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Postoperative opioid-free ureteroscopy discharge: A quality initiative pilot protocol

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Abstract

Background: Opioids are commonly prescribed after ureteroscopy. With an increasing adoption of ureteroscopy for management of urolithiasis, this subset of patients is at high risk for opioid dependence. We sought to pilot an opioid-free discharge protocol for patients undergoing ureteroscopy for urolithiasis.

Materials and methods: A prospective cohort study was performed of all patients undergoing ureteroscopy for urolithiasis and compared them to a historical control group. An opioid-free discharge protocol was initiated targeting all areas of surgical care from June 20th, 2019 to September 20th, 2019 as part of an institutional quality improvement initiative. Demographic and surgical data were collected as were morphine equivalent doses (MEDs) prescribed at discharge, postoperative measures including phone calls, clinic visits, and emergency room visits for pain.

Results: Between October 1st, 2017 and February 1st, 2018, a total of 54 patients who underwent ureteroscopy were identified and comprised the historical control cohort while 54 prospective patients met the inclusion criteria since institution of the quality improvement initiative. There were no statistically significant differences in baseline patient demographics or surgical characteristics between the 2 patient groups. Total 37% of the intervention group had a preexisting opioid prescription versus 42.6% of the control group with no difference in preoperative MED ($p = 0.55$). The intervention group had a mean MED of 12.03 at discharge versus 110.5 in the control cohort ($p \leq 0.001$). At discharge 3.7% of the intervention group received an opioid prescription versus 88.9% of the control group ($p < 0.001$). Overall, there was no difference in postoperative pain related phone calls ($p = 1.0$) or emergency room visits ($p = 1.0$).

Conclusions: An opioid-free discharge protocol can dramatically reduce opioid prescription at discharge following ureteroscopy for urinary calculi without affecting postoperative measures such as phone calls, clinic visits, or subsequent prescriptions.

Keywords: Opioid free; Opioid sparing; Ureteroscopy

1. Introduction

The opioid epidemic is a public health crisis which has been demonstrated to be both deadly and costly within the United States healthcare system.[1,2] This epidemic has the potential to worsen as the number of prescriptions for opioid medications has increased from 76 million prescriptions in 1991 to more than 200 million in 2011 along with a parallel rise in opioid-related deaths.[2] As deaths related to opioid use are increasingly common – surpassing the number of deaths related to kidney cancer and bladder cancer combined – urologists can no longer ignore the crisis.[3,4]

The practice of prescribing opioids after surgery is a uniquely American pattern and many of these medications will go unused.[5–7] Ureteroscopy is now the most common treatment of urinary calculi, with more than 400,000 upper tract procedures done for urinary calculi from 2003 to 2012.[8] There is wide variation in opioid prescriptions given following stone surgery. Evidence suggests that opioids are over prescribed, with an average prescription containing enough opioids for 10 days of postoperative pain control.[9] There is high risk of continued chronic opioid use, with 6% risk of chronic use after ureteroscopy.[10] Additionally, patients who receive a prescription are more likely to use an opioid and those who receive more morphine equivalent doses (MEDs) per prescription use more pills.[11] While recent guidelines on the use of opioids following endourologic procedures have been published, these remain broad in their recommendations.[12] Therefore, the optimal pain control after ureteroscopy remains unknown.

The type of pain following ureteroscopy can lend itself to be controlled with multimodal nonopioid based methods. Attempts to evaluate this are limited; however, 2 prior studies have suggested the feasibility of an opioid-free discharge after ureteroscopy without negatively affecting outcomes.[13,14] We sought to initiate a pilot study for ureteroscopy for urinary calculi as part of a departmental quality improvement project to test the feasibility of an opioid-free discharge in our patient population.

2. Material and methods

We performed a prospective cohort study of all patients undergoing ureteroscopy for urinary calculi from June 20th,

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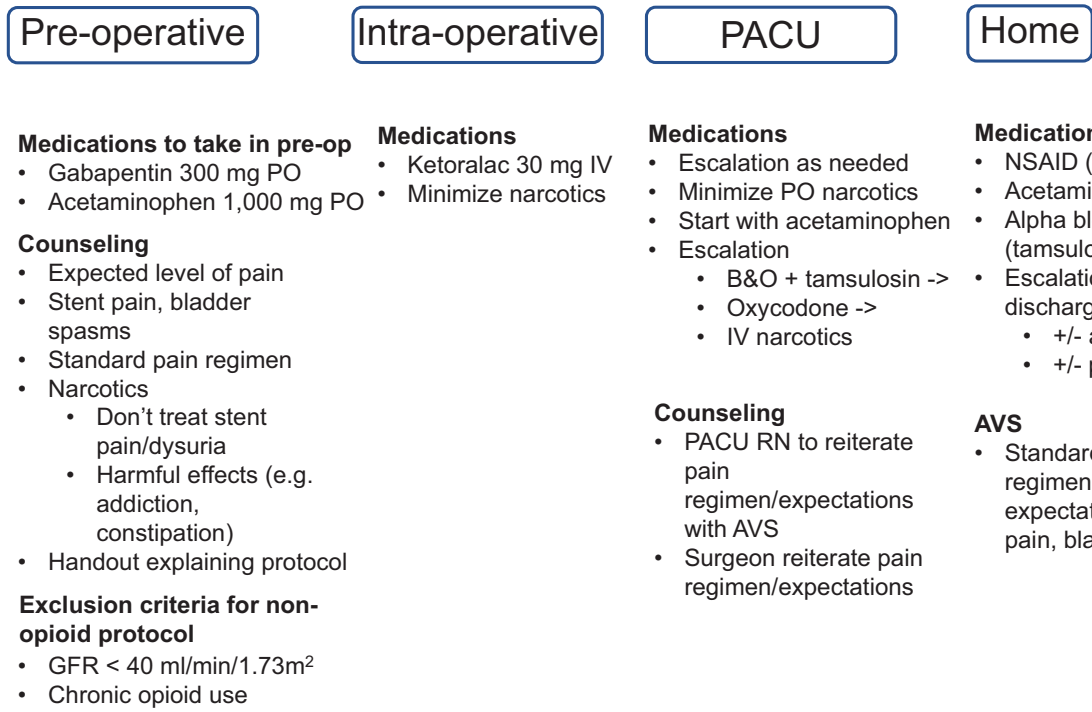

Figure 1. Opioid-free ureteroscopy discharge protocol. AVS = after-visit summary; B&O = belladonna and opium; GFR = glomerular filtration rate; IV = intravenous; NSAID = nonsteroidal anti-inflammatory drug; PACU = postanesthesia care unit; PO = per os; RN = registered nurse.

2019 to September 20th, 2019 at a major academic stone center and compared them to a historical control group. The historical controls were taken from retrospective chart review of patients undergoing ureteroscopy for urinary calculi from October 1st, 2017 to February 1st, 2018, performed at the same institution by the same 2 trained surgeons (neither had fellowship training in endourology) while residents participating did differ. This initiative was done as part of a quality improvement project within the Department of Urology and therefore did not require internal review board approval. The historical cohort was derived from a period where there were no departmental prescribing guidelines and providers (advanced practice providers [APPs], residents, fellows, and attendings) could prescribe per their practice at discharge. After June 20th, 2019 an opioid-free protocol was instituted for patients undergoing ureteroscopy for urinary calculi. All residents, fellows, attendings, and APPs were educated on this quality improvement initiative. The opioid-free protocol excluded patients with a prior history of chronic opioid use (>90 days of use), chronic kidney disease (estimated glomerular filtration rate < 40 mL/min/1.73 m^2), or receipt of concurrent surgery in addition to ureteroscopy for urinary calculi. During the quality improvement period either a Storz flexible ureteroscope or Boston Scientific LithoVue were utilized. All double J stents placed were 6Fr.

The opioid-free protocol at discharge involved interventions at 5 distinct steps: 1) preoperative clinic visit, 2) preoperative surgical staging area, 3) intraoperative, 4) postanesthetic care unit (PACU), and 5) discharge (Fig. 1). In the preoperative clinic visit, APPs would counsel patients on our opioid-free protocol and set pain expectations along with providing the patient with an informational handout on pain control after ureteroscopy and the potential harms of opioids (Supplementary Figure 1; http://links.lww.com/CURRUROL/A1). At the preoperative surgical staging area, the patient would receive a 1-time oral dose each of 1,000 mg acetaminophen and 300 mg gabapentin. Intraoperatively, anesthesia teams would be asked to minimize narcotics and administer intravenous ketorolac 30 mg. In the PACU, patients were reminded of the opioid-free protocol by the surgeon or resident. For pain experienced within the PACU, oral and intravenous narcotics were again minimized, and escalation was done via acetaminophen intravenous or per os (PO) followed by belladonna and opium suppository with tamsulosin 0.4 mg PO followed by oxycodone 5 mg PO followed by intravenous narcotics. Escalation eventually ending in intravenous narcotics was done only if the patient had increasing pain. At discharge, patients were given prescriptions for 7 days of ibuprofen (400 mg PO q6 h Prn), acetaminophen (1,000 mg PO q6 h Prn), and tamsulosin (0.4 mg PO every night at bedtime) barring contraindications. If a contraindication was encountered, the medication dose was reduced as appropriately or omitted. Additionally, patients were provided with instructions on opioid-free pain control via the after-visit summary with how to best alternate ibuprofen and acetaminophen and explanations of common causes of pain after ureteroscopy (eg, bladder spasms and stent discomfort). If the patient called in with pain information standard pain related questions were asked (eg, location, duration, intensity) as well as information about what methods of pain control they had already utilized. If there were concerns regarding other potential issues (eg, urinary tract infection), this type of information was also elicited. If, after this conversation, escalation was done with a prescription of anticholinergic agent and/or phenazopyridine barring contraindications. If necessary, patients were provided with an opioid prescription at the providers discretion.

We collected data for both the prospective cohort and retrospective controls. We abstracted patient age, sex, American Society of Anesthesiologists status, body mass index, and baseline common comorbidities (hypertension, hyperlipidemia, obstructive sleep apnea, and diabetes mellitus), prior abdominal

surgeries, and a diagnosis of a chronic pain condition (gout, chronic joint/back pain, arthritis including immunologic, inflammatory bowel disease, peripheral vascular disease, migraine/chronic headache, fibromyalgia, herniated disc, carpal tunnel, radiculopathies, sciatica, neuropathies, or tendinitis) were collected. In addition, we collected surgical data including the length of surgery, whether the procedure was unilateral or bilateral, if the procedure was a second look, if a ureteral stent was placed (and duration), prior history of ureteroscopy and location of stone (renal or ureteral). We recorded whether a patient called any clinic with complaints of pain, visited any clinic, or presented to the emergency room (ER) for pain within a 30-day period. This data was obtained from the electronic medical record which allowed for review of these outcome measures both at the primary site of the study and at any site sharing the electronic medical record (EMR). We recorded if any opioid was prescribed, including the number of MEDs at discharge, along with the type of opioid along with any subsequent prescriptions within a 30-day period.

Statistical analysis was performed using Mantel-Haenszel chi-square for trend and analysis of variance.

3. Results

In total, 54 patients underwent ureteroscopy as part of the quality improvement initiative matched with 54 patients in the historical control cohort. There were no statistically significant differences in baseline patient demographics between the control and intervention group such as age (mean 61 vs. 56 years, $p=0.40$), body mass index (median 29.2 vs. 30.9, $p=0.27$), American Society of Anesthesiologists (median 2 vs. 2, $p=1.0$), or chronic pain diagnosis at baseline (29.6% vs. 22.2%, $p=0.38$; Table 1). No intraoperative complications were encountered. Additionally, the groups did not differ significantly in their surgical characteristics. Operative time was similar with a mean of 52.5 minutes in the control group versus 51.9 minutes in the intervention group ($p=0.79$). There were no differences in the rate of stenting (100% vs. 94%, $p=0.07$), location of the stone (74% ureteral vs. 61%, $p=0.15$), unilateral versus bilateral ureteroscopy (13% bilateral vs. 5.6%, $p=0.28$), or the duration of postprocedure stenting (15.5 vs. 12.3 days, $p=0.31$).

Preexisting opioid prescriptions, all related to their underlying stone diagnosis, were present in 37% of the intervention group versus 42.6% of the control group with no difference in rate or MED ($p=0.35$ and $p=0.55$; Table 2). At discharge 2 of 54 (4%) of the intervention group received an opioid prescription versus 48 of 54 (89%) of the control group ($p<0.001$). The mean MED prescribed at discharge for the intervention group was 12.03 versus 110.5 for the control group ($p<0.001$). Overall, there was no difference in postoperative pain related phone calls ($p=0.56$) or ER visits ($p=0.78$). Additionally, there was no difference in follow-up opioid prescriptions between the groups ($p=0.56$).

Table 1

Baseline demographics and co-morbidities for the historical control cohort and prospective quality improvement initiative cohort.

	Control	Intervention	*p*
Number of cases	54	54	1.0
Age, y	61	56	0.40
Sex	63% female	46% female	0.08
BMI, kg/m^2	29.2	30.9	0.28
ASA	2	2	1.00
Co-morbidities			
Hypertension	44.40%	53.70%	0.34
Hyperlipidemia	33.30%	33.30%	1.00
OSA	9.30%	16.70%	0.25
Diabetes mellitus	27.80%	16.70%	0.17
History of abdominal/hernia surgery	44.40%	46.30%	0.85
Baseline pain related diagnosis	29.60%	22.20%	0.38
Pre-operative opioid prescription	42.60%	37.00%	0.56
Pre-operative opioid MED (mean)	59.25	45.55	0.35

ASA = American Society of Anesthesiologists; BMI = body mass index; MED = morphine equivalent dose; OSA = obstructive sleep apnea.

Table 2

Comparison of surgical characteristics and pain related outcomes between the historical control cohort and prospective quality improvement initiative cohort.

	Control	Intervention	*p*
Operative time, min	52.5	51.9	0.79
Stent placed	100%	94.40%	0.08
Stent duration (d, mean)	15.5	12.3	0.31
Bilateral ureteroscopy	13%	5.60%	0.28
Second look ureteroscopy	14.80%	14.80%	1.00
Ureteral stone	74.10%	61.10%	0.15
Renal stone	25.90%	38.90%	0.15
Opioid prescription at discharge	88.90%	3.70%	<0.001
Average MED at discharge (mean)	110.55	12.03	<0.001
Post-discharge opioid prescription	1.90%	3.70%	0.56
Post-discharge average MED	1.85	2.11	0.92
Pain related outcome			
Phone call	7.40%	7.40%	1.00
Clinic visit	0.00%	0.00%	1.00
ER visit	3.70%	3.70%	1.00

ER = emergency room; MED = morphine equivalent dose.

4. Discussion

This prospective cohort quality improvement initiative examined the feasibility of implementing an opioid-free discharge for a patient after ureteroscopy utilizing a multifactorial nonopioid based pain treatment regimen. We found that nearly all patients (96%) were discharged with an opioid prescription following ureteroscopy for urinary calculi. Moreover, this initiative did not increase patient calls related to pain, clinic visits, or ER visits.

Our findings provide additional support for implementation of opioid-free discharge protocols following ureteroscopy without effecting ER visits or volume of phone calls. Large et al.[14] reported through a chart review 104 patients undergoing ureteroscopy for urinary calculi, of whom 52 overlapped with the launch of an opioid sparing protocol initiated at their institution. Overall, baseline demographics and surgical characteristics were similar. While 9% of their opioid-free patients received an opioid prescription at discharge (versus 100% of their control cohort), there were no differences in postoperative phone calls, clinic visits, or ER visits. The authors note that in multivariate analysis, a prior psychiatric diagnosis was a predictor for opioid prescription after surgery; however, the sample size is very small making this difficult to interpret. Sobel et al.[13] noted a similar outcome after a retrospective review of

210 patients undergoing ureteroscopy for urinary calculi. Overall, 73% of their patients were discharged without a narcotic and, while no statistical analysis was done, there was no apparent increase in postoperative phone calls or ER visits. Interestingly, those patients receiving an opioid had increased pain medication refill requests; however, we do not know why those 27% of patients who received an initial opioid required one. Finally, Gridley et al.[15] in a cohort of 28 patients undergoing an enhanced recovery after surgery protocol demonstrate that an opioid-free protocol similarly does not impact postoperative phone calls or ER visits and, importantly, no clinically significant differences in patient reported outcomes. Taken together, these data support that opioid-free regimens should be the default pain control regimen after ureteroscopy.

Multimodal pain control and counseling have independently been shown to be effective postoperative analgesia. Preoperative counseling is important, in order to set patient expectations and increase patient buy in. This is consistent with prior studies that have shown counseling to have a significant impact on postoperative pain control.[16,17] Intravenous ketorolac has been shown to reduce narcotic requirements in the PACU and after discharge.[18] Additionally, alpha blockers and oxybutynin, in combination and alone, have been shown to reduce symptoms related to ureteroscopy and ureteral stents.[19,20] There exists many nonopioid based alternatives for pain control after ureteroscopy that can be combined for effective analgesia. With these options and several professional guidelines, including state guidelines, suggesting nonopioid alternatives first for postoperative pain there is little reason for the urologist to prescribe opioids for routine ureteroscopy.[12,21]

Our study has several limitations. As this is a nonrandomized comparison of prospectively collected data with retrospective controls direct comparison is not perfect as there is inherent bias. As we did not collect survey data for our patients and data was obtained from prescription data in the EMR, and linked EMRs, we cannot rule out patients obtaining a narcotic prescription elsewhere that was not recorded or presenting to an emergency department not linked to our system. However, the majority of our patients are local and use our hospital as their primary source of care. Additionally, we queried the California Controlled Substance Utilization Review and Evaluation System and no patient was noted to have received an outside opioid prescription. We are also unaware if any patient had additional opiates at home from previous prescriptions that were able to be utilized in the postoperative period. Sociodemographic data, such as education and income, were not collected. An additional limitation of our study design is that ureteroscopy with laser lithotripsy encompasses a wide range of stone sizes and location that might affect pain level, while we accounted for renal versus ureteral stones, the impact of stone size was not evaluated. Furthermore, this is a single academic institution's experience with an opioid-free discharge and thus the results may not be entirely generalizable to other practices. Finally, several countermeasures were used to ensure we were not harming patients' pain control, but direct measurement of pain scores at home was not recorded.

Through this pilot study we have identified that implementing an opioid-free pain control regimen for patients undergoing ureteroscopy with laser lithotripsy as a quality improvement initiative is feasible. With larger prospective studies examining patient reported outcomes (such as pain scores), an opiate-free discharge may become the new standard for postoperative pain management.

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None.

Statement of ethics

This study did not require ethics or IRB approval as it was a quality improvement initiative which was noted to be exempt from approval after inquiry. Nonetheless, the study adhered to an international standard of ethics.

Conflict of interest statement

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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Author contributions

All authors contributed equally in this study.

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