Finally, unless the World Federation of Societies of Intensive and Critical Care Medicine can attract the support of all who work in Intensive Care, whatever their speciality, it is doomed to failure. Anaesthetists are not merely invited; in my view, they are essential.

ALAN GILSTON
London

REFERENCE


AWARENESS DURING ANAESTHESIA

Sir,—The recent article on “Awareness during anaesthesia” (Agarwal and Sikh, 1977) and an earlier one (Brice, Hetherington and Utting, 1970) may lead anaesthetists to the conclusion that this risk is remote with a properly given unsupplemented nitrous oxide in oxygen anaesthetic and so must be virtually non-existent when narcotic supplements are used. Our impression, which is supported by others (McKenna and Wilton, 1973), is that awareness occurs more frequently than is acknowledged generally. The following is a recent example:

A man aged 59 yr (weight 87 kg) was undergoing resection of an aortic aneurysm and insertion of a Dacron graft. He suffered from ischaemic heart disease and was being treated with digoxin, diuretics and potassium supplements. He had received no other medication and did not drink alcohol. Premedication was not given and anaesthesia was induced with papaveretum 20 mg and thiopentone 250 mg i.v. and tubocurarine 50 mg was given for myoneural blockade. The lungs were ventilated with 70% nitrous oxide in oxygen using a Blease ventilator with a frequency of 12 b.p.m., and at no stage was air entrained or the reservoir bag overdistended. Over the next hour, the patient showed clinical signs of lightness of anaesthesia by frowning and making minor limb movements. Supplements of thiopentone and papaveretum were given to a total of 150 mg and 20 mg respectively, bringing the overall dose of papaveretum to 40 mg in 90 min.

After operation the patient stated in reply to questioning that he had been aware of the abdominal incision, which had been made 30 min after induction of anaesthesia. He could recall some rather emphatic words spoken about half an hour later by the surgeon. He had no recall of endotracheal intubation, and he was not aware of being paralysed. There were no further episodes of awareness during the remaining 3 h of the operation, although the patient was deemed not to need any further narcotic supplements throughout this time. During the operation arterial blood was analysed: \( P_{O_2} \) 18.87 kPa and \( P_{CO_2} \) 4.49 kPa. Though he had felt the incision, the patient was emphatic that there had been no pain, and that he did not find the experience distressing. This may have been the result of the cortical depressant effect of the opium alkaloids.

As fentanyl and phenoperidine do not possess this property to such a degree (Edmonds-Seal and Prys-Roberts, 1970), we suggest that these older drugs may be more suitable to supplement nitrous oxide in oxygen anaesthesia when volatile agents or other drugs are contraindicated. In the unfortunate event of the patient being aware, there would be less risk of distress from the experience. The postoperative drowsiness which usually follows the use of papaveretum or morphine would be a contraindication to their use in certain circumstances.

It is of interest to note that there has not been one recorded instance when a patient has complained that he felt cold whilst aware during anaesthesia, and this applies in the present case. This is somewhat remarkable in view of the frequency and occasional severity of this symptom soon after regaining consciousness at the end of anaesthesia. It would seem that temperature sensation is obtunded, even when anaesthesia is inadequate.

Even more worrying is the recent medico-legal development (Annual Report, 1977) that, should the patient become aware during anaesthesia, the anaesthetist may be called to account, even though the anaesthetic was apparently conducted with due care.

C. HUTTER
P. J. TOMLIN
Birmingham

REFERENCES


DISPOSITION OF PETHIDINE IN CHILDBIRTH

Sir,—We read with interest the work of Hogg and colleagues (1977) on the urinary excretion of pethidine by the newborn of mothers receiving this agent during labour. These authors studied three facets of this subject: the accumulation of pethidine by the foetus, the neonatal metabolism of pethidine and the elimination kinetics of pethidine in the newborn, and they used a number of extrapolations to arrive at the results quoted. However, these three topics are more directly answered by analysis of appropriate blood samples, coupled with a complete analysis of the urinary metabolites of pethidine in the newborn, and we write to draw attention to our work (Caldwell, Notarianni and Smith, 1977; Caldwell et al., 1977) in this area.

Analysis of samples of umbilical cord venous and arterial blood and maternal venous blood taken at delivery from 40 mothers showed that the concentrations of pethidine in each were dependent on the dose–delivery interval. The cord/mother concentration ratio increased from 0.6 at 20 min to 2.5 at 480 min, indicating that the foetus is able to concentrate pethidine relative to the mother. The ratio was always greater than 1 when the dose–delivery interval exceeded 160 min.

Using a sensitive and specific assay involving gas chromatography and mass spectrometry, we have measured pethidine in serial blood samples taken during the first 48 h of life, and from this have determined the elimination half-life of pethidine in 40 babies. The mean value was 18.1 h (SEM ± 2.9 h, range 7.0–36.1 h).
Since pethidine is excreted by adults principally in the form of metabolites, it is tempting to speculate that the prolonged half-life seen in babies compared with adults (3-4 h) is the result of impaired metabolism in the newborn. We have assayed pethidine together with all its known metabolites in the 0-24 h urine collections of five babies and the results, compared with those from normal adults, are shown in table I.

**Table I. Metabolism of pethidine in human adults and neonates. (All data standardized to pethidine=100%)**

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Neonate</th>
<th>Adult/neonate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pethidine</td>
<td>100</td>
<td>100</td>
<td>—</td>
</tr>
<tr>
<td>Norpethidine</td>
<td>132</td>
<td>19</td>
<td>6.95</td>
</tr>
<tr>
<td>Pethidine N-oxide</td>
<td>15</td>
<td>0.3</td>
<td>50</td>
</tr>
<tr>
<td>Pethidinic acid:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>free</td>
<td>59</td>
<td>13</td>
<td>4.46</td>
</tr>
<tr>
<td>glucuronide</td>
<td>124</td>
<td>11</td>
<td>11.27</td>
</tr>
<tr>
<td>Norpethidinic acid:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>free</td>
<td>75</td>
<td>14</td>
<td>5.36</td>
</tr>
<tr>
<td>glucuronide</td>
<td>175</td>
<td>20</td>
<td>8.75</td>
</tr>
<tr>
<td>Total metabolites</td>
<td>580</td>
<td>77.3</td>
<td>7.5</td>
</tr>
<tr>
<td>Total recovery</td>
<td>65.6%</td>
<td>153 µg</td>
<td></td>
</tr>
</tbody>
</table>

These data show very clearly that the neonate is some seven time less able to metabolize pethidine than the adult, and that ester hydrolysis, N-demethylation and N-oxidation are impaired equally in the newborn.

It is clear that the conclusions drawn by Hogg and colleagues are in broad agreement with the results of our studies, and our work therefore substantiates the more theoretical parts of their paper.

**REFERENCES**


**APOMORPHINE**

Sir,—Over the past 2–3 years I have administered apomorphine to 26 patients (ages 5–67 yr) using the method described by Holdsworth, Furness and Roulston (1974). The drug was simple to use and rapidly efficacious. My patients seemed to find it less unpleasant than attempting to swallow a stomach tube. The smaller children were managed by sitting them on the knee of mother or a nurse. No patient vomited during induction or maintenance of anaesthesia but one child vomited in the ward after operation.

Recently we have learned that apomorphine is no longer obtainable. As a result of insufficient demand the drug is not being manufactured. There does not seem to be a substitute for this useful drug. Will anyone join me in a plea for its retention?

E. M. Pitt

**REFERENCE**


**A NEW ARM POSITION**

Sir,—The positioning of a patient’s arms may present problems especially during upper abdominal operations. Ingenious arm rests have been described, but the majority require to be made specially, and not all allow free access to the hands and forearms. The position illustrated in figure 1 has several advantages.

![Fig. 1. Demonstration of the position of the patient’s arm.](image)

Standard table accessories may be used and the hands and forearms are even more accessible than when they are positioned transversely. In addition, assistants have no inviting structures upon which to lean. The position may be used for both arms simultaneously, and the hazards associated with arm boards are avoided. It is, of course, topologically equivalent to the position of the uppermost arm when the anaesthetized patient is in the lateral position, and as long as the normal range of joint movements is not exceeded there should be no risk to nerves or ligaments. The usual precautions should be taken to avoid diathermy burns.

David Zuck

Enfield