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Analysis of the Anesthesia Effects of Otolaryngology Surgery with Cisatracurium Besylate and Mivacurium Chloride

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Abstract

The goal is to compare and contrast the anaesthetic effects of otolaryngology surgery using cisatracurium besylate and mivacurium chloride. For a retrospective analysis, 108 patients who underwent ENT surgery in our hospital between November 2021 and March 2022 were selected. Patients in the experimental group A were given cisatracurium besylate, while patients in the experimental group B were given mivacurium. The anaesthetic effects and recovery of the two groups were then compared and analysed. At the six time periods of admission, anaesthetic induction, intubation, end of procedure, recovery of consciousness, and extubation, there was no statistically significant difference in mean arterial pressure, heart rate, or pulse oximetry levels between the two groups.

Extubation, recuperation after surgery, and the train of four stimulation levels were all considerably greater than they were for experimental group A. The experimental group B experienced much shorter recovery times for self-consciousness, extubation, and eye opening than the experimental group A, and experienced significantly less agitation than the experimental group A. The overall incidence of unfavourable conditions was substantially lower in experimental group B than it was in experimental group A. Mivacurium chloride anaesthesia presents a viable alternative to cisatracurium besylate in otolaryngology surgery in terms of reduced hemodynamic impact, quicker postoperative recovery, lack of the build-up of neuromuscular blockade, less unpleasant responses, and higher safety.

Keywords: Otolaryngology; Surgery; ENT surgery; Sinusitis surgery; Anaesthesia; Mivacurium chloride

Introduction

One of the most frequent clinical procedures is ear, nose, and throat surgery, which encompasses a number of different types, including ear surgery, which includes otitis media surgery, hearing reconstruction surgery, and surgical treatment of vertigo; rhinologic surgery, which includes correcting nasal structures, turbinate hypertrophy surgery, sinusitis surgery, and nasal tumour surgery; and laryngeal surgery, which includes tonsil surgery, adenoid surgery, and hypopharyngeal tumour ENT procedures are distinguished by their brief duration and intensive stimulation of the patient's throat's nerves and muscles. Therefore, to ensure a speedy anaesthetic emergence following surgery, muscular relaxation and depth of anaesthesia are greatly desired in otolaryngology surgery. If the procedure is complicated and the intraoperative procedure does not influence airway patency, general anaesthesia can be given via tracheal intubation; if the surgical site is superficial and the intraoperative procedure does not affect airway patency, local anaesthetic can be given. Compared to general anaesthesia and intravenous anaesthesia, local anaesthesia is less dangerous [1].

Mivacurium chloride has fewer side effects than cisatracurium besylate, which has a stronger muscle-relaxing effect, according to strong observational evidence. Cisatracurium besylate for injection is a moderate-acting, nondepolarizing skeletal muscle relaxant with an isoquinolinium benzyl ester structure and a neuromuscular blocker. It has a molecular formula of C65H82N2O18S2. Cisatracurium besylate inhibits the function of acetylcholine by binding to cholinergic receptors on the motor endplate, causing a competitive neuromuscular blockade, according to human clinical research. Currently, it is primarily utilised in intensive care for surgeries and other operations. It is used clinically as an adjuvant medication for general anaesthesia or as a sedative in intensive care due to its properties of relaxing skeletal muscles and convenience for tracheal intubation and mechanical breathing. Mivacurium chloride is a benzylisoquinoline nondepolarizing muscle relaxant that has a short half-life and the chemical formula C58H80Cl2N2O14. It is mostly employed in short-term surgical procedures and has the potential to be utilised as an adjuvant medication for general anaesthesia during tracheal intubation and mechanical breathing. For instance, mivacurium chloride is frequently chosen as the primary anaesthetic for bladder cancer removal during cystoscopy [2].

With the advantages of a quick onset of action, quick recovery, few side effects, no drug accumulation, no negative effects on the autonomic nervous system or cardiovascular system, and an elimination half-life, available research indicates that it is the most effective and selective nondepolarizing inotropic drug currently available in clinical settings. However, there are limited studies comparing the anaesthetic effects of cisatracurium besylate and mivacurium chloride, as well as studies of mivacurium chloride's clinical use in minor surgery like otolaryngology surgery. In order to fill the gap, this study compared the anaesthesia effects of mivacurium chloride and cisatracurium besylate during otolaryngology surgery in an effort to suggest new anaesthetic techniques [3].

Materials and Method

Retrospective analysis was performed on 108 patients who

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underwent otolaryngology surgery in our hospital from November 2021 to March 2022 under general anaesthesia. Patients were equally divided into experimental groups A and B. After entering the operation room, both groups of patients underwent a normal anaesthetic induction. 30 minutes prior to surgery, intravenous doses of 0.05-0.10 mg/kg midazolam, 1-2 mg/kg propofol, and 1-2 g/kg remifentanil (approval numbers H20030200, H20051843, and Yichang Renfu Pharmaceutical Co., Ltd., respectively) were provided. The closed-loop muscle relaxant injection system was opened when the patient lost consciousness, and muscle relaxant medications were administered [4].

The experimental group A patients were put to sleep using cisatracurium besylate (approval no. H20060927, Dongying Pharmaceutical Co., Ltd.) Patients in the experimental group B received mivacurium chloride (approval no. H20100454, GlaxoSmithKline Manufacturing S.P.A.) For anaesthesia with an induction dose of 0.2 mg/kg and a maintenance rate of 0.15% mgz/(kg•h); patients in the control group received mivacurium chloride with an induction dose of 0.15 mg/kg and a maintenance rate of 0.1 mg/(kg•h) (kg h). When the maximum inhibition was attained, both groups were intubated using an orotracheal tube. Subsequently, the anaesthetic machine was connected, and the necessary parameters were adjusted. The inspiratory ratio was 1:2, the respiratory rate was 12 cycles per minute, and the tidal volume was 8 millilitres per kilogramme [5].

Propofol, remifentanil, and sevoflurane were administered as follows during the maintenance phase: propofol 2 mg/kg was slowly pushed, and the bronchoscope was introduced when breathing and circulation were steady. Propofol was sporadically administered throughout the procedure depending on the patient's response, and sevoflurane was used to maintain anaesthesia. Remifentanil dosage was modified based on the patient's hemodynamic and breathing rate, increasing or decreasing it by 0.025 g/(kg/min) each time. Twenty minutes before the procedure was to end, inhalation was halted, and no muscle relaxant antagonist was applied following the procedure [6].

Discussion

One of the most important factors in successful surgery is anaesthesia for ENT procedures. The right anaesthetic techniques and medications must be chosen for surgical anaesthesia. Given that tracheal intubation and surgery are both accompanied by various degrees of anaesthesia and muscle relaxation, surgical anaesthesia is challenged by the unavoidable postoperative neuromuscular blockade. To achieve effective anaesthesia while limiting the severity of hemodynamic fluctuations, the choice of medication or procedure should consider the patient's psychological and physiological health. Both cisatracurium besylate and mivacurium chloride are effective options among the available clinical anaesthetics, and each has unique advantages. For instance, the former significantly reduces muscle tension, whilst the latter is linked to less adverse effects. Currently, it is still debatable, which is more effective [7].

In accordance with our hypotheses, we discovered that there was no significant difference in MAP, HR, and SpO2 levels between the two groups at the six time points of admission, anaesthesia induction, intubation, end of operation, recovery of consciousness, and extubation. Likewise, TOF values were comparable between the two patient groups at the three time points of admission, anaesthesia induction, and intubation; however, TOF values at end of operation, recovery of consciousness, and ejection were significantly. This interpretation, however, is supported by the fact that a reduction in anaesthesia depth toward the end of the procedure was made possible by mivacurium chloride's quick onset of action and the absence of significant neuromuscular blockade accumulation as shown by monitoring with a muscle relaxation monitor. Mivacurium chloride is a synthetic diquaternary compound with two ester bonds and therefore has a rapid onset of action and a short duration of action with an elimination half-life of 2-3 minutes, consistent with previous studies. This study required a closed-loop myorelaxant injection, which allows for effective individualization of dosing and helps to avoid drug wastage due to long-term myorelaxant use [8].

Additionally, in line with our hypotheses, we discovered that the experimental group B's recovery times for self-consciousness, extubation, and eye-opening were noticeably shorter than those of the experimental group A, and the incidence of agitation was noticeably lower than that of the experimental group A. This would imply that mivacurium chloride was superior to cisatracurium besylate in improving muscular contraction function in patients recovering from otolaryngology surgery. Mivacurium chloride is a diquaternary ammonium compound that can be synthesised as a substitute for succinylcholine; it is assumed that cisatracurium besylate is a nondepolarizing muscle relaxant due to its similar metabolism and myorelaxant effect to atracurium, despite having fewer side effects on the human cardiovascular system but a higher muscle relaxant effect. It is a nondepolarizing, short-acting benzylisoquinoline muscarinic drug having a short half-life, rapid onset, rapid metabolism, no build-up, and quick recovery. Few autonomic and cardiovascular side effects are present. After stopping the medication, the patient can quickly regain muscular tone through natural means[9].

As was previously mentioned, both cisatracurium besylate and micuronium anaesthesia will harm people in varying degrees and result in negative reactions. The micuronium anesthesia's adverse impact profile is influenced by histamine release and dose; however it is possible to lessen it by splitting or modifying the time of administration. The treatment in experimental group B was associated with a lower rate of adverse responses, which is equally interesting. We speculate that this may be the case because using mivacurium chloride anaesthesia can lessen the likelihood of residual muscular relaxation both during and after recovery, helping patients recover both physically and mentally from surgery. The data corroborate these hypotheses[10].

Atracurium cisbenzoate side effects have been linked to skin flushing or rash, bradycardia, hypotension, and bronchospasm. After using neuromuscular blocking drugs, allergic responses of varying severity can be seen. When this product is used with one or more anaesthetic drugs, serious allergic responses have reportedly occurred in a small number of patients. Following extended usage of muscle relaxants, myasthenia and/or myopathy have been recorded in critically ill patients in intensive care units. The majority of patients had concurrent steroid preparations, and these have occasionally been recorded after using this medicine, although there is no proof of a causative link [11].

Conclusion

In conclusion, mivacurium chloride anaesthesia offers a promising alternative to cisatracurium besylate in otolaryngology surgery in terms of less impact on hemodynamic, quicker postoperative recovery, lack of the build-up of neuromuscular blockade, less unpleasant responses, and higher safety. Overall, it justifies extensive clinical use. However, the experiment has a lot of limitations. In our investigations, a one-way ANOVA was first necessary for comparisons between various time points. Second, a lot of indicators depend on the follow-up period, so we must carry out more thorough analysis following follow-up inquiries in follow-up research.

Conflict of Interest

None

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