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SCIENTIFIC ARTICLE

Effects of lidocaine and magnesium sulfate in attenuating hemodynamic response to tracheal intubation: single-center, prospective, double-blind, randomized study

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KEYWORDS

Laryngoscopy;
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Abstract

Background and objectives: Hemodynamic response to airway stimuli is a common phenomenon and its management is important to reduce the systemic repercussions. The objective of this study is to compare the efficacy of intravenous magnesium sulfate versus lidocaine on this reflex hemodynamics after laryngoscopy and tracheal intubation.

Methods: This single-center, prospective, double-blind, randomized study evaluated 56 patients ASA 1 or 2, aged 18–65 years, scheduled for elective surgeries under general anesthesia with intubation. The patients were allocated into two groups: Group F received 30 mg·kg⁻¹ of magnesium sulphate and Group L, 2 mg·kg⁻¹ of lidocaine, continuous infusion, immediately before the anesthetic induction. Blood pressure (BP), heart rate (HR), and bispectral index (BIS) were measured in both groups at six different times related to administration of the study drugs.

Results: In both groups there was an increase in HR and BP after laryngoscopy and intubation, compared to baseline. Group M showed statistically significant increase in the values of systolic and diastolic blood pressure after intubation, which was clinically unimportant. There was no difference in the BIS values between groups. Among patients receiving magnesium sulfate, three (12%) had high blood pressure versus only one among those receiving lidocaine (4%), with no statistical difference.

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PALAVRAS-CHAVE

Laringoscopia;
Intubação
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Sulfato de magnésio;
Fenômenos
fisiológicos
cardiovasculares

Conclusion: Magnesium sulfate and lidocaine have good efficacy and safety for hemodynamic management in laryngoscopy and intubation.

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Os efeitos da lidocaína e do sulfato de magnésio na atenuação da resposta hemodinâmica à intubação orotraqueal: estudo unicêntrico, prospectivo, duplamente encoberto e aleatorizado

Resumo

Justificativa e objetivos: A resposta hemodinâmica aos estímulos das vias aéreas é um fenômeno comum e seu controle é importante para diminuir as repercussões sistêmicas. O objetivo deste trabalho é comparar os efeitos da administração endovenosa de sulfato de magnésio versus lidocaína na hemodinâmica desse reflexo após a laringoscopia e intubação orotraqueal. **Métodos:** Este estudo duplamente encoberto, aleatorizado, unicêntrico e prospectivo avaliou 56 pacientes, ASA 1 ou 2, entre 18 e 65 anos, escalados para cirurgias eletivas sob anestesia geral com intubação orotraqueal. Foram alocados em dois grupos, o M recebeu $30 \text{ mg} \cdot \text{kg}^{-1}$ de sulfato de magnésio e o L, $2 \text{ mg} \cdot \text{kg}^{-1}$ de lidocaína, em infusão contínua, imediatamente antes da indução anestésica. Os valores de pressão arterial (PA), frequência cardíaca (FC) e índice bispectral (BIS) foram aferidos nos dois grupos em seis momentos relacionados com a administração dos fármacos do estudo.

Resultados: Em ambos os grupos houve aumento na FC e PA após a laringoscopia e intubação, em relação aos valores basais. No Grupo M observou-se elevação estatisticamente significativa, mas clinicamente pouco importante, nos valores das pressões arteriais sistólica e diastólica após a intubação. Não houve diferença nos valores de BIS entre os grupos. Dos pacientes que receberam o sulfato de magnésio, 3 (12%) apresentaram episódio de hipertensão, ao passo que apenas um dos que receberam lidocaína (4%) apresentou esse sinal, sem diferença estatística. **Conclusão:** Sulfato de magnésio e a lidocaína apresentam boa eficácia e segurança no controle hemodinâmico à laringoscopia e intubação.

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Introduction

The hemodynamic response to stimuli evoked by laryngoscopy and intubation is a common phenomenon, resulting from the release of endogenous catecholamines reflexively to the upper airway afferents when stimulated.¹ This inappropriate response may increase perioperative morbidity and mortality, especially in patients with coexisting disease, particularly patients with cardiovascular disease. The management of this defensive reflex is essential because it prevents adverse events, such as tachycardia, systemic hypertension, pulmonary hypertension, and arrhythmias, which may result in stroke or myocardial infarction resulting from hemodynamic instability produced by laryngoscopy and intubation. Many drugs are the subject of studies, including those with good results, such as magnesium sulfate¹⁻³ and lidocaine.⁴⁻⁶

The magnesium sulfate mechanism of action for hemodynamic response attenuation appears to result from the inhibition of catecholamine release from the adrenal medulla, maintains the plasma concentration of epinephrine practically unchanged, and also reduces the increased circulating norepinephrine when compared to that of a control group.² It also has a systemic and coronary vasodilation effect by antagonizing calcium ion in vascular smooth

muscle.⁷ As for lidocaine, when used systemically, it has an antagonistic action on sodium channels and NMDA receptors, reduces the release of substance P, has glycinergic action, which decreases the airway reactivity.^{8,9}

The aim of this study was to compare the effects of intravenous magnesium sulfate with lidocaine on hemodynamics during intubation.

Material and methods

This prospective, randomized, double blind, single-center study was approved by the Research Ethics Committee — FEPECS/SES-DF — under the opinion number 799,112 on September 22, 2014, and is identified in the *Plataforma Brasil* (<http://aplicacao.saude.gov.br/plataformabrasil>) as CAAE No 33365114.7.0000.5553 and registered in ClinicalTrials (NCT02359370). After written informed consent was given, 56 patients, ASA 1 or 2, aged between 18–65 years, scheduled for elective surgery with orotracheal intubation (OTI) were assessed for eligibility, between September and November 2014 at the *Hospital de Base do Distrito Federal* (Fig. 1).

Patients with contraindications or history of hypersensitivity to the study drugs, those with coronary ischemic

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