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SPECIAL ARTICLE

Survey of postoperative residual curarization, acute respiratory events and approach of anesthesiologists

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KEYWORDS
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Abstract
Background and objectives: residual paralysis following the use of neuromuscular blocking drugs (NMBDs) without neuromuscular monitoring remains a clinical problem, even when NMBDs are used. This study surveys postoperative residual curarization and critical respiratory events in the recovery room, as well as the clinical approach to PORC of anesthesiologists in our institution.
Methods: This observational study included 415 patients who received general anesthesia with intermediate-acting NMBDs. Anesthesia was maintained by non-participating anesthesiologists who were blinded to the study. Neuromuscular monitoring was performed upon arrival in the recovery room. A CRE was defined as requiring airway support, peripheral oxygen saturation <90% and 90–93% despite receiving 3 L/min nasal O2, respiratory rate >20 breaths/min, accessory muscle usage, difficulty with swallowing or speaking, and requiring reintubation. The clinical approach of our anesthesiologists toward reversal agents was examined using an 8-question mini-survey shortly after the study.
Results: The incidence of PORC was 43% ($n = 179$) for TOFR <0.9, and 15% ($n = 61$) for TOFR <0.7. The incidence of TOFR <0.9 was significantly higher in women, in those with ASA physical status 3, and with anesthesia of short duration ($p < 0.05$). In addition, 66% ($n = 272$) of the 415 patients arriving at the recovery room had received neostigmine. A TOFR <0.9 was found in 46% ($n = 126$) of the patients receiving neostigmine.
Conclusions: When routine objective neuromuscular monitoring is not available, PORC remains a clinical problem despite the use of NMBDs. The timing and optimal antagonism of the

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neuromuscular blockade, and routine objective neuromuscular monitoring is recommended to enhance patient safety.

PALAVRAS-CHAVE
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Curarização residual;
Monitoração;
Bloqueio neuromuscular;
Eventos respiratórias agudos

Pesquisa de curarização residual no pós-operatório, eventos respiratórios agudos e abordagem de anestesiologistas

Resumo
Justificativa e objetivos: A paralisia residual após o uso de bloqueadores neuromusculares (BNMs) sem monitoração neuromuscular continua sendo um problema clínico, mesmo quando BNMs são usados. Este estudo pesquisou a curarização residual pós-operatória e os eventos respiratórios críticos em sala de recuperação, bem como a abordagem clínica da CRPO feita pelos anestesiologistas em nossa instituição.
Métodos: Este estudo observacional incluiu 415 pacientes que receberam anestesia geral com BNMs de ação intermediária. A manutenção da anestesia foi feita por anestesiologistas não participantes, ''cegos'' para o estudo. A monitoração neuromuscular foi realizada no momento da chegada à sala de recuperação. Um ERC foi definido como necessidade de suporte ventilatório; saturação periférica de oxigênio <90% e 90-93%, a despeito de receber 3 L/min de O2 via cânula nasal; frequência respiratória >20 bpm; uso de musculatura acessória; dificuldade de engolir ou falar e necessidade de reintubação. A abordagem clínica de nossos anestesiologistas, em relação aos agentes de reversão, foi avaliada usando um miniquestionário de oito perguntas logo após o estudo.
Resultados: A incidência de CRPO foi de 43% (n = 179) para a SQE <0 e 15% (n = 61) para a SQE <0,7. A incidência de SQE <0,9 foi significativamente maior em mulheres, pacientes com estado físico ASA III e com anestesia de curta duração (p < 0,05). Além disso, 66% (n = 272) dos 415 pacientes que chegam à sala de recuperação haviam recebido neostigmina. Uma SQE <0,9 foi encontrada em 46% (n = 126) dos pacientes que receberam neostigmina.
Conclusão: Quando a monitoração neuromuscular objetiva de rotina não está disponível, a CRPO continua sendo um problema clínico, a despeito do uso de BNMs. O momento e o antagonismo ideais do bloqueio neuromuscular e a monitoração neuromuscular objetiva de rotina são recomendados para aumentar a segurança do paciente.

Introduction

Neuromuscular blocking drugs (NMBDs) are used to facilitate endotracheal intubation during induction of anesthesia. Residual postoperative paralysis following the use of muscle relaxants agents, known as postoperative residual curarization (PORC), may increase postoperative pulmonary complications, morbidity and mortality.[1,2] For many years a train-of-four ratio (TOFR) of 0.7 was considered sufficient to exclude PORC; nowadays, however, to exclude clinically significant PORC it is considered that the TOFR should be $\geq$0.9.[3,4] PORC is associated with weakness of upper airway muscles, airway obstruction, impaired pharyngeal function leading to increased risk for aspiration, inadequate recovery of pulmonary function, and impaired hypoxic ventilatory response.[2,5] The incidence of PORC in the recovery room/post-anesthesia care unit (PACU) varies widely, with reported frequencies ranging from 9 to 47%.[2,6–9] Critical respiratory events (CREs) during early recovery from general anesthesia are not uncommon and their etiology is multifactorial. Anesthetic variables associated with postoperative CREs include the use of opioids and NMBDs during general anesthesia.[2,10]

This prospective observational study aimed to determine the incidence of PORC in the early recovery period, anticholinesterase application ratios and doses, adverse respiratory events of PORC, and the current approach of anesthesiologists to PORC without routine monitorization in our institution.

Materials and methods

Patients and study protocol

This prospective, observer-blinded observational study was approved by the local Ethical Committee (Clinical Trial-number 024/2010). A total of 415 patients (ASA Physical Status 1–3, aged 18–65 years) who were operated under general anesthesia using intermediate-acting muscle relaxants between April 2010 and June 2010 were enrolled in the recovery room. Exclusion criteria were patients with