

found in the parenchymal tissue of any kidney by gross, MRI, or histologic examination, although petechial damage and erosion were identified to the urothelium of the collecting system limited to the area directly around the stone.

CONCLUSIONS: Burst wave lithotripsy can produce consistent stone fragmentation with use of appropriate ultrasound parameters. Such exposures cause minimal injury to the kidney and urinary tract during treatment.

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PD26-09

A GLOBAL SURVEY OF UROLOGIST'S CURRENT PRACTICE: WHEN ARE THE NEW/NOVEL ORAL ANTICOAGULANTS (NOACS) DISCONTINUED AND RESUMED IN PATIENTS UNDERGOING SHOCK WAVE LITHOTRIPSY?

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INTRODUCTION AND OBJECTIVES: The use of new/novel oral anticoagulants (NOACs) continues to increase and Urologists are faced with increasing numbers of patients in their practice using these agents. Although general guidelines directing the management of these medications in the perioperative period exist for open and endoscopic procedures, no consensus exists for those patients being considered for shock wave lithotripsy (SWL). In order to gauge current practice, we developed and sent a survey to the endourological community.

METHODS: A web-based survey was sent to all current Endourological Society members. Members were asked 10 questions regarding their current practice in dealing with patients using NOACs and who might be candidates for SWL. Respondents were specifically asked whether being on a NOAC would be considered a contraindication to SWL, or if SWL was to be performed, when the agent would be discontinued preoperatively and resumed postoperatively. Respondents were also queried on who managed the NOAC discontinuation and resumption.

RESULTS: There were 165 respondents from 37 countries, with the largest cohort responding from North America (43%). (87.8%) of society members had been in practice for 5 years or more, with (70%) being in an academic practice. The vast majority (92.73%) provided SWL treatments in their institutions, while only (53.37%) would consider offering SWL to patients taking NOACs. The decision on when to stop NOACs prior to SWL, was made by (36.65%) of urologists although the majority (56%) consulted internal medicine/cardiology for their input. The majority of urologists (64.2%) handled the resumption of the NOACs after SWL by themselves. There appeared to be great variability in the number of days prior to SWL were NOACs stopped, and when they were resumed Post treatment.

CONCLUSIONS: Somewhat surprisingly, over half of surveyed endourologists do not even offer SWL to patients taking NOACs. For those patients who are treated with SWL there appears to be a lack of consensus among endourologists on what is the optimal duration of NOAC cessation, suggesting a need to establish evidence-based guidance to optimize outcomes.

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PD26-10

REGIONAL VARIATION IN RATES OF SWL UTILIZATION AMONG PATIENTS WITH NEPHROLITHIASIS

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INTRODUCTION AND OBJECTIVES: Nephrolithiasis is rising in prevalence and continues to pose an increasing financial burden on society. Common management options for stones include watchful waiting, percutaneous stone removal, ureteroscopy and shock wave

lithotripsy, with the latter two comprising the majority of interventions for stones in the US. When multiple treatment options exist, effective care is heralded by equal utilization rates in disparate locations. Conversely, if variation is identified, this may be secondary to unwarranted variation, potentially driven by either supply-sensitive or preference-sensitive care. Responsible health care spending dictates identification of variation in surgical utilization as a first step in unravelling and then addressing underlying sources of potentially unwarranted variation. Variation in the utilization of SWL has been suspected but not comprehensively evaluated in the United States.

METHODS: Utilizing the full 100% Medicare dataset from the year 2014, we identified all patients with the diagnosis of a renal stone within the previously defined and validated 306 hospital referral regions (HRR's) of the US. Among beneficiaries with the diagnosis of a renal stone, we then assessed the rate of any type of surgical management of the stone, and then specifically the rate of use of SWL, both on a national level and by HRR. Both crude rates and rates adjusted by age, sex and race were generated.

RESULTS: In 2014 there were a total of 806,652 included Medicare beneficiaries with a diagnosis of a renal stone. Nationally, the rate of any surgical intervention was 71.34/1,000. The HRR with the lowest rate of surgical intervention was 31.67/1,000 while that with the highest was 131.02/1,000, representing an approximately 4-fold variation in the rate of all surgical management.

For SWL, the national rate of utilization was 45.48/1,000 patients with kidney stones. The HRR with the lowest rate of SWL utilization was 9.24/1,000 while that with the highest was 105.80/1,000, representing a greater than 11-fold regional variation in SWL utilization among those with stones.

CONCLUSIONS: In this all-inclusive population of Medicare beneficiaries with a diagnosis of a renal stone, there is dramatic variation in the rate of SWL utilization. Although this may reflect overutilization of SWL in some centers and underutilization in others, these findings clearly suggest that the probability of having SWL as opposed to any other management option for a stone may depend heavily upon the hospital to which one is referred. Whether this is due to supply-sensitive factors including the availability of a lithotripter or number of urologists on staff, or preference-sensitive factors including the surgeon's preferred treatment, warrants further investigation. Future efforts to standardize treatment algorithms and develop shared decision-making models may reduce unwarranted variation in the care of patients with kidney stones.

Source of Funding: none

PD26-11

QUALITY INDICATORS FOR SHOCKWAVE LITHOTRIPSY IN THE STATE OF MICHIGAN: ARE WE FOLLOWING THE GUIDELINES?

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INTRODUCTION AND OBJECTIVES: Recent guidelines from the American Urological Association (AUA) provides a clinical framework for the surgical management of patients with kidney stones. The extent to which these guidelines are followed in clinical practice for patients undergoing shockwave lithotripsy (SWL) has not been studied. To better understand quality indicators for SWL, we assessed adherence to AUA recommendations for the treatment of renal stones using data from a statewide clinical registry.

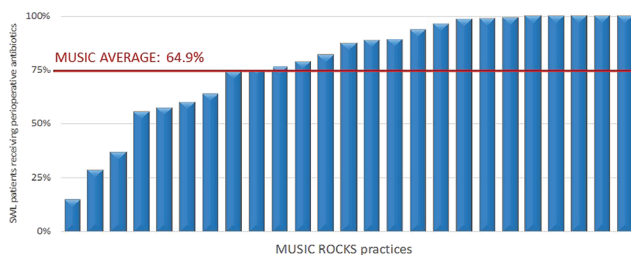
METHODS: We used the Michigan Urologic Surgery Improvement Collaborative Reducing Operative Complications for Kidney Stones (MUSIC ROCKS) registry to understand SWL use in the state of Michigan. This prospectively maintained registry includes data from community and academic practices and contains detailed clinical and operative data for patients undergoing SWL and ureteroscopy. We identified all patients undergoing SWL from 2016 to 2018. In accordance with AUA guidelines, we evaluated practice patterns in relation to

recommendations on (1) antibiotic administration at the time of SWL, (2) ureteral stent placement at the time of SWL, (3) SWL utilization for large renal stones (>2cm) and lower pole stones >1cm, and (4) post-procedural alpha-blocker use.

RESULTS: 3,545 SWL procedures performed across 34 practices were analyzed. Perioperative antibiotics were administered to 64.9% percent of patients undergoing SWL with substantial variation across practices (range 14.8% to 100%, $p < 0.01$; Figure). A ureteral stent was placed at the time of SWL in 2.8% of patients. Of all large (>2cm) or lower pole renal stones >1cm in the registry, 36.7% and 58.6% of patients, respectively, underwent SWL, while the remainder were treated with ureteroscopy. Postoperatively, 41.9% of patients were prescribed an alpha-blocker with substantial variability seen amongst practices (range 0% to 98.75%, $p < 0.01$).

CONCLUSIONS: Substantial variation exists amongst urology practices with regard to perioperative and postoperative optimization for SWL, with high rates of utilization for large and lower pole renal stones. These data serve to better inform future quality improvement efforts regarding appropriateness criteria for SWL in the state of Michigan.

Figure. Variation in the use of perioperative antibiotics at the time of SWL



Source of Funding: Blue Cross/Blue Shield of Michigan

PD26-12 RETREATMENT AFTER URETEROSCOPY AND SHOCKWAVE LITHOTRIPSY: A POPULATION-BASED PSEUDO-RANDOMIZED COMPARATIVE EFFECTIVENESS STUDY

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INTRODUCTION AND OBJECTIVES: Ureteroscopy (URS) and shockwave lithotripsy (SWL) are the most commonly performed surgical interventions for kidney and ureteral stones. However, the comparative effectiveness of these interventions at the population level is unclear as prior studies have been performed in younger, commercially insured populations and have estimated retreatment for the marginal rather than the average patient. We sought to determine the risk of retreatment after SWL and URS among all patients undergoing these surgeries in South Carolina.

METHODS: Using all payer billing data from 74 hospitals in South Carolina, we performed a series of pseudo-randomized trials to determine the risk of retreatment within 6 months of URS or SWL between 1997 and 2016. To account for confounding between surgical interventions, we first fit a propensity score model for each year's data to predict the probability of undergoing SWL conditional on hospital-level and patient-level covariates. Next, a discrete time failure model was fit using inverse probability weighted logistic regression which accounted for repeated observations of the same patient across multiple trials and balanced measured confounders across treatment groups. Odds Ratios (OR), 95% confidence intervals, and probabilities of retreatment were estimated.

RESULTS: From 1997-2016, 123,970 children and adults underwent SWL ($n = 74,235$; 59.9%) or URS ($n = 49,735$; 40.1%), of whom 12,208 patients (9.9%) underwent retreatment with SWL and/or URS within 6 months. 73% of retreatments occurred within 2 months of the original surgery. The probability of retreatment was 7.5% for URS and

10.4% for SWL (number of SWL needed to retreat, 33). Compared to initial URS, initial SWL was associated with a 44% increased odds of retreatment (95% CI 1.36, 1.51). SWL (vs. URS) was always associated with a greater odds of retreatment over the 6-month period, but the magnitude of the association varied significantly across the follow-up time. SWL had the greatest risk for retreatment compared to URS at months 2 (OR 2.09, 95% CI 1.86, 2.35) and 3 (OR 1.98, 95% CI 1.70, 2.31). Of those patients who had retreatment, patients who had initial SWL were more likely to have SWL for retreatment (84.6%) than were patients who had initial URS to have URS for retreatment (29.3%).

CONCLUSIONS: Compared to URS, SWL was associated with a substantially increased odds of retreatment among the population of South Carolina over a 20 year period. However, the probability of retreatment for the average patient was modest for both URS (7.5%) and SWL (10.4%).

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PD26-13 OPTIMAL NON-INVASIVE TREATMENT OF 1-2.5 CM RADIOLUCENT RENAL STONES: ORAL DISSOLUTION THERAPY (ODT), SHOCK WAVE LITHOTRIPSY (SWL) OR COMBINED TREATMENT: A RANDOMIZED CONTROLLED TRIAL

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INTRODUCTION AND OBJECTIVES: Non-invasive modalities for radiolucent stone management in adult patients had sparse trials. We aim to evaluate efficacy of ODT, SWL and combined SWL and ODT for medium sized radiolucent renal calculi.

METHODS: A randomized controlled trial (RCT) registered at clinicaltrials.gov (NCT03388060) for patients with medium sized renal stone(s) 1-2.5 cm, ≤ 500 Hounsfield unit (HU). The ODT patients were counseled for oral potassium citrate. The 2nd group underwent SWL and the last group had combined SWL and ODT. The primary outcome, stone free rate (SFR) at 3 months, was assessed by Non-contrast Computed Tomography (NCCT). We defined complete response (success) if no residual fragment by NCCT. Partial response (failure) if there was a decrease in stone size and not free of residual stones. No response (failure) if there was no change or increase in stone size.

RESULTS: 150 patients completed follow up. Patients' demographic were comparable in groups. The stone free rate (SFR) at 1st month and 3rd month were; 8 (16%) and 25 (50%) in ODT group, 5(10%) and 23(46%) in SWL group, 17(35%) and 36(72%) patients in combined group with ($p = 0.03$ and 0.003), respectively. The SFR for all group was 84(66%). In multivariate analysis, combined type of intervention and presence of initial response in first month follow up were the independent factors predicting SFR. Besides, combined ODT and SWL had significantly decreased the overall stone volume ($p = 0.03$) and the need for another stone management procedures after 3 months ($p = 0.01$).

CONCLUSIONS: Combined ODT and SWL is the most rapid and effective treatment approach for medium sized radiolucent renal stones and significantly decreases the overall stone volume especially in presence of initial response. It also decreases the SWL sessions in comparison to SWL alone.