Rev Bras Anestesiol. 2015;65(1):51–60

REVISTA BRASILEIRA DE ANESTESIOLOGIA

Official Publication of the Brazilian Society of Anesthesiology
www.sba.com.br

SCIENTIFIC ARTICLE

Effects of various anesthesia maintenance on serum levels of selenium, copper, zinc, iron and antioxidant capacity

Mehmet Akın[a], Hilal Ayoglu[a,*], Dilek Okyay[a], Ferruh Ayoglu[b], Abdullah Gür[a], Murat Can[c], Serhan Yurtlu[a], Volkan Hancı[a], Gamze Küçükosman[a], Işıl Turan[a]

[a] *Department of Anesthesiology and Reanimation, Bülent Ecevit University, School of Medicine, Zonguldak, Turkey*
[b] *Department of Public Health, Bülent Ecevit University, School of Medicine, Zonguldak, Turkey*
[c] *Department of Biochemistry, Bülent Ecevit University, School of Medicine, Zonguldak, Turkey*

Received 9 March 2014; accepted 9 April 2014
Available online 10 May 2014

KEYWORDS
Propofol;
Desflurane;
Sevoflurane;
Selenium;
Zinc;
Antioxidant capacity

Abstract
Background and objectives: In this study, we aimed to investigate the effects of sevoflurane, desflurane and propofol maintenances on serum levels of selenium, copper, zinc, iron, malondialdehyde, and glutathion peroxidase measurements, and antioxidant capacity.
Methods: 60 patients scheduled for unilateral lower extremity surgery which would be performed with tourniquet under general anesthesia were divided into three groups. Blood samples were collected to determine the baseline serum levels of selenium, copper, zinc, iron, malondialdehyde and glutathion peroxidase. Anesthesia was induced using 2–2.5 mg kg^{-1} propofol, 1 mg kg^{-1} lidocaine and 0.6 mg kg^{-1} rocuronium. In the maintenance of anesthesia, under carrier gas of 50:50% O_2:N_2O 4 L min^{-1}, 1 MAC sevoflorane was administered to Group S and 1 MAC desflurane to Group D; and under carrier gas of 50:50% O_2:air 4 L min^{-1} 6 mg kg h^{-1} propofol and 1 μg kg h^{-1} fentanyl infusion were administered to Group P. At postoperative blood specimens were collected again.
Results: It was observed that only in Group S and P, levels of MDA decreased at postoperative 48th hour; levels of glutathion peroxidase increased in comparison to the baseline values. Selenium levels decreased in Group S and Group P, zinc levels decreased in Group P, and iron levels decreased in all three groups, and copper levels did not change in any groups in the postoperative period.
Conclusion: According to the markers of malondialdehyde and glutathion peroxidase, it was concluded that maintenance of general anesthesia using propofol and sevoflurane activated

* Corresponding author.
E-mail: periayogluzku@yahoo.com (H. Ayoglu).

http://dx.doi.org/10.1016/j.bjane.2014.04.001
0104-0014/© 2014 Sociedade Brasileira de Anestesiologia. Published by Elsevier Editora Ltda. Este é um artigo Open Access sob a licença de CC BY-NC-ND

the antioxidant system against oxidative stress and using desflurane had no effects on oxidative stress and antioxidant system.
© 2014 Sociedade Brasileira de Anestesiologia. Published by Elsevier Editora Ltda.
Este é um artigo Open Access sob a licença de CC BY-NC-ND

PALAVRAS-CHAVE
Propofol;
Desflurano;
Sevoflurano;
Selênio;
Zinco;
Antioxidantes

Efeitos da manutenção de várias anestesias sobre os níveis séricos de selênio, cobre, zinco e ferro e a capacidade antioxidante

Resumo
Justificativa e objetivos: Investigar os efeitos da manutenção de sevoflurano, desflurano e propofol sobre nos níveis séricos de selênio, cobre, zinco, ferro e malondialdeído, as mensurações de glutationa peroxidase e a capacidade antioxidante.
Métodos: Foram alocados em três grupos 60 pacientes agendados para cirurgia unilateral de membros inferiores, feita com torniquete sob anestesia geral. Amostras de sangue foram coletadas para determinar os níveis séricos basais de selênio, cobre, zinco, ferro, malondialdeído e glutationa peroxidase. A anestesia foi induzida com 2-2,5 mg kg^{-1} de propofol, 1 mg kg^{-1} de lidocaína e 0,6 mg kg^{-1} de rocurônio. Na manutenção da anestesia, sob gás de transporte de 50% O_2 e 50% N_2O (4 L min^{-1}), sevoflurano a 1 CAM foi administrado ao Grupo S e desflurano a 1 CAM ao Grupo D e, sob gás de transporte em mistura de 50% O_2 e 50% ar (4 L min^{-1}), 6 mg $kg\,h^{-1}$ de propofol e 1 mg $kg\,h^{-1}$ de fentanil foram administrados ao Grupo P. No pós-operatório, amostras de sangue foram novamente coletadas.
Resultados: Apenas nos grupos S e P os níveis de MDA diminuíram em 48 horas de pós-operatório; os níveis de glutationa peroxidase aumentaram em comparação com os valores basais. Os níveis de selênio diminuíram no Grupo S e no Grupo P, os níveis de zinco diminuíram no Grupo P, os níveis de ferro diminuíram em todos os grupos e não houve alteração nos níveis de cobre em nenhum grupo no período pós-operatório.
Conclusão: De acordo com os marcadores de malondialdeído e glutationa peroxidase, concluímos que a manutenção da anestesia geral com propofol e sevoflurano ativou o sistema antioxidante contra o estresse oxidativo e o uso de desflurano não teve efeitos sobre o estresse oxidativo e o sistema antioxidante.
© 2014 Sociedade Brasileira de Anestesiologia. Publicado por Elsevier Editora Ltda.
Este é um artigo Open Access sob a licença de CC BY-NC-ND

Introduction

The purpose in general anesthesia practices is to decrease the potentially harmful conditions for the organism to the lowest level as well as conducting the anesthesia effectively. During general anesthesia, stress due to anesthesia and surgery and immunological defense mechanisms can be disrupted, and macrophages cause releasing of free oxygen to the environment by inducing inflammatory reaction. These radicals lead formation of toxic metabolites such as malonyl dialdehyde (MDA) by causing cellular damage with lipid preoxidation.[1,2]

MDA is used as an indirect indicator of oxidative damage that its level can be detected in the systemic circulation, and as a marker of ischemia–reperfusion damage.[3]

Antioxidant enzymes such as glutathione peroxidase (GPx), superoxide dismutase (SOD) and catalase (CAT) play role as the defense mechanism in the body against tissue damage caused by reactive oxygen substrates (ROCs).[4] Activities of these enzymes are dependent on the synthesis and degradation rates of free radicals, nutrition, and condition of trace elements. Trace elements play cofactor-key role in cleaning of free oxygen radicals in antioxidant systems.[5,6]

Tourniquet is used to decrease bleeding in extremity surgery, and presence of ischemia reperfusion damage caused by free oxygen radicals depending on tourniquet application was shown in previous studies.[7] Use of immunosuppressants, corticosteroids, anesthetics, various anesthetic methods and antioxidants for the purpose of decreasing free radicals in the prevention of this damage was studied.[3,8–10]

It was shown in the studies that effects of anesthetic agents on oxidative stress and antioxidant capacity vary.[1,11,12] Volatile anesthetics were shown to induce oxidative stress and inflammatory response with causing relasing of free radicals such as inflammatory mediators and superoxide anions, with decreasing antioxidant defense mechanisms, and with inducing gene expression of proinflammatory cytokines, as well as it was reported that some anesthetics could also have antioxidant effects.[13–19] Besides this, it was stated that anesthetic agents could trigger oxidative stress, and could cause decrease in serum trace elements.[20,21]

Download English Version:

https://daneshyari.com/en/article/2750269

Download Persian Version:

https://daneshyari.com/article/2750269

Daneshyari.com