Czech Society of Anaesthesiology and Intensive Care Medicine

PRACTICE PARAMETERS FOR THE SAFE AND EFFECTIVE USE OF NEUROMUSCULAR BLOCKING DRUGS IN ANAESTHESIA

I. BACKGROUND

- Muscle relaxation is a part of selected techniques of general anaesthesia (balanced anaesthesia).
- Muscle relaxation cannot substitute for insufficient depth of anaesthesia/analgesia.
- The method of monitoring the depth of neuromuscular blockade must be documented appropriately.
- Continuous observation of the vital signs of patients who underwent anaesthesia using muscle relaxants at an appropriately equipped facility is recommended.

II. SELECTION OF NEUROMUSCULAR BLOCKING DRUGS IN ANAESTHESIA

- The administration, selection and dosage of muscle relaxants during anaesthesia are based on the clinical judgement of a physician with specialization in anaesthesiology and resuscitation or a physician under the supervision of such a physician.
- Non-depolarizing muscle relaxants are preferred for endotracheal intubation in patients with low risk of aspiration and no simultaneously anticipated difficulty with securing a patent airway.
- The use of suxamethonium is recommended especially in the following situations:
  - planned endotracheal intubation in patients at risk of aspiration (rapid sequence induction technique)
  - planned endotracheal intubation in patients with anticipated difficult intubation (if apnoeic technique requiring muscle relaxation has been selected)
  - unplanned endotracheal intubation in the case of acute airway obstruction requiring muscle relaxation
- Non-depolarizing muscle relaxants with intermediate duration of action are recommended for the maintenance of neuromuscular blockade during anaesthesia.
- Long-acting non-depolarizing muscle relaxants may be used during anaesthesia if delayed extubation and/or continuous postoperative ventilation are planned.

III. NEUROMUSCULAR BLOCKADE MONITORING

- The effects of muscle relaxants may persist postoperatively and may increase the risk of postoperative complications (especially pulmonary).
- The recommended clinical signs of recovery from neuromuscular blockade include the following:
  - sustained head lift for more than 5 s
  - sustained leg lift for more than 5 s
  - sustained handgrip for more than 5 s
  - sustained tongue depressor test
  - maximum inspiration pressure of more than 50 cm H_2O
- Clinical assessment of the blockade and recovery from the muscle relaxant effect is unreliable.
- Semi-quantitative (subjective - visual or tactile) evaluation of the evoked muscle response to motor nerve stimulation using a peripheral stimulator is unreliable, however it is preferred to clinical (non-instrumental) examination.
- Quantitative (objective) evaluation of the blockade depth and recovery is recommended. In the clinical setting, an accelerometric evaluation of the response of the thenar muscles to ulnar nerve stimulation appears to be the most appropriate method at present time.

Achieving TOF-ratio above 0.9 is considered an adequate sign of recovery from the effect of non-depolarizing muscle relaxants.

- Monitoring the effects of muscle relaxants improves the surgical conditions as well as the safety of the patients.

IV. PHARMACOLOGICAL ANTAGONISATION OF NON-DEPOLARIZING NEUROMUSCULAR BLOCKADE (REVERSAL)

- The risk-benefit ratio of neuromuscular blockade reversal has to be considered in each individual clinical situation and with regard to the organization of the postoperative care.
- Residual neuromuscular blockade can be reliably detected only by the quantitative evaluation of an evoked muscle response to motor nerve stimulation with a peripheral nerve stimulator.
- The recovery from neuromuscular blockade may be enhanced by pharmacological reversal (cholinesterase inhibitor - neostigmine, administered together or in succession with an anticholinergic agent). The administration of neostigmine is appropriate once clinical signs of at least partial recovery from neuromuscular blockade are present and/or two or three muscle responses are achieved using the train-of-four (TOF) method.
- Appropriate pharmacological agents used for neuromuscular blockade reversal have to be administered at sufficient doses and their correct timing and effect have to be well established. The administration of a reversible cholinesterase inhibitor does not exclude possible recurarization.
- Antagonism of the effects of non-depolarizing neuromuscular blocking drugs of the aminosteroid group (especially rocuronium) may be achieved in adults and children of 2 years of age and older using gamacyclodextrin derivate (sugammadex). Mechanism of its action is completely different from that of neostigmine and the administration is not accompanied by side effects of cholinesterase inhibitor administration.
- Sugammadex-induced reversal is also effective in profound blockade and therefore there is no need to wait for partial recovery of neuromuscular transmission. The risk of recurarization is minimal.

Task Force Group for Practice Parameters for the safe and effective use of neuromuscular blocking drugs in anaesthesia (alphabetically): Milan Adamus (Czech Republic) , Vladimír Cerny (Canada), Karel Cvachovec (Czech Republic), Jan Hanousek (United Kingdom), Ivan Herold (Czech Republic), Pavel Sevcik (Czech Republic)

Approved by the Board of Czech Society of Anesthesiology and Intensive Care on 20.3.2010