inge. A boiled syringe is used and with its needle is carefully cleansed by repeated aspiration of sterile water between each case. . . . The longest time a bulk solution has been in use is 16 days. In this time no loss of potency has been observed, and only the faintest cloudiness has appeared in the solution. All the anaesthesias conducted with the solution have been satisfactory at the time and postoperatively. A sample of the solution left over after 16 days remained sterile after a week's incubation. . . . Washings of sterile water from a syringe used for the whole of a morning session in the theatre gave no growth of pathogenic organisms on 14 days' incubation."

J. C. M. C.

KENNEDY, R. L.: *Pentothal Sodium Anesthesia.* J. M. A. Georgia **33**: 327–330 (Nov.) 1944.

"During the past three years we have employed the intermittent intravenous administration of pentothal sodium for anesthesia in more than 4,000 operations. These operations have consisted of both minor and major procedures and the period of anesthesia has varied from five minutes to two and one-half hours. No deaths attributable to the anesthetic agent have occurred in this series. A 2.5 per cent solution of pentothal sodium is used. . . . Preoperative sedation is generally recommended and used prior to intravenous pentothal sodium anesthesia. It is our usual practice to administer one 1½ gr. nembutal capsule at bed time on the night preceding the operation. . . . The dose of nembutal is repeated on the morning of the operation one or two hours prior to the scheduled time of operation. One-half to one hour before transfer to the operating room a hypodermic injection is given of a solution containing morphine sulfate gr. ⅛ to ¼, atropine sulfate gr. $\frac{1}{150}$ and strychnine sulfate gr. $\frac{1}{60}$. . . . In addition to using pentothal sodium or pentothal sodium-oxygen as the sole anesthetic for minor and major surgery we have used pentothal sodium for induction of anesthesia to be maintained by ether and have found light pentothal sodium anesthesia a valuable supplement and complement to spinal anesthesia. We have also employed pentothal sodium administered rectally for basal anesthesia in children with excellent results."

J. C. M. C.

NARAT, J. K., AND GIRALDI, ERNEST: *Intravenous Anesthesia in Major Surgery: Use of One Per Cent Solution of Pentothal Sodium.* Am. J. Surg. n.s. **66**: 178–181 (Nov.) 1944.

"A critical analysis of intravenous anesthesia with the short-acting barbiturates shows that this method represents an outstanding advance in anesthesiology. . . . On account of variations in individual tolerance, the originally recommended injection of one calculated single dose was replaced by the intermittent mode of administration of fractional doses of a 5 per cent or 2½ per cent solution. However, three disadvantages of the intermittent method may be pointed out: First, clogging of the needle may occur since the solution is not flowing continuously. . . . Second, the intermittent mode of intravenous administration of an anesthetic may be compared with driving a car by stepping on the accelerator from time to time, instead of exerting a steady pressure on it. It is obvious that it is more difficult to maintain a uniform level of anesthesia with an intermittent method than it is with a continuous drip. Third, the anesthetist must manipulate the apparatus at frequent intervals while injecting the anesthetic solution and does not have both hands free for administration of oxygen, recording the

blood pressure, etc. All three drawbacks of the intermittent method are eliminated by the continuous drip. As to the concentration of pentothal sodium, the experience proved that 5 or 2½ per cent solution can be replaced as a routine by a 1 per cent solution, thus diminishing the danger of phlebitis. . . . The evening before the operation one of the customary hypnotics is given by mouth. One hour before the operation the customary dose of pantopon and atropine or morphine and atropine is administered subcutaneously. . . . An amount of 1 per cent pentothal sodium solution sufficient for the entire schedule of operations is made up in the morning, calculating approximately 1.5 Gm. of pentothal sodium per patient. The drug is dissolved in sterile normal saline solution. . . . Approximately 150 cc. of the solution are placed in an open 200 or 300 cc. burette or salvarsan tube suspended from a stand. The burette is supplied with approximately 90 cm. long rubber tubing interrupted by a Murphy drip glass tube and equipped with an adjustable clamp which controls the rate of flow of the solution. The distal end of this tubing is equipped with a Luer metal adapter which is connected with another adapter attached to a 30 cm. long ¼ inch tubing. The distal end of this tubing is mounted with a glass adapter to which a No. 20 gauge, short bevel, one inch long needle is attached. The reason for using two tubings instead of one is that the same burette with the attached tubing may be used for one operation after another, and only the above mentioned second or distal ¼ inch tubing with glass adapter and needle is changed. In this manner blood, which could have entered the tubing, cannot be transferred from one patient to another.

"A fairly rapid flow, averaging 100 to 150 drops per minute, is used to induce sleep. As soon as the patient loses consciousness, his jaw is relaxed, the respirations become shallow and the eyelid reflex is abolished, the rate of flow is reduced considerably so that the drip becomes as slow as 4 or 5 drops per minute. The depth of respiration is the main guide in determining the level of anesthesia. No set rules as to the rate can be given because pentothal sodium like any other anesthetic should be administered in accord with the individual's needs. As soon as the patient is asleep, pure oxygen is administered for approximately one minute and from that time on throughout the operation a mixture of equal parts of oxygen and nitrous oxide is given by a closed method. . . . If the relaxation obtained in this manner is not satisfactory, nitrous oxide is replaced by cyclopropane. . . . Helium is also administered if the patient has a dusky appearance, or it is added to the oxygen toward the end of the operation to bring the patient out of deep anesthesia. When the peritoneum is being closed, the intravenous administration of pentothal sodium may be discontinued if the abdominal wall is well relaxed. After the patient has consumed approximately 1.5 Gm. of pentothal sodium and is well relaxed, but the operation is not yet finished, enough saline solution is added to the burette to transform the 1 per cent solution into a ¾ or ¼ per cent solution. In patients who are poor risks the entire anesthesia may be carried out with a ½ or ¾ per cent solution. Furthermore, 1 cc. of coramine or metrazol may be added to the solution in such cases at the onset of the anesthesia. A free airway must be maintained at all times. . . . As a rule, patients wake up within the first two hours after the operation. Headaches are very rare, nausea and vomiting are hardly ever observed and, therefore, fluids can be taken by

mouth much earlier than after an exclusive inhalation anesthesia, and the postoperative use of sedatives is curtailed. . . . The blood pressure usually drops during the induction; the initial drop may reach 40 points, but during the rest of the anesthesia it remains on the normal level or stays 10 to 20 points below it. The average amount of pentothal sodium used in the reported series of major operations was 1.0 to 1.5 Gm., but in exceptional cases the total dose reached 2.5 Gm. . . . Clinical experience in 1,462 consecutive cases showed the intravenous administration of a 1 per cent solution of pentothal sodium by continuous drip to be a dependable method of anesthesia which can be employed in practically all fields of major surgery." 4 references.

J. C. M. C.

HELM, J. D., AND INGELFINGER, F. J.: *The Effect of Spinal Anesthesia on the Motility of the Small Intestine.* Surg. Gynec. & Obst. 79: 553–556 (Nov.) 1944.

"Spinal anesthesia is generally believed to stimulate intestinal motility. This effect has been noted both clinically and experimentally under a variety of conditions, but the results have not been wholly consistent. Our observations show that under actual operating conditions, spinal anesthesia has little effect on the motor activity of the intact human small intestine. . . . Balloon kymograph records of the motility of the human small intestine were taken before and during 11 abdominal operations. In patients receiving the usual preoperative medication, spinal anesthesia did not increase the ability of the small bowel to contract against a mild distending force. The results suggest that under certain conditions spinal anesthesia is not a very potent means of stimulating human small intestinal motility, and furthermore that its effect on the small bowel is abolished by moderate doses of morphine and scopolamine." 23 references.

J. C. M. C.

MAGNANO, JOSEPH: *Continuous Spinal Anesthesia—Observations on 1,000 Cases.* Connecticut State M. J. 8: 743–747 (Nov.) 1944.

"Since 1928 we have used spinal anesthesia, in the Middlesex Hospital in Middletown, Conn., in over 8,197 cases. Six thousand of these cases were done under 'one dose' spinal anesthesia and 2,197 cases under continuous spinal anesthesia according to the method of William T. Lemmon. . . . It is our opinion that procaine hydrochloride (novocain or neocain) is the least toxic, both clinically and experimentally, of all drugs to produce spinal anesthesia. . . . We present at this time a report on the first 1,000 cases in which the method has been employed. In each instance the operation was begun and finished under spinal anesthesia, but in the longer procedures we had to supplement the spinal with pentothal sodium. . . . The oldest patient in this group was 90 years old. The youngest patient was 15 days old. . . . A subtotal gastrectomy required 6 hours of anesthesia. The shortest procedure took about 5 minutes for an incision and drainage of an abscess. . . . The smallest dose was 37.5 mgs. of 2½ per cent for release of volvulus in a 15 day old child. The largest dose given to any one patient was 1450 mgs. . . . In 406 appendectomies the average dose of novocain used was 157 mgs. . . . In 51 cholecystectomies, the average dose of novocain administered was 283 mgs. . . . In this series, 76 cesarean sections were done under continuous spinal. . . . The incidence of headache in this series was 5.8 per cent. . . . Urinary retention requiring catheterization occurred in 9.6 per cent of the cases in