perinephric hematomas. During a median follow up of 13 months (IQR 3-33), 14 patients underwent salvage therapies. Salvage-free survival rate was 88% at 12 months and 80% at 36 months. Salvage treatment rate and type did not differ between CA and RFA (p=0.71). Larger maximum tumour dimension and prior history of RCC were associated with higher risk of undergoing salvage treatment (p<0.01).

Conclusion: CA and RFA showed comparable outcomes in this retrospective study with intermediate follow up. Maximum tumour size and prior history of RCC were associated with increased risk of salvage treatment. Ablation procedures remain viable options for patients with multiple or recurrent small tumours as well as for patients with tumours thought to be less fit for conventional treatment.
MATCHED PAIR ANALYSIS OF TRANSPERITONEAL VERSUS RETROPERITONEAL ROBOTIC PARTIAL NEPHRECTOMY
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(Presentation to be made by Dr. Stepanian)

Purpose: Since the AUA’s establishment of new guidelines on renal masses in 2009, utilization of partial nephrectomy in the United States has increased. Although open partial nephrectomy remains the most commonly used technique, robotic partial nephrectomy use has overtaken laparoscopic partial nephrectomy as the most commonly used minimally-invasive approach. Tumor location may play a critical role in whether or not minimally-invasive nephron sparing surgery is performed, since posterior tumors are often not easily accessed via the typical transperitoneal (TP) approach, and the retroperitoneal (RP) approach is relatively unfamiliar. We compare our experience with TP and RP robotic partial nephrectomy (RPN) with particular focus on pre-operative patient and tumor characteristics, perioperative outcomes, and postoperative change in renal function.

Materials and Methods: A series of RPN patients for whom RENAL nephrometry score (RNS) was available, were identified from 2006 to 2014. A total of 324 patients who underwent robotic partial nephrectomy by a single surgeon (JRP) were analyzed. Of those, 86 RP RPN were matched to 86 TP RPN. Data on patient demographics, pre-operative tumor characteristics, including RNS, perioperative outcomes, and postoperative change in renal function as measured by comparison of radioisotope renography preoperatively and at three months postoperatively, were retrospectively collected. Matched pair analysis was performed one to one based on tumor size and RNS.

Results: No significant differences were observed between RP and TP RPN groups in patient age, gender, body mass index, Charlson comorbidity index, laterality, tumor size (mean 3.1cm), or RNS (mean score of 7). Perioperatively, there were no differences seen in mean estimated blood loss (mean 146cc), warm ischemia time (mean 17.8 mins), or console time (mean 130.0 mins). Mean total operative time was shorter in the RP group when compared to the TP group (164 ± 46 vs 187 ± 53 minutes; p=0.004). Mean change in 3 month split function of the affected kidney was similar between the RP and TP RPN (-10.5 ± 8.9 vs -8.4 ± 7.0%; p=0.24). Mean hospital stay was shorter in the RP group as compared to the TP group (1.9 ± 0.8 vs 2.3 ± 1.6 days; p=0.05). Positive margins were seen in two patients, one in each group. Overall, 7 Clavien II or higher complications were seen: four in the RP RPN group and 3 in the TP RPN group.

Conclusions: Retroperitoneal robotic partial nephrectomy is a safe and effective approach for posterior based renal masses. As compared to TP RPN, total operative time and hospital stay were shorter with the RP approach. Mean estimated blood loss, warm ischemia time and change in renal function as measured by radioisotope renography was equivalent regardless of approach in this series of 172 matched cases.

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PREDICTING PATHOLOGIC UPSTAGING OF CLINICAL T1 RENAL MASSES

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Objectives: Clinical prediction of peri-nephric and hilar fat invasion (pT3) may be difficult for many small renal masses undergoing partial nephrectomy (PN). We report our experience with pathologic upstaging of cT1 renal tumors undergoing PN and attempt to identify possible clinical predictors.

Methods: Retrospective analysis of 236 renal tumors (159 cT1a, 77 T1b) treated with robotic PN was performed from a prospectively-maintained database (2010-2013). Patient demographics, radiographic tumor characteristics, histopathologic data and oncologic follow-up were assessed. The likelihood of upstaging to pT3a was compared between cT1a versus cT1b tumors. Additionally, upstaged tumors were compared to those that remained pT1 for various clinical variables.

Results: Overall incidence of pT3a disease was 7% (17/236), including 6% for cT1a (9/159) vs. 10% for cT1b (8/77) (p=0.19). There were no differences between upgraded pT3a masses with to regards tumor size, R.E.N.A.L score and centrality in both the cT1a or cT1b sub-groups. All pT3a tumors had negative resection margins and 15/17 had involvement of peri-nephric fat whereas 2/17 invaded renal sinus fat. Pathologic subtypes included 12 clear cell (71%), 2 chromophobe (12%) and 2 papillary (12%) renal cell carcinomas. The pT3a subgroup had similar distribution of Furhman grade when matched for clinical stage compared to tumors that remained pT1. Lymphovascular invasion and sarcomatoid histology were identified in 12% and 6% of upstaged patients, which was similar to those not upstaged. Pre- and 1 month post-operative estimated glomerular filtration rate was similar between pT3a vs pT1 patients. Over a mean follow up of 8.3 months (1-38), no patients with pT3a disease and 1 patient with pT1a disease had tumor recurrence (p=NS).

Conclusion: Incidental upstaging to pT3a disease remains difficult to predict from clinical or radiographic parameters and occurs with equal frequency in cT1a vs. cT1b tumors. While short-term follow-up show favorable outcome after partial nephrectomy, longer-term follow-up in a larger cohort of patients is required to confirm oncologic efficacy.
FACTORs PREDICTIVE OF UPSTAGING FROM T1 TO T3 IN RENAL MASSES < 4 CM IN SIZE UNDERGOING RADICAL OR PARTIAL NEPHRECTOMY
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(Presentation to be made by Dr. Song)

Introduction: Preoperative predictors for upstaging of clinical stage T1a (cT1a) renal masses to pathologic stage T3 (pT3) have not been well described in the literature. Improving risk stratification of cT1a lesions can allow for better assessment of optimal treatment choice. We sought to examine our own cohort of clinical stage T1a patients to understand what factors were predictive for upstaging.

Materials and Methods: Utilizing a prospectively maintained retrospective nephrectomy database, we identified 511 patients with a cT1a lesion who underwent partial or radical nephrectomy. When available preoperative imaging was available, RENAL nephrometry scores were calculated for tumor characteristics. Univariate and multivariate analyses were performed to determine preoperative characteristics predictive of upstaging.

Results: 41 patients (8%) were upstaged to a pT3 on final pathologic rendering. Those upstaged to pT3 had significantly larger tumors than those who remained at pT1 (2.96 cm vs. 2.48 cm, respectively). Significantly more pT3 tumors were treated with radical nephrectomy than their pT1 counterparts, which were more likely to be treated with partial nephrectomy. On univariate and multivariate analysis, those with higher R and N scores on nephrometry were more likely to experience upstaging. Lastly, significantly more pT3 tumors experienced tumor recurrence than those with pT1 tumors.

Conclusions: Even in a cohort of cT1a lesions, measureable differences do exist with regards to tumor size and nephrometry scores, specifically the R and L components. Further validation will be required to assess if these differences can be utilized to risk stratify patients preoperatively.
INVESTIGATION OF VARIOUS OPERATING TIMES AND LEARNING CURVES FOR LAPAROSCOPIC NEPHRECTOMY AND NEPHRoureterectomy PERFORMED BY A SINGLE SURGEON UNDER THE GUIDANCE OF A CERTIFIED LAPAROSCOPIC SPECIALIST: IS QUALIFICATION FOLLOWING AT LEAST 20 SURGERIES APPROPRIATE?

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(Presentation to be made by Dr. Minami)

Purpose: The Japanese Urological Association and Japanese Society of Endourology and ESWL established the Endoscopic Surgical Skill Qualification System (ESSQS) for urological laparoscopy in 2004. Skill is assessed by double-blind evaluation of an unedited DVD recording of the whole procedure. Urologists that have completed ≥20 laparoscopic surgeries (nephrectomy, adrenalectomy, pyeloplasty, partial nephrectomy) over 2 years (except cases ending in open conversion) can apply. However, compared with the required number of surgeries in other countries, 20 surgeries is a very small number. Thus, is a minimum of 20 surgeries appropriate?

So, we investigated the pneumoperitoneum time and the amount of bleeding in surgeries performed by surgeon with experience of ≤10 and >10 laparoscopic surgeries (including laparoscopic adrenalectomy and pyeloplasty initiated from 2009), and we investigated the learning curves for the pneumoperitoneum time in laparoscopic nephrectomy (including nephroureterectomy) performed by a single surgeon who has been certified this year under the guidance of the same certified laparoscopic specialist.

Subjects and Methods: DVD recordings of 28 surgeries involving laparoscopic nephrectomy or nephroureterectomy performed by a single surgeon (those who received their laparoscopic surgery certification this year) under the guidance of the same certified laparoscopic specialist from September 2010 to March 2014 were investigated. The pneumoperitoneum time during each step of the surgery was divided into the respective motions according to each approach as follows [retroperitoneal approach (n=17): removal of the flank pad from the start of abdominal insufflation, tapered extra-myofascial incision, renal artery avulsion and transection from the expansion of the posterior aspect of the kidney, renal vein avulsion and transection from the expansion of the anterior aspect of the kidney, adrenal transection (adrenalectomy), and confirmation of kidney isolation, and hemostasis].

[Transperitoneal approach (n=11): incision to the retroperitoneum and colon mobilization from the start of abdominal insufflation, approach toward the iliopectos muscle and identification of the renal artery after the mobilization, renal artery avulsion and transection, renal vein avulsion and transection, adrenal gland transection (adrenalectomy), and confirmation of kidney isolation, and hemostasis]. Each approach was retrospectively analyzed. Surgeries were divided according to the number (≤10 or >10 surgeries; including laparoscopic adrenalectomy and pyeloplasty that were initiated from 2009). The overall pneumoperitoneum time, time required for each step, and amount of bleeding were statistically investigated for any significant changes.

Results: Regarding the overall pneumoperitoneum time (both approaches combined), the >10 surgeries group (mean±SD: 169.1±33.8 min) had significantly shorter times compared with the ≤10 surgeries group (mean±SD: 239±27.9 min) (p<0.001). Regarding the retroperitoneal approach, the time required for removal of the flank pad was significantly shorter in the >10 surgeries group than in the ≤10 surgeries group (≤10 surgeries group, mean±SD: 32.4±10.8 min; >10 surgeries group, mean±SD: 17.2±4.1 min) (p<0.001). With the transperitoneal approach, the time required for renal artery avulsion and transection was significantly shortened. (≤10 surgeries group, mean±SD: 42.5±3.5 min; >10 surgeries group, mean±SD: 20.7±8.5 min) (p<0.01). Regarding other motions in both approaches, the time required was shortened, although not significantly. The amount of bleeding was lesser in the >10 surgeries group for both approaches, although this was not significant. Retroperitoneal approach: ≤10 surgeries group, mean±SD: 60.71±71.20 ml; >10 surgeries group, mean±SD: 32.5±50.84 ml) (p=0.38); transperitoneal approach: ≤10 surgeries group, mean±SD: 75±21.21 ml; >10 surgeries group, mean±SD: 56.44±61.63 ml) (p=0.69).

Conclusion: Laparoscopic surgery under the guidance of a certified laparoscopic specialist significantly shortened the surgical time by improving the pace of surgery. Moreover, a minimum requirement of 20 surgeries to obtain a qualification was considered appropriate.

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MULTIPARAMETRIC MRI CHARACTERIZATION OF PORCINE EX VIVO KIDNEY BOILING HISTOTRIPSY LESIONS
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(Presentation to be made by George R. Schade)

Objective: Boiling histotripsy (BH) is a non-thermal pulsed high intensity focused ultrasound (HIFU) technology using millisecond-long HIFU bursts to mechanically homogenize targeted tissue, in this case porcine kidney, with negligible thermal effect. Although BH treatment is visible on B-mode ultrasound (US) as hyper-echoic bubbles, visualization of renal sinus structures and effective monitoring of renal BH with ultrasound may be insufficient for transcutaneous treatment. We characterized ex vivo renal BH lesions with multiparametric MRI (mpMRI).

Methods: Fresh porcine kidneys (≤4 hours post-mortem, n=6) were degassed for ≥30 min in phosphate buffered saline and then treated with BH using a 1-MHz 7-element HIFU transducer (duty factor 1%, 10 ms pulses, 98 MPa in-situ shock amplitude, 17 MPa peak negative) under US guidance. Single focal volumes within the cortex or medulla were treated (10-180 pulses/focus). mpMRI (T1W turbo spin echo (TSE), T2W TSE, and diffusion weighted imaging (DWI)) was then performed with a 3T MRI system (Philips Achieva) with each kidney placed in a 4 channel Sense wrist coil (Philips). Images were then post-processed and analyzed with imaging software (Osirix). Following mpMRI, tissue was evaluated grossly or formalin-fixed for histologic assessment.

Results: Following ex vivo BH treatment, lesions were visible within the kidneys on T1W, T2W and DWI MRI. Specifically, lesions appeared as mildly hyper-intense foci on T1W and T2W imaging at doses above 30 pulses/focus in both cortex and medulla. Calculated T2 values were not significantly different between lesions and the surrounding cortex (p=0.20) or medulla (p=0.36). On DWI, lesions were well visualized as discrete areas of increased diffusion at all administered doses, which correlated with gross and histologic findings. Apparent diffusion coefficients of cortical (1.27±0.23 x10^-3 mm^2/s vs. 0.46 ± 0.03 x10^-3 mm^2/s, p<0.0001) and medullary (1.60±0.13x10^-3 mm^2/s vs. 0.70±0.10 x10^-3 mm^2/s, p<0.0001) lesions were significantly greater than the surrounding cortical or medullary tissue, respectively.

Conclusion: mpMRI, in particular DWI, may be a useful adjunct for monitoring renal BH treatments. Further preclinical studies will be aimed at determining the utility of mpMRI in vivo.

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HIGH THROUGHPUT GENETIC SCREENING WITH DROSOPHILA MELANOGASTER IDENTIFIES NOVEL GENES ASSOCIATED WITH STONE FORMATION

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(Presentation to be made by Dr. Chi)

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Introduction: Vertebrate models for nephrolithiasis are limited in their ability to rapidly screen multiple and varied interventions that modulate urinary stone formation. A short lifespan and rapid stone formation makes Drosophila melanogaster an ideal system to screen large numbers of interventions to assess their effect on kidney stone formation. A method of screening single gene knockdown candidates for their ability to prevent the formation of urinary stones was successfully developed utilizing Drosophila melanogaster.

Methods: Microdissection facilitates identification and collection of fly stones within the lumen of the Drosophila Malpighian tubule (the functional equivalent of the human renal tubule). In a similar fashion as seen in humans, fly stones frequently obstruct the ureter and result in early death. Utilizing shortened lifespan as a surrogate for stone formation, an unbiased screen of orthologues for human genes known to be associated with nephrolithiasis was undertaken. A double knockdown unbiased screen to identify genes that lengthened lifespan and modulated the stone formation process was developed; microdissection confirmed these results.

Results: Stone formation was associated with a significantly shortened fly lifespan (mean lifespan 60 days with no stones, 3 days with stones, p<0.05). An unbiased double knockdown screen of more than 80 genes was performed utilizing the GAL4-UAS RNAi system and identified 7 genes that rescued lifespan. Microdissection confirmed that three genes decreased stone formation in the fly, including genes encoding a salt transporter (SLC5A5), a zinc transporter (ZnT35C), and a regulator of oxidative stress (Cyp4d1). These lengthened lifespan to 9, 12, and 11 days (p < 0.05) respectively and significantly modulated the stone formation process (see Table).

Conclusions: A Drosophila urinary stone model was leveraged to perform large scale genetic screens to identify novel genes that modulate calculi formation. Newly identified genes may represent novel targets that could translate to new therapies to prevent or reduce the formation of urinary stones.

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A RANDOMIZED CONTROLLED STUDY ON NUTRITION COUNSELING FOR KIDNEY STONE PATIENTS REVEALS ABYSMAL COMPLIANCE IN AN EQUAL ACCESS FULLY SUBSIDIZED HEALTHCARE SYSTEM
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(Presentation to be made by Dr. Salomon)

**Purpose:** Dietary interventions serve as an important means of preventing kidney stones. We compared the effectiveness of formal nutrition education offered by a nutrition professional to standard guidance provided by a urology provider for adult kidney stone patients treated at Madigan Army Medical Center in Joint Base Lewis-McChord, WA.

**Materials and Methods:** We attempted to randomize 100 patients seen as new kidney stone consults into two groups. The control group received standard preventive guidance from their urologic provider. The intervention group received a 60 minute nutrition education class or a 30-45 minute initial appointment with a nutrition care specialist. The formal counseling utilized educational materials endorsed by the Academy of Nutrition and Dietetics to provide specific nutrition recommendations for renal stone patients and cover meal planning. All participants were to complete a combined knowledge and food frequency questionnaire for renal stone risk factors at baseline, 2 months, and 6 months in order to assess retained knowledge related to kidney stone prevention as well as document changes in behavior. All participants were also to complete a 24-hour UroRisk urine lab profile during these same time intervals in order to monitor any associated changes in urine composition. As members of the military healthcare system, there was no cost to any of the participants for appointments, resources, or labs. As a courtesy, members of the research team contacted participants one week prior to their scheduled appointments as a reminder. Results of the data were to be analyzed within and between the groups with a multivariate analysis of variance (MANOVA). Using G-Power version 3.1, the estimated sample size to provide adequate power for this study was 72 participants, at a minimum, or 90 participants to allow for a 25% attrition rate.

**Results:** Out of the 100 eligible patients seen in our urology clinic over an eight month period, a total of 40 patients enrolled in the study. The study was terminated due to poor compliance. Most patients did not return at or after the first 2 month follow-up appointment. Only one patient in the formal counseling arm and two patients in the control arm completed the required follow-up appointments and related labs. This study did not achieve the statistical power necessary to arrive at a significant conclusion.

**Conclusions:** While lifestyle modification with dietary changes represents a feasible means of kidney stone prevention, it relies on a patient’s compliance to achieve an effective intervention. This study highlights the difficult nature of influencing changes in patients’ dietary behavior, or at least the ability to verify them, when it comes to management of kidney stone disease. Overall, in this era of medicine that focuses on preventative health therapies, patients must take more of an initiative and primary responsibility for their health when it comes to dietary habits and available resources for self-improvement.

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ULTRA LOW DOSE CT-KUB TO DETECT KIDNEY STONES WITH 50% LESS RADIATION: IS THE PLAIN RADIOGRAPH OBSOLETE?

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Introduction: At our institution, Kidney-Ureter-Bladder (KUB) radiographs are performed immediately prior to shockwave lithotripsy (SWL). Conventional low dose CT-KUBs (radiation dose of 2.2-3.0 mSv) are only performed if stones are not visible on KUB. Recent advances in CT detector design and image reconstruction algorithms have made sub-milliSievert ultra-low dose CT (ULDCT) acquisition feasible, but diagnostic performance of these exams has not yet been reported. We sought to compare the radiation dose and diagnostic performance of ULDCT to KUB plain in patients prior to SWL.

Methods: Patients enrolled in this study received both an abdominal radiograph and an ultra-low dose CT prior to SWL. Radiation exposure parameters were recorded and both examinations were read in random order by blinded radiologists to determine the correlation between the two modalities.

Results: To date, 51 patients (M:F, 34:17) with a mean age of 56.2 ± 13.8y were enrolled. The radiation dose was significantly lower with ULDCT (0.28 ±0.10 mSv) compared to KUB (0.50±0.10 mSv, p=0.014). The number of stones seen on KUB was 1.59±1.27 vs 1.92±01.51 for ULDCT (p=0.35). Measurement of stone size was equivalent using ULDCT (6.47±3.34mm) compared to KUB (6.98±3.41mm, p=0.455). In 3 cases, the ULDCT helped localize ureteral stones that were not visible on KUB.

Conclusions: Sub-milliSievert ULDCT delivers 43% less radiation than a plain KUB radiograph and was equivalent in detecting the number and size of stones. In some cases, it helped localize stones prior to SWL better than KUB. In future, ULDCT may replace KUB as it delivers less radiation with more information. This study is ongoing.
SIGNIFICANTLY FEWER RATES OF STRUVITE STONES ARE SEEN IN CHINESE PATIENTS LIVING IN CHINA COMPARED TO CHINESE PATIENTS LIVING IN NORTH AMERICA

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(Presentation to be made by Dr. Chi)

Introduction and Objectives: Interracial disparities in nephrolithiasis prevalence have been reported, but the interplay between genetics and environment as risk factors for urinary stone disease are poorly understood. To examine how environment may alter genetic predisposition for urinary stone formation, we established the International Chinese Consortium on Nephrolithiasis (ICCON) as a multi-institutional collaboration to examine patterns of nephrolithiasis presentation between Chinese patients living in China and those living in North America.

Methods: Chinese patients undergoing consecutive percutaneous nephrolithotomy at 6 participating institutions (half in China and half in North America) over 4 years were reviewed in a retrospective fashion. Patient demographics and clinical data, including stone and lab analyses, were compared between Chinese patients living in China and those living in North America.

Results: 848 patients were included, encompassing 732 Chinese patients living in China and 116 living in North America. Nephrolithiasis patients living in China were significantly more likely to be male (66.7% versus 53.4%, p = 0.02), present at a younger age (48.6 ± 15.0 years versus 57.6 ± 12.9 years, p < 0.0001), and have a lower BMI (24.6 ±/ - 4.0 versus 25.8 +/-1 5.5, p = 0.048) but less likely to form struvite stones (5.5% versus 14.1%, p < 0.001). There were no cystine stone patients seen in Chinese patients living in North America, whereas 1.8% of nephrolithiasis patients living in China presented with cystine stones. Similar rates of calcium based and uric acid calculi were seen between the two groups. Urinary pH was no different between the two populations.

Conclusions: Significant differences exist between Chinese nephrolithiasis patients living in China compared to those living in North America. This highlights the importance of environmental factors in addition to genetics in modulating risk for urinary stone disease since these two patient study populations likely comprise a relatively similar genetic background.

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ROLE OF TAMSULOSIN, TADALAFIL AND SILODOSIN AS THE MEDICAL EXPULSIVE THERAPY IN LOWER URETERIC STONE – A RANDOMIZED TRIAL (A PILOT STUDY)

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Purpose: To evaluate the role of two different alpha-1 blockers and one phosphodiesterase-5 inhibitor (PDE-5) as medical expulsive therapy for distal ureteric calculi.

Materials and Methods: Between Jan 2011 and Dec 2012, 285 patients presenting with distal ureteric stones of size 5 to 10 mm were upon consent randomly assigned to one of three outpatient treatment arms: Tamsulosin (group A), Tadalafil (group B), Silodosin (group C). Therapy was given for a maximum of four weeks. Stone expulsion rate, time to stone expulsion, analgesic use, number of hospital visits for pain, follow-up and endoscopic treatment and adverse effects of drugs were noted.

All three groups were compared for normally distributed data by analysis of variance (ANOVA), Bonferroni or Kruskal-Wallis and Mann-Whitney U tests, as required. All the classified and categorical data were analyzed for all three groups by using the chi-square test.

Results: There was a statistically significant expulsion rate 83.3% in group B than 64.4%, 66.7% in group A and C with lower time of stone expulsion. (p-value=0.006, p-value=0.016). Statistically significant differences were noted in colicky episodes and analgesic requirement in group B than group A and C. There was no serious adverse event.

Conclusions: Medical expulsive therapy for the distal ureteric stones using Tamsulosin, Silodosin and tadalafil is safe, efficacious and well tolerated. The result of this pilot study showed that Silodosin increases ureteric stone expulsion quite significantly along with better control of pain with significantly lesser analgesic requirement.
PERCUFLEX HELICAL URETERAL STENT PROVIDES EXCELLENT PATIENT COMFORT AND UPPER TRACT DRAINAGE
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Introduction: Ureteral stent discomfort is a problem. A novel helically cut Percuflex stent (Boston Scientific) was developed to follow the shape of the ureter to improve patient comfort. We sought to determine its comfort in a prospective single-arm study of patients undergoing ureteroscopy for stone disease.

Materials: A 6F Percuflex Helical ureteral stent (Boston Scientific Corporation) was placed in patients following successful ureteroscopy. Patients filled out a visual analog score (VAS) and analgesic record at regular intervals.

Results: Fifteen (10M:5F) patients were enrolled. Stent remained in 7.3±1.2d and mean stone size was 11.5±1.9mm. Ureteral access sheath was used in 20% of cases, 0% balloon dilation, 0% pre-stented, basket in 33%, and 100% of cases used holmium:YAG laser. There were no intraoperative complications. Two developed a UTI in follow-up. Three required an unscheduled visit for pain or infection and all resolved. Flank and lower abdominal pain, urgency and frequency were never statistically significantly different from baseline levels. Urethral pain was the only parameter that was significantly worse on post-operative day 1 (p=0.017) and day 2 (p=0.037) compared to baseline levels in the stented patients, but this resolved by day 7. 60% of patients did not require medications in the recovery room or 4 weeks following surgery. 82% of patients were satisfied and of 5 patients who had stents previously, 4 (80%) reported the Helical stent to be more comfortable.

Conclusions: The Percuflex Helical stent is a very well-tolerated stent in patients following uncomplicated ureteroscopy. The Helical stent may be more comfortable than regular double-J stents. Further studies will be necessary.
INCIDENCE, PREDICTORS AND MANAGEMENT OF DIFFICULT ACCESS CASES WITH URETEROSCOPY FOR RENAL CALCULI
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Introduction: Ureteroscopy is one of the most common urologic procedures. Attaining access into the collecting system is the first and most important step in any retrograde ureteral or renal surgery. On occasion, access to the upper tract may be difficult. We examine the incidence, possible predictors, and management of those cases when faced with challenging access to the upper collecting system.

Methods: An IRB approved database was used to prospectively accrue data on consecutive ureteroscopic cases for ureteric or renal calculi to examine those cases in which access into the collecting system was difficult. Patient demographics, calculi characteristics, operative management, and outcomes were evaluated. A comparison was performed between two groups, those in which there were no issues in gaining access versus those where difficulty was encountered. Specific management of those cases where there was difficulty is highlighted.

Results: Sixty-three consecutive cases of ureteroscopy for ureteral or renal calculi were examined. Mean age was 47.6 years (range 18-81 yrs) and mean BMI was 29.9 kg/m² (range 21-63.1). Mean calculi size was 1.22 cm (range 0.4- 2.8 cm) and 54% of stones were within the renal collecting system. Overall incidence of difficult access was 16% (10/63) amongst all cases. Of those with difficult access 4 were due to a tight ureter, 3 cases had obstructing ureteral calculi, 2 had ureteral strictures and 1 had prior bladder reconstructive surgery. Of these ten cases only two resulted in treatment failure. However a stent was able to be placed and both patients subsequently underwent successful second look ureteroscopies. The remaining eight cases were successfully treated at the time of the original surgery. There was no significant difference in age, BMI or history of prior calculi amongst the two groups. There was a significant difference in longer operating and fluoroscopy time in the group with difficult access.

Conclusions: The incidence of difficult access for ureteroscopic cases is low however most cases encountered can still be successfully treated in the hands of an experienced endourologist. Those cases in which one is faced with difficult access it will have a longer OR time and more radiation exposure.
Purpose: Negative Ureteroscopy (URS) occurs when a patient undergoes URS for the purpose of stone treatment, but they are found to not have a ureteral or kidney stone. We aimed to determine the rate at which this occurs.

Materials and Methods: Using the Office of Statewide Health Planning Database (OSHPD), a publically available database for all patients in California undergoing outpatient surgeries in 2008, we identified all patients with ICD-9 diagnosis code for upper tract nephrolithiasis. We used CPT codes to identify all patients in this group who underwent diagnostic URS only versus those that underwent stone treatment during URS (laser lithotripsy or basketing). The negative URS rate was then calculated (diagnostic URS / URS with stone laser lithotripsy or basketing). Rates of negative URS were compared based on gender, race, age, and expected source of payment.

Results: In the OSHPD database for the year 2008, 9192 patients underwent ureteroscopic procedures with the diagnosis of upper tract stone disease. Of these, 897 patients underwent diagnostic URS. There were 8295 who underwent URS with laser lithotripsy or stone basketing. The rate of negative URS was 9.8%. There were no significant differences in the negative URS rate based on gender, race, or age. Patients with “Commercial insurance” underwent higher rates of negative URS (15.2%). The negative URS rate for a patient with Medicare Part B coverage was 14.2% vs. 9.1% for their counterparts with Medicare Part A coverage.

Conclusions: The rate of negative URS is significant and it occurs in nearly 1/10 individual undergoing URS for therapy of a stone. The possibility of negative URS should be considered when counseling patients pre-operatively. The source of payment may influence the rate of negative URS.

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Introduction and Objectives: The efficiency of Ho:YAG laser lithotripsy depends on laser pulse energy, pulse frequency, and stone retropulsion. This study investigates the relationship of these factors and lithotripsy efficiency using bench-top models that approximate the renal calyx and ureter.

Materials and Methods: In-vitro calyceal and ex-vivo porcine ureteral models were constructed. Pure calcium oxalate monohydrate stones were fragmented using a flexible ureteroscope and 200µm laser fiber. In the calyceal model, fragmentation rates using 0.6J/5Hz, 0.2J/15Hz, and 0.2J/50Hz settings were compared. In the ureteral model, retropulsion rate, fragmentation rate, and stone weight fragmented using settings of 0.6J/5Hz and 0.2J/15Hz were compared. Stone retropulsion forces generated by the 0.6J/5Hz, 0.2J/15Hz, and 0.2J/50Hz settings were measured and compared. Statistical analysis was performed using the Mann-Whitney U test.

Results: In the calyceal model, the 0.6J/5Hz fragmented faster than the 0.2J/15Hz setting (4.3mg/min vs. 2.9mg/min; p<0.001). However, the fragmentation rates of the 0.6J/5Hz and 0.2J/50Hz settings were comparable (4.3mg/min vs. 4.17mg/min; p=0.413). In the ureteral model, the 0.6J/5Hz setting produced higher retropulsion (4.38cm/min vs. 1.26cm/min; p<0.001) and fragmentation rates (5.34mg/min vs. 2.95mg/min; p<0.001) compared to the 0.2J/15Hz setting, resulting in lower total fragmented weight (16.8mg vs.25.5mg; p=0.009). The retropulsive force generated was higher using the 0.6J vs. 0.2J pulse energy (0.91N vs. 0.22N; p<0.001), but did not change with increasing frequency from 15 to 50Hz (0.22N vs. 0.29N; p=0.509) while holding the pulse energy constant.

Conclusion: Lithotripsy in the ureter should be performed using the low-energy/high-frequency dusting settings to minimize retropulsion and maximize stone fragmentation. In the renal calyx, the high-energy/low-frequency fragmenting setting should be employed.

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DIRECT ENDOSCOPIC VISUALIZATION COMBINED WITH ULTRASOUND GUIDED ACCESS DURING PERCUTANEOUS NEPHROLITHOTOMY

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(Presentation to be made by Dr. Alsyouf)

Introduction and Objectives: Establishing renal access for percutaneous nephrolithotomy (PCNL) is challenging and requires significant radiation exposure. In an attempt to reduce radiation exposure, we employed a novel technique combining direct ureteroscopic visualization of access location with ultrasound (US) guidance.

Methods: In this novel technique, a ureteroscope was placed in the kidney using a fluoroless technique. Under direct endoscopic vision the optimal calyx for access was selected. Percutaneous US guidance was used to advance a chiba needle into the desired calyx identified using deflection of the ureteroscope tip. A wire was then advanced into the calyx and grasped using a basket and pulled into the ureter. Balloon, sheath and nephrostomy tube placement were all performed under direct ureteroscopic guidance. 20 consecutive patients undergoing this technique were matched against 20 patients who had undergone conventional fluoroscopic access. Outcomes compared were fluoroscopy time, operative time, EBL, stone free rates and complications. Mann-Whitney U and Pearson Chi-square tests were used for comparisons, with p<0.05 considered significant.

Results: Using this novel technique, mean fluoroscopy time needed to obtain access was 3.5 seconds(0–27.9), mean total fluoroscopic time was 8.8 seconds(0-47.1), mean operative time was 233 minutes(87-533), EBL was 111ml, stone free rate was 65% and complications were 25%. Comparing these 20 patients to 20 matched conventional PCNL patients, there was no difference in operative time (p=0.76), EBL (p=0.64), stone free rates (p=0.52) or complications (p=0.71). However, the novel technique resulted in significant reduction in fluoroscopy time to achieve access (3.5 vs.915.5 sec; p<0.001) and total fluoroscopy time (8.8 vs 1028.7 sec; p<0.001).

Conclusions: This study demonstrates the feasibility of combined US and ureteroscopic assisted access for PCNL. In addition, a >95% reduction in fluoroscopy time was achieved using this technique.

Source of Funding: None
Purpose: Variation in surgical supply utilization presents a prime opportunity for identifying cost discrepancies that can then be targeted for optimization. We evaluate surgeon variation in operating room costs at our institution to identify areas for standardization and cost reduction.

Methods: Elective urologic surgical procedures over a one-year period (9/2012-9/2013) were analyzed to determine the itemized supply costs (as the institution-negotiated item rates) and case duration (which was monetized assuming $69/minute of operating room time cost). Initial analyses focused on the top ten most common procedures in which at least 2 surgeons had performed the procedure at least twice, excluding any cases consisting of multiple billed procedures. Mean case supply cost and case duration cost by surgeon were analyzed with one-way analysis of variance. Univariate and multivariate analysis of factors associated with case supply cost above the mean cost for each procedure was conducted using multilevel mixed effects logistic regression grouped by surgeon.

Results: Over a one-year period, a total of 2,022 cases were performed, comprising 183 unique procedures performed by 14 surgeons, with a mean of 144 cases per surgeon. Overall, there were 49,708 items billed, accounting for $2,884,055 in OR supply cost and 5,472 hours (or $22,654,080) of OR time. Of the 10 most frequent procedures that met criteria, 5 had significant variations in mean supply cost between providers and 6 had significant variation in mean case duration cost between providers.

Multivariate analysis of supply costs showed that increased surgeon annual case-specific volume and number of years of practice since residency were both predictors of increased case supply cost (p < 0.001), while case start after 3 pm (which is associated with the OR staff change of shift) was not (p = 0.896).

Conclusions: There are significant variations in procedural costs among providers even within the same institution. Though supply costs constitute a fraction of overall surgical costs, targeting high-volume procedures with supply cost variability among providers for standardization could have a substantial impact on overall costs. Higher annual volume and more years of experience since training appear to be correlated with higher case supply costs. A complete analysis of predictive factors of case cost, including patient-related factors, has potential to identify additional modifiable drivers.

Source of Funding: None
Purpose: Management of high-grade renal trauma has shifted towards more non-operative management, yet analysis of differences in length of hospital stay by type of management has not been carried out, leaving the question of whether non-operative management of high-grade injuries leads to longer length of hospitalization. We sought to describe the characteristics of patients with high-grade renal trauma by hospital stay and to evaluate the effect of conservative versus surgical management on hospital stay.

Methods: We performed a cross-sectional retrospective analysis of a prospective contiguous database of who sustained unilateral high-grade renal trauma at San Francisco General Hospital in San Francisco, California from 9/21/77 through 8/10/2012. Patients' injury mechanism, injury grade, details about associated injuries and management were recorded by the urology provider. Length of hospital stay was determined by admission and discharge dates.

Descriptive analysis was performed using chi-squared and linear regression. Multivariate analysis was performed using a Fine-Gray model of competing risks survival analysis adjusting for trauma type, grade, surgery, associated injury, and complications, where discharge was defined as the event of interest and death was considered a competing event; an interaction term for renal and non-GU surgery was included due to significant collinearity. P-value < 0.05 was considered significant.

Results: The cohort included 413 patients, of whom 257 underwent renal exploration (77% discharged, 16% transferred, and 6% died) (Table 1). Those who were discharged were more likely to be younger, male, have penetrating trauma and less likely to have associated injuries and complications. In multivariate analysis, penetrating trauma was associated with a shorter hospital stay, whereas non-GU surgery, associated injuries, grade 4 and 5 injuries, and complications were associated with a significantly longer hospital stay (Table 2). Renal surgery was not significantly associated with length of hospitalization (p = 0.10).

Conclusions: The etiology, grade, and non-GU management of renal trauma are predictive of length of hospital stay, yet there is no significant difference between operative and non-operative management of high-grade renal trauma in this context. These results can reassure us that the movement to more conservative management of high-grade renal trauma does not impact patients' length of hospitalization.

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ANGIOEMBOLIZATION FOR TRAUMATIC RENAL INJURY IS MORE COMMON IN CONSERVATIVELY MANAGED PATIENTS WITH CONCOMITANT ABDOMINAL SOLID ORGAN INJURY

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Introduction: Conservative management of renal trauma has emerged as the safest and preferred treatment method in the stable patient. This is based on solid evidence from several series and has been bolstered by improvements in diagnostic imaging and interventional techniques. We seek to evaluate the characteristics that predict the need for angioembolization in renal trauma patients who do not ultimately go on to nephrectomy.

Materials and Methods: Using the prospectively collected institutional trauma database, we identified 18 patients with American Association of Surgery for Trauma grade (AAST) grade 2-5 renal injuries who underwent renal angiography without angioembolization (RA, n=9) or renal angiography with angioembolization (AE, n=9) and retrospectively reviewed their charts for clinically predictors of the need for AE.

Results: Univariate analysis revealed no significant clinical differences between the RA and AE cohorts. After attaining appropriate degrees of freedom using sensitivity analysis and removing non-clinical data from the analysis, concomitant abdominal solid organ injury was the only significant association distinguishing the RA and AE groups (p=0.01). AAST grade, injury severity score (ISS), transfusion, mechanism, nor gross hematuria where significantly associated with the need for AE.

Conclusions: In our study, concomitant abdominal solid organ injury was the most significant risk factor associated with AE and can be used to help guide clinical decision making when considering percutaneous endovascular management of renal trauma.
USE OF NOVEL Technician TO ESTIMATE URETER LENGTH USING PREOPERATIVE CT

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(Presentation to be made by Dr. Arenas)

Introduction and Objectives: Optimal ureteral stent placement depends upon accurate estimation of ureteral length. Conventionally, CT measurements of ureteral length measure a single dimension. In this study, we compare ureteroscopically measured ureteral length to the CT+20% method and a novel Pythagorean based correction method that considers the ureteral length in all three dimensions.

Materials and Methods: Preoperative CT scans were reviewed for 55 patients undergoing flexible ureteroscopy. The ureteral length was estimated on the axial (a), sagittal (s) and coronal (c) views (Fig.1). Using the Pythagorean theorem, the ureteral length (U) was determined using the derived equation: U = √(s² + c² - a²). Ureter length was also calculated by adding 20% to the measurement in axial length. These two methods were then compared to the direct measurement of ureteral length measured by noting the location of the UPJ and UVJ on the external surface of the ureteroscope at the meatus. The distance between the two points on the endoscope was the ureteroscopically measured ureteral length. Pearson correlation coefficient was used for statistical comparison, with p<0.05 considered significant.

Results: The Pearson correlation coefficient of actual length with axial measurement +20% was 0.239 (p = 0.079). There was a better correlation using the novel Pythagorean theorem method that significantly correlated with the actual length 0.325 (p = 0.016).

Conclusion: We report a novel Pythagorean based mathematical model to predict ureteral length based upon preoperative CT imaging. This technique provides higher correlation to actual ureteral length compared to conventional methods. Use of this model may improve outcomes of stent placement.

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