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Shared decision making: why do patients choose ureteroscopy?

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Abstract To evaluate patient's characteristics that affects their decision on the management of asymptomatic renal calculi, and to determine the impact of anesthetic on the selection of shockwave lithotripsy (SWL). A survey was distributed to 100 patients in our multi-disciplinary stone clinic. The patients were given a hypothetical scenario of an asymptomatic 8 mm lower pole stone and descriptions for managements options including active surveillance (annual radiography, 40 % chance of growth >10 mm within 4 years, 20 % chance of passage), SWL under conscious sedation (65 % success rate), and URS (90 % success rate, with stent placement for 1 week). Patients were asked what was the most important variable impacting the choice of treatment. Patients preferred SWL (45 %) over URS (32 %) and active surveillance (23 %). Patients with a previous experience with URS were more likely to choose it again ($p = 0.0433$). Decisions were driven primarily by success rate (52 %), followed by risk of complications (29 %), postoperative pain (7 %) and others (12 %). Patients choosing URS had the highest magnitude of history of pain ($p = 0.03$) and were more likely to prioritize success (78 %) and less likely to prioritize surgical risk (13 %) or anticipated pain after surgery (0 %) ($p = 0.01$). Most (85 %) of the patients would rely on the physician's recommendation for the treatment modality. Patients place differing value on risk versus success. As they rely heavily on the physician's recommendation, it is important that their urologist determine whether risk or success is of highest priority for them to facilitate a shared medical decision.

Keywords SWL · URS · Urolithiasis · Patients' preference · Counseling

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Introduction

The estimated lifetime risk of urolithiasis is between 5 and 12 % in Europe and the United States, afflicting 13 % of men and 7 % of women. About half of [1] first-time stone formers will have a recurrence within 5 years. With an estimated total health care spending of approximately $4.5 billion for evaluation, hospitalization, and treatment of nephrolithiasis and 3.1 million lost workdays per year (among the privately insured) [2], the optimization of management for patients with urolithiasis is critical.

No consensus exists regarding the appropriate management of patients with asymptomatic small renal stones.

It is not clear whether patients should be observed or treated surgically, as there is a lack of data distinguishing the patients who are likely to pass the stone spontaneously from those that will ultimately require an intervention [3].

However, there is evidence that patients with lower pole renal stones <10 mm may be treated successfully with shockwave lithotripsy (SWL) (63 %), while those with larger stones (10–20 mm) benefit from percutaneous nephrolithotomy (PNL), since success rates of SWL fall to 23 % with stones of this size [4, 5]. Thus, viable surgical options for patients with small (<10 mm) stones include SWL and ureteroscopy (URS).

Outcomes of surveillance of asymptomatic stones <10 mm include a symptomatic stone event (13–32 %), spontaneous stone passage (13–20 %), stone growth (30–46 %) and the need for surgical intervention (7–26 %) [6]. For stones of such size, options of active surveillance, SWL and URS are often discussed as a part of shared decision-making.

The object of this study is to evaluate the relevant factors effecting patient decision-making regarding the management of a hypothetical 8 mm asymptomatic lower calyceal calculus, in order to help guide a shared medical decision-making approach.

Materials and methods

After institutional review board approval, a survey was distributed to 100 patients in our multi-disciplinary stone clinic. Consecutive patients were approached to participate in the study; 15 % of patients declined the opportunity. Prior to their counseling with the doctor, the patients were given a hypothetical scenario of an asymptomatic 8 mm lower pole stone and descriptions for managements options including active surveillance (annual radiography, 40 % chance of growth >10 mm within 4 years, 20 % chance of spontaneous stone passage), SWL under conscious sedation (65 % success rate) [5], and URS (90 % success rate, with stent placement for 1 week). For surveillance, patients were additionally counseled on the risk of developing pain with stone movement. Success rates for different interventions and chance of stone passage were based on current evidence from the literature regarding stone size, location, and the natural history of small stones [4–7]. Patients were counseled that if they selected observation, stone growth beyond 10 mm would remove the future option of SWL, based on the body of evidence reporting success rates <25 % for stones >10 mm.

The questionnaire was self-administered without assistance prior to the patient meeting the physician on a scheduled clinic visit. The responses to the questionnaire were not modified after the clinic visit with the physician, as such the responses were independent of the doctors counseling or influence.

The survey was similar to our prior study, however we offered SWL under sedation instead of general anesthesia, and also garnered information regarding gender, age and factors influencing decisions that were not captured in the initial study [7].

We characterized SWL as a noninvasive (no scope or stent) outpatient surgery with the patient under conscious sedation (in a "twilight state", still awake during procedure, but given medication to relax and relieve pain. The patient was advised that they would be able to return to work in 2 days. The patient was informed that there was a 1 in 1000 risk of a serious bleed requiring transfusion and 1 in 100 risk of needing an emergent second procedure in the case of "larger stone fragments that had become lodged," (steinstrasse) [5].

URS was described as a minimally invasive outpatient surgery under general anesthesia with an ureteroscope inserted through urethra and up to the ureter, utilizing a laser fiber inside it to fragment the stone followed by a stent insertion for 1 week and removed in the clinic with a 5 min procedure. The overall risk of serious injury to the ureter requiring major surgical repair was cited as 1 in 1000, with a 1 in 100 risk of a minor injury requiring a stent for 2–3 weeks. While 80 % of patients would experience some discomfort from the stent, discomfort would be severe in only 10 % of cases (Joshi et al.) [8].

Patients were asked to rate the following as the most important variable impacting the choice of treatment: success rate, risk of complications, minimizing time out of work or family, cost of the surgery, avoiding general anesthesia, avoiding pain, avoiding a stent, and previous experience of stone episode or surgery. Additional information was gathered about the size of the largest stone they had passed, the worst kidney stone pain they had experienced (using a 1–10 scale) and whether they would rather defer the decision to their physician.

The mean, median and IQR were utilized for descriptive statistics. Statistical analysis was performed using standard computer software with the Chi-square, Median test and Wilcox signed-rank tests with $p < 0.05$ considered statistically significant.

Results

One hundred patients completed the survey. The mean age of survey respondents were 55 ± 14 years; stone histories of our surveyed patients are listed in Table 1. Approximately 86 % of respondents had either a history of passing a stone or had undergone a stone procedure. The average pain score was 8 ± 2.

Patients preferred SWL (45 %) over URS (32 %) and active surveillance (23 %). There were no significant differences in age or gender between these groups Table 2.

Most (85 %) of the patients would rely on the physician's recommendations for the treatment modality.

Table 1 Overall stone history of surveyed patients

Previous stone passage	(57 %)
Average stones passed (*n*)	5 ± 7
Mean size stone	5 ± 7 mm
Previous stenting	(54 %)
Previous SWL	(44 %)
Previous URS	(47 %)
Previous PCNL	(16 %)
No previous stone surgery	(31 %)

SWL, extracorporeal shock wave lithotripsy, *PCNL* percutaneous nephrolithotomy, *URS* ureteroscopy

Patients choosing active surveillance were more likely to rely on the physician's input (100 %) than those choosing URS (75 %) or SWL (84 %) ($p = 0.03$).

The effect of previous stone interventions is listed in Table 2. Patients with a history of URS were more likely to choose URS again ($p = 0.04$).

Decisions were driven generally by success rate (52 %), followed by risk of complications (29 %), postoperative pain (7 %) and other factors (12 %). When sub-analyzed over the treatment groups, patients choosing URS were more likely to prioritize success (78 %) and less likely to prioritize surgical risk (13 %) or anticipated pain after surgery (0 %) ($p = 0.01$).

Patients with a higher magnitude of stone pain on a scale of 1/10 were more likely to choose URS ($p = 0.03$).

The most compelling predictors affecting patients choice of management were success rate (median 5, IQR 1) and risk of surgery (median 5, IQR 2), while avoiding general anesthesia (median 2, IQR 2), or overnight hospital stay (median 2, IQR 3) were unimportant factors in determining the operative choice. Cost, avoiding time away from work, and avoiding time away from family were of intermediate significance for patients (median 3). The full list of factors influencing patients choices is provided in Table 3, with no significance differences except for success rate being highly important for the URS ($p = 0.02$) group while avoiding a ureteral stent was least important for this group ($p = 0.04$). There was no significant difference in results whether SWL was offered under conscious sedation or general anesthesia, and patients reported that their choice of procedure was not affected by a fear of general anesthesia ($p = 0.6$).

Discussion

Over the past three decades, there has been a significant evolution in the management of urolithiasis; treatment options now include SWL, URS, and PNL.

There is controversy over the management of asymptomatic pole calyceal stones, as the natural history of such stones is not well understood [4]. The EAU guidelines cite SWL, PCNL, URS and active surveillance with periodic evaluation as possible treatment options for renal stones, indicating that stone burden, stone composition, patient

Table 2 Demographic and stone history differences of surveyed patients according to chosen

Variable	*p* value	Active surveillance	ESWL	URS
Number		23	45	32
Age	0.4179	57 ± 10	53 ± 14	56 ± 16
Sex	0.4138			
Male		14 (64 %)	23 (52 %)	14 (45 %)
Female		8 (36 %)	21 (48 %)	17 (55 %)
Doctor choice	0.0373[a]	23 (100 %)	38 (84 %)	24 (75 %)
Most important variable	0.0114[a]			
Success		9 (39 %)	18 (40 %)	25 (78 %)
Risk		9 (40 %)	16 (36 %)	4 (13 %)
Pain		1 (4 %)	6 (13 %)	0
Other		4 (17 %)	5 (11 %)	3 (9 %)
History passed stone	0.4130	16 (70 %)	25 (85 %)	16 (52 %)
Number passed stone	0.9700	6 ± 8	6 ± 8	5 ± 5
Pain scale of (1/10) median/range	0.0350[a]	9 (1–10)	9 (1–10)	10 (5–10)
History of stent	0.7245	14 (60 %)/(26 %)	24 (53 %)/(44 %)	16 (50 %)/(30 %)
History of ESWL only	0.9680	3 (13 %)/(25 %)	5 (11 %)/(42 %)	4 (12.5 %)/(33 %)
History of URS only	0.0433[a]	4 (17 %)/(22 %)	4 (9 %)/(22 %)	10 (31 %)/(56 %)
History of PCNL only	0.0889	0	1 (2 %)/(33 %)	2 (6 %)/(67 %)
History of no surgery	0.2010	6 (26 %)/(19 %)	18 (40 %)/(58 %)	7 (22 %)/(23 %)

[a] Significant *p* value ≤ 0.05

Table 3 The Likert scale for most common variables affecting patient's decisions in choosing type of surgery

	Median					
	Overall median IQR (range)		Active surveillance median (range)	ESWL median (range)	URS median (range)	*p* value
Success	5 (3–5)	1	5 (3–5)	5 (3–5)	5 (4–5)	0.0254[a]
Time out of work	3 (1–5)	2	4 (1–5)	3 (1–5)	3 (1–5)	0.1936
Time away of family	3 (1–5)	2.5	3 (1–5)	3 (1–5)	3 (1–5)	0.7053
Cost	3 (1–5)	2	4 (1–5)	3 (1–5)	3 (1–5)	0.224
Expected pain	3 (1–5)	1	3 (1–5)	3 (1–5)	2 (1–5)	0.9062
Avoiding anesthesia	2 (1–5)	2	2 (1–5)	2 (1–5)	2 (1–5)	0.6086
Avoiding stent	3 (1–5)	2	3 (1–5)	3 (1–5)	2.5 (1–5)	0.0429[a]
Avoiding night at hospital	2 (1–5)	3	2.5 (1–5)	2 (1–5)	2 (1–5)	0.2184
Risk of surgery	5 (1–5)	2	4 (1–5)	4 (1–5)	4 (1–5)	0.1369
Previous experience	4 (1–5)	1	4 (1–5)	3 (1–5)	4 (1–5)	0.4005
Friend experience	2 (1–5)	2	2 (1–5)	2 (1–5)	2 (1–5)	0.6571

[a] Likert scale (1–5) while 1 = nonimportant and 5 = most important

comorbidities, anatomical factors, and patient preference all play a role in the selection of the appropriate management [9] SWL remains a safe option, and may be preferable for patients who are asymptomatic, as it is the least invasive. With the advent of flexible ureteroscopy and new endoscopic lithotripters, URS has become widely employed and provides an efficacious and minimally invasive option for patients with renal stones [9]. PCNL has the benefit of high success rates, but is limited by higher rates of complications, which could pose more of an issue for asymptomatic patients. Currently, there is no consensus on the appropriate indications, timing or type of intervention for small, asymptomatic stones.

Shared clinical decision making represents a shift from paternalistic practice to active engagement of the patient with the physician. With the development of a variety of more efficacious treatment approaches, the clinical emphasis on assessing patient's preferences and discussing different treatment options has become increasingly important [10]. The benefits of increased patient participation in treatment plans have been demonstrated [11, 12]. In shared decision-making, a reciprocal physician-patient interaction gives patients an opportunity to improve their understanding of the medical process, thereby taking a more active role in their medical care. A patient who comprehends the logic of treatment and follow-up is more prepared to translate treatment plans into a workable daily routine of disease management [10].

We have developed a survey designed to explore the traditional patient role in the physician-patient interaction. Using of hypothetical scenario of an asymptomatic 8 mm lower pole stone, we presented three options (active surveillance, SWL, URS) with details regarding the procedure, the anticipated outcomes and the associated risk.

Previous studies have reported patient outcomes with self-selected therapy for ureteral stones, however have not evaluated why patients make decisions with regards to which treatment approach is best for them [13].

The factors affecting the disparity between the selection rates of SWL and URS are not clear. We have previously evaluated this [7] in a similar study. However, in this prior study we offered SWL under general anesthesia and wished to evaluate the impact of conscious sedation on the patient decision making. Similarly, important demographic data were not evaluated in the prior study.

In that study we reported that past stone experience significantly affected patients' treatment choices. Patients were more likely to undergo procedures with which they had previous experience. Similarly, in this study we found that patients with a history of prior URS were more likely to choose URS again.

Overall, the results strongly support the importance of physician recommendations on patient choice, with 85 % of respondents indicating that they would likely defer the final decision to the physician. An active surveillance approach was not favored, as it was selected by only 23 % of respondents; these respondents were also more likely to be influenced by the physician's input (100 %) as compared to patients selecting SWL (84 %) and URS (75 %) ($p = 0.0373$). As such, this suggests the importance of the urologist in supporting active surveillance as an option in the appropriately selected patient.

In a recent study of 150 patients with small (<1 cm), asymptomatic stones randomized to three groups (SWL, URS, and active surveillance), Sener et al. [14] found that the rate of stone enlargement or symptoms developing for the active surveillance group was 12 % (6/50) at a follow-up of 2 years, and the risk of intervention was low. This is

especially relevant for patients who fear pain and risk. As our study demonstrates, patients who deemed pain as the most important factor in their decision-making were more likely to choose active surveillance (4 %) or SWL (13 %) versus URS (0 %). Also, those who prioritized risk were more likely to elect active surveillance (40 %) versus SWL (36 %) or URS (13 %). However, it is important to note, that other studies have suggested a much higher risk of progression (77 %) for small asymptomatic (mean 10 mm) renal stones [4].

In a prospective study of 228 patients with small (<15 mm), asymptomatic calyceal stones, Keeley et al. assessed stone free rates, need for additional intervention and quality of life for patients randomized to SWL versus active surveillance [15]. The study found that prophylactic SWL did not significantly improve stone free rates, symptoms, quality of life or renal function; however, it did reduce the need for more invasive procedures as compared to active surveillance. In our study, patients prioritized different decision-making factors based on which treatment option they chose. That study suggests that those who prioritize success (stone free rates) should not undergo prophylactic SWL, because it did not have any benefit over active surveillance. Our study showed that patients who chose URS were more likely to prioritize success as compared to patients choosing other options (SWL), and we confirm that URS is a better option in that case.

While we did not directly evaluate the anticipated need for invasive procedures as an element in patient decision-making, it is possible that patients who are concerned with risk are more suited to SWL versus active surveillance, as it could reduce the need for more invasive interventions later on. Indeed, patients choosing SWL tended to prioritize risk (36 %), but not as highly as those choosing active surveillance. Perhaps this was related to our counseling approach, which did not place a great emphasis on the risk of active surveillance. It may be relevant to explore the prophylactic role of SWL with the patient, citing that delay in treatment may require a more invasive intervention at a later date. Further studies are needed to evaluate the prophylactic impact of SWL or URS.

In our study, we found that patients choosing URS had a history of more severe pain, with a median pain score of 10, and range of 5–10 ($p = 0.03$), while those who chose SWL or active surveillance had significantly lower median pain scores and range (9, 1–10 for both). This differs from the findings in our prior study [7] that previous pain intensity did not affect intervention choice. Further, our findings indicated that respondents who feared pain chose differently (SWL or active surveillance) than those who had experienced severe pain (URS). It is reasonable to conclude that those who have already experienced severe pain on previous renal colic episode are amenable to a more invasive treatment option, especially if it offered a higher success rate.

Similar to our prior study, we found that patients favored SWL (45 %) above URS (32 %). Pearle et al. [16] proposed that, despite the potential for improved SFR with URS, SWL is still tolerated better than URS. It has been proposed that much of the morbidity from URS is related to the stent; thus, we hypothesized that patients would be more concerned about stent placement in the case of URS. Sarkissian et al. [7] found that patients who had previously undergone URS or stent placement were still more likely to choose URS ($p = 0.04$). One might conclude then that patients will choose a procedure if they are familiar with it, in spite of the expected morbidity. This may explain our finding that overall, patients were less concerned with avoiding a stent than expected, and those who chose URS were actually the least concerned about the prospect of a stent ($p = 0.04$).

We hypothesized that patients would prefer SWL if it were offered under conscious sedation rather than general anesthesia, but found that patient choice of procedure was not affected by a fear of general anesthesia ($p = 0.6$). In fact, the proportion of patients who chose SWL (45 %) in our study (presented as a procedure with conscious sedation), was similar to the proportion in the previous study, where SWL was presented under general anesthesia (47.5 %). We observed that across all management choices, patients were surprisingly unconcerned with exposure to general anesthesia (median 2 on Likert scale). This information is relevant for the physician counseling process, and implies that physicians need not spend time focusing on type of anesthesia, as it is not as important to patients as one might expect.

We expected that male patients would be less likely to elect URS. However, we noted that there was no significant gender difference in patients choosing URS (37 % of females vs. 27.5 % males chose URS, $p = 0.3161$).

We recognize a few limitations to our study including the inherent limitation of a survey based study design. We did not gather information on employment, insurance status or income, all of which may pertain to the patient's decision-making. However, we did assess concerns about cost, which was of intermediate significance and did not vary significantly across treatment choices. One limitation of our study is that patients were recruited from a tertiary care stone clinic. As noted by their history of multiple stone recurrences and level of experience with prior interventions their responses may not be representative of the general stone population.

Patients were quoted stone-free rate estimates derived from a review of the evidence-based literature as well as the investigator's personal experience based on a prospective registry to monitor clinical outcomes. We recognize

that the definition of stone-free rates (stone-free vs. residual fragments) and method of defining stone-free rates (endoscopic/KUB/US/CT) varies. Though varying the quoted success rates could impact the percentage of patients who selected each management approach, it would be less likely to impact our analysis of "why" decisions are made.

Conclusion

Patients who elect active surveillance versus SWL versus URS place differing value on risk, success, and previous experience and doctor recommendations. The success rate and risk of the surgery are the most important factors for patients. Previous history of severe pain and experience with URS are especially important for patients who elect URS as their treatment modality. Stent morbidity is less of a concern for patients than expected. Patient choice is unaffected by fear of general anesthesia. As patients rely heavily on the physician's recommendation for the most appropriate procedure, it is important that the urologist assess the patient's priorities in order to facilitate shared decision making. In addition, with new insight into patients' priorities, physicians can focus on patients' greatest concerns and limit time spent on factors that may not affect patient decision-making.

Compliance with ethical standards

Funding This study was not funded.

Conflict of interest None.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (institutional review board) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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