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SCIENTIFIC ARTICLE

Effect of intraoperative intravenous lidocaine on pain and plasma interleukin-6 in patients undergoing hysterectomy☆

Caio Marcio Barros de Oliveira[a,b,c], Rioko Kimiko Sakata[d,*], Alexandre Slullitel[e], Reinaldo Salomão[f], Vera Lucia Lanchote[g], Adriana Machado Issy[d]

[a] *Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil*
[b] *Pain Service, Hospital São Domingos (HSD), São Luís, MA, Brazil*
[c] *Sociedade de Anestesiologia do Estado do Maranhão (SAEM), São Luís, MA, Brazil*
[d] *Pain Division of the Department of Anesthesiology, Pain and Intensive Care of the Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil*
[e] *Department of Anesthesiology, Associação Paulista de Medicina, São Paulo, SP, Brazil*
[f] *Department of Infectious Diseases, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil*
[g] *Faculdade de Ciências Farmacêuticas de Ribeirão Preto, Universidade de São Paulo (USP), Ribeirão Preto, SP, Brazil*

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KEYWORDS
Lidocaine;
Intravenously;
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Abstract
Background and objectives: Interleukin-6 is a predictor of trauma severity. The purpose of this study was to evaluate the effect of intravenous lidocaine on pain severity and plasma interleukin-6 after hysterectomy.
Method: A prospective, randomized, comparative, double-blind study with 40 patients, aged 18–60 years. G1 received lidocaine (2 mg kg^{-1} h^{-1}) or G2 received 0.9% saline solution during the operation. Anesthesia was induced with O_2/isoflurane. Pain severity (T0: awake and 6, 12, 18 and 24 h), first analgesic request, and dose of morphine in 24 h were evaluated. Interleukin-6 was measured before starting surgery (T0), 5 h after the start (T5), and 24 h after the end of surgery (T24).
Results: There was no difference in pain severity between groups. There was a decrease in pain severity between T0 and other measurement times in G1. Time to first supplementation was greater in G2 (76.0 ± 104.4 min) than in G1 (26.7 ± 23.3 min). There was no difference in supplemental dose of morphine between G1 (23.5 ± 12.6 mg) and G2 (18.7 ± 11.3 mg). There were increased concentrations of IL-6 in both groups from T0 to T5 and T24. There was no difference in IL-6 dosage between groups. Lidocaine concentration was 856.5 ± 364.1 ng mL^{-1} in T5 and 30.1 ± 14.2 ng mL^{-1} in T24.

☆ Study performed at the Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil.

* Corresponding author.
E-mail: riokoks.dcir@epm.br (R.K. Sakata).

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Conclusion: Intravenous lidocaine (2 mg kg^{-1} h^{-1}) did not reduce pain severity and plasma levels of IL-6 in patients undergoing abdominal hysterectomy.

PALAVRAS-CHAVE
Lidocaína;
Via venosa;
Dor pós-operatória;
Histerectomia;
Interleucina-6

Efeito da lidocaína venosa intraoperatória sobre dor e interleucina-6 plasmática em pacientes submetidas a histerectomia

Resumo
Justificativa e objetivos: A interleucina-6 (IL-6) é preditora de intensidade no trauma. O objetivo deste estudo foi avaliar o efeito da lidocaína por via venosa sobre a intensidade da dor e IL-6 após histerectomia.
Método: O estudo foi prospectivo, randomizado, comparativo e duplo-encoberto em 40 pacientes, entre 18 e 60 anos. Foi administrada lidocaína (2 mg.kg^{-1}.h^{-1}) no G1 ou solução salina a 0,9% no G2 durante a operação. A anestesia foi com O2/isoflurano. Foi avaliada a intensidade da dor (T0: despertar e seis, 12, 18 e 24 horas), a primeira solicitação de analgésico, a dose de morfina nas 24 horas. A IL-6 foi medida antes do início da operação (T0), após cinco horas do início (T5) e 24 horas após o término (T24).
Resultados: Não houve diferença na intensidade da dor entre os grupos. Ocorreu diminuição da intensidade da dor entre T0 e os outros momentos avaliados no G1. O tempo para primeira complementação foi maior no G2 (76,0 ± 104,4 min) do que no G1 (26,7 ± 23,3 min). Não houve diferença na dose de morfina complementar entre G1 (23,5 ± 12,6 mg) e G2 (18,7 ± 11,3 mg). Houve aumento das concentrações de IL-6 em ambos os grupos de T0 para T5 e T24. Não houve diferença na dosagem de IL-6 entre os grupos. A concentração de lidocaína foi 856,5 ± 364,1 ng.mL^{-1} em T5 e 30,1 ± 14,2 ng.mL^{-1} em T24.
Conclusão: A lidocaína (2 mg.kg^{-1}.h^{-1}) por via venosa não promoveu redução da intensidade da dor e dos níveis plasmáticos de IL-6 em pacientes submetidas a histerectomia abdominal.

Introduction

Both the dose and duration of lidocaine infusion remain controversial. Moreover, its effectiveness has not yet been determined. Surgical trauma results in the release of cytokines that are responsible for local inflammatory responses and promote tissue healing.[1] Interleukin-6 (IL-6) is a cytokine that is early detected in response to injury and its increase is correlated with the degree of tissue damage.[1,2]

Some authors have reported that intravenous lidocaine promotes reduction of cytokines,[3,4] inhaled anesthetics[5] and opioids consumption,[6,7] and postoperative pain severity.[3,6,7] Furthermore, low doses of intravenous lidocaine (plasma concentrations less than 5 μg mL^{-1}) do not interfere with normal nerve conduction and are associated with a lower incidence of opioid-related adverse effects.[3,6,8]

Lidocaine has analgesic,[6] anti-hyperalgesic,[6,9] and anti-inflammatory effects.[4,10] Analgesia may persist even after plasma concentration reduction.[10,11]

The voltage-gated sodium channels are the classic targets of lidocaine.[12] The analgesic and anti-inflammatory action also occurs through calcium and potassium channels and receptors coupled to G protein.[13,14] The neuronal transmission blockade and reduced neurogenic response are caused by the action on sodium and potassium channels.[13,15] Lidocaine metabolite, monoethylglycinexylidide (MEGX), may also exert analgesic effect.[16] Unlike MEGX, lidocaine reduces glycine uptake only at toxic concentrations. However, other studies reported no analgesic effect of lidocaine.[17,18]

Thus, the primary objective of this study was to evaluate the effect of intraoperative intravenous lidocaine on postoperative pain severity and plasma levels of IL-6 after abdominal hysterectomy.

Methods

After approval by the Research Ethics Committee of the Federal University of São Paulo and obtaining written informed consent, 40 patients, ASA 1 or 2, aged between 18 and 60 years, undergoing elective total hysterectomy by laparotomy through a Pfannenstiel incision were included.

Patients who experienced cardiac arrhythmia; cardiomyopathy; cardiac conduction abnormality; electrolyte disorders; acid–base imbalance; hypersensitivity to lidocaine; psychiatric, hepatic, respiratory or cancer disease; those receiving any type of painkiller in the week before