Sugammadex, a reversal of the neuromuscular blocker rocuronium has no effect on the depth of anaesthesia

Neuromuscular blockers are drugs given during general anaesthesia to facilitate the anaesthetists' and surgeons manoeuvres, like relaxation of the vocal cords and relaxation of the abdominal muscles. These drugs do not spare the respiratory muscles impairing so normal breathing. At the end of surgery the paralyzing effect of these neuromuscular blockers must be reversed as the anaesthesiologist and the surgeon have accomplished their jobs. This reversal is of vital importance for normal breathing as the respiratory muscles will resume their normal function.

So far the commonest drug used to reverse the neuromuscular block and thus the muscle relaxation was neostigmine. However, neostigmine is associated with a variety of side effects, like bradycardia with potential to asystole, bronchospasm, salivation, rupture of an intestinal anastomosis or leakage of the intestinal contents. When neostigmine is given intravenously it must be always co-administered with atropine to counteract some side effects.

Sugammadex is a relatively new drug capable to reverse the action of the neuromuscular blockers rocuronium and vecuronium. Its action is different from the mechanism of action of neostigmine as it encapsulates the neuromuscular blocker in the blood.

Several studies reported that when sugammadex is given to reverse the relaxation of the muscles it also speeds up the waking of the patient from general anaesthesia, in other words that this drug reverses general anesthesia as well. However it is almost impossible to distinguish between reversal of anaesthesia and reversal of muscle relaxation as sugammadex primarily was given to reverse neuromuscular block.

Studies suggesting that sugammadex can reverse general anaesthesia were based on the events of reversing the effect of rocuronium at the end of surgery, thus reversing the muscle paralysis at the same time.The present study isolated the effect of the sugammadex on the depth of anaesthesia as we gave a neuromuscular blocker which is not reversed by sugammadex and which is called cis-atracurium (Nimbex).

In patients anaesthetised for abdominal procedures and paralysed by cis-atracurium we administered intraoperatively in a randomised manner sugammadex in doses 2, 4 or 16 mg per kg body weight, thus the doses recommended by literature to reverse moderate, deep and profound paralysis. In each patient we monitored the degree of neuromuscular paralysis and we administered one of the three doses according to the degree of the paralysis and as indicated by the randomization procedure. Entropy and Bispectral Index (monitors measuring the depth of anaesthesia), arterial blood pressure, heart rate, oxygenation, carbon dioxide expired and anaesthetic expired concentrations were monitored and recorded every three minutes during surgery and until neuromuscular paralysis was partially recovered.

The entropy and bispectral Index, both indicating the depth of anaesthesia on a -100 scale with 0 representing no Electoencephalogram activity and 98-100 full wakefulness, were not affected by sugammadex by the three doses of sugammadex studied. We also found no effect of sugammadex on the arterial blood pressure, heart rate, oxygenation or expired carbon dioxide, which change with the depth of anaesthesia.

Eliminating the effect of reversal of neuromuscular paralysis on the depth of anaesthesia by administering a neuromuscular blocker not reversed by sugammadex we managed to demonstrate that sugammadex in all the three (high, moderate and low) doses clinically recommended does not change the depth of anaesthesia.

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Publication

Sugammadex at both high and low doses does not affect the depth of anesthesia or hemodynamics: a randomized double blind trial.
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