Original Article

A Comparison Of Emergence Agitation Between Succinylcholine And Rocuronium

Saied Amniati[1], Sepideh Malekpour[2], Ali Khatibi[3], Mehrdad Mesbah Kiaei[4], Amirhossein Jalali[5], Ali Akbar Jafarian[6*]

[1] Pain Research Center, Department of Anesthesiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran. Email: sa_amniati@yahoo.com
[2] Resident of Anesthesiology and Pain, School of Medicine, Iran University of Medical Sciences, Tehran, Iran. Email: drsepidehmalekpour@gmail.com
[3]Assistant Professor of Anesthesiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.Email: alikhatibi2002@yahoo.com
[4] Department of Anesthesiology and Pain, Hasheminejad Hospital, Iran University of Medical Sciences, Tehran, Iran. Email: dr.mmesbah@gmail.com
[5] Assistant Professor of Cardiac Surgery, Rajaie Cardiovascular, Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran. Email: jalaliamirhosein@gmail.com
[6] Associate Professor of Anesthesiology and Pain, School of Medicine, Iran University of Medical Sciences, Tehran, Iran. Email: aajafari41@gmail.com
*Corresponding Author: Ali Akbar Jafarian
*Corresponding Email: aajafari41@gmail.com
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Abstract

Introduction:
Agitation immediately after EA operation is one of the common problems during recovery, especially in children. In general, agitation is defined as a set of physical symptoms or emotional distress that includes the following symptoms alone or together: crying, restlessness, clutching, demonstrations, verbal kicking, and purposeful or purposeless behaviors that may have a logical connection.

Method:
In this study, 60 patients in the age range of 20 to 50 years who were in ASA I and II categories were subjected to tracheal intubation in two groups by rapid sequence induction method. The first group received 3 μg/kg of fentanyl and 0.5 mg/kg of lidocaine for premedication and were given induction with 1 mg/kg of succinylcholine and 5 mg/kg of nesdonal. The second group received 3 μg/kg of fentanyl and 0.5 mg/kg of lidocaine for premedication and were given induction with 0.6 mg/kg of rocuronium and 5 mg/kg of nesdonal. After surgery, the incidence, intensity and duration of agitation when the patient woke up in both groups was recorded by a physician based on Riker's criteria. Also, the occurrence of myalgia and its persistence from one to 24 hours after the operation were assessed.

Results:
According to the results of this clinical trial, succinylcholine and rocuronium were not significantly different from each other in terms of the occurrence of agitation, its intensity and duration, but based on the results of the odds ratio, the probability that in patients who took rocuronium they found that agitation is 0.6 times less than the patients who received succinylcholine. Logistic analysis of the data also showed that in patients who received succinylcholine, the probability of agitation being more severe is 2.47 times higher than in patients who received rocuronium. The duration of agitation in patients receiving succinylcholine was also higher than in patients receiving rocuronium. In terms of the incidence and severity of myalgia, there was no significant difference in the people who received rocuronium or succinylcholine, however, a total of 50% of the patients showed agitation symptoms, showed myalgia, of which 16.6% were related to the people who received rocuronium and 33.3% were related to patients who received succinylcholine. The results of the myalgia odds ratio also showed that the probability of myalgia symptoms being observed in patients who received rocuronium is 0.5 times lower than in patients who received succinylcholine.

Conclusion: In aggregate, the results of this trial showed that rocuronium can be a suitable alternative to succinylcholine in applications outside the operating room.

Keywords: Agitation, Myalgia, Succinylcholine, Rocuronium.

Introduction

Agitation immediately after EA operation is one of the common problems during recovery, especially in children. In general, agitation is defined as a set of physical symptoms or emotional distress that includes the following symptoms alone or together: crying, restlessness, clutching, demonstrations, verbal kicking, and purposeful or purposeless behaviors that may have a logical connection. Although the etiology of this condition is not known, several factors have been proposed in connection with it, such as: age before school, nervousness of previous surgery, patient's ability to adapt, presence of pain in eye, ear, and pharynx surgeries. Inhalation agents, especially sevoflurane, isoflurane, and duration of anesthesia are among the proposed causes of pain and nervousness as the most common causes.

Agitation after surgery is very common in children and its preventive role has been proven (1, 2). During a post-anesthetic agitation, the child is usually moody and intransigent, may cry, whine or wail incoherently, and paranoid ideas have been reported with these behaviors. These children are not even able to recognize their first-degree family members (parents) and the surrounding environment becomes unfamiliar to them. thise is a dissociative state of consciousness in which the child is relieved, unresponsive, restless and uncooperative. Parents who witness such a state usually state they know that this kind of behavior is unusual in their child. The duration of anesthesia and post-anesthesia agitation usually interferes with the child's recovery and requires special evaluation and management. Prevention and treatment of post-anesthesia agitation is an important point in pediatric anesthesia (2). The anesthesia process should be in such a way that minimal damage is done to the patient, but in some cases unwanted side effects, which are controllable, may annoy the patient.

Muscle relaxation is one of the main needs of anesthesia and surgery, because otherwise, intubation inside the chip will not be possible and the surgeon will not have enough access to the operating environment. On the other hand, muscle contractions caused by uncoordinated stimulation of muscles (fasciculation) following the injection of muscle relaxant succinylcholine make them worried after the operation and they suffer from muscle pain caused by micro hemorrhage in muscle tissues. A large scale is used for endotracheal intubation, orthopedic manipulations when closing the peritoneum, burn dressing and electroshock. This drug is extremely common in anesthesia. Because the duration of its effect is short and soon neutralized by plasma cholinesterase (3). Succinylcholine causes an increase in IOP about 4-6 minutes after use, and the pressure reaches normal levels after 10-20 minutes. The mechanism of IOP increase is not clear, but it may be due to the contraction of myofibrils or the transient expansion of choroid blood vessels, depending on the dose. The tonic response of the extraocular muscles has an effect on the choroid volume, for this reason, succinylcholine given during anesthesia may theoretically play a role in spilling out the intraocular contents of patients with open injuries (4). In the history of modern surgery and since anesthesia and analgesia have been used by anesthesiologists to perform various surgeries, the discovery and use of revolutionary muscle relaxants to facilitate endotracheal intubation and also to relax skeletal muscles for it has created easy access to the depths of the body and made it easy to perform surgeries. In 1956, succinylcholine relaxant was used, which created a strong block in a short period of time and ease of intubation. In the following years, industrial and semi-industrial relaxants were made. Since 1956, succinylcholine has been used as a suitable relaxant for induction and difficult intubation (5). In many patients, establishing a safe and fast airway is of particular importance and reduces the occurrence of many complications due to the delay in endotracheal intubation.

Rapid tracheal intubation in emergency cases is one of the most important and controversial issues in. It is anesthesia because aspiration of stomach contents and pneumonia caused by it are still life-threatening complications in emergency surgery with a full stomach, and rapid tracheal intubation is a basic and necessary condition to prevent these complications. The chosen method of anesthesia in full stomach

patients is induction of anesthesia with rapid sequence induction in cases where rapid intubation is required (12). In the history of modern surgery and since anesthesia and analgesia have been used by anesthesiologists to perform various surgeries, the discovery and use of revolutionary muscle relaxants to facilitate endotracheal intubation and also to relax skeletal muscles for it has created easy access to the depths of the body and made it easy to perform surgeries. In 1956, succinylcholine relaxant was used, which created a strong block in a short period of time and ease of intubation. In the following years, industrial and semi-industrial relaxants were made. Since 1956, succinylcholine has been used as a suitable relaxant for induction and difficult intubation (5). In many patients, establishing a safe and fast airway is of particular importance and reduces the occurrence of many complications due to the delay in endotracheal intubation.

Rocuronium bromide (Esmeron) was developed with rapid onset of action, moderate duration of action, rapid recovery and cardiovascular stability, making it known as an ideal depolarizing relaxant that did not have the side effects of succinylcholine and as a suitable alternative. Succinylcholine was recognized in intubation (1). Succinylcholine is a depolarizing muscle relaxant, which structurally consists of 2 acetylcholine molecules that are attached to nicotinic receptors and autonomic ganglia and 5 different types of muscarinic receptors in the acetate group. The sympathetic and parasympathetic autonomic system has a slow effect, the only depolarizing drug with a very short onset of action and a short duration of action, ED = 0.5-0.6 mg/kg is prescribed and the recovery returns to 90 muscle strength within 9-13 minutes and this drug is metabolized by butyryl cholinesterase to succinylcholine and only about 10 esculin reaches the nerve-muscle junction (NMJ), the effect is terminated by diffusion from NMJ to It is blood circulation. According to the above explanations, this drug is currently the most suitable muscle relaxant drug for tracheal intubation in emergency situations (13). Considering the importance of the topic, the present study was conducted with the aim of comparing the emergence of agitation between Succinylcholine and rocuronium.

Method

The present trial was conducted in order to compare the effect of Succinylcholine and Rocuronium on the incidence, intensity and duration of agitation, and the incidence of myalgia and throat pain after surgery, in patients undergoing diagnostic direct laryngoscopy under general anesthesia at Rasoul Akram Hospital.

In this trial, 60 patients aged 20 to 50 years with anesthesia risk of ASA I-II were randomly assigned to two groups. Patients with a history of malignant hyperthermia, a history of pseudo cholinesterase enzyme deficiency, a history of addiction, a history of benzodiazepine intake, and a history of psychiatric illness, will be excluded from the study. The maximum length of the operation will be considered 30 minutes, and if the length of the operation was longer than 30 minutes or if the relaxant needs to be repeated, the patient will be excluded from the study.

Patients underwent diagnostic direct laryngoscopy surgery. The first group received 3 μg/kg of fentanyl and 0.5 mg/kg of lidocaine for premedication and were given induction with 1 mg/kg of succinylcholine and 5 mg/kg of nesdonal. The second group received 3 μg/kg of fentanyl and 0.5 mg/kg of lidocaine for premedication and were given induction with 0.6 mg/kg of rocuronium and 5 mg/kg of nesdonal. In the second group, patients received rocuronium instead of succinylcholine. Both groups will receive 1 MAC isoflurane during operation.

At the end of the operation, after the return of spontaneous breathing, to a current volume of 5 cc/kg, opening of the eyes and lifting of the head for 5 seconds, in the rocuronium group with 40 micrograms/kg of neostigmine and 20 micrograms/kg of atropine, reversed and extubated.

The emergence of patient agitation from the moment of closing the gas until 10 minutes after extubation was recorded by the doctor based on Riker's criteria. In case of severe agitation (grade 5 to 7) and prolonged for more than 20 minutes, midazolam 20 mg/kg was used for treatment. Also, myalgia pain score will be recorded 1, 4, 8 and 24 hours after the operation. Blood pressure, heart rate, SPO_2 and ECG monitored during the operation, too.

The patient's information was recorded in the data collection sheets through examination by a physician. The patient himself and the person injecting the drug and the person recording the results were unaware of the type of drug and the study was done in a triple-blind manner. SPSS version 19 software was used for data analysis.

Discussion

In primary epidemiological studies, the incidence of agitation at different ages has been reported as 5.3. But in subsequent studies, its incidence in children has been estimated from 18 to 80% occur in the range of 3 to 9. Rocuronium is a neuromuscular blocking drug (NMBD) often reported for postoperative hypersensitivity (POH) (9). Intravenous rocuronium can cause local burning pain or tearing movement in 50 to 80% of patients, although it is more common in women (12). Although agitation resolves on its own, it is the reason for the dissatisfaction of parents, nurses and people taking care of the child. It also prolongs the recovery time. Among the other problems caused by that are nursing problems in order to take care of restless children. There is a need for prodrugs in children to relieve irritability, create analgesia, prevent aspiration and prevent bradycardia and psychological effects after surgery (1). Muscle pains caused by uncoordinated contractions caused by succinylcholine injection can be observed 24 hours after the operation (3). One of the important side effects of succinylcholine is the release of potassium from the cell, which under certain conditions is very intense and dangerous to hyperkalemia. These conditions include multiple traumas, burns, extensive neuromuscular diseases, motor nerve damage, extensive upper abdominal infections and neuropathy, caused by chronic renal failure, there is also a case of patient introduction in the case of a patient with closed head trauma (6). One of the side effects of the drug is an increase in the serum potassium level by 0.5 milliequivalent per liter. This mild increase generally does not cause dysrhythmias, but its use in the hands of patients such as third-degree burns on the second day and spinal cord severing the loss of a large number of nerves in the skeletal muscles, due to the increase of extra-junctional receptors and the longer duration of ion channels, the serum potassium concentration suddenly increases. As a result, patients are prone to cardiac arrest. Also, in cases such as severe intra-abdominal infection, kidney failure and muscle dystrophy with emergency conditions that require immediate protection of the airway, a lot of potassium is released after administering succinylcholine into the serum. In this method, succinylcholine is used conventionally (7).

Another side effects of this drug is the occurrence of myalgia fasciculation after the operation, the increase in blood potassium, the appearance of myoglobin in the serum, and the increase in creatine phosphokinase. The prevalence of fasciculation has been reported up to 95% (8) but due to its serious side effects such as hyperkalemia, myalgia, muscle fasciculation, increased intraocular pressure and increased intragastric pressure, an effort was made to discover an alternative relaxant with a rapid onset of action and excellent intubation (5). Various drugs such as benzodiazepines, midazolam and ketamine are used to calm children.

Use of medicinal agents before anesthesia, effective prevention of post-operative pain and prevention of verbal and physical stimulation; In other words, the child is allowed to wake up from anesthesia in a calm environment (2). Today, in many cases, the use of succinylcholine has been reduced due to its possible side effects, and its use is not recommended except in essential cases. Seok-Jin Lee et al., 2019) conducted a study entitled "Comparison of Emergence of Agitation between Succinylcholine and Rocuronium Sugammadex in adults following closed reduction of nasal bone fracture, a prospective randomized controlled trial. It was determined that Sugammadex has a rapid recovery from Rocuronium-induced neuromuscular blockade allows. Succinylcholine is often used for brief surgeries, but is associated with muscle pain, headache, histamine release, and increased lactate levels. Therefore, we hypothesized that succinylcholine may stimulate emergence (EA) and we compared the effects of succinylcholine and rocuronium-Sugammadex on EA in patients who underwent closed reduction of nasal bone fractures under general anesthesia. Methods Forty-two patients were prospectively enrolled in the study and randomly assigned to the group succinylcholine (group) (SC) or rocuronium Sugammadex group (RS group; all 21 subjects) were divided. Neuromuscular block and its reversal was achieved with succinylcholine and

normal saline in the SC group, while rocuronium and Sugammadex in the RS group prescribed after surgery b Day of EA as primary outcome, incidence of severe EA and duration of EA as secondary outcomes were compared.

Findings: The incidence of EA in the SC group was higher than in the RS group (90.5% versus 47.6%, respectively); Relative risk [4.3 [RR; 95% confidence interval [CI 1.2 to 15.7; P = 0.006). The incidence of dangerous EA increased in the SC group compared to the RS group, 33.3 vs. 4.8, respectively; 2.1 RR; 95% CI: 1.3 to 3.4 P 0.045 Stirring time was longer in the SC group than in the RS group [106.5 (65.1) vs. 40.4 (26.0) seconds, mean difference 66.1 seconds; CI31.095 to 101.1; Effect size 1.3; P 0.001)

Succinylcholine increases the incidence, severity and duration of EA compared to rocuronium Sugammadex in patients undergoing closed reduction of nasal bone fracture. Trial registration CRIS registration number KCT0002673, initial registration date was January 31, 2018 (previously registered) (14). Xiao-Dan Wang et al., 2022) conducted a study entitled "The time interval between the administration of alfentanil and rocuronium necessary to prevent crack movement caused by rocuronium". Prevention of crack movement caused by pain was caused by injection of rocuronium (Time AR50). Methodology In this study, 64 patients for general anesthesia, 33 (male) and 31 (female) were included in the study. Anesthesia was induced by target-controlled infusion of propofol at the target site of 3 μg/ml. Then alfentanil 15 μg/kg was injected for 30 seconds. After 60 seconds, rocuronium 0.6 mg/kg was given to the first patient. Dixon's upper and lower method was used to determine the time interval of each subsequent patient, an interval of 5 seconds. Mean arterial pressure (MAP) and heart rate (HR) were recorded at three time points: TO, pre-induction. T1, before rocuronium injection; and 1 2 minutes after rocuronium injection. Findings: AR50 standard deviation time is 5.6 ± 3.7 seconds and in female patients 21.9 ± 5.6 s, based on regression, AR50 time probit is 4.7 seconds respectively (95% confidence interval [Cl 1.2-7.6 seconds and 20.3 seconds (95% The confidence interval (CI) was 77-26.1 seconds in male and female patients. The AR95 time was 10.6 seconds (95% CI 7.7-25.3) and 35.0, S (95% CI (28.1-95.5) in male and female patients respectively) with significantly higher values in women than men (P < 0.001) compared to TO, MAP and HR significantly decreased in T1 and T2 in both groups. Conclusion: AR50 time required to prevent crack-induced movement of rocuronium in male and female patients was 7.4 and 3.20 seconds, respectively (12).In a study, the amount of agitation and its duration compared to those receiving succinylcholine.

It was reported from rocuronium in 2019. Lee et al. In the mentioned study, 42 patients were divided into two groups of 21 people for nasal fracture. The first group received succinylcholine and the second group received rocuronium. In another study that was published in the ECT journal, for a man who repeatedly had brain agitation after receiving succinylcholine for shock, rocuronium was used instead of succinylcholine on the sixth time, and the agitation was greatly reduced (13).

As mentioned, agitation is one of the most common side effects after general anesthesia, and male sex, old age, long-term abdominal surgery, spine surgery, and postoperative pain have been reported as risk factors (14, 15). Among other factors affecting agitation, pain, cold etc. Having a bladder and fear of parental separation have been mentioned (16).

Conclusion

According to the results of this clinical trial, succinylcholine and rocuronium were not significantly different from each other in terms of the occurrence of agitation, its intensity and duration, but based on the results of the odds ratio, the probability that in patients who took rocuronium they found that agitation is 0.6 times less than the patients who received succinylcholine. Logistic analysis of the data also showed that in patients who received succinylcholine, the probability of agitation being more severe is 2.47 times higher than in patients who received rocuronium. The duration of agitation in patients receiving succinylcholine was also higher than in patients receiving rocuronium. In terms of the incidence and severity of myalgia, there was no significant difference in the people who received rocuronium or succinylcholine, however, a total of 50% of the patients showed agitation symptoms, showed myalgia, of which 16.6% were related to the people who received rocuronium and 33.3% were related to patients who received succinylcholine. The

results of the myalgia odds ratio also showed that the probability of myalgia symptoms being observed in patients who received rocuronium is 0.5 times lower than in patients who received succinylcholine.

Correlation analysis of the assessed traits showed that high blood pressure has a significant direct correlation with the occurrence, intensity and duration of agitation, myalgia and throat pain. Also, myalgia and throat pain had a direct significant relationship with the occurrence, intensity and duration of agitation. In aggregate, the results of this trial showed that rocuronium can be a suitable alternative to succinylcholine in applications outside the operating room.

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