Awareness in general anaesthesia

As the concentrations of anaesthetics in the brain increase the patient initially loses some sensations, including pain, and then becomes unconscious, not recognising or remembering what happens. At higher concentrations muscle relaxation occurs and surgery becomes easy. Thus if anaesthetics only are used and conditions are acceptable for surgery, the patient cannot be aware of what is happening. Neuromuscular blocking drugs have changed this, since patients can be paralysed and surgery proceed while the concentrations of the anaesthetics in the brain are insufficient to produce unconsciousness or even analgesia. The combination of neuromuscular blockade and light anaesthesia is well known to leave some patients aware of what is happening—and some, frighteningly, in pain. Waters has discussed many of the factors in the techniques of anaesthesia that could produce this state.

Awareness is most commonly reported as occurring during general anaesthesia in operative obstetric. Here the anaesthetist has two problems. Firstly, he has to anaesthetise the mother and, secondly, he has to produce the minimum depression of the baby, who may well be already in trouble. Additional anaesthetic and opiate drugs crossing the placenta will depress respiration and circulation further. In most series of women given anaesthesia for caesarean section awareness has been reported in about one case in 12 when only nitrous oxide is used to maintain anaesthesia, with an incidence of one in 50 or less when the nitrous oxide is supplemented by halothane, methoxyflurane, trichlorethylene, or enfurane. Such supplementation does not appear to add to the risks for the baby, and even if it did the depression should be treatable with normal methods of neonatal resuscitation—it would be of short duration. But the anaesthetist must balance the two risks.

Two papers have described techniques which should allow anaesthetists to assess whether individuals are aware during anaesthesia or whether a particular technique is likely to be associated with too light a plane of anaesthesia. Tunstall has described the isolated-forearm technique to assess wakefulness during surgery. After induction of anaesthesia but before any suxamethonium is given a sphygmomanometer cuff is inflated to 250 mm Hg on one arm and kept at that pressure. The patient's hand is clasped by the anaesthetist and the patient is asked to squeeze or grip the hand and subsequently to let go. If the patient responds to both commands Tunstall considers her to be wakeful. Using suxamethonium as the neuromuscular blocking drug he detected wakefulness in several of his patients, although none recalled the experiences after the operation. A similar system of hand movement in response to commands, with the forearm isolated, was used by Campbell and his colleagues to investigate the actions of tubocurarine. If long-acting neuromuscular blocking drugs are used with Tunstall's method the cuff must be kept inflated, for low circulating concentrations of drugs will interfere with movements of the hand muscles.

Cormack has developed a screening technique whereby the anaesthetist can assess at the end of an operation whether the patient was at risk of being aware. After the anaesthetist has antagonised the neuromuscular blocking drug he turns the nitrous oxide off and every 15 seconds asks the patient to open his or her mouth. Should the patient do this by 15 seconds Cormack considers that the concentration of nitrous oxide in the brain must have been insufficient and that there has been a risk of awareness. How well this method works in practice remains to be seen.

Awareness is not an acceptable complication of general anaesthesia, yet its detection in the paralysed patient is difficult. Anaesthetists should take care to ensure that their patients are unconscious by proper techniques of administering their drugs, and, when it is essential to use the minimal amounts of depressants, to use a method such as that of Tunstall to reduce the risks.

7 Farnsworth GM. Enflurane and the incidence of awareness in caesarean section. Anaesthesia 1978;23:553.
9 Tunstall ME. The reduction of amnesic wakefulness during caesarean section. Anaesthesia 1979;34:316-9.