

A Case Report of Prolongation of Neuromuscular Blockade by Clindamycin in a Vegetarian

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Case Report

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Abstract

Background

Previous study has illustrated that the factors can affect the duration of neuromuscular blockade. Vegetarian habits may affect osteoporosis and respiratory muscle tone.

Case Presentation

The purpose of this report is to record the first unusual prolonged neuromuscular block by concomitant clindamycin in a vegetarian.

Conclusion

Clinical doses of clindamycin may significantly prolong the neuromuscular blockade of “short-acting” nondepolarizing muscle relaxants when the patient is so weak and vegetarian. This requires vigilance and routine monitoring of the neuromuscular junction by the anesthesiologist.

Background

Previous study has illustrated that the factors that inhaled anesthetics, antibiotics (including aminoglycosides), clindamycin, magnesium, alcohols, local anesthetics, calcium channel blockers, barbiturates and old age can affect the duration of neuromuscular blockade^[1]. Vegetarian habits may affect osteoporosis and respiratory muscle tone. The purpose of this report is to record the first unusual prolonged neuromuscular block by concomitant clindamycin in a vegetarian.

Case Report

This is a case report of a 65 year old, 52 kg, 155 cm woman who was to undergo thoracoscopic wedge resection of the left upper lobe and lower lobe and systemic lymph node dissection for the tumors in two lobes. She had no history of hypertension, myocardial infarction, angina pectoris or smoking history. Her medical history was unremarkable apart from penicillin allergy. She is a vegetarian since she has never eat animal product and seafood. Her physical examination was normal. Preoperative resting electrocardiogram (ECG), echocardiogram (UCG) and lung function testing were within normal limits. Laboratory data revealed no abnormalities. Vital signs revealed an arterial blood pressure of 121/88 mm Hg, pulse of 86 bpm, and respiratory rate of 16 breaths/min.

Clindamycin 300 mg was then given IV over 15 min to the patient 30mins before anesthesia induction at the request of surgeon. Standard monitoring was used. General anesthesia was administered. Anesthesia was induced with propofol 120 mg, rapacuronium 40 mg, sufentanil 20 µg and lidocaine 80 mg, and tracheal intubation (rapid sequence) was facilitated by administration of right double lumen tubes (F35). Anesthesia was maintained by cisatracurium besylate (1.5 µg/kg/min), propofol (30ml/h) and sufentanil (total 70 µg sufentanil). End-tidal CO₂ was maintained from 35 mmHg to 45 mmHg and esophageal

temperature was 36.6°C. Surgery was finished 2.2 hours later. Neostigmine (2 mg) reversal was then given, along with atropine 1 mg, the patient was then transferred to the post anesthesia care unit. The patient waked up half an hour later in the post anesthesia care unit. She can open her eyes, nod and shake her head as instructed. However, oxygen saturation cannot be maintained when attempting to disconnect the ventilator. The patient was moved to the intensive care unit 2 hours later when she still cannot disconnect the ventilator.

Another 300 mg clindamycin was then given IV that night in the intensive unit since it is usually used twice a day. However, the patient was extubated the next morning.

Discussion

As we know, this is the first clindamycin's unusual long lasting effect report on the neuromuscular blocking effect. Fewer studies have reported the antibiotics' effect on no depolarizing neuromuscular blocking especially the rapacuronium bromide^[1-4]. But all these reported cases occurred about 20 years ago. There is no such report in recent years.

Rapacuronium bromide is a no depolarizing neuromuscular blocking drug with a rapid onset and short duration of action. So cisatracurium besylate was applied in the anesthesia maintenance stage. The clinical duration of a rapacuronium block may be prolonged a few minutes with the use of volatile anesthetics, antibiotics and magnesium^[5].

Volatile anesthetics affect the potency of NDMRs, possibly by enhancing antagonist affinity at the receptor site, contributing to the clinically observable enhancement of neuromuscular blockade by volatile anesthetics^[6]. Sevoflurane and isoflurane inhibit exocytosis evoked by sodium-dependent depolarization and might act on sodium channels^[7], which is the mechanism of the effecting of volatile anesthetics prolonging the neuromuscular blocking. This factor was not taken into account since volatile anesthetics were not used in this case.

Antibiotics were divided into β -lactams, aminoglycosides, macrolides, quinolones antibiotics, tetracyclines, chloramphenicols, lincomycin antibiotics according to its effect sites. Previous studies have reported that aminoglycosides, colistin and clindamycin. At clinically relevant doses, the penicillins, cephalosporins, tetracyclines are apparently no effects at the neuromuscular junction. Clindamycin, a macrolide antibiotic resembling erythromycin in antimicrobial activity, prolongs no depolarizing muscle relaxants such as pancuronium, vecuronium, and it has also been found to produce profound neuromuscular blockade at large dose. Previous studies reported that a profound neuromuscular block with 2400 mg of clindamycin that was given to a patient who had fully recovered (TOF of 1.0) from succinylcholine^[3] and 15 mg/kg that prolonged rapacuronium block by approximately 65 minutes^[4]. However, the dose in this patient was relatively low (300mg,twice a day) which can significantly prolong the neuromuscular block time is extremely rare especially when we used it at the beginning of surgery.

Till to now, the mechanism of antibiotics -induced neuromuscular block is not fully understood. Its mechanism maybe in the following aspects which are illustrated in the normal neuromuscular transmission: Calcium ion promotes the fusion of the vesicle membrane in the axon and the rupture of the anterior membrane of the joint; The acetylcholine in the vesicle is released into the neuromuscular junction space; Acetylcholine binds to a receptor on the membrane behind the joint, triggering an endplate potential. For clindamycin, it appears to cause muscle relaxation predominantly by a direct action on muscle contractility and cholinergic receptors, rather than by inhibition of neuromuscular transmission.

Interestingly, this patient is a vegetarian. When general anesthesia is given for vegetarians, it is imperative that control of the electrolyte balance smoothly. Although the preoperative results of laboratory tests were almost normal, there is still lack of some exams such as examination of osteoporosis and respiratory muscle tone [8].

Conclusion

In summary, clinical doses of clindamycin may significantly prolong the neuromuscular blockade of “short-acting” no depolarizing muscle relaxants when the patient is so weak and vegetarian. This requires vigilance and routine monitoring of the neuromuscular junction by the anesthesiologist.

Declarations

Ethical Approval and Consent to participate

This study was approved by the Ethics Committee of Affiliated Hospital of Qingdao University and obtained informed consent from the patient.

Consent for publication

All the authors was consent for publication.

Availability of data and materials

The data and materials are available.

Competing interests

There is no competing interests.

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Authors' contributions

Xiaojie Liu wrote the manuscript. Jihui Yin and Zhen Hua finished the operative process. Haichen Chu supervise all this work.

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