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P-04.01
A Comparison of Extracorporeal Shockwave Lithotripsy with an Electrohydraulic Unit vs an Electromagnetic Unit

Ordon Michael, Ghiculete Daniela, Wiesenthal Joshua D, D'A Honey R John, Pace Kenneth T
St. Michael's, Division of Urology, University of Toronto, Toronto, ON, Canada

Introduction and Objective: Extracorporeal Shockwave Lithotripsy (SWL) still represents the most commonly used treatment modality for the management of urinary tract calculi. Various technologies exist for shockwave generation including electrohydraulic, electromagnetic and piezoelectric. Several studies comparing electrohydraulic and electromagnetic lithotripters have shown mixed results. Our objective was to evaluate the effectiveness of a new electromagnetic lithotripter compared to our previous electrohydraulic lithotripter.

Methods: We compared 100 patients treated with the Philips Lithotron Ultra electrohydraulic lithotripter with 100 patients treated with the Storz Modulith SLX F2 electromagnetic lithotripter, matched on stone area (mm^2), location, and BMI. The outcome measured was stone free rate and success rate at 2 weeks and 3 months. Success was defined as being either stone free, having residual sand or an asymptomatic fragment <4mm on KUB x-ray. We also compared complications and need for ancillary procedures between the two groups. In all patients, SWL treatment was continued to a maximum of 3000 shocks or until there was clear fluoroscopic evidence of complete fragmentation.

Results: The two groups were comparable in terms of stone size, location and density, BMI, presence of a stent and skin-to-stone distance. Univariate analysis showed no difference between the two groups for stone free or success rate at 2 weeks and 3 months. There was no difference in the complication rate and need for ancillary procedure between the groups. However, there was a trend toward a greater incidence of subcapsular hematoma in the Storz group that was not statistically significant (p=0.12). On average a significantly fewer number of shocks were administered with the Storz unit (p=0.02). Logistic regression, adjusting for stone size and location, BMI, presence of a stent and type of lithotripter, showed no effect for type of lithotripter. Stone size (p=0.002) and presence of a stent (p=0.025) were the only significant predictors of stone free rate at 3 months in this model.

Conclusion: The Phillips Lithron Ultra and Storz Modulith SLX F2 had equivalent stone free and success rates at 2 weeks and 3 months. However, the Storz Modulith demonstrated more efficient fragmentation as fewer shocks were administered.

MP-04.02
Do Longer Wait Times Lead to Poor Outcomes in Patients with Ureteral Stones Waiting for Ureteroscopy?

Patafio Francis[1], Roberts Greg[2], Beiko Darren[1,2], Siemens, D. Robert[1,2]
[1]School of Medicine, Queen's University, Kingston, ON, Canada; [2]Department of Urology, Queen's University, Kingston, ON, Canada

Introduction and Objectives: Surgical wait times have become a contentious quality indicator in universal health care systems. The potential for cannibalization towards higher priority surgical cases has led to concerns for the prolonged wait times for non-priority urologic procedures. This may be particularly relevant given the expanding use of medical expulsive therapy for ureteric stones. We describe and evaluate the effect of surgical wait times on the early outcomes and peri-operative complications of elective ureteroscopic laser lithotripsy for non-urgent ureteral calculi.

Methods: All patients undergoing ureteroscopic laser lithotripsy for non-urgent ureteral stones at a single centre between 2008 and 2010 were included. Wait times were determined utilizing a prospectively collected administrative database reporting a summary OR wait times. Further determination of wait times as well as clinical data was supplemented by extensive chart review. Associated outcomes investigated included additional hospitalization or urgent care visits while on the wait list and success of lithotripsy.

Results: One hundred and sixty four patients were identified. The mean stone size was 8.7 mm and only 29% of patients were started on medical expulsive therapy at the time of presentation. The reported success at lithotripsy was 96%, with 6 (4%) cases of unsuccessful access/fragmentation. The mean number of extra hospital visits after initial presentation was 1.0 (range 0-6) and 22 (13%) patients had more than 2 urgent care visits. The median wait time from OR booking to case completion was 55 days, however, the median wait time from the urology referral to procedure completion date was 111 days. There was a significant trend to increasing urgent care visits with prolonged wait times (0.69 visits/person compared to 1.57 visits/person at a cut-off at the 25th percentile (90 days), p<0.05). There was a non-significant trend to decreased success of lithotripsy with wait times.

Conclusions: The overall wait time for elective ureteroscopy was prolonged, likely influenced by multiple factors including specialist use of medical expulsive therapy. An overall wait time from presentation of greater than 90 days from original presentation was associated with a significant increase in rates of urgent care visits. Success of ureteroscopy was high despite prolonged wait times.

MP-04.03
A Comparison of the Metabolic Profiles of Diabetic and Non-Diabetic Uric Acid Stone Formers

Fernandez Alfonso[1], Al-Bareeq Reem[2], Nott Linda[1], Razvi Hassan[1]
[1]Division of Urology, Department of Surgery, Schulich School of Medicine & Dentistry, The University of Western Ontario, London, ON, Canada; [2]Department of Surgery, Salmaniya Medical Complex, Manama, Bahrain

Introduction and Objective: The aim of this study was to compare the metabolic profiles of diabetic and non-diabetic populations to understand whether preventative strategies should be tailored to reflect different causative factors.

Method: The results of the metabolic evaluation of patients with uric acid stones, identified from the prospective data collected on the Metabolic Stone Clinic at St. Joseph's Hospital, London, Canada were reviewed. Information included patients' clinical histories, two consecutive 24 hour urine collections, blood chemistry and stone analyses.

Results: Complete data was obtained in 63 patients (46 males, 17 females) with uric acid stones that included 21 diabetics (16 males, 5 females). There were no statistically significant differences with respect to mean age, body mass index or history of gout, nor were the number of patients passing stones spontaneously or requiring surgical or SWL intervention. Stone analysis by group showed that in the diabetic group pure uric acid stones were identified in 13 patients (61.9%). Mixed uric acid stones also containing calcium oxalate were seen in 8 (38.5%). In the non-diabetic group 18 patients had pure uric acid stones (42.8%), and 24 had mixed uric acid stones (57.1%), containing calcium oxalate and phosphate. Pure uric acid stones were more common in the diabetic cohort than among non-diabetics (61.9% vs 42.8%, p=0.15). The diabetic group had an increased

average oxalate excretion (421.63 µmol/dl vs 321.47, p=0.0081), percentage of hyperoxaluric patients (52.3% vs 23.8% p=0.02), and percentage of patients with hypernatriuria (52.38% vs 28.57%, p=0.04). A greater proportion of non-diabetics had hyperchloremia (50% vs 9.5%, p=0.03), a slight increase in serum sodium (139.35 mmol/d vs 138.55, p=0.01), and a tendency towards lower urinary citrate levels (2.42 mmol/d vs 2.99, p=0.052). No significant differences were found in any other urinary or serum parameter.

Conclusion: The etiology behind the higher oxalate excretion in diabetic uric acid stone formers is unclear. To our knowledge there are no previous reports of hyperoxaluria in diabetic uric acid stone formers. Whether this is a metabolic feature of diabetes or the iatrogenic consequence of dietary advice requires further investigation.

MP-04.04

Factors Influencing Shockwave Lithotripsy Retreatment Rates

Elkoushy Mohamed, Szymanski Konrad, Morehouse Douglas, Anidjar Maurice, Andonian Sero

Department of Surgery, Division of Urology, McGill University, Montreal, QC, Canada

Introduction and Objective: Since its clinical introduction in 1982, there have been several generations of shockwave lithotripters in use. The aim of the present study was to review factors influencing Shock-Wave Lithotripsy (SWL) retreatment rates among three different shock wave lithotripters at a single center.

Methods: A retrospective review of a prospectively collected SWL database for patients with radio-opaque stones between July 2001 and February 2010. 6434 SWL treatments were included (2824 with Lithotripter A [July 2001- August 2004], 3136 with Lithotripter B [September 2004- May 2009], and 474 with Lithotripter C [June 2009- February 2010]). Both Lithotripters A and B were electrohydraulic whereas Lithotripter C was a mobile electromagnetic lithotripter. Patients presenting for retreatment of the same stone were considered SWL failures. Except for patients undergoing SWL with Lithotripter C, clinical follow-up information regarding auxiliary procedures were not available. Logistic regression was used to compare retreatment rates of the three lithotripters.

Results: Lithotripter C had significantly higher percentages of stones in the middle (p<0.001) and lower calyces (p=0.02) and significantly lower percentage of mid ureteral stones (p<0.001) when compared with the other two lithotripters. In terms of mean stone size, there was significantly larger mean stone size with Lithotripter B (10.3 mm± 3.2), when compared with Lithotripter A (9.6 mm ± 3.4) and Lithotripter C (9.7 mm ± 3.0) (p=0.001). Lithotripter C was associated with significantly higher fluoroscopy time (2.4±1.3 min) when compared with Lithotripter A (1.74±0.8 min) and Lithotripter B (2.13±1.1 min) (p=0.001). In terms of SWL retreatment rates, Lithotripter C had significantly lower retreatment rate (14.7 %) when compared with Lithotripter A (18.8%, OR=1.34, p= 0.04) and Lithotripter B (19.6 %, OR=1.41, p=0.01). However, on multivariate analysis, Lithotripter C significantly differed only from Lithotripter B (OR= 1.36, p=0.02). On multivariate analysis, when compared with renal pelvic stones, stones in the upper calyx were associated with significantly lower retreatment rates (OR=0.65, p=0.02) and stones located in the lower ureter were associated with significantly higher retreatment rates (OR=1.30, p=0.01).

Conclusion: SWL retreatment rates significantly varied depending on the type of lithotripter used and location of stones.

MP-04.05

Ureteroscopy in Coagulopathic Patients is Associated With Lower Stone Free Rate and Increased Risk of Clinically Significant Hematuria

Elkoushy Mohamed, Violette Philippe, Andonian Sero

Department of Surgery, Division of Urology, McGill University, Montreal, QC, Canada

Introduction and Objectives: Patients with coagulopathy are at increased risk of peri-operative hemorrhage and thrombo-embolism. The aim of the present study was to compare peri-operative outcome ureteroscopies (URS) in these high risk patients to those with normal bleeding profile.

Methods: A retrospective review of prospectively collected data on patients undergoing URS was performed. Group I included 9 coagulopathic patients undergoing 14 URS (2 for biopsy of ureteral lesions and 7 for laser lithotripsy). One patient had Child B MELD 11 cirrhosis, 6 patients were on warfarin [2 for deep vein thrombosis (DVT), 2 for atrial fibrillation, 1 for mechanical aortic valve], 2 patients on ASA for coronary disease and stents, and the last patient was on low molecular weight (LMW) heparin for recent DVT and pulmonary embolism. URS in Group I was performed without correction of coagulopathy. Group II consisted of 32 patients with normal bleeding profile who underwent URS concurrently.

Results: In Group I, three ureteral biopsies in two patients with suspicious ureteral lesions were performed. Seven patients with stones underwent 11 URS and laser lithotripsy (median stone size was 11 mm). There were no significant differences between both groups in term of the age, sex, median operative time, fluoroscopy time and stone size. There were more renal stones in group I (55% vs 40% in GII, p< 0.01). Stone- free rate was significantly lower in group I when compared with group II (86% vs 97%, p<0.05). Two coagulopathic patients were readmitted for gross hematuria on post-operative days 6 and 47 for continuous bladder irrigation and withholding of anti-coagulants. There were no post-operative complications in group II.

Conclusions: Although URS in selected coagulopathic patients is safe, it is associated with lower stone free rates and higher re-admission for management of gross hematuria.

MP-04.06

Does the X-Ray Technologist or Amount Fluoroscopy Time Effect Treatment Success with Extracorporeal Shockwave Lithotripsy?

Ordon Michael, Ghiculete Daniela, Wiesenthal Joshua D, Pace Kenneth T, D'A Honey R John

Department of Urology, St. Michael's, University of Toronto, Toronto, ON, Canada

Introduction and Objective: The minimally invasive nature and effectiveness of Extracorporeal Shockwave Lithotripsy (SWL) has made it one of the primary treatment modalities for urinary tract calculi. Several factors determining the success of SWL treatment have been studied including stone factors (i.e., location, size, and composition) and patient factors (i.e., patient habitus and skin-to-stone distance). Furthermore, treating urologist has also been shown to effect treatment outcome. Our objective was to determine if either the assisting X-ray technologist or the amount of fluoroscopy time used had an impact on SWL success.

Methods: We compared the outcome of 283 SWL treatments across three X-ray technologists. We also evaluated the average amount of fluoroscopy time used in treatment success versus failures in this same cohort. The outcome measured was stone free rate and success at 2 weeks and 3 months. Success was defined as being either stone free, having residual sand or an asymptomatic fragment <4mm on KUB x-ray**.**

Results: The patients treated by the three different X-ray technologists were comparable with respect to BMI, stone side and location, presence of ureteric stent and mean stone area (mm^2). The stone free and success rate at 2 weeks and 3 months between the three X-ray technologists were not significantly different. When examining fluoroscopy time, we found a significantly greater mean fluoroscopy time was used in the treatment successes at 2 weeks (3.03 min vs 2.62 min, p=0.005) and 3 months (2.97 min vs 2.66 min, p=0.03) compared to treatment failures.

Conclusion: X-ray technologist did not have a significant impact on SWL treatment outcome at 2 weeks and 3 months. However, SWL treatment success at 2 weeks and 3 months was associated with a greater amount of fluoroscopy time suggesting using fluoroscopy to ensure accurate targeting during SWL is important for success.

MP-04.07

Study of Quality of Life and its Determinants in Patients after Urinary Stone Fragmentation

Rabah Danny
Division of Urology, Department of Surgery, College of Medicine, King Saud University, Riyadh, Saudi Arabia

Background: This study was designed to evaluate the health-related quality of life (HRQOL) of patients who had undergone lithotripsy for treatment of urinary stones and to identify factors that significantly affect the HRQOL of these patients.

Methods: A comparative cross-sectional study was performed at the main university and main Ministry of health hospitals in Riyadh, Saudi Arabia. All patients admitted to the urology service and who underwent lithotripsy for urinary stones during a 9-month period were included in the study. An observation period of 3-15 months following the last treatment was allowed before patients completed the QOL questionnaire. Information on socio-demographic, and medical characteristics, and number and type of lithotripsies were collected. The Medical Outcome Study Short-Form 36-item survey (SF-36) was used to assess HRQoL. For comparison, the HRQoL in an equal number of healthy individuals was investigated; multivariate analysis of variance was used for comparisons between groups.

Results: Compared with healthy subjects, lithotripsy patients had significantly higher mean scores in the different subscales of the SF-36 questionnaire such as physical functioning, vitality, role-physical, role-emotional and mental health, indicating a better HRQOL. Compared with patients who underwent ureteroscopic or extracorporeal shock-wave lithotripsies, those who underwent percutaneous lithotripsy had significantly worse mean scores for all the SF-36 scales, except for body pain. Factors impacting HRQOL of the patients were age, obesity, diabetes mellitus, and stone characteristics such as localization (in the kidney) and recurrence (multiple lithotripsies).

Conclusions: Post-lithotripsy, patients have a favorable HRQOL compared with healthy volunteers. Further prospective studies are warranted to confirm these results owing to the inherent limitations of the cross-sectional design and backward analysis of this study.r treatment of urinary stones and to identify factors that significantly affect the HRQOL of these patients.

MP-04.08

Impact of Body Mass Index on Clinical Outcomes Associated with Percutaneous Nephrolithotomy

Alyami Fahad, Skinner Thomas, Norman Richard
Department of Urology, Dalhousie University, Halifax, NS, Canada

Introduction and Objective: The burden of obesity in Canada is increasing at a rapid rate. In addition to contributing to many disease processes, obesity puts patients at risk of surgical complications resulting in a reluctance of surgeons to operate on obese patients. Percutaneous nephrolithotomy (PCNL) is the preferred treatment for patients with large renal calculi or with stones that have not responded to extracorporeal shock wave lithotripsy (ESWL). Our objective was to compare outcomes and complications of PCNL in patients of various body mass indexes (BMI) to determine the safety of this procedure in patients with elevated BMI.

Methods: A retrospective chart review of 114 patients who underwent PCNL between 2006 – 2009 was performed. Patients included in the study were separated into 4 groups with respect to their BMI. The groups were based on standard definitions of BMI: ideal body weight (IBW) (BMI < 25 kg/m^2), overweight (OW) (25 ≤ BMI < 29.9 kg/m^2), obese (OB) 30 ≤ BMI < 40 kg/m^2), and morbidly obese (MO) (BMI ≥ 40 kg/m^2). Univariate analysis was used to compare the variables across BMI groups. Variables analyzed were age, sex, stone size, length of stay (LOS), incidence of complications and stone-free rates.

Results: Of the 114 patients included in the study, the number of individuals in each BMI category was as follows: IBW 39 (34%), OW 24 (21%), OB 41 (36%), MO 10 (9%). There was no difference in the composition of groups with respect to age, sex, or stone size. Mean LOS values in days ± standard error for each group were not significantly different: 1.6 ± 0.3 (IBW), 1.9 ± 0.3 (OW), 1.6 ± 0.2 (OB), and 1.7 ± 0.3 (MO), p=0.59. Intraoperative complication rates between groups: 8% (IBW), 8% (OW), 2% (OB), 0% (MO), p=0.55 and post-operative complication rates between groups: 3% (IBW), 21% (OW), 10% (OB), 20% (MO), p=0.17, were also comparable. Finally, stone-free rates showed no significant difference between groups: 90% (IBW), 87% (OW), 90% (OB), 80% (MO), p=0.83.

Conclusions: Comparative analysis revealed no difference in LOS, intraoperative or postoperative complication rates and stone-free rate between each of the BMI categories. The outcome of PCNL is independent of a patient's BMI and results are favourable in most patients. We advocate treating obese patients with symptomatic stone disease based on individual status, using PCNL where appropriate.

MP-04.09

Variations Between Two 24-hour Urine Collections in Patients Presenting to a Tertiary Stone Clinic

Nayan Madhur, Elkoushy Mohamed, Andonian Sero
Division of Urology, Department of Surgery, McGill University, Montreal, QC, Canada

Introduction and Objective: The current CUA guidelines recommend two 24-hour urine collections in the metabolic evaluation for patients with urolithiasis. However, some studies suggest that only one 24-hour urine collection may be sufficient. The aim of the present study was to evaluate differences between two 24-hour collections in patients presenting to a tertiary stone clinic.

Methods: A retrospective review of 188 patients who had two 24-hour urine collections upon presentation between January 2009 and December 2010. The two 24-hour collections were performed on consecutive days and were examined for the following 11 urinary parameters: volume, creatinine, sodium, calcium, uric acid, citrate, oxalate, potassium, phosphorous, magnesium, and urea nitrogen. For each parameter, the absolute value of the difference between two samples rather than the actual difference was compared with zero. This avoids the possibility of positive and negative values in the actual differences from negating each other. Similarly, percentage difference between samples was calculated for each parameter. Student t-test was used to compare means of the absolute difference between the two samples with 0.

Results: The means of the absolute difference between the two samples were significantly different from the value 0 for all 11 urinary parameters (p<0.0001). The percent difference for all urinary parameters ranged from 20.5% to 34.2%. Furthermore, 17.1% to 47.6% of patients had a change from a normal value to an abnormal value, or vice-versa. Significance was maintained when patients with incomplete or over collections were excluded (Table 1).

Table 1. MP-04.09

24-Hour Urinary Parameter	% Patients with Clinically Significant Change
Volume	47.6
Creatinine	21.9
Sodium	17.6
Calcium	23.6
Uric acid	18.2
Citrate	26.1
Oxalate	17.1
Potassium	25.8
Phosphorous	14.9
Magnesium	42.0
Urea nitrogen	23.0

Conclusions: Significant variations among the two 24-hour urine collections were observed in all of the 11 urinary parameters analyzed. This variation may change clinical decision making in up to 47% of patients if only a single 24-hour urine collection is obtained.

MP-04.10

Interim Analysis of a Multi-Centre Randomized Controlled Trial Comparing Three Different Modalities of Newer Lithotrites for Intracorporeal Lithotripsy

Chew Ben[1], Paterson Ryan[1], Arsovska Olga[1], Preminger Glenn[2], Lipkin Michael[2], Miller Nicole[3], Krambeck Amy[4], Razvi Hassan[5], Matlaga Brian[6], Nakada Stephen[7], Nadler Robert[8], Humphreys Mitchell[9], Lingeman James[10]

[1]University of British Columbia, Department of Urologic Sciences, Vancouver, BC, Canada; [2]Duke University, Department of Urology, Durham, North Carolina, USA; [3]Vanderbilt University, Department of Urology, Nashville, TN, USA; [4]Mayo Clinic, Department of Urology, Rochester, MN, USA; [5]-University of Western Ontario, Division of Urology, London, ON, Canada; [6]Johns Hopkins University, Department of Urology, Baltimore, MD, USA; [7]University of Wisconsin, Department of Urology, Madison, WI, USA; [8]Northwestern University, Department of Urology, Chicago, IL, USA; [9]Mayo Clinic, Department of Urology, Scottsdale, AZ, USA; [10]Clarian Health Partners, Methodist Research Institute, Indianapolis, IN, USA

Introduction and Objective: The purpose of this study is to compare the efficiency and fragmentation rate of 3 modern lithotrites during percutaneous nephrolithotomy.

Methods: Patients undergoing percutaneous nephrolithotomy with stones greater than 2 cm in diameter were randomized to intracorporeal lithotripsy with the Cyberwand (Olympus-ACMI), Lithoclast Select (EMS/Boston Scientific Microvasive), or StoneBreaker (Cook Urogical) and Olympus LUS-2 ultrasonic lithotripsy. The total time to perform the procedure including fragmentation time, grasping fragments, and ultrasonic lithotripsy was recorded. Clearance rate was calculated by dividing the surface area of the targeted stone by the total clearance time. Stone free rate was determined by post-operative CT scan or secondary nephroscopy within 30 days.

Results: Forty-five patients to date have been enrolled in the study across multiple sites. The results are shown in Table 1.

Conclusions: Preliminary data shows a slight advantage in stone free rate to the Cyberwand and Lithoclast Ultra groups over the Stone Breaker. There was no difference in clearance efficiency among groups. The study is ongoing and further patients will help determine if true differences exist among lithotrites in their efficiency of fragmenting stones during percutaneous nephrolithotomy.

MP-04.11

Selective Renal Parenchymal Clamping in Robot-Assisted Laparoscopic Partial Nephrectomy: A Multi-Institutional Experience

Viprakasit Davis P[1], Derweesh Ithaar[2], Wong Carson[3], Su Li-Ming[4], Stroup Sean P[2], Bazzi Wassim[2], Strom Kurt H [3], Gu Xiao[3], Herrell Duke[1]

[1]Department of Urology, Vanderbilt University, Nashville, TN, USA; [2]Department of Urology, University of California San Diego, San Diego, CA, USA; [3]Department of Urology, University of Florida Gainesville, Gainesville, FL, USA; [4]Department of Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA

Introduction and Objectives: Selective regional clamping can create a bloodless operative field during nephron-sparing surgery in order to avoid complete warm ischemia with hilar clamping and potential renal damage. We describe our multi-institutional experience using a laparoscopic clamp to induce selective regional ischemia during robot-assisted laparoscopic partial nephrectomy (RALPN) without hilar occlusion.

Methods: A retrospective review of IRB-approved databases of patients who underwent selective regional clamping during RALPN at four institutions was performed.

Results: Between August 2009 and August 2010, 20 patients were treated for elective indications. RALPN with clamp utilization was successful in 17 (85%). Mean age was 63 years (24-78). 9(53%) patients were female. Median tumor diameter was 2.2cm (1.1-7.2cm). Mass location was polar in 13 (76%) and interpolar in 4 (24%). Median RENAL Nephrometry score was 6 (4-10). Median overall operative time was 190 minutes (129-309) while selective clamp time was 26 minutes (19-52). Collecting system repair occurred in 8 (47%) patients. Median estimated blood loss was 100ml (25-550) and no patients required a blood transfusion. One patient developed a pulmonary embolus in follow-up. There was no significant difference in preoperative (median 86ml/min/1.73m2) and immediate postoperative GFR (median 78ml/min/1.73m2, p=0.33) or with most recent GFR (median 78ml/min/1.73m2, p=0.54) at a mean follow-up of 6.1 months (1.2-11.9). Final pathology revealed renal cell carcinoma in 71% with no positive margins on frozen or final evaluation. There was no evidence of disease recurrence on follow-up imaging. In 3 additional patients undergoing RALPN, incomplete clamp compression at the distal aspect resulted in bleeding and decreased visualization requiring hilar clamping for the completion of the procedure.

Conclusions: Our preliminary multi-institutional experience demonstrates that renal parenchymal lamping can be safely and effectively used during RALPN to create a bloodless operative field. Careful preoperative selection of patients with optimally located renal tumors, in particular polar lesions, with respect to complete clamp jaw closure is required for successful utilization of regional clamping. This technique may be useful in patients at high risk for renal damage following prolonged complete warm ischemia. However, comparison studies are necessary.

Table 1. MP-04.10

	Cyberwand (n=15)	Lithoclast Select (n=14)	Stonebreaker (n=16)	*p*-value
Median patient age (Years) (range)	50 (30-80)	63.5 (49-80)	58.5 (44-67)	ns
Median stone size (mm2) (range)	449.7 (138.4-4884)	308.4 (182-671.5)	321.7 (109-732.6)	ns, p=0.10
Median Clearance Efficiency (mm2/sec)	16.1 (7.8-175)	17.2 (6.2-30.2)	20.6 (4-44)	ns, p=0.24
Stone Free Rates	93%	79%	50%*	*p=0.006
Complications	Mucosal perforation (1)	Fever (1) Mucosal perforation (1) Transfusion (1)	Fever (1), Muscosal perf (1) Transfusion (3)	ns

MP-04.12

Designing a High-Fidelity Laparoscopic Partial Nephrectomy Bench Model: Determining the Tear Strength and Resistance of a Synthetic Silicone Composition

Alamri Abdulaziz, Abdulla Alym, Madjeruh John, Shayegan Bobby, Piercey Kevin, Whelan John, Kapoor Anil, Matsumoto Edward D
Department of Surgery, Division of Urology, McMaster University, Hamilton, ON, Canada

Introduction and Objectives: Teaching and learning laparoscopic partial nephrectomy (LPN) is challenging. A bench model that simulates tissue handling and fidelity to a real kidney would be highly valued. We previously studied and measured the tear strength and tissue resistance of human kidneys. The objective of this study was to assess the tear strength and tissue resistance of various synthetic silicone compositions to develop a LPN bench model with high-fidelity tissue handling characteristics.

Methods: Different silicone samples were made by adding varying percentages of platinum silicone additive (0%, 5%, 10%, 15% and 16%). This resulted in samples with different consistency and texture. Using ten samples of each composition, the tear strength was measured by placing a 2/0 vicryl through each sample, which was attached to a strain gauge fixed within a standardized traction applying apparatus. The tear strength reading was taken at the moment the suture began tearing the material. The resistance of the silicone samples was measured using a commercial Durometer fixed to a Keith needle. The tear strength and resistance values from these samples were compared to readings from human kidneys. Kruskal-Wallis non-parameteric statistics were utilized.

Results: The median tear strength for the 0%, 5%, 10%, 15%,16% and human kidney samples were 1900, 645, 665, 460, 210, 445 grams respectively. Post-hoc analysis showed there was no difference between the 15% sample and the human kidney (p=0.97). The median resistance values for the same samples were 80, 62, 112, 85, 89 and 26 units respectively. There were statistically significant differences noted (p<0.05) and none of the silicone samples was found to have similar resistance values to the human kidney.

Conclusions: We found that the 15% silicone sample had similar tear strength to that of human kidneys. All of the silicone samples, including the 15%, had needle resistance much greater than the human kidney. However, we feel tear strength of tissue is essential for teaching suturing and suture tying, as this is a critical construct of learning LPN. The next phase of our study will be the development of the final LPN model using the 15% platinum silicone composition and validation.