TABLE 1. The Effect of Alterations in Test Dose Procedure on Success Rates in 10,000 Patients

<table>
<thead>
<tr>
<th></th>
<th>Oyston &amp; Prince</th>
<th>Cartwright et al.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate increase (bpm)</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Test repetition if first result positive</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>90%</td>
<td>50%</td>
</tr>
<tr>
<td>Specificity</td>
<td>94%</td>
<td>88%</td>
</tr>
<tr>
<td>Unnecessary removal of epidural catheter</td>
<td>576</td>
<td>1200</td>
</tr>
<tr>
<td>Successful warning of intravascular injection</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Intravenous injection despite negative test dose</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

Although the results are not perfect, there is a substantial improvement.

An epinephrine-containing test dose is not necessary before every obstetric epidural block; in certain instances, it may even be dangerous to the fetus, but, when large volumes of concentrated bupivacaine are to be injected, it is still a useful safety measure.

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**REFERENCES**


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In Reply:—The raison d’être for our study on epidural test doses was an attempt to evaluate the clinical application for the proposed 15 µg epinephrine test dose; particularly, its seemingly unquestioned extension from use in sedated elective surgical cases to awake laboring obstetric patients. The value of the epinephrine test dose in such surgical patients has been shown, and, I feel sure, could be logically applied also as a test dose for epidural blocks performed in anesthetized patients, a common practice in Europe.

Although, in clinical practice, the insertion of the epidural catheter or the initial epidural injection occasionally can cause some patient discomfort, it is usually transient, and so the injection rate of 1 ml/s for the test dose was accepted as in previous protocols. If one is establishing a valuable clinical test, then an attempt to apply rigid criteria is necessary for the test to become widely accepted. If blood pressure changes are added to the test criteria, then the use of an automated noninvasive blood pressure monitor by a single-handed anesthesiologist to evaluate a very rare epinephrine response lasting 1–2 min is not scientifically acceptable. Any meaningful data for such a rapid event would require the use of invasive arterial monitoring.

Our study involved the acquisition of data during the administration of a plain epidural test dose, and, as such, no comment or conclusions can be made on the repeated use of the epinephrine test dose in equivocal cases, other than a possible awareness of the underlying variability of heart rate in obstetric patients. Whether our evaluation of the statistics is taken, or that of Oyston and Prince (above), it is irrelevant because of the unacceptably high false positive rates and unnecessary removal of epidural catheters, in relation to the low incidence of the complication in question. I would tentatively suggest that statistics derived from data on ten unmedicated volunteers may need further confirmation.

That there has not been an instance of accidental intravenous injection in 7,000 epidural blocks, as mentioned above, is within the quoted incidence range for this com-
plication of epidural anesthesia, with or without the use of epinephrine test doses. The important result will be shown in time, if any proposed test dose technique leads to a reduction in the complication rate from epidural anesthesia.

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Video Induction: CO₂ Wars

To the Editor:—To a child, the operating room is a bizarre place, full of strangers behind masks and replete with sinister-looking tools and machines. Distraction of the child, with stories, conversation, and games, has been a time-honored aid to inhalation induction in these circumstances.¹⁻³ One standard pediatric anesthesia text recommends that distraction techniques specifically avoid reference to the “equipment being used, breathing,” etc.⁴ As an alternative, we have chosen to practice distraction by focusing the child’s attention on the monitor. With the recent popularization of video games and personal computers, the monitoring screen has become a familiar object to most children. Using the context of the video game, this idea is incorporated into the preoperative visit. The child is given a mask for “practice” and is introduced to ECG patches. Most children then look forward to playing the video game in the operating room. The mask is given to the child, and the ECG connections are made. With the patient sitting, often in the anesthetist’s lap, a standard induction is pursued. Seeing the CO₂ trace on the screen, most children cooperate readily with the induction, especially since removing the mask makes the CO₂ trace fall (i.e., the patient loses “points”). Any number of variations on the game are possible; e.g., to make the CO₂ trace touch the ECG (Fig. 1), to use the numbers as points, or to set CO₂ limits so that alarms sound (that’s good in the video game context). Capnography has not only become a routine part of our anesthetic practice, but, in this use, it has helped to allay anxiety, increase cooperation, and speed induction in our pediatric population. Some of our patients have even asked to come back and play the game again!

Fig. 1. A young patient excitedly points out her CO₂ trace (Spacelabs Monitor 512D with Capnograph 540, Squibb Vitatek Inc., Hillsboro, OR).