GENERAL ANAESTHESIA FOR CAESAREAN SECTION

Sir,—In the excellent paper entitled "A further study of general anaesthesia for Caesarean section" (Crawford et al., 1976), the authors have referred to work in our unit (Coleman and Downing, 1975), on the supplementation of anaesthesia with enflurane 0.5–0.8% for Caesarean section. The incidence of awareness of zero was obtained in a small series of 50 patients.

We now have data in a further 99 mothers who received enflurane, bringing the total number of patients studied to 149 (table I). These results compare favourably with those reported by Crawford and his co-workers using 0.1% methoxyflurane.

As a result of our experience with enflurane, we are using this agent routinely in our clinical practice. In addition, we are investigating the effects of enflurane on the biochemical status of the foetus and on maternal myometrial muscle tone.

J. W. Downing
Durban, S. Africa

TABLE I. Awareness and dreaming during anaesthesia supplemented with enflurane in patients undergoing elective Caesarean section. (The incidence of awareness and dreaming in all anaesthetics is 4.0%)

<table>
<thead>
<tr>
<th>Anaesthetic</th>
<th>No. of patients studied</th>
<th>No. of patients exhibiting:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Awareness</td>
</tr>
<tr>
<td>Ketamine 2 mg/kg + enflurane 0.5–0.8%</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Methohexitone 1 mg/kg + enflurane 0.5–0.8%</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>Thiopentone 3.5 mg/kg + enflurane 0.5–0.8%</td>
<td>110</td>
<td>1</td>
</tr>
<tr>
<td>All agents</td>
<td>149</td>
<td>3</td>
</tr>
</tbody>
</table>

A NEW EXTRADURAL SPACE INDICATOR

Sir,—Numerous methods for the identification of the extradural space have been described. The tactile method whereby the thumb of the anaesthetist’s hand presses the piston of a syringe containing air, water or saline has the advantage of simplicity as no special apparatus is required. However, the technique involves holding the needle in one hand while the other hand applies pressure to the piston and occasionally the onward movement of the needle cannot be checked, resulting in dural puncture. Ilke’s spring-loaded syringe (Brunner and Ilke, 1949), Macintosh’s balloon indicator (Macintosh, 1950), Macintosh’s spring-loaded needle (Macintosh, 1953), stretching of an elastic band over the top of the piston of an ordinary syringe (Bromage, 1954; Dawkins, 1963), Brooks’ indicator (Brooks, 1957), and Dawkins’ gravity indicator (Dawkins, 1963) have been designed to impart a pressure to the piston of a syringe to aid the identification of the extradural space. However, Ilke’s syringe is “top heavy” and weighs 85 g, whilst the springs of Ilke’s syringe and Macintosh’s needle are concealed and may become rusty and non-functional following repeated sterilization (Dawkins, 1963).

These devices are not always available in many hospitals in the developing countries and anaesthetists have to rely on the tactile loss of resistance or the hanging drop methods to identify the extradural space. These are associated with a high rate of failure and a greater incidence of dural puncture.

A new extradural space indicator based on the loss of resistance test has been designed. Its attraction lies in its simplicity and ease of manufacture at low cost, which may be of importance in the developing countries. It is very light (5 g). The spring is visible and can be replaced easily if it becomes rusty and non-functional after repeated use. As it is used in conjunction with the tactile loss of resistance test, the changes in the “feel” of resistance offered by different ligaments can be appreciated simultaneously.

As a result of our experience with enflurane, we are using this agent routinely in our clinical practice. In addition, we are investigating the effects of enflurane on the biochemical status of the foetus and on maternal myometrial muscle tone.

J. W. Downing
Durban, S. Africa

REFERENCES

Fig. 1. The new extradural space indicator and the method of use.

The indicator (fig. 1A) consists of three parts:
1. An aluminium plate (approximately 3.5 x 2.5 cm) with a central circular hole having a diameter of 1.2 cm for use with a 2-ml syringe or 1.6 cm for a 5-ml syringe which is slightly greater than the diameter of the barrel of a standard 2- or
5-ml syringe (1.1 or 1.5 cm respectively). Two small holes, one each side act as fixation points for the springs.

(2) Two stainless steel extension springs of diameter 0.3 cm. Each spring is 1.8 cm long, which is equal to the distance between the barrel and the piston of the empty standard 2- or 5-ml syringe (fig. 1A). Of this 1.8 cm, 1.3 cm comprises the spring itself and 0.5 cm the terminal fixation pieces. Each spring stretches by 1.5–2 cm when a weight of 75 g is applied (fig. 1A). If the spring is longer and the distance between the two plates is greater than the distance between the barrel and the piston of the syringe, a piece of cork of suitable thickness may be fixed to the top of the piston using Araldite, which can withstand repeated autoclaving.

(3) A second aluminium plate the same as the first but without the central hole.

The two plates are joined together on either side by the two springs.

In practice the extradural needle, with the stylet, is introduced into the interspinous ligament and the stylet is then removed. The aluminium plate with the central hole is slid over the barrel of the ordinary 2-ml/5-ml glass syringe filled with about 2 ml of air and the syringe is attached firmly to the hub of the needle. The plate without the central hole is then pulled and positioned over the end of the piston of the syringe thereby stretching the spring which exerts pressure on the piston (fig. 1C). The needle is advanced in a slow, careful and controlled manner. As soon as the plunger surges forward further advance of the needle is halted. This occurs simultaneously with, or usually before, the tactile appreciation of loss of resistance. The syringe is then disconnected and additional confirmative tests are carried out.

The extradural space indicator has been used consecutively in a large number of patients and has given correct identification of the extradural space in all instances so far, without any incidence of dural puncture, total spinal or massive extradural.

C. P. Bahl
Dhanvantari Nagar, Pondicherry, India

Furthermore, we found this rare gene functioning in two additional families who had lost at least one blood relative as a consequence of malignant hyperthermia.

A survey of the literature indicates that 1 in 14 000 young, apparently healthy individuals could be susceptible to malignant hyperthermia and genetic information shows that this syndrome has a dominant trait albeit with incomplete penetrance and variable expressivity. The incidence of the plasma cholinesterase variant found in our three patients is 1 in 200; moreover, the inheritance of the plasma cholinesterase variants is a recessive trait.

However, there is much evidence in the literature that malignant hyperthermia is a complex syndrome. Kalow and others (1970) have suggested that there are two types of malignant hyperthermia: with and without myopathy.

The association of myopathy with the syndrome has led Denborough and others (1970) to propose that the serum creatine phosphokinase concentration (c.p.k.) may be increased consistently in susceptible patients. Although measurement of this enzyme has been proposed as a method of identifying susceptible individuals, it is not reliable since many susceptible patients have a normal c.p.k.

More detailed biochemical investigations of several families associated with malignant hyperthermia are in progress and we hope to publish the results soon. Many problems remain to be resolved and we will be very glad to investigate any patient or members of any family with a history of malignant hyperthermia. A 10-ml sample of heparinized blood can be sent by first-class post or delivered by road to us in Exeter. With such assistance some of these anomalies may be resolved.

MARY WHITTAKER
Richard Spencer
Department of Chemistry
University of Exeter
Stocker Road
Exeter EX4 4QD

REFERENCES


INTRAVENTRICULAR PRESSURE WAVES AND THEIR SIGNIFICANCE IN THE PROGNOSIS OF HEAD INJURY

Sir,—In the symposium on Neurosurgical Anaesthesia, Drs Turner and McDowall (1976) referred to our study of continuous intraventricular pressure recording in unconscious patients suffering from brain-injury undergoing controlled ventilation (Cold, Envoldesen and Malmros, 1975). We found that in such patients subjected to moderate controlled hyperventilation (Paco2 4–5.33 kPa), prognostic information can be obtained from the frequency and amplitude of non-respiratory waves (Traube–Hering–Mayer waves) which are related predominantly to rhythmic spontaneous variations in arterial pressure. As the amplitudes increase with intraventricular pressure (IVP), the index

PLASMA CHOLINESTERASE AND MALIGNANT HYPERTHERMIA

Sir,—During the past five years the Cholinesterase Research Unit at Exeter University has received blood samples from four patients who have survived malignant hyperthermia. It was surprising to find that three of these individuals had the rare fluoride-resistant gene in addition to the usual gene controlling the biosynthesis of their plasma cholinesterase.

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