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Case:

A 14 year old, 74 kg female with past medical history significant for Systemic Lupus Erythematosus with nephritis, sclerosing cholangitis, and recurrent biliary tract strictures presented for an interventional radiology guided cholangiogram with biliary dilation and stent placement.

General anesthesia was induced at with propofol 200 mg, fentanyl 100 mcg, and rocuronium 50 mg. The procedure ended 5 hours later, at which point the patient had demonstrated signs of recovery from rocuronium via spontaneous ventilation with tidal volumes greater than 6 ml/kg. The patient was reversed with neostigmine 2 mg and glycopyrrolate 0.4 mg because of her underlying liver and kidney disease causing decreased clearance. Additionally, the patient had developed hypothermia to 34.4 degrees Celsius at time of extubation despite the use of a forced warm air blanket, which likely also reduced rocuronium's metabolism. The patient was extubated without sequelae. Post-operatively the patient described diffuse body weakness in the setting of normal physical exam and stable vital signs. The patient was speaking cohesively and ventilating well. She had a normal motor and sensory exam. Despite the normal physical exam, this weakness led to psychological trauma for the patient. Specifically, the patient expressed concerns regarding future anesthetics.

Discussion:

- 1) Hypothermia, independent of muscle relaxant medications, decreases nerve conduction velocity. Furthermore, a reduction in 1 degree Celsius results in a 10% decrease in twitch response due to reduced myofilament sensitivity to calcium(1).
- 2) Hypothermia decreases the rate of elimination of rocuronium in a temperature dependent fashion and therefore causes an increased duration of action. Hypothermia to 30.4 degrees Celsius decreased clearance of rocuronium by 51 percent. The increased duration of action is secondary to changes in pharmacokinetics without changes in pharmacodynamics(1). Mild residual muscle paralysis, as evidenced by a train of four ratio greater than 0.7, can produce symptoms of blurred vision, ptosis, difficulty swallowing and general discomfort despite 5 second sustained head lift and adequate ventilatory mechanics(2).
- 3) Paradoxical weakness after administration of neostigmine is described secondary to increased acetylcholine leading to a block similar to a phase 2 block seen with succinylcholine. Additionally, neostigmine is a competitive antagonist of the acetylcholine receptor, which can also result in weakness. However, paradoxical weakness due to neostigmine is unlikely when administered in clinically relevant doses(2).

Conclusions:

Post-operative weakness can have multiple etiologies and can be a source of significant distress for patients

References:

- 1) Heier T, Caldwell JE. Impact of hypothermia on the response to neuromuscular blocking drugs. *Anesthesiology*. 2006;104:1070–80.
 - 2) Bevan DR, Donati F, Kopman AF. Reversal of neuromuscular blockade. *Anesthesiology* 1992; 77: 785–805
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