Neuromuscular blockade in Clinical Practice in Paediatric Anaesthesia: Retrospective Cohort Trial in Tertiary Paediatric Anaesthesia Centre Research report: retrospective observational trial

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Background and Goal of Study: Neuromuscular blockade is associated with improved airway conditions for intubation and superior conditions for surgical interventions (predominantly important in laparoscopic surgery). Residual neuromuscular blockade (NMB) in postoperative period is, according to the recently published data, associated with the negative impact on perioperative morbidity and mortality. The primary outcome was to evaluate the frequency of neuromuscular blockade monitoring and the incidence of the active pharmacological reversal of NMB at the end of the operation. Secondary outcome was the frequency of the different muscle relaxants usage according to the age of the patients and to the duration of the surgery.

Materials and Methods: The retrospective cohort study was approved by the local Ethics Committee of the University Hospital Brno and trial was registered on www.clinicaltrials.gov (ClinicalTrials.gov Identifier: NCT03086915). All paediatric patients who underwent general anaesthesia in the Department of Paediatric Anaesthesiology and Intensive Care Medicine during the study period between 1. 1. 2016 and 1. 12. 2016 based on data derived from anaesthesiology records were screened.

The methods of descriptive statistics (incidence, mean, median) were used for study group data. Kruskal-Wallis H test was used to analyse the statistical significance by using the median values and Chi-squared test by using the average values (Table 1, 2).

Results and Discussion: Overall 8046 paediatric patients underwent general anaesthesia in the study period. Muscle relaxants were administered in 1650 cases (20.5%). The most frequently administered muscle relaxant was mivacurium (48.2 %, n=795), followed by cis-atracurium (36.4 %, n=601), suxamethonium (10.3 %, n=170) and rocuronium (7.0 %, n=115). NMB monitoring was used only in 2.5% (n=41) cases. Active NMB reversal was administered in 5.8% (n=95) cases, more frequently in older children (Table 1) and more frequently in NMB induced by rocuronium (27.8%) (Table 2).

Conclusion: Neuromuscular blockade was used only in 20.5% of paediatric patients during anaesthesia. The low rate of NMB monitoring in combination with low rate of active NMB reversal can be considered dangerous due to the relatively high risk of potential residual postoperative NMB, that can negatively influence the clinical outcome.

Table 1. Age, duration of surgery in patients with active blockade reversal and in patients without active reversal

	Neostigmine	Sugammadex	No active reversal	p value
Number of patients	68 (4.1%)	27 (1.6%)	1555 (94.2%)	-
Age (in years) average	12.8 (1-19)	13.6 (6-19)	9.8 (0-19)	p<0.001
Age (in years) median	13	14	10	p<0.001
Surgery duration (in minutes) average	84.7 (30-300)	82.3 (25-170)	87.9 (10-655)	p=0.9744
Surgery duration (in minutes) median	70	70	70	p=0.4096

Table 2. Block reversal, duration of surgery and age according to muscle relaxant

	Mivacurium	Cis-atracurium	Rocuronium	Suxamethonium	Atracurium	p value
Number of patients	795 (48.2%)	601 (36.4%)	115 (7.0 %)	170 (10.3%)	18 (1.1%)	p<0.001
Number of patients with block reversal	8 (1.0%)	53 (8.8%)	32 (27.8%)	0 (0%)	2 (11.1%)	p<0.001
Age (in years) average	10.4 (0-19)	9.8 (0-19)	11.3 (0-19)	7.2 (0-19)	12.2 (0-17)	-
Age (in years) median	11	11	12	6	13.5	-
Surgery duration (in minutes) average	69.8 (10-655)	116.1 (15-380)	94.1 (25-315)	71.6 (15-250)	65.8 (30-150)	p<0.001
Surgery duration (in minutes) median	60	105	80	60	60	p<0.001

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