

anesthesia for minor gynecologic operations. For this protocol we used our modification of Epstein's technique, which is commonly used for outpatient gynecologic surgical procedures in our institution. Awakening time is rapid, and outpatients are usually discharged six to eight hours postoperatively.

Awakening time is very rapid, 4–10 min, after a dose of 0.3 mg/kg etomidate, but sleep time can be prolonged by increasing the dose.<sup>9</sup> When etomidate was substituted for thiopental in this study, the awakening time was similar to that observed with thiopental.

The 50 per cent incidence of pain on injection and 70 per cent incidence of myoclonic movements we previously reported<sup>9</sup> were reduced to 10 per cent using etomidate in its new formulation. Other possible reasons for the improvement might include the iv administration of fentanyl before induction, placement of the intravenous catheter in a large vein, and use of an injection time of 1 min.

The only disturbing side effect was the nausea and/or vomiting that frequently occurred after emergence from anesthesia with etomidate. Even when patients undergoing voluntary interruption of pregnancy, who are known to have a higher incidence of these symptoms, were excluded, there was still a difference between the two groups.

We conclude that the new formulation of etomidate reduces the incidences of pain on injection and myoclonic movements to acceptable levels. Although

awakening time is rapid, it is similar to that seen with thiopental.

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## A New Epidural Space Indicator

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Identification of the epidural space remains a problem, especially for the inexperienced. There are numerous methods currently in use:

1. Loss of resistance techniques
  - a. Syringe technique: sudden loss of resistance to pressure exerted on the plunger of a syringe<sup>1</sup>
  - b. MacIntosh balloon technique<sup>2</sup>
  - c. Vertical tube of Dawkins<sup>3</sup>

2. Negative pressure techniques
  - a. Hanging drop sign<sup>4</sup>
  - b. Manometer technique<sup>5</sup>
  - c. Capillary tube methods<sup>6</sup>

Recently we modified the balloon technique by incorporating a three-way stopcock. The necessary materials consist of a three-way stopcock, a 1 × 1-inch piece of Penrose drain, cement suitable to bond rubber and plastic, a 2-0 silk suture, and a 5 ml syringe. The cement is applied to the middle appendage of a three-way stopcock and a piece of Penrose drain is secured to the cement by tying it tightly with a 2-0 silk suture. The bonding is allowed to dry for one to two hours before testing for leaks.

With the stopcock closed to the male port, the bal-

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loon is inflated by injecting 3–5 ml air through the open female port. When the balloon stays inflated for a reasonable period, it is deflated and the apparatus is prepared for gas sterilization.

When the patient is prepared for epidural anesthesia, the needle is advanced until it is supported by the spinous ligaments. The balloon on the three-way stopcock is inflated with 3–5 ml air from a sterile syringe and the directional arm turned to close the balloon port. The stylet is removed from the epidural needle and the stopcock is attached firmly. The directional arm is then turned to close the open female port, thereby opening the balloon to the epidural needle. When the balloon deflates slowly the needle is probably too superficial. When the needle placement is proper the balloon will stay inflated. Upon entrance into the epidural space the balloon will suddenly deflate, pushing the dura away from the needle point.

We have used this technique on numerous occasions and have found it to be well accepted by the house

staff. We have had no accidental subarachnoid puncture.

The balloon stopcock is easy to construct and simple to use. We believe there are several advantages to this technique. It is sensitive, the epidural space is dramatically indicated, and it allows the use of both hands for the control and slow advancement of the needle. There is no need to remove the stopcock from the needle until a continuous catheter has been placed or a single dose of local anesthetic has been injected.

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## “Self-taming” of Succinylcholine-induced Fasciculations and Intraocular Pressure

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Induction of anesthesia with a thiopental–succinylcholine sequence followed by endotracheal intubation is a commonly used technique. Succinylcholine (SCh) increases intraocular pressure (IOP).<sup>1–7</sup> This effect can be reduced by pretreatment with nondepolarizing muscle relaxants,<sup>3,7</sup> but such pretreatment delays onset of and increases resistance to the SCh-induced block.<sup>8,9</sup>

Baraka<sup>10</sup> reported the “self-taming” of SCh-induced muscle fasciculations by a small dose of SCh used as pretreatment before a subsequent full dose. Utilizing this technique, succinylcholine-induced changes in intraocular pressure were studied.

#### MATERIALS AND METHODS

A Schöitz tonometer was used to measure intraocular pressures before and after anesthesia in 25 female patients, 16–40 years old, operated on for gynecologic problems. Lidocaine, 4 per cent, was instilled

for corneal analgesia. Premedication consisted of diazepam, 10 mg, im, given 30 to 45 minutes before operation. Atropine, 0.65 mg, was given iv simultaneously with thiopental. Intraocular pressure in each eye was measured: 1) before induction of anesthesia (control); 2) 2 min after administration of thiopental (5 mg/kg); 3) 1 min after the initial dose of SCh (10 mg); 4) 2 min after the full dose of SCh (1 mg/kg); 5) after endotracheal intubation; 6) after return of spontaneous respiration.

In 15 healthy patients (Group I) measurements of intraocular pressure were made as described above. In ten healthy patients (Group II), control readings of intraocular pressure were obtained after giving an additional 10 mg diazepam iv. In addition, in three children with buphthalmos, aged 2 to 10 years, the same technique was followed but diazepam was avoided. The initial dose of SCh given to children was a fifth the total dose. Control values of intraocular pressure could not be obtained in these glaucomatous patients. Effects of this regimen on pulse, blood pressure, and fasciculations were recorded. Post-succinylcholine muscle pains were assessed postoperatively.

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