worth while to determine whether butyn was a useful and desirable local anesthetic for injection in oral surgery. It was also thought important to ascertain to what extent the added systemic toxicity, which butyn possesses, modifies the clinical results obtained under conditions of dental practice, and whether this toxicity is great enough to counterbalance its greater anesthetic power. . . .

"Butyn, 0.75 per cent, was compared with procaine, 2 per cent, in 231 patients subjected to oral surgical operations, using the 'blind test' procedure. The same volumes of the solutions were required, the speed of onset of anesthesia was the same, but butyn-anesthesia persisted approximately one hour longer than procaine-anesthesia. Both solutions modified the pulse rate, blood pressure and respiration in similar degree and in the same direction; therefore, there was no difference between them as regards these functions. The injection of butyn caused pain in about four times as many patients as did the injections of procaine; this indicating that the butyn was somewhat more irritating to the tissues when first injected. Incomplete anesthesia occurred somewhat more frequently with butyn than with procaine but the difference was too small to be significant. The amount of bleeding during the operation was much the same with the two solutions, indicating that neither had an advantage in this respect. Perspiration was produced by procaine injection in 18 per cent of the patients, as compared to 30 per cent by butyn. Nervousness occurred in 34 per cent of the procaine-cases as compared to 53 per cent of the butyn. Faintness occurred in 5.8 per cent of the procaine-cases, and in 15.1 per cent of the butyn. These results indicate that butyn injection had reactions much more frequently than did procaine during the course of the operation. However, in spite of these differences, the operators thought that anesthesia was satisfactory in 78.7 per cent of the butyn-cases as compared to 83.9 per cent of those receiving procaine. During the postoperative period, pain and swelling at the site of the injection, trismus of the muscles from irritation and inflammation at the operative site were similar after the two solutions, within the range of individual variations. However, septic alveolus occurred in 15.6 per cent of the patients receiving butyn, and in only 7.9 per cent of those receiving procaine, indicating possibly another undesirable action of butyn. . . . Butyn would seem to have no advantage over procaine sufficient to outweigh its potential disadvantages, and procaine remains the anesthetic of choice for injections in dental local anesthesia. However, if there is a definite reason that procaine should not be used, butyn can be injected with assurance that it will be an effective and relatively satisfactory local anesthetic solution." 4 references.

J. C. M. C.

BURSTEIN, C. L., AND ROVENSTINE, E. A.: *Toxicity of Intravenous Paraldehyde.* Proc. Soc. Exper. Biol. & Med. **48**: 669 (Dec.) 1941.

Intravenous paraldehyde for anesthesia of short duration has been frequently advocated by clinicians. The rapid induction and recovery following its use have suggested the impression that it is without toxic effects. We have attempted animal experiments in an effort to study the toxicity of this drug after intravenous administration. The drug was injected undiluted, 0.5 cc. per second.

Our results indicate a low margin of safety. The Minimum Anesthetic Dose rather closely approximates the Minimum Lethal Dose in cats, dogs and rabbits. Animals recovering from anesthetic doses looked poorly. After one

week autopsy revealed multiple pulmonary hemorrhages. When death occurred six to twenty-four hours after anesthesia, acute pulmonary edema was evident. Those dying within ten minutes showed massive pulmonary hemorrhage.

Other observations were directed toward respiratory and circulatory reactions. In accord with clinical reports the respiratory rate was increased, though breathing became more shallow. Coughing was seen frequently and cyanosis was noted. Arterial blood pressure decreased and the pulse rate became accelerated.

The intravenous administration of paraldehyde as recommended for clinical anesthesia is not without danger.

R. D. D.

RHOADS, JONATHAN, AND LEE, WALTER ESTELL: *The Advantages of Combining Local Infiltration Anesthesia with Controlled Fractional Spinal Anesthesia in Substandard Surgical Risks.* Ann. Surg. **115**: 156–158 (Jan.) 1942.

Occasionally, in the practice of most surgeons, celiotomy must be performed upon patients who are bad risks for any type of anesthesia. When the character and the site where the proposed procedure is to be carried out are accurately known, it is usually possible to employ local anesthesia, which most physicians will agree entails the least risk for the patient.

Unfortunately, it is sometimes impossible to arrive at an exact diagnosis preoperatively and there are other cases in which one can feel reasonably certain of the diagnosis but in which the possibility of error persists. In such instances, and in bad risk patients, one is confronted with the following dilemma: On the one hand spinal anesthesia may be employed which will provide adequate exposure for whatever is encountered but entails considerable risk for patients with impaired circulation. On the other hand, local anesthesia may be used which will too frequently have to be supplemented with an inhalation anesthesia if the exposure and relaxation are not adequate. This often means a deep ether anesthesia with a difficult induction after the peritoneum is opened.

The use of Lemmon's apparatus for controlled fractional spinal anesthesia makes it possible to avoid the dilemma. The spinal part is done, the point of the needle is left in place within the subarachnoid space, and the other end connected by rubber tubing to a syringe containing 500 mg. of procaine hydrochloride dissolved in 10 cc. of spinal fluid. However, none of this solution is administered at once. Instead, the operation is begun under local anesthesia, exposing the patient to the minimum risk in opening the abdomen. After the abdomen is open, if the procedure can be satisfactorily completed under local anesthesia, no spinal anesthesia is given. If, on the other hand, the necessary procedure requires extensive exploration and more relaxation, spinal anesthesia may be given in its safest form and maintained during such part of the procedure as is necessary. If it does cause a substantial drop in blood pressure, and this cannot always be avoided when the patients are on the verge of shock, the withdrawal of spinal fluid will usually shorten its action. We have used continuous spinal anesthesia for nearly all abdominal cases except appendectomy during the past fifteen months. There have been no table deaths, relaxation has been as perfect as with nupercaine, the anesthesia has been conducted as long as four and one-half hours, patients have been encountered who required several hundred mg. of procaine hydrochloride, while others have been anesthetized to the costal margin with