CUA 2023 Annual Meeting Abstracts – Poster Session 1: Endourology, BPH (Part 1)

Saturday, June 24, 2023 • 16:10–17:40

Cite as: *Can Urol Assoc J* 2023;17(6Suppl2):S34-47. http://dx.doi.org/10.5489/cuaj.8409

MP 1.1

Readability of patient resources on nephrolithiasis from AUA, CUA, and EAU

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Introduction: Patient engagement is essential in nephrolithiasis to navigate complex choices among interventions and preventative measures. Urologists often provide patients with patient information materials (PIMs) published by major urological organizations such as the CUA, AUA, and EAU. The readability of CUA PIMs has been previously assessed for general urological conditions; however, a comparative assessment of major urology association PIMs for different facets of kidney stone disease is not yet available. We undertook this comparative readability analysis to predict comprehension based on reading ability and to provide a resource for clinicians and patients.

Methods: We located CUA, AUA, and EAU PIMs on four topics related to nephrolithiasis; general information, dietary information, and surgical and medical management. We then performed a readability analysis of each PIM using three major scoring systems: SMOG, Gunning Fog, and FKGL. Average readability levels for each topic PIM were then calculated for each organization and compared.

Results: Readability for CUA PIMs ranged 9.5–11.6 (grade 10–12). This was similar to EAU PIMs at 9.2–11.2 (grade 9–11). AUA resources were more easily readable, with averages scores from 7.5–10.1, corresponding to grade 8–10. For the topic 'medical management' the AUA PIM did have a higher readability score at 10.1 compared to both CUA (9.5) and EAU (9.2) (Table 1). CUA had resources only in English and French, while EAU had resources in 20 different languages, including; Dutch, Greek, Portuguese, and Italian. AUA resources had nine different languages, including; Spanish, Hindi, Arabic, Punjabi, and Vietnamese (only English was scored in our analysis).

MP 1.1. Table 1. Grade level readability score for kidney stone-specific patient information materials from major urological organizations

PIM type	Organization	SMOG	Gunning Fog	FKGL	Mean grade score ± SD
General stone information	CUA	9.9	13.7	11.3	11.6±1.9
	AUA	6.4	9.4	6.8	7.5±1.6
	EAU	9.9	13.3	10.4	11.2±1.8
Dietary management of kidney stones	CUA	10.0	13.8	10.4	11.4±2.0
	AUA	9.3	10.2	7.2	8.9±1.5
	EAU	9.0	12.6	9.5	10.4±2.0
Medical management of kidney stones	CUA	8.4	11.2	8.9	9.5±1.5
	AUA	8.9	12.2	9.1	10.1±1.9
	EAU	8.2	11.2	8.1	9.2±1.8
Surgical management of kidney stones	CUA	8.5	11.5	8.6	9.5±1.7
	AUA	7.7	10.4	7.9	8.6±1.5
	EAU	9.4	12.8	9.8	10.6±1.9

Conclusions: Both CUA and EAU kidney stone PIMs do not meet the standard of 6–8th grade reading level for patients recommended by NIH and AMA. AUA resources only meet this recommendation for some of their PIMs. Without additional guidance, patients may either have an incomplete understanding of resources or may seek out additional unsourced resources from the internet. We invite physicians to assess readability and availability of PIMs from our analysis and curate the resources they provide for patients accordingly.

MP 1.2

The impact of kidney stone disease on quality of life in patients with metabolic disorders

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Introduction: Kidney stone disease (KSD) is associated with substantial morbidity and economic costs. Patients suspected of kidney stones due to metabolic diseases have a higher risk of recurrence and often require an in-depth metabolic evaluation through a multidisciplinary approach and preventive treatments for their KSD. We aim to evaluate the impact of KSD on stone-specific health-related quality of life (HRQOL) in patients with hyperparathyroidism (HPT), renal tubular acidosis (RTA), malabsorptive disease (MalA), and medullary sponge kidney (MSK).

Methods: The Wisconsin Stone Quality of Life Questionnaire (WISQOL) was used to evaluate HRQOL in 2438 patients with a history of KSD from 14 institutions in North America. Baseline characteristics and medical history were collected from patients while stone status was confirmed through radiological imaging. HRQOL scores for each subpopulation of metabolic disease (HPT, RTA, MalA, MSK) were compared to patients with KSD but without metabolic diseases using the Wilcoxon rank sum test.

Results: A total of 2438 patients with KSD and medical history of either HPT (n=57), RTA (n=27), MalA (n=74), or MSK (n=48) were included. HRQOL was significantly lower in patients with RTA (p=0.01), MalA (p=0.01), and MSK (p=0.01) compared to patients without metabolic diseases. Patients with HPT had similar HRQOL compared to non-HPT patients (p=0.894); however, within our multivariable linear regression model, only MSK was found to be an independent negative predictor of worse HRQOL (β=-9.0, CI -16.7 to -1.3) points (p<0.05).

Conclusions: Among patients with KSD, those with MSK appear to be associated with a decreased stone-specific quality of life. Although other metabolic conditions also reduced stone-specific HRQOL, this could be related to a number of other factors, such as increased stone events or the need for medications. Clinicians should be aware of the importance of identifying these patients earlier, as they would benefit from prompt treatment and prevention management.

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MP 1.3

Evaluating the acceptability of the French version of the patient decision aid for the surgical management of lower urinary tract symptoms secondary to benign prostatic hyperplasia

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Introduction: The surgical options available to treat benign prostatic hyperplasia (BPH) are increasing at a rapid rate. Ensuring a shared decision-making approach becomes more challenging as patients and urologists are exposed to a significant amount of information. Recently, we developed the first online, CUA-endorsed surgical BPH decision aid that includes all guideline-approved surgical modalities. The aim of this study was to assess the acceptability of the French version (FRv) of the decision aid among patients who underwent BPH surgery and urologists who perform BPH surgery.

Methods: The International Patient Decision Aids Standards were used to develop a PtDA that includes the following interventions: monopolar transurethral resection of the prostate (TURP), bipolar TURP, GreenLight photovaporization, endoscopic enucleation of the prostate, Rezum, Urolift, Aquablation, open retropubic prostatectomy, and robotic simple prostatectomy. Ten urologists who perform BPH surgery and 21 patients with a history of BPH surgery were recruited. Alpha-testing was performed using a validated acceptability scoring system and compared to the English version (ENv) of the PtDA.

Results: In both versions of the decision aid (FRv/ENv), most urologists and patients agreed that the language used was easy to follow (urologistsFRv/Env=78.4%/91.9%, patientsFRv/Env=90.5%/100%), and that the outcomes reported were correct (urologistsFRv/Env=71.4%/81.8%) and well-explained (patientsFRv/Env=90.4%/89.5%). Most patients found the decision aid would have been helpful during their consultation (FRv=87.5%, ENv=89.5%) and all of them would recommend the decision aid for future patients. Compared to urologists, a higher proportion of patients (FRv/ENv) indicated that the decision aid was appropriate in terms of length (urologistsFRv/Env=46.4%/63.6%, PatientsFRv/Env=90.4%/84.2%) and that the amount of information provided was adequate (urologistsFRv/Env=53.6%/63.6%, patientsFRv/Env=57.1%/84.2%). Meanwhile, a higher proportion of urologists perceived the decision aid to be too detailed (urologistsFRv/Env=39.3%/36.4%, patientsFRv/Env=19.0%/0%) and more time-consuming (urologistsFRv/Env=53.6%/36.4%, patientsFRv/Env=4.76%/21.0%). Based on feedback from urologists in the FRv, the lack of illustrations, the large amount of information, and the time required to use the decision aid in the clinical setting have been identified as barriers to the use of a decision aid.; however, 50% and 72.7% of urologists anticipated using the French and English version of the decision aid, respectively, while the others remained neutral (Tables 1, 2).

Conclusions: While the French version of the decision aid was found to be acceptable among urologists and patients, it underperformed compared to the ENv among urologists due to its large amount of information. In the future, the FRv will be revised, with the main objective of making it more concise to facilitate its integration into clinical practice.

Acknowledgements: The authors would like to thank the Canadian Urological Association for endorsing the development of this online PtDA. They would also like to thank the clinicians and patients for participating in this study, as well as Ian Langleben and Stella Kim Nguyen for carrying out the programming and designing of the online tool.

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MP 1.3. Table 1. Detailed description of quantitative clinician alpha-testing results specific to each section of French version of the decision aid compared to the English version

	Questions		Small to moderate prostate volumes (<80 ml)	Moderate to large prostate volumes (80–150 ml)	Large prostate volumes (>150 ml)
			French version		English version
			N (%)		N (%)
1	The amount of information provided was:	Much less than wanted	-		-
		A little less than wanted	2 (7.14 %)		-
		About right	15 (53.6 %)		7 (63.6%)
		A little more than wanted	5 (17.9 %)		2 (18.2%)
		Much more than wanted	6 (21.4 %)		2 (18.2%)
2	The length of the PtDA was:	Too short	-		-
		Just right	13(46.4 %)		7 (63.6%)
		Too long	15 (53.6 %)		4 (36.4%)
3	The language used was easy to follow:	Strongly disagree	-		
		Disagree	3 (10.7 %)		1 (9.09%)
		Neutral	3 (10.7 %)		
		Agree	11 (39.2 %)		6 (54.5%)
		Strongly agree	11 (39.2 %)		4 (36.4%)
4	I agree with the outcomes reported:	Strongly disagree	-		-
		Disagree	3 (10.7 %)		-
		Neutral	5 (17.9 %)		2 (18.2%)
		Agree	9 (32.1 %)		6 (54.5%)
		Strongly agree	11 (39.3 %)		3 (27.3%)
	Section for all prostate volumes				
5	I believe the PtDA would be a useful tool when counseling a new patient with BPH:	Strongly disagree	-		-
		Disagree	1 (10 %)		-
		Neutral	2 (20 %)		3 (27.3%)
		Agree	4 (40 %)		5 (45.4%)
		Strongly agree	2 (20 %)		3 (27.3%)
6	I anticipate using this PtDA in my practice once it is complete:	Strongly disagree	-		-
		Disagree	-		-
		Neutral	4 (40%)		3 (27.3%)
		Agree	1 (10 %)		5 (45.4%)
		Strongly agree	4 (40 %)		3 (27.3%)
7	I am satisfied with the overall quality of this PtDA:	Strongly disagree	-		-
		Disagree	-		-
		Neutral	3 (33.3 %)		3 (27.3%)
		Agree	1 (11.1%)		6 (54.5%)
		Strongly agree	5 (55.6 %)		2 (18.2%)

MP 1.3. Table 2. Detailed description of quantitative patient alpha-testing results specific to each section of French version of the decision aid compared to the English version

Questions			Small to moderate prostate volumes (30-80 ml) (n=11)		Moderate to large prostate volumes (80–150 ml) (n=5)		Large prostate volumes (>150 ml) (n=3)	
			French version n (%)	English version n (%)	French version n (%)	English version n (%)	French version n (%)	English version n (%)
1	The amount of information provided was:	Much less than wanted	–	-	–	-	–	-
		A little less than wanted	1 (25%)	-	4 (26.7%)	2 (40.0%)	–	1 (33.3%)
		About right	3 (75%)	11 (100%)	9 (60%)	3 (60.0%)	–	2 (66.7%)
		A little more than wanted	–	-	2 (13.3%)	-	2 (100%)	-
		Much more than wanted	–	-	–	-	–	-
2	The length of the PtDA was:	Too short	–	-	1 (6.70%)	-	–	-
		Just right	3 (75%)	9 (81.8%)	14 (93.3%)	5 (100%)	2 (100%)	1 (33.3%)
		Too long	1 (25%)	2 (18.2%)	–	-	–	2 (66.7%)
3	The language used was easy to follow:	Strongly disagree	–	-	–	-	–	-
		Disagree	–	-	–	-	–	-
		Neutral	1 (25%)	-	1 (6.70%)	-	–	-
		Agree	2 (50%)	3 (27.3%)	3 (20%)	1 (20%)	–	2 (66.7%)
		Strongly agree	1 (25%)	8 (72.7%)	11 (73.3%)	4 (80%)	2 (100%)	1 (33.3%)
4	The outcomes reported were easy to follow:	Strongly disagree	–	-	1 (6.7%	-	–	-
		Disagree	–	-	1 (6.7%	-	–	-
		Neutral	–	2 (18.2%)	–	-	–	-
		Agree	2 (50%)	6 (54.5%)	5 (33.3%)	3 (60.0%)	1 (50%)	2 (66.7%)
		Strongly agree	2 (50%)	3 (27.7%)	8 (53.3%)	2 (40.0%)	1 (50%)	1 (33.3%)
5	This decision aid would have been helpful during my treatment decision-making:	Strongly disagree	–	-	–	-	–	-
		Disagree	–	-	–	-	–	-
		Neutral	–	1 (9.09%)	3 (20%)	-	–	1 (33.3%)
		Agree	1(25%)	4 (36.4%)	7 (46.7%)	4 (80.0%)	1 (50%)	2 (66.7%)
		Strongly agree	3 (75%)	6 (54.5%)	5 (33.3%)	1 (20.0%)	1 (50%)	-
6	I would recommend this decision aid for new patients with BPH:	Strongly disagree	–	-	–	-	–	-
		Disagree	–	-	–	-	–	-
		Neutral	–	-	–	-	–	-
		Agree	1(25%)	3 (27.7%)	3 (20%)	2 (40.0%)	–	-
		Strongly agree	3 (75%)	8 (72.7%)	12 (80%)	3 (60.0%)	2 (100%)	3 (100%)
7	I am satisfied with the overall quality of this PtDA:	Strongly disagree	–	-	–	-	–	-
		Disagree	–	-	–	-	–	-
		Neutral	–	-	1 (6.7%)	-	–	-
		Agree	2 (50%)	3 (27.7%)	6 (40%)	2 (40.0%)	1 (50%)	2 (66.7%)
		Strongly agree	2 (50%)	8 (72.7%)	8 (53.3%)	3 (60.0%)	1 (50%)	1 (33.3%)

MP 1.4

Shockwave lithotripsy of upper urinary tract calculi: Outcomes of a multicenter, international, prospective, observational study

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Introduction: Although shockwave lithotripsy (SWL) is endorsed by clinical practice guidelines as a treatment option for renal and ureteric calculi, its usage has been decreasing. Multiple factors can influence SWL results. This study aims to evaluate the real-world success rates and predictors of treatment success in patients undergoing SWL worldwide.

Methods: Adult patients undergoing SWL as primary treatment for renal or ureteric calculi at four institutions (Canada, Vancouver and London; Denmark, Vejle; Oman, Muscat) using the same lithotripter (Storz SLX-F2) were prospectively enrolled. Overall success rate after a maximum of two SWL sessions was defined by stone-free status or presence of renal fragments with total size smaller than 4 mm without necessity for further treatment. Postoperative imaging was performed with computerized tomography (CT), plain film X-ray, and/or ultrasound. Descriptive statistics were used to analyze patient characteristics, and predictors of treatment success were assessed using binomial logistic regression.

Results: Between May 2021 and February 2022, 353 patients underwent SWL with mean age of 48.4 years, median body mass index (BMI) 27.0Kg/m^2; 70.2% were male. Overall success rate was 49.7% after one SWL session and 58.8% after two sessions. Younger age (p=0.04), lower BMI (p=0.012), male sex (p=0.001), smaller stone size (p=0.044), and lower stone attenuation on CT (p=0.011) were predictors of treatment success in multivariable analysis. Patients with stones <7 mm and <1000 HU had a 82.9% success rate. Serious complications (Clavien-Dindo grade 3 or higher) were 3.3%.

Conclusions: Unlike many prior series, this study was performed in a real-world setting with broader inclusion criteria. While ureteroscopy is always touted to be better than SWL, studies of real-world outcomes using CT show similar results.1,2 Stone and patient factors appear to be the most important in predicting SWL treatment success, highlighting the importance of proper patient selection.

Acknowledgements: This study was partially funded by Storz Medical AG.

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MP 1.5

Thulium fiber laser lithotripsy and stone composition: Dust or bust?

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Introduction: After demonstrating efficacious in vitro efficacy, the thulium fiber laser (TFL) has been released to market with promising initial clinical results. At our institution, reduced TFL lithotripsy was observed during certain stone cases. The purpose of this study was to identify whether stone composition affects TFL lithotripsy.

Methods: We conducted a retrospective review of all patients that had undergone TFL laser lithotripsy (SOLTIVETM SuperPulsed Laser System, Olympus America) at our institution between July 2020 and January 2022. Only patients with stone analysis data were included. Demographic and stone-specific data were collected and correlated with subjective (surgeon rating) and objective measures of lithotripsy efficacy.

Results: A total of 91 patients were included in the study. Mean age was 59.8 years, mean BMI was 27.5, and mean stone volume was 438 mm3 (Table 1). Stone composition correlated with patient age (p=0.008), mean stone density (p<0.001), mean stone volume treated per laser time (p=0.033), and surgeon rating of TFL efficacy (p<0.001). Lower surgeon rating of TFL efficacy correlated with higher stone density (p=0.011), greater number of laser pulses used (p=0.035), and stone composition (p=0.035). Stones composed of CaPO4 + struvite had lower surgeon rating of TFL efficacy, while pure uric acid and mixed CaOx + uric acid stones had the best rating. Stone location correlated with total energy (J) used (p=0.036) but not with any other TFL efficacy measures or stone composition (α=0.05).

Conclusions: Stone composition, particularly CaPO4 + struvite, seems to be associated with reduced TFL lithotripsy. A limitation of our retrospective study is that we were unable to differentiate between brushite and apatite stones. The relationship between stone composition and TFL lithotripsy requires further evaluation prospectively, while basic science research is required to understand the biophysical mechanisms of reduced lithotripsy.

MP 1.5. Table 1. Study variables stratified by primary chemical components[A] that featured in urinary stones subjected to thulium fiber laser (TFL) lithotripsy

Variable	Full sample	COM	COD	Mixed or undifferentiated CaOx	Uric acid	CaPO4 + struvite	p[B]
Case count (%)	91 (100%)	39 (43.3%)	4 (4.4%)	13 (14.4%)	6 (6.7%)	18 (20%)	
Mean age (years, SD)	59.8 (17.5)	62.5 (18.2)	61.9 (17.4)	56.3 (14.5)	72.5 (12.3)	51.4 (14.5)	**p=0.008**
Sex (count, %) Female Male	 40 (44%) 51 (56%)	 14 (35.9%) 25 (64.1%)	 2 (50%) 2 (50%)	 5 (38.5%) 8 (61.5%)	 4 (66.7%) 2 (33.3%)	 11 (61.1%) 7 (38.9%)	p=0.2
Mean BMI (SD)	27.5 (6.4)	28.3 (6.2)	25.5 (3.4)	24.3 (4.5)	30 (3.2)	28.2 (8.2)	p=0.2
Stone laterality[C] (count, %) Left Right	 51 (57.3%) 38 (42.7%)	 22 (56.4%) 17 (43.6%)	 2 (50%) 2 (50%)	 8 (61.5%) 5 (38.5%)	 4 (80%) 1 (20%)	 9 (52.9%) 8 (47.1%)	p=0.99
Stone locus[C] (count, %) Ureter Kidney	 35 (39.3%) 54 (60.7%)	 17 (43.6%) 22 (56.4%)	 2 (50%) 2 (50%)	 5 (38.5%) 8 (61.5%)	 1 (20%) 4 (80%)	 5 (29.4%) 12 (70.6%)	p=0.3
Mean stone volume (mm^3, SD)	438 (538)	477.9 (487.4)	97.1 (58.2)	585.9 (972.6)	342.1 (291.5)	422.8 (522.5)	p=0.8
Mean stone density (HU, SD)	792.2 (288.6)	918.9 (257)	626.3 (67.7)	782.9 (232.2)	393.8 (35.3)	816.8 (303.7)	**p<0.001**
Mean TFL energy/stone volume (J/mm^3, SD)[D]	27.3 (25.4)	25.6 (27.9)	29.3 (4.9)	28.7 (26.3)	28.4 (17.9)	30.9 (29.2)	p=0.9
Mean TFL laser time (sec, SD)[E]	500 (510.9)	545.5 (473.3)	132.8 (69.7)	587.3 (784.4)	451.1 (367.8)	373.3 (390.6)	p=0.1
Mean stone volume/TFL laser time (mm^3/s, SD)[D]	1.49 (2.91)	1.91 (4)	0.78 (0.06)	1.05 (0.65)	0.66 (0.41)	1.72 (2.46)	**p=0.033**
Surgeon TFL efficacy rating (count, %) Normal Lower	 62 (68.1%) 29 (31.9%)	 32 (82.1%) 7 (17.9%)	 1 (25%) 3 (75%)	 9 (69.2%) 4 (30.8%)	 6 (100%) 0 (0%)	 4 (22.2%) 14 (77.8%)	**p<0.001**

[A]Only the five most prevalent primary chemical components are shown. [B]p-value corresponds to Spearman's correlation between each variable and stone chemical composition. [C]In cases involving bilateral stones, stone laterality and locus were determined according to the largest stone. [D]TFL energy and time were scaled proportionally to total stone size per body side.

MP 1.6

Micro cost-effectiveness analysis of standard vs. mini percutaneous nephrolithotomy: A single Canadian institution's experience

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Introduction: The mini percutaneous nephrolithotomy (mPCNL) technique has been described as a viable alternative to the standard nephrolithotomy (sPCNL) procedure for select stones. Previous studies suggest that mPCNL has comparable stone-free rates with potential decreased complications and hospital stay. Costs associated with both procedures present a challenge to Canadian institutions due to the capital acquisitions of required equipment and ongoing disposables. The objective of this study was to compare the cost-effectiveness of both procedures at our institution.

Methods: A decision tree analytic model was developed to compare costs and outcomes of both procedures. Primary outcomes included assessment of total capital, operative, and hospitalization costs. Cost and outcome of peri- and postoperative parameters were obtained using a retrospective analysis of 20 mPCNL and 84 sPCNL procedures on 1–2.5 cm stones between January 2020 and June 2022, and supplemented with internal hospital expenditure records and literature outcome data. Descriptive statistics and regression models were performed.

Results: The estimated total cost per patient was $7427.05 and $5036.29 for sPCNL and mPCNL, respectively, resulting in cost savings of $2390.76 in favor of mPCNL, with a dominant incremental cost-effectiveness ratio (ICER) due to lower costs associated with complications and length of hospitalization and a comparable stone-free rate. mPCNL had higher capital costs ($95 116.00) compared to sPCNL ($78 517.00), but per-procedure operative costs were lower for mPCNL ($2504.48) compared to sPCNL ($3335.72). Cost-per-case regression of total costs between both procedures intersected at 5.51 cases when accounting for operative and hospitalization costs and at 20 cases when only considering operative costs.

Conclusions: Despite higher upfront costs, mCPNL may represent a valid, cost-effective alternative to sPCNL for select stones due to long-term clinical and economic benefits in Canadian institutions with over 20 cases.

MP 1.7

Innovations in endourological stone surgery: Contemporary practice patterns from a global survey

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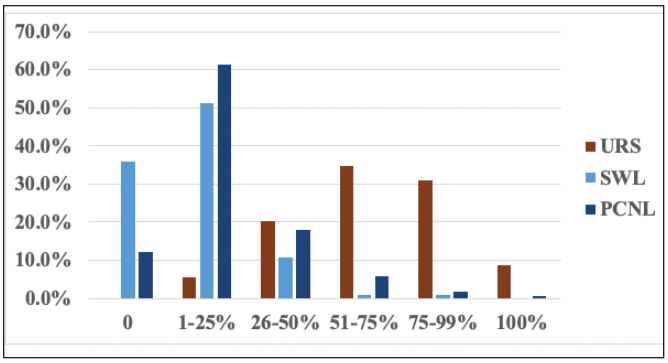
Introduction: The purpose of this study was to evaluate the current availability of technology for urolithiasis treatment and ureteroscopy. Perioperative practice patterns, availability of ureteroscopic technologies, pre- and post-stenting practices, and methods to alleviate stent-related symptoms were assessed via a survey of members of the Endourological Society.

Methods: We distributed a 43-question survey online via the Qualtrics platform to members of the Endourological Society. The survey consisted of questions



MP 1.7. Figure 1. Percentage of URS, SWL, and PCNL used by survey respondents for upper tract calculi.

MP 1.7. Table 1. Answers pertaining to ureteroscopy

	Mean (±SD)
Percentage of primary URS (no prior stenting)	70% (±25.5)
Percentage of delayed URS (after prestenting)	30% (±25.1)
Time between prestenting and URS	21 days (±16.5)
Percentage of urologists performing URS as day-case surgery	62%
Mean length of hospital stay	1.7 days (±1.1d)
Treatment preference in case of emergency (obstructing ureteral stone)	
Primary URS	60.2%
Stenting with delayed URS	37.5%
Nephrostomy tube and subsequent treatment	2.5%
Percentage of urologists that use a kidney scoring system	21.9%
Percentage of urologists who prescribe alpha-blockers before URS	31.8%
Percentage of urologists who give preoperative antibiotics before URS	93.8%
Percentage of urologists who give antibiotics postoperatively after URS (> 24 hours)	45.7%
Duration of postoperative antibiotic treatment	5 days (± 2.3d)

MP 1.7. Table 2. Answers pertaining to postoperative ureteroscopy

Postoperative URS	
Preferred drainage after uncomplicated URS	
Tubeless	28.6%
Mono-J ureteral stent	5.6%
Double-J ureteral stent	58.7%
Ureteral catheter as external drainage	7.1%
Time interval between uncomplicated URS and stent removal	8 days (±5.6)
Time interval between complicated URS and stent removal	21 days (±14.8)
Extraction of ureteral stents	
Cystoscopically by urologist	62.1%
Self-extraction by patient (string extraction)	19.7%
String extraction by urologist	12.9%
Cystoscopically by nurse or other trained staff	4.5%
Via magnet by provider	0.8%

pertaining to the following topics: general (6), equipment (17), preoperative ureteroscopy (URS; 9), intraoperative URS (2), and postoperative URS (9).
Results: A total of 191 urologists responded to the survey; 51% of urologists were fellowship-trained and dedicated an average of 58% of their practice to stone management. In terms of procedures, most urologists performed ureteroscopy most commonly (68%), followed by percutaneous nephrolithotomy (23%) and shockwave lithotripsy (11%) (Figure 1). Most (90%) respondent urologists purchased a new ureteroscope within the last five years (16% single-use scopes, 53% reusable, and 31% purchased both). Just over half (57%) of the respondents stated that they would be interested in a ureteroscope that can sense intrarenal pressure, with an additional 30% stating they would be interested depending on the cost. Eighty percent of responders purchased a new laser within the last five years, and 59% changed their lasering technique due to the new laser. Seventy percent are performing primary ureteroscopy for obstructing stones, and 30% prefer pre-stenting patients for subsequent URS (on average after 21 days). Fifty-nine percent of respondents insert a ureteral stent after URS, which is removed, on average, after eight days in uncomplicated cases and 21 days after complicated URS. Most urologists give analgesics, alpha-blockers, and anticholinergics for stent-related symptoms and less than 10% prescribe opioids (Tables 1, 2).
Conclusions: Our survey revealed urologists' eagerness for the early adoption of novel technologies and adherence to conservative practice patterns focused on patient safety.

MP 1.8

Healthcare utilization by patients with primary hyperparathyroidism – what is the effect of kidney stone formation?

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Introduction: Urolithiasis is a common complication of primary hyperparathyroidism (PHPT). Parathyroidectomy has been shown to decrease the rate of recurrent kidney stone formation. The purpose of this study was to evaluate healthcare resource utilization before and after parathyroidectomy for patients with PHPT and identify predictors of increased healthcare utilization.
Methods: We analyzed a retrospective cohort of patients who had a parathyroidectomy for PHPT in Nova Scotia from 2013–2018. Data from five years before parathyroidectomy to three years after were included. Outcomes included emergency department (ED) visits and the total number of urological interventions (shockwave lithotripsy, ureteroscopy, percutaneous nephrolithotomy, cystoscopy, and stent removal). Random-effects Poisson regression models were used to model the primary outcomes, the number of ED visits, and composite endpoints of the total number of urological interventions while adjusting for prespecified characteristics. Outcomes were reported using incidence rate ratios (IRR) with 95% confidence intervals (CI). Univariate and multivariate models were performed. A two-sided p-value of <0.05 was the threshold for statistical significance.
Results: Forty-eight patients (62% female) with a mean age of 60±11 years were identified. ED visits were 0.42 per year prior to parathyroidectomy and 0.20 per year after surgery in a multivariate analysis adjusting for sex and diabetes (IRR 0.48, CI 0.25–0.91, p=0.024). There was no statistical difference between male and female ED visits (p=0.6719); conversely, diabetes was statistically significant (IRR 0.083, CI 0.030–0.23, p<0.0001). There was no difference in the rate of ED visits for non-urological reasons after parathyroidectomy (p=0.0749). The incidence of urological intervention for stones was 1.24 per year prior to parathyroidectomy and 0.53 per year after (IRR 0.42, CI 0.26–0.68, p=0.0005).
Conclusions: Healthcare resource utilization, in terms of ED visits and urological intervention, was greater in patients with PHPT and significantly decreased after parathyroidectomy. Sex showed no statistical difference in predicting healthcare utilization, while non-urological ED visits remained the same after surgery. Expedited parathyroidectomy for patients with PHPT may decrease urological interventions and ED visits, resulting in a decrease in healthcare utilization.
Acknowledgements: The authors would like to thank Dr. Timothy Wallace.

MP 1.9

Outcomes and cost assessment of outpatient percutaneous nephrolithotomy: A retrospective, contemporaneous analysis to standard percutaneous nephrolithotomy

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Introduction: Standard percutaneous nephrolithotomy (sPCNL) is the gold-standard surgical treatment for large renal calculi. Postoperatively, the patient is admitted with an indwelling nephrostomy tube, which is typically removed within 1–2 days; however, nephrostomy tubes are associated with increased hospital stay, higher postoperative pain, and increased hospital costs. Recently, outpatient tubeless PCNL (oPCNL) has been described where patients are discharged on the same day as surgery with the use of a stent rather than a nephrostomy tube. We hypothesize that oPCNL will result in lower healthcare costs when compared to sPCNL with similar outcomes.

Methods: A retrospective chart review was conducted of patients who underwent PCNL at the Rockyview General Hospital from June 2019 to December 2021 by three fellowship-trained endourologists. The sPCNL cohort used fluoroscopic percutaneous access with nephrostomy tube placement and postoperative nephrostogram. The oPCNL cohort used endoscopic-guided access with stent placement, Gelfoam and Surgiflo for hemostasis, and postoperative same-day CT scan. The sPCNL and oPCNL cohorts were retrospectively compared based on age, BMI, and stone burden (Table 1). Statistical significance was determined by Student's t-tests.

Results: A total of 300 patients were treated: 147 in the oPCNL cohort and 153 in the sPCNL cohort. The oPCNL technique at a single center shows a reduction in patient cost (Table 2). Mean overall treatment cost per oPCNL patient was $5165.7 compared to $6324.0 per sPCNL patient (p=0.04). Mean hospital stay time was 19.8 hours for oPCNL compared to 58.8 hours for sPCNL (p≤0.001). There was no significant difference in postoperative complications or hospital readmissions.

Conclusions: This study demonstrates that oPCNL resulted in significantly decreased healthcare cost due to shorter hospital stays without increased rates of complications, ancillary procedures, and urinary tract infections, as well as less postoperative stone burden.

MP 1.9. Table 1. Demographic and preoperative information on all patients included in the study

Variable	Outpatient PCNL	Standard PCNL	p-value
Number of Patients	147	153	-
Number of Males	83 (56%)	80 (52%)	0.47
Mean Age	57.3	57.5	0.92
Mean BMI	31.4	28.4	0.12
Total Bilateral PCNL	10	22	0.03*
Total Unilateral PCNL and Contralateral Ureteroscopy	18	8	0.03*
Mean Sum Diameter of All Stones (mm)	33.0	30.1	0.12
Mean Guy's Score	2.4	2.3	0.27

Standard PCNL patients were match-paired with outpatient PCNL patients. *Statistically significant.

MP 1.9. Table 2. Perioperative data

Variable	Outpatient PCNL	Standard PCNL	p-value
Mean Operative Time (min)	68.7	42.9	<0.001*
Mean Fluoroscopy Time (sec)	32.6	216.4	<0.001*
Nephrostomy Tract Access Location:	157 total	175 total	-
Lower Pole	18 (11%)	143 (82%)	<0.001*
Interpolar	16 (10%)	11 (6%)	0.21
Upper Pole	120 (76%)	14 (8%)	<0.001*
Renal Pelvis	0 (0%)	2 (1%)	0.18
Unknown	3 (2%)	5 (3%)	0.56
Mean Number of Punctures	1.1	1.0	0.39
Mean Number of Dilated Tracts	1.0	1.0	0.62
Mean Hospital Stay (hours)	19.8	58.8	<0.001*
Mean Hospital Stay (Post-Op days)	0.45	2.2	<0.001*
Total SIRS	6	4	0.50
Total UTI	11	6	0.18
Total Postoperative Complications	4	5	0.78
Total Emergency Department Visits	38	21	0.01*
Total Hospital Readmission	19	15	0.40
Mean Operative Cost/patient (CAD)	$2,381.5	$1,674.9	<0.001*
Mean Total Hospital Stay/patient (CAD)	$1,269.9	$3,689.5	<0.001*
Mean Cost of Readmission (CAD)	$7,607.4	$6,242.8	0.62
Mean Overall Treatment Cost per Patient (CAD)	$5,165.7	$6,324.0	0.04*
Postoperative Imaging:			
CT	100%	13%	-
XR	0	47%	-
US	0	14%	-
Postoperative Stone Free Status:			
Stone Free	59 (38%)	39 (22%)	0.003*
1-4 mm Stone	47 (30%)	45 (26%)	0.43
Total†	106 (68%)	84 (48%)	<0.001*
>4 mm Stone	51 (32%)	64 (37%)	0.39
Unknown	0	27 (15%)	<0.001*

*Statistically significant. †Clinically insignificant stone.

MP 1.10

The role of claudin sequence variants on calcium-based kidney stone formation

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Introduction: Claudins (CLDNs) are a large family of transmembrane proteins that are found in the tight junctions of epithelial cells. They interact with each other to form various kinds of ion-specific pores and barriers that regulate the paracellular exchange of calcium and other ions in the nephrons. Certain CLDN variants, such as those in CLDN16, have been well-documented as a monogenic cause of kidney stones, while other CLDN variants have been associated with kidney stones in genome-wide association studies. The Gupta laboratory recruited a cohort of children and adults with recurrent kidney stones and used exome sequencing to determine if they had variants in any claudin genes. We identified 13 rare or novel variants in CLDN genes in the cohort.

Methods: We are doing functional studies on these variants by expressing them in kidney cells in vitro and then using confocal imaging to determine the localization of the CLDNs, dextran assays to determine the paracellular permeability of the cells to small molecules and trans-epithelial electrical resistance assays to determine the ionic conductance of the cell layers.

Results: Preliminary data of one of the CLDN8 variants (CLDN8 A94V) shows disrupted localization to the tight junctions that results in a leakier tight junction compared to the wildtype protein. Another variant (CLDN8 M97T) shows normal localization but still results in a leakier tight junction compared to the wildtype protein. By contrast, two CLDN4 variants and one CLDN17 variant all show no difference in protein localization or cell layer permeability compared to wildtype.

Conclusions: CLDN8 impedes the paracellular flow of calcium in the distal nephron. Variants in CLDN8 could be a polygenic risk factor for the development of kidney stones. This study will aid in the prediction of kidney stone recurrence based on genotype, especially in younger patients who lack the typical environmental risk factors, and hopefully pave the way for more targeted interventions.

Acknowledgements: This work was made possible by a grant from the Kidney Foundation and support from the RI-MUHC.

MP 1.11

Efficacy of holmium laser enucleation of the prostate (HoLEP) in the management of acute and chronic urinary retention: A retrospective study

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Introduction: The objective of our study was to evaluate the efficacy and durability of holmium laser enucleation of the prostate (HoLEP) for the management of acute urinary retention (AUR), neurogenic chronic urinary retention (NCUR), and non-neurogenic chronic urinary retention (NNCUR) and to determine outcomes compared to patients without preoperative urinary retention.

Methods: We conducted a retrospective study of prospectively collected data from individuals who underwent HoLEP at our institution from October 2017 to July 2022. Patient demographics and outcome measures were recorded, including indications for the procedure, median urinary volume drained, or median postvoid residual urine volume (PVR) before catheterization or HoLEP. Chronic

urinary retention (CUR) was defined as PVR of 300 mL in males able to void and initial catheter drainage >1000 mL in males unable to void, in the absence of pain. NCUR and NNCUR were differentiated based on the presence of any significant illness or injury with a neurological impact on the bladder. All patients had postoperative followup visits at one, three, six, and 12 months. Our evaluation included the International Prostate Symptom Score (IPSS), quality-of-life (QoL) assessment, maximum urinary flow rate (Qmax), PVR, and catheter-free status. **Results:** Three hundred sixty-eight males who underwent HoLEP were included in our study. The urinary retention (UR) group consisted of 189 patients (70 AUR, 42 NCUR, and 77 NNCUR), and the lower urinary tract symptoms (LUTS) group was comprised of 179 individuals. There were no statistically significant differences between the NCUR and NNCUR subgroups regarding demographics and outcomes. At 12-month followup, the AUR group had a higher catheter-free rate than the CUR group (p=0.04); other outcome variables were comparable between the two cohorts. The UR group had a significantly lower QoL score at one month (p=0.01) and a significantly lower IPSS score at one and 12 months (p=0.034 and 0.018, respectively) compared to the LUTS cohort. During all followup visits, the UR group had a significantly higher PVR than the LUTS cohort. The successful first trial of void (TOV) rates for the UR and LUTS groups were 81% and 83.2%, respectively. At 12 months postoperative, the catheter-free rates for the UR and LUTS cohorts were 96.3% and 99.4%, respectively (Table 1). **Conclusions:** HoLEP is an effective and durable treatment for urinary retention, with a high catheter-free rate and comparable outcomes when performed to manage LUTS.

MP 1.11. Table 1. Patient demographics, perioperative and postoperative outcomes of HoLEP in urinary retention

Parameters		NCUR	NNCUR	p value	AUR	CUR	p value	UR	LUTS	p
Number of participants, n		42	77	–	70	119	–	189	179	–
Age, years, median (range)		76.5 (60–92)	75 (55–95)	0.104	75 (59–96)	75 (55–95)	0.924	75 (55–96)	74 (55–92)	0.218
Initial urinary volume drained or PVR, mL, median (range)		628 (300–2600)	638 (370–2300)	0.09	900 (700–1100)	657 (300–2600)	0.000	800 (300–2600)	134 (0–285)	0.000
Preoperative catheter duration, months, median (range)		4 (1–12)	4 (1–72)	0.108	4 (1–120)	4 (1–72)	0.496	4 (1–120)	–	–
Preoperative prostate size by TRUS, cc, median (range)		102 (42–250)	113 (60–203)	0.333	120 (60–325)	110 (42–250)	0.298	113 (42–325)	106 (50–273)	0.048
Enucleated tissue weight, g, median (range)		80 (50–242)	76 (25–204)	0.619	100 (20–303)	78 (25–242)	0.014	85 (20–303)	72 (18–238)	0.009
Enucleation time, min, median (range)		55 (28–125)	60 (24–165)	0.464	70 (25–184)	60 (24–165)	0.149	61 (24–184)	60 (19–200)	0.149
Enucleation efficiency, g/min, median (range)		1.35 (.3–2.4)	1.5 (0.5–2.5)	0.681	1.41 (0.48–3)	1.31 (0.3–2.5)	0.076	1.35 (0.3–3)	1.23 (0.38–3.93)	0.226
Length of hospital stay, days, median (range)		0.5 (0.25–2)	0.5 (0.25–8)	0.80	0.5 (0.25–4)	0.5 (0.25–3)	0.073	0.5 (0.25–4)	0.5 (0.25–5)	0.24
Postoperative catheterization time, days, median (range)		0.5 (0.5–8)	0.5 (0.25–8)	0.617	0.5 (.25–12)	0.5 (0.25–8)	0.669	0.5 (0.25–12)	0.5 (.25–14)	0.224
Successful first TOV n (%)		34 (81)	63 (81.8)	0.546	56 (80)	97 (81.5)	0.433	153 (81)	149 (83.2)	0.567
1 month postoperative	IPSS, median (range)	5 (0–18)	5 (0–22)	0.151	8 (0–25)	5 (0–22)	0.292	6 (0–25)	8 (0–24)	0.034
	QoL, median (range)	1 (0–6)	1 (0–6)	0.377	1 (0–5)	1 (0–6)	0.476	1 (0–6)	2 (0–6)	0.01
	Qmax, mL/s, median (range)	20.7 (5.2–65)	22.9 (10.2–73.3)	0.326	21.5 (4.3–47.1)	23 (3–54)	0.421	21.5 (4–73)	23.5 (5–64)	0.997
	PVR, mL, median (range)	53 (0–164)	65 (0–530)	0.964	65 (0–594)	60 (0–530)	0.804	60 (0–594)	38 (0–265)	0.000
3 months postoperative	IPSS, median (range)	3 (0–23)	4 (0–21)	0.175	8 (0–21)	4 (0–23)	0.126	5 (0–23)	6 (0–27)	0.307
	QoL, median (range)	1 (0–6)	1 (0–6)	0.891	1.5 (0–6)	1 (0–6)	0.096	1 (0–6)	1 (0–6)	0.296
	Qmax, mL/s, median (range)	25.6 (3–60)	20.4 (8.6–48.7)	0.10	22 (8–42)	24 (3–60)	0.667	21.6 (3–60)	20 (8–59)	0.457
	PVR, mL, median (range)	43 (0–273)	63 (0–480)	0.061	45 (0–1000)	59 (0–480)	0.267	61 (0–1000)	37 (0–225)	0.02
6 months postoperative	IPSS, median (range)	3 (0–16)	4 (0–17)	0.187	8 (0–21)	3.5 (3–17)	0.53	4 (0–27)	4 (0–30)	0.108
	QoL, median (range)	0.5 (0–3)	1 (0–3)	0.412	1.5 (0–6)	1 (0–3)	0.187	1 (0–6)	1 (0–6)	0.753
	Qmax, mL/s, median (range)	22.5 (13–49)	25.6 (2.8–76)	0.935	22 (8–42)	23.6 (2.8–76)	0.60	23 (3–76)	25 (1–69)	0.282
	PVR, mL, median (range)	54 (0–287)	66 (0–480)	0.247	45 (0–1000)	61 (10–480)	0.267	60 (0–1000)	27 (0–250)	0.000
12 months postoperative	IPSS, median (range)	2.5 (0–16)	3 (0–20)	0.84	3 (0–17)	3 (0–20)	0.297	3 (0–20)	4 (0–21)	0.018
	QoL, median (range)	0.5 (0–3)	0 (0–3)	0.899	1 (0–4)	0 (0–4)	0.292	0 (0–4)	1 (0–6)	0.077
	Qmax, mL/s, median (range)	22.5 (5–65)	24 (6–64)	0.418	27 (8–45)	23.8 (5–65)	0.316	24.7 (5–65)	24 (6–51)	0.63
	PVR, mL, median (range)	69 (0–790)	72.5 (0–445)	0.21 5	39 (0–185)	60 (0–790)	0.144	50 (0–790)	41 (0–286)	0.012
	Catheter-free, n (%)	39 (92.9)	73 (94.8)	0.476	70 (100)	112 (94.1)	0.04	182 (96.3)	178 (99.4)	0.087

MP 1.12

Impact of frailty on postoperative outcomes of percutaneous nephrolithotomy

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Introduction: Frailty has been associated with poor patient outcomes and increased hospital utilization; however, there is a lack of quantitative evidence on the impact of frailty after percutaneous nephrolithotomy (PCNL).

Methods: Adult patients who underwent PCNL from 2015–2019 were identified from the National Surgical Quality Improvement Program database using current procedural terminology codes. Patient frailty was assessed using the modified five-item frailty (mFI-5) index, which is assessed from 0–5 for the cumulative presence of five comorbidities (not frail [NF] 0, slightly frail [SF] 1, and frail [F]>2). The primary outcome was 30-day postoperative complications. The Secondary outcome was hospital utilization: total hospital length of stay, reoperation, and unplanned readmission. Odds ratios (OR) with 95% confidence intervals (CI) and p-values (α=0.05) were estimated using multivariate regression controlling for baseline variables that were significantly different between groups.

Results: From a total of 265 PCNL patients included for analysis, 58.7% (n=123) were not frail, 31.3% (n=83) were slightly frail, and 22.2% (n=59) were frail. After controlling for covariates, among all PCNL patients, frailty was not associated with 30-day postoperative complications (F: OR 0.98, 95% CI 0.13–7.24, p=0.980; SF: OR: 2.02, 95% CI 0.64–6.45, p=0.227). Compared to non-frail patients, increased frailty was not associated with increased healthcare utilization in terms reoperation (F: OR 0.49, 95% CI 0.04–5.69, p<0.575; SF: OR 0.99, 95% CI 0.27–3.92, p=0.904) or unplanned readmission (F: OR 1.40, 95% CI 0.05–33.2, p<0.840; SF: OR 0.61, 95% CI 0.10–2.81, p=0.543). Compared to non-frail patients, patients that were slightly frail were more likely to stay longer in hospital (F: 4.0±3.7 vs. SF: 4.3±5.7 vs. NF: 2.4±2.3, p=0.001).

Conclusions: Patient frailty is associated with longer hospital stay but not 30-day postoperative complications, readmission, or reoperation after PCNL.

UP 1.1

Does type of anesthesia matter for ureteroscopy for urolithiasis? A propensity score-matched analysis of a national registry

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Introduction: Ureteroscopy (URS) is a bread-and-butter urological procedure performed under neuraxial or general anesthesia (GA). Spinal anesthesia may be preferred for comorbid patients and optimizing patient turnover. Limited data exists regarding postoperative outcomes relating to anesthetic modality for ureteroscopy.

Methods: Adult patients that underwent URS for urolithiasis from 2015–2019 were identified from the National Surgical Quality Improvement Program database using International Classification of Diseases (ICD)-10 and ICD-9 codes and current procedural terminology codes. The awake group, which included patients who underwent epidural, local, regional, spinal, and monitored anesthesia care/intravenous sedation was matched with patients that received general anesthesia with a 1:1 nearest-neighbor propensity score-matching protocol. Primary outcomes were operative time and hospital length of stay. Secondary outcomes were 30-day postoperative complications and reoperation. Univariate between-group analysis was performed using ANOVA tests for continuous variables and Fisher's exact tests for categorical variables.

Results: A total of 781 patients were identified, with 31 individuals (54.7±18.7 years, 74.2% male) that underwent awake (A) URS for nephrolithiasis. The location of the calculus (kidney vs. ureter) was evenly distributed between groups (A: 41.9% vs. 48.8%, p=0.571). After matching, 62 patients were included in the final analysis. Patients who underwent neuraxial URS had a significantly shorter operative time (A: 30.5±23.9 min vs. GA: 55.3±39.8 min, p=0.004) but did not differ in hospital length of stay (A: 0.9±1.3 days vs. GA: 0.5±1.5 days, p=0.317). Rates of 30-day complications (A: 3.1% vs. GA: 3.1%, p=1.000) and reoperation (A: 6.5% vs. GA: 3.1%, p=1.000) were similarly low in both groups.

Conclusions: Awake URS and URS with GA are both associated with low rates of postoperative complications. There are no significant differences in hospital length of stay or complications between anesthetic choices; however, neuraxial URS was associated with shorter operative time. It is unclear whether shorter operative time was related to patients with lower stone burden or favorable stone location receiving neuraxial anesthetic. Further prospective trials with higher patient numbers are needed to compare the two anesthetic modalities further.

UP 1.2

Evaluating the role of postoperative ultrasound in extracorporeal shockwave lithotripsy patients

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Introduction: Extracorporeal shockwave lithotripsy (SWL) is a common treatment method for renal and ureteric stones. A postoperative KUB X-ray is frequently performed to evaluate treatment success and residual stone burden. Some urologists also order a KUB ultrasound (US) to rule out silent obstruction. The purpose of this study was to evaluate the role of the postop US and to determine its usefulness in altering clinical course.

Methods: This is a retrospective review of patients who underwent SWL at the Kipnes Urology Centre. Data was obtained from the electronic health record of patients treated from September 2021 to March 2022. Five surgeons were responsible for treatment and followup. The primary variables reviewed were: patient age and gender, stone size, location, and Hounsfield units, KUB X-ray results, and the use of post-SWL US, their results, and whether this impacted postop management. Stone-free status, determined by KUB X-ray and US, was also measured.

Results: A total of 251 patients were treated and reviewed. Of these, 101/250 (40.4%) received postop US. Of the 150 that had no US, 72 (48%) were deemed stone-free, 12 (8%) were on surveillance for non-obstructing fragments, and 54 (36%) underwent re-treatment with URS or ESWL based on KUB. Five patients in the no-US group presented to ER and had a CT, but all were within a week of ESWL and had known stone burden based on KUB X-ray. No patients in the no-US group re-presented to the ER with AKI or sepsis due to obstructing stones between the date of intervention and chart review. Within in US group, 86/101 (85%) were reported to be stone-free. Of the 15 US that detected stones, all 15 patients had visible or likely visible stones on KUB. Eight of these patients underwent more frequent surveillance, four underwent further treatment (three URS, one ESWL), two patients passed stones following their US and became stone-free, and one was lost to followup. None of the patients in the US group were found to have silent obstruction.

Conclusions: Based on this review, a postop US for uncomplicated SWL patients appears to yield minimal clinical benefit. Silent obstruction was not identified in this study population. Further prospective study may help determine a subset of patients that could be routinely studied or perhaps better studied with non-contrast CT.

Acknowledgements: The authors would like to thank Jamey Olson-Marrese.

UP 1.3

A contemporary review of the metabolic urinary stone risk factors in patients with medullary sponge kidney disease

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Introduction: Medullary sponge kidney (MSK) is a relatively common congenital disorder involving ectatic malformation of the terminal renal collecting ducts. Nephrocalcinosis and stone formation commonly occur in affected individuals. Historical series suggested up to one-half of patients had associated hypercalciuria further increasing patients' risk of stone development. Our aim, using a contemporary metabolic stone clinic database, was to assess the occurrence of metabolic abnormalities in patients with anatomical features suggestive of MSK.

Methods: We retrospectively reviewed our institutional metabolic stone clinic database, which includes serum and 24-hour urine collections, from 2005–2019. Patients diagnosed with MSK and prior episodes of symptomatic urolithiasis were selected. None of the patients at initial evaluation had been started on medical prophylaxis.

Results: Twenty-three patients were included. The mean age was 44±12 and 87% (20) were females. The median 24-hour urine collection volume was 1650 cc (1122–2065) and below 2 L/day for 15 patients (65%). Documented 24-hour metabolic abnormalities included hypercalciuria (21%), hypocitraturia (13%),

hyperoxaluria (17%), and hyperuricemia (4%). The median urinary calcium, citrate, oxalate, and urate were 5.3 (3.5–7.5) mmol/d, 2.3 (1.8–4), 242 (171–344) µmol/d, and 3 (2.4–3.5) mmol/d respectively. Twelve patients (52%) had at least one alteration in the 24-hour urine collection. Detectable serum anomalies were hyperuricemia (17%) and low vitamin D (21%).

Conclusions: In this series, more than half of patients (52%) had at least one metabolic alteration in the 24-hour urine collection. The incidence of hypercalciuria, however, was far less than in prior reports. These findings suggest stone formation in patients with MSK is multifactorial, and should not simply be attributed to the anatomical anomaly. Identifying metabolic abnormalities may permit tailored dietary and/or medical prophylaxis of modifiable risk factors.

UP 1.4

Aquablation® therapy in men with BPH on anti-thrombotics: Clinical outcomes and safety assessment

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Introduction: We analyzed the impact of perioperative anti-thrombotic (AT) use on the bleeding and functional outcomes of Aquablation.

Methods: A total of 116 patients with moderate to severe lower urinary tract symptoms who underwent Aquablation as part of the WATER prospective trial were included in the study. Patients were assigned to two groups based on bleeding risk, deemed high if taking AT medications perioperatively (including low-dose AT medications during surgery and/or high-dose AT medications, which were resumed within one week postoperatively) or deemed low if not taking AT medications perioperatively. Methods of achieving intraoperative hemostasis consisted of either no-cautery balloon tamponade or cautery. Primary endpoints were based on intraoperative and postoperative bleeding, including hematuria rates and changes in hemoglobin (Hb). Secondary endpoints included functional outcomes, such as the rates of adverse events.

Results: Forty-one men were identified taking regular AT medications both in the perioperative and postoperative period (Table 1). This cohort was compared to 75 men with no use of AT or anticoagulation. Rates of alpha-blocker or 5-alpha reductase inhibitors were similar in both groups. Preoperative hemoglobin levels were comparable between both groups. Postoperative hemoglobin change from baseline (drop of 1.8±1.5g/dl among the AT group vs. 1.8±1.7 g/dl among the AT-naive group) did not differ between both groups (p=0.896). In total, four (9.8%) men in the AT group and four (5.3%) patients in the AT-naive group experienced a Clavien-Dindo grade 1 complication (p=0.451) in the three-month postoperative period (Table 2). Eight (19.5%) patients in the AT group and 11 (14.7%) patients in the AT-naive group experienced a Clavien-Dindo grade 2 complication (p=0.601), none of which is associated with bleeding in either group. De novo ejaculatory dysfunction was seen in four (9.8%) patients in the AT group and four (5.3%) patients in the AT-naive group (p=0.451). No men in either group demonstrated de novo erectile dysfunction. One patient (2.4%) in the AT group required a blood transfusion, while no patients in the AT-naive group required blood products (p=0.353). There were no significant differences in IPSS score, IPSS QoL score, Qmax, PVR, or PSA between both groups during the five-year followup period (Table 3).

Conclusions: Aquablation demonstrates comparable postoperative bleeding outcomes and other adverse effects among a smaller prostate cohort (30–80 ml) for men with BPH who are on AT therapy to those on none. Aquablation yielded robust functional outcomes improvement up to five years after surgery.

UP 1.4. Table 1. Perioperative characteristics in men undergoing Aquablation therapy with perioperative use of anti-thrombotic therapy vs. no anti-thrombotic therapy

Characteristic	Anti-thrombotic use n=41	No anti-thrombotic use n=75	p
Age (years)			0.0191
n	41	75	
Mean ± SD	68.7±7.2	65.4±7.2	
Median	67.7	64.5	
Min, max	53, 81	52, 80	
Body mass index			0.3054
n	41	75	
Mean ± SD	29.0±4.5	28.1±3.9	
Median	28.7	27.9	
Min, max	21, 40	19, 41	
Prostate size TRUS (mL)			0.8782
n	41	75	
Mean ± SD	53.8±17.0	54.3±16.1	
Median	52.2	55.0	
Min, max	31, 80	25, 80	
Obstructive median lobe	61.0% (25/41)	64.0% (48/75)	0.8412
Prostate-specific antigen (ng/mL)			0.1623
n	41	75	
Mean ± SD	3.1±3.1	4.0 ±3.0	
Median	2.1	3.3	
Min, max	0, 15	0, 13	
IPSS score			0.5024
n	41	75	
Mean ± SD	23.4±6.4	22.6±5.8	
Median	25.0	23.0	
Min, max	12, 35	12, 35	
IPSS QoL			0.3419
n	41	75	
Mean ± SD	4.9±1.1	4.7±1.0	
Median	5.0	5.0	
Min, max	2, 6	2, 6	
Sexually active (MSHQ-EjD)	73.2% (30/41)	82.7% (62/75)	0.2400
MSHQ-EjD			0.2218
n	30	62	
Mean ± SD	7.5±4.0	8.5±3.5	
Median	8.0	9.0	
Min, max	1, 15	1, 15	
IIEF-5			0.0492
n	29	62	
Mean ± SD	14.1±7.4	17.3±6.9	
Median	13.0	19.0	
Min, max	3, 25	1, 25	
Anti-thrombotic use			
Anticoagulant	4.9% (2/41)	0	0.1229
Anti-platelet/NSAID, including high-dose Aspirin	36.6% (15/41)	0	<0.0001
Aspirin	58.5% (24/41)	0	<0.0001
Any of above	100.0% (41/41)	0	<0.0001

UP 1.4. Table 1 (cont'd). Perioperative characteristics in men undergoing Aquablation therapy with perioperative use of anti-thrombotic therapy vs. no anti-thrombotic therapy

Characteristic	Anti-thrombotic use n=41	No anti-thrombotic use n=75	p
BPH medication use			
Alpha-blocker	61.0% (25/41)	60.0% (45/75)	1.0000
5-ARI	31.7% (13/41)	14.7% (11/75)	0.0532
Alpha-blocker/5-ARI	29.3% (12/41)	13.3% (10/75)	0.0480
Any of above	63.4% (26/41)	61.3% (46/75)	0.8444
Hb (g/dL) at baseline			0.1567
n	41	75	
Mean (g/dL) ± SD	14.6±1.5	15.0±1.4	
Median (g/dL)	14.9	15.1	
Min, max (g/dL)	9, 17	9, 18	
Hb (g/dL) at discharge			0.4348
n	34	72	
Mean (g/dL) (±SD)	12.8±1.8	13.1±1.6	
Median (g/dL)	13.2	13.5	
Min, max (g/dL)	9, 16	8, 16	
Hb change (g/dL) at discharge			0.8961
n	34	72	
Mean (g/dL) ± SD	-1.8±1.5	-1.8± 1.7	
Median (g/dL)	-1.5	-1.4	
Min, max (g/dL)	-6, 0	-7, 1	
Length of stay (days)			0.4859
n	41	75	
Median (days)	1.0	1.0	
Catheter duration (days)			0.0450
n	39	74	
Median (days)	1.3	1.0	

UP 1.4. Table 2. 3-month summary of postoperative bleeding rates and adverse events in men undergoing Aquablation therapy with perioperative use of anti-thrombotic therapy vs. no anti-thrombotic therapy

Endpoint	Anti-thrombotic use n=41	No anti-thrombotic use n=75	p
Bleeding requiring transfusion	2.4% (1/41)	0	0.353
Ejaculatory dysfunction rate	9.8% (4/41)	5.3% (4/75)	0.451
Erectile dysfunction rate	0	0	1.000
Clavien-Dindo grade 1	9.8% (4/41)	5.3% (4/75)	0.451
Clavien-Dindo grade 2	19.5% (8/41)	14.7% (11/75)	0.601
Bladder pain/spasm	4.9% (2/41)	2.7% (2/75)	
Non-urologic	4.9% (2/41)	1.3% (1/75)	
Pain	0	1.3% (1/75)	
Urinary tract infection	9.8% (4/41)	5.3% (4/75)	
Urinary urgency/frequency/difficulty/leakage	0	4.0% (3/75)	
Clavien-Dindo grade 3a	2.4% (1/41)	4.0% (3/75)	1.000
Bleeding	2.4% (1/41)	0	
Strictures or adhesions	0	4.0% (3/75)	
Clavien-Dindo grade 3b	0	4.0% (3/75)	0.551
Bleeding	0	2.7% (2/75)	
Urinary retention	0	1.3% (1/75)	
Clavien-Dindo grade 4	0	1.3% (1/75)	1.000
Non-urological	0	1.3% (1/75)	

UP 1.4. Table 3. Postoperative functional outcomes on a 5-year followup period in men undergoing Aquablation therapy with perioperative use of anti-thrombotic therapy vs. no anti-thrombotic therapy

Outcome	Anti-thrombotic use n=41	No anti-thrombotic use n =75	p
IPSS score change at 60 months			0.8014
n	17	41	
Mean ± SD	-15.4±6.5	-14.9±6.7	
Median	-17.0	-15.0	
Min, max	-24, -2	-31, 3	
Qmax change at 60 months			0.5387
n	12	29	
Mean ± SD	7.4±6.8	9.3±10.0	
Median	6.3	7.8	
Min, max	-2, 22	-7, 36	
PVR change at 60 months			0.5805
n	12	29	
Mean ± SD	-73.6±57.4	-56.9±96.4	
Median	-69.0	-65.0	
Min, max	-162, 3	-260, 244	
PSA change at 60 months			0.5101
n	14	31	
Mean ± SD	-1.5±4.5	-0.7±2.9	
Median	-0.1	-0.4	
Min, Max	-14, 4	-8, 9	
MSHQ-EjD change at 60 months			0.4635
n	9	23	
Mean ± SD	0.2±7.2	-1.7±6.3	
Median	0.0	-1.0	
Min, max	-14, 14	-13, 13	
IIEF-5 change at 60 months			0.7142
n	9	23	
Mean ± SD	-4.1±6.8	-3.0±7.5	
Median	-3.0	-2.0	
Min, max	-19, 3	-22, 8	

Repeated measures ANOVA.

UP 1.5

Is the time between upper urinary tract drainage and ureteroscopy in patients with sepsis due to obstructive urolithiasis important for the prevention of urosepsis? A systematic review

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Introduction: Infected obstructive urolithiasis is initially managed either by a ureteric stent (US) or percutaneous nephrostomy (PN) and antibiotics. Eventually, a ureteroscopy (URS) is required for definitive treatment. We evaluated the impact of the timing of ureteroscopy and the risk of urosepsis.

Methods: We performed a literature review of documents published in French or English between January 1, 2000, and May 10, 2022. We looked for systematic reviews, clinical guidelines, randomized controlled trials, and comparative observational studies. Targeted preventive interventions included: timing between drainage and URS, duration and modalities of preoperative antibiotics, and preoperative strategies for clinical and microbiological surveillance. Furthermore, we conducted a local retrospective data collection to identify patient characteristics,

infection rates, and preventive interventions. Semi-directive interviews were performed with local urologists and from other academic centers.

Results: One randomized study and seven observational studies were selected. No study regarding PN placement evaluated the impact of duration on the risk of postoperative infection; however, time intervals were analyzed regarding US. One study estimated the mean duration before URS at 78 days. Another study showed a higher infection rate, with a duration of US longer than 30 days (26% vs. 4%). Two studies found no difference in the risk of postoperative fever after US placement, between early (seven days or less) vs. delayed URS; however, another study observed lower febrile infection rates (6%) if US was implanted in 21 days or less. Also, urosepsis rates were lower in groups where duration was inferior to 21 days or 30 days or less. Three studies found no association between the result of the preoperative urine culture and the risk of postoperative urosepsis but two studies found an association with cultures collected intraoperatively. Over three years in CHU de Québec, 364 patients were treated by a two-step approach and the average delay before URS was 35 days. Sixty-seven of the 102 patients treated in 2020–2021 had a suspected urinary tract infection. The mean time between the last urine culture and the URS was 15.1 days. Two postoperative acute pyelonephritis were reported. For academic center urologists, URS should be done within two weeks after drainage, and should not exceed four weeks. Also, urine culture should be sampled before the intervention but the time interval varies widely (Figures 1–3, Table 1–3).

Conclusions: Available data in the literature are heterogeneous and of low methodological quality. Nevertheless, they suggest that a shorter duration of US may have a beneficial effect on postoperative urosepsis rate.

Acknowledgements: This study was financed by the operating budget of the UETMIS (Unité d'évaluation des technologies et des modes d'intervention en santé).

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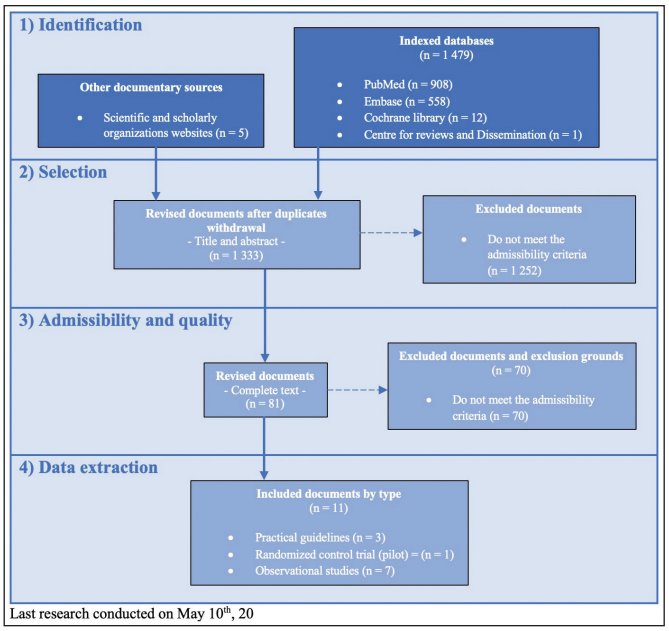
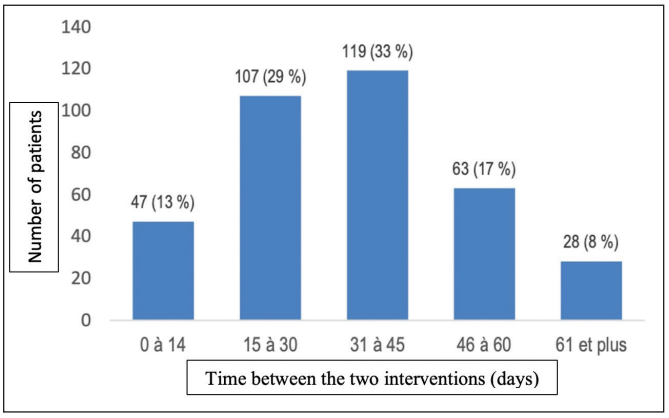
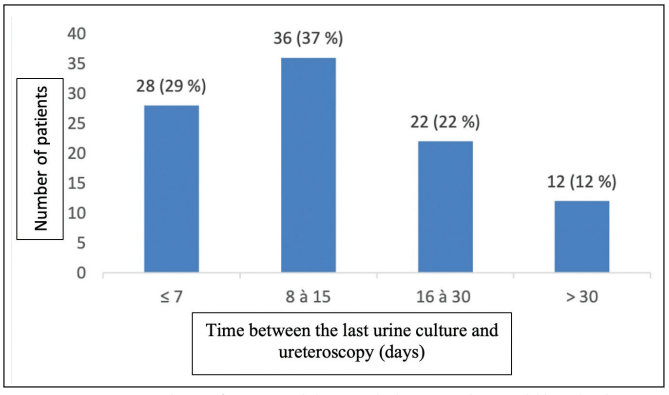


UP 1.5. Figure 1. Schematization of document selection on post-ureteroscopy urosepsis prevention strategies in patients with prior ureteric stent or percutaneous nephrostomy placement.



UP 1.5. Figure 2. Distribution of time intervals in days between ureteric stent placement and ureteroscopy for the management of urolithiasis at the CHU de Quebec between April 1, 2018, and May 31, 2021 (n=364 patients).



UP 1.5. Figure 3. Distribution of time intervals between the last urine culture available in the electronic file and the ureteroscopy for the management of urolithiasis at the CHU de Quebec between April 1, 2018, and May 31, 2021 (n=102 patients).

UP 1.5. Table 1. Results of original studies on urosepsis rates and postoperative infectious complications in function of the time between ureteric stent placement and ureteroscopy

Author, year	Study design	Comparison groups in function of the duration of ureteric stent placement	n	Mean duration of ureteric stent placement (days)	Postoperative infectious complications, n (%)		
					Fever < 38.5 °C (Clavien-Dindo 1)	Febrile infection (Clavien-Dindo 2)	Urosepsis
Patients with urosepsis or acute pyelonephritis at diagnosis							
Astroza, 2019	RCT	48–72h after stabilization[1] ≥7 days	12[2] 10[2]	5.4 15.4	1 (8) 0	0 0	NR
Itami, 2021	Retro. obs. study	<21 days **≥21 days**	101[3] 114[3]	NR	NR	6 (6)[4] 24 (21)[4]	1 (1) 8 (7)
Shi, 2017	Retro. obs. study	7days >7 days	63 79	8.0 13.6	25 (40) 27 (34)	4 (6)[5] 5(6)[5]	NR
Patients with or without urinary tract infection at diagnosis							
Nevo, 2017	Retro. obs. study	≤ 30 days **> 30 days**	601	Med: 62.0	NR	NR	NR (1) NR (6)

[1]Stabilization implied no fever, tachycardia or tachypnea. [2]Spontaneous lithiasis expulsion: 1 in the early intervention group and 3 in the delayed intervention group. [3]Duration of ureteric stent placement was not documented for 7 patients. [4]Febrile urinary tract infection is defined by a fever ≥38.0 with pyuria or bacteriemia within 7 days after surgery. [5]Febrile urinary tract infection is defined by a fever > 38.5 °C

UP 1.5. Table 2. Results of original studies on the association between the duration of ureteric stent placement and urosepsis onset in univariate and multivariate analyses

Author, year	Study design	n	n urosepesis ± n urosepsis (-)	Duration of ureteric stent placement		Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
				Urospesis (+)	Urosepsis (-)				
Patients with or without urinary tract infection at diagnosis									
Wood, 2020	Prosp. obs. study	281 URS	16/265	Mean (SD): 70 (38)	Mean (SD): 79 (52)	1.0 (0.90–1.05)[1]	0.49	–	–
Nevo, 2017	Retro. obs. study	601 patients	28/573	Med. (range) 70 (49–127)	Med. (range) 62 (37–83)	1.1 (1.04–1.16)[1]	0.001	1.1 (1.04–1.16)[2]	0.01

[1]Odds ratios for a raise of 7 days of the duration of ureteric stent placement. [2]Adjusted in function of gender, Charlson comorbidity index, and the concurrence of sepsis at the ureteric stent placement.

UP 1.5. Table 3. Results from univariate and multivariate analyses of the original studies on the association between microbiological cultures and the risk of post-URS urosepsis in patients with ureteric stent

Author, year	Study design	n (n urosepsis (+)/n urosepsis (-))	Type of urine culture	Urine culture (+), n (%)		Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
				Urosepsis (+)	Urosepsis (-)				
Patients with or without urinary tract infection at diagnosis									
Wood, 2020	Prosp. obs. study	281 URS (16/265)	Preop. urine sample Bladder sample intraop[1] US - bladder end US - kidney end Renal urine (end of surgery)	9 (56) 11 (69) 11 (69) 10 (63) 8 (50)	81 (31) 36 (14) 99 (37) 101 (38) 32 (12)	2.9 (1.1–8.2) 14.0 (4.6–42.8) 3.7 (1.2–11.0) 2.7 (1.0–7.7) 7.3 (2.5–20.9)	0.04 <0.0001 0.01 0.06 0.0004	NR 11.2 (3.6–35.0)[2] NR NR NR	NS <0.0001 NS NS NS
Nevo, 2019	Retro. obs. study	1011 (70/940)	Pre-URS urine US + urolithiasis (intraop.)	34 (47) 53 (74)	182 (19) 161 (17)	3.7 (2.3–6.1) 13.5 (7.8–23.3)	<0.001 <0.001	0.96 (0.5–1.8)[3] 10.3 (5.6–19.2)[3]	0.91 <0.001
Nevo, 2017	Retro. obs. study	509 (25/484)	Pre-URS urine (2 weeks) US intraop	14 (56) 21 (84)	77 (16) 83 (17)	5.2 (2.3–11.8) 25.6 (8.5–76.9)	0.003 <0.001	1.08 (0.4–3.1)[4] 17.9 (5.8–55.5)[4]	0.89 <0.001

[1]Before removal of the bladder catheter. [2]Adjusted for gender, steroid use, chronic kidney disease and results from microbiological cultures (preoperative urine sample, US). [3]Adjusted for gender, Charlson comorbidity index, type of surgery, and results from pre-URS urine cultures or from foreign materials (US, urolithiasis). [4]Adjusted for gender, Charlson comorbidity index, and results from pre-URS urine cultures or from US.

UP 1.6

An analysis of flexible ureteroscope damage from a high-volume endourology center

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Introduction: The objective of this study was to analyze cases where flexible ureteroscopic damage occurred and identify factors that may predict scope breakage.

Methods: A retrospective review was conducted of all digital flexible ureteroscopes (KARL STORZ Flex XC) that failed a postoperative leak test between January 2021 and September 2021 at a high-volume endourology academic center. Intraoperative data, including last performed procedure, surgical indication, and laser usage, as well as patient factors, such as stone location and body mass index (BMI), were collected. These variables were then analyzed to identify risk factors for intraoperative flexible ureteroscopy damage.

Results: A total of 24 cases were flagged for a failed leak testing and requiring repair. The majority of cases were for stone therapy (88%) and 86% of these were for intra-renal stones. The average BMI among patients was 27.1 (22.1–37.6). Average scope use before requiring repair was 11.8. The holmium laser was used in 50% or 12% of the cases. Forty-eight percent of procedures had scopes used for endoscopic-assisted PCNL and 52% for primary flexible ureteroscopy (Figure 1). The most common primary damage was a leak and the most common secondary damage was to the working channel.

Conclusions: Flexible ureteroscopes at our high-volume endourology center require repairs after approximately 12 uses. Our case mix does not show a specific procedure that is more at risk of causing damage.

UP 1.7

Predictive factors of enucleation and morcellation times of holmium laser enucleation of the prostate: Analysis of over 1500 cases

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Introduction: Since its introduction in 1990, holmium laser enucleation of the prostate (HoLEP) has rapidly gained acceptance as an excellent surgical option for benign prostatic hyperplasia (BPH) due to its durable outcomes, low re-operation rates, and low risk of bleeding, while being effective over a wide range of prostate sizes; however, long operative times are a barrier to implementation and adoption of HoLEP procedure.[1] Additionally, the COVID-19 pandemic has caused limited access to operative time and increased surgical waiting lists. Thus, resource allocation and scheduling optimization are crucial in order to deliver high-quality care to the most patients possible. Therefore, the present study aimed to evaluate the predictors influencing operative time of HoLEP in over 1500 cases.

Methods: Between March 1998 and May 2016, a prospectively maintained HoLEP database was reviewed. All procedures were performed by a single expert surgeon using either one-lobe, two-lobe, or three-lobe technique. Patients with incomplete data were excluded from the cohort. A univariate analysis was performed on all preoperative variables to quantify the potential predictors for both enucleation and morcellation times; only significant variables were included in the final multivariate analyses to identify the independent predictors

Results: After excluding patients with missing data, 1278 patients were included in the final analysis, with a mean age of 70.3±7.9 years and a mean preoperative prostate size of 92±50.9 mL. A longer enucleation time was associated with age >70 years, previous prostate surgery, duration of preoperative Foley catheter, preoperative prostate size >90 mL, and early learning curve of the surgeon in the univariate analysis (all $p<0.05$). In multivariate regression analysis, only preoperative prostate size >90 mL and early learning curve were independent predictors for enucleation time. Likewise, a preoperative prostate size >90 mL and early learning curve of the surgeon were associated with a longer morcellation time (all $p<0.05$) in the multivariate regression analysis.

Conclusions: This large series of HoLEP procedures suggests that large prostate size and the early learning curve of the surgeon were independent predictors for increased enucleation and morcellation times of HoLEP. This prediction model is valuable for surgeons to schedule appropriate surgical time for the use of the operating room.

Reference:

1. Ibrahim A, Alharbi M, Elhilali MM, et al. 18 years of holmium laser enucleation of the prostate: A single-center experience. *J Urol* 2019;202:795-800. https://doi.org/10.1097/JU.0000000000000280

UP 1.8

Occupational risk factors for nephrolithiasis across Canada: Implications for preventative counselling

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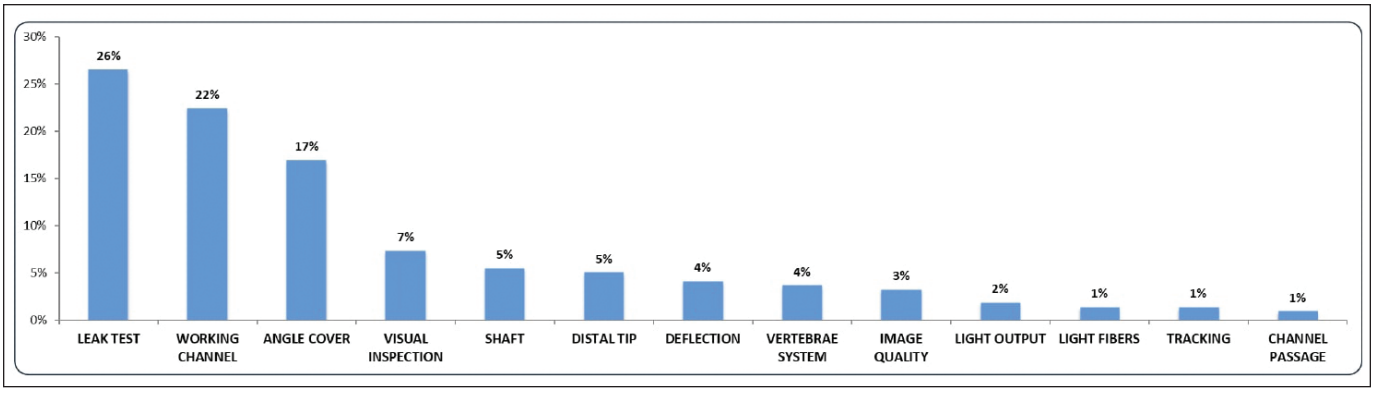
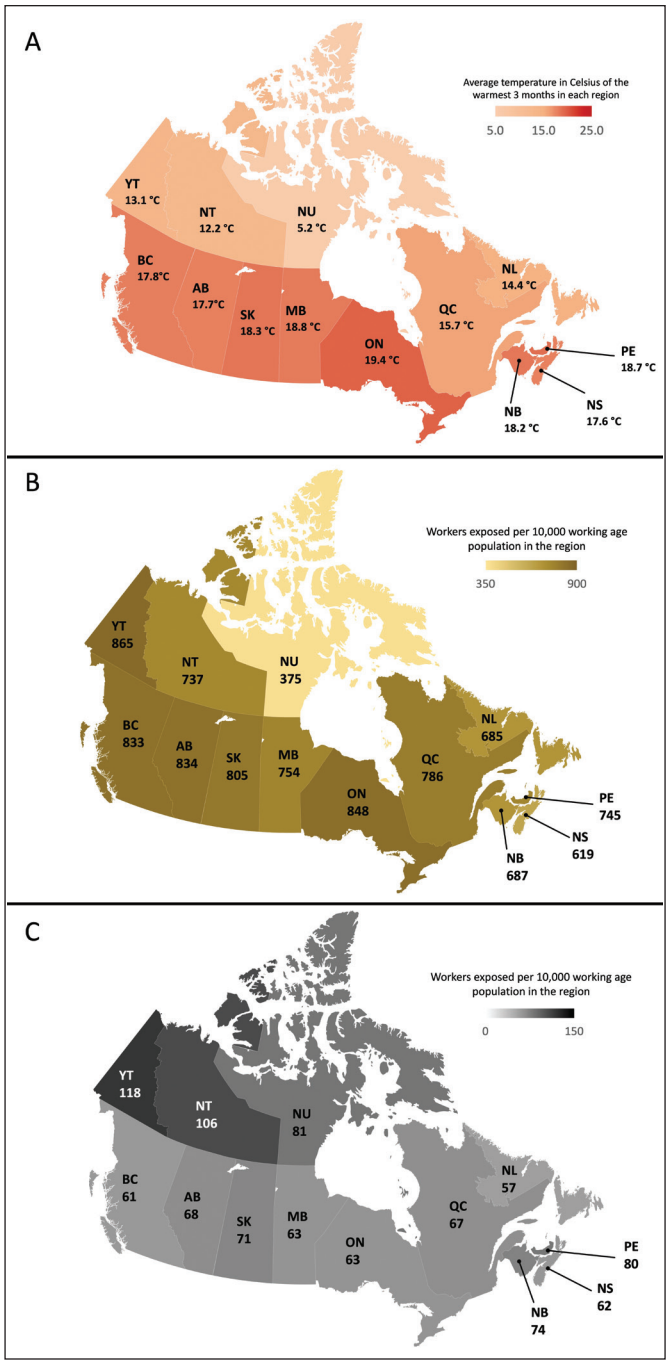
Introduction: Environmental risk factors for nephrolithiasis include higher-temperature climates and occupational exposures to heat. In addition, lesser-known occupational exposures, such as cadmium, lead, and arsenic are associated with nephrolithiasis. We evaluated the distribution of nephrolithiasis risk factors of ambient temperature and these occupational exposures across Canadian provinces/territories. This may help to guide future resource planning and preventative measures.

Methods: Regional monthly mean temperatures in 2021 were obtained from Environment Canada, and the average ambient temperature of the three warmest months in each region was calculated. The number of workers in industries with heat stress, as well as top five industries with cadmium, lead, and arsenic exposure, were mapped across Canadian regions according to Statistics Canada data to create easily interpretable risk maps. Statistical significance was calculated based on 95% confidence interval difference from the null hypothesis.

Results: The highest ambient temperatures were in lower latitude provinces, with Ontario being the warmest region (Figure 1A). Rates of occupational heat exposure were similar among all regions (619–865 per 10 000) except in Nunavut (375 per 10 000) (Figure 1B). Significantly higher rates of occupational exposure to cadmium, lead, and arsenic were captured in Yukon, Northwest



UP 1.6. Figure 1.



UP 1.8. Figure 1.

Territories, and Nunavut, except for Nunavut not being statistically different from Prince Edward Island (Figure 1C).

Conclusions: Occupational exposures to cadmium, lead, and arsenic were higher in Northern Canada. Tailored preventative measures may benefit workers in these industries. While direct causation of stone occurrence from these exposures cannot be measured due to many potential confounders, this also has implications for resource planning, as these regions also suffer from having no urologists permanently stationed among the population. Occupational heat exposure was similar between regions.