

Ureteroscopy vs. shockwave lithotripsy for lower pole renal stones: Treatment variation and outcomes in a surgical collaborative

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INTRODUCTION AND OBJECTIVE: American Urological Association guidelines recommend ureteroscopy (URS) or shockwave lithotripsy (SWL) for lower pole (LP) renal stones ≤ 1 cm, and URS for stones >1 -2cm. However, data guiding these recommendations are from select centers. We examined treatment variation, unplanned healthcare utilization and stone-free rates (SFR) in the diverse practices comprising the Michigan Urological Surgery Improvement Collaborative (MUSIC).

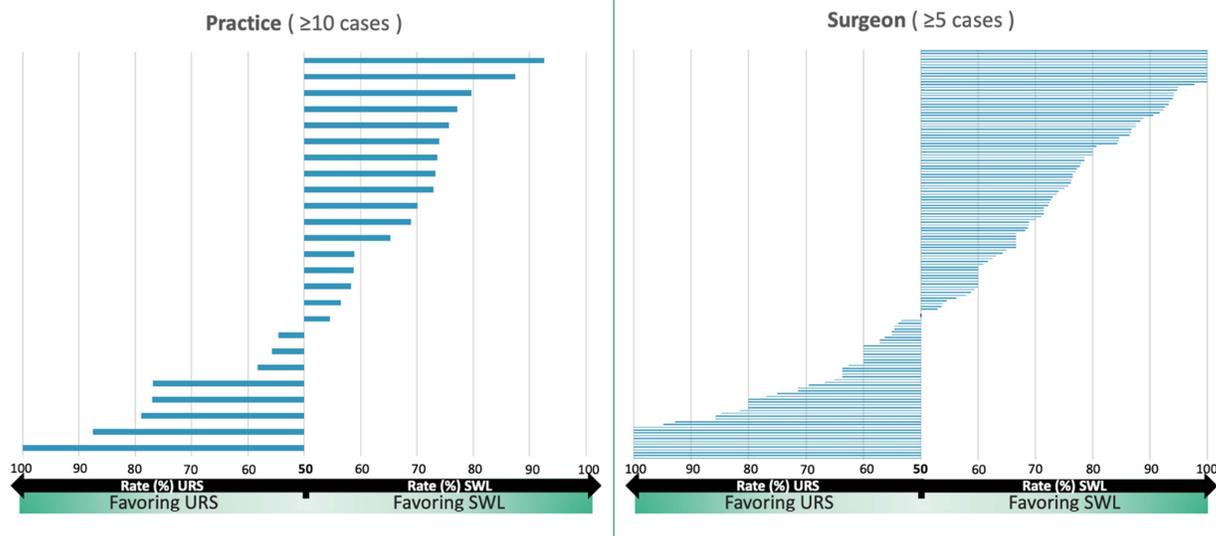
METHODS: Using the MUSIC registry we identified URS and SWL cases for LP stones ≤ 2 cm from 2016-2021. We assessed practice and surgeon frequency of performing URS or SWL. A treatment modality was considered favored if the procedure rate was $>50\%$. Emergency department (ED) visits, hospitalization and SFRs were assessed according to stone size (≤ 1 , >1 -2cm).

RESULTS: 3,645 procedures were performed across 35 practices and 209 surgeons; 1358 (37.3%) URS and 2287 (62.7%) SWL. 80.2% of stones were ≤ 1 cm. There was practice variation in performing URS (0 to 100%; $p < 0.001$) and SWL (0 to 100%; $p < 0.001$). 74.2% of surgeons favored SWL; 10% performed SWL, and 5.7% URS exclusively (Figure). For stones ≤ 1 cm, ED visits (9.5% vs 2.5%, $p < 0.001$) and hospitalizations (3.5% vs 0.4%, $p < 0.001$) were higher after URS, as were SFRs (URS 56.4% vs SWL 38.8%; $p < 0.001$). There were no significant differences between URS and SWL for ED visits, hospitalizations, or SFRs, for >1 -2cm stones. Multivariable analysis revealed significantly increased odd of having an ED visit and being stone-free for all LP stones ≤ 2 cm and ≤ 1 cm treated with URS (Table).

CONCLUSIONS: In Michigan, SWL is the favored treatment modality for LP stones ≤ 2 cm. Over 15% of surgeons used one modality exclusively. URS provided better SFRs but with a 4-fold increase in ED visits and hospitalization for stones ≤ 1 cm but no difference for >1 -2cm stones. Our findings demonstrate the need for quality efforts to address treatment selection and improve outcomes.

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Figure 1. Practice and surgeon-level variation rate of performing URS or SWL for LP stones ≤ 2 cm to determine which modality was favored in the Michigan Urological Surgery Improvement Collaborative.



SWL – shockwave lithotripsy, URS – ureteroscopy, LP – lower pole

Table 1: Multivariable model comparing odds of treatment efficacy and emergency department visits for patients with LP stones treated with SWL versus URS in the Michigan Urological Surgery Improvement Collaborative.

		Adjusted Odds Ratio	95% Confidence Interval	P-Value	Interaction Test
Efficacy (Stone-free)					
LP stones ≤ 2 cm	- SWL vs URS	0.462	0.331 – 0.646	<i><0.0001</i>	
LP stones ≤ 1 cm vs $>1 - 2$ cm					0.106
	≤ 1 cm				
	- SWL vs URS	0.407	0.288 – 0.575	<i><0.0001</i>	
	$>1 - 2$ cm				
	- SWL vs URS	0.601	0.361 – 1.002	0.0511	
Post-procedural ED visit					
LP stones ≤ 2 cm	- SWL vs URS	0.405	0.242 – 0.677	<i>0.0006</i>	
LP stones ≤ 1 cm vs $>1 - 2$ cm					<i>0.0065</i>
	≤ 1 cm				
	- SWL vs URS	0.339	0.199 – 0.576	<i><0.0001</i>	
	$>1 - 2$ cm				
	- SWL vs URS	1.036	0.449 – 2.392	0.9342	

LP – lower pole, SWL – shockwave lithotripsy, URS – ureteroscopy