Rev Esp Anestesiol Reanim. 2016;xxx(xx):xxx–xxx

Revista Española de Anestesiología y Reanimación

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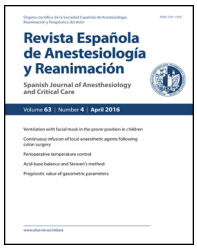

ORIGINAL ARTICLE

Comparison of the effectiveness of dexmedetomidine, meperidine and ketamine in the prevention of postoperative shivering☆

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Received 18 November 2015; accepted 12 February 2016

KEYWORDS
Postoperative shivering;
Prevention;
Dexmedetomidine;
Meperidine;
Ketamine;
General anaesthesia

Abstract
Objective: To compare the prophylactic effectiveness of dexmedetomidine, meperidine, and ketamine for postoperative shivering.
Materials and methods: A randomised, controlled, double-blind, clinical trial, including 160 patients (ASA I–II) undergoing surgical procedures under general anaesthesia for longer than 1 h. They were randomly assigned to four groups to receive a single intravenous dose: dexmedetomidine 1 μg/kg (group A, n = 33), meperidine 0.4 mg/kg (group B, n = 38), ketamine 0.5 mg/kg (group C, n = 40), or 0.9% saline solution (group D, n = 45), administered 20 min before the skin suture. To avoid bias, the anaesthetic induction and maintenance technique, as well as postoperative follow-up was standardised.
Results: For any level of shivering, the greatest incidence was observed in the placebo group (47%) ($P < .01$). The greatest effect on shivering levels 3 and 4 occurred in the placebo group (22% and 18%, respectively). For levels 3 and 4 during follow-up, there was not a single case of shivering at any time in the meperidine group ($P < .01$). The placebo group (38%) had the highest proportion of patients requiring treatment for post-operative shivering ($P < .01$).
Conclusion: Meperidine given intravenously in a single dose of 0.4 mg/kg is a useful means for preventing postoperative shivering.

☆ Please cite this article as: Alvarez Corredor FA. Comparación de la eficacia de dexmedetomidina, meperidina y ketamina en la prevención de escalofrío postoperatorio. Rev Esp Anestesiol Reanim. 2016. http://dx.doi.org/10.1016/j.redar.2016.02.006

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PALABRAS CLAVE
Escalofrío postoperatorio;
Prevención;
Dexmedetomidina;
Meperidina;
Ketamina;
Anestesia general

Comparación de la eficacia de dexmedetomidina, meperidina y ketamina en la prevención de escalofrío postoperatorio

Resumen
Objetivo: Comparar la eficacia de la dexmedetomidina, meperidina y ketamina profiláctica en el tratamiento del temblor postoperatorio.
Materiales y métodos: Ensayo clínico, aleatorizado, controlado y de doble ciego. El estudio incluyó 160 pacientes (ASA I-II) bajo anestesia general mayor a 1 h de duración. Se asignaron aleatoriamente a 4 grupos para recibir dosis única intravenosa: dexmedetomidina 1 μg/kg (grupo A, n = 33), meperidina 0,4 mg/kg (grupo B, n = 38), ketamina 0,5 mg/kg (grupo C, n = 40), o solución salina 0,9% (grupo D, n = 45), administrados 20 min antes de la sutura de piel. Para evitar sesgos, se estandarizó la técnica de inducción y mantenimiento anestésico así como el seguimiento postoperatorio.
Resultados: Para cualquier grado de escalofrío, la mayor incidencia se presentó en el grupo placebo (47%) (p < 0,01). La mayor incidencia para escalofrío (grados 3 y 4) se presentó en el grupo placebo (22 y 18% respectivamente). Para los grados 3 y 4 en todos los momentos de seguimiento no se presentó ningún caso de escalofrío en el grupo de meperidina (p < 0,01). El grupo placebo (38%) fue el que mayor proporción de pacientes requirió tratamiento de rescate para escalofrío postoperatorio (p < 0,01).
Conclusión: La meperidina en dosis única de 0,4 mg/kg intravenosa es una medida útil para la prevención del escalofrío postoperatorio.

Introduction

Recovery from anaesthesia involves the gradual recovery of organ function and vital reflexes, and can be associated with significant complications. One such event is postoperative shivering (POS), which is not uncommon, and usually presents in the post-anaesthesia care unit (PACU). It is perceived and remembered by the patient as an unpleasant postoperative experience.[1–3] The reported incidence of POS is between 5% and 65% in patients recovering from general anaesthesia, depending on the definition of tremor,[1] and in approximately 30% of volunteers undergoing epidural anaesthesia.[1] Pharmacological therapy varies greatly, and according to some authors, is seldom effective.[4] The efficacy of measures taken to prevent and treat POS varies greatly in the literature. The pathogenesis of POS has been variously attributed to the α2 adrenergic, opioid, anticholinergic and serotonergic systems, and this has led to the use of a variety of different pharmacological approaches to prevent and treat this entity. The different drugs used to treat POS include non-opioid analgesics: tramadol and metamizoll[5,6]; opioid analgesics: meperidine, alfentanil and nalbufine[7,8]; α2 adrenergic agonists: clonidine and dexmedetomidine[5,9–12]; respiratory analeptics: doxapram[10]; anticholinergics: physostigmine[11]; antiserotonergics: dolasetron, ondansetron and ketanserin[5,11]; and NMDA receptor antagonists: ketamine.[13] It is important to treat POS because it is associated with a significant increase in oxygen consumption, onset of lactic acidosis, increased carbon dioxide production, and important physiological changes that can lead to complications in the immediate postoperative period in patients with major cardiovascular comorbidities. It also interferes with cardiovascular monitoring.[5,10,14,15] Anti-shivering pharmacological prophylaxis is not routinely used, but has been shown to be effective in controlling this complication. This raises the need for studies aimed at identifying the most effective drug to prevent POS. Meperidine is one of the most commonly used and most effective therapeutic options in treating POS[4,5,16–18]; however, the development of new POS prophylactics, such as ketamine[19] and dexmedetomidine[20] would help increase patient satisfaction and thus improve quality of care. The aim of this study has been to compare the efficacy of dexmedetomidine, meperidine and ketamine in the prevention of POS in patients receiving general anaesthesia in the Fundación Santa Fe de Bogotá.

Materials and methods

Study design: randomised controlled, double-blind (patients and statistician) clinical trial. Study population and sample: patients undergoing both elective and emergency surgery under general anaesthesia in the Hospital Universitario Fundación Santa Fe de Bogotá, Colombia. The sample size was calculated using the sample size calculation software version 1.1, developed by the Pontifical Xavierian University. Study parameters were measured for an outcome variable in a population of more than 2 independent groups using Fisher's exact test. The sample size was calculated on the assumption of 50% incidence of POS in the placebo group.