On admission, hemoglobin was 5 g/dl. The abdomen was tender, with increasing distension; an exploratory laparotomy was then planned. Whole blood, 1,500 ml, was given prior to transfer of the patient to the operating room.

The patient arrived in the operating suite obtunded, with systolic blood pressure 80 mm Hg, heart rate 120 beats/min. The trachea was intubated following administration of succinylcholine, 100 mg, iv, as a bolus. Anesthesia was maintained with 40 per cent nitrous oxide with infusion of 0.2 per cent succinylcholine during abdominal exploration.

Approximately 1,500 ml of clotted blood were present in the peritoneal cavity. A 4-mm tear in the distal aorta near the origin of the right iliac artery was identified and repaired after a large retroperitoneal hematoma was opened.

Whole blood, 8,500 ml, 5 per cent albumin solution, 500 ml, and lactated Ringers solution, 2,400 ml, were given during the procedure. Postoperatively the patient had slight pulmonary edema, which subsided in 48 hours. She was discharged ten days postoperatively.

**Discussion**

The tear in the aorta was caused by the Verres needle or the laparoscopic trocar. Anterior perforation of the aorta would tend to bleed more than posterior perforation done with lumbar aortography. The blood, extravasated from the posterior perforation is trapped and tamponaded by the periaortic connective tissue.

Phillips reviewed more than 100,000 pelvic laparoscopies from the literature and found a 0.64 per cent incidence of hemorrhage and a 0.3 per cent incidence of cardiac arrest. McDonald et al.\(^1\) reported two cases of hemorrhage and hypotension following aortic injury during pelvic laparoscopy. Injury to the aorta occurred from a 16-gauge Touhy needle which was used for the insufflation of carbon dioxide. McDonald et al. suggest that aortic injury is more likely if the angle of the pneumoperitoneal needle is vertical, and recommend a 45-degree angle. McKenzie\(^3\) reported a case of massive hemorrhage (3,000 ml) during pelvic laparoscopy for tubal ligation. At laparotomy a tear in the broad ligament was discovered.

Ivankovich reported four cases of cardiovascular collapse and cardiac arrest during pelvic laparoscopy.\(^4\) One patient had pneumothorax, another a ruptured ectopic pregnancy and hemorrhage, a third a carbon dioxide embolism of the coronary and carotid arteries via a patent foramen ovale, and the fourth had vena caval compression from increased abdominal pressure.

Severe complications, though rare, can occur during anesthesia for laparoscopy. When laparoscopic tubal ligations are done at an outpatient facility, the ability to do an emergency laparotomy for massive hemorrhage and facilities for massive transfusion should be available.

**References**


Rectal Methohexital Premedication in Children, a Dose-comparison Study

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Despite favorable results, the rectal administration of methohexital (Brevital\(^®\)) for premedication in pediatrics is not widespread.\(^1–3\) However, we believe it can be used successfully as a premedication–induction agent while eliminating the pain associated with

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parenteral drug administration. Separation anxiety for both the parents and the child is decreased, since the drug may be administered in the presence of the parents and the child allowed to fall asleep before being taken to the operating room. With this technique, a smooth atrumatic induction of anesthesia

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Key words: Anaesthetics, rectal; Methohexital. Anesthetic techniques, rectal. Anesthesia, pediatric.

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may be accomplished. The rectal doses of methohexitol used have ranged from 10 to 50 mg/kg, averaging between 20 and 30 mg/kg.

Previous studies have not established clearly the times to the onset of sleep after different doses of methohexitol are administered rectally. We undertook this study to evaluate the responses of three commonly used rectally administered doses of methohexitol in healthy pediatric surgical patients.

**Methods**

Ninety-nine children, ASA Class I, between the ages of 3 months and 7 years, who were scheduled for elective surgical procedures were studied. They ranged in weight from 6 to 26.5 kg. None of the patients received a preoperative enema. The patients were assigned at random to three groups. Those in Group I received methohexitol, 20 mg/kg, rectally. Those in Group II received 25 mg/kg, and those in Group III received 30 mg/kg.

Methohexitol was prepared by dissolving 500 mg methohexitol sodium (Brevital®) crystals in 5 ml sterile water to make a 10 per cent solution. This solution was drawn up into a 5-ml syringe, and the end of a 14-Fr Argyle® oxygen catheter was attached to the syringe. After lubrication of the catheter with Lubrifax®, the calculated dose of methohexitol was given rectally. The time lapse between administration of the drug and the onset of sleep was recorded. The onset of sleep was defined as loss of consciousness, unresponsiveness to verbal stimulation, and absence of voluntary and purposeful movements when unstimulated. The time from administration of the drug to the onset of sleep was defined as the sleep induction time. After receiving methohexitol, the child was comforted by a parent or nurse, with an anesthetist in attendance. When a child was still awake 15 minutes after receiving methohexitol, the dose was judged to be inadequate.

Pulse rate and blood pressure were measured by palpation and the Riva-Rocci method prior to administration of the drug and 5 minutes after the child was asleep.

Results were analyzed for significance by the Student t test for unpaired data, or the chi-square method, where appropriate.

**Results**

The mean sleep induction time of those patients who fell asleep in 15 minutes decreased as the drug dose was increased. The difference between mean sleep induction times in those patients who received 20 mg/kg and those who received 30 mg/kg methohexitol was significant (P < 0.05) (fig. 1). Four patients in Group I, six patients in Group II, and two patients in Group III did not fall asleep within 15 minutes of rectal methohexitol administration. There was no significant difference between the numbers of patients who fell asleep within 10 and within 15 minutes as the dose of methohexitol was increased from 20 to 30 mg/kg (table 1). In addition, we found no significant difference between pulse and blood pressure values.

**Table 1. Characteristics of Patients Studied and Results**

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methohexitol (mg/kg)</td>
<td>20</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Number of patients</td>
<td>31</td>
<td>38</td>
<td>30</td>
</tr>
<tr>
<td>Age (years)*</td>
<td>3.6 ± 1.9</td>
<td>3.2 ± 2.0</td>
<td>3.1 ± 2.0</td>
</tr>
<tr>
<td>Weight (kg)*</td>
<td>15.9 ± 5.2</td>
<td>14.7 ± 3.7</td>
<td>14.3 ± 4.2</td>
</tr>
<tr>
<td>Sleep induction time (min)*</td>
<td>7.8 ± 2.2†</td>
<td>7.2 ± 2.3</td>
<td>6.7 ± 1.6†</td>
</tr>
<tr>
<td>Asleep at 15 min (per cent)</td>
<td>87</td>
<td>84</td>
<td>93</td>
</tr>
<tr>
<td>Asleep at 10 min (per cent)</td>
<td>74</td>
<td>73</td>
<td>90</td>
</tr>
</tbody>
</table>

* Mean ± SD.
† P < 0.05.
taken before the drug was administered and those values obtained as long as five minutes after the onset of sleep. None of the patients studied became apneic or developed airway obstruction.

In the first 88 patients in this study, there was a 13 per cent incidence of defecation shortly after rectal methohexital administration. There was no relationship between sleep induction time and the incidence of defecation.

DISCUSSION

The data from this study support our clinical impression that methohexital administered rectally in a dose of 20–30 mg/kg to healthy pediatric surgical patients is safe and useful as a premedicant–induction agent. Since the mean sleep induction time of those patients who received 20 mg/kg was only 1.1 minutes slower than the mean sleep induction time of those patients who received the higher dose of 30 mg/kg, we advocate the use of 20 mg/kg for routine preoperative sedation of healthy children in most clinical situations. Lower doses have been reported to be inadequate for sedation.1 Higher doses may be administered in circumstances where more central nervous system depression is desired, or to patients who are receiving drugs that alter the metabolism of methohexital.

The increase in the number of children who fell asleep when the dose was increased from 20 to 30 mg/kg was not statistically significant. We speculate that the failure to achieve sleep in some children may have been due to: 1) interference with absorption of the drug due to feces in the rectum; 2) variations in the distribution of the absorbed drug in the rectal venous drainage system. Since the hemorroidal plexus represents a free communication between the portal and systemic venous systems, a decrease in the systemic bioavailability of rectally absorbed drugs may occur if more drug is distributed to veins that eventually drain into the portal system rather than veins that drain into the inferior vena cava. Breimer4 has shown that there is considerable “first-pass” elimination by the liver after oral administration of methohexital. When a patient is still awake 15 minutes after receiving methohexital rectally, we usually repeat the dose of methohexital. On very rare occasions, we have used three doses for induction of anesthesia.

Our patients' sleep induction time after 25 mg/kg methohexital is consistent with that reported by Goresky and Steward.9 These investigators found that recovery time of children who received methohexital (25 mg/kg) rectally was not significantly different after short surgical procedures (30 minutes) when compared with the recovery time of children who received thiopental (5 mg/kg) intravenously.

The possibility of defecation is an inherent esthetic shortcoming of this technique. To avoid fecal contamination, it is prudent after administering rectal methohexital to allow the patient to fall asleep before moving him to the operating room table.

REFERENCES