CORRESPONDENCE

INTRA-OCULAR ADRENALINE AND HALOTHANE ANAESTHESIA

Sir,—Phaco-emulsification and aspiration, a new technique of cataract removal was first described in 1967 by Kelman. Phaco-emulsification of the lens is performed using a low frequency (sonic/ultrasonic) needle combined with controlled irrigation and suction. It is important that the pupil be widely dilated for this procedure. Adrenaline in a concentration of 1/1000 is injected into the anterior chamber of the eye to achieve maximal pupillary dilatation.

The maximum safe dose of adrenaline that can be injected into the anterior chamber of the eye in patients under halothane anaesthesia has not been established. When this surgical technique was first used, a number of patients received relatively large amounts of adrenaline by injection into the anterior chamber of the eye under halothane anaesthesia.

Five case reports, four children and one adult, in whom adrenaline was used intra-ocuially with halothane anaesthesia for phaco-emulsification lens extractions are summarized below.

The past medical history, physical examination and laboratory findings were negative in all patients except patient No. 3 who had a history of surgical correction of a patent ductus arteriosus and a systolic murmur. Two of the children were exposed to the same procedure twice. All patients were managed similarly. Premedication consisted of pentobarbitone 2 mg/lb with atropine 0.01 mg/lb for children. The adult received pentobarbitone 2 mg/lb with atropine 0.6 mg. The premedication was given 45 minutes before surgery. All patients were induced with nitrous oxide and halothane.

Lignocaine solution 2 per cent 1 mg/lb was used to provide topical anaesthesia of the larynx. In the adult, suxamethonium 100 mg was also used to facilitate intubation. All the patients were intubated and anaesthesia was maintained with 1–2 per cent halothane. Gallamine 100 mg was used in the adult to permit control of the ventilation.

The relationships between the age, weight and the amount of adrenaline injected into the anterior chamber of the eye are shown in table I.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (yr)</th>
<th>Body weight (lb)</th>
<th>Body weight (kg)</th>
<th>Adrenaline (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>26</td>
<td>12.2</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>27</td>
<td>12.3</td>
<td>0.04</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>17</td>
<td>7.7</td>
<td>0.1</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>131</td>
<td>60.0</td>
<td>0.3</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>135</td>
<td>61.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

The children were monitored with a precordial stethoscope and the adult with a cardio-oscilloscope. No arrhythmias or evidence of systemic effects of adrenaline were noted.

The following guidelines for the safe use of adrenaline with halothane have been recommended (Katz, Matteo and Papper, 1962). Ventilation should be adequately assured, adrenaline should be used in a solution of 1/100,000 to 1/200,000 and the dose in adults should not exceed 10 ml of 1/100,000 solution in any given 10-minute period or 30 ml per hour. If these guidelines were adhered to for injection of adrenaline into the anterior chamber, this would put the maximum dose under 0.1 mg. The largest dose given in the present cases was 0.3 mg to a 26-lb child. This would be equivalent to 2.9 mg in a 150-lb adult. This is far in excess of the doses that have been recommended for subcutaneous use. In this case, no arrhythmias were noted and there was no evidence of systemic effects of adrenaline. It is possible that some adrenaline was lost in the suction accompanying the irrigation. It should be noted that all patients received lignocaine by topical application to the larynx. The anti-arrhythmic properties of this drug are well known. Injections of 0.2–0.8 mg of adrenaline 1/1000 have been administered to over 300 patients undergoing cataract extraction by phaco-emulsification under halothane anaesthesia (Kelman, Becker and Goldman, 1966). The incidence of arrhythmias has been studied in patients undergoing tonography (Ballin, Becker and Goldman, 1966). The incidence of premature ventricular contractions was found to be high in the group of patients receiving topical adrenaline. Topical application of adrenaline is used in the treatment of open angle glaucoma in high concentration of 0.5 to 2 per cent (Kolker and Hethrington, 1970). The iris is richly supplied with adrenergic receptors (Graymore, 1970) and may possess the ability to store or to metabolize adrenaline injected into the anterior chamber very rapidly.

No conclusions on the safety of the use of adrenaline on the anterior chamber of the eye can be drawn from these case reports but they do raise a question concerning the rate and quantity of systemic absorption of adrenaline from the anterior chamber of the eye. Studies on the fate of intra-ocular adrenaline need to be undertaken.

R. BRIAN SMITH
JAROSLAW PETRUSCAK
Pittsburgh, Pa.

REFERENCES

