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FAMILY PLANNING (A BURKE, SECTION EDITOR)

Alleviating Pain with IUD Placement: Recent Studies and Clinical Insight

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Abstract

Purpose of Review The pain associated with intrauterine device placement (IUD) may decrease uptake of this highly effective form of contraception. The purpose of this review is to present recently studied methods and techniques employed by clinicians to reduce pain with IUD placement.

Recent Findings Paracervical and intracervical lidocaine blocks are effective options for pain control during IUD placement. Lidocaine blocks are particularly effective in nulliparous patients during IUD placement. Topical or vaginal lidocaine are not effective in decreasing pain with IUD placement.

Summary Based on the existing published literature and our clinical experience, we recommend clinicians use several modalities to decrease pain associated with IUD placement. For nulliparous women, we recommend an intracervical or paracervical lidocaine block prior to IUD placement. Misoprostol use should be limited to when a patient had a prior unsuccessful IUD placement attempt or known cervical stenosis. NSAIDs can help with post-procedure pain but do not help with pain during the placement.

Keywords Intrauterine device · Intrauterine device placement · Pain · Analgesia · Paracervical block · Long-acting reversible contraception

Introduction

The intrauterine device (IUD) is a long-acting reversible contraceptive (LARC) with high efficacy and continuation rates [1]. The unintended pregnancy rates in the United States are among the highest in the developed world and uptake of IUDs has the potential to decrease this high rate of unintended pregnancy[2, 3]. The Contraceptive CHOICE Project found a 20-fold increase in the rate of unintended pregnancies for women using short-acting contraceptives (SARCs) when compared to patients using LARCs [4]. Unintended pregnancies have social and economic repercussions on both a personal and societal level. In addition, unintended pregnancies can also lead to adverse maternal and neonatal outcomes [2, 5].

LARCs, including the levonorgestrel and copper IUDs, are among the most cost-effective forms of contraception [6]. In the United States, approximately 11.6% of women use LARC methods for contraception, with 10.3% using an IUD [7]. LARC utilization has increased in recent years, however continued barriers exist [1, 8, 9]. One such barrier includes patient concern and fear of pain with IUD placement. In our experience, many patients with IUDs report that the discomfort experienced during placement is one of their biggest concerns with using an IUD.

The most researched strategies for decreasing pain and anxiety associated with IUD placement include misoprostol, non-steroidal anti-inflammatory drugs (NSAIDs), and lidocaine used topically or as an injection. Most researchers evaluating pain with IUD insertion utilize the visual analogue scale (VAS) to measure pain perception. The VAS measures pain intensity on a continuum, asking participants to mark their pain intensity form 0 mm (no pain) to 100 mm (worst pain). Use of the VAS allows researchers to measure

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pain perceptions at multiple points during the insertion procedure, with the majority including a score immediately following IUD placement. Prior studies have established a clinically significant reduction in pain as a reduction of 15–20 mm on the 100 mm VAS. The purpose of this article is to review recent literature on these techniques and outline best practices for the placement of IUDs and to describe our experience and expertise from an academic family planning practice.

Patient Perspectives on Pain

Pain perception may vary by demographics. A secondary analysis of a single-blinded randomized control trial (RCT) of patients receiving the 13.5 mg levonorgestrel IUD identified trends in patient predictors of anticipated pain during IUD placement. Black or African-American participants had a median anticipated VAS pain score of 68 mm, compared to white patients median of 51 mm, and patients of other races median of 64 mm ($p = 0.12$). Participants ages 14–17 years old had higher VAS pain scores compared to those aged 18–22 (69 mm versus 59 mm, $p = 0.16$)[10]. These findings, however, are not statistically significant. Additionally, nulliparous patients may experience more pain with IUD placement than multiparous patients [11, 12].

Patient fear of pain with placement of the IUD remains one of the barriers to increased uptake and utilization among nulliparous women [13]. Pain attributed to placement may affect or delay uptake of IUDs among adolescents [14]. Apprehension over anticipated pain may affect pain perception during the placement procedure for both nulliparous and multiparous patients [10, 15]. Participants with anticipated pain scores above the median experienced significantly higher perceived pain throughout all collected time points of the procedure in the previously mentioned secondary analysis [10]. A recent prospective cohort study evaluated the relationship between pain with IUD placement and patients' negative perceptions of the IUD, anxiety, and previous mode of delivery. Previous history of only cesarean deliveries, pre-procedure anxiety, and negative perception of the IUD were all associated with higher levels of pain with IUD placement, with negative perception of the IUD noted to be the most significant predictor ($p < 0.001$) [15].

Patient education and discussion of procedural expectations has the potential to mitigate and possibly decrease patients' experiences of pain. We offer this as an area for further study to evaluate the efficacy of improved counseling on patient perceptions of pain.

Misoprostol

In an effort to decrease pain with IUD placement, several studies have evaluated the use of misoprostol as a cervical ripening agent [16–19]. Swenson et al. performed a double-blinded, placebo-controlled RCT to compare the effects of self-administered vaginal or buccal misoprostol 400 mcg versus placebo placed 3–4 h prior to IUD placement in nulliparous patients. There was no significant difference was found in pain during the IUD placement ($p = 0.74$). Additionally, pain prior to placement was significantly higher in participants who received misoprostol (VAS pain score of 17.1 mm versus 4.7 mm, $p = 0.003$). Healthcare providers did not report significant differences in the perceived ease of placement ($p = 0.64$) [16].

Multiple studies have confirmed the findings of Swenson et al. [17, 18]. A double-blinded, placebo-controlled RCT by Espey et al. evaluated the effects of 400 mcg buccal misoprostol given two to eight hours prior to procedure versus placebo in multiparous patients. The study also found no significant difference in the worst pain during placement ($p = 0.94$) or in provider experienced ease of placement ($p = 0.54$) [17]. Finally, Dijkhuizen et al. performed an RCT to evaluate if 400 mcg of vaginal misoprostol compared to placebo would reduce pain with IUD placement or the number of failed placement and placement related complications. The researchers found no significant difference in pain scores between the two groups ($p = 0.14$), no difference in number of failed placements ($p = 0.59$), and no difference in placement related complications ($p = 0.65$). They did find a significant difference in side effects, with the misoprostol arm experiencing more total side effects (including cramping, headache, nausea, vomiting, diarrhea and fever). These findings were not stratified by parity, however the authors did report their sub analysis by parity also revealed no statistically significant differences in complications, VAS pain scores, or difficulty of insertion [18].

Overall, misoprostol has been found to be ineffective in decreasing pain with IUD placement and the American College of Obstetricians and Gynecologists (ACOG) recommends against its routine use [6]. We utilize misoprostol to facilitate placement of the IUDs for patients with prior failed IUD placements secondary to cervical stenosis. This practice is in line with the findings of Rasheedy et al. who discovered increased success rates with copper IUD insertions among patients receiving preprocedural misoprostol who had previously experienced insertion failure [20]. We often have success with IUD placement in this subset of patients after administration of 400 mcg of buccal misoprostol three hours prior to placement. We do not use misoprostol to reduce pain with IUD placement. However, in these scenarios we also often use

adjunctive paracervical block to decrease pain with the IUD placement.

NSAIDs

Multiple studies have evaluated the use of non-steroidal anti-inflammatory drugs (NSAIDs) for pain reduction with IUD placement [12, 21, 22]. It was a common practice in the United States to recommend a dose of NSAIDs prior to placement with the belief it could assist in procedural and post-procedural pain. A double-blinded, placebo-controlled RCT by Bednarek et al. evaluated the use of 800 mg ibuprofen compared with placebo given thirty to forty-five minutes prior to IUD placement. There was no difference in mean or median pain scores during IUD placement compared to placebo. Additionally, pain scores did not significantly differ when participants were stratified by parity. This study did not evaluate pain after IUD placement [22].

In a double-blinded, placebo-controlled RCT by Ngo et al., participants were randomized to receive either 30 mg of ketorolac injection intramuscularly (IM) or saline injection IM 30 min prior to IUD placement. There was no difference between the groups in pain reported at IUD placement ($p = 0.99$). However, there were significant lower pain scores for the ketorolac group compared to the saline group at 5 and 15 min after IUD placement ($p < 0.001$). In subgroup analysis, the nulliparous patients reported a difference in VAS pain scores during IUD placement ($p = 0.02$) [12].

Additionally, Ngo et al. performed a double-blinded, placebo-controlled RCT that compared perceived pain with 550 mg oral naproxen given one hour prior to placement compared to placebo. The authors cited previous findings of naproxen reducing pain during insertion of the Multiload-Cu 375 IUD and after insertion of the Dalkon Shield as motivation to evaluate if these findings could be extrapolated to insertion of currently used IUDs in the United States. There was no significant difference across arms for pain for IUD insertion (treatment group median VAS pain score of 69 mm versus placebo 66 mm, $p = 0.89$). Similar to the ketorolac study described above, pain at 5 and 15 min post placement were both noted to significantly lower in the naproxen arm [21].

Although NSAIDs do not help with pain control at the time of IUD placement, NSAIDs do decrease post-procedural cramping, likely through inhibition of prostaglandin production. In our practice, we routinely recommend that patients take NSAIDs 600 mg every 6 h as needed after placement. See Table 1 for a summary of recent studies related to NSAIDS and pain with IUD placement.

Topical Lidocaine

Several studies have evaluated the efficacy of topical lidocaine on reducing pain with IUD placement [23–26]. A randomized, double-blinded, placebo-controlled RCT with 2% lidocaine gel on a cotton swab that was placed to the level of the internal os did not help with the pain the IUD placement [23]. McNicholas et al. performed a randomized, double-blinded RCT using 0.5- 1 mL of 2% lidocaine gel to the ectocervix at the planned site of tenaculum placement and then used a 20 gauge angiocatheter to place 2 mL of 2% lidocaine gel into the endocervical canal. No significant difference was found in pain with IUD insertion. Additionally, no significant difference was found in pain with tenaculum placement [27].

In a placebo-controlled, double-blinded RCT of nulliparous women, Rapkin et al. studied the use of 4 mL of self-applied vaginal 2% lidocaine gel to decrease pain with IUD placement. The secondary outcomes included patient acceptability of the self-applying the gel and pain with tenaculum placement. Patients in the lidocaine arm experienced less pain compared to the placebo arm (median VAS pain score 61 mm versus 69 mm, $p = 0.06$). There was a statistically significant difference in pain with tenaculum placement between the groups (median VAS pain score 32 mm versus 56 mm, $p = 0.02$). Overall, 97% of participants reported no difficulty inserting the gel and 95% reported no pain with gel insertion [24].

In addition, a single-blinded RCT using self-inserted 20 mL of 2% lidocaine gel compared to placebo gel for pain control with IUD placement in both nulliparous and multiparous patients. Fifteen minutes prior to IUD placement, participants self-inserted a 20-cc syringe of gel using a disposable vaginal applicator. There no significant difference in pain with IUD placement between the two groups (mean VAS pain score of 58.1 versus 52.3, $p = 0.09$) nor difference in pain with tenaculum placement ($p = 0.15$) [25].

Lidocaine gel, applied vaginally or intracervically, although appealing due to lack of injection is not effective in decreasing pain with IUD placement. The lidocaine gel may decrease pain with tenaculum placement, however the evidence is conflicting. We do not use lidocaine gel for intrauterine device placement.

Paracervical and Intracervical Blocks

Multiple studies have investigated the effect of intracervical and paracervical lidocaine injection on pain with IUD placement [11, 28••, 29, 30••]. Mody et al. completed a single-blinded RCT on the use of 2 mL of 1% lidocaine at the tenaculum site followed by 10 mL of 1% lidocaine in a paracervical block compared to no anesthesia (see Fig. 1 for

Table 1 Summary of recent studies of NSAIDs and pain during intrauterine device placement

Intervention	Investigators	Type	Setting	Population	IUD type	Outcome	Findings	P value
800 mg ibuprofen 30–45 min prior to procedure	[22]	Double-blind, placebo-controlled RCT	Four academic centers in USA	n = 202, nulliparous and parous, 2–6 weeks out from first trimester uterine aspiration	Copper T380A or levonorgestrel 52 mg	Pain at placement (VAS, mm)	No significant difference even when stratified by parity	p = .5
30 mg IM ketorolac injection 30 min prior	[12]	Double-blind, placebo-controlled RCT stratified by parity	Multiple academic center-affiliated clinics, University of San Diego Medical Center, CA, USA	n = 67, nulliparous and multiparous	Copper T380A or levonorgestrel	Pain at placement (VAS, cm)	No significant difference	p = .99
						Pain at 5 min after placement (VAS, cm)	Intervention: 0.3 Placebo: 2.2	**p < .001**
						Pain at 15 min after placement (VAS, cm)	Intervention: 0.1 Placebo: 1.6	**p = .02**
550 mg oral naproxen 1 h prior	[21]	Double-blind, placebo-controlled RCT	Multiple community clinics, Boston, MA, USA	n = 119, nulliparous	Copper T380A or levonorgestrel 20 mcg/day	Pain at insertion (VAS, mm)	No significant difference	p = .89
						Pain at 5 min after placement (VAS, mm)	Intervention: 16.5 Placebo: 26	**p = .01**
						Pain at 15 min after placement (VAS, mm)	Intervention: 12.8 Placebo: 24	**p = .01**

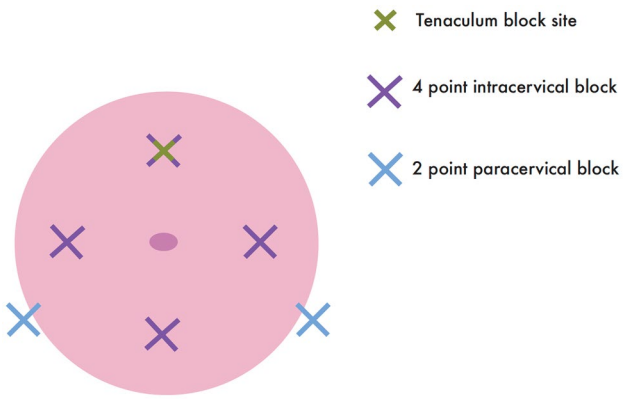

Fig. 1 Anesthetic Blocks

schematic of paracervical block technique). Study participants were a fairly homogeneous population recruited from a tertiary care center. This trial included multiparous and nulliparous patients. There were lower median pain scores with tenaculum placement in the treatment group compared to the placebo group (median VAS pain score 12 mm versus 28 mm, p = 0.008). The difference in median pain score at the time of IUD placement in the paracervical block group was not statistically significant (p = 0.09) [11].

A subsequent single-blinded, sham-controlled, multi-site RCT by Mody et al. evaluated a higher volume of lidocaine and only focused on nulliparous patients. Participants were randomized to receive a 20 mL paracervical block using 18 mL of 1% lidocaine and 2 mL of 8.4% sodium bicarbonate or a sham block. A sham block is performed by providing tactile feedback at the site of a potential nerve block, with the goal of decreasing the risk of unblinding the patient participants. The intervention group received 2 mL of the paracervical block at 12 o'clock on the anterior lip of the cervix, followed by tenaculum placement and the remaining 18 mL injected at the cervicovaginal junction at 4 and 8 o'clock (Fig. 1). The sham block started with 2 mL of 1% lidocaine placed at the anterior cervix, followed by tenaculum placement and a capped needle placed against the vaginal tissue at 4 and 8 o'clock. A saline block was not placed as this has the potential to distend the paracervical nerves and provide some pain relief. Pain with placement in the treatment was significantly lower than with placebo (median VAS pain score 33 mm versus 54 mm, p = 0.002). The paracervical block group reported more pain at time of the block (p = 0.003), but less pain at the time of uterine sounding (p = 0.005), 5 min after the procedure (p = 0.005), and overall pain with the procedure (p < 0.05) [28••].

Akers et al. also evaluated the use of paracervical blocks in nulliparous patients, with specific interest in adolescents and young women (aged 14–22 years). The research team conducted a multi-site single-blinded, sham-controlled RCT, and evaluated the use of a 10 mL 1% lidocaine block to decrease pain with IUD placement compared to a sham block. The lidocaine group received 1 mL of 1% lidocaine at the site of planned tenaculum placement and 4.5 cc at 4 and 8 o'clock along the cervicovaginal junction. The sham block was completed by placing an unbroken wooden end of a cotton tip applicator at the same locations. The researchers found significantly lower pain scores with IUD placement in the lidocaine group compared to the sham block arm immediately following placement (Median VAS pain scores 30 mm versus 72 mm, p = 0.001) [29].

A multi-site study conducted in Brazil by De Nadai et al., compared intracervical lidocaine, compared to the above studies that use paracervical blocks. This study was double-blinded, placebo and sham-controlled RCT of nulliparous patients undergoing 52 mg levonorgestrel IUD placement. Participants were randomized to one of three study arms: 3.6 mL of 2% lidocaine by intracervical block, sham injection, or no intervention. Those receiving the intracervical block received the 3.6 mL spread out at 3, 6, 9, and 12 o'clock positions prior to tenaculum placement. Those receiving the sham block did have a dry needle placed at the same positions. Dry needling was chosen due to its use in treating other types of pain, specifically chronic pain [31]. Pain immediately after IUD placement was lower in the intracervical block arm when compared to the sham block and the no intervention arm (mean VAS pain scores 4.3 mm versus 6.6 mm (p < 0.0001); versus 5.8 mm (p < 0.0001). There was lower pain scores in the intracervical block arm with tenaculum placement as well when compared to the sham block and the no intervention arm. Although dry needling has been shown to improve chronic pain, pain with IUD insertion is an acute pain, likely unaffected by the dry needle sham block [30••].

Lidocaine injections, both paracervical and intracervical, have been found to be effective in decreasing pain with IUD placement among nulliparous patients. We offer nulliparous patients paracervical lidocaine blocks and see excellent outcomes with pain. We also use paracervical lidocaine blocks for patients with prior failed placements or cervical stenosis, regardless of parity. Some have proposed that mixing a block may slow clinic flow, but we find that patients who get blocks often recover and are able to go home more quickly than those who do not. See Table 2 for a summary of recent studies that looked at local anesthetics and pain with IUD placement.

Other Interventions

There are studies that have evaluated other interventions such as tramadol and verbal anesthesia to decrease patient pain with IUD placement [32, 33] A study by Karabayirli et al. was and RCT that used three arms prior to IUD placement

Table 2 Summary of recent studies of anesthetics and pain during intrauterine device placement

Intervention	Investigator	Type	Setting	Population	IUD type	Outcome	Findings	P value
2 mL 1% lidocaine at tenaculum site followed by 10 mL 1% lidocaine in a paracervical block	[11]	Single-blind RCT	Single academically-affiliated clinic, Northwestern Medical Center, Chicago, IL, USA	n = 50, nulliparous and multiparous	Copper T380A or levonorgestrel	Pain at placement (VAS, mm)	No significant difference	p = .09
						Pain with tenaculum placement (VAS, mm)	Intervention: median 12, mean 18.8	**p = .008**
							Standard of care: median 28, mean 29.0	
18 mL 1% lidocaine buffered with 2 mL 8.4% sodium bicarbonate; 2 mL injected at tenaculum site and 18 mL injected as paracervical block	[28••]	Single-blind, sham-controlled RCT	Multiple community and university-affiliated clinics, University of California, San Diego Medical Center, CA, USA	n = 64, nulliparous	Copper T380A or levonorgestrel 52 mg	Pain at placement (VAS, mm)*	Intervention: 33	**p = .002**
							Sham: 54	
						Pain at uterine sounding (VAS, mm)*	Intervention: 30	**p = .005**
							Sham: 47	
						Pain at 5 min (VAS, mm)*	Intervention: 12	**p = .005**
							Sham: 27	
						Overall pain (VAS, mm)*	Intervention: 30	**p < .05**
							Sham: 51	
1 mL 1% lidocaine at tenaculum site and 9 mL 1% lidocaine paracervical block	[29]	Single-blind, sham-controlled RCT	Three clinics, unspecified affiliation, Philadelphia, PA, USA	n = 95, ages 14–22, nulliparous	levonorgestrel 13.5 mg	Pain at placement (VAS, mm)	Intervention: 30.0	**p = .001**
							Sham: 71.5	
3.6 mL 2% lidocaine intracervical block	[30••]	Double-blind, placebo- and sham-controlled RCT	Two academically-affiliated clinics, Ribeirão Preto and Campinas, São Paulo, Brazil	n = 302, nulligravidas	Levonorgestrel 52 mg	Pain at placement (VAS, cm)	Intervention: 4.3	
							Sham: 6.6	**p < .0001**
							Standard of care: 5.8	**p < .0001**

*Median

(tramadol 50 mg, naproxen sodium 550 mg, versus placebo). This study found significant differences in pain with IUD placement among the 3 groups. Pain scores in the tramadol arm were significantly lower than in the naproxen sodium arm ($p=0.001$) which in turn were significantly lower than in the placebo arm ($p=0.001$) [33]. The finding of efficacy with naproxen sodium contradicts the findings of Ngo et al. [21].

Verbal anesthesia is a technique in which the provider calms and relaxes the patient during procedures, often by using a low pitch, slower speech, and a low volume of speech [34]. Daykan et al. evaluated the use of verbal anesthesia compared to 50 mg oral tramadol capsule to reduce pain with IUD placement among nulliparous patients. The authors describe the verbal anesthesia protocol, "During the steps of the IUD placement, the physician relaxes the patient by asking her several times to relax her body and reassures her that she/he will not cause any harm or pain. The physician repeats the sentences "please relax your body, relaxing your body will help you to pass this procedure without any pain" and "This procedure shouldn't cause you any harm or pain". This was repeated quietly and calmly throughout the procedure. During the entire process, the physician maintained continuous verbal communication with the participant, shared and explained to her every step of the procedure until it was completed." The study found no difference in pain with IUD placement between the two groups (mean VAS pain score 4.5 mm tramadol group versus 4.8 mm verbal anesthesia group, $p=0.646$) [32]. Despite this finding, verbal anesthesia remains a low-risk intervention that may help certain patients relax.

As patient anxiety and expectation of pain may contribute to experienced pain, verbal anesthesia is a valuable tool to improve the patient experience. We routinely use a calming voice, dim the lights, and play relaxing music for our patients.

Conclusions

As pain with IUD placement may be a barrier to patient uptake, efforts to decrease pain with placement continue to be a priority. Patient anxiety and anticipation of pain alone can increase patient's experienced pain during IUD placement [10, 15]. Researchers have evaluated diverse interventions to improve patient experiences.

Misoprostol does not decrease pain with IUD placement [16, 17, 35]. ACOG recommends against routine use of misoprostol, however consideration may be taken to utilizing misoprostol following failed attempts at IUD placement [6]. In our own practice misoprostol is reserved to use after a failed attempt, and second attempts with misoprostol 400 mcg buccally 2 h prior to placement are attempted under ultrasound guidance. We find the combination of misoprostol and ultrasound allow for more successful dilation and subsequent IUD placement, however we do not use this technique to decrease pain.

NSAIDs does not decrease pain with IUD placement but do to help decrease post procedural pain and cramping [12, 21, 22]. We recommend 600–800 mg of oral ibuprofen post procedural pain.

Although lidocaine gel has not been found to provide significant pain relief with IUD placement, lidocaine block with both paracervical and intracervical blocks does decrease pain [23–25]. Nulliparous patients in our practice are offered a paracervical block with 18 mL of 1% lidocaine and 2 mL of 8.4% sodium bicarbonate.

Future opportunities for research remain in optimizing pain control with IUD placement. Combinations such as topical lidocaine and paracervical block or NSAIDs in combination with paracervical block remain unevaluated, and pain control for multiparous patients continues to be an area in need of improvement. Decreasing pain as a barrier to IUD uptake has the potential to decrease the rates of unintended pregnancies and increase patient comfort with exploring use of these effective contraceptive devices.

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Compliance with Ethical Standards

Conflict of Interest Dr. Mody is a consultant for Bayer, is a Merck Nexplanon trainer and is an UpToDate Author. The other authors have no conflict of interest to report.

Human and Animal Rights All reported studies/experiments with human or animal subjects performed by the authors have been previously published and complied with all applicable ethical standards (including the Helsinki declaration and its amendments, institutional/national research committee standards, and international/national/institutional guidelines).

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