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An Innovative Analgesia Based on Optimizing Safety, Pain Control, and Reduction of Adverse Effects

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ABSTRACT

Pain in critically ill patients requires effective analgesia, but unnecessary exposure to potent opioids increases risks of respiratory depression, hypotension, excessive sedation, dependence, and other adverse events, leading to more complications. Recent emphasis on multimodal analgesia highlights safer options like metamizole and tramadol in selected contexts. This retrospective observational study describes a cohort of 339 ICU patients receiving continuous metamizole-tramadol infusion for pain control, aiming to support this as an opioid-sparing alternative.

The cohort (mean age 37.0 years, median 32, range 1-97) showed clinical heterogeneity (neurocritical, obstetric, septic, surgical, respiratory, cardiac, pancreatitis). Analysis used SPSS for descriptives. No nausea, vomiting, or hypotension occurred; BPS scores indicated adequate pain control (all 3/12).

In selected critically ill patients, continuous metamizole-tramadol infusion is a reasonable opioid-sparing option in multimodal protocols, reducing potent opioid exposure and adverse effects.

Keywords

Continuous infusion analgesia, Critically ill patients, Metamizole, Opioid-sparing, Tramadol.

Introduction

Pain in the ICU not only impairs patient comfort but also exacerbates sympathetic response, interferes with mechanical ventilation, and hinders weaning [1]. Untreated or undertreated pain associates with agitation, sleep disturbances, and chronic pain risk, while indiscriminate potent opioid use (e.g., fentanyl) causes respiratory depression, hypotension, muscle rigidity, prolonged sedation, and dependence, prolonging hospital stays [2].

Recent literature supports multimodal, opioid-sparing approaches in acute pain, especially surgical/ICU settings, positioning metamizole and tramadol favorably due to benefit-risk profiles in protocolized use [3]. Multimodal analgesia, a pillar of ERAS protocols, combines complementary mechanisms to enhance efficacy and reduce opioid doses; scheduled metamizole shows postoperative efficacy and opioid-sparing effects [4]. Tramadol's weak μ-agonism plus serotonin/norepinephrine reuptake inhibition suits moderate pain as an intermediate option [5].

Limited ICU data exist on protocolized metamizole-tramadol versus fentanyl-centric regimens. This local cohort provides foundational evidence for safer, evidence-aligned protocols.

Methods

This descriptive, retrospective, cross-sectional study occurred in the ICU of Hospital Regional Docente de Cajamarca, Peru (January 1, 2019–December 31, 2020).

Inclusion

Patients aged 1–75 years with informed consent (patient/family), complete records, admitted with diagnoses including severe obstetric (preeclampsia/eclampsia/HELLP/DPP/puerperium), hemorrhagic shock, polytrauma, hysterectomy, strychnine/organophosphate intoxication, status epilepticus, necrotizing fasciitis, traumatic brain injury/neurotrauma, cerebrovascular/neurocritical events, sepsis/septic shock, acute abdominal surgery/peritonitis, Guillain-Barré/polyneuropathy, neurosurgery/post-craniotomy, acute/chronic renal failure, uncomplicated post-cesarean, respiratory failure/COPD/pneumonia, acute pancreatitis, metabolic disorders/valve replacements/stent placement.

Exclusion

Transfers to other hospitals, incomplete records. Intervention: On admission, continuous infusion of metamizole (1.14 mg/kg/h) + tramadol (0.057 mg/kg/h) in 100 mL 0.9% saline; morphine (0.2 mg/kg) as rescue for severe pain. One hour post-infusion, BPS scale applied; adverse events (nausea, vomiting, abdominal distension, hypotension) assessed. Data collected in Excel 2020, analyzed in SPSS v20 with descriptives (means, medians, ranges). Ethics approval from hospital committee; informed consents obtained.

Results

The cohort (n=339) had mean age 37.0 (SD 20.5) years, median 32, range 1–97 years (Table 1). Diagnoses were heterogeneous (Table 2). BPS scores were optimal (3/12) across all items in all patients (Tables 3 and 4). No adverse events occurred (Table 5).

Table 1: Basic Demographic Characteristics of the Cohort.

Variable	Result
Number of patients	339
Mean age (SD), years	37.0 (20.5)
Age range, years	1–97

Table 2: Distribution of Grouped Diagnoses and Number of Patients (n=339) with Metamizole-Tramadol Continuous Infusion, ICU, Hospital Regional Docente de Cajamarca.

Grouped Diagnosis	Number of Patients
Severe obstetric (PE/eclampsia/HELLP/DPP/puerperium)	112
Other critical diagnoses (hemorrhagic shock, polytrauma, dilation/curettage, hysterectomy, salpingectomy, strychnine/organophosphate intoxications, status epilepticus, necrotizing fasciitis)	84
Traumatic brain injury/neurotrauma	30
Cerebrovascular/neurocritical non-traumatic	26
Sepsis/septic shock	21
Acute abdominal surgery/peritonitis	12
Guillain-Barré syndrome/polyneuropathy	11
Neurosurgery/post-craniotomy	11
Acute/chronic renal failure	9
Uncomplicated post-cesarean	9
Respiratory failure/COPD/pneumonia	7
Acute pancreatitis	5
Metabolic disorders/valve replacements/stent placement	2

Table 3: Behavioral Pain Scale (BPS).

Item	Description	Points	Interpretation
Facial movements	Relaxed: No facial tension/movement	1	No apparent pain
	Partial contraction: Mild (frown, pursed lips)	2	Mild/moderate pain
	Total contraction: Marked (very tense face)	3	Moderate/severe pain
Upper limb movements	Relaxed posture: No movement, calm	1	No apparent pain
	Partial movement: Limited, tense	2	Mild/moderate pain
	Withdrawal/strong movements: Abrupt withdrawal to painful stimulus	3	Moderate/severe pain
Ventilation (ventilator compliance)	No dyssynchrony: No respiratory changes	1	No apparent pain
	Partial dyssynchrony: Localized effort, mild cough	2	Mild/moderate pain
	Total dyssynchrony: Strong cough, fighting ventilator, severe effort	3	Moderate/severe pain

Total BPS: Minimum 3 (no pain), maximum 12 (extreme pain).

Table 4: BPS Scores in Critically Ill Patients Using Metamizole-Tramadol Infusion, Hospital Regional Docente de Cajamarca 2019–2020.

Item Evaluated	Description	BPS Score	Number of Patients
1. Facial expression	Relaxed	1	339
2. Upper limb movements	Relaxed	1	339
3. Ventilation compliance	Ventilator tolerance	1	339

Table 5: Potentially Related Adverse Events with Metamizole-Tramadol Continuous Infusion in ICU Patients, Hospital Regional Docente de Cajamarca.

Variable	Result
Recorded nausea	0/339 (0%)
Recorded vomiting	0/339 (0%)
Recorded hypotension	0/339 (0%)
Patients with ≥1 event	0/339 (0%)

This heterogeneous cohort supports metamizole-tramadol as safe/effective, aligning with evidence on multimodal regimens reducing opioid needs without adverse events [6,7]. No prior ICU reports on continuous infusion across these diagnoses exist, though postoperative studies confirm efficacy/safety versus alternatives [5,7]. Fentanyl risks (respiratory depression, addiction) underscore this opioid-sparing strategy [8].

Conclusions

In selected critically ill patients, continuous metamizole-tramadol infusion is a rational opioid-sparing alternative to fentanyl, maintaining adequate analgesia with no adverse effects observed. This supports multimodal protocols with clinical/health policy implications for safer ICU pain management.

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