ORIGINAL ARTICLE

A survey of the current use of neuromuscular blocking drugs among the Middle Eastern anesthesiologists

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ABSTRACT

Background: This survey aimed to assess the extent of practice of the Middle Eastern anesthesiologists in the use of neuromuscular blocking agents (NMB) in 2012. **Methods:** We distributed an electronic survey among 577 members of the Triple-M Middle Eastern Yahoo anesthesia group, enquiring about their practice in the use of neuromuscular blocking agents. Questions concerned the routine "first choice" use of NMB, choice for tracheal intubation, the use of neuromuscular monitoring (NMT), type of NMB used in difficult airway, frequency of using suxamethonium, cisatracurium, rocuronium and sugammadex, observed side effects of rocuronium, residual curarization, and the reversal of residual curarization of rocuronium. **Results:** A total of 71 responses from 22 Middle Eastern institutions were collected. Most of the Middle Eastern anesthesiologists were using cisatracurium and rocuronium frequently for tracheal intubation (39% and 35%, respectively). From the respondents, 2/3 were using suxamethonium for tracheal intubation in difficult airway, 1/3 were using rocuronium routinely and 17% have observed hypersensitivity reactions to rocuronium, 54% reported residual curarization from rocuronium, 78% were routinely using neostigmine to reverse the rocuronium, 21% used sugammadex occasionally, and 35% were using NMT routinely during the use of NMB. **Conclusions:** We believe that more could be done to increase the awareness of the Middle Eastern anesthesiologists about the high incidence of PROC (>20%) and the need for routine monitoring of neuromuscular function. This could be accomplished with by developing formal training programs and providing official guidelines.

Key words: *Middle East, neuromuscular blockers, residual curarization, survey*

INTRODUCTION

Neuromuscular blocking agents are frequently used during general anesthesia to facilitate the tracheal intubation and the ease of surgical access. Unfortunately, their use may be associated with many serious adverse effects such as residual neuromuscular blockade (26%)[1] and hypersensitivity reactions (0.015%).[2] Even a mild degree of residual neuromuscular blockade (train-of-four ratio of 0.7-0.9) may be associated with significant impairment of respiratory and pharyngeal muscle function.[3]

Access this article online	
Quick Response Code:	Website: www.saudija.org
	DOI: 10.4103/1658-354X.114063

The avoidance of the former raises the importance of objective neuromuscular monitoring[4] and proper reversal of the residual neuromuscular blocking.[5] The use of recently coming sugammadex is able to reverse the effect of the neuromuscular steroidal agent namely rocuronium and vecuronium by direct inactivation in plasma.[6]

Della Rocca and coauthors[7] conducted a survey to gather information about the use of neuromuscular monitoring and the reliable train of four (TOF) value to assess the clinical recovery among the Italian anesthesiologists. They reported that the routine use of TOF monitoring among 50% of the respondents. Fifty-seven percent of the respondents considered that the reliable TOF ratio required for extubation was greater than 0.7. They demonstrated that most of Italian anesthesiologists are still using clinical tests to assess the recovery from the neuromuscular blockers which might be explained with the unawareness of 94% of the respondents about the fact that the incidence of postoperative residual curarization (PORC) exceeds 20%.

Little is known about the practice of the Middle Eastern anesthesiologists in respect to the use of neuromuscular blockers.

We aimed to assess the practice of the Middle Eastern anesthesiologists in respect to the frequently used neuromuscular blockers, use of objective neuromuscular monitoring, reversal of residual neuromuscular blocking and the use of sugammadex as well as the incidence of adverse effects including PORC.

METHODS

The commercially available "Survey Monkey" software (www.surveymonkey.com) was used for the current survey. An electronic invitation message was sent to all (562) members of the MMM (morbidity mortality meeting) web site (http://health.groups.yahoo.com/group/TripleM). Those who are practicing anesthesia in the Middle Eastern region were asked to complete the survey. The MMM is an anesthesia Yahoo group including 577 anesthesiologists. It was found in February 1999 with the aim of providing a forum for the exchange of ideas and experiences pertinent to the practice of anesthesia with special reference to morbidity and or mortality cases related to anesthetics.

Participants were requested to complete questions in the context of their "current routine 'first choice' practice when performing general anesthesia using neuromuscular blocker in the absence of any contraindications or special (patient) considerations." Questions concerned the muscle relaxant of choice for tracheal intubation, whether or not neuromuscular monitoring used (NMT), which type muscle relaxant used in difficult airway, frequency of using suxamethonium, cis-atracurium and rocuronium, side effects of rocuronium (if any), residual curarization secondary to rocuronium, frequency of using sugammadex and the reversal agent of choice for rocuronium.

After sending two follow-ups, responses were collected by the Survey Monkey website.

All statistical analyses were performed using SPSS software version 13 (SPSS, Inc., Chicago, Illinois). Data were expressed as frequencies (percent).

RESULTS

A total of 71 members of the MMM anesthesia group participated in the survey from 22 institutions in the Middle East region with calculated margin of error of 11.63%.

Muscle relaxant of choice for tracheal intubation

For 39% of the respondents, cisatracurium was the muscle relaxant of choice for tracheal intubation provided no contraindication or special (patient) considerations. Rocuronium was the second muscle relaxant of choice for tracheal intubation (35%). Atracurium scored the third place with a percentage of 16%. Only five of the respondents mentioned that they are using suxamethonium for tracheal intubation (7%) [Figure 1].

Muscle relaxant of choice in difficult airway

Sixty-three percent of the respondents reported using suxamethonium for tracheal intubation in difficult airway patients versus 10% reported using rocuronium [Figure 2].

Frequency of using rocuronium in the daily practice

Nearly one third of the respondents (35%) reported using it daily versus 14% rarely using and 4% reported never used rocuronium in their practice.

Side effects of rocuronium

Nearly half of the respondents (49%) reported not seen any anaphylaxis secondary to rocuronium injection. Anaphylactic reaction in the form of skin rash or bronchospasm was reported by 17% of the respondents following rocuronium injection.

Residual curarization following rocuronium

For those who are using rocuronium in their routine practice, 54% reported residual curarization following rocuronium.

Use of sugammadex

The majority of the respondents 79% reported never using sugammadex in their daily practice. Occasional use of sugammadex was reported in 21% of the respondents.

The reversal agent of choice following rocuronium

Of those who routinely use rocuronium in their daily practice, 78% reported using neostigmine to reverse the drug effect and only 10% reported use of sugammadex [Figure 3].

Using of NMT monitoring routinely during general anesthesia when muscle relaxant used

Forty-seven percent of the respondents reported that they do not use NMT monitoring regularly versus 35% who reported using NMT regularly in their practice. Only 16% of the respondents reported occasional use of NMT monitoring in their daily practice [Figure 4].

Mode of NMT assessment used before tracheal extubation

Only 23 members responded to this question. A total of 18% reported using train of four (TOF > 0.9) to assess NMT during the recovery period. Ten percent reported

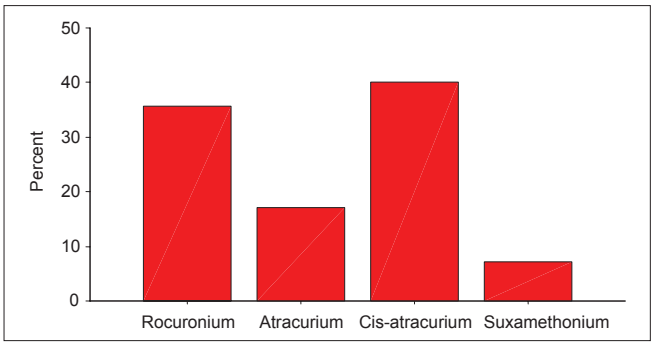

Figure 1: The muscle relaxant of choice for tracheal intubation

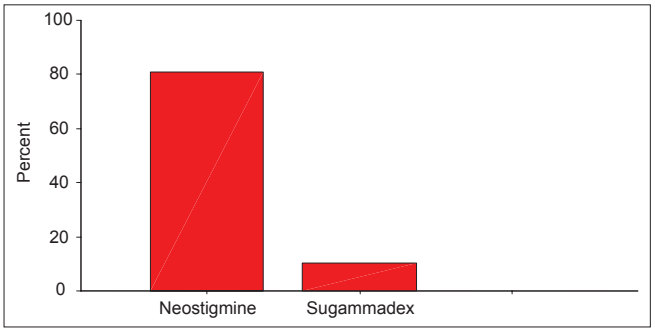

Figure 3: The reversal agent of choice following rocuronium

using subjective clinical tests to assess NMT before tracheal extubation.

DISCUSSION

This is the first survey to assess the practice of the use of neuromuscular blockers among the Middle Eastern anesthesiologists. Most of the respondents are practicing in Saudi Arabia and Egypt, whereas others are practicing in the Sultanate of Oman, Jordon, Syria, Qatar, Bahrain and United Arab Emirates.

Cisatracurium and rocuronium are the most frequently used neuromuscular blocking agents for tracheal intubation among 74% of the respondents. Similarly, in an old survey,[8,9] 76.6% of the respondents Dutch anesthesiologists practicing at general and private hospitals were preferring to use nondepolarizing neuromuscular blockers rather than suxamethonium. In the Middle East, cisatracurium, with its favorable pharmacologic profile and less adverse effects, is the predominantly used neuromuscular blocker for tracheal intubation. The availability of cisatracurium at reasonable prices in the Middle East reduces the use of atracurium to 16% of the respondents. Surprisingly, compared with the Italian anesthesiologists,[7] fewer of the respondents of the Middle Eastern survey are using suxamethonium for routine tracheal intubation (77% vs. 7%, respectively).

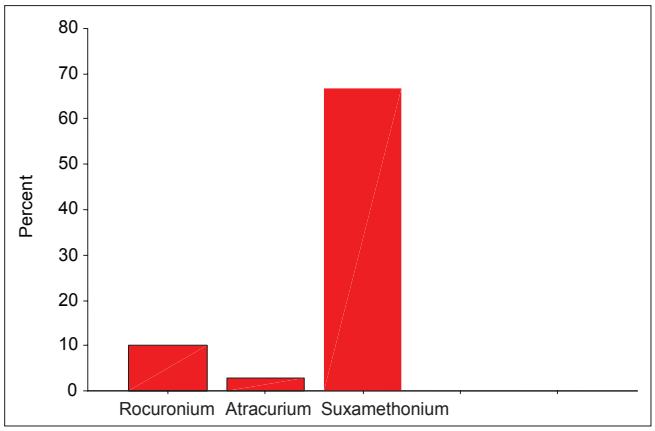

Figure 2: Muscle relaxant of choice in difficult airway

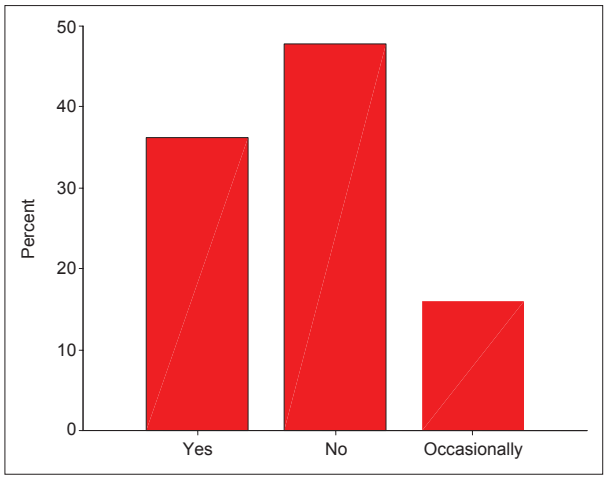

Figure 4: Using of NMT monitoring routinely during general anesthesia

Although rocuronium emerged as an alternative to suxamethonium for the tracheal intubation in the patients with difficult airway, only 10% of the respondents are using it, whereas 63% of the respondents are still reluctant to use the latter.[10,11] This may be explained by the unavailability of sugammadex in most of the Middle Eastern countries to allow earlier re-establishment of spontaneous ventilation after the use of rocuronium in the disastrous difficult to intubate, difficult to ventilate cases.[12] Seventy-nine percent of respondents reported that they never used sugammadex.

Our data show that more than one third of the Middle Eastern anesthetists are using rocuronium in their daily practice, because of their familiarity with rocuronium than cisatracurium.

The overall incidence of perioperative anaphylaxis is estimated at 1 in 6,500 administrations of neuromuscular blocking agents.[2] In a recent 10 years audit at the Royal Adelaide University Hospital, Australia, the majority of the patients with anaphylaxis to muscle relaxants during anesthesia were to rocuronium and

suxamethonium.[13] This may explain our finding that only 17% of the respondents noted skin rash or bronchospasm related to the administration of rocuronium.

Eighty-three percent of the respondents of the Italian anesthesiologists have observed residual curarization at least once,[7] whereas only 54% of the respondents of the Middle Eastern anesthesiologists noted residual curarization. This difference may be attributed to that 78% of the Middle Eastern respondents are routinely reversing the residual neuromuscular blocking action. However, routine pharmacologic reversal was less common among European and American anesthesiologists (18% vs. 34.2%, respectively),[14] whereas 5% of the respondents to the Italian survey reported that reversal is always efficacious, officious when TOF count = 0 or 1 or depending on the type of the used neuromuscular blocking agent (5%, 3%, 11%, and 20%, respectively).[7]

The routine use of neuromuscular instrumental monitoring varies among the European,[14] Italian,[7] Denmark,[15] Middle Eastern, Germany,[16] American,[14] United Kingdom,[17] and Mexico[18] anesthesiologists (70.2%, 50%, 43%, 35%, 28%, 22.7%, 10%, and 2% of the respondents, respectively).

Only 32.4% of the respondents of the Middle Eastern anesthesiologists responded to the question about monitoring of neuromuscular function before extubation. Eighteen percent of the respondents considered tracheal extubation when the TOF ratio exceeded 0.9, whereas 10% are using only subjective clinical evaluation of neuromuscular block before tracheal extubation. Similarly, 50% of the Italian anesthesiologists, 19.3% of the European anesthesiologists, and 9.4% of the American anesthesiologists are not using objective neuromuscular monitoring.[7,14] Nevertheless, comparison of our findings with results from other countries indicates that there are regional differences among the practicing anesthesiologists. In a recent consensus document on guidelines in the immediate postanesthesia recovery, produced by expert members of a working party established by the Association of Anesthetists of Great Britain and Ireland, a nerve stimulator for assessing neuromuscular blockade, was considered an appropriate standard of monitoring until the patient is fully recovered from anesthesia.[19]

Our study had some limitations, such as the inadequate response rate with a calculated margin of error of 11.63%. Second, we have to ask the respondents whether an objective TOF monitors were available in every operating room to address the shortage of resources among the developing Middle Eastern countries.

In conclusion, we believe that more could be done to increase the awareness of the Middle Eastern anesthesiologists about the high incidence of PORC (>20%) and the need for routine monitoring of neuromuscular function. This could be accomplished with by developing formal training programs and providing official guidelines.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the cooperation of the MMM-Anaesthesia group collaborators: Z. Al Sabaa (King Faisal Specialist Hospital, Dammam, KSA), M. Farghaly (Ain Shams University, Cairo, Egypt), A. Al Saflan (King Fahd Teaching Hospital, Dammam University, KSA), A. Al Sharif (Ibri Regional Hospital, Sultanate of Oman), M. Abdulatif (Faculty of Medicine, Cairo University, Egypt), A. Asaad (Damascus University, Syria and Al Razi Hospital Kuwait), H. Hosny (Cairo University, Egypt), H. Alakkad (Toronto Western Hospital, University of Toronto, Canada), K. Abdelsalam (Ain Shams Univerity, Cairo, Egypt), T. Marei (Cairo University, Egypt), N. Al Kemyani (Sultan Qaboos University Hospital, Muscat, Sultanate of Oman), W. Riad (Toronto Western Hospital, Toronto, Ontario, Canada), Abraham Joseph (Head, Dept of Anaesthesia and Critical Care, Al Buraimi Hospital, Sultanate of Oman), A. Shorrab (University Hospital, Sharjah, UAE), M. Delvi and M. U. Khan (College of medicine, King Saud University, KSA), A. Al Shaer (King Fahad Cardiac Sciences Centre, King Saud University, KSA), A. Abdel Fattah (Faculty of Medicine, Cairo University, Egypt), M. Hajnour (King Khalid University Hospital, Riyadh, KSA), S. Abdelmaksoud (Hamad Medical Corporation, Doha, Qatar), D. Baroudi (Basharahil Hospital, Makkah, KSA), E. Bantan (MCH, Makkah, KSA). G. Zaki (Ain Shams University, Cairo, Egypt), M. Al Haddabi (Royal Hospital, Sultanate of Oman), M. Bakri (King Fahad Hospital- Hofuf, KSA), I. Badran (Faculty of Medicine, Jordan University, Amman, Jordan), D. Alkhudairy (King Fahad General Hospital, Jeddah, KSA), A. Alzahry (King Fahad Hospital, Almadinah Almounawarah, KSA), E. Ismail (Al Azhar University, Cairo, Egypt), M. T. Shawagfeh (King Hussein Cancer Center, Amman, Jordan), I. Zogary (King Abdulaziz University Hospital, Riyadh, KSA), O. Ebrahim (Salmaniya Medical Complex, Manama, Bahrain), A. Zeidan (Faculty Of Medicine, Alexandria, Egypt and Dallah Hospital, Riyadh, KSA), A. Alzoman (Prince Salman bin Abdulaziz Hospital, Riyadh, KSA), B. Al Abri (Military Hospital, Sultanate of Oman), A. Abo El Azm (Al Iman General Hospital, Riyadh, KSA).

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How to cite this article: Eldawlatly A, El-Tahan MR, M. A survey of the current use of neuromuscular blocking drugs among the Middle Eastern anesthesiologists. Saudi J Anaesth 2013;7:146-50.

Source of Support: Nil, **Conflict of Interest:** None declared.