Cost containment and muscle relaxants: Why we should not return to long-acting drugs

Key words: Cost containment, neuromuscular relaxants, pharmacoeconomics, residual neuromuscular block.

Given the current economic climate in healthcare, cost containment has become the newest buzzword in the literature and on the lecture circuit. Cost cutting simply must be done.

One of the easiest ways to show reduction in costs is to decrease the dollar amount spent on pharmaceutical supplies by the anesthesia department. Those methods of cost cutting which look at the bottom line expenditures by separate departments can easily overlook the total picture. The costs of treating postoperative muscle weakness, even on an infrequent basis, can quickly outweigh the savings of drug acquisition. In addition to the economic costs, those patients who experience prolonged muscle relaxation or recurarization will also experience the very real personal cost of additional ventilator or other support.

The interest of the public in this debate is significant. This article is offered by the Council for Public Interest in Anesthesia for consideration and dialogue among anesthesia providers.

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In the early 1980s, there was a revolution in the clinical use of neuromuscular blocking drugs (muscle relaxants) when vecuronium and atracurium were released. These two drugs had an intermediate duration of action, in contrast to the earlier drugs which all had a long duration. As a consequence of the widespread use of vecuronium and atracurium, the incidence of muscle weakness persisting into the postanesthesia care unit (PACU) was significantly reduced,¹ and the phenomenon of recurarization virtually disappeared. Unfortunately, there is now pressure to turn back the clock and revert to the widespread use of long-acting muscle relaxants, particularly pancuronium.

Why even consider using long-acting relaxants?

This movement to return to long-acting muscle relaxants masquerades under the guise of cost containment because, looked at simply in terms of acquisition costs, pancuronium is 10-20 times cheaper than vecuronium. However, merely comparing acquisition costs of drugs is a naive form of...
cost-benefit analysis and fails to take account of the impact muscle relaxants have on overall healthcare costs. Compared to drugs with an intermediate duration of action (vecuronium, atracurium, rocuronium), long-acting muscle relaxants are associated with the complication of postoperative muscle weakness, which is very expensive in terms of overall healthcare costs.

The problem with long-acting muscle relaxants!

In 1979, a landmark study identified that a large proportion of patients had significant muscle weakness in the PACU. In that study, 42% of patients had a train-of-four ratio of less than 0.7 and 24% could not sustain a head lift for 5 seconds. A later study clearly showed that the factor most likely to be associated with residual weakness in the PACU was the use of a long-acting muscle relaxant. Residual weakness occurred in 36% of patients after the use of pancuronium even when its administration was guided by the use of a nerve stimulator. In contrast, residual weakness occurred in less than 10% of patients who received vecuronium or atracurium. This intrinsic risk of persistent weakness with long-acting muscle relaxants is due to the fact that their neuromuscular effects are more difficult to reverse than those of the intermediate-acting drugs. With long-acting muscle relaxants, reversal will often be inadequate even 20 minutes after neostigmine administration.

The costs of residual weakness

Ensuring adequate reversal of neuromuscular block is vital for patient safety, because even a small degree of residual block can significantly impair function of the muscles responsible for maintenance of a patent airway or decrease the ventilatory response to hypoxia. Therefore, the use of pancuronium in place of intermediate-acting muscle relaxants will result in delayed recovery of adequate neuromuscular function and this has several costly sequela. There may be delay in the operating room while the clinician waits to extubate the patient's trachea, or the clinician may have to remain in the PACU caring for a patient who cannot maintain a patent airway (delaying the next operation), or in a worse case scenario, the patient's trachea may have to be reintubated because of inadequate ventilation or pulmonary aspiration.

By increasing the time the patient spends in the operating room, delaying the start of subsequent surgeries, or causing a significant complication, the use of long-acting muscle relaxants is likely to actually increase overall healthcare costs. Thus, any cost-benefit analysis of intermediate versus long-acting muscle relaxants must take into account the cost of the complications inherent in the use of long-acting muscle relaxants.

A place for long-acting relaxants?

A pharmacoeconomic (i.e., what impact medical therapies have on overall healthcare costs) analysis of muscle relaxant use will favor retaining intermediate-acting drugs for most clinical situations. Long-acting drugs will continue to be appropriate for use where tracheal extubation will not be attempted at the end of surgery (e.g., patients postcardiopulmonary bypass who are transferred directly to an intensive care unit).

Another appropriate use of long-acting muscle relaxants is where muscle paralysis does not have to be maintained until the end of the surgical procedure. If long-acting relaxant administration is stopped well before the end of the procedure and there are clearly 3 or 4 train-of-four responses before reversal with neostigmine is attempted, rapid recovery should ensue and residual paralysis is unlikely.

Conclusion

The clinical use of intermediate-acting relaxants has increased patient safety and decreased the costs associated with persistent postoperative weakness. Cost containment should focus on how intermediate-acting drugs can be used most efficiently (e.g., reduced wastage) and not on how they can be replaced by older, less safe, long-acting drugs.

REFERENCES


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