found to be a McKesson of the type probably used at Gettysburg. Ether was frowned on because it is inflammable. . . . Chloroform, yes; but when we unpacked it, it turned out to be a Bard Parker solution. All of which simmers down to what could be used, namely—the three types of anesthesia—spinal, local, and intravenous, with various combinations of each. By going through all of the surgical supplies we found some Pilling silver continuous spinal needles, but no one-way syringes or mattresses for same. The American sailor is a resourceful individual, so when we told the mechanics in the gear locker what was wanted, they rigged up a one-way syringe by means of a ball-bearing taken from a junked plane and a pad made from three narrow mattresses, covered with canvas and a notch cut in the side. Crude, but extremely serviceable, and from these models many others were made. Pentothal sodium was easier—we simply started intravenous glucose or saline, and added the pentothal in 5 per cent solution until the desired depth of anesthesia was obtained. Many of the patients were in shock; thus two purposes were served. The only disagreeable feature is that all litter bearers are equipped with morphine syrettes and think nothing of giving a grain or more if it was felt the patient needed it. Oftentimes only 2 or 3 cc. of the 5 per cent solution was needed after such a heavy dosage of morphine. A bombing or shelling might be going on at the same time as surgery; so, to prevent the needle being jarred out of the vein, we devised a canvas sleeve into which the patient’s arm was placed, and an opening through which the syringe and needle were secured. On numerous occasions it was impossible to find a vein due to exsanguinated condition of the patient. In these cases, we injected the glucose, plasma and whole blood directly into the corpus cavernosum of the penis. It’s surprising how few sloughs we got. Local anesthesia was used whenever possible. All patients had been liberally subjected to sulfanilamide in dosages far above those used in the States. It is my understanding that some experimental work is now being done on the hazards of novocaine and pentothal in the presence of this drug. If this is true, we did not recognize it. Many had been given atabrine and quinine prophylactically for malaria. It is doubtful if these influenced the anesthetic in any way. . . . Several times we were called to give anesthetics to wounded Japanese. Experience quickly taught us not to entrust this to any of our Marine corpsmen.”

J. C. M. C.


“Curare has been used in the physiological laboratories for a great many years as an agent which paralyzes muscle. Its action is at the myoneural junction. So far as has yet been found, it has no other effect upon the nervous system. . . . We started the use of curare as an adjuvant to general anesthesia at the University of Minnesota Hospitals in May, 1943, and have used it in about 250 cases at the university Hospitals and other hospitals in the Twin Cities. Like all drugs which anesthetists use, curare has a progressive effect upon different parts of the organism. One group of muscles after another is affected. The muscles of the throat are affected among the earliest, so that the swallowing reflex is impaired. The conscious animal becomes unable to swallow saliva. It tends to run into the larynx and trachea. The animal then becomes unable to cough and thus extrude this foreign material. Muscles of the extremities
then become weakened and paralyzed so that the animal is unable to walk and falls down. The muscles of the trunk then lose their tone. Costal breathing becomes impossible, and the abdominal muscles become flaccid. The last effect is then upon the diaphragm, and when this becomes paralyzed respiration of course ceases and death ensues. Each one of these effects takes place in progression as the dose is increased until it reaches the lethal dose. . . . When general anesthesia is very light and reflexes of the pharynx and larynx are in evidence with a tendency to pharyngeal and laryngeal spasm and partial respiratory obstruction, one of the first results of curare noticed is the release of this spasm. . . . The next very evident effect is the relaxation of the abdominal muscles. This relaxation compares very favorably with the relaxation obtained by spinal anesthesia. The abdominal muscles of course are in the same group with the intercostal muscles, being supplied by the same nerves and therefore being susceptible to the same dosage of any general anesthesia, and now susceptible to the same dose of curare. Most surgeons realize with their anesthetists that when complete abdominal relaxation is obtained the intercostal muscles are at the same time paralyzed, so that breathing is then carried on by the diaphragm alone.

"When now we use curare we must realize that the same thing takes place. Intercostal muscles cease to move when the abdomen is well relaxed. The next step in dosage also paralyzes the diaphragm, and respiration ceases. The dose must be planned and administered so that this last does not happen. However, if the dose should be miscalculated, the patient is well cared for by hand compression of the breathing bag to produce each inspiration. I believe that curare should never be given unless the anesthetist knows that the mask can be fitted perfectly and the jaw and tongue can be well supported, so that this type of artificial respiration can easily be carried on. The alternative of this is the use of an intratracheal tube. One feels perfectly assured of his ability to carry the patient through this event if he has good means of artificial respiration for a period of five to ten minutes. Prostigmine is the drug antidote. . . . The average dose of curare ranges from 60 milligrams to 100 milligrams, according to the size and vigor of the patient and the depth of anesthesia when the curare is administered. It is administered intravenously. The full effect takes place in from forty to sixty seconds. In the beginning of our use of curare, we tried to estimate the dose needed and then to give the whole amount at once. It was in the early cases that we had the three arrests of respiration. It is now our custom to start with no more than 60 milligrams, and in case of rather frail patients 40 milligrams, then to wait with the needle in the vein for at least one full minute, and if the relaxation does not appear to be sufficient we add about 20 milligrams at a time until relaxation is complete. A convenient technique is to inject it into an already set-up intravenous drip tubing close to the needle. General anesthesia may be very light so that when the peritoneum is opened the abdominal contents are actually extruded. When curare is administered at this time, it is quite dramatic to see the viscera recede within the peritoneum.

"The action of the drug is of rather short duration, and another dose must be administered in from twenty minutes to an hour and a half. The clever anesthetist is able to keep the general anesthesia very light so as to actually have need for additional curare. It
is rather easy to allow the administration of the general anesthetic to proceed so that sufficient relaxation is maintained without more curare. This is what we should avoid. The patient recovers from curare without the slightest depression. Our object is to avoid the depressing effect of deep general anesthesia. Although the duration of the curare effect is usually as stated above from twenty to ninety minutes, it should never be repeated according to lapse of time but only as the signs of receding effect appear. Then the second and ensuing doses should be smaller than the first. . . . It seems that curare bids fair to replace not only a great deal of deep ether anesthesia but a great deal of spinal anesthesia as well.” 5 references.

J. C. M. C.


“I offer this paper with a certain feeling of apology. I have no illusions about my being one versed in the art of anesthesia. However, I have two reasons for presenting it. In the first place, I should like to express the satisfaction and the feeling of safety that this type of anesthesia has given me after many years of experience with the one dose of spinal anesthesia and, secondly, to demonstrate the method of introducing the soft malleable German silver needle that I have been using. This has made easier for me the only really difficult part of the procedure. Since January, 1930, when I first joined the surgical service of the Veterans Hospital and including the last four months since I left it, spinal anesthesia was used on 8,140 occasions. To a certain extent we were forced to spinal anesthesia. For, strangely enough, the Veterans Administration which, prior to the war, was probably the largest medical organization in the world, hires no trained anesthetists. . . . Often I have been amazed by the relaxation that can be obtained and the comfort that can be given to a patient by the use of local and splanchnic novocaine as an adjunct to a waning spinal anesthesia, when injected sub-peritoneally, intramuscularly, and into the splanchnic area, by the method of Farr and Maxeiner. Large wheals of novocaine placed into the gastro-hepatic and other mesenteries gravitate back into and anesthetize the splanchnic plexus. . . . In 1939, Lemmon reported 100 cases of what he calls by various names—continuous, serial, fractional, controllable, intermittent spinal anesthesia. . . . Since June of 1943, we have used this method in 105 cases and, for the most part, have been well pleased with it. We have limited its use to what we expected would be a long or difficult case, or to the poor-risk patient where we felt spinal anesthesia would be more suitable than inhalation or intravenous anesthesia. . . . We have followed Lemmon’s advice in regard to the drug to use and have limited ourselves to novocaine exclusively. . . . The only real difficulty in continuous spinal is the introduction of the soft flexible German silver needle. Most authors whom I have read, recommend the use of a Sise introducer to puncture the skin and the interspinous ligament. This then is removed and the soft needle is put through the tract that this leaves. I have been using a different technique. Instead of pulling the introducer out I leave it in and make the spinal puncture through the introducer. After spinal fluid is obtained, the introducer is withdrawn from the skin or at least into the subcutaneous fat where it is left to stay hanging around the spinal needle. This withdrawal is a very essential step. One dare not leave the introducer in its original position in the interspinous ligament. Any mo-