Intrauterine lignocaine versus paracervical block for pain relief during cervical dilatation and endometrial curettage

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Background Dilatation and curettage and fractional curettage are commonly performed gynecological procedures. Randomized-controlled trials have concluded that topical anesthesia effectively reduces pain in endometrial sampling and hysteroscopy. A major obstacle to the successful completion of outpatient gynecologic procedures is pain. Most patients can tolerate pain to complete necessary procedures, but studies show that pain scores are often high.

Objective The aim of this study was to compare the efficacy of intrauterine instillation of lidocaine, paracervical block, and a combination of both techniques to control pain during endometrial curettage in a randomized, double-blinded trial in premenopausal and postmenopausal women.

Patients and methods A total of 90 patients scheduled for endometrial curettage were allocated randomly to three groups: group L, group P, and group LP according to the type of anesthesia that was administered. Group L received lidocaine 2% injected into the uterine cavity (*n*=30). Group P received paracervical block (*n*=30). Group LP received combined intrauterine lidocaine and paracervical block (*n*=30). Women were observed for pulse rate and the mean arterial blood pressure was monitored continuously and recorded manually. The pain score assessed using 10 mm visual analog scale. Also, types and incidence of adverse events were reported.

Results In terms of heart rate changes, there was a statistically significant increase in both groups L and P than group LP. The changes in the mean arterial blood pressure showed no statistical significance difference among the study groups. Statistically significant differences were found in the number of patients who received fentanyl and the total fentanyl required among the three groups; this was less in group LP than the other two groups. Also, the number of patients who received propofol was significantly lower in group LP compared with the other groups. In terms of the quality of intraoperative analgesia, there was statistically significant adequate analgesia in group LP compared with the other groups.

Conclusion This study concluded that intrauterine lidocaine in combination with paracervical block significantly provides adequate intraoperative and postoperative analgesia, whereas intrauterine lidocaine alone or paracervical block alone provides intraoperative analgesia that requires the addition of intraoperative opioid analgesics and sometimes hypnotics and mostly requires immediate postoperative analgesia.

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Introduction

Dilatation and curettage (D&C) as well as fractional curettage (F/C) are commonly performed gynecological procedures that have traditionally been performed in the operation theater, but are now routinely performed in the outpatient department because of increasing workload and the relative lack of time [1].

D&C refers to the dilatation of the cervix and surgical removal of part of the lining of the uterus and/or contents of the uterus by scraping and scooping (curettage). It has both diagnostic as well as therapeutic value in abnormal uterine bleeding (AUB) patients and is also a rarely used method of first-trimester abortion [2].

As this procedure is associated with pain and discomfort, this can be performed under local anesthesia, conscious sedation, or general anesthesia (GA). As GA is associated with anesthetic complications, the need for hospital stay, and high cost, only a few clinics use GA [3].

Pain from the cervix is transmitted by the pelvic splanchnic nerve, whereas sensation from the upper part of the cervix and the body of the uterus is transmitted with sympathetic fibers through afferent nerves supplying uterus to T11 and T12. Parasympathetic supply occurs from the second, third, and fourth sacral nerves. The cervix and the uterus are richly innervated, with Frankenhäuser plexus parasympathetic S2–4 supplying the cervix and the lower uterus, and sympathetic nerves through the infundibulopelvic ligament from the ovarian plexus

supplying the uterine fundus. Various methods of systemic analgesia and local anesthesia have been tested to reduce the discomfort associated with hysteroscopy and postoperative pain [4].

The effectiveness of intrauterine anesthesia for pain relief in gynecological procedures that involve the uterine cavity has been reported in many studies [5]. The intrauterine instillation of a topical anesthetic is easy, relatively painless, and promising for adequate analgesia during endometrial biopsy. This technique could be an ideal method of anesthesia for endometrial biopsies [6].

Local anesthetic drugs act by causing a reversible conduction block along nerve fibers. They do not rely on the systemic circulation for transport to the site of action, but unwanted leak into the circulation is important in terminating the action by decreasing the concentration of the local anesthetic at receptors at the site of injection and can in fact produce toxic side effects [7]. The rate of systemic absorption of local anesthetics is dependent on the total dose and concentration of the drug administered, the vascularity of the administration site, and the presence or absence of epinephrine in the anesthetic solution. It is therefore generally recommended that these compounds should not be used in inflamed or traumatized tissues [8].

Two methods of local anesthetic administration include paracervical and intracervical block (ICB). ICB acts as an infiltrative anesthetic by distending the tissues, causing mechanical disruption of neural impulses [9].

The paracervical block relieves pain in the lower part of the uterus and cervix by blocking nerve impulses that are conveyed through the Frankenhäuser plexus. However, it may not be effective for pain in the upper part of the uterus, which has a different innervation. Intrauterine anesthesia, by the infusion of a local anesthetic into the uterine cavity, exerts a theoretical action by blocking nerve endings in the uterine corpus and fundus [10]. The effectiveness of intrauterine anesthesia for pain relief in gynecological procedures that involve the uterine cavity has been reported in many studies.

The use of different local anesthetics (i.e. lidocaine and mepivacaine) to decrease the pain experienced as a result of endometrial biopsy and other intrauterine procedures, such as hysteroscopy, F/C, hysterosalpingography, or removal of a 'lost' intrauterine device, has been investigated in recent studies [10].

The aim of this study was to compare the efficacy of intrauterine instillation of lidocaine, paracervical block, and a combination of both techniques to control pain during endometrial curettage through a randomized, double-blinded trial in premenopausal and postmenopausal women. Also, the types and incidence of adverse events were reported.

Patients and methods

After obtaining the approval of the Hospital Ethical Committee and written informed consents, this prospective, double-blinded randomized study was carried out between September 2015 and July 2016 in the Obstetric and Gynecological Department, Al-Azhar University hospitals, on 90 women American Society of Anesthesiologists (ASA) class I and II who were scheduled for endometrial biopsy because of AUB or for preoperative detection of endometrial pathology.

Patients with ASA physical status class greater than II, acute cervicitis, profuse uterine bleeding, known allergy to lidocaine, a history of impaired liver function, pregnant, cervical stenosis, or vaginismus were excluded from the study.

Randomization was performed by computer-generated and allocation concealment by sequentially sealed opaque envelope. A total of 90 women scheduled for endometrial curettage were allocated randomly to three groups: group L, group P, and group LP according to the type of anesthesia that was administered. Group L (n=30) received lidocaine 2% injected into the uterine cavity. Group P (n=30) received paracervical block. Group LP (n=30) received combined intrauterine lidocaine and paracervical block.

The trial medications were prepared by only one anesthesiologist, who opened the envelope and was not involved in the process. A gynecologist performed endometrial curettage and anesthesia residents monitored the patients and assessed the pain score; the patients were blinded to the experiment. Administration of anesthesia and F/C was performed by only one gynecologist.

The patient was placed in the lithotomy position and a bimanual examination was performed. A bivalve speculum was then inserted to expose the cervix, which was disinfected with an antiseptic solution.

The anterior lip of the cervix was grasped with single-tooth vulsellum forceps by the gynecologist.

In group L, a suction catheter (size 6 Fr) was inserted into the endometrial cavity up to 2–3 cm distal to the end of cervix. Thereafter, 5 ml of 2% lidocaine solution was instilled slowly through the catheter into the uterine cavity and then clamped for 5 min until withdrawal of the catheter to decrease backflow and allow the anesthetic to take effect.

In group P, the paracervical block technique was performed using a 22 G spinal needle, 5 ml of 1% lidocaine was injected at the 3 and 9 o'clock positions of the cervicovaginal reflection at ~1 cm depth.

In group LP, the paracervical block technique was performed using a 22 G spinal needle, and 5 ml of 1% lidocaine was injected at the 3 and 9 o'clock positions of the cervicovaginal reflection at ~1 cm depth. The intrauterine instillation was provided immediately after a paracervical block by 5 ml of 2% lidocaine using a suction catheter (size 6 Fr) as in group I.

Women were monitored for pulse rate and blood pressure before performing the maneuver (baseline monitoring), which was continued during the injection. After injection, monitoring was continued for pulse rate and blood pressure every 3 min in the first 15 min, and 15, 30, 60, and 120 min postoperatively. All possible adverse effects (bradycardia, hypotension, convulsions, or arrhythmia) were observed and recorded until the patients were discharged.

Pain score was assessed using 10 mm visual analog scale (VAS). The pain score was measured during cervical dilatation and endometrial curettage by an anesthesia resident who monitored the patients. For women who were intolerant to pain, the procedure was discontinued and the pain score was recorded. A rescue painkiller (intravenous fentanyl) was administered when needed. The secondary outcomes included adverse effects of lidocaine and additional analgesic drug.

All patients have not received any sedation, to evaluate inoperative pain sensation. If patients reported pain during the maneuver, they received analgesia in the form of fentanyl 0.5 μg/kg/dose and this was repeated for two doses if required. If the VAS score was higher than 4 in any patient after fentanyl 1 μg/kg/dose, propofol 1 mg/kg was administered and the patient was excluded from the study.

The intraoperative quality of analgesia was recorded as excellent, good, fair, and poor, assessed according to the following scale: excellent (no complaint from the patient), good (minimal complaints without any need for supplemental analgesics), moderate (complaints that required supplemental analgesics, fentanyl ≤1 μg/kg/dose), and unsuccessful (requiring analgesics and hypnotics).

Statistical analysis

Data were summarized using mean, SD, and frequencies (number of cases) and relative frequencies (percentages) for categorical variables. Comparisons between groups were carried out using analysis of variance, followed by a post-hoc test if there was significance in normally distributed quantitative variables. The χ^2-test is used to compare the frequency and percentage. *P* value less than 0.05 was considered significant.

Results

There were no statistically significant differences in age, ASA physical status, BMI, previous vaginal births, previous cervical operations, or menopausal status among the groups (Table 1).

Pain perceived was assessed by the VAS during, immediately after, and 30 min after the procedure. At all three stages, pain perceived in the group LP was significantly lower than that in the other two groups (groups L and P), with *P* values less than 0.001*, less than 0.001*, and 0.006*, respectively (Table 2).

In terms of heart rate changes, there was a statistically significant increase in both groups L and P than group LP during the procedure and after the procedure, with *P* values 0.017* and 0.011*, respectively (Table 2). The changes in the mean arterial blood pressure showed no statistically significant difference among the study groups (Table 2).

There was a significant decrease in the number of patients who received fentanyl and the total fentanyl required in group LP compared with the other two groups, with *P* values less than 0.001* and less than 0.001*, respectively. Also, the number of patients who received propofol was significantly lower in group LP compared with the other two groups, with *P* value of 0.049* (Table 2).

In terms of the quality of intraoperative analgesia, there was statistically significant adequate analgesia in group

Table 1 Demographic data and indication of procedures

Parameters	Group L (*n*=30)	Group P (*n*=30)	Group LP (*n*=30)	*P* value
Age	41.1±9.9	43.1±11.5	40±10.5	0.52
ASA				
I	12	8	10	0.54
II	18	22	20	
BMI	24.9±4.5	23.7±3.9	25.6±5.3	0.27
Menopausal status				
Premenopausal	22	20	23	0.77
Postmenopausal	8	10	7	0.77
Previous vaginal births	17	15	19	0.58
Previous cervical operations	1	0	2	0.35
Indications				
Menorrhagia	8	9	10	0.96
Irregular bleed	12	11	13	
Polymenorrhea	4	3	2	
Postmenopausal bleed	3	4	3	
Simple hyperplasia	1	2	2	
Others	2	1	0	

Data are presented as mean±SD or number. ASA, American Society of Anesthesiologists; L, lidocaine group; LP, combined lidocaine and paracervical group; P, paracervical group.

Table 2 Pain score, hemodynamics, fentanyl, and propofol required

Parameters	Group L (*n*=30)	Group P (*n*=30)	Group LP (*n*=30)	*P* value
VAS score				
VAS at the time of D and C	5.36±1.3	5.93±1.4	4.3±0.9[a]	<0.001*
VAS at 5 min after the procedure	3.4±1.2	3.9±1.3	2.7±0.4[a]	<0.001*
VAS at 30 min after the procedure	2.41±0.8	2.56±0.90	1.95±0.5[a]	0.006*
Heart rate				
Baseline	71.42±11.31	69.56±7.11	73.54±12.21	0.340
During the procedure	80.45±10.20	81.54±12.32	74.69±5.71[a]	0.017*
After the procedure	71.2±7.3	73.5±5.2	67.9±5.3[a]	0.011*
Mean arterial blood pressure				
Baseline	104±6.30	106±5.91	108±8.31	0.087
During the procedure	108±8.61	110±9.82	106±7.82	0.217
After the procedure	105±6.34	107±7.11	104±5.55	0.183
Number of patients who received fentanyl	26	29	18[a]	<0.001*
Total fentanyl required (μg)	56.67±31.44	68.33±24.50	36.67±34.57[a]	<0.001*
Number of patients who received propofol	7	4	1	0.049*

Data are presented as mean±SD or number. L, lidocaine group; LP, combined lidocaine and paracervical group; P, paracervical group; VAS, visual analog scale. *$P<0.05$. [a]Statistical significance with groups L and P.

Table 3 Quality of intraoperative analgesia among the groups

Parameters	Group L (*n*=30)	Group P (*n*=30)	Group LP (*n*=30)	*P* value
Excellent	1	0	3	0.07*
Good	3	1	9	
Fair	19	25	17	
Poor	7	4	1	

Data are presented as number. L, lidocaine group; LP, combined lidocaine and paracervical group; P, paracervical group. *$P<0.05$.

LP compared with the other two groups, *P* value of 0.07* (Table 3).

Discussion

After leukorrhea, AUB is the second most common gynecological complaint in premenopausal and post-menopausal women. AUB constitutes about 30% of gynecological consultations. To establish the treatment plan, endometrial evaluation is a must in cases of AUB. In low-resource settings, endometrial evaluation has to be planned as an outpatient procedure as most women are not willing to undergo procedures as inpatients [11].

The technique of endometrial sampling may vary depending on the patient's age, menopausal status,

clinical suspicion of malignancy, availability of instruments, etc. [12].

It is important to identify the best method of analgesia. The various approaches for local uterine anesthesia require an understanding of uterine anatomy. The cervix receives its innervations from S2 to S4 largely through the uterosacral ligaments, whereas the corpus is innervated by T10 to L1, distributed within the uterine and ovarian vasculature, and more cephalad in the broad ligament. As a result, procedural anesthesia using local anesthetic agents must consider both pathways [9].

This study evaluated the different methods of uterine anesthesia. Uterine anesthesia had been attempted in different gynecologic procedures by some investigators and various data on its effectiveness have been reported. Also, many studies have examined paracervical block and its efficacy has been reported. A combination of the two techniques exerts a more powerful effect than each technique alone.

The choice of 2% lidocaine for intrauterine anesthesia was made because it has a quicker onset and shorter duration of action than bupivacaine, which was used in previous studies, and 2% lidocaine might have greater efficacy theoretically than 1% lidocaine [13]. The time duration allowed for the local anesthetic to become effective is also important. The peak anesthetic effect following topical application of lidocaine occurs within 10 min [14].

In the present study, there was significantly adequate intraoperative and postoperative analgesia with the combination of intrauterine lidocaine and paracervical block in comparison with intrauterine lidocaine alone or paracervical block alone and thus the requirements of additive analgesics or hypnotics increased in the latter two groups.

The limited efficacy of paracervical block alone or intrauterine lidocaine alone is likely because of its inability to block the hole nerves supplying the cervix and the lower uterus. Hence, it is expected that the combination of two techniques may reach these nerves more effectively, and will provide more global anesthesia.

In the present study, heart rate showed a significant increase in both the intrauterine lidocaine group and the paracervical block group in comparison with the combined technique group, which may suggest a more intense sympathetic response to the greater magnitude of pain perceived in these two groups.

A randomized, double-blind controlled trial in 200 patients by Hui *et al*. [15], found that the use of intrauterine lignocaine reduced pain during suction curettage in endometrial sampling (pains core 2.1 vs. 4.2). Dogan *et al*. [5] conducted a randomized, double-blind, placebo-controlled study in 1230 patients undergoing endometrial biopsy using a Pipelle device; the mean pain scores in the NSAID-only and the lignocaine-only groups were not significantly different compared with the placebo group. However, the pain score in the lignocaine plus NSAID group showed a significant reduction (4.6 vs. 7.1) [5].

Meenambiga and Haribaskar [16] concluded that the combination of paracervical block and intrauterine anesthesia is more effective than paracervical block alone for pain relief during F/C. The addition of intrauterine anesthesia does not increase the adverse effects of paracervical block. In low-resource settings, this procedure can be carried out safely as an outpatient procedure; thus, it is cost effective.

Edelman *et al*. [17], in their (40 patients) study, reported that 5 ml of 4% lidocaine injected into the endometrial cavity after a standard paracervical block decreased the pain significantly more than a placebo in D&C of first-trimester elective abortions. In the study by Guney *et al*. [18], published in 2006, it was reported that intrauterine lidocaine could be an effective anesthetic method for removal of lost intrauterine devices.

Rattanachaiyanont *et al*. [19] found statistically significant reductions in pain when a combination of paracervical block and intrauterine anesthesia was used before F/C. We did not apply a paracervical block as cervical dilation was not necessary in our patients. Cases with cervical stenosis who required cervical dilation were excluded from the study.

Cicinelli *et al*. [13] randomly assigned 80 women to receive 2 ml of 2% mepivacaine or normal saline with a 5 min delay before an office hysteroscopy and/or endometrial biopsy. Their results showed a statistically significant reduction in pain in women receiving the mepivacaine infusion. They reported considerably higher (32.5%) incidence of vasovagal reaction in their placebo group.

Soriano *et al*. [20] assessed the efficacy of lidocaine spray during outpatient hysteroscopy in reducing procedure-related pain and to identify risk factors for discomfort. They concluded that women treated with lidocaine spray had significantly less pain.

The results of the present study are not coincident with the results of the study carried out by Kozman *et al.* [21], who reported that intrauterine application of 2% lignocaine gel did not significantly reduce the frequency with which women experienced unacceptable levels of pain or anxiety during endometrial aspiration compared with placebo. Shankar *et al.* [22] found that adding lignocaine to normal saline as distension media for hysteroscopy and endometrial biopsy did not reduce the pain during the procedure. However, lignocaine was diluted 13.5 times compared with 2% lignocaine used in the present study.

In the study by Zupi *et al.* [23], it was reported that 5 ml 2% mepivacaine administered into the uterus, as in our study, effectively decreased pain in an endometrial biopsy taken during hysteroscopy. Chanrachakul *et al.* [24] also reported that intrauterine lidocaine decreased pain in fractionated curettage without causing any complications.

Lau *et al.* [25] reported in two separate studies that neither paracervical block nor intrauterine anesthesia was effective in decreasing pain in hysteroscopy and endometrial biopsy compared with a placebo.Poornima and Panicker [26] found that during D&C, pain relief associated with ICB administration was more effective than with intramuscular sedation ($P<0.001$). The recovery in ICB was faster compared with intramuscular sedation. Postprocedure complications with ICB are almost negligible if performed correctly. It is also an easier technique of administration and cost effective. Chanrachakul *et al.* [27], reported that intrauterine lidocaine decreased pain in fractionated curettage without causing any complications.

In contrast, Davies *et al.* [28], suggested that application of lidocaine spray during hysteroscopy relieved pain significantly only during grasping of the cervix, but not during the endometrial biopsy. As the cervix was not be grasped with mezzo forceps during Pipelle biopsy, it seems that its governing pain did not play any role in the study; thus, cervical spray of lidocaine in combination with intrauterine lidocaine did not induce pain relief to a greater extent. Injection of an anesthesia agent into the cervix (paracervical block) not only did exert a positive impact on pain relief but also led to complications such as bradycardia, hypotension, and even death [29].

Conclusion

This study concluded that intrauterine lidocaine in combination with paracervical block significantly provide adequate intraoperative and postoperative analgesia, whereas intrauterine lidocaine alone or paracervical block alone for intraoperative analgesia required the addition of opioid analgesics and sometimes hypnotics intraoperatively and required immediate postoperative analgesia; however, our study found that the procedure could not be performed without anesthesia.

The addition of intrauterine anesthesia does not increase the adverse effects of paracervical block. In low-resource settings, this procedure can be performed safely as an outpatient procedure; thus, it proved to be cost effective.

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Conflicts of interest
There are no conflicts of interest.

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