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ARTICULO ORIGINAL

Abdominal hysterectomy and postoperative Pain: A multimodal strategy to overcome the challenge

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ABSTRACT

Introduction: hysterectomy is one of the most frequently performed gynecological surgeries worldwide, with a high incidence of postoperative pain that increases morbidity. Currently, multimodal analgesia is recommended as a strategy for its control.
Objective: to describe the results obtained with the use of multimodal analgesia in patients undergoing abdominal hysterectomy.
Methods: a longitudinal descriptive observational study was conducted from December 2021 to November 2022 at the Julio Trigo López Clinical Surgical Teaching Hospital. The study included a universe of 130 patients who underwent abdominal hysterectomy. Ketamine infusion, sodium diclofenac, and infiltration of the surgical wound with 0,25 % bupivacaine were used. Pain intensity was assessed using a visual analog scale during the first four hours of the immediate postoperative period. The need for rescue analgesia and adverse effects associated with the multimodal technique were evaluated.
Results: at the end of the first four hours, no patient reported severe pain. In the third and fourth hours, 6,9 % and 31,5 % of patients, respectively, reported mild pain; 6,9 % and 19,3 % reported moderate pain, respectively. The requirements for rescue analgesics were minimal: 6,9 % in the third hour and 19,2 % in the fourth hour. Only 10 % of patients experienced nausea and vomiting.
Conclusions: multimodal analgesia demonstrated adequate control of acute postoperative pain in abdominal hysterectomy, with minimal adverse events and reduced need for rescue analgesia.

Keywords: Analgesia; Hysterectomy; Pain, Postoperative.

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INTRODUCTION

Hysterectomy is one of the most commonly performed gynecological surgeries worldwide. According to statistical data, 40 % of women will have undergone a hysterectomy by the age of 64.[1,2] The incidence is particularly high in the United States, with 510 procedures per 100,000 women. In France, over 60,000 women undergo this procedure annually. However, official data on the frequency of this surgery in health systems across most countries in the Americas region remain scarce.[3]

The development of minimally invasive techniques has provided numerous advantages for this surgical procedure; however, these approaches require a longer learning curve and greater technological resources. Consequently, open abdominal hysterectomy remains the most widely used approach, despite being more invasive, associated with greater bleeding, and causing more postoperative pain.[4]

The incidence of postoperative pain appears unchanged over the past 20 years, and both the intensity and duration of this pain are predictors for the development of chronic postoperative pain, which can persist beyond three months after surgery.[5]

Inadequate pain management can trigger segmental, suprasegmental, and cortical responses, leading to hemodynamic, respiratory, endocrinometabolic, and psychological manifestations. Therefore, optimal pain control is a cornerstone for achieving rapid postoperative recovery, reducing morbidity, shortening hospital stays, and lowering healthcare costs.[6]

Unfortunately, despite numerous clinical practice guideline recommendations, postoperative pain continues to be underassessed and undertreated, representing one of the most significant unresolved challenges in surgical care.[7]

Given that postoperative pain is a complex phenomenon, it is un likely that a single drug or technique can completely abolish it. Currently, multimodal analgesia is recommended as the treatment strategy.[6] Considering the limited healthcare resources in much of Latin America and the projected increase in future surgical interventions, there is an urgent need to develop new strategies to address this challenge. With this in mind, the present study was conducted to describe the outcomes of multimodal analgesia in patients undergoing abdominal hysterectomy.

METHODS

A prospective longitudinal descriptive observational study was carried out in patients undergoing open abdominal hysterectomy at "Julio Trigo López" Hospital between December 2021 and November 2022. The sample consisted of 130 patients classified as ASA (American Society of Anesthesiologists) physical status I–II. Patients were excluded if they had cardiovascular, renal, or hepatic conditions contraindicating the analgesics used, a history of hypersensitivity to these drugs, psychiatric illness or intellectual disability, or if they declined to participate.

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In the preoperative period, patients received preanesthetic medication with midazolam 0.05 mg/kg body weight. In the operating room, standard noninvasive monitoring was applied throughout the anesthetic-surgical procedure, including continuous electrocardiography, systolic and diastolic blood pressure, and peripheral oxygen saturation via pulse oximetry. General endotracheal anesthesia was induced with propofol 2 mg/kg, fentanyl 5 µg/kg, lidocaine 2 % 1 mg/kg, and vecuronium 0,1 mg/kg intravenously.

Anesthetic maintenance was achieved with total intravenous anesthesia (TIVA) using propofol infusion, supplemental neuromuscular blockade at appropriate doses, fentanyl microdoses, and an oxygen–air mixture with FiO_2 45 %. Ketamine was administered via infusion at an analgesic dose: starting at 0,6 mg/kg/h and gradually reduced every 15 minutes until a continuous maintenance dose of 0,2 mg/kg/h was reached. The ketamine infusion was discontinued 30 minutes before the end of surgery. Immediately after ketamine discontinuation, intravenous sodium diclofenac (1 mg/kg) and ondansetron (0,15 mg/kg) were administered.

At the conclusion of surgery, before skin closure, the surgical team was requested to infiltrate the wound edges with 0,25 % bupivacaine (2 mg/kg). Patients were then transferred to the post-anesthesia care unit. Postoperatively, pain intensity was assessed hourly during the first four hours using the Visual Analog Scale (VAS): 0 = no pain; 1–3 = mild pain; 4–6 = moderate pain; 7–10 = severe pain.

Rescue analgesia was administered according to pain intensity:

- Tramadol 1 mg/kg diluted in 250 mL of 0.9% NaCl IV for moderate pain.
- Morphine 0.1 mg/kg IV for severe pain.

Data were collected using a purpose-designed data collection form.

Statistical Analysis

Data were analyzed using SPSS version 18.1. Descriptive statistics were applied, including frequency distributions. Mean and standard deviation were calculated for quantitative variables. Complex results were presented in tables for clarity.

Ethical Considerations

The study adhered to the basic principles of medical ethics as outlined in the Declaration of Helsinki, Seoul Amendment (2008), regarding diagnostic and therapeutic research in humans. Authorization was obtained from the Anesthesiology and Resuscitation Service of "Julio Trigo López" Hospital to review clinical records. Confidentiality of patient data was guaranteed, and informed consent was obtained after explaining all aspects of the study. The protocol was reviewed and approved by the Ethics Committee of "Julio Trigo López" Hospital.

RESULTS

The predominant age range was 30–50 years, with a mean age of 46 years (SD = 5,03). The majority (86 patients) were classified as ASA I.

As shown in Table 1, no patient reported severe pain during the first four postoperative hours. In the third and fourth hours, although most patients remained pain-free (86,2 % and 49,2 %, respectively), mild pain was reported by 6,9 % and 31,5 %, and moderate pain by 6,9 % and 19,3 %, respectively.

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Table 1. Postoperative Analgesia Evaluation.

Postoperative Analgesia	1st hour		2nd hour		3rd hour		4th hour	
	No.	%	No.	%	No.	%	No.	%
No pain	130	100	129	99,2	112	86,2	64	49,2
Mild pain	0	0	1	0,8	9	6,9	41	31,5
Moderate pain	0	0	0	0	9	6,9	25	19,3
Total	130	100	130	100	130	100	130	100

During the third postoperative hour, 93,1 % of study participants did not require rescue analgesia, while during the fourth hour, 80,8 % did not require it, as shown in Table 2.

Table 2. Rescue Analgesia Requirement.

Rescue Analgesia	3rd hour		4th hour	
	No.	%	No.	%
Yes	9	6,9	25	19,2
No	121	93,1	105	80,8
Total	130	100	130	100

Ninety percent (90 %) of patients did not report adverse reactions associated with the multimodal analgesia strategy used (Table 3); adverse reactions occurred only in 10 % of patients, and all were nausea and/or vomiting. The age group with the highest prevalence was 41–50 years (38,5 %).

Table 3. Distribution of Patients by Age and Presence of Adverse Reactions.

Age	Adverse Reactions				Total	
	No		Yes			
	No.	%	No.	%	No.	%
30 - 40	39	30	4	3,1	43	33,1
41 - 50	33	25,4	5	3,8	38	29,2
51 - 60	23	17,7	2	1,5	25	19,2
> 60	22	16,9	2	1,5	24	18,5
Total	117	90	13	10	130	100

DISCUSSION

Effective control of postoperative pain has become an essential component of perioperative care; evidence of this includes various consensus statements developed both to provide treatment recommendations and to formulate high-evidence algorithms, such as the *Postoperative Pain Management Guidelines* created by The American Pain Society, which include a significant section on multimodal analgesia and the use of NSAIDs and acetaminophen as part of this approach. [8]

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Alcántara-Montero, [9] states that in clinical practice, the use of analgesic combinations—both at fixed doses and at doses adapted to individual needs—is increasingly common, and that the scientific principle justifying these pharmacological combinations is synergy, such that the total effect is greater than the sum of the individual effects.

Similarly, Albuja and Paredes,[10] in an updated literature review, found that 85 % of studies mentioned at least one multimodal therapy for pain control. Gómez et al.,[11] support the innovation of multimodal analgesia using new drugs in different types of surgeries and even in outpatient regimens, with the common goals of preventing acute pain, its progression to chronicity, reducing medication doses and adverse reactions—even in critically ill patients. Indeed, Guerrero-Gutiérrez et al.,[12] state that pain experienced in the ICU has the potential to transition to chronic pain and has been shown to persist in 12 % to 44 % of patients six months after hospital discharge.

In the present study, a multimodal strategy was used based on the intravenous combination of NSAID (Sodium Diclofenac), Ketamine infusion, and surgical wound infiltration with local anesthetic. It was demonstrated that the majority of patients in the study reported no pain during the first four hours of the immediate postoperative period; this result coincides with the study by Soto and Nodal,[13] in which multimodal analgesia was used in 54 patients undergoing videolaparoscopic hysterectomy, and none reported severe postoperative pain in the first four hours.

Reyes and Navarrete,[14] in their randomized clinical trial using three different multimodal techniques and a conventional analgesia technique, found that most patients in the study maintained mild pain levels (VAS 0–3 points), with a general satisfaction rate of 87 %, thus demonstrating that multimodal analgesia is a safe and effective alternative that reduces medication doses and yields satisfactory results on the pain scale.

The use of Ketamine has gained renewed interest as part of the multimodal approach to acute pain management. It can act as an analgesic by blocking N-methyl-D-aspartate receptors involved in nociceptive pain transmission and inflammation. Remarkable results have been reported with the use of this drug in postoperative analgesia; for example, used sub-anesthetic dose ketamine infusion in 100 patients undergoing proctologic surgery, and 100 % of the sample denied the presence of pain upon arrival at the Post-Anesthesia Care Unit, rating their condition at level zero on the Visual Analog Scale. Correa,[15] concludes in his article that ketamine administered at low doses intra- and postoperatively significantly improves pain and hyperalgesia. He also demonstrates that its analgesic effect at sub-anesthetic doses leads to a reduction in the drug's psychomimetic adverse effects.

Tejeda et al.,[16] employed a multimodal strategy similar to the current study. They evaluated analgesic behavior during the use of low-dose ketamine combined with adjuvants such as diclofenac, metamizole, morphine, and dexamethasone in spinal arthrodesis; they observed that 88% showed absent or mild pain scores at least at four time points, and nearly 90 % of patients achieved mobilization and ambulation on the first postoperative day.

Infiltration of a local anesthetic such as bupivacaine into the surgical wound is a simple method that also reduces postoperative analgesic consumption and prolongs the time to first rescue analgesia. It exerts its action by blocking sodium channels in the cell membrane, thereby interfering with afferent signal propagation. However, Marrero et al.,[6] state that this method has the disadvantage of limited analgesic effect, as it prevents somatic but not visceral pain, and therefore should not be used as an isolated method but as part of a multimodal strategy.

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In the present study, it was confirmed that the need for rescue analgesia was minimal, a finding that supports the benefits of the multimodal strategy and coincides with results from Ramos,[17] in which 88 % of patients did not require rescue analgesia. Soto and Nodal,[13] reported that, of all patients receiving multimodal analgesia, only 1,9 % required rescue analgesia. However, Tejeda et al.,[16] observed that half of the patients in their study used opioid rescue, with an average time of 85 minutes to the first dose and an average of 1 to 2 rescues during the first 24 hours.

The current research demonstrates that the use of a multimodal strategy facilitates the rare occurrence of adverse reactions. Several authors in the reviewed literature report results similar to this study.[14,17,18] The limitations of this study focus on two fundamental elements: the assessment of pain intensity, as only subjective scales are used that do not cover all dimensions of pain, and the pharmacological homogeneity of the multimodal strategy, as new drugs are continually added, preventing the development of homogeneous comparative studies.

CONCLUSIONS

Multimodal analgesia proved to be a safe and effective therapeutic strategy, ensuring optimal control of acute postoperative pain in patients undergoing total abdominal hysterectomy. Its application significantly reduced pain intensity, minimized the occurrence of adverse events, and decreased the need for rescue analgesia, resulting in better postoperative recovery and a positive impact on the quality of medical care.

Conflicts of Interest
There are no conflicts of interest among the authors of this article.

Author Contributions
LSM: Participated in conceptualization, investigation, project administration, supervision, visualization, writing, review, and editing.
TAA: Participated in conceptualization, investigation, project administration, review, and editing.
The manuscript was approved by both authors of the study.

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