



Can Reduce Postoperative Pulmonary Complications Related to Neuromuscular Block Agents in Geriatric Surgical Population?

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Editorial

The respiratory system undergoes various physiological and anatomical changes with age [1]. Gas exchanges are modified with a linear decrease of PaO₂ up to the age of 70 years, and ventilatory responses to hypercapnia, hypoxia and exercise decrease in the elderly [2]. Furthermore, closing volume increases with age, and FEV1 declines 8% to 10% per decade due to reduced pulmonary compliance [3]. Also age-related decline in diaphragmatic strength may predispose geriatric population to diaphragmatic fatigue and ventilatory failure during increased ventilatory load on the respiratory system. Thus, elderly patients are at greater risk for many postoperative pulmonary complications and may have preexisting muscle weakness and respiratory dysfunction.

Postoperative respiratory complications are one of the most common complications in geriatric patients. Well known meaningful predictive factors of postoperative respiratory complications are underlying disease, operation site and anesthesia-related pulmonary complications. COPD and sleep apnea are very common among the elderly. Another significant clinical predictor of adverse pulmonary outcome is the site of surgery, with thoracic and upper abdominal surgery having the highest pulmonary complication rate [4]. Postoperative Residual Neuromuscular Block (PRNB) is one of the most serious complications regarding the intraoperative use of muscle relaxants and remains a high incidence. PRNB complications in geriatric patients may exacerbate preexisting muscle weakness and respiratory dysfunction. The risk of neuromuscular block complications in geriatric patients is about twice as high as that in younger patients, and the incidence of airway obstruction or hypoxia in the post-anesthesia care unit is about twice as high [3,5].

Clinical symptoms of PRNB are very variable from mild diplopia or general weakness to serious respiratory distress and may progress to hypoxia. Therefore, PRNB can increase postoperative morbidity. Preventing respiratory complication is the most important thing to the anesthesiologists when using muscle relaxants. Hypoxemia following surgery is common and may be prolonged and severe complications in geriatric patients. The problems of assessment of the adequacy of tissue oxygenation are recommended. Residual effects of neuromuscular function following the administration of medium-acting Non-Depolarizing Muscle Relaxants (NDMR) such as vecuronium and rocuronium is one of the most feared complications in anesthesia because steroid-based muscle relaxants changes its pharmacokinetic properties with age.

Sugammadex, a recently developed muscle relaxant antagonist, is a novel drug that selectively binds to amino steroid NDMR and reverses even a deep level of neuromuscular block. Recently, recommend sugammadex to antagonize the effect of the amino steroid NDMR at the end of surgery. Because recent meta-analysis suggest that sugammadex is superior to neostigmine, as it reverses amino steroid NDMR faster and more reliably, with a lower risk of adverse events (respiratory, cardiovascular complications, and postoperative weakness) [4]. However, the inadequate dose of sugammadex may occur postoperative residual paralysis which required tracheal intubation [6]. Furthermore, the mean time from sugammadex administration to recovery of the TOF ratio to 0.9 was prolonged in geriatric patients who are aged ≥ 75 years compared to patients of different age [6].

Aging results in a gradual reduction of organ function, which limits the physiologic reserve of the cardiovascular, neurologic, respiratory, hepatic, and renal systems [5]. This decline in organ function in the elderly may influence the pharmacokinetics and pharmacodynamics of amino steroid NDMR and sugammadex, resulting in a prolonged effect of neuromuscular relaxation and an increased risk of postoperative complications related to neuromuscular relaxation [5]. Residual

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paralysis remains a major problem in geriatric clinical anesthesia. Therefore, it is necessary to remember that neuromuscular function monitoring is obligatory, postoperative anesthesia management are important to minimize postoperative adverse events in the elderly.

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