A narcotic free pathway for postoperative pain following urethroplasty

Eileen R. Byrne, MD,[1] Thomas W. Fuller, MD,[2] Sunchin Kim, MD,[3] Engy T. Said, MD,[4] Jill C. Buckley, MD[1]

[1]Department of Urology, University of California, San Diego, California, USA
[2]Department of Urology, Virginia Mason, Seattle, Washington, USA
[3]Department of Urology, Banner Health, Tucson, Arizona, USA
[4]Department of Anesthesia, University of California, San Diego, California, USA

BYRNE ET, FULLER TW, KIM S, SAID ET, BUCKLEY JC. A narcotic free pathway for postoperative pain following urethroplasty. *Can J Urol* 2021;28(6): 10914-10919.

Introduction: *In an effort to decrease physician contribution to the opioid crisis, we utilized a narcotic free pathway (NFP) after urethroplasty. Our objectives were to demonstrate feasibility of a NFP and identify patients at higher risk for requiring postoperative narcotics.*

Materials and methods: *We implemented a NFP for patients undergoing urethroplasty. Pain was assessed using the Likert scale (1-10). Narcotic use was quantified using oral morphine equivalents (OMEs).*

Results: *Forty-six patients underwent urethroplasty following the NFP over a 7-month period. Fifteen patients were excluded, leaving 31 patients in the final analysis. Postintervention data was compared to 30 patients who underwent urethroplasty prior to implementation of the NFP. The groups had similar demographics except for a history of heroin abuse (0% preintervention, 12.9% postintervention, p = 0.04). Surgical characteristics were not statistically different aside from length of surgery (183.6 minutes preintervention, 145.5 minutes postintervention, p = 0.01). The mean [SD] perioperative OME use preintervention was 194.9 [151] mg, compared to 40.4 [111.9] mg postintervention (p < 0.001). Six patients postintervention were discharged with a narcotic prescription (mean 27.5 mg OME) compared to 26 patients preintervention (mean 76 mg OME) (p < 0.001). There was no difference in pain scores at any time interval. Patients with a history of chronic opioid use were more likely to require narcotics (OR 5.33, CI 1-28.44).*

Conclusions: *The narcotic free pathway resulted in a dramatic reduction in narcotic prescriptions without a significant difference in postoperative pain scores. Opioid use can be minimized following urethral and perineal surgery.*

Key Words: non-narcotic pathway, opioid-free, opioid epidemic, urethroplasty

Introduction

Drug overdose is the leading cause of accidental death in the United States.[1] Since 1999, over 450,000 people in the United States have died due to opioid overdose.[2] In 2018 alone, nearly 15,000 deaths were attributed to prescription opioids – an average of 41 deaths per day.[2] It is estimated the economic burden of the opioid crisis on the US economy between 2015 and 2018 was at least $631 billion, one-third of which is attributed directly to healthcare costs.[3]

Opioid prescriptions peaked in 2011 prompting the CDC to implement programs to reduce prescriptions including improved monitoring of distribution and increased provider awareness.[4] When opioid-related deaths reached an all-time high of over 42,000 in 2016, the Department of Health and Human Services declared the opioid crisis a public health emergency and further devoted government resources.[5]

Accepted for publication September 2021

Address correspondence to Dr. Jill C. Buckley, Department of Urology, University of California, San Diego, 200 West Arbor Drive, San Diego, CA 92103 USA

As physicians, we have been charged with the responsibility of being cognizant of our contribution to the opioid crisis.[4,6] In patients who were prescribed narcotics for postoperative pain, approximately 6% will still be taking them three months later.[7] Total of 21%-29% of patients with chronic pain who are treated with narcotics are found to abuse them and 8%-12% develop opioid use disorder (OUD).[8-10] In addition to the serious risks associated with OUD, opiates also have less than desirable side effects which can complicate postoperative recovery including sedation, constipation, nausea, vomiting, and pruritis.[11]

One key area identified for improvement is the overprescription of narcotics after surgery. Several studies have demonstrated that patients receive far more narcotic pills than they require postoperatively.[12,13] Minimal narcotic pathways and narcotic free pathways have recently been shown to be successful in a variety of specialties including orthopedic surgery, gynecologic surgery, and general surgery.[14-16] In urology, studies have shown nearly no narcotic pain medication is required after nephrectomy, partial nephrectomy, prostatectomy, and ureteroscopy.[17-19] To date, no study has demonstrated the feasibility of a narcotic free pathway (NFP) for perineal surgery. Our objective was to address this gap in the literature by implementing a NFP after urethroplasty and identify any factors which may be associated with use of narcotics postoperatively.

Materials and methods

Cohort

The NFP was implemented in July 2019. All patients undergoing urethroplasty, both perineal and pendulous techniques, for a period of 7 months, from July 2019 to January 2020, were included in this study. Patients who were inadvertently not placed on the NFP were excluded. No patients were excluded based on their medical history or prior narcotic exposure. The control group underwent urethroplasty prior to implementation of the NFP between February 2019 to June 2019.

Pain management pathway

The NFP was standardized for all patients for the preoperative, perioperative, and postoperative settings. Patients received celecoxib 200 mg, gabapentin 300 mg and acetaminophen 975 mg orally in the preoperative area. Intraoperatively, no narcotics were used for anesthesia, including on induction. Patients received local anesthetic, 0.25%-1% bupivacaine, based on surgeon discretion at the conclusion of the case. Postoperatively, patients were placed on scheduled acetaminophen 975 mg every 8 hours alternating with ibuprofen 600 mg every 8 hours. If they were admitted overnight, ibuprofen could be substituted for ketorolac 15 mg IV every 6 hours at surgeon preference. Narcotics were not ordered for breakthrough pain. In patients whose pain was not well controlled, narcotics could be added if necessary, with the type and dosage at the provider's discretion. Patients who required narcotics for breakthrough pain were assessed prior to discharge to determine if they would require a discharge prescription for narcotics. Patients who underwent concurrent buccal graft harvest were also administered 10 mL of a 1:1:1 Maalox™ : viscous lidocaine : diphenhydramine mouthwash to swish four times daily.

Patients with known liver disease were excluded from taking acetaminophen. Patients with kidney dysfunction as determined by a GFR < 60 were excluded from taking ibuprofen and ketorolac or with a GFR < 30 were excluded from taking gabapentin. There were no substitutions made for these exclusions. Medication administration and surgical data were obtained by chart review from our electronical medical wrecord. The CURES database was used to determine if patients obtained a narcotic prescription from an outside provider.

Pain was assessed using the Likert scale (1-10) in the preoperative area, immediately prior to discharge (either in the postoperative recovery unit for same day surgery or on the morning of postoperative day 1), and on the day of their catheter removal in clinic.

Outcomes

Our primary outcome was perioperative narcotic use, measured by conversion to oral morphine equivalents (OMEs). As a secondary outcome we analyzed demographic and surgical factors to determine if there were any associations with postoperative narcotic requirement.

Analysis

All analyses were conducted using SPSS v27 (IBM Corp., Armonk, NY, USA). Univariate analysis was performed using t-test and chi-square to analyze continuous data and categorical data, respectively. Logistic regression was performed to determine associations with postoperative narcotic requirement. P values were paired, and statistical significance was designated $p < 0.05$.

Results

A total of 46 patients underwent urethroplasty in the 7-month period after implementation of the NFP. Fifteen of those patients were excluded due to failure

TABLE 1. **Preoperative and perioperative characteristics**

	Pre-NFP	NFP	p value, test
Age (years), mean (SD)	49 (19)	54 (16)	0.34, paired t-test
Gender, n (% male)	30 (100)	31 (100)	
Race			0.17, chi-squared
Caucasian, n (%)	18 (60)	22 (71)	
African American, n (%)	0 (0)	1 (3.2)	
Hispanic n, (%)	5 (16.7)	7 (22.6)	
Asian, n (%)	2 (6.7)	0 (0)	
Other, n (%)	5 (16.7)	1 (3.2)	
BMI (kg/m^2), mean (SD)	31.3 (7.2)	29.5 (5.6)	0.29, paired t-test
History of opioid use, n (%)	25 (83.3)	31 (96.8)	0.08, chi-squared
History of chronic opioid use, n (%)	5 (16.7)	9 (29)	0.25, chi-squared
Active opioid use at time of surgery, n (%)	6 (20)	5 (16.1)	0.69, chi-squared
History of opioid abuse, n (%)	3 (10)	5 (16.1)	0.48, chi-squared
History of heroin abuse, n (%)	0 (0)	4 (12.9)	0.04, chi-squared
History of methadone/suboxone use, n (%)	2 (6.7)	1 (3.2)	0.53, chi-squared
Surgical approach			
Perineal, n (%)	13 (43.3)	15 (48.4)	
Pendulous, n (%)	17 (56.7)	16 (51.6)	
Stricture length (cm), mean (SD)	2.8 (3.1)	3.61 (2.8)	0.29, paired t-test
Surgical time (min), mean (SD)	184 (63)	145 (47)	0.01, paired t-test
Buccal graft harvest, n (%)	9 (30)	17 (54.8)	0.052, chi-squared

NFP = narcotic free pathway; SD = standard deviation; BMI = body mass index

to initiate the narcotic free pathway. There were 61 patients total included in the cohort; 30 prior to implementation of the pathway and 31 patients on the pathway. Descriptive data are recorded in Table 1. The only statistically significant difference for patient factors between the two cohorts was history of heroin abuse, with no patients in the cohort prior to the NFP and four patients in the NFP cohort ($p = 0.04$). The two cohorts were equally matched for other demographic factors, most notably history of use, history of abuse and current use of narcotics. History of opioid use was defined as patient endorsed opiate use within the past 5 years for a period of less than 3 months. Chronic opioid use was defined as consistent opioid use for a period of longer than 3 months. The only statistically significant difference for surgical factors between the two cohorts was surgical time, with a mean of 184 minutes in the pre-pathway cohort and a mean of 145 minutes in the pathway cohort $p = 0.01$).

Pain management data are recorded in Table 2 and show a significant difference between the two cohorts in every aspect of the NFP ($p < 0.001$). This includes increased administration of non-narcotic adjuvants in the preoperative setting and decreased narcotic use during and after urethroplasty. Perioperative opioid use was defined as opioid administration while the patient was in the hospital setting. Mean OME use was reduced from 195 mg to 40 mg on the pathway, which is approximately the equivalent of a reduction of 26 tablets of 5 mg oxycodone to five 5 mg tablets. Twenty-six patients were discharged with a narcotic prescription before pathway implementation compared to six patients after pathway implementation; mean OME use was reduced from 63 mg to 3 mg. This reduction equates to approximately eight tablets of 5 mg oxycodone to less than one-half of a tablet. The significant reduction in the number of narcotics administered did not have an effect on patient pain scores at any time point, Table 3.

On univariate analysis, a history of chronic opioid use was the only factor associated with narcotic administration for patients on the NFP (odds ratio 5.3, 95% confidence interval 1-28, $p = 0.04$), Table 4.

TABLE 2. **Pain management**

	Pre-NFP	NFP	p value, test
Preoperative gabapentin, n (%)	0 (0)	27 (87.1)	< 0.001, chi-squared
Preoperative Celebrex, n (%)	0 (0)	29 (93.5)	< 0.001, chi-squared
Preoperative acetaminophen, n (%)	13 (43.3)	30 (96.7)	< 0.001, chi-squared
Intraoperative opioid use, n (%)	30 (100)	4 (12.9)	< 0.001, chi-squared
Local block, n (%)	0 (0)	13 (41.9)	< 0.001, chi-squared
Perioperative opioid use			
Postoperative opioid use, n (%)	30 (100)	12 (38.7)	< 0.001, chi-squared
Opioid use (OME), mean (SD)	195 (151)	40 (112)	< 0.001, paired t-test
Post discharge opioid use			
Discharge opioid prescription, n (%)	26 (87)	6 (19.4)	< 0.001, chi-squared
Opioid use (OME), mean (SD)	66 (37)		< 0.001, paired t-test
Discharge opioid prescription, n (%) preoperative opioid users excluded	21 (87.5)	3 (13)	< 0.001, chi-squared
Opioid use (OME), mean (SD) Preoperative opioid users excluded	63 (33)	3 (8)	< 0.001, paired t-test

NFP = narcotic free pathway; OME = oral morphine equivalents; SD = standard deviation

TABLE 3. **Pain measurement**

	Pre-NFP	NFP	p value
Preoperative pain score (1-10)			
Cohort	0.6 (1.7)	0.7 (1.7)	0.81
Perineal incision	0.4 (1.4)	0.8 (1.8)	0.5
Pendulous incision	0.8 (2.0)	0.6 (1.7)	0.83
Postoperative day 1 pain score (1-10)			
Cohort	1.4 (2.0)	1.9 (2.5)	0.35
Perineal incision	1.2 (2.1)	2.0 (2.9)	0.4
Pendulous incision	1.5 (1.9)	1.8 (2.1)	0.69
Postoperative VCUG pain score (1-10)			
Cohort	2.1 (2.0)	1.7 (2.7)	0.71
Perineal incision	0.7 (1.2)	1.0 (2.2)	0.82
Pendulous incision	2.1 (2.0)	1.9 (2.8)	0.86

All values are reported as mean (standard deviation)
NFP – narcotic free pathway

Discussion

In this study, we demonstrated the successful implementation of a narcotic free pathway after urethroplasty. While not all patients were able to have their pain adequately managed without narcotics, a majority of them were. There was a dramatic decrease in the amount administered in both the hospital setting and at discharge without increased discomfort or change in the patients' experience. A CURES search revealed only two patients out of 31 filled a narcotic prescription after being discharged without narcotics

TABLE 4. **Univariate analysis of preoperative and postoperative characteristics associated with narcotic use**

	OR (95% CI)	p value
Age	0.63 (0.95-1.04)	0.86
Body mass index	0.63 (0.86-1.12)	0.73
Preoperative opioid use	0.95 (0.85-1.05)	0.42
Active opioid use	2.8 (0.4-20.18)	0.29
Chronic opioid use	5.33 (1-28.44)	0.04
Perineal incision	0.95 (0.45-1.99)	0.89
Buccal graft harvest	4.13 (0.84-20.23)	0.07

OR = odds ratio; CI = confidence interval

originally, bringing the total number of patients who required narcotics after discharge to 6, down from 26 prior to the NFP. It is unknown if they filled the narcotic prescription secondary to their recent urologic surgery.

Of the 15 patients that were excluded, the main opportunity for improved implementation was continuous and widespread communication to our anesthesia colleagues. Several steps of increased electronic communication with our anesthesia colleagues have significantly improved the adoption and implementation of the pathway. On further chart review for the patients who were administered narcotics perioperatively, many of them were only given 1-2 doses of intravenous medications while in the recovery unit. This highlighted another opportunity for improved education and communication. Our recovery nurses are accustomed to having narcotic medication readily available for administration and were not included in our initial education plan. By educating our nursing staff on multimodal pain control, we have increased adherence to the narcotic free pathway and decreased the amount of narcotic pain medication administered in the recovery area. A third area of improvement was increased attention to the delivery of intra-operative local anesthetic by the surgical team. The above detailed increased communication, education and adherence to the pathway have resulted in a significantly improved implementation of the narcotic free pathway to > 90%.

Other prior studies have given special consideration for patients with a history of opiate abuse or current opiate use.[15,16,18] In our NFP, there were more patients with a history of opioid and heroin use yet we were still able to use fewer narcotics. Our study shows that even patients actively taking narcotics around the time of surgery can follow the NFP successfully. Although it is important to mention, none of our patients were taking long-acting narcotics preoperatively. High dose opiate users should be evaluated on a case by case basis as there is risk associated with opiate withdrawal and in most cases they should be administered at least their home regimen.[11] Patients with a history of chronic opioid use were found to be five times more likely to require narcotics postoperatively. While each case should be considered individually, we do not feel that this group of patients should be excluded from the NFP.

Limitations

During the 7-month period after implementation of the NFP, 46 total patients underwent urethroplasty. Of those, 15 were excluded due to provider noncompliance of the pathway. Further chart review reveals that 12 of these patients were administered IV narcotics upon anesthesia induction. The remainder of these patients were ordered narcotics as part of the previous standard order set. Nearly all of these cases happened within the first 8 weeks which highlights how challenging the transition to a NFP can be for providers. Communication with our anesthesia team and warm handoffs to providers who are covering patients on the floor overnight are imperative.

Conclusions

Implementation of the narcotic free pathway resulted in a dramatic reduction in postoperative narcotic prescriptions without a significant difference in postoperative pain scores. Narcotics carry significant risk when overused and are highly addictive. They can be avoided or dramatically decreased in perineal and urethral surgery. □

References

1. Kochanek KD, Murphy SL, Xu J, Arias E. Deaths: final data for 2017. *Natl Vital Stat Rep* 2019;68(9):1-77.
2. Wilson N, Kariisa M, Seth P, IV HS, Davis NL. Drug and opioid-involved overdose deaths — United States, 2017-2018. *MMWR Morb Mortal Wkly Rep* 2020;69(11):290-297.
3. Davenport S, Weaver A, Caverly M. Economic Impact of non-medical opioid use in the United States. Society of Actuaries; 2019.
4. (CDC) CfDCaP. Vital signs: overdoses of prescription opioid pain relievers---United States, 1999--2008. *MMWR Morb Mortal Wkly Rep* 2011;60(43):1487-1492.
5. Strategy to combat opioid abuse, misuse, and overdose. In: Services USDoHaH, editor. 2018.
6. Califf RM, Woodcock J, Ostroff S. A proactive response to prescription opioid abuse. *N Engl J Med* 2016;374(15):1480-1485.
7. Brummett CM, Waljee JF, Goesling J et al. New persistent opioid use after minor and major surgical procedures in US adults. *JAMA Surg* 2017;152(6):e170504.
8. Vowles KE, McEntee ML, Julnes PS, Frohe T, Ney JP, van der Goes DN. Rates of opioid misuse, abuse, and addiction in chronic pain: a systematic review and data synthesis. *Pain* 2015; 156(4):569-576.
9. Fleming MF, Balousek SL, Klessig CL, Mundt MP, Brown DD. Substance use disorders in a primary care sample receiving daily opioid therapy. *J Pain* 2007;8(7):573-582.
10. Boscarino JA, Rukstalis M, Hoffman SN et al. Risk factors for drug dependence among out-patients on opioid therapy in a large US health-care system. *Addiction* 2010;105(10):1776-1782.
11. Benyamin R, Trescot AM, Datta S et al. Opioid complications and side effects. *Pain Physicia*n 2008;11(2 Suppl):S105-S120.
12. Howard R, Fry B, Gunaseelan V et al. Association of opioid prescribing with opioid consumption after surgery in Michigan. *JAMA Surg* 2019;154(1):e184234.
13. Overton HN, Hanna MN, Bruhn WE et al. Opioid-prescribing guidelines for common surgical procedures: an expert panel consensus. *J Am Coll Surg* 2018;227(4):411-418.
14. Patzkowski MS, Patzkowski JC. Perioperative pain management and avoidance of long-term opioid use. *Sports Med Arthrosc Rev* 2019;27(3):112-118.
15. Mark J, Argentieri DM, Gutierrez CA et al. Ultrarestrictive opioid prescription protocol for pain management after gynecologic and abdominal surgery. *JAMA Netw Open* 2018;1(8):e185452.
16. Keller DS, Zhang J, Chand M. Opioid-free colorectal surgery: a method to improve patient & financial outcomes in surgery. *Surg Endosc* 2019;33(6):1959-1966.
17. Talwar R, Xia L, Serna J et al. Preventing excess narcotic prescriptions in new robotic surgery discharges: the PENN prospective cohort quality improvement initiative. *J Endourol* 2020;34(1):48-53.
18. Patel HD, Srivastava A, Patel ND et al. A prospective cohort study of postdischarge opioid practices after radical prostatectomy: the ORIOLES initiative. *Eur Urol* 2019;75(2):215-218.
19. Gridley C, Robles J, Calvert J et al. Enhanced recovery after surgery protocol for patients undergoing ureteroscopy: prospective evaluation of an opioid-free protocol. *J Endourol* 2020;34(6):647-653.