Sir,—Drs Clarke and Mirakhur’s letter addresses the two messages which we hoped our paper would convey to your readers.

First, as the correspondents rightly stated, this study was conceived and designed in order to test the hypothesis that vecuronium relaxes the respiratory (and, by inference, the laryngeal) muscle before the peripheral muscles. Intubation should consequently be possible when the peripheral muscles are still partially paralysed and the time to intubation would then be relatively short. This suggestion was put forward by Agoston and colleagues (1980) and later echoed by Krieg and co-workers (1980). Mirakhur and associates (1983) stated “that intubation could be carried out before the onset of complete neuromuscular block”. This was, however, said in the context of the above-mentioned hypothesis and seemed to us to be providing supportive evidence for it. Clarke and Mirakhur (1983) later stated that the “intubating conditions when studied in a clinical sequence after thiopentone cannot be related closely to the onset of neuromuscular block”. This statement points to the lack of correlation between peripheral neuromuscular block and intubating conditions. Which comes first is the important consideration. Indeed, in the same paper, Clarke and Mirakhur had noted earlier: “it was notable that in most patients tracheal intubating conditions were excellent well before the last twitch in the train-of-four was lost”.

Second, we felt that the popular mode of assessing the intubating conditions provided by a neuromuscular blocker was inadequate in that it does not provide the practising anaesthetist with some of the most crucial information on the ability of a neuromuscular blocker to provide good clinical intubating conditions.

The information that most intubation studies provide is that, under an “average” type of anaesthesia – usually a deeper form of anaesthesia than minimal anaesthesia – a myoneural blocker will produce “excellent” intubating conditions, in a certain percentage of patients, with a given dose, at some minutes after its injection. This information is inadequate to the anaesthetist with some of the most crucial information on the ability of a neuromuscular blocker to provide good clinical intubating conditions.

The excellence of the intubating conditions is based on a complex score that is subjective and seems to mean different things to different people. The anaesthetist is thus not sure of the excellence of the intubating conditions that he should expect. Knowing only that a percentage of the patients will not react to tracheal intubation is of no use when faced with a perforating eye injury. The patient must not react to intubation.

These problems can be overcome by studies under light anaesthesia, simplifying the intubation score (taking as an end-point no reaction at all to intubation), and by noticing the doses as well as time after injection which produce no reaction in all patients. It is evident from most studies, once a certain dose is exceeded, that excellent conditions will be attained if the time to intubation is long enough.

This is what we called the Time to Optimal Intubation (TOI). It is certainly not possible to predict such a time interval in any one patient; this value can be achieved in large enough groups of patients by increasing the dose and the time to intubation in steps of, say, 30 s. The correspondents would have achieved this if, in their investigations, they had kept on increasing the dose of vecuronium and intubated the patients at ever longer intervals after injection of each dose of vecuronium. This method of assessment, besides being more simple and applicable to the most exigent clinical situation, will also do away with the cumbersome expression of an intubation score in terms of mean ± SD.

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tomic and clonic response were very similar to that produced after administration of suxamethonium 30 mg. The effect of the neuromuscular blocking drug was then immediately and completely antagonized with neostigmine 2.5 mg and atropine 0.6 mg.

Others in a similar situation may find this technique useful.

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USE OF VECURONIUM IN CARCINOID SYNDROME

Sir,—Anaesthesia for two patients with carcinoid syndrome is described, including the management of a patient in whom emergency surgery was required.

A 55-year-old woman presented for laparotomy with a gastrointestinal carcinoid tumour and multiple liver metastases. Oral premedication consisted of diazepam 5 mg and promethazine 25 mg, and anaesthesia was induced with fentanyl 100 μg, etomidate 15 mg (and pancuronium 6 mg). Intubation produced no adverse cardiovascular effects, but slight expiratory wheezing developed which persisted throughout the operation. Anaesthesia was maintained with 66% nitrous oxide in oxygen with increments of fentanyl 50 μg and vecuronium 2 mg. Hemicolectomy, hepatic dearterialization and portal vein cannulation were performed. Glycopyrrolate 0.6 mg and neostigmine 2.5 mg produced prompt and complete recovery from neuromuscular blockade, verified by the use of a nerve stimulator. The patient made an uneventful recovery, and was discharged from hospital 2 weeks later.

A 63-year-old lady presented with acute bowel obstruction caused by an ovarian carcinoid tumour. Hepatic dearterialization and portal vein cannulation had been performed on a previous occasion. She was rehydrated and premedicated with diazepam 5 mg and promethazine 20 mg by mouth. After preoxygenation, anaesthesia was induced with etomidate 15 mg, suxamethonium 75 mg was administered and the trachea intubated. Cricoid pressure was performed. After a few minutes the patient became flushed, but there was no bronchospasm and the arterial pressure and heart rate remained at their preoperative values. Ventilation was continued by hand using a mixture of 66% nitrous oxide in oxygen, and the flushing decreased over the next few minutes. Anaesthesia was maintained with fentanyl 100 μg, vecuronium 6 mg and the same gas mixture. Heart rate and arterial pressure remained stable, except during manipulation of the tumour when the arterial pressure increased briefly. One increment of fentanyl 50 μg and vecuronium 2 mg was needed. Surgery lasted 1 h and revealed widespread inoperable tumour. Reversal of neuromuscular blockade, using glycopyrrolate 0.6 mg and neostigmine 2.5 mg, was confirmed using a nerve stimulator. The patient recovered well from anaesthesia and surgery, but her condition gradually deteriorated, and she died 10 days later.

In 1976, Mason and Steane reviewed the problems of anaesthesia for patients with secreting carcinoid tumours and stressed the importance of reporting anaesthetic management, the choice of neuromuscular blocking drugs requiring careful consideration in such patients.

The use of suxamethonium is hazardous, as the fasciculations increase intra-abdominal pressure and release tumour hor- mones (Déry, 1971; Mason and Steane, 1976). Protection of the airway was the primary concern during induction of anaesthesia in the patient with bowel obstruction. The severe flushing which occurred after intubation was attributed to release of tumour mediators. Pretreatment with a small dose of a competitive neuromuscular blocker to reduce fasciculations may have been useful.

The patient for elective surgery was starved, therefore a non-depolarizing neuromuscular blocker could be given at induction. The ganglion-blocking and histamine-releasing properties of tubocurarine are undesirable (Sniper, 1952). It has been suggested that pancuronium is the drug of choice (Mason and Steane, 1976), and it was therefore used for the first patient, but it can cause tachycardia, hypertension and histamine release (Kelman and Kennedy, 1971; Bodman, 1978). In view of this, the newer neuromuscular blocking agents were considered. Atracurium has a novel mode of elimination and less cumulation, but it can also cause histamine release (Basta et al., 1982), and may be unsuitable for patients with carcinoid syndrome. Vecuronium lacks histamine-releasing properties (Basta et al., 1983), is relatively free from cardiovascular effects and is antagonized readily (Fahey et al., 1981). As the first patient’s condition was stable when a supplementary dose of relaxant was needed, vecuronium 2 mg was given. Good relaxation was produced, with no adverse effects, and reversal at the end of the procedure was prompt and complete. It was therefore chosen for the second patient again with no adverse effects and prompt reversal. Perhaps the properties of vecuronium make it the drug of choice in these cases.

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REFERENCES


HYPOGLYCAEMIA IN CHILDREN UNDERGOING OUTPATIENT PROCEDURES

Sir,—Dr Padfield (1984) in his study of blood glucose concentrations in children undergoing dental procedures concludes "that the young dental outpatient over the age of four years is not at risk from hypoglycaemia during anaesthesia."