

Stone Management in the Solitary Kidney, Are We Doing Things Differently? Results from a Statewide Clinical Registry

Mohit Butaney*, Detroit, MI, Stephanie Dagnault-Newton, Ann Arbor, MI, Isaac Palma-Zamora, Grace Yaguchi, David Leavitt, Detroit, MI, Casey Dauw, Khurshid Ghani, Ann Arbor, MI, Naveen Kachroo, Detroit, MI, for the Michigan Urological Surgery Improvement Collaborative, Ann Arbor, MI

INTRODUCTION AND OBJECTIVE: Stone management in patients with solitary kidneys (SK) is challenging due to the significantly increased morbidity associated with any complication or potential kidney function insult. Given the lack of high quality-evidence to guide optimal management, we sought to assess statewide stone management patterns in SK patients.

METHODS: The Michigan Urological Surgery Improvement Collaborative Reducing Operative Complications from Kidney Stones (MUSIC ROCKS) prospective clinical registry was utilized to identify patients with SK from any etiology undergoing either ureteroscopy (URS) or shockwave lithotripsy (SWL) between 2016 and 2021 and compared their management to patients with non-anomalous urinary anatomy (non-SK). Outcomes evaluated included peri-operative management patterns, complication and stone free rates.

RESULTS: Patients with a SK (n=326) and with non-SK (n=30116) treated for stones were compared. SK patients were older (median age 63 vs 58, p<0.0001) and more likely to have public or no insurance (p<0.01). SK patients were significantly more likely to not have a pre-op urine culture prior to both URS (30.3% vs 16.6%, p<0.0001) and SWL (33.7% vs 26.4%, p<0.05) but had increased peri-op SWL antibiotic rates (81.9% vs 54.6%, p<0.001). Clopidogrel usage in SK patients completely excluded SWL as a treatment modality. SK patients undergoing URS were more likely to undergo ureteral dilation (p<0.0001) and ureteral access usage (p=0.02) but had no difference in post-op stent placement (p=0.73). Only 9% of SK patients had a stent placed at time of SWL. SK patients were less likely to be prescribed antibiotics or NSAIDs post URS and SWL but had higher rates of opioids post-URS (**Table 1**). Significant differences in postoperative imaging rates and modality were noted (**Table 1**). Stone free rates in SK were significantly higher among SWL (72% vs 40%, p<0.0001) but not among URS patients (69% vs 61%, p=0.10).

CONCLUSIONS: We observed significant variation in urolithiasis management for SK patients compared to non-SK patients likely due to lack of specific guidelines. Certain findings in SK patients, the lower pre-op urine culture performance and higher opioid rates in particular, represent opportunities for quality improvement.

Source of Funding: Blue Cross Blue Shield of Michigan

Table 1. Peri-operative variables and outcomes comparing stone management in solitary kidneys to anatomically non-anomalous kidneys

	URS		p-value	SWL		p-value
	Non-SK (n=20,410)	SK (n=228)		Non-SK (n=9706)	SK (n=98)	
Median stone size	7 (5-9)	6 (5-8)	0.014	8 (6-10)	8 (6-10)	0.24
Categorical						
<5 mm	6339 (32.3%)	84 (38.01%)	0.055	1886 (20.0%)	14 (14.4%)	0.19
5-10 mm	9974 (50.9%)	109 (49.3%)		5625 (59.7%)	60 (61.9%)	
10-15 mm	2427 (12.4%)	19 (8.6%)		1503 (16.0%)	18 (18.6%)	
>15 mm	869 (4.4%)	9 (4.1%)		409 (4.3%)	5 (5.2%)	
Stone location						0.0006
Both	3760 (19.1%)	22 (9.9%)	0.0004	765 (8.5%)	1 (1.0%)	
Renal	4502 (22.9%)	68 (30.6%)		6296 (69.8%)	61 (63.5%)	
Ureter	11396 (58.0%)	132 (59.5%)		1955 (21.7%)	34 (35.4%)	
Urine culture			<0.0001			0.0497
Positive	2943 (14.4%)	29 (12.7%)		573 (5.9%)	1 (1.0%)	
Negative	14058 (69.0%)	130 (57.0%)		6570 (67.7%)	64 (65.3%)	
Not performed	3381 (16.6%)	69 (30.3%)		2557 (26.4%)	33 (33.7%)	
Pre-op alpha blocker used?	8943 (4.87%)	148 (66.87%)	0.0004	2716 (28.7%)	25 (25.7%)	0.53
Pre-op clopidogrel used?	1159 (5.8%)	17 (7.6%)	0.26	495 (5.2%)	0	0.0098
Pre-stented?	8049 (39.6%)	95 (41.9%)	0.48	1408 (14.6%)	16 (16.3%)	0.62
Peri-op antibiotics?	15930 (86.4%)	184 (90.2%)	0.115	4507 (54.6%)	77 (81.9%)	<0.0001
Ureteral dilatation performed?	3521 (17.5%)	67 (29.6%)	<0.0001	NA	NA	NA
Ureteral access sheath used?	7457 (37.0%)	100 (44.6%)	0.0192	NA	NA	NA
Ureteral stent used?	15225 (74.8%)	172 (75.8%)	0.73	349 (3.62%)	9 (9.2%)	0.0035
Intra-operative complication?	232 (1.1%)	2 (0.9%)	1.0	23 (0.24%)	0	1
Discharged with Antibiotics?	7055 (38.6%)	63 (30.4%)	0.0167	1747 (22.6%)	12 (12.9%)	0.026
Discharged with Alpha blockers?	11112 (60.7%)	111 (54.7%)	0.0799	3878 (49.6%)	41 (44.1%)	0.29
Discharged with Opioids?	7846 (44.3%)	108 (53.2%)	0.0111	4175 (56.5%)	54 (59.3%)	0.59
Discharged with NSAIDs?	4286 (24.0%)	18 (8.8%)	<0.0001	837 (11.2%)	4 (4.4%)	0.0421
Post-op imaging done?	8422 (41.3%)	83 (36.4%)	0.138	7091 (73.1%)	82 (83.7%)	0.018
Post op imaging type			0.0029			<0.0001
CT	1500 (17.8%)	16 (19.3%)		610 (8.6%)	2 (2.4%)	
KUB	2802 (33.3%)	41 (49.4%)		4799 (67.7%)	77 (93.9%)	
US	4120 (48.9%)	26 (31.3%)		1682 (23.7%)	3 (3.7%)	
ED visit in 30d	1517 (7.5%)	15 (6.6%)	0.63	346 (3.6%)	2 (2.0%)	0.59
Readmission in 30d	610 (3.0%)	7 (3.1%)	0.94	100 (1.0%)	0	0.63
Stone free rates	60.8%	69.2%	0.0996	39.9%	72.4%	<0.0001