International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article.

To Assess Post-Anaesthesia Pulmonary Complications After Use of Muscle Relaxants: An Institutional Based Study

Tushar Nehra[1], Sarita Nandal[2*], Harshraj Nehra[3]

[1]Senior Resident, Department of Respiratory Medicine,
Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi, India.
[2]Assistant Professor, Department of Anesthesia & Critical Care,
World College of Medical Sciences Research and Hospital, Jhajjar, Haryana, India.
[3]Assistant Professor, Department of Ophthalmology,
World College of Medical Sciences Research and Hospital, Jhajjar, Haryana, India.

ABSTRACT

Background: Post-operative pulmonary complications are broadly defined as conditions affecting the respiratory tract that can adversely influence clinical course of the patient after surgery. Hence; the present study was conducted with the aim of assessing the post-anaesthesia pulmonary complications after use of muscle relaxants.

Materials and Methods: A total of 200 subjects were enrolled in the present study. All the subjects were broadly divided into two study groups as follows: Group A: 100 subjects with muscle relaxants, and Group B: 100 subjects without muscle relaxants. Complete demographic and clinical details of all the subjects were obtained. Postoperative physical examination of all the subjects was carried out for checking for adverse pulmonary events. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: Among the group A subjects, Post-anaesthesia pulmonary complications were seen in 10 percent of the patients while in group B, Post-anaesthesia pulmonary complications were seen in 4 percent of the patients. Among group A subjects associated with Post-anaesthesia pulmonary complications, 5 subjects belonged to the age group of more than 80 years. Among group B subjects associated with Post-anaesthesia pulmonary complications, 2 subjects belonged to the age group of more than 80 years. Significant correlation was seen between occurrences of post-anaesthesia pulmonary complications and patients with BMI ≥ 30 Kg/m^2.

Conclusion: Post-anaesthesia pulmonary complications are significantly associated with use of muscle relaxants.

Key words: Pulmonary Complications, Muscle Relaxant.

***Correspondence to:**

Dr. Sarita Nandal,
Assistant Professor,
Department of Anesthesia & Critical Care,
World College of Medical Sciences Research and Hospital,
Jhajjar, Haryana, India.

Article History:

Received: 11-04-2020, **Revised:** 06-05-2020, **Accepted:** 28-05-2020

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2020.6.3.041	

INTRODUCTION

Post-operative pulmonary complications are broadly defined as conditions affecting the respiratory tract that can adversely influence clinical course of the patient after surgery. Prior risk stratification, risk reduction strategies, performing short duration and/or minimally invasive surgery and use of anaesthetic technique of combined regional with general anaesthesia can reduce the incidence of adverse events.[1]

Neuromuscular blocking agents (NBAs) exhibit their clinical effects on pulmonary functions indirectly by acting on autonomic nervous system. Succinylcholine stimulates autonomic ganglia whereas D-tubocurarine blocks it. D-tubocurarine, succinylcholine, atracurium and mivacurium are associated with histamine release that may cause increased airway resistance and bronchoconstriction in patients with hyperactive airway. Pancuronium, vecuronium and rocuronium do not have any effect on pulmonary functions. The allergic reactions are most common in NBAs amongst all drugs used in anaesthesia. Cross-reactions with other NBAs are also common; hence, allergy test must be done if found allergic to one of them. Anticholinesterases do not have direct effect on pulmonary functions but when used alone cause increased tracheal secretions and consequent bronchoconstriction.[2-6] Hence; the present study was conducted with the aim of assessing the post-anaesthesia pulmonary complications after use of muscle relaxants.

MATERIALS & METHODS

A total of 200 subjects were enrolled in the present study. All the subjects were broadly divided into two study groups as follows:

Group A: 100 subjects with muscle relaxants, and

Group B: 100 subjects without muscle relaxants

Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining the entire research protocol.

Enrolment of all the patients who were more than 18 years of age and who were schedule to receive general anaesthesia for any in-hospital procedure. Patients schedule to undergo cardiac surgical procedures were excluded. Complete demographic and clinical details of all the subjects were obtained. Postoperative physical examination of all the subjects was carried out for checking for adverse pulmonary events. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

Among the group A subjects, Post-anaesthesia pulmonary complications were seen in 10 percent of the patients while in group B, Post-anaesthesia pulmonary complications were seen in 4 percent of the patients. Among group A subjects associated with Post-anaesthesia pulmonary complications, 5 subjects belonged to the age group of more than 80 years.

Among group B subjects associated with Post-anaesthesia pulmonary complications, 2 subjects belonged to the age group of more than 80 years. 6 subjects in the group A with presence of post-anaesthesia pulmonary complications were males while 4 subjects in the group B with presence of post-anaesthesia pulmonary complications were males.

Significant correlation was seen between occurrences of post-anaesthesia pulmonary complications and patients with BMI ≥ 30 Kg/m^2.

Table 1: Post-anaesthesia pulmonary complications

Variable		Groups	
		Group A	Group B
Age group	18-40	0	0
	41-60	3	1
	61-80	2	1
	Above 80	5	2
Gender	Male	6	3
	Female	4	1
Overall complication (n)		10	4

Table 2: Correlation of Post-anaesthesia pulmonary complications with BMI

Variable	95% CI	p- value
BMI less than 25 Kg/m^2	0.86 to 1.23	0.12
BMI between 25 to 29.9 Kg/m^2	0.94 to 1.85	0.35
BMI ≥ 30 Kg/m^2	-1.56 to 1.42	0.00 (Significant)

DISCUSSION

The World Health Organization estimates that at least 187 million surgeries requiring general anesthesia are performed each year worldwide. Anesthesiologists often use intermediate-acting neuromuscular-blocking agents (NBAs) to facilitate tracheal intubation and maintain optimal surgical conditions. However, studies show that NBAs are associated with postoperative respiratory complications including postextubation hypoxia, respiratory failure, negative pressure–induced pulmonary edema, and atelectasis.[7-9] Postoperative respiratory complications are the second most common postoperative surgical complications, after wound infection, and contribute to a significant financial burden on hospitals and patients. Anesthesiologists need to balance optimal surgical conditions and associated side effects of medications used to accomplish surgical relaxation. Although deeper levels of neuromuscular blockade may improve surgical conditions, larger doses of NBAs are more difficult to reverse and put patients at a greater risk of developing residual paralysis.[7-10] Hence; the present study was conducted with the aim of assessing the post-anaesthesia pulmonary complications after use of muscle relaxants.

Among the group A subjects, Post-anaesthesia pulmonary complications were seen in 10 percent of the patients while in group B, Post-anaesthesia pulmonary complications were seen in 4 percent of the patients. Among group A subjects associated with Post-anaesthesia pulmonary complications, 5 subjects belonged to the age group of more than 80 years. Among group B subjects associated with Post-anaesthesia pulmonary complications, 2 subjects belonged to the age group of more than 80 years. In ambulatory surgery, residual paralysis occurs less frequently, however the proportion of patients affected is still significant at 38 %. The overall risk of perioperative morbidity and mortality in day-case surgeries is low with one recent study quoting the risk to be as low as 0.1 %. By these observations the effect of residual paralysis on postoperative outcomes in day case surgery must be very minimal. Despite this, concerns over patient safety remain as more procedures are carried out on an ageing population in ambulatory care centers with fewer resources to rapidly identify and treat post-operative complications.[11]

In the present study, 6 subjects in the group A with presence of post-anaesthesia pulmonary complications were males while 4 subjects in the group B with presence of post-anaesthesia

pulmonary complications were males. Significant correlation was seen between occurrences of post-anaesthesia pulmonary complications and patients with BMI ≥ 30 Kg/m^2. Duncan J McLean et al assessed the dose-dependent Association between Intermediate-acting Neuromuscular-blocking Agents and Postoperative Respiratory Complications. In a hospital-based registry study on 48,499 patients who received intermediate-acting neuromuscular-blocking agents, the authors tested the primary hypothesis that neuromuscular-blocking agents are dose dependently associated with the risk of postoperative respiratory complications. In the secondary analysis, the authors evaluated the association between neostigmine dose given for reversal of neuromuscular-blocking agents and respiratory complications. Post hoc, the authors evaluated the effects of appropriate neostigmine reversal (neostigmine ≤ 60 µg/kg after recovery of train-of-four count of 2) on respiratory complications. The authors controlled for patient-, anesthesia-, and surgical complexity-related risk factors. High doses of neuromuscular-blocking agents were associated with an increased risk of postoperative respiratory complications (n = 644) compared with low doses (n = 205) (odds ratio [OR], 1.28; 95% CI, 1.04 to 1.57). Neostigmine was associated with a dose-dependent increase in the risk of postoperative respiratory complications (OR, 1.51; 95% CI, 1.25 to 1.83). Post hoc analysis revealed that appropriate neostigmine reversal eliminated the dose-dependent association between neuromuscular-blocking agents and respiratory complications (for neuromuscular-blocking agent effects with appropriate reversal: OR, 0.98; 95% CI, 0.63 to 1.52). The use of neuromuscular-blocking agents was dose dependently associated with increased risk of postoperative respiratory complications.[12]

CONCLUSION

Post-anaesthesia pulmonary complications are significantly associated with use of muscle relaxants.

REFERENCES

1. Kelkar KV. Post-operative pulmonary complications after non-cardiothoracic surgery. Indian J Anaesth. 2015;59(9):599-605. doi:10.4103/0019-5049.165857.

2. Saraswat V. Effects of anaesthesia techniques and drugs on pulmonary function. Indian J Anaesth 2015;59:557-64.

3. Ripke F, Fink H, Blobner M. Concepts for the avoidance of residual neuromuscular blockades after the administration of nondepolarizing muscle relaxants. Anasthesiol Intensiv med Notfallmed Schmerzther 2014; 55: 564–76.

4. McAlister FA, Bertsch K, Man J, Bradley J, Jacka M. Incidence of and risk factors for pulmonary complications after nonthoracic surgery. Am J Respir Crit Care Med 2005; 171: 514–17.

5. Smetana GW. Preoperative pulmonary evaluation. N Engl J Med 1999; 340: 937–44.

6. Kopman AF, Yee PS, Neuman GG. Relationship of the train-of-four fade ratio to clinical signs and symptoms of residual paralysis in awake volunteers. Anesthesiology 1997; 86: 765–71

7. Murphy GS, Szokol JW, Marymont JH, et al. Intraoperative acceleromyographic monitoring reduces the risk of residual neuromuscular blockade and adverse respiratory events in the postanesthesia care unit. Anesthesiology 2008; 109: 389–98.

8. Baillard C, Clec'h C, Catineau J, et al. Postoperative residual neuromuscular block: a survey of management. Br J Anaesth 2005; 95: 622–26.

9. Weiser TG, Regenbogen SE, Thompson KD, Haynes AB, Lipsitz SR, Berry WR, Gawande AA: An estimation of the global volume of surgery: A modelling strategy based on available data. Lancet 2008; 372:139–44.

10. Mencke T, Echternach M, Kleinschmidt S, Lux P, Barth V, Plinkert PK, Fuchs-Buder T: Laryngeal morbidity and quality of tracheal intubation: A randomized controlled trial. Anesthesiology 2003; 98:1049–56.

11. Farhan H, Moreno-Duarte I, McLean D, Eikermann M. Residual paralysis: does it influence outcome after ambulatory surgery? Curr Anesthesiol Rep. 2014;4:290–302.

12. Duncan J McLean et al. Dose-dependent Association between Intermediate-acting Neuromuscular-blocking Agents and Postoperative Respiratory Complications. Anesthesiology. 2015 Jun;122(6):1201-13.

Source of Support: Nil.

Conflict of Interest: None Declared.

Cite this article as: Tushar Nehra, Sarita Nandal, Harshraj Nehra. To Assess Post-Anaesthesia Pulmonary Complications After Use of Muscle Relaxants: An Institutional Based Study. Int J Med Res Prof. 2020 May; 6(3): 189-91.
DOI:10.21276/ijmrp.2020.6.3.041