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SCIENTIFIC ARTICLE

The effect of sugammadex on postoperative cognitive function and recovery

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KEYWORDS
Sugammadex;
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Abstract
Background and objective: Sugammadex is the first selective relaxant binding agent. When compared with neostigmine, following sugammadex administration patients wake earlier and have shorter recovery times. In this study, we hypothesized that fast and clear awakening in patients undergoing general anesthesia has positive effects on cognitive functions in the early period after operation.
Methods: Approved by the local ethical committee, 128 patients were enrolled in this randomized, prospective, controlled, double-blind study. Patients were allocated to either Sugammadex group (Group S) or the Neostigmine group (Group N). The primary outcome of the study was early postoperative cognitive recovery as measured by the Montreal Cognitive Assessment (MoCA) and Mini Mental State Examination (MMSE). After baseline assessment 12–24 h before the operation. After the operation, when the Modified Aldrete Recovery Score was ≥9 the MMSE and 1 h later the MoCA tests were repeated.
Results: Although there was a reduction in MoCA and MMSE scores in both Group S and Group N between preoperative and postoperative scores, there was no statistically significant difference in the slopes ($p > 0.05$). The time to reach TOF 0.9 was 2.19 min in Group S and 6.47 min in Group N ($p < 0.0001$). Recovery time was 8.26 min in Group S and 16.93 min in Group N ($p < 0.0001$).
Conclusion: We showed that the surgical procedure and/or accompanying anesthetic procedure may cause a temporary or permanent regression in cognitive function in the early

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postoperative period. However, better cognitive performance could not be proved in the Sugammadex compared to the Neostigmine.

PALAVRAS-CHAVE
Sugamadex;
Neostigmina;
Disfunção cognitiva no pós-operatório;
MMSE;
MoCA

O efeito de sugamadex sobre a função cognitiva e recuperação no pós-operatório

Resumo
Justificativa e objetivo: Sugamadex é o primeiro agente de ligação relaxante seletivo. Após a administração de sugamadex, os tempos de despertar e de recuperação dos pacientes são menores, em comparação com neostigmina. Neste estudo, a hipótese foi que um despertar mais rápido e claro dos pacientes submetidos à anestesia geral possui efeitos positivos sobre as funções cognitivas no pós-operatório imediato.
Métodos: Após a aprovação do Comitê de Ética local, 128 pacientes foram incluídos neste estudo prospectivo, randômico, controlado e duplo-cego. Os pacientes foram designados para o grupo sugamadex (Grupo S) ou grupo neostigmina (Grupo N). O desfecho primário do estudo foi a recuperação cognitiva no pós-operatório imediato, de acordo com a mensuração da Avaliação de Montreal da Função Cognitiva (MoCA) e com o Mini Exame do Estado Mental (MMSE). Após a avaliação inicial 12–24 h antes da operação. Após a operação, quando o escore de Recuperação de Aldrete modificado era ≥ 9, o teste MMSE e, uma hora depois, o teste MoCA foram repetidos.
Resultados: Embora tenha havido uma redução nos escores de MoCA e MMSE tanto no Grupo S quanto no Grupo N, entre os escores pré- e pós-operatório, não houve diferença estatisticamente significativa nas reduções ($p > 0,05$). O tempo para atingir TOF 0.9 foi de 2,19 min no Grupo S e de 6,47 min no Grupo N ($p < 0,0001$). O tempo de recuperação foi de 8,26 min no Grupo S e de 16,93 min no Grupo N ($p < 0,0001$)
Conclusão: Mostramos que o procedimento cirúrgico e/ou procedimento anestésico de acompanhamento pode causar uma regressão temporária ou permanente da função cognitiva no pós-operatório imediato. No entanto, um desempenho cognitivo melhor não pode ser provado no grupo sugamadex em comparação com o grupo neostigmina.

Introduction

Patients who undergo major surgery with general anesthesia may experience memory impairment and regression of high-executive functions such as ordering, planning, and organization after the operation.[1] This intellectual and cognitive worsening is known as postoperative cognitive dysfunction (POCD). POCD often creates temporary cognitive impairment but, especially in older patients, it may take the form of permanent decline.[1] To date, controlled studies and animal models have not established diagnostic criteria for POCD, and its etiology is not fully understood.[2–4] However, animal studies have provided strong evidence that exposure to anesthetic agents may cause permanent learning and memory impairment.[5–8]

Sugammadex (Bridion®, Merck Sharp and Dohme (MSD), Oss, The Netherlands) is a rapid and selectively effective aminosteroid agent that has recently entered use. Through rocuronium and vecuronium encapsulation, it causes rapid recovery independent of the time of administration.[9–13] Compared to patients given neostigmine to recover, patients given sugammadex have been observed to recover with a clearer level of consciousness.

In this study, we hypothesized that fast and clear awakening in patients undergoing general anesthesia has positive effects on cognitive functions in the early period after operation. To test this hypothesis, postoperative cognitive functions of patients were evaluated, comparing those given neostigmine or sugammadex for revival after general anesthesia with rocuronium-based neuromuscular block.

Method

This randomized, prospective, controlled, double-blind study was approved by the Bülent Ecevit University Practice and Research Hospital Ethics Committee (2012/07-7). The study included patients with planned operations under general anesthesia (abdominal surgery; upper extremity orthopedic interventions; gynecology; plastic surgery; urology; ear, nose, and throat; and spinal surgery operations lasting at least 60 min) who could read and write Turkish, were between 18 and 60 years of age, and had American Society of Anesthesiologists (ASA) scores of I or II.

Exclusion criteria were congestive heart failure, renal and hepatic failure, adrenal failure, hormonal disorder,