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Editorial

Limited Action of Sugammadex on Postoperative Recovery of Gastrointestinal Bowel Function: The Pharmacological and Physiological Basis

Dear Editor,

We read with great interest the article by Dogan *et al.*[1] recently published in your remarkable journal. The effect of neuromuscular blocking agents on gastrointestinal motility is a fundamental concern in abdominal surgery. Few studies have been conducted to investigate the role of the different reversal agents in accelerating the recovery of bowel function, and the data collected so far are inconclusive. Bowel motility could impact not only clinical outcomes but also hospital length of stay and costs.

Reversal from neuromuscular block was traditionally achieved through the use of anticholinesterase drugs such as neostigmine and pyridostigmine. They are nonspecific agents which increase the systemic concentration of acetylcholine, potentially causing bronchospasm, bradyarrhythmias, increased secretions, miosis, and nausea; these symptoms are usually managed with anticholinergic drugs such as atropine or glycopyrrolate.[2] Sugammadex is a gamma cyclodextrin engineered to encapsulate aminosteroid neuromuscular blocking agents (i.e., rocuronium, vecuronium); this specific binding dramatically reduces the incidence of side effects and shortens the time of neuromuscular block reversal. Its interaction with other drugs commonly used in clinical practice has been extensively studied to define its safety profile.[3]

Postoperative ileus has a multifactorial origin; the most important causes are intraoperative and postoperative use of opioids, intestinal manipulation, and surgical inflammatory response. Gastrointestinal motility is primarily mediated by the muscarinic receptor M3 located on the smooth muscle; instead, skeletal muscle contraction is due to nicotinic receptor activation. The interaction of acetylcholine with M3 receptor causes the release of calcium ions from intracellular stores and consequent contraction. Hou *et al.* studied *in vitro* the affinity of some of the most commonly used muscle relaxants (e.g., rocuronium, atracurium, pancuronium, gallamine, succinylcholine) to M2 and M3 receptors, and they concluded that only pancuronium and gallamine had significant affinities at the concentrations achieved in clinical practice.[4]

Moreover, An *et al.* found that the time to first flatus was 15.03 h in sugammadex group and 20.85 h in the pyridostigmine/glycopyrrolate group: these times far exceed the terminal half-life of these drugs which range from 50 min of glycopyrrolate to 84 min of pyridostigmine; so they are unlikely to exert such a prolonged pharmacological activity.[5] In conclusion, these biochemical, physiological, and pharmacokinetic considerations support the findings of little influence of the reversal technique on gastrointestinal motility.

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Disclosure

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article.

REFERENCES

1. Dogan G, Dogan G, Kayir S, Yagan O, Hanci V. Comparison of the effects of neostigmine and sugammadex on Colonic Anastomotic Strength in Rats. *J Surg Res*. 2020;248:123–128.
2. Carron M, De Cassai A, Iepparielloo G. Reversal of rocuronium-induced neuromuscular block: is it time for sugammadex to replace neostigmine? *Br J Anaesth*. 2019;123:e157–e159.
3. Buonanno P, Laiola A, Palumbo C, et al. Dexamethasone does not Inhibit sugammadex reversal after rocuronium-induced neuromuscular block. *Anesth Analg*. 2016;122:1826–1830.
4. Hou VY, Hirshman CA, Emala CW. Neuromuscular relaxants as antagonists for M2 and M3 muscarinic receptors. *Anesthesiology*. 1998;88:744–750.

5. An J, Noh H, Kim E, Lee J, Woo K, Kim H. Neuromuscular blockade reversal with sugammadex versus pyridostigmine/glycopyrrolate in laparoscopic cholecystectomy: a randomized trial of effects on postoperative gastrointestinal motility. *Korean J Anesthesiol*. 2020;73:137–144.

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