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Postoperative residual paralysis in patients aged over 65 years old at the Post-Anesthesia Care Unit☆

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ABSTRACT

Introduction: Few studies have been made on the incidence of residual paralysis from non-depolarizing relaxants in people over 65 years old; however, estimating the number of cases and treatment thereof are both important.
Objective: To study the incidence of residual paralysis with non-depolarizing relaxants in patients over 65 years of age and discuss treatment.
Methodology: Analytical observational study based on a cohort design.
Results: The pre-extubation residual paralysis was estimated at 23.2% and at 9.2% at patient admission to the Recovery Suite. Pharmacological reversal showed 89.4% and 100% success rates with Neostigmine and Sugammadex respectively, with similar times at T4/T1 > 0.9.
Conclusions: The incidence of pre-extubation residual paralysis was lower than the figure published worldwide. Pharmacological reversal therapies were typically highly effective.

Relajación residual postoperatoria en pacientes mayores de 65 años en la Unidad de Cuidado Posanestésico

Palabras clave:
Relajación muscular
Bloqueantes neuromusculares

RESUMEN

Introducción: La incidencia de Relajación Residual por relajantes no despolarizantes en mayores de 65 años ha sido poco estudiada, siendo relevante su calculo y su tratamiento.

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Sala de recuperación
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Objetivo: Estudiar la incidencia de Relajación residual en pacientes mayores de 65 años con relajantes neuromusculares no despolarizantes y describir su tratamiento.
Metodología: Estudio Observacional Analítico con Diseño de Cohorte.
Resultados: La Relajación Residual pre-extubación fue del 23.2% y al ingreso a la Sala de Recuperación del 9.2%. La reversión farmacológica con Neostigmina exhibió un éxito del 89.4% y con Sugammadex del 100%, con similares tiempos a una T4/T1 > 0.9.
Conclusiones: Las incidencias de Relajación Residual pre-extubación y en la Sala de Recuperación fueron mas bajas que las publicadas a nivel mundial. Las terapias de reversión farmacológica se distinguieron por su alta eficacia.

Introduction

Neuromuscular relaxation is mainly used to facilitate orotracheal intubation, for improved visualization and manipulation of the surgical field, and to optimize the patient–ventilator interaction when appropriate.[1,2]

Notwithstanding the considerable benefits of these drugs, they may lead to post-operative residual paralysis (Rp).[1–3] The recommendation is to make the diagnosis using quantitative criteria to assess the function of the neuromuscular junction through peripheral nerve stimulation that guides our choice of a safe neuromuscular relaxation therapy and helps to optimize the pharmacological reversal measures.[1–3]

According to the study, the incidence of residual paralysis ranges from 2% to 88%.[1,4,5] In the opinion of Donati,[4] this number is closer to 57%, averaging the results from the trials by Murphy, Naguib, Kumar, Butterly and Thilen, reported between 2007 and 2012. It should be stressed however, that based on this study, only 1% of anesthetists actually consider the problem.[6–10]

Residual paralysis is relevant because it may go unnoticed during the post-anesthesia recovery period, giving rise to severe respiratory post-operative complications associated with longer extubation times, risk of re-intubation, bronchoaspiration, extended recovery, delayed PACU discharge, and even more severe life-threatening conditions.[1,3,5–7,11]

There is a wide range of studies worldwide but usually they fail to consider the population over 65 years of age. These so-called "elderly" patients usually present an impaired organ ability to clear medications and increased sensitivity in terms of length and depth of the relaxation effects that may result in additional economic and healthcare burden.[12] In fact, the Polish trial by Pietraszewski et al.,[12] describes the higher Rp incidence in patients aged 65 through 89, in contrast with patients between 19 and 57 years old (44% vs. 20%), and even higher rates of hypoxia when comparing both groups (17.9% vs. 8.2%).

The incidence of Residual Paralysis is yet unknown, particularly when referring to people over 65 years of age, since the statistics reported for this age group are meager.

Based on the above statements and considering the major impact of evaluating both the incidence and current management of Rp in patients over 65 years old, we tried to respond the following question: "What is the incidence of Rp in patients over 65 years of age, exposed to nondepolarizing neuromuscular relaxants? Which are the characteristics of the current treatment for residual paralysis in patients aged 65 and older?

The key objective in trying to answer these questions was to estimate the incidence of Rp in patients over 65 years old, exposed to nondepolarizing relaxants, and then to discuss the effectiveness of pharmacological reversal therapy.

Materials and methods

Analytical, observational, cohort-based trial at the Samaritana University Hospital and the San Jose University Children's Hospital Foundation, between 2014 and 2015. The cohort inclusion criteria included: patients over 65 years old exposed to nondepolarizing neuromuscular relaxants. All patients discharged from the ICU with mechanical ventilation were excluded.

The patients enrolled in the trial were conveniently selected in consecutive order based on the surgical schedule of the research institution. Only the records that met the selection criteria and were fully compliant with the Stockholm Consensus were included in the analysis.[13]

Residual paralysis was defined as a train of four (TOF) ratio between the first and the last motor response (T4/T1) of less than 90%. This measurement was taken according to the parameters under the Stockholm Consensus[13] using two different approaches: TOF-Watch SX (TOF-Watch XS Device, Organon, Oss, The Netherlands). Single-use disposable electrodes were placed over the skin on the cubital nerve after cleaning thoroughly a 2–3 cm^2 surface. The accelerometer was placed on the pulp of the first digit making sure that the hand movement was artifact-free for an unbiased accelerometer reading. A measurement was taken at the time of admission to the OR, at the end of surgery, prior to extubation, and when the patient was admitted to the recovery room. In case of reversal of the residual paralysis, the necessary TOF measurements were taken from the time of the initial administration of the agent, until a value of over 90% was obtained. This period of time was the time required for total reversal of the residual paralysis. It is important to highlight that the arm used for taking the measurements was immobilized during the measurements and the medications used were administered via a separate line. The measurements were taken by one of the