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Sugammadex: routine use vs restrictive use

Worldwide, the use of sugammadex for the reversal of neuromuscular blocking agents worldwide is restricted. This article reflects on how more liberal use of sugammadex might alter patient experience, anaesthetic delivery and surgical techniques.

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Historically, the only pharmacological option for reversal of muscle relaxation has been neostigmine (combined with glycopyrrolate), acting as an anticholinesterase. The development of sugammadex offers a viable alternative. Although globally available, use of this drug is potentially restricted because of its cost (O'Reilly-Shah et al, 2017). Given its clinical merits, there could be an argument for using sugammadex as the standard reversal agent for all cases following the administration of rocuronium.

Suggamadex should be routinely used

Sugammadex acts by encapsulating the rocuronium molecule, rendering it inactive. As long as adequate doses of sugammadex are administered, reversal of rocuronium is possible at any point after induction. This differs from neostigmine, where reversal is only possible once a significant proportion of the neuromuscular blocking agent has been metabolised and the patient has reached a certain point on the cholinergic recovery curve. Measurement of train of four ≥0.9 offers a reliable objective method for determining return of neuromuscular function and safe timing of exubation (Brull and Kopman, 2017). When spontaneous recovery from neuromuscular blockade has occurred, administration of neostigmine may cause paradoxical muscle weakness.

Incomplete reversal is a deeply distressing experience for any patient, but can be disastrous in patients with reduced respiratory reserve, such as those with sleep apnoea, morbid obesity, chronic obstruction pulmonary disease or myopathies. Residual neuromuscular blockade is seen in recovery with neostigmine (25–85% of patients) more frequently than sugammadex (5–10%) (Brull and Kopman, 2017; Honing et al, 2019).

Adverse effects of neostigmine stem from its pro-cholinergic effects and include nausea, vomiting, increased salivation, bronchoconstriction, bradycardia, agitation and other arrhythmias. These potentially life-threatening side effects are only partly mitigated by the coadministration of glycopyrrolate. In comparison, reported adverse effects of sugammadex have been less common but may include cardiac arrhythmia, QT prolongation, hypotension and anaphylaxis (Honing et al, 2019).

A systematic review by Bruintjes et al (2017) suggests that there may be advantages to a lower pressure pneumoperitoneum facilitated by deeper muscle relaxation. Thus, there are potential surgical advantages of sugammadex, as it allows anaesthetists to provide deeper muscle relaxation in the knowledge that patients can still be reliably reversed at the end of surgery, regardless of duration.

Suggamadex should not be routinely used

Despite the many advantages of sugammadex, there are still limitations to its use. It cannot be used to reverse other classes of muscle relaxants, such as the benzylisoquinolinium derivative atracurium.

After administration of sugammadex, the newly formed encapsulated sugammadex–rocuronium complex is excreted unchanged in the urine. The use of sugammadex is relatively contraindicated in patients with end-stage renal failure (creatinine clearance <30 ml/min) because of concerns that the sugammadex–rocuronium complex may accumulate and dissociate, leading to a secondary muscular blockade (Panhuizen et al, 2015). For patients

returning to theatres within the first 4 hours of sugammadex being given, careful dosing (1.2 mg/kg) is required because of persistent unbound sugammadex left in the circulation (Honing et al, 2019).

Given the increased availability of sugammadex, rocuronium is now considered a plausible alternative to suxamethonium for rapid sequence induction. More liberal use of sugammadex might lead to preferential use of rocuronium in all circumstances requiring neuromuscular blockade (which may have its own disadvantages).

Ultimately, the biggest argument against the routine use of sugammadex is its cost, which is currently approximately £59 per 200 mg vial (compared to standard reversal which only costs £1.50 per vial). However, this fails to take into account potential savings such as reduction of postoperative nausea and vomiting (which in turns reduces hospital admissions), improved theatre use and list turnover. Studies to date that have attempted to analyse this cost benefit have, unfortunately, been unsuccessful (Paton et al, 2010).

Conclusions

The NHS operates within a finite resource structure with increasing pressures on funding in recent years. With an overspend of over £4.3 billion last year, the cost vs benefit dichotomy will continue to factor in decisions regarding treatment options. Ultimately, the key focus must be patient safety. Sugammadex is still a relatively new drug, and the full extent of its potential role in clinical practice is still being explored.

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