GYNECOLOGY

Gabapentin as an adjunct to paracervical block for perioperative pain management for first-trimester uterine aspiration: a randomized controlled trial

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BACKGROUND: Pain management approaches during uterine aspiration vary, which include local anesthetic, oral analgesics, moderate sedation, deep sedation, or a combination of approaches. For local anesthetic approaches specifically, we continue to have suboptimal pain control. Gabapentin as an adjunct to pain management has proven to be beneficial in gynecologic surgery. We sought to evaluate the impact of gabapentin on perioperative pain during surgical management of first-trimester abortion or early pregnancy loss with uterine aspiration under local anesthesia.

OBJECTIVE: We hypothesized that adding gabapentin to local anesthesia will reduce perioperative and postoperative pain associated with uterine aspiration. Secondary outcomes included tolerability of gabapentin and postoperative pain, nausea, vomiting, and anxiety.

STUDY DESIGN: We conducted a randomized double-blinded placebo-controlled trial of gabapentin 600 mg given 1 to 2 hours preoperatively among subjects receiving a first-trimester uterine aspiration under paracervical block in an outpatient ambulatory surgery center. There were 111 subjects randomized. The primary outcome was pain at time of uterine aspiration as measured on a 100-mm visual analog scale. Secondary outcomes included pain at other perioperative time points. To assess changes in pain measures, an intention to treat mixed effects model was fit with treatment groups (gabapentin vs control) as a between-subjects factor and time point as a within-subjects factor plus their interaction term. Because of a non-normal distribution of pain scores, the area under the curve was calculated for secondary outcomes with comparison of groups utilizing Mann-Whitney U tests.

RESULTS: Among the 111 randomized, most subjects were Black or African American (69.4%), mean age was 26 years (±5.5), and mean gestational age was 61.3 days (standard deviation, 14.10). Mean pain scores at time of uterine aspiration were 66.77 (gabapentin) vs 71.06 (placebo), with a mean difference of −3.38 (P=.51). There were no significant changes in pain score preoperatively or intraoperatively. Subjects who received gabapentin had significantly lower levels of pain at 10 minutes after surgery (mean difference [standard error (SE)]=−13.0 [−5.0]; P=.01) and 30 minutes after surgery (mean difference [SE]=−10.8 [−5.1]; P=.03) compared with subjects who received placebo. Median nausea scores and incidence of emesis pre- and postoperatively did not differ between groups. Similarly, anxiety scores did not differ between groups, before or after the procedure. At 10 and 30 minutes after the procedure, most participants reported no side effects or mild side effects, and this did not differ between groups.

CONCLUSION: Preoperative gabapentin did not reduce pain during uterine aspiration. However, it did reduce postoperative pain, which may prove to be a desired attribute of its use, particularly in cases where postoperative pain may be a greater challenge.

Key words: gabapentin, pain management, surgical abortion, uterine aspiration

Introduction

Uterine aspiration is one of the most common surgical procedures performed worldwide.[1,2] Indications include induced abortion and early pregnancy loss. The management of pain is critical to patient care as many patients experience substantial pain with the procedure.[3–7] Therefore, pain control during and after uterine aspiration is a family planning research priority.[8] Pain management regimens for uterine aspiration may include local anesthetic, oral analgesics, moderate sedation, deep sedation, or a combination of approaches. Although prior studies have assessed various modalities to improve pain associated with uterine aspiration,[9,10] these studies have yet to find an effective alternative to general anesthesia. Although the evidence supports the benefit of intravenous (IV) sedation (moderate or deep) at reducing intraoperative and postoperative pain with uterine aspiration,[11] IV sedation may not be an option for all patients or in all clinical settings.

Gabapentin is commonly prescribed to treat neuropathic and chronic pain. The mechanism of action may include calcium channel blockade or modulation of nociceptive neurotransmitters.[12] Gabapentin is an inexpensive medication with substantial evidence to support routine use and safety in reducing perioperative pain for nongynecologic procedures.[13] When used for inpatient obstetrical and gynecologic procedures, gabapentin has been shown to improve pain scores and reduce nausea and vomiting.[14,15] It is generally well-tolerated, with peak concentration reached by 2 hours, with minimal side effects and few contraindications.[13] A recent study evaluating the addition of gabapentin to an oral pain management regimen of lorazepam, ibuprofen, oxycodone, and acetaminophen with paracervical block (PCB) did not reduce postoperative pain at 5 minutes after surgical abortion.[16]

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AJOG at a Glance

Why was this study conducted?

This study aimed to evaluate if preoperative gabapentin, as an adjunct to paracervical block, reduced pain with uterine aspiration and to evaluate whether gabapentin is well-tolerated and decreases postoperative nausea, vomiting, and anxiety.

Key findings

The use of gabapentin as an adjunct to paracervical block for first-trimester uterine aspiration does not reduce intraoperative pain during uterine aspiration. Gabapentin reduced postoperative pain 10 and 30 minutes following first-trimester uterine aspiration. Gabapentin is safe for same-day gynecologic surgery.

What does this add to what is known?

This study supports the use of gabapentin as an adjunct to local anesthesia for decreasing postoperative pain after uterine aspiration.

A simple adjunct to current pain regimens could expand options for pain management during uterine aspiration as not all clinical sites routinely provide oral sedation or opioids for pain control. We hypothesized that gabapentin alone given before the procedure, as an adjunct to PCB, would reduce intraoperative pain with uterine aspiration. Secondary outcomes included tolerability of gabapentin and postoperative pain, nausea, vomiting, and anxiety.

Material and Methods

A randomized double-blind placebo-controlled trial was conducted at an ambulatory surgery center in Atlanta, GA. A member of the study team approached all patients who consented to uterine aspiration for surgical management of abortion or early pregnancy loss and selected local anesthesia following their selection and payment for the procedure. A standard recruitment script was employed, and patients expressing interest were screened for eligibility. For those who were ineligible or declined to participate, the reason was documented, and no other demographic information was collected.

Eligible participants were 18 years or older, consenting to uterine aspiration under local anesthesia, and fluent in English and had a driver to take them home. Exclusion criteria included allergy, sensitivity or contraindication to gabapentin, severe renal disease, current use of gabapentin or pregabalin within the past month, or contraindication to outpatient uterine aspiration under local anesthesia. All eligible participants who agreed to participate completed a written informed consent for the study with a member of the study team. Following enrollment, the clinic nurse reviewed each participant's medical history to verify eligibility before randomization. The institutional review board at Emory University approved the study protocol. This study was registered on clinicaltrials.gov (NCT02944656). Participants were remunerated for their time with a $30 gift card provided on the day of the procedure, and an additional $20 electronic gift card was emailed to them at completion of the postoperative day 1 survey.

Randomization was done using computer-generated random numbers using varying block sizes of 4 and 6. Gabapentin (two 300-mg capsules) and placebo (2 capsules) were prepared in identical gelatin capsules and then sealed in identical, sequentially numbered containers according to the randomization scheme by the study pharmacy. Once a participant was randomized, a member of the study team obtained the next sequentially numbered pill container, and a clinical nurse or coinvestigator administered the medication orally with sips of water. All participants received the intervention a minimum of 1 hour before starting the surgical procedure.[13] Ibuprofen 800 mg was administered to all participants in the recovery room following the procedure (per clinic protocol). No other oral or IV medications for pain or anxiety were administered.

Data were collected on a tablet using a web-based password-protected relational database (REDCap). Demographics, medical history, reproductive history, surgical history, gestational age, drug and alcohol use, medication used at home, and medications given in the clinic preoperatively were collected before surgery. Procedures were performed under PCB per standard clinic procedure. PCB consisted of 18 to 20 mL 1% nonbuffered lidocaine. Providers performed a 2- or 4-point block per provider preference. Our primary outcome was pain score at time of uterine aspiration as measured on a 100-mm visual analog scale (VAS), anchored by "no pain" at 0 mm and "worst pain imaginable" at 100 mm.[17,18] In addition, pain scores were collected before speculum placement and at time of PCB, dilation of the cervix, completion of the procedure (removal of the speculum), 10 minutes following the procedure, and 30 minutes following the procedure. In the recovery room, participants were also asked to recall the worst pain thus far throughout the experience (collected at both 10 and 30 minutes after the procedure).

We assessed nausea and vomiting preoperatively and at 10 and 30 minutes postoperatively. Nausea was assessed on a 100-mm VAS, whereas vomiting was dichotomized with a yes or no response. Anxiety before and after the procedure was measured using the preoperative state trait anxiety inventory.[19] We assessed safety and side effects using a validated recovery assessment[20,21] checklist at 10 and 30 minutes. The postanesthetic Aldrete recovery assessment evaluated oxygenation, respiration, circulation, consciousness, and activity, per clinic protocol. The safety checklist assessed dizziness, lack of muscle control, sleepiness or drowsiness, weakness, headache, and visual disturbance. Patients were discharged home with a prescription of 800 mg

ibuprofen per routine practice for the clinic (ie, no other pain medication prescription was provided at discharge). For patients who remained in the recovery room beyond 30 minutes, additional assessments were collected including current pain, anxiety, nausea, and emesis.

We contacted participants on postoperative day 1 to assess pain, nausea, vomiting, side effects, overall satisfaction with the procedure (on a 5-point scale), and a quality of recovery survey. In the assessment of pain, we identified if patients filled and used their prescription of ibuprofen. We also identified if any other medications were taken that were not administered by the clinic. Four weeks after the procedure, chart abstraction was completed to identify any additional patient calls or visits for potential side effects or complications. Randomization allocation was not revealed, and double-blinding (ie, of subjects and researchers) was maintained until time of analysis.

Our primary endpoint was pain during uterine aspiration as measured on a 100-mm VAS. We aimed to detect a 15-mm difference on the VAS as this difference has been regarded to be clinically meaningful in prior pain studies.[22,23] We assumed a standard deviation of 26 mm on the 100-mm VAS,[9] a power of 80%, and a 2-sided test with an alpha level of 0.05. We used a priori power analysis for our primary endpoint of pain at time of uterine aspiration, so we analyzed a pairwise test instead of a global comparison. After adjusting for non-normality and asymptotic relative efficiency using the Mann-Whitney U test statistic, and a projected loss to follow-up rate of 20%, we determined that we needed to randomize 111 participants.

Descriptive statistics were reported to characterize the study population. To explore the change in VAS pain scores at 7 different time points during the procedure (ie, before the operation, during the operation, and after the operation), a linear mixed effects model was used to quantify the pain scores. The model outcome was VAS pain scores and exposures including time points, group (gabapentin or placebo), and their interaction. From the mixed effects models, we reported the mean (standard error) at each time point by group. The hypothesis testing was performed to compare the VAS pain score between different groups at the same time point (ie, uterine aspiration). The mean differences (95% confidence interval) between groups and corresponding *P* values at each time point were reported from the linear mixed effects model.

Because of their non-normal distribution, secondary outcomes including nausea, worst pain (at 10 and 30 minutes), and anxiety were evaluated by calculating the area under the curve (AUC) values and comparing groups utilizing the Mann-Whitney U test. The AUC for each outcome was calculated as the product of the average measure score over a period and the duration of the measurement.[24]

Side effect assessment by treatment groups was compared using Fisher's exact test, in consideration of small numbers (<5) in some categories. For postoperative day 1 assessment, the Mann-Whitney U test and χ^2 test were utilized for continuous and categorical outcomes, respectively. All analyses were conducted using SAS 9.4. An alpha level

FIGURE 1
Flow diagram of study participants, per consolidated standard of reporting trials

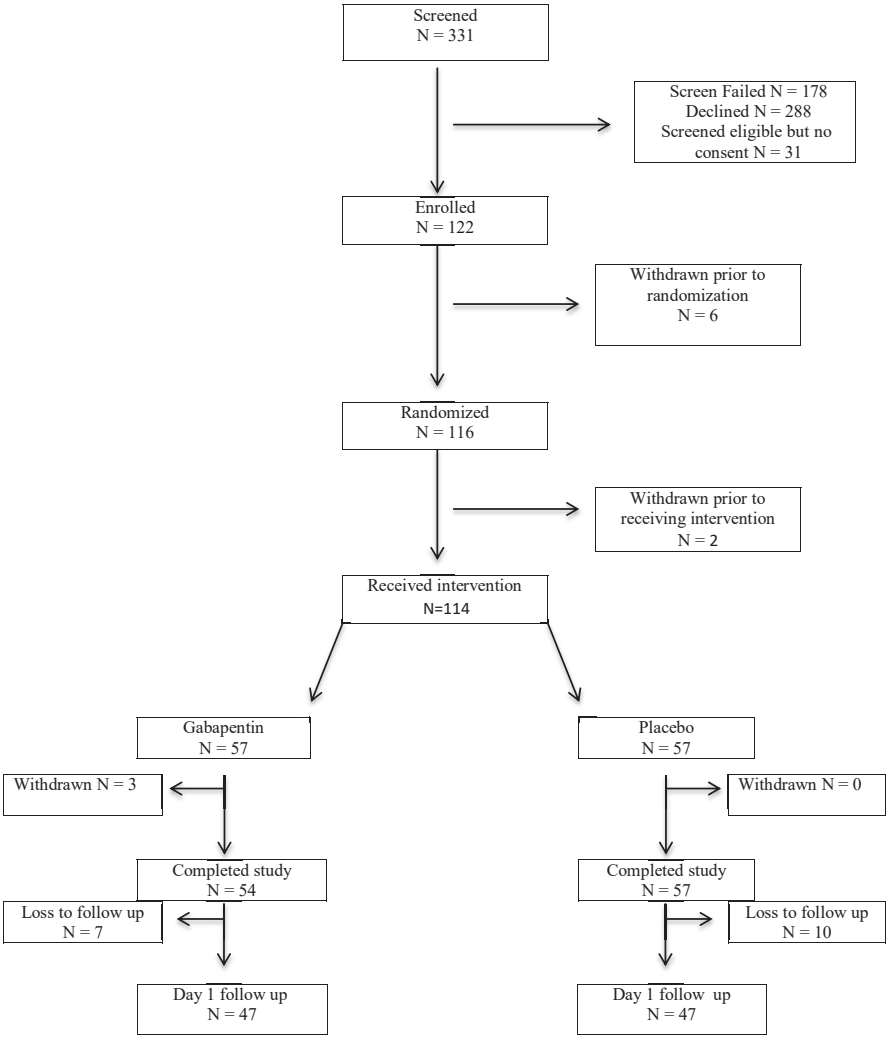

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TABLE 1
Demographic characteristics (N = 111)

Characteristics	Gabapentin (n=54)	Placebo (n=57)
Age (y)	25.2±5.5	26.8±5.5
BMI (kg/m^2)	29.8±7.2	29.0±7.1
Gestational age	60.1±15.1	62.5±13.2
Gravidity		
1	14 (25.9)	14 (24.6)
2–3	19 (35.2)	24 (42.1)
≥4	21 (38.9)	19 (33.3)
Parity		
0	19 (35.2)	22 (38.6)
1	16 (29.6)	18 (31.6)
≥2	19 (35.2)	17 (29.8)
Previous cesarean delivery		
0	45 (83.3)	46 (80.7)
1	7 (13.0)	8 (14.0)
≥2	2 (3.7)	3 (5.3)
Previous vaginal delivery		
0	27 (50.0)	31 (54.4)
1	11 (20.4)	13 (22.8)
≥2	16 (29.6)	13 (22.8)
Prior abortion		
0	29 (53.7)	32 (56.1)
1	15 (27.8)	15 (26.3)
≥2	10 (18.6)	10 (17.5)
Race		
American Indian	1 (1.8)	1 (1.7)
Asian	0 (0)	0 (0)
Black or African American	35 (64.8)	42 (73.7)
White or Caucasian	15 (27.8)	13 (22.8)
Mixed or multiracial	0 (0)	3 (5.3)
Other	2 (3.5)	0 (0)
Native Hawaiian or Pacific Islander	0 (0)	0 (0)
Do not know, refused, or not specified	0 (0)	0 (0)
Ethnicity		
Hispanic	3 (5.6)	2 (3.5)
Non-Hispanic	51 (94.4)	55 (96.5)
Marital status		
Single, divorced, or widowed	51 (94.4)	50 (87.7)
Cohabitating	1 (1.9)	0 (0)
Married	2 (3.7)	7 (12.3)

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of 0.05 was utilized to determine the statistical significance level.

Results

Between December 2016 and July 2018, a total of 331 participants were screened for study eligibility to enroll 122 participants (Figure 1). There were 6 participants who consented and enrolled but later withdrew because of randomization. Factors contributing to their withdrawal included concern with side effects or wait time needed to participate in the study. Of the 116 participants randomized, 114 received the intervention. After randomization, there were 2 participants that withdrew from the study before receiving the intervention because of the inability to swallow capsules. A total of 3 participants were withdrawn after receiving the intervention because of changing their mode of anesthesia or refusal to participate with measuring pain at intraoperative time points. The total number of participants completing study participation on the day of surgery was 111.

Demographic characteristics of the gabapentin and placebo arms were similar. Most participants were identified as African American and non-Hispanic, with an overall mean gestational age of 61.3 days (Table 1). History of anxiety was higher among the gabapentin group (15 [27.8%] vs 8 [14.0%]), whereas history of depression was similar for both groups. Overall, past marijuana use was relatively common, but current daily use was more common among gabapentin participants (8 [14.8%] vs 1 [1.8%]) (Table 2).

Pain at time of uterine aspiration was similar for both groups (mean pain score, 67.77 for gabapentin vs 71.06 for placebo) with a mean difference of −3.28 (P=.51) (Figure 2). There were no differences in mean pain scores between groups for preoperative or other points of intraoperative pain. Postoperative pain scores at 10 and 30 minutes were significantly lower in the gabapentin group at both time points (Table 3). The worst pain scores were similar between groups, and AUC showed no statistical difference between

TABLE 1
Demographic characteristics (N = 111) *(continued)*

Characteristics	Gabapentin (n=54)	Placebo (n=57)
Education		
Less than high school	1 (1.9)	0 (0)
Some high school	5 (9.3)	2 (3.5)
High school diploma or GED	12 (22.2)	17 (29.8)
Some college	22 (40.7)	16 (28.1)
Associate degree or technical certificate	6 (11.1)	9 (15.8)
Bachelor's degree	6 (11.1)	10 (17.5)
Master's degree or higher	2 (3.7)	3 (5.3)
Income		
≤$10,000	24 (44.4)	20 (35.1)
$10,001–$25,000	12 (22.2)	14 (24.6)
$25,001–$50,000	12 (22.2)	14 (24.6)
$50,001–$75,000	2 (3.7)	2 (3.5)
$75,001–$100,000	1 (1.9)	0 (0)
≥100,001	0 (0)	2 (3.5)
Do not know or refused	3 (5.6)	4 (7.0)
Insurance		
Medicare or Medicaid	18 (33.3)	22 (38.6)
None	15 (27.8)	14 (24.6)
Private	21 (38.9)	20 (35.1)

BMI, body mass index; *GED*, general educational diploma.
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gabapentin and placebo users (Table 4).

Few participants reported nausea or vomiting pre- or postoperatively. Median nausea scores and incidence of emesis pre- and postoperatively did not differ between groups (Table 4). Similarly, anxiety scores did not differ between groups, before or after the procedure. At 10 and 30 minutes after the procedure, most participants reported no side effects or mild side effects. Very few participants reported moderate or severe symptoms. Side effects did not differ between groups (Table 5).

Seventeen participants were discharged beyond the typical 30-minute time frame. Most delays in discharge were because of clinic flow between postoperative counseling and discharge from the clinic. One patient had a vasovagal response managed with IV fluid hydration with subsequent delay in discharge. There were no documented severe adverse reactions.

Overall, 84.7% of participants completed the postoperative day 1 assessment. The completion of primary outcomes and postoperative day 1 assessment was similar between groups (47 of 54 in the gabapentin group and 47 of 57 in the placebo group). There were 51 participants that reported filling and using the prescription of ibuprofen postoperatively (24 [44.4%] for gabapentin and 27 [47.4%] for placebo; P=.66). The average number of tablets taken of the prescribed ibuprofen was 2.5 tablets. No participants reported taking any other pain medications aside from the prescribed ibuprofen. One participant called the clinic due to cramping and pain postoperatively. Most participants denied having moderate or severe pain since being discharged from the clinic.

Most participants said that their pain experience was better than anticipated (34 [63.0%] for gabapentin and 30 [52.6%] for placebo). When asked about receiving gabapentin for future procedures with local anesthesia, overall, 74 (66.7%) stated that they would be interested (41 [75.9%] for gabapentin and 33 [57.9%] for placebo). Participants were always blinded to the study intervention even after study completion. Many (51 [45.9%]) participants rated their satisfaction with the overall experience as a 9 or higher out of 10 on the satisfaction scale, and this did not differ between groups (P=.47).

Discussion

Principle findings

We investigated the use of gabapentin as an adjunct to PCB for first-trimester uterine aspiration and found that gabapentin did not reduce intraoperative pain during uterine aspiration. Gabapentin 600 mg was selected as a well-tolerated intermediate dosage with benefit proven in prior preoperative studies.[14] Prior studies did not show improvement in pain scores with higher dosing. Participants waited a minimum of 1 hour after drug administration to undergo their procedure to allow the medication to reach an adequate concentration for effect (time to peak concentration=2 hours). Although we investigated gabapentin in the setting of an ambulatory surgery center, we anticipated that the results would be similar for uterine aspiration for other outpatient clinical settings like a provider's office or an emergency department. The primary challenge for patients receiving a uterine aspiration in the outpatient setting without IV sedation or general anesthesia is perioperative pain, and unfortunately, this peak time of pain did not significantly alter with gabapentin given preoperatively.

There are limited studies that have evaluated the use of gabapentin for pain management in outpatient surgery. Most studies evaluating its use were in the setting of general anesthesia and moderate sedation. A recent randomized controlled trial evaluating gabapentin as an adjunct to minimal sedation for postoperative pain management found no effect in pain scores intraoperatively

TABLE 2
Medical history and drug use (N = 111)

Medical history and drug use	Gabapentin (n=54)	Placebo (n=57)
Anxiety	15 (27.8)	8 (14.0)
Depression	10 (18.5)	8 (14.0)
NSAIDs	51 (94.4)	55 (96.5)
Use within 6 mo	34 (63.0)	35 (61.4)
Daily	2 (3.7)	2 (3.5)
Weekly	5 (9.3)	8 (14.0)
Monthly	27 (50.0)	25 (43.9)
Opioid	17 (31.5)	22 (38.6)
Use within 6 mo	1 (1.9)	5 (8.8)
Daily	0	0
Weekly	0	1 (1.8)
Monthly	1 (1.9)	4 (7.0)
Heroin users	0	0
Methamphetamine	0	2 (3.5)
Use within 6 mo	0	2 (3.5)
Cocaine or crack	1 (1.9)	3 (5.3)
Use within 6 mo	0	1 (1.8)
Weekly	0	1 (1.8)
Other illicit drugs	2 (3.7)	2 (3.5)
Use within 6 mo	1 (1.9)	1 (1.8)
Weekly	0	1 (1.8)
Monthly	1 (1.9)	0
Marijuana	23 (42.6)	20 (35.1)
Use within 6 mo	15 (27.8)	8 (14.0)
Daily	8 (14.8)	1 (1.8)
Weekly	1 (1.9)	3 (5.3)
Monthly	6 (11.1)	4 (7.0)
Tobacco	18 (33.3)	15 (26.3)
Use within 6 mo	10 (18.5)	9 (15.8)
Daily	6 (11.1)	7 (12.3)
Weekly	3 (5.6)	1 (1.8)
Monthly	1 (1.9)	1 (1.8)
Alcohol	44 (81.5)	48 (84.2)
Use within 6 mo	33 (61.1)	32 (56.1)
Weekly	11 (20.4)	8 (14.0)
Monthly	22 (40.7)	24 (42.1)

Data are presented as number (percentage). Percent totals may not add up to 100 because of rounding.

NSAID, nonsteroidal anti-inflammatory drug.

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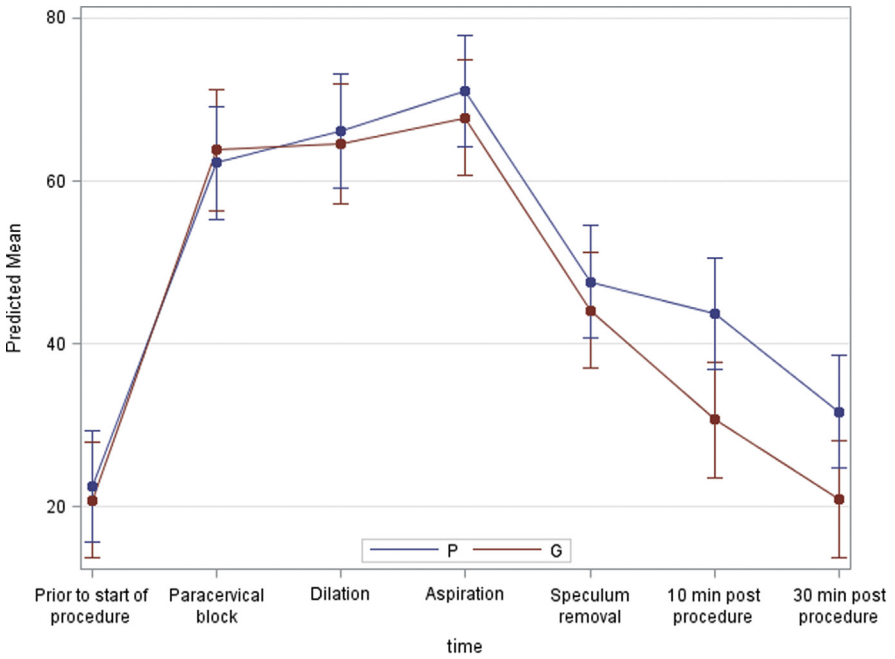
or immediately after the procedure (5 minutes).[16] Our study of gabapentin alone did show improved pain scores with increased time after the procedure, with patients in the gabapentin group reporting markedly reduced pain by time of discharge. Other clinical trials have noted improvement in postsurgical pain with perioperative gabapentin for procedures other than uterine aspiration.[12] In the setting of obstetrics and gynecology, evidence supports perioperative gabapentin before hysterectomy to reduce postoperative pain scores at 24 hours, analgesia need, nausea, and vomiting.[14,15] Although these studies evaluated gabapentin for in-hospital major gynecologic and obstetrical procedures, our results highlight a utility for postoperative pain for outpatient procedures.

Prior studies evaluating a single dose of gabapentin given preoperatively also showed a reduction in postoperative opioid consumption.[14,16] Although we cannot comment on the effect of gabapentin on postoperative opioid use in the outpatient setting, our study reaffirms that for most patients, opioids are not needed for postoperative pain management after uterine aspiration. None of our participants reported taking any other pain medications aside from the prescribed ibuprofen. Only 1 study participant called the clinic following the procedure due to concern with cramping and pain postoperatively. Overall, participants in our study reported high satisfaction and denied moderate or severe pain 24 hours postoperatively.

Pain control for outpatient uterine aspiration may be challenging because of availability of pharmacologic agents or acceptability of these methods for patients. Patients who screened out for our study reported concern with potential side effects of the medication in addition to the potential prolonged wait time to allow maximal benefit of the medication. These factors may also account for the proportion of patients that stated they would not use gabapentin in the future for uterine aspiration. In addition, some participants had issues with swallowing

FIGURE 2
Pain scores at perioperative time points by treatment groups on visual analog scale



The primary endpoint was at time of uterine aspiration. There were no statistical differences (P=.51).
P, placebo; *G*, gabapentin.
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tablets, whereas others opted for a change in anesthesia because of potential pain concerns. Pain anticipation and perception are multifaceted, and expanding the options for pain management with uterine aspiration is imperative.

Strengths and limitations

This study has several strengths. Our population was diverse with a large African American demographic, which is a population often underrepresented in clinical studies; however, we recognize that generalizability to other populations may nonetheless be limited. A prior study evaluating predictors and perception of pain with first-trimester surgical abortion found that nonwhite women and women who preoperatively expected more pain reported higher pain scores with the procedure.[25] However, the trend toward more pain experienced by nonwhite women was not statistically significant. In addition, we used validated scales from prior abortion research to assess a proven effective dose of gabapentin. However, we conducted this study in a clinic where IV sedation was available on most days and enrolled participants after their pain control option was decided, therefore recruiting a population that self-selected PCB only for their procedure. It is possible that patients who know that they may not handle pain well opt for sedation or that patients with known higher pain thresholds opt for local anesthesia. Anecdotally, patients sometimes choose PCB because they do not have a driver, but our requirement of a driver for the study negates the impact of that factor. Although our study was not designed to assess sedation after preoperative gabapentin, most of our subjects reported no to mild side effects 24 hours following their procedure. A subset of patients who want an adjunct to PCB without IV sedation may benefit from gabapentin, especially if they desire less sedation or related side effects throughout the perioperative process.

TABLE 3
Mean pain scores at perioperative time points for gabapentin and placebo

Time point	Gabapentin, mean (SE)	Placebo, mean (SE)	Mean difference	95% CI of difference	*P* value
Pain before start of procedure	20.76 (3.60)	22.48 (3.49)	−1.71	(−11.56 to 8.13)	.73
Paracervical block	63.79 (3.77)	62.21 (3.52)	1.57	(−8.54 to 11.69)	.76
Dilation	64.58 (3.74)	66.12 (3.54)	−1.55	(−11.66 to 8.56)	.76
Aspiration	67.77 (3.63)	71.06 (3.49)	−3.28	(−13.17 to 6.61)	.51
Speculum removal	44.10 (3.60)	47.61 (3.52)	−3.50	(−13.39 to 6.38)	.49
Current pain at 10 min after procedure	30.64 (3.65)	43.68 (3.47)	−13.04	(−22.94 to −3.15)	.01
Current pain at 30 min after procedure	20.89 (3.68)	31.65 (3.54)	−10.76	(−20.79 to −0.73)	.03

Estimates are from the linear mixed effects model.
CI, confidence interval; *SE*, standard error.
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TABLE 4
Nausea, anxiety, and worst pain for gabapentin and placebo

Outcome	N	Before procedure	10 min after procedure	30 min after procedure	*P* value
Nausea					.09
Gabapentin	54	26 (3, 57.0)	1 (0.0, 22)	0 (0.0, 16)	
Placebo	57	26 (9, 59.0)	12 (0.0, 52)	5 (0.0, 26)	
Anxiety					.34
Gabapentin	54	66 (21, 83.0)	14 (0.0, 36)	4 (0.0, 29)	
Placebo	57	72 (52, 96.5)	17 (0.0, 49)	2 (0.0, 27)	
Worst pain					.33
Gabapentin	54		67 (47.5, 87)	65 (39.0, 79)	
Placebo	57		71 (57.0, 79)	67.5 (53.5, 79)	
Vomiting					.34[a]
Gabapentin	54	4 (7.41)	5 (9.26)	5 (9.26)	
Placebo	57	7 (12.28)	2 (3.51)	5 (8.77)	

Data are presented as median (quartile 1, quartile 3) or number (percentage).

P value from area under the curve comparison.

[a] *P* value from Breslow-Day homogeneous association test.

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TABLE 5
Side effects with gabapentin and placebo

	10 min after procedure			30 min after procedure		
Side effects	Gabapentin, N=53	Placebo, N=56	*P* value[a]	Gabapentin, N=51	Placebo, N=56	*P* value[a]
Dizziness			.27			.41
No	26 (48.1)	33 (57.9)		31 (57.4)	41 (71.9)	
Yes, mild	21 (38.9)	12 (21.1)		15 (27.8)	9 (15.8)	
Yes, moderate	5 (9.3)	9 (15.8)		3 (5.6)	4 (7.0)	
Yes, severe	1 (1.9)	2 (3.5)		2 (3.7)	2 (3.5)	
Lack of muscle control			.88			.36
No	44 (81.5)	47 (82.5)		46 (85.2)	46 (80.7)	
Yes, mild	6 (11.1)	5 (8.8)		4 (7.4)	5 (8.8)	
Yes, moderate	2 (3.7)	4 (7.0)		1 (1.9)	5 (8.8)	
Yes, severe	1 (1.9)	0 (0)		0 (0)	0 (0)	
Sleepiness or drowsiness			.40			.61
No	15 (27.8)	22 (38.6)		21 (38.9)	27 (47.4)	
Yes, mild	24 (44.4)	18 (31.6)		20 (37.0)	16 (28.1)	
Yes, moderate	11 (20.4)	9 (15.8)		8 (14.8)	9 (15.8)	
Yes, severe	3 (5.6)	7 (12.3)		2 (3.7)	4 (7.0)	

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(continued)

TABLE 5
Side effects with gabapentin and placebo *(continued)*

Side effects	10 min after procedure			30 min after procedure		
	Gabapentin, N=53	Placebo, N=56	*P* value[a]	Gabapentin, N=51	Placebo, N=56	*P* value[a]
Weakness or lack of energy			.94			.81
No	20 (37.0)	22 (38.6)		31 (57.4)	27 (47.4)	
Yes, mild	18 (33.3)	15 (26.3)		13 (24.1)	18 (31.6)	
Yes, moderate	10 (18.5)	13 (22.8)		5 (9.3)	7 (12.3)	
Yes, severe	5 (9.3)	6 (10.5)		2 (3.7)	3 (5.3)	
Headache			.96			.81
No	48 (88.9)	52 (91.2)		47 (87.0)	52 (91.2)	
Yes, mild	3 (5.6)	3 (5.3)		3 (5.6)	3 (5.3)	
Yes, moderate	1 (1.9)	1 (1.8)		1 (1.9)	1 (1.8)	
Yes, severe	1 (1.9)	0 (0)		0 (0)	0 (0)	
Visual changes (vision in 1 or both eyes reduced, lazy eye)			.94			.20
No	44 (81.5)	45 (78.9)		48 (88.9)	51 (89.5)	
Yes, mild	6 (11.1)	6 (10.5)		1 (1.9)	4 (7.0)	
Yes, moderate	3 (5.6)	5 (8.8)		2 (3.7)	0 (0)	
Yes, severe	0 (0)	0 (0)		0 (0)	1 (1.8)	

Data are presented as number (percentage). Percent totals may not add up to 100 because of rounding.

[a] Fisher's exact *P* value.

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Meaning of our study

This study reaffirms the safety of gabapentin for same-day, outpatient gynecologic surgery. Although the inclusion criteria for our study participants ensured all participants had a driver, the recovery assessment showed similar side effect profiles and no adverse events for gabapentin or placebo. Notably, we were underpowered to detect any differences in nausea, vomiting, or side effects, but these events were rare, which further confirms the safety of gabapentin in this clinical setting. Further studies to evaluate if postoperative functioning is impaired (ie, necessitating a driver) could augment our results to potentially expand this as an option for individuals for whom having a driver may be challenging.

Future research

Gabapentin may benefit a subset of patients who want more pain control than PCB but do not opt for IV sedation or may not have a support person to drive them. Future studies may assess gabapentin in different subgroups of patients that may benefit from better pain control like opiate users, patients with chronic pain, patients in the second trimester, or patients with social determinants that may impact pain control. In particular, patients undergoing uterine aspiration are racially diverse; as a result, further study of the impact of structural racism on procedural pain is warranted.

Optimizing pain control during a first-trimester uterine aspiration must continue to be a priority as many pharmacologic modalities fail to show reduction in intraoperative pain. Although gabapentin did not improve pain at time of uterine aspiration when combined with PCB, it did show improvement in postoperative pain. Its safety, tolerability, and overall high satisfaction among patients show its promise in other outpatient gynecologic surgical settings as with women undergoing uterine aspiration for abortion or early pregnancy loss, particularly in cases where postoperative pain may be a greater challenge. ■

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