WAKEFULNESS AND GENERAL ANAESTHESIA

Sir,—The suggestion that the isolated forearm technique (Tunstall, 1977) is impracticable during general surgical procedures and less sensitive than clinical signs in the detection of light planes of anaesthesia (Breckenridge and Aitkenhead, 1981) deserves further comment.

There are several areas of doubt in the technique described by Breckenridge and Aitkenhead. First the minor problem of semantics: any procedure relying on a patient’s memory after surgery will detect awareness, but by definition will not detect wakefulness (Tunstall, 1977). The second more serious problem is the complexity of their command. We know very little of mental processes under light anaesthesia and it is quite possible that the original instructions had been forgotten by the time the electronic signal was presented. Also it is accepted widely that patients will be aroused by a meaningful stimulus such as their name more frequently than by a non-meaningful stimulus. Thus it is equally possible that the electronic stimulus was not heard.

A simple command to squeeze with a particular hand is sufficient, although admittedly it lacks the stimulus–response relationship on the recording paper. My third point is to draw attention to the contradictions between their conclusions and findings. They found surgery impossible because of purposeful movement of the isolated arm, yet concluded that the isolated arm provided a less sensitive index than clinical signs. Presumably the clinical signs suggested adequate anaesthesia before surgery commenced. However, because the arm moved purposefully, surgery stopped.

Surely this is a valuable sign of inadequate anaesthesia, and to release the tourniquet (thus paralysing the arm) to allow surgery to proceed without deepening anaesthesia is a questionable decision. The subsequent continuous surgical stimulation could cause sufficient arousal for the patient to become wakeful, but there may be no means of detecting this. After four years’ experience of the technique in general surgery I have not yet resorted to deflating the tourniquet for this reason since a small dose of induction agent combined with an increased halothane concentration or increment of analgesic will suffice. Unfortunately a further dose of relaxant seems to be the treatment of choice for patients who move during surgery. Even when it is demonstrated that the patient can obey commands many trainees would still administer a muscle relaxant “to stop the patient moving”. This response is evidently something they have been taught since they show great reluctance to deepen anaesthesia.

When tracheal intubation is performed with the aid of suxamethonium an assessment of consciousness should be made before injecting the non-depolarizing agent, especially if the isolated arm technique is not to be used. I could not agree more with Wilson (1981) when he encourages readers to give the technique a fair trial, since there is an abundance of evidence that clinical signs of anaesthesia cannot be relied upon to detect awareness or wakefulness.

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REFERENCES


MAGILL INTUBATING FORCEPS

Sir,—About a year ago I had a pair of Magill intubating forceps made with blades 5 cm longer than the standard adult pattern. When used with the large Magill laryngoscope blade they can reach into the upper end of the oesophagus, and have solved the problem of introducing a nasogastric tube, oesophageal stethoscope, or the tail of a Celestin tube.

We were so pleased with this modification that we asked for six more pairs to be ordered. Our excellent hospital Supplies Officer carefully provided Area Staff with all the necessary information, specifying particularly the original manufacturer, who understood exactly what was required. The Area Supplies Department, however, obtained a cheaper quotation elsewhere.

Magill forceps with elongated blades can be obtained from Seward Surgical, UAC House, Blackfriars Road, London SE1 9UG; a limited number of Magill forceps with elongated handles are available from the Enfield and Haringey Area Supplies Department.

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MORPHINE AND THE EXTRADURAL SPACE

Sir,—Information on the adverse effects of morphine on the extradural space is still sparse: we treated a 59-yr-old man with intractable tenesmus for 6 months using extradural morphine 4–6 mg two or three times daily. The patient had had radiotherapy, and had undergone cystectomy with uro-ileo–cutaneostomy.

The autopsy showed tumour masses and fibrosis in the pelvis and widespread metastases. Slight oedema and brown discoloration of the dura mater and the extradural space were seen at the location of the catheter tip, but there were no adhesions nor signs of infection.

Microscopy showed a normal dura mater. At the tip of the catheter, the extradural space consisted of vascular and hyperaemic connective tissue with a few lipophages, clefts caused by cholesterol crystals, multinuclear giant cells of foreign body type, scattered macrophages containing haemosiderin and small accumulations of lymphocytes and plasma cells.

Histological examination of various levels of the injection track showed no oedema, haemorrhage or granulomatous reaction. Bacteria and fungi were not seen. It was concluded that these were slight reactive changes, probably resulting from haemorrhage.

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RESISTANCE TO PANCRURONIUM AND HÄMOCENTRIFICATION

Sir,—Schuh (1981) has shown that the potency of neuromuscular blocking drugs is increased following normovolaemic haemodilution. This has been attributed to a decrease in blood viscosity and peripheral resistance which increases the regional blood flow, particularly to skeletal muscle, resulting in a more rapid initial uptake of the neuromuscular blocking drugs. Also, a decrease in serum protein concentration may be followed by a decreased protein binding capacity leading to a higher concentration of unbound free and pharmacologically active neuromuscular blocking drugs.
In contrast, haemoconcentration may produce resistance to neuromuscular blocking drugs as observed in two children with congenital cyanotic heart disease (Fallot tetralogy; transposition of great vessels with VSD). In both children before operation, $P_aO_2$ was 30 mmHg, Hct was 70 and plasma protein concentrations were within the normal range. Anaesthesia was induced with ketamine $2 \text{mgkg}^{-1}$, followed by pancuronium. Optimal relaxation necessary for tracheal intubation was only achieved with pancuronium $0.35 \text{mgkg}^{-1}$ in the patient with Fallot tetralogy and $0.40 \text{mgkg}^{-1}$ in the patient with transposition. These doses are about three or four times the usual doses.

Such resistance to pancuronium cannot be explained by the right-to-left intracardiac shunt, which can slow the rate of uptake of inhalation anaesthetics (Eger, 1974). Conversely, drugs administered i.v. will reach the systemic circulation rapidly via the shunt without traversing the lung. The unexpected resistance to i.v. pancuronium may be attributed to the excessive haemoconcentration associated with the cyanotic heart diseases. Haemoconcentration will produce a mirror-image effect of haemodilution. It increases the viscosity and peripheral resistance, resulting in a decrease of regional blood flow to muscles. It is also possible that pancuronium and perhaps other neuromuscular blocking drugs are directly bound to the structural stroma that envelops the RBCs, or to the anionic sites of the stroma-bound acetylcholinesterase enzyme. Increased binding to the high RBC mass can lead to a lower concentration of the unbound free drug. It may be concluded that smaller doses of neuromuscular blocking drugs are required in patients having normovolaemic haemodilution, while larger doses are needed with haemoconcentration.

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REFERENCES
Baltimore, Maryland: The Williams and Williams Company.

POSTERIOR FOSSA SURGERY
Sir,—Dr Walters and Mr Torrens (1982) have drawn attention once again to the well documented hazards of the sitting position and state that the prone or semi-prone positions provide satisfactory operating conditions for infratentorial and cervical surgery. However, in support of their case for abandoning the sitting position they have quoted inaccurately from reference sources to give a misleading impression concerning the frequency and mortality of venous air embolism. Ericsson, Gottlieb and Sweet (1964) considered reports of 93 patients who presented with profound cardiovascular collapse or a precordial mill-wheel murmur, or both; 40 of these patients received no treatment at all and the mortality was 73%. In their own series of seven patients, five received closed-chest cardiac massage and resuscitation was successful; the mortality was 28%. These authors emphasized the importance of early detection at a time before the routine use of intra-arterial pressure measurement or the detection of small volumes of air by Doppler ultrasound or end-tidal carbon dioxide monitoring. Michenfelder, Miller and Gronert (1972), using a Doppler device, detected emboli in 20 of 69 patients in only one of whom were there clinical signs. In two further patients clinical signs of embolism developed without positive Doppler activation; the overall frequency was therefore 32% and not 93% as suggested by Dr Walters and Mr Torrens. There were no deaths in this series.

In my own practice a major air embolism has occurred on nine occasions during a period extending for 24 years. There was one fatality which occurred at a time when sophisticated detection techniques were not available.

The statement that the sitting position allows the surgeon to orientate himself better is an expression of opinion that more than one surgeon has made to me. Although amusing, the comments on the supine and lithotomy positions, which evoke visions of hitherto unreported surgical contortions, are irrelevant in the present context.

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REFERENCES