Intraperitoneal instillation versus wound infiltration for postoperative pain relief after cesarean delivery

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Running title

Pain therapy after cesarean section

Abstract

Techniques and individuals: this is a prospective, randomized, double-blind, placebo-controlled trial was carried out at the Department of Obstetrics and Gynecology of both Menoufia University Hospital and, Abu Elmatamir General Hospital. 306 women were scheduled to undergo optional C/S through a Pfannenstiel incision under spinal anasthesia, were 34 weeks or older, divided into three groups, 102 of each 1- First, we injected 20 ml of normal saline into the uterine peritoneum just prior to fascia closure. Next, 20 ml of a local anesthetic solution (10 ml of 0.5% bupivacaine and 10 ml of 2% lidocaine mixture) were injected subcutaneously before skin closure. 2- Second group (IPLA): we injected (10 ml 0.5% bupivacaine and 10 ml 2% lidocaine) into the uterine peritoneum, and 20 ml of normal saline was injected subcutaneously. 3- Placebo group: we injected 20 ml of saline into both the peritoneum of the uterus and subcutaneously.

Results: The pain scores at rest at 2, 12, and 24 hours do not significantly differ across the three groups, ($p > 0.05$) ($p=0.184$, 0.359 and 1.633, respectively). The pain scores after movement differ significantly only at two hours in the group of intraperitoneal instillation Compared to subcutaneous infiltration and placebo group, the IPLA group's pain score is significantly reduced ($p<0.05$),($P=0.003$, 0.112 and 0.156, respectively).

Conclusion: Administering lidocaine and bupivacaine intraperitoneally appears to be a useful technique for reducing post-caesarean pain, since it lowers the movement-related discomfort score in women undergoing caesarean section under spinal anesthetic early.

Keywords: Intraperitoneal local anesthetic instillation, local anesthetic wound infiltration, postcesarean analgesia.

Synopsis: The method of injection of lidocaine and bupivacaine intraperitoneally appears is an effective technique for decreasing post-cesarean pain, since it lowers the de-

gree of pain during movement in women having an early cesarean section while under spinal anesthesia.

Introduction

The prevalence of cesarean sections (C/S) varies by country but Surgical procedures like these are among the most common. In Egypt, the country is ranked first globally in the number of C-section deliveries which make up 72 percent of deliveries, in comparison to an average of 25-30 percent worldwide.(1) About 20% of newborns in European nations are delivered by C/S. In the US, C/S is the most often carried out inpatient procedure. A figure of 57% has been reported for the private health sector in South Africa.

Since C/S is associated with severe postoperative pain, gynecologists must ensure adequate pain control after C/S, particularly in the first 48 hours. Opioid-based analgesia is frequently required, and it is the first choice, both in the hospital and after discharge; however, it comes with a number of side effects.(2, 3) Reducing the requirement for opioids after C/S and optimizing postoperative analgesia are critical for early mobilization, preventing opioid-induced drowsiness, promoting newborn care, preserving the mother-infant attachment, enabling early release, and raising patient satisfaction.(3, 4) Moreover, there is a correlation between postpartum depression and persistent pain and significant acute pain after C/S.(5) For this reason, it is advised to treat postoperative pain for C/S using a multimodal strategy that combines systemic and regional approaches.(6)

A post-operative analgesic regimen that is effective, inexpensive, minimally intrusive, and free of side effects is desirable.(7, 8) Although there aren't many studies on the subject, peritoneal analgesia since postoperative multimodal analgesia following gynecological and abdominal procedures, including C/S, has benefited from the use of intraperitoneal local anesthetic (IPLA) instillation. Postoperative pain following C/S procedures is mediated by somatic and visceral innervation.(9, 10)

Local anesthetic wound infiltration (LWI) is another method for postoperative analgesia. When used without long-acting intrathecal opioid, LWI approaches have been demonstrated to lower post-C/S pain scores and the need for opioids. This effect is contingent upon the function of parietal nociceptive afferent neurons in triggering pain reduction following surgery.(11-13)

In addition, it is difficult to determine which of these approaches produces superior analgesia due to the small number of randomized, controlled trials.

Techniques and individuals

In our prospective, randomized, double-blind, placebo-controlled clinical trial investigation, 306 pregnant womens who were admitted for cesarean sections were included in the obstetrics and gynecology departments of Menoufia University Hospital and Abu Elmatamer General Hospital. The time frame for conducting the study was June 1, 2023, to November 30, 2023. The Hospital Ethics Committee granted consent prior to the study's launch. Every subject provided their informed consent prior to taking part in the research. In the current investigation, 396 patients were evaluated to see if they qualified to take part. 306 people were recruited for the trial as a consequence of 90 applicants declining or being determined to be ineligible, and 21 patients being removed from analysis following randomization.

Inclusion Criteria

- Age ≥18<40 years.
- 34 weeks or more gestation, scheduled for elective C/S by Pfannenstiel incision while sedated.

Criteria for Exclusion

- Less than 18 years old or older than 40.
- Cautions related to neuraxial pain relief.
- Patient aversion, allergy to any medication used in the investigation.
- General anesthesia is used if the BMI (body mass index) exceeds 35 kg/m2.
- Neuralgia or chronic pain, diabetes, preeclampsia, cardiovascular disease, and intraoperative opioid use for pain relief.
- A history of drug abuse, mental illness, or abdominal surgery.
- Uncontrollably bleeding throughout the procedure, uterine atony, drain implantation at the point of infiltration, and incapacity to comprehend a visual analogue scale (VAS).

Methods

306 women who were scheduled to undergo optional C/S through a Pfannenstiel incision while sedated and were 34 weeks or older were included in the study.

The following was applied to each patient:

- A thorough clinical examination and history.
- Laboratory investigations were conducted on blood samples to test several parameters such as serum transaminases, uric acid, urea and creatinine levels, blood grouping, and coagulation profiles. Additionally, a comprehensive urine examination was performed.

After determining each patient's eligibility, a lone researcher received signed informed permission.

An arbitrary number table produced by a computer was used to divide the patients into three groups, each including 102 patients:

1. First, 20 ml of normal saline were injected into the peritoneum of the uterus just prior to fascia closure. Next, 20 ml of a local anesthetic solution (10 ml of 0.5% bupivacaine and 10 ml of 2% lido-Caine mixture) were applied locally via invasion of subcutaneous wounds before closing the skin.
2. Group 2 (IPLA): in this group, a local anesthetic solution (10 ml 0.5% bupivacaine and 10 ml 2% lidocaine mix-true) was injected into the peritoneum of the uterus, and a local subcutaneous wound injection (20 ml of normal saline) was given.
3. Group 3 (the placebo group) involved injecting 20 milliliters of saline into the peritoneum of the uterus and administering 20 milliliters of normal saline locally by subcutaneous wound infiltration.

Normal monitors were fitted immediately upon the patients' arrival in the operating room.

Spinal anesthesia was given in a seated position under aseptic conditions at the L3–L4/L4–L5 interspace by the use of a 25-gauge Whitacre spinal needle, An intrathecal mixture of 15μcg fentanyl and 7 mg iso-baric bupivacaine was delivered. Following the intrathecal injection, with a height below the right hip and a 15° left lateral tilt, the patient was positioned supine on the operating table.

After arriving at the T4 sensory block level, the procedure began by assessing the level's perception of cold.

If the patient had reported pain after the procedure began, 50μg of fentanyl and 2 mg of intravenous midazolam were given. In cases where this continued, the patient was removed from the research and IV ketamine was given.

After the block, blood pressure was regularly checked for 10 minutes at a time, and then for 5 minutes during the procedure. Systolic blood pressure 20% below baseline was referred to as hypotension. To maintain systolic blood pressure, 10 mg boluses of ephedrine were administered together with a fast col-

loid or crystalloid infusion. In patients with bradycardia (heart rate less than 50 beats per minute), intravenous atropine (1 mg) was given.

Upon completion of the procedure, the surgeon was given two sterile, transparent, 20 ml syringes containing either saline or anesthetic solution. Twenty milliliters was injected into the uterine peritoneum just prior to fascia closure, and in accordance with three groups: First group (LWI), Wecond group (IPLA), and Third group (Placebo group), twenty milliliters was supplied locally through subcutaneous wound infiltration prior to skin closure. Every patient received care, unless it was not recommended.

After the procedure, all patients received 30 mg of intravenous ketorolac tromethamine every 12 hours and 15 mg/kg of acetaminophen every 6 hours for a minimum of 24 hours. Patients at the end of the procedure should also be ordered IV fentanyl patient-managed pain relief (bolus dosage = 25 mg, 10 min lockout interval, maximum dose = 200 mg/4 h, with no background infusion).

Using a VAS 0–100 mm (0 = no pain, = 100 the worst discomfort imaginable), the pain ratings both when moving and when at rest (moving forward and backward while sitting in bed). were assessed 2, 12, and 24 hours after surgery.

The patients' age, height, weight, BMI, gestational week, and the length of the procedure (the time between making a skin incision and closing it) were noted.

The main result was the pain score after 24 hours of movement. Maternal satisfaction and the level of pain both at rest and when moving at 2, 12, and 24 hours were the secondary objectives.

Ethical consent:

The Menoufia University Academic and Ethical Committee gave its clearance for the project. All study participants provided written informed consent after being informed of our research goals. This study was conducted in compliance with the Declaration of Helsinki of the World Medical Association. Human subjects code of ethics.

Statistical analysis:

The IBM SPSS software package version 20.0 was utilized for analysis once data was loaded into the computer. (Armonk, NY: IBM Corp.) Utilizing percentages and numbers, the qualitative data was described. The Kolmogorov-Smirnov test was used to confirm that the distribution was normal. The phrases range (minimum and maximum), mean, standard deviation, median, and interquartile range (IQR) were employed to characterize quantitative data. The 5% level of significance was applied to the results.

The tests that were employed were:

1. **Chi-square test:** Comparing categorical variables across various groupings.
2. **The F-test (ANOVA):** To compare more than two groups for normally distributed quantitative variables, use the Post Hoc test (Turkey) for pairwise comparisons.
3. **The Monte Carlo adjustment:** When more than 20% of the cells have an expected count of less than 5, chi-square correction is required.
4. **The Wallis-Kruskal test:** To compare more than two groups for quantitative variables with aberrant distributions.
5. **Repeated measures ANOVA:** When comparing more than two periods or stages for quantitative variables with a normally distributed distribution, use the Post Hoc test (adjusted Bonferronal) for pairwise comparisons.

Results

396 patients were assessed to see if they qualified for the trial. Thirty-six patients were recruited into the trial after fifty-three patients were excluded for not matching the eligibility criteria. Following randomization,

twenty-one patients were not included in the analysis. The installation of a drain in the infiltration site was a procedural violation that resulted in nineteen patients. Eight of these patients were assigned to the LWI group, six to the IPLA group, and five to the placebo group.

The final intention to treat analysis included three hundred and six patients.

There are no statistically obvious variations in our investigation in age between the three groups, $p < 0.05$), as indicated (Table I). There are no statistically significant variations in gestational age ($p < 0.05$) between the three groups, as seen by (table II). There were no appreciable variations in the operation's duration among the three groups ($p > 0.05$) as demonstrated by (Table III). There are no statistically significant variations in gravidity or parity ($p > 0.05$) between the three groups, according to (table IV). There were statistically obvious variations in ($p < 0.05$) but not significant values in weight or height between the three groups as indicated by (table V). The pain scores at rest at 2, 12, and 24 hours do not significantly differ across the three groups, ($p >0.05$) as this table demonstrates (table VI).

The pain scores at two hours after movement differ significantly across the three groups, Compared to the intraperitoneal instillation and placebo groups, the IPLA group's pain score is significantly reduced ($p<0.05$).

However, at 12 and 24 hours, there is no discernible variation in any group's pain score when moving as demonstrated by (table VII)

Discussion

In our study, we discovered that the pain scores postoperatively at rest at 2, 12, and 24 hours $p<0.05$ did not differ statistically ($p = 0.184$, 0.359 and 1.633, respectively). There were notable variations in the three groups' pain scores on movement at two hours, but not at twelve or twenty-four hours. The group receiving intraperitoneal instillations had lower pain scores than the placebo group and the intraperitoneal instillation group ($p<0.05$) ($p = 0.003$, 0.112 and 0.156, respectively).

The first Randomized, Double-Blind, Placebo-Controlled Trial by Patel R. et al. (14) provided support for the current study by examining the impact of intraperitoneal lidocaine instillation on pain following cesarean delivery. Under spinal anesthesia, 244 women had been checked out for elective cesarean deliveries randomly assigned to receive an injection of lidocaine (20 mL 2% lidocaine with epinephrine) or a placebo (20 mL normal saline) into the peritoneal cavity just prior to parietal peritoneum or fascia closure.

In patients given intraperitoneal lidocaine, they did not see any statistically significant variation in the primary result, discomfort on mobility at 24 hours following cesarean section. In comparison to the placebo group, the lidocaine group showed significantly lower pain scores two hours after cesarean delivery, and a much smaller number of women requested opioid analgesia for postoperative pain.

According to a Cochrane database analysis (15), local anesthetic-induced wound infiltration was linked to a reduction in opioid intake 24 hours following cesarean delivery, but it had no effect on VAS ratings. Only individuals who did not receive intrathecal morphine showed a reduction in opioid intake following other meta-analyses from 2016 and 2021. (13, 16)

According to Tverskoy et al (17), pain scores were shown to decrease in the 48 hours following cesarean section. There have also been reports of postoperative pain relief lasting up to 10 days. (18) Additionally, several investigations conducted in various surgical specialties have documented a supplementary advantage when combining adrenaline with local anesthetic for wound infiltration. (16-19) As used in other studies, adrenaline

may have helped to improve postoperative VAS scores, extend the duration of bupivacaine's effect, and further reduce the use of opioids. (16, 17)

In their study, Tharwat et al. (19) evaluated the safety and effectiveness of the infiltration of the incision with lidocaine and epinephrine vs lidocaine alone for the purpose of lowering pain postoperatively during sedation. They discovered that the duration of the effects of local anesthetics was extended when epinephrine was administered in addition to them. Owing to taking the benefit of the synergistic actions of these local anesthetics, we combined long-acting bupivacaine with lidocaine in our trial in order to give superior, longer-lasting analgesia. When compared to normal saline, they observed no discernible variation in the duration between the initial request for analgesic medication via intraperitoneal instillation or local infiltration.

Furthermore, Gozdenur Dagasan Cetin et al. A prospective randomized, double-blind, placebo-controlled trial (20) involved 150 pregnant females going through an elective cesarean section.

While sedated under spinal anasthesia. With subcutaneous (IV) lidocaine infusion for the management of postoperative pain following cesarean section, no statistically significant distinction was found between the two groups with respect to demographic information.

As a result, the pain scores postoperatively at rest at 2, 12, and 24 hours ($p = 0.314$, 0.343, and 0.735, respectively) and on movement at 12 and 24 hours ($p = 0.318$ and 0.642, respectively) did not differ statistically between the groups. When comparing Group IPLA to Group Placebo, the pain scores during movement at two hours were considerably decreased ($p = 0.047$). The time to first analgesic request and total fentanyl usage did not substantially change across the groups. Assess the injection of lidocaine intraperitoneally (IP).

Adesope et al. (13) introduced a meta-analysis and systematic review of 21 studies. The findings demonstrated a substantial drop in pain ratings throughout rest and activity 24 hours after surgery. In this meta-analysis, women who weren't given intrathecal mdorphine (ITM) saw a drop in opioid intake in particular, There was not a discernible difference between the groups.

One possible explanation for the discrepancy in the outcomes could be that randomized controlled studies based on ITMs were included in the meta-analysis.

Since our goal was to evaluate the exact effect of IPLA or LWI on post-caesarean pain relief without the use of morphine, we avoided using ITM in our trial.

Shahin AY & Osman AM (21) corroborated our findings, reporting that control group patients on the first postoperative day, there was a substantial increase in the general abdominal VAS (4.4 ± 1.4 vs. 2.8 ± 1.3, with a range of 2.0 to 7.0 in both groups, $P<0.001$) in terms of abdominal pain scores than lidocaine group patients. The results of this study revealed that the IpAI group had substantially low pain scores than the other study group.

Another double-blind, randomized, placebo-controlled study by Abu-Zaid A (22) With TAH, The aim of the research was to evaluate the efficiency of intraperitoneal lidocaine injection in the management of postoperative pain. Participants in a double-blind, randomized, placebo-controlled experiment were Forty females having complete abdominal hysterectomy procedures. Two groups of patients were formed at random, each with the same number of patients: 20 in the lidocaine group and 20 in the normal saline group. 50 mL of 0.8% lidocaine with epinephrine was given to the lidocaine group, while 50 mL of 0.9% saline was given to the placebo group. The lidocaine group showed significantly reduced means of pain scores at different periods ($P < 0.05$) in relation to the placebo group. But there was no discernible variation in the average dosage of opioid consumption

throughout a 24-hour period between the two groups (P = 0.785). Comparable to the saline group, the lidocaine group's patient satisfaction score was considerably greater (P = 0.034). After total abdominal hemectomy (TAH), an efficient and secure method for managing postoperative pain is to inject 50 mL of 0.8% lidocaine with epinephrine intraperitoneally. However, this method is unable to lower opioid intake more than 24 hours following TAH.

In a research conducted on patients having gynecological laparoscopy, Abdelazim et al. (23) discovered that intraperitoneal lidocaine, as opposed to saline, can considerably lower pain and narcotic intake over the course of the first 24 hours following surgery. Certain investigations have demonstrated the effectiveness of intraperitoneal instillation of lidocaine in the relief of pain following gynecological procedures. Additionally, research on patients undergoing other abdominal procedures showed that intraperitoneal lidocaine was effective in minimizing postoperative pain.

During gynecologic laparoscopy, intraperitoneal injection of local anesthetic considerably reduce discomfort during a 6-hour period following the procedure, but had little effect 24 hours later, according to a systematic study. (24) TAH, or total abdominal hysterectomy, results in severe tissue damage. Because lidocaine causes a stronger inflammatory response, it is more effective for procedures that result in more tissue damage.

An extra comprehensive analysis found that intraperitoneal local anesthesia was found to be effective in eight randomized trials involving gastrointestinal and gynecological surgery to decrease postoperative pain but did not increase opioid use. These findings are consistent with our own research.(25)

Our study is subject to the following restrictions:

The first issue was that the sensory block wasn't evaluated until two hours following the operation. The SA's residual effects could have an impact on the pain ratings.

Since the majority of patients were released from the hospital 24 hours following surgery, at that moment, we could only assess pain scores.

Third, neither the primary nor secondary goals of our study included patient recovery when we were designing it. It may be possible to schedule follow-up research to assess how these analgesic techniques affect the quality of obstetric recovery.

Conclusions

Administering lidocaine and bupivacaine intraperitoneally appears to be a useful technique for reducing post-cesarean pain, since it lowers the degree of pain during movement in women having an early cesarean section while under spinal anesthesia.

To contrast the effectiveness of intraperitoneal instillation with other successful strategies for reducing pain following cesarean delivery, more extensive, randomized studies are required. Additionally, research is needed to determine the safest amount of epinephrine to add to the anesthetic solution in order to obtain the optimum analgesia.

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Potential conflict of interest: None.

References

1. Central Agency for Public Mobilization and Statistics (CAPMAS). Egypt has highest rates of C-section deliveries globally: Health minister. Egypt, CAPMAS; 2022.
2. Carvalho B, Cohen SE, Lipman SS, Fuller A, Mathusamy AD, Macario A. Patient preferences for anesthesia outcomes associated with cesarean delivery. Anesth Analg, 2005; 101(4):1182-1187.
3. Bateman BT, Franklin JM, Bykov K, Avorn J, Shrank WH, Brennan TA, et al. Persistent opioid use following cesarean delivery: patterns and predictors among

opioid-naïve women. Am J Obstet Gynecol, 2016; 215(3):353.

4. Carvalho B, Mirza F, Flood P. Patient choice compared with no choice of intrathecal morphine dose for caesarean analgesia: a randomized clinical trial. Br J Anaesth, 2017; 118(5):762-771.
5. Sultan P, Patel SD, Jadin S, Carvalho B, Halpern SH. Transversus abdominis plane block compared with wound infiltration for postoperative analgesia following Cesarean delivery: a systematic review and network meta-analysis. Can J Anaesth, 2020; 67(12):1710-1727.
6. Dahl JB, Jeppesen IS, Jørgensen H, Wetterslev J, Møiniche S. Intraoperative and postoperative analgesic efficacy and adverse effects of intrathecal opioids in patients undergoing cesarean section with spinal anesthesia: a qualitative and quantitative systematic review of randomized controlled trials. Anesthesiology, 1999; 91(6):1919-1927.
7. Eisenach JC, Pan PH, Smiley R, Lavand'homme P, Landau R, Houle TT. Severity of acute pain after childbirth, but not type of delivery, predicts persistent pain and postpartum depression. Pain, 2008; 140(1):87-94.
8. Kainu JP, Sarvela J, Tiippana E, Halmesmäki E, Korttila KT. Persistent pain after caesarean section and vaginal birth: a cohort study. Int J Obstet Anesth, 2010; 19(1):4-9.
9. Pan PH. Post cesarean delivery pain management: multimodal approach. Int J Obstet Anesth, 2006; 15(3):185-188.
10. Patel R, Carvalho JC, Downey K, Kanczuk M, Bernstein P, Siddiqui N. Intraperitoneal Instillation of Lidocaine Improves Postoperative Analgesia at Cesarean Delivery: A Randomized, Double-Blind, Placebo-Controlled Trial. Anesth Analg, 2017; 124(2):554-559.
11. Marks JL, Ata B, Tulandi T. Systematic review and metaanalysis of intraperitoneal instillation of local anesthetics for reduction of pain after gynecologic laparoscopy. J Minim Invasive Gynecol, 2012; 19(5):545-553.
12. Gupta A, Perniola A, Axelsson K, Thörn SE, Crafoord K, Rawal N. Postoperative pain after abdominal hysterectomy: a double-blind comparison between placebo and local anesthetic infused intraperitoneally. Anesth Analg, 2004; 99(4):1173-1179.
13. Adesope O, Ituk U, Habib AS. Local anaesthetic wound infiltration for postcaesarean section analgesia: A systematic review and meta-analysis. Eur J Anaesthesiol, 2016; 33(10):731-742.
14. Patel R, Carvalho JCA, Downey K, Kanczuk M, Bernstein P, Siddiqui N. In Response. Anesth Analg, 2017; 125(1):352-353.
15. Bamigboye AA, Hofmeyr GJ. Local anaesthetic wound infiltration and abdominal nerves block during caesarean section for postoperative pain relief. Cochrane Database Syst Rev, 2009; (3):Cd006954.
16. Riemma G, Schiattarella A, Cianci S, La Verde M, Morlando M, Sisti G, et al. Transversus abdominis plane block versus wound infiltration for post-cesarean section analgesia: A systematic review and meta-analysis of randomized controlled trials. Int J Gynaecol Obstet, 2021; 153(3):383-392.
17. Tverskoy M, Cozacov C, Ayache M, Bradley EL, Jr., Kissin I. Postoperative pain after inguinal herniorrhaphy with different types of anesthesia. Anesth Analg, 1990; 70(1):29-35.
18. Metaxotos NG, Asplund O, Hayes M. The efficacy of bupivacaine with adrenaline in reducing pain and bleeding associated with breast reduction: a prospective trial. Br J Plast Surg, 1999; 52(4):290-293.
19. Tharwat AA, Yehia AH, Wahba KA, Ali AE. Efficacy and safety of post-cesarean

section incisional infiltration with lidocaine and epinephrine versus lidocaine alone in reducing postoperative pain: A randomized controlled double-blinded clinical trial. J Turk Ger Gynecol Assoc, 2016; 17(1):1-5.

20. Dagasan Cetin G, Dostbil A, Aksoy M, Kasali K, Ince R, Kahramanlar AA, et al. Intraperitoneal instillation versus wound infiltration for postoperative pain relief after cesarean delivery: A prospective, randomized, double-blind, placebo-controlled trial. J Obstet Gynaecol Res, 2023; 49(1):209-219.
21. Shahin AY, Osman AM. Intraperitoneal lidocaine instillation and postcesarean pain after parietal peritoneal closure: a randomized double blind placebo-controlled trial. Clin J Pain, 2010; 26(2):121-127.
22. Abu-Zaid A, Baradwan S, Himayda S, Badghish E, Alshahrani MS, Miski NT, et al. Intraperitoneal lidocaine instillation during abdominal hysterectomy: A systematic review and meta-analysis of randomized placebo-controlled trials. J Gynecol Obstet Hum Reprod, 2021; 50(10):102226.
23. Abdelazim IA, Al-Kadi M, El Shourbagy MM, Mohamed AA, Abu Fasel M. Intraperitoneal lidocaine tenoxicam for pain relief after gynecological laparoscopy. Asian Pac J Reprod, 2013; 2:146-150.
24. Kahokehr A, Sammour T, Soop M, Hill AG. Intraperitoneal local anaesthetic in abdominal surgery - a systematic review. ANZ J Surg, 2011; 81(4):237-245.
25. Grady MV, Mascha E, Sessler DI, Kurz A. The effect of perioperative intravenous lidocaine and ketamine on recovery after abdominal hysterectomy. Anesth Analg, 2012; 115(5):1078-1084.

Table I: Analysis of the three research groups regarding to age.

Age (years)	Group 1 (n = 102)	Group 2 (n = 102)	Group 3 (n = 102)	F	p
Min. – Max.	18.0 – 39.0	19.0 – 40.0	19.0 – 39.0		
Mean ± SD.	29.14 ± 6.09	29.81 ± 6.27	30.31 ± 5.86	0.963	0.383
Median (IQR)	29.0 (25.0 – 34.0)	29.50(25.0 – 36.0)	31.0 (26.0 – 36.0)		

IQR: **Inter quartile range** SD: **Standard deviation** F: **F for One way ANOVA test.**
p: p value for comparing between the three studied groups.
*: Statistically significant at $p \leq 0.05$
Group 1: LWI(local wound infilteration) Group 2: IpLA (intraperitoneal local anesthetic) Group 3: Placebo

Table II: Analysis of the three research groups regarding to gestational age.

Gestational age	Group 1 (n = 102)	Group 2 (n = 102)	Group 3 (n = 102)	F	p
Min. – Max.	26.0 – 72.0	26.0 – 41.0	36.0 – 41.0		
Mean ± SD.	38.82 ± 8.23	37.26 ± 3.14	38.73 ± 1.22	2.950	0.044
Median (IQR)	38.0 (36.0 – 39.0)	38.0(36.0 – 39.0)	39.0 (38.0 – 39.0)		

IQR: **Inter quartile range** SD: **Standard deviation** F: **F for One way ANOVA test.**
p: p value for comparing between the three studied groups.
*: Statistically significant at $p \leq 0.05$
Group 1: LWI(local wound infilteration) Group 2: IpLA (intraperitoneal local anesthetic) Group 3: Placebo

Table III: Analysis of the three research groups regarding to the length of operation.

Duration of operation (min.)	Group 1 (n = 102)	Group 2 (n = 102)	Group 3 (n = 102)	F	p
Min. – Max.	35.0 – 60.0	36.0 – 62.0	35.0 – 62.0		
Mean ± SD.	47.25 ± 6.28	47.74 ± 5.85	48.04 ± 7.04	0.388	0.679
Median (IQR)	47.50(43.0 – 51.0)	48.0(44.0 – 51.0)	48.0 (43.0 – 51.0)		

IQR: **Inter quartile range** SD: **Standard deviation** F: **F for One way ANOVA test.**
p: p value for comparing between the three studied groups.
*: Statistically significant at $p \leq 0.05$
Group 1: LWI(local wound infilteration) Group 2: IpLA (intraperitoneal local anesthetic) Group 3: Placebo

Table IV: Analysis of the three research groups regarding to the gravidity and parity.

	Group 1 (n = 102)		Group 2 (n = 102)		Group 3 (n = 102)		Test of sig.	p
	No.	%	No.	%	No.	%		
Gravidity								
1	16	15.7	14	13.7	18	17.6		
2	24	23.5	15	14.7	19	18.6	χ^2= 3.573	0.467
≥3	62	60.8	73	71.6	65	63.7		
Min. – Max.	1.0 – 8.0		1.0 – 8.0		1.0 – 6.0			
Mean ± SD.	3.12 ± 1.56		3.31 ± 1.51		3.04 ± 1.39		H=1.633	0.442
Median (IQR)	3.0(2.0 – 4.0)		3.0(2.0 – 4.0)		3.0(2.0 – 4.0)			
Parity								
Nullipara (0)	16	15.7	14	13.7	18	17.6		
Primi (1)	28	27.5	22	21.6	26	25.5	χ^2= 1.940	0.747
Multipara (≤2)	58	56.9	66	64.7	58	56.9		
Min. – Max.	**0.0 – 4.0**		**0.0 – 4.0**		**0.0 – 4.0**			
Mean ± SD.	**1.75 ± 1.16**		**1.96 ± 1.19**		**1.82 ± 1.26**		H=1.904	0.386
Median (IQR)	**2.0(1.0 – 3.0)**		**2.0(1.0 – 3.0)**		**2.0(1.0 – 3.0)**			

X^2: Chi square test MC: Monte Carlo H: H for Kruskal Wallis test
p: p value for comparing between the three studied groups.
Group 1: LWI(local wound infilteration) Group 2: IpLA(intraperitoneal local anesthetic) Group 3: Placebo

Table V: Analysis of the three research groups regarding to anthropometric measurement.

	Group 1 (n = 102)	Group 2 (n = 102)	Group 3 (n = 102)	F	p	Sig. bet. grps.		
						1 vs. 2	1 vs. 3	2 vs. 3
Weight (kg)								
Min. – Max.	67.0 – 99.0	59.0 – 98.0	68.0 – 98.0					
Mean ± SD.	78.87 ± 8.54	79.09 ± 11.05	78.33 ± 7.67	0.182	0.834	>0.005	>0.005	>0.005
Median (IQR)	77.0 (72.0 – 85.0)	78.50 (69.0 – 89.0)	76.0 (72.0 – 85.0)					
Min. – Max.	152.0 – 175.0	156.0 – 175.0	156.0 – 175.0					
Mean ± SD.	162.3 ± 6.19	163.6 ± 5.49	163.6 ± 5.68	1.763	0.173	>0.005	>0.005	>0.005
Median (IQR)	162.0 (158.0 – 166.0)	162.0 (159.0 – 168.0)	162.0 (159.0 – 168.0)					
BMI (kg/m^2)								
Min. – Max.	24.0 – 32.0	24.0 – 39.0	24.0 – 39.0					
Mean ± SD.	28.0 ± 2.52	28.44 ± 3.38	29.18 ± 3.76	3.384*	0.035*	0.599	0.028*	0.243
Median (IQR)	28.0 (26.0 – 30.0)	28.0 (26.0 – 31.0)	29.0 (26.0 – 31.0)					

IQR: **Inter quartile range** SD: **Standard deviation** F: **F for One way ANOVA test.**
p: p value for comparing between the studied groups.
*: Statistically significant at $p \leq 0.05$
Group 1: LWI(local wound infilteration) Group 2: IpLA(intraperitoneal local anesthetic) Group 3: Placebo

Table (VI): Analysis of the three research groups regarding to Pain Score (At Rest).

Pain score (At rest)	Group 1 (n = 102)	Group 2 (n = 102)	Group 3 (n = 102)	F	p	Sig. bet. grps.		
						1 vs. 2	1 vs. 3	2 vs. 3
2hr								
Min. – Max.	40.0 – 80.0	43.0 – 73.0	40.0 – 70.0					
Mean ± SD.	55.49 ± 9.71	53.20 ± 8.32	53.92 ± 9.14	1.703	0.184	>0.05	>0.05	>0.05
Median (IQR)	60.0 (50.0 – 60.0)	53.0 (43.0 – 63.0)	50.0 (50.0 – 60.0)					
12hr								
Min. – Max.	50.0 – 90.0	44.0 – 74.0	44.0 – 74.0					
Mean ± SD.	64.80 ± 9.72	63.61 ± 6.59	65.18 ± 7.87	1.028	0.359	>0.05	>0.05	>0.05
Median (IQR)	60.0 (60.0 – 70.0)	64.0 (64.0 – 64.0)	64.0 (64.0 – 74.0)					
24hr								
Min. – Max.	40.0 – 90.0	43.0 – 73.0	38.0 – 88.0					
Mean ± SD.	65.78 ± 10.09	64.18 ± 7.87	66.63 ± 11.26	1.633	0.197	>0.05	>0.05	>0.05
Median (IQR)	60.0 (60.0 – 70.0)	63.0 (63.0 – 73.0)	68.0 (58.0 – 78.0)					

IQR: Inter quartile range F: F for One way ANOVA test, pairwise comparison bet. each 2 groups were done using Post Hoc Test (Tukey)
SD: Standard deviation
p: p value for comparing between the studied groups.
*: Statistically significant at $p \leq 0.05$
Group 1: LWI(local wound infilteration) Group 2: IpLA(intraperitoneal local anesthetic) Group 3: Placebo

Table (VII): Analysis of the three research groups regarding to the movement-related pain score.

Pain score (On movement)	Group 1 (n = 102)	Group 2 (n = 102)	Group 3 (n = 102)	F	p	Sig. bet. grps.		
						1 vs. 2	1 vs. 3	2 vs. 3
2hr								
Min. – Max.	40.0 – 90.0	50.0 – 80.0	40.0 – 80.0					
Mean ± SD.	65.0 ± 10.41	60.49 ± 8.49	63.43 ± 9.60	5.886*	0.003*	0.002*	0.469	0.072
Median (IQR)	70.0 (60.0 – 70.0)	60.0 (50.0 – 70.0)	60.0 (60.0 – 70.0)					
12hr								
Min. – Max.	60.0 – 100.0	53.0 – 83.0	48.0 – 98.0					
Mean ± SD.	74.51 ± 9.81	72.61 ± 6.88	75.35 ± 11.43	2.207	0.112	>0.05	>0.05	>0.05
Median (IQR)	70.0 (70.0 – 80.0)	73.0 (73.0 – 73.0)	78.0 (68.0 – 88.0)					
24hr								
Min. – Max.	50.0 – 100.0	53.0 – 83.0	48.0 – 98.0					
Mean ± SD.	75.69 ± 9.90	73.98 ± 8.39	76.63 ± 11.26	1.867	0.156	>0.05	>0.05	>0.05
Median (IQR)	70.0 (70.0 – 80.0)	73.0 (73.0 – 83.0)	78.0 (68.0 – 88.0)					

IQR: Inter quartile range SD: Standard deviation. F: F for One way ANOVA test, pairwise comparison bet. each 2 groups were done using Post Hoc Test (Tukey) p: p value for comparing between the studied groups. *: Statistically significant at $p \leq 0.05$
Group 1: LWI Group 2: IpLA Group 3: Placebo

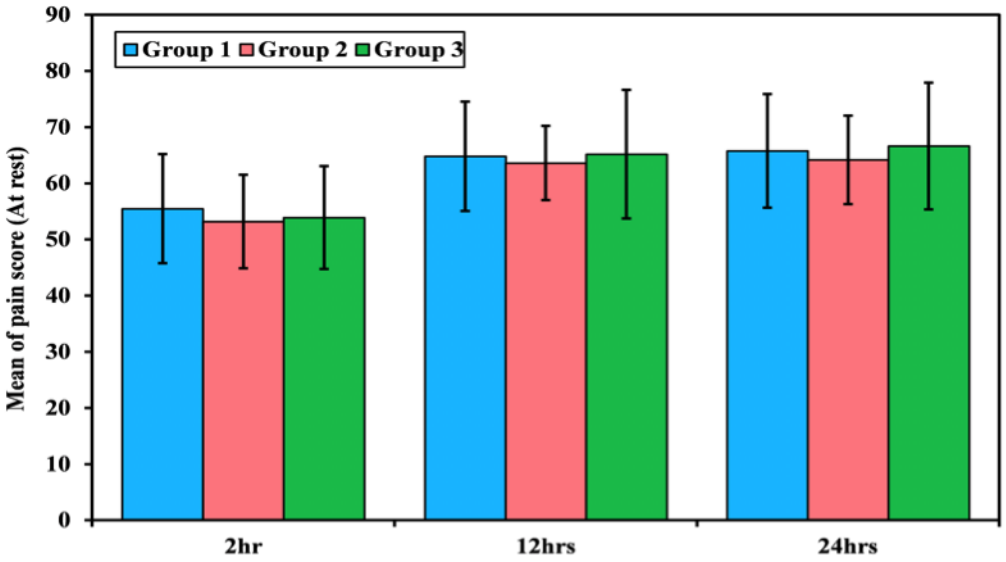

Figure (1): Analysis of the three research groups regarding to pain scores (at rest)

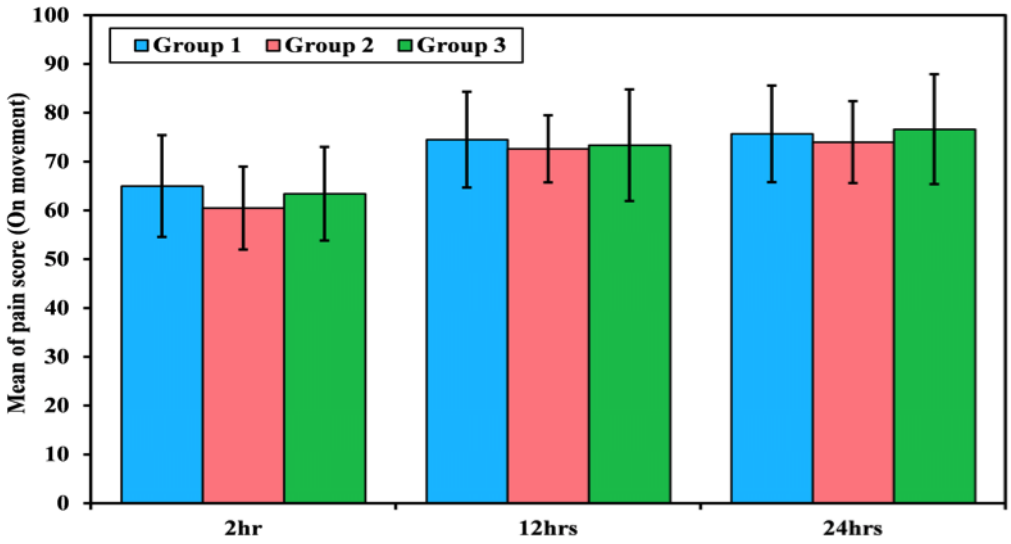

Figure (2): Shows analysis of the three research groups regarding to movement-related pain score