Double burst stimulation_{2,3} at submaximal current

We investigated whether double burst stimulation_{2,3} (DBS_{2,3})¹ at submaximal current was useful to diagnose level of recovery from neuromuscular block. At varying degrees of vecuronium neuromuscular block, fade or waxing (the feeling that the muscular contraction in response to the second burst was stronger than that to the first) in response to DBS_{2,3} delivered at 50, 30, or 20 mA was determined in 120 adult patients. Discomfort associated with the DBS_{2,3} applied at 50, 30, or 20 mA was examined using 10 cm-visual analog scale (VAS) in 15 awake volunteers.

When TOF ratios were 0.31–0.40, 0.41–0.50, 0.51–0.60, 0.61–0.70, 0.71–0.80, and 0.81–1.00, the probabilities of detection of fade were 91, 70, 50, 16, 10, and 0% at a stimulating current of 50 mA; 84, 61, 33, 13, 0, and 0% at 30 mA; 97, 71, 38, 9, 3, and 0% at 20 mA. When TOF ratios were 0.61–0.70, 0.71–0.80, 0.81–0.90, and 0.91–1.00, the probabilities of detection of waxing were 19, 51, 84, and 98% at 50 mA; 11, 54, 68, and 93% at 30 mA; 9, 59, 63, and 96% at 20 mA. The probabilities of detection of fade or waxing did not differ at 50, 30, and 20 mA. The VAS associated with the DBS_{2,3} delivered at 50, 30, and 20 mA were 8.7 ± 1.7 , 6.8 ± 3.6 , and 4.3 ± 2.2 (mean $\pm$ SD, $P < 0.001$ among 50, 30, and 20 mA). (See Figure below.)

FIGURE Stimulating pattern for double burst stimulation_{2,3}.

Using DBS_{2,3} at submaximal current the depth of residual neuromuscular block can be evaluated with less discomfort than at supramaximal current. Adequate neuromuscular recovery occurs when the waxing in response to submaximal DBS_{2,3} is felt.

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Neuromuscular monitoring in paediatric intensive care patients

It seems sensible to monitor neuromuscular blockade with an apparatus that can measure the train of four (TOF) response, if only to focus the minds of clinicians on the therapy being used. In practice, the TOF response is usually observed at the thumb, by stimulating the ulnar nerve. The problem is that the response of the adductor pollicis does not reflect the degree of paralysis of other muscles. The muscles of the diaphragm, the orbicularis oris and the larynx have a different response to muscle relaxants than does the adductor pollicis. Therefore, a child could be coughing or bucking the ventilator while the TOF response at the adductor pollicis still shows full paralysis.

We demonstrated that in 25% of paediatric patients, there was definite movement while the TOF still showed 0–1 twitches and the observation was repeated in a subsequent study.¹ In my opinion, clinical monitoring provides adequate and pertinent information. If possible, drugs should be administered as boluses rather than infusions to allow a ‘drug holiday’ and prevent infusions for going on unchecked for days.

If formal comparisons are made between the adductor pollicis and other untested muscles, it is conceivable that we will find that the thumb TOF, which is the gold standard of neuromuscular blockade monitoring, to be irrelevant!

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