

Trends in Opioid Prescriptions after Laparoscopic Sterilization

Moona Arabkhazaeli, MD, Genevieve Umeh, MD, Bijan J. Khaksari, MPH, Lauren Sanchez, BA, Xianhong Xie, PhD, Kari Plewniak, MD

ABSTRACT

Background and Objectives: Examine trends in opioid prescriptions after laparoscopic sterilization over time, and identify any individual patient, provider, or procedural factors influencing prescribing.

Methods: A retrospective observational cohort analysis of laparoscopic sterilizations between January 1, 2016 and December 31, 2019 at Montefiore Medical Center. A review of the medical records was performed and information on patient demographics, comorbid conditions, and surgical characteristics were collected. The number of opioid pills prescribed postoperatively and any pain related patient calls, visits, or refills was recorded.

Results: Between January 1, 2016 and December 31, 2019, 615 laparoscopic sterilizations were performed. The median number of opioid pills prescribed was 10, ranging from 0 to 40. There was a significant decrease in the number of opioid pills prescribed ($p < .0001$) and refill incidence ($p < .001$) over time. Patients with a documented diagnosis of pelvic pain received significantly more opioid pills ($p = .02$), as did patients who underwent tubal occlusion versus salpingectomy ($p = .01$). There was no association between the number of opioid pills prescribed and other patient or procedural characteristics. Finally, the number of pills prescribed was not associated with urgent patient contact ($p = .34$).

Department of Obstetrics and Gynecology, Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY (Drs Arabkhazaeli, Umeh, Khaksari, Sanchez and Plewniak).

Department of Epidemiology and Population Health, Montefiore Medical Center/Albert Einstein College of Medicine, Bronx, NY (Dr. Xie).

Disclosure: none.

Conflict of Interest: none.

Funding/Financial Support: none.

Informed consent: Dr. Moona Arabkhazaeli declares that written informed consent was obtained from the patient/s for publication of this study/report and any accompanying images.

Address correspondence to: Dr. Moona Arabkhazaeli, Department of Obstetrics and Gynecology, Montefiore Medical Center, 3332 Rochambeau Ave, Suite 1 C Bronx, NY, USA, 10467, Telephone: 718-920-5157, E-mail: moona1325@gmail.com.

DOI: 10.4293/JSLs.2020.00088

© 2021 by SLS, Society of Laparoscopic & Robotic Surgeons. Published by the Society of Laparoscopic & Robotic Surgeons.

Conclusions: The overall number of opioid pills prescribed after laparoscopic sterilization decreased at our institution over time, which paralleled a decrease in refills and urgent postoperative patient contact. Further, few clinical characteristics influenced postoperative prescribing and there was no association between number of pills prescribed and urgent patient contact. These findings suggest excess prescribing and highlight the need to identify and adopt an evidenced-based approach to post-surgical opioid prescriptions.

Key Words: Sterilization, Tubal, Prescription Drug Misuse, Pain, Postoperative.

INTRODUCTION

Prescription opioid abuse is a nationwide epidemic.¹ The Centers for Disease Control and Prevention estimates that from 1999 to 2017 almost 400,000 people died from opioids, often involving prescription opioids.² A survey of Americans receiving opioid prescriptions for pain demonstrated that more than half had leftover opioids, and 61.3% of those planned on saving the opioids for future use.³ Leftover prescription medication is a major source of diverted or misused opioids, and growing literature suggests that physicians prescribe opioids in excess of what is needed for pain.³⁻⁷

Peri-operative care presents a unique challenge as providers must ensure adequate analgesia while minimizing excess prescribing. A significant proportion of opioid prescriptions are related to postsurgical care, and there is evidence that 6.8% of patients develop new, persistent opioid use after gynecologic surgery.^{2,8} This number is significant when considering frequently performed gynecologic procedures such as laparoscopic sterilization, a procedure performed on 640,000 women every year.⁹ Despite this, there are few evidenced-based guidelines informing gynecologic surgeon prescribing.¹⁰ Enhanced recovery after surgery protocols encourage multimodal, opioid-sparing, postoperative pain-control and recommending prescribers account for patient factors when prescribing postoperative opioids, but explicit prescribing

Table 1. Demographic and Operative Characteristics	
	N = 615
Number of opioids, median (IQR)	10 (5–15)
Year of surgery, n (%)	
2016	153 (24.9)
2017	159 (25.9)
2018	154 (25.0)
2019	149 (24.2)
Specialty, n (%)	
Family Planning	269 (43.9)
General	194 (31.7)
Minimally Invasive Gynecological Surgery	149 (24.3)
Other	1 (0.2)
Resident year of training, n (%)	
PGY1	449 (73.0)
PGY2	156 (25.4)
PGY3	4 (0.7)
PGY4	6 (1.0)
Surgery time, median (IQR)	40 (31–51)
Number of previous surgeries, median (IQR)	0 (0–1)
Depression or anxiety, n (%)	
No	554 (90.2)
Yes	60 (9.8)
Chronic pain, n (%)	
No	558 (90.9)
Yes	56 (9.1)
Pelvic pain, n (%)	
No	603 (98.2)
Yes	11 (1.8)
Procedure type, n (%)	
Salpingectomy	423 (69.0)
Tubal occlusion	190 (31.0)
Additional procedure, n (%)	
0: None	565 (92.0)
1: Hysteroscopy	16 (2.6)
2: Ovarian cystectomy	8 (1.3)
3: Endometriosis	1 (0.2)
4: Other	20 (3.3)
5: Salpingoophorectomy	2 (0.3)
1,2,3	1 (0.2)
1,4	1 (0.2)

Table 1. Continued	
	N = 615
EBL, median (IQR)	5 (5–10)
Number of incisions, median (IQR)	3 (2–3)
10–12 mm port, n (%)	
No	593 (96.6)
Yes	21 (3.4)
Use of lidocaine, n (%)	
No	262 (42.6)
Yes	353 (57.4)
Residents prescribed, n (%)	
No	11 (1.8)
Yes	604 (98.2)

IQR, interquartile range; PGY, post graduate year; EBL, estimated blood loss.

regimens and procedure specific recommendations are lacking.¹¹

This study seeks to contribute to the literature on opioid prescribing patterns after gynecologic surgery by focusing on laparoscopic sterilization. Our primary objective is to describe trends in post-sterilization opioid prescriptions and refills over time. Our secondary aim is to identify any individual patient, prescriber, or surgical factors that may influence prescribing patterns. We hypothesized that increasing provider awareness and education has led to a decrease in opioid prescriptions over time.

METHODS

Institutional review board approval was obtained to review the medical records of laparoscopic sterilizations performed at Montefiore Medical Center, Bronx NY, between January 1, 2016 and December 31, 2019. Cases were identified using procedure codes. This time frame was chosen as the electronic medical record (EMR) at our institution was universally implemented after January 1, 2016.

Patient demographic data including age, race/ethnicity, and language were collected from the medical records. Comorbid conditions including fibromyalgia, chronic pain, pelvic pain, depression and anxiety, and tobacco use history were obtained from the surgical admission history and physical. The method of sterilization (salpingectomy versus tubal occlusion via electrosurgery), the performance of concurrent procedures, and additional surgical characteristics such

Table 2.
Trends in Opioid Prescriptions Over Time

	2016	2017	2018	2019	P-Value
Number of opioid pills (median, IQR)	15 (10–20)	10 (10–20)	10 (5–10)	5 (0–10)	< .0001
Analgesic refill prescribed (N, percent)	9 (5.9)	7 (4.4)	0 (0)	1 (0.7)	.001
Unscheduled patient contact (N, percent)	14 (9.2)	10 (6.3)	2 (1.3)	5 (3.4)	.005

IQR, interquartile range.

as operative time, estimated blood loss, port number and size, and use of local anesthetic were recorded. Surgeon and prescriber characteristics were also recorded; surgeon subspecialty was defined based on the academic division in which they are employed.

All analgesics prescribed and any refills sent within two weeks of surgery were recorded. Each type of prescribed opioid (oxycodone, oxycodone-acetaminophen, tramadol, acetaminophen with codeine, or hydromorphone) was recorded, and was cumulatively described as ‘number of opioid pills.’ Unscheduled patient contact was defined as urgent visits or phone calls for pain within two weeks of surgery.

Data analysis was performed using SAS software version 90.4. The Mann-Whitney U test was used to analyze continuous variables and the χ^2 test and the Fisher’s exact test were used to compare categorical variables. The Spearman’s correlation was used to analyze the association between two continuous variables. All tests were two-sided, and a p-value < 0.05 was considered statistically significant.

RESULTS

We identified 615 patients who underwent a laparoscopic sterilization between January 1, 2016 and December 31, 2019. Patient, provider, and procedural characteristics are outlined in **Table 1**. The number of sterilization procedures performed remained stable over time. During the study period, 69% of patients underwent salpingectomy and 31% underwent sterilization by tubal occlusion via electrosurgery. Sterilizations were performed by 45 different surgeons; almost half (43.9%) of procedures were performed by the Family Planning division, and the remainder were performed by a general obstetrician and gynecologist (31.7%), a minimally invasive surgeon (24.3%), or other (0.2%).

Most patients were prescribed oxycodone-acetaminophen (74%) or oxycodone (11%), with the remainder being

prescribed acetaminophen with codeine (2%), tramadol (< 1%) or hydromorphone (< 1%). Most patients received a nonsteroidal anti-inflammatory and acetaminophen as well. Twelve percent of patients did not receive a prescription for any opioid medication. Overall, the median number of postoperative opioid pills prescribed was 10 (interquartile range 5 – 15) with a range of 0 – 40 (**Table 1**). The number of opioid pills prescribed post-sterilization decreased over time (p < .0001) (**Table 2**).

Surgeon subspecialty and resident year of training were both significantly associated with number of opioids prescribed (p < .0001; p < .0001) (**Table 3**). A history of chronic pain was significantly associated with number of opioids prescribed (p = .02), but a history of pelvic pain (p = .74) and depression (p = .69) or anxiety (p = .27) were not (**Table 3**). There was a statistically significant difference in the number of opioid pills prescribed after a salpingectomy as compared with a tubal occlusion (p = .01), with patients being prescribed less after salpingectomies. Estimated blood loss (p = .70), number of incisions (p = .08), port size (p = .08), or use of lidocaine (p = .22) were not associated with the number of pills prescribed (**Table 3**).

Thirty-one patients (5.04%) had an urgent visit or phone call, and 17 (2.76%) received an analgesic refill within 2 weeks of surgery (**Table 2**). Nine (1.46%) of the 615 patients received an opioid refill postoperatively. The number of opioid pills prescribed was not significantly associated with the incidence of unscheduled patient contact (p = .34), but paradoxically was directly associated with analgesic refills (p = .01) (**Table 4**). The greater the initial prescription, the more likely a patient was to get a refill. The incidence of unscheduled patient contact and refills both significantly decreased over time (**Table 2**).

CONCLUSION

In a large academic medical center, the number of opioids provided after laparoscopic sterilization has decreased

Table 3.
Associations Between Number of Opioid Pills and
Demographic and Operative Characteristics

	Median Number of Opioid Pills, IQR	P-Value
Specialty		<.0001
Family Planning	10 (5–10)	
General	10 (5–15)	
Minimally Invasive Gynecological Surgery	15 (10–20)	
Other	30 (30–30)	
Resident year of training		<.0001
PGY1	10 (5–12)	
PGY2	15 (10–20)	
PGY3	8 (3–18)	
PGY4	15 (6–20)	
Resident prescribed		.78
No	10 (0–15)	
Yes	10 (5–15)	
Depression		.69
No	10 (5–15)	
Yes	10 (5–20)	
Anxiety		.37
No	10 (5–15)	
Yes	10 (5–20)	
Chronic pain		.02
No	10 (5–15)	
Yes	10 (10–20)	
Chronic pelvic pain, median (IQR)		.74
No	10 (5–15)	
Yes	10 (6–15)	
Procedure type, median (IQR)		.01
Salpingectomy	10 (5–15)	
Tubal occlusion	10 (6–15)	
10–12 mm port, median (IQR)		.08
No	10 (5–15)	
Yes	15 (10–20)	
Use of lidocaine, median (IQR)		.22
No	10 (5–15)	
Yes	10 (5–15)	
	Spearman's correlation	P-value
Estimated blood loss	-.02	.70
Surgery time	-.02	.62
Number of incisions	-.07	.08

IQR, interquartile range; PGY, post graduate year.

over time. However there remains concern for unselective and possibly excessive prescribing.

We present encouraging trends in the number of opioid pills prescribed after laparoscopic sterilization over time at our institution, which paralleled a decrease in the incidence of postoperative urgent patient contact and analgesic refills. In contrast, Thompson et al. demonstrated an increase in opioid prescriptions after hysterectomy from 2004 to 2014, despite a concomitant increase in minimally invasive routes.¹⁰ Our more recent time period of 2016 to 2019 suggests a shift in trends towards more judicious opioid prescribing among gynecologists. Alternatively, this may reflect cultural or individual physician practices at our institution.

A study of obstetrics & gynecology residents training in the United States found that prescribing practices were influenced by region, program, and hospital factors, rather than individual patient or procedural factors.¹² In agreement, we found that provider factors including surgeon subspecialty and prescriber year of training were associated with the number of opioid pills given. Additionally, patients who received more initial opioid pills were more likely to receive a refill, suggesting that certain prescribers may have more liberal prescribing practices. These findings highlight the need to emphasize an approach to opioid prescribing that is driven by clinical factors rather than physician preference or training.

In this cohort, the only patient factor associated with the number of postoperative opioids given was a history of chronic pain. While research shows that it may be more difficult to achieve pain relief in patients with chronic pain,¹³ reflexively prescribing more opioids to these patients may result in overprescribing to a patient population at increased risk of dependence.¹⁴ Two studies of patients undergoing hysterectomy demonstrated that while patients with a chronic pain syndrome have increased opioid use postoperatively, they were still prescribed excess opioids.^{5,15} Recommendations to optimize postoperative pain control and minimize sequelae of opioid use in this patient population includes a pre-operative referral to a pain management provider and continuing their pre-operative pain regimen post operatively (Stone), but additional guidelines are lacking.¹¹ A prospective analysis on postoperative opioid prescriptions in this patient population is an important area for future research.

In our study there was no association between the number of opioid pills prescribed and unscheduled patient contacts. Even as the number of opioids prescribed

Table 4.
Association of Unscheduled Patient Contact and Refills with Number of Opioid Pills Prescribed

	Median Number of Opioid Pills, IQR		P-Value
	No	Yes	
Unscheduled patient contact	10 (5–15)	10 (10–15)	.34
Refills	10 (5–15)	15 (10–20)	.01

decreased over time, there was no increased urgent patient contact or refills. Additionally, 12% of patients received zero opioids and only 1 of those 76 patients had unscheduled contact resulting in an opioid prescription. These findings suggest that prescribers overestimate patients’ analgesic needs. Studies by As Sanie et al. and Wong et al. demonstrated this by finding that patients undergoing hysterectomy were prescribed two to four times the amount of opioids than was needed.^{15,16} Further, Plewniak et al. randomized patients to 5 or 10 opioid pills after minor gynecologic laparoscopy and found similar use (2 tablets vs 2.5 tablets, respectively) between the groups and consequently more unused opioid pills in the latter.¹⁷ These findings have important implications as a larger initial prescription incurs more risk for a long-term opioid use disorder.^{8,18} Additional research investigating the appropriate number of postoperative opioid pills is needed, in particular identifying in which patients an opioid-free approach may be feasible.

A potential limitation of our study is that we examined a composite number of opioid pills, rather than converting all to oral morphine equivalents. We took this approach for clarity; further, the vast majority (96.5%) of opioid prescriptions were oxycodone, thus the small percentage of patients receiving alternate opioids were unlikely to affect our result. An additional limitation inherent in the retrospective design was that we were limited by the data available in the EMR. A patient theoretically may have had unscheduled contact for pain that was not documented and therefore not captured, but we expect this to be rare. Conversely, use of the EMR and its electronic prescribing feature allowed us to construct a comprehensive and reliable dataset, an important strength. Finally, due to the retrospective nature we were unable to quantify patient use of opioids, patient satisfaction, or quality of recovery.

Our study has several additional strengths. Examining a recent time frame, during which state mandated provider education on opioid abuse was implemented, enhances the relevance of our findings. Future research examining why opioid prescriptions have decreased could help develop

interventions to minimize overprescribing. Additionally, we investigated a large sample size in a community that is disproportionately affected by the opioid epidemic. In doing so we provide insight into changing prescribing behavior that may have a beneficial impact on our community.

Postoperative prescriptions represent an important target for curtailing the opioid epidemic. Our study suggests that physician factors, rather than clinical characteristics, drive postoperative prescribing practices, and may result in excess prescribing. This information could assist the development of evidence-based, individualized opioid prescribing guidelines.

References:

1. Hill MV, McMahon ML, Stucke RS, Barth RJ Jr., Wide variation and excessive dosage of opioid prescriptions for common general surgical procedures. *Ann Surg.* 2017;265(4):709–714.
2. Wright JD, Huang Y, Melamed A, et al. Use and misuse of opioids after gynecologic surgical procedures. *Obstet Gynecol.* 2019;134(2):250–260.
3. Kennedy-Hendricks A, Gielen A, McDonald E, McGinty EE, Shields W, Barry CL. Medication sharing, storage, and disposal practices for opioid medications among US adults. *JAMA Intern Med.* 2016;176(7):1027–1029.
4. Bateman BT, Cole NM, Maeda A, et al. Patterns of opioid prescription and use after cesarean delivery. *Obstet Gynecol.* 2017;130(1):29–35.
5. Patanwala I, Ouyang C, Fisk M, Lamvu G. Opioid prescription usage after benign gynecologic surgery: a prospective cohort study. *J Minim Invasive Gynecol.* 2020;27(4):860–867.
6. Feinberg AE, Chesney TR, Srikandarajah S, Acuna SA, McLeod RS. Opioid use after discharge in postoperative patients: a systematic review. *Ann Surg.* 2018;267(6):1056–1062.
7. Waljee JF, Li L, Brummett CM, Englesbe MJ. Iatrogenic opioid dependence in the United States: are surgeons the gatekeepers? *Ann Surg.* 2017;265(4):728–730.
8. Sekhri S, Arora NS, Cottrell H, et al. Probability of opioid prescription refilling after surgery: does initial prescription dose matter? *Ann Surg.* 2018;268(2):271–276.

9. Chan LM, Westhoff CL. Tubal sterilization trends in the United States. *Fertil Steril*. 2010;94(1):1–6.
10. Thompson JC, Komesu YM, Qeadan F, et al. Trends in patient procurement of postoperative opioids and route of hysterectomy in the United States from 2004 through 2014. *Am J Obstet Gynecol*. 2018;219(5):484.e1–84.
11. Stone R, Carey E, Fader AN, et al. Enhanced recovery and surgical optimization protocol for minimally invasive gynecologic surgery: an AAGL white paper. *J Minim Invasive Gynecol*. 2020.
12. Baruch AD, Morgan DM, Dalton VK, Swenson C. Opioid prescribing patterns by obstetrics and gynecology residents in the United States. *Subst Use Misuse*. 2018;53(1):70–76.
13. Schrepf A, Harper DE, Harte SE, et al. Endogenous opioidergic dysregulation of pain in fibromyalgia: a PET and fMRI study. *Pain*. 2016;157(10):2217–2225.
14. Speed TJ, Parekh V, Coe W, Antoine D. Comorbid chronic pain and opioid use disorder: literature review and potential treatment innovations. *Int Rev Psychiatry*. 2018;30(5):136–146.
15. As-Sanie S, Till SR, Mowers EL, et al. Opioid prescribing patterns, patient use, and postoperative pain after hysterectomy for benign indications. *Obstet Gynecol*. 2017;130(6):1261–1268.
16. Wong M, Vogell A, Wright K, Isaacson K, Loring M, Morris S. Opioid use after laparoscopic hysterectomy: prescriptions, patient use, and a predictive calculator. *Am J Obstet Gynecol*. 2019;220(3):259.e1–59.
17. Plewniak KM, Kintzer E, Eisenberg R, Fazzari M, Shin JH. Examining reduced opioid prescriptions after gynecologic laparoscopy: a randomized controlled trial. *J Minim Invasive Gynecol*. 2020.
18. Shah A, Hayes CJ, Martin BC. Characteristics of initial prescription episodes and likelihood of long-term opioid use - United States, 2006-2015. *MMWR Morb Mortal Wkly Rep*. 2017; 66(10):265–269.