QUANTITATIVE NEUROMUSCULAR MONITORING MAY HELP REDUCE THE INCIDENCE AND SEVERITY OF RESIDUAL NEUROMUSCULAR BLOCK¹

POST-OPERATIVE RESIDUAL PARALYSIS (RP) IS UNDER RECOGNISED^{2,5,6}.

VISUAL OR TACTILE ASSESSMENTS OF NEUROMUSCULAR FUNCTION ARE NOT RELIABLE ENOUGH^{1,2}.



Adequate recovery from neuromuscular block = return of train-of-four ratio (TOFR) to >0.9^{1,2}

40-83 % of cases don't reach this TOFR threshold and initial recovery is insufficient¹.

Possible consequences of RP:

Increased post-operative complications, mortality and morbidity

Increased length of hospital stay



Risk of critical respiratory events in post-anaesthesia care

Reintubation

Qualitative, subjective and dependent on the anaesthetist.

Sufficient minute

ventilation of an

intubated patient



Residual block of TOFR >0.4 can't be reliably detected, even by an experienced **`10.4** anaesthetist³.

Frequently misinterpreted as adequate recovery²:



Normal tidal volume possible with TOFR < 0.1^{1,2}.

Patients can lift the head and hold a firm handshake for five seconds with $TOFR = 0.33^{2}$.

Normal vital capacity possible with TOFR = 0.6².

PTC

QUANTITATIVE MONITORING IS NECESSARY TO ACCURATELY ASSESS NEUROMUSCULAR BLOCK.

- One of the only suitable methods to identify low but clinically meaningful levels of residual neuromuscular block.
- One of the only suitable methods to guide optimal dose and timing of reversal agents.
- Strongly recommended by the FSA, IC SFAR and APSF.
- Electromyography (EMG) is considered a gold standard for measuring neuromuscular function due to its high correlation with MMG¹.
- EMG devices offer advantages over other categories of monitoring devices¹.
- EMG captures the very clean first electric signal available directly at the neuromuscular junction.



Specifically, two main stimulation modes are used for different phases of block: TOF and PTC.

Single

тоғ% 25	Count 4		
	0 💻 🔤 20 s		

TOFC = number of elicited contractions



TW Used if there is no response to TOF or a single twitch

Count

(eg. in profound non-depolarising block)

Tetanic stimulation is a continuous stimulation of

TOF%

second intervals. The response is measured after each stimulus, and the ratio of the fourth to the first response of the TOF sequence is calculated, resulting in TOF%.

five seconds. After tetanic stimulation, single twitch stimulations are generated. The number of detected responses is counted and expressed as PTC. The fewer the responses, the deeper the relaxation.

QUANTITATIVE NEUROMUSCULAR MONITORING GIVES A RATIONAL BASIS FOR REVERSAL AGENT AND DOSE DECISIONS^{2,4}.

 At TOFR < 0.9, residual neuromuscular block is present and needs to be treated, either by waiting or by giving the patient a reversal drug such as neostigmine or sugammadex.

Count

 Dose, timing and choice of reversal drug are crucial for achieving complete neuromuscular recovery and minimising side effects.

Depth of block	Quantitative measurement	Neostigmine (µg/kg)	Sugammadex (mg/kg)
Complete block	PTC = 0	Not effective	16
Deep block	PTC ≥1	Not effective	4
Moderate block	TOFC = 1-3	Not effective	2
Shallow block	TOFC = 4 TOFR <0.2	50-70	1*-2
Shallow/minimal block	TOFR: 0.2-0.5	40	0.75*-2
Minimal block	TOFR: 0.5-0.7	20	0.25*-2
Minimal block	TOFR: 0.7-0.9	10	

*These doses have been determined in dose-finding studies, and have not been tested in comparative clinical trials. They are not recommended by the manufacturer. Please note that the use of low-dose sugammadex has been questioned, since elderly patients are at greater risk for recurarisation and residual muscle paralysis when low-dose sugammadex is administered.

OUTCOMES



Ø **OPTIMAL DOSE AND INJECTION** TIME OF REVERSAL AGENT¹

 \bigcirc **ENHANCED PATIENT EXPERIENCE⁶**

COST-EFFECTIVE PATIENT THROUGHPUT²

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