SCIENTIFIC ARTICLE

Comparison of the effects of sugammadex and neostigmine on postoperative nausea and vomiting

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Abstract
Background and objectives: The aim of our study is to compare the effects of sugammadex and neostigmine, used for neuromuscular blockage antagonism, on postoperative nausea and vomiting (PONV).

Methods: Our study was completed with 98 ASA I-II risk patients undergoing endotracheal intubation under general anesthesia. At the end of the surgery patients were randomly divided into two groups given 2 mg kg⁻¹ sugammadex (Group S) or 50 µg kg⁻¹ neostigmine plus 0.2 mg kg⁻¹ atropine (Group N). Monitoring and recording times were set as 1 hour postoperative and from 1–6, 6–12, and 12–24 hours. The anti-emetic amounts administered were recorded.

Results: In the first hour postoperative 13 patients in Group N (27%) and 4 in Group S (8%) were observed to have nausea and/or vomiting and the difference was statistically significant (p = 0.0016). During the 24 hours of monitoring there was no significant difference in the incidence and severity of PONV (p > 0.05), however the number of patients given ondansetron for PONV treatment in Group N was statistically significantly higher than the number in Group S (16 in Group N, 6 in Group S, p < 0.011).

Conclusions: At the end of our study comparing neostigmine with sugammadex for neuromuscular blockage antagonism, we found use of sugammadex had lower incidence of PONV in the postoperative 1st hour and less anti-emetic use in 24 hours of monitoring.

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Introduction

Postoperative nausea and vomiting (PONV) has been one of the most important problems of anesthesia through the years. Kapur\(^1\) described PONV as the "Big Little Problem" in 1991. While Watcha\(^2\) touched on Kapur's definition, he summarized his own views of PONV as the "Big Big Problem". PONV is one of most common complications after general anesthesia that may cause increased morbidity and prolonged hospital stay.\(^3\) Duration of anesthesia, type of surgery, postoperative analgesia with opioids, as well as patient related factors such as age, gender, smoking habits and previous history of PONV and of motion sickness are known as risk factors for developing PONV.\(^4\)\(^5\)

Neuromuscular blocker medications are a necessary part of general anesthesia. Additionally at the end of the surgical procedure the majority of times the residual neuromuscular block is reversed with acetyl choline esterase inhibitors.\(^6\) Cholinesterase inhibitors have been implicated in the development of PONV as a result of their potent muscarinic effects upon the gastrointestinal tract and the vomiting center in the brain.\(^7\) Neostigmine, used at the end of surgery for residual neuromuscular block, is associated with increased risk of PONV, especially when used in large doses (>2.5 mg).\(^7\) Some previous studies have recommended avoiding the use of acetyl choline esterase inhibitors to reduce postoperative vomiting.\(^8\)

Sugammadex is a γ cyclodextrin agent that selectively binds steroidal neuromuscular blockers such as rocuronium. By making complexes with rocuronium in circulation and at neuromuscular junction, it enables the excretion of the drug in the urine without metabolization.\(^9\) Sugammadex gives rise to safe and rapid reversal of neuromuscular blockade induced by rocuronium.\(^10\)\(^11\) Sugammadex is known as a safe drug without any known serious side effects. The common side effects of sugammadex are minimal cough, oral discomfort, hypersensitivity, temporary QT prolongation and temporary (<30 min) activated partial thromboplastin time prolongation.\(^12\) The studies on the effects of sugammadex on PONV are very limited.\(^13\)

The hypothesis of our study is that use of sugammadex to antagonize the effects of neuromuscular blocker agents will reduce postoperative nausea and vomiting when compared with neostigmine. With the aim of testing this hypothesis we aimed to compare the effects of 2 mg kg\(^{-1}\) sugammadex and 50 μg kg\(^{-1}\) neostigmine on the incidence of PONV. We defined the major outcome as presence of PONV at the postoperative one hour period and number of patients who were needed ondansetron for symptomatic treatment during 24 hours postoperative period.

Method

This single-blind prospective randomized controlled study was conducted at ninety-six ASA I and II patients, aged in between 18 and 65 years, scheduled to have general anesthesia with endotracheal intubation for elective surgery. The study was approved by Ethics Committee of University School of Medicine (2014/515) and Clinical Trials study report (NCT) and conducted in accordance with the
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