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SCIENTIFIC ARTICLE

Comparison of the effects of magnesium sulphate and dexmedetomidine on surgical vision quality in endoscopic sinus surgery: randomized clinical study

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KEYWORDS
Endoscopic sinus surgery;
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Abstract
Background and objectives: Even a small amount of bleeding during endoscopic sinus surgery can corrupt the endoscopic field and complicate the procedure. Various techniques, including induced hypotension, can minimize bleeding during endoscopic sinus surgery. The aim of this study was to compare the surgical vision quality, haemodynamic parameters, postoperative pain, and other effects of magnesium, a hypotensive agent, with that of dexmedetomidine, which was initially developed for short-term sedation in the intensive care unit but also is an alpha 2 agonist sedative.
Method: 60 patients between the ages of 18 and 45 years were divided into either the magnesium group (Group M) or the dexmedetomidine group (Group D). In Group M, magnesium sulphate was given at a pre-induction loading dose of 50 mg kg^{-1} over 10 min and maintained at 15 mg kg^{-1} h^{-1}; in Group D, dexmedetomidine was given at 1 mcg kg^{-1} 10 min before induction and maintained at 0.6 mcg kg^{-1} h^{-1}. Intraoperatively, the haemodynamic and respiratory parameters and 6-point intraoperative surgical field evaluation scale were recorded. During the postoperative period, an 11-point numerical pain scale, the Ramsay sedation scale, the nausea/vomiting scale, the adverse effects profile, and itching parameters were noted.
Results: Group D showed a significant decrease in intraoperative surgical field evaluation scale scale score and heart rate. The average operation time was 50 min, and Group M had a higher number of prolonged surgeries. No significant difference was found in the other parameters.
Conclusions: Due to its reduction of bleeding and heart rate in endoscopic sinus surgery and its positive impacts on the duration of surgery, we consider dexmedetomidine to be a good alternative to magnesium.

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PALAVRAS-CHAVE
Cirurgia endoscópica sinusal;
Sulfato de Magnésio;
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Hipotensão

Comparação dos efeitos de sulfato de magnésio e da dexmedetomidina sobre a qualidade da visibilidade em cirurgia endoscópica sinusal: estudo clínico randomizado

Resumo
Justificativa e objetivo: Uma quantidade, mesmo pequena, de sangramento durante a cirurgia endoscópica pode alterar o campo endoscópico e dificultar o procedimento. Várias técnicas, incluindo hipotensão induzida, podem minimizar o sangramento durante a cirurgia endoscópica. O objetivo deste estudo foi comparar a qualidade da visibilidade cirúrgica, os parâmetros hemodinâmicos, a dor no período pós-operatório e outros efeitos do sulfato de magnésio, um agente hipotensor, com os da dexmedetomidina, inicialmente desenvolvida para sedação em curto prazo em unidade de terapia intensiva, mas que também é um sedativo agonista alfa-2.
Métodos: Foram alocados 60 pacientes entre 18 e 45 anos em dois grupos: Grupo M (magnésio) e Grupo D (dexmedetomidina). No Grupo M, sulfato de magnésio foi administrado pré-indução a uma dose de carga de 50 mg kg^{-1} por 10 minutos e mantida com 15 mg kg^{-1} h^{-1}; no Grupo D, dexmedetomidina foi administrada a uma dose de 1 mcg kg^{-1} 10 minutos antes da indução e mantida com 0,6 mcg kg^{-1} h^{-1}. No período intraoperatório, foram registrados os parâmetros hemodinâmicos e respiratórios e a avaliação do campo cirúrgico com uma escala de seis pontos. Durante o período pós-operatório foram registrados os valores da escala numérica de 11 pontos para avaliar a dor, a escala de sedação de Ramsay, a escala de avaliação de náusea/vômito, o perfil dos efeitos adversos e pruridos.
Resultados: O Grupo D apresentou redução significativa da frequência cardíaca e do escore na escala de avaliação do campo cirúrgico intraoperatório. A média do tempo cirúrgico foi de 50 minutos e o Grupo M apresentou um número maior de cirurgias prolongadas. Não houve diferença significativa em outros parâmetros.
Conclusão: Por causa da redução da taxa de sangramento e da frequência cardíaca em cirurgia endoscópica e dos impactos positivos sobre a duração da cirurgia, consideramos dexmedetomidina como melhor opção que o sulfato de magnésio.

Introduction

Endoscopic sinus surgery (ESS) is a form of surgical intervention in which surgical visualization may diminish completely with only a small amount of bleeding.[1] This surgery is done under endoscopic magnification in a narrow area where manipulation is difficult.

Therefore, hypotensive bleeding control during the operation may help to increase surgical visualization. Different anaesthetic techniques and drugs are being explored and tested to help to solve this problem.[2-4] Magnesium is one drug used for this purpose, and its positive effects on the control of postoperative bleeding have been clearly defined.[5,6] Magnesium is an N-methyl-D-aspartate (NMDA) receptor antagonist that reduces the need for analgesic and sedative drugs. Dexmedetomidine is also an alpha 2 agonist; it has sedative, amnestic, and analgesic properties.[7] Additionally, it has a decongestant effect and induces hypotension in tympanoplasty surgeries.[8,9] Dexmedetomidine has been also used in ESS patients under local anesthesia,[10,11] as well as in septoplasty and tympanoplasty patients under general anaesthesia; it has been stated that it decreases the bleeding score and reduces the required amount of fentanyl.[12]

Therefore, in our study we compared the effects of magnesium and dexmedetomidine, which are used during ESS in patients under general anaesthesia, primarily on surgical vision quality and on haemodynamics and postoperative analgesia.

Methods

After the approval of the University of Abant Izzet Baysal Clinical Research Ethics Committee, document number 2011/97, we enrolled 60 patients of the American Society of Anesthesiologists (ASA) risk classification I–II according to the pre-anaesthetic evaluation, ranging from 18 to 45 years of age who were scheduled to have an elective functional ESS operation. The patients were randomly divided into two groups of 30 people: the magnesium group (Group M) and the dexmedetomidine group (Group D). The control group without hypotensive drugs was not used due to ethical concerns, and the two agents were compared. Patients who were allergic to any of the drugs that would be used in the study, those who had hypermagnesaemia, were opioid-dependent, had severe cardiac, renal, neurological, and liver diseases, and had a history of postoperative nausea/vomiting were excluded from the study.

In the preoperative evaluation, all patients were asked to provide oral and written informed consent for the anaesthesia and research; those who accepted and signed were included in the study. The patients were informed about the method of anaesthesia, and their adaptation to the study was implemented by explaining the 11-unit Numerical Pain Scoring (NPS11) Scale, Ramsay Sedation Score, and nausea/vomiting scale. These parameters were recorded immediately after surgery and then thereafter at intervals of 5 min.