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*In reply:*—The criticisms by Dr. Lees of our computerized anesthesia record are based mainly on some commonly held misconceptions. We think that he would be convinced his search for the computerized anesthesia record has ended if we could dispel some of these misconceptions.

In regard to the RS-232 interface, standards have been established by the Electronics Industry Association (EIA) that go beyond just matching plugs but extend to communications protocols, which include signal voltages, frequencies, and data formats. A number of monitor manufacturers are making available interfaces in compliance with these standards. United Medical Technologies customizes the program to the protocol, data format, and information content offered by the manufacturer. As a result, and contrary to the implications of Dr. Lees' criticism, the operation of the RS-232 interface is completely transparent to the user.

As for the difficulty of manual data entry, this is a matter of individual ability. In any case, it comes down to exchanging keystrokes for pen strokes.

The plotting time for the entire record depicted in our article was 14 min, starting from a blank sheet of paper. With reduced information content, the plotting time is less. It may be tedious to watch the plotting process, but it does work unattended. United Medical Technologies now has a version of the program that runs on IBM® compatible computers. These can accommodate up to four RS-232 interfaces, which allow one interface to communicate with the monitor and another to communicate with the plotter so that plotting can be done during the case. Plotting time then becomes inconsequential.

The accuracy referred to in our letter indicates the preciseness with which the plotter can produce points on a calibrated grid. No claim was made or could reasonably be inferred that this could make up for

errors in transducer function or poor manual techniques of blood pressure acquisition. There still needs to be a doctor in the house.

Entries to be made in any order at any time naturally refers only to information that is known. Prior to the case this would include patient name and preop data, OR team, and anesthesia plan. This certainly could not include information only obtainable during the case, though this can be recorded after the fact if necessary. Condition of the patient in recovery and last details of the record are usually inserted after the case is over.

It is obvious that a good record cannot cover up a bad anesthetic. This was not stated nor implied. This does not, however, minimize the importance of a well-kept record.

The FDA has been contacted to determine whether this computer application requires premarket notification under regulation 510(k). No determination has yet been made.

A demonstration disc that runs on IBM®-compatible computers is available from United Medical Technologies for those interested in testing the system. We invite Dr. Lees to try it. He may like it.

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## Bilateral Amaurosis Following Unilateral Retrobulbar Block

*To the Editor:*—Numerous complications of retrobulbar block have been described, including brain stem anesthesia with unconsciousness and apnea,<sup>1,2</sup> grand mal seizures,<sup>3</sup> retrobulbar hemorrhage,<sup>4</sup> elicitation of the oculocardiac reflex,<sup>4</sup> toxic reaction from intravascular injection,<sup>4</sup> central retinal artery occlusion,<sup>4</sup> optic nerve neuropathy,<sup>4</sup> and perforation of the globe.<sup>5</sup> The follow-

ing is a case of transient bilateral blindness following unilateral retrobulbar block, which we have been unable to find previously reported in the literature.

The patient was a 67-year-old, 66-kg male who was having repair of a leaking corneal suture line of the left eye. The patient had undergone a left corneal transplant for an infected perforated corneal ulcer under uneventful

isoflurane-N<sub>2</sub>O-fentanyl anesthesia, 11 days before admission for the present surgery. Physical examination was unremarkable, including no detectable carotid bruits. Laboratory data were all within normal limits.

After 5 mg nalbuphine iv and block of the orbicularis oculi muscle, the surgeon administered a retrobulbar block behind the left eye. He first injected 1.5 ml of a lidocaine/marcaine mixture (2% lidocaine, 0.75% marcaine, 50:50). As the block had not seemed to work after a few minutes, he injected an additional 0.75 ml of the mixture. Adequate anesthesia was established, and the patient was draped. During the 12-min procedure, the patient's vital signs remained stable. When the drapes that had been covering the right (unoperated) eye were removed, the patient reported that he could not see anything. The pupil of the right eye was mid-position and fixed, funduscopy revealed no apparent abnormalities, corneal reflex was intact, and movement of the globe was intact. He had no other neurologic deficits by physical examination.

Eighty minutes after the block the patient reported that he could perceive light with his right eye. Fifty-five minutes later the patient was able to read small print, and by examination, vision had returned to preoperative values of 20/25 right eye, 20/200 in the left eye. Confrontation visual fields were intact, and vision remained intact, bilaterally, through hospital discharge the following day.

Although the initial differential diagnosis included occipital ischemia and ophthalmic transient ischemic attack, the pupillary examination, time course, and progression of improvement suggest anesthesia of the contralateral optic nerve by the retrobulbar block. Possibly the initial 1.5 ml was injected into the left optic nerve sheath and tracked back to the optic chiasm. This would explain the failure of the initial injection to anesthetize the ipsilateral globe and paralyze the extraocular muscles. As the patient's vision in the left eye was already distorted by preexisting ocular disease, he might not have perceived any changes with the initial injection.

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The recommended amount of local anesthetic mixture for retrobulbar anesthesia is 2-3 ml<sup>6</sup> and brain stem anesthesia has been reported with suspected subdural (via optic sheath) injection of this amount (although in the case reported by Chang *et al.*,<sup>1</sup> 8 ml was used). The slightly smaller amount in this case might have been sufficient to track back to and affect the chiasm and, therefore, the right optic nerve without affecting the brain stem.

The incidence of complications with retrobulbar block is very small, but the ophthalmology/anesthesia care team needs to remain aware that such complications can, as in this case, be very dramatic.

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### Accidental Epidural Overdose of Hydromorphone

*To the Editor:*—Respiratory depression after epidural narcotic administration has been recently reviewed.<sup>1</sup> The margin of safety and optimal dose of narcotic have not been determined. A recent case report suggests that in some patients the margin of safety may be extremely

high.<sup>2</sup> Our experience in one case supports this conclusion.

A 17-year-old female patient with steroid dependent asthma since age two years was admitted for surgical correction of severe reflux esophagitis. Medications in-