RAPID ONSET OF SUXAMETHONIUM BLOCK

Sir,—Suxamethonium is used widely for "crash" induction of anaesthesia because of its rapid onset of action. In contrast, non-depolarizing neuromuscular blocking drugs have a relatively slow onset.

The present report supports the hypothesis of Feldman, Fauvel and Harrop-Griffiths, who postulated that the rapid onset of suxamethonium block may be secondary to its depolarizing nature [1]. Pretreatment with a non-depolarizing agent such as vecuronium may change the nature of suxamethonium block, and slow its onset.

In five adult patients, anaesthesia was induced with ketamine \(2 \text{ mg kg}^{-1}\). Suxamethonium 100 mg produced complete neuromuscular block after 60-90 s, and showed 75% recovery in 5-10 min. The block was depolarizing in nature, as indicated by a \(T_4:T_1\) ratio > 0.85. When the same dose of suxamethonium was injected after establishment of a 25-50% block by vecuronium, complete block was achieved after 120-180 s, and 75% recovery occurred after 3-5 min; the block showed a \(T_4:T_1\) ratio < 0.3 (fig. 1).

The results suggest that vecuronium may not only compete with suxamethonium for the endplate cholinergic receptors, but may also change the nature of its block from pure depolarizing into mixed or even non-depolarizing. This may explain the slow onset of block observed when suxamethonium was administered after vecuronium.

The concept of the margin of safety of neuromuscular transmission [2] may explain the different onsets of depolarizing compared with non-depolarizing block. Waud and Waud demonstrated that the twitch response is not reduced unless more than 70% of receptors are occupied by a non-depolarizing neuromuscular block, and the twitch is eliminated completely when 90% of receptors are occupied [3]. It is possible, therefore, that suxamethonium can produce depolarizing neuromuscular block when only 10-30% of endplate receptors are occupied.

Our results suggest that the difference in onset times between depolarizing and non-depolarizing blockers may be attributed to the different proportions of endplate receptors that need to be occupied in order to achieve neuromuscular block. Thus the rapid onset of suxamethonium block may be attributed to its depolarizing nature. Also, suxamethonium is hydrolysed rapidly by plasma cholinesterase and an overdose is usually used, which speeds the onset of block further without marked prolongation of its duration. This may explain our repeated failure to discover a new non-depolarizing neuromuscular blocking drug which can achieve the rapid onset of suxamethonium block.

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REFERENCES


MEASUREMENT OF TRANSTHORACIC ELECTRICAL IMPEDANCE

Sir,—A paper comparing the use of Ringer's acetate with 3% Dextran 70 for volume loading before Caesarean section appeared recently in *British Journal of Anaesthesia* [1]. One of the methods described in this paper was the estimation of extravascular lung water by the use of transthoracic electrical impedance (TEI) (also termed thoracic fluid index by the makers of the BoMed NC303 used in this study). The authors were correct to stress that TEI is affected by both intra- and extravascular fluid. However, it must be remembered that the paper which they quoted showing a correlation between double dye-dilution and TEI estimation of lung water was carried out in an animal model in which the intravascular volume remained constant [2].

We wish to draw attention to one other factor which affects TEI and which differed significantly between the two groups of patients studied, namely the PCV. Increases in PCV result in an increase in the resistivity of blood [3] and this influence of PCV on TEI has been demonstrated in animal models [4]. Recently, we have investigated this relationship in humans, comparing a group of patients with polycythaemia rubra vera...