required an infusion of dilute plasma later." Bibliography—18 references.

J. C. M. C.

LUNDY, J. S., and SELDON, T. H.: *Devised to Prevent Gas Mix-ups.* Mod. Hosp. **55**: 96 (Sept.) 1940.

"In order to eliminate the danger of attaching a tank of gas, such as carbon dioxide, to the yoke reserved for one of the anesthetic gases or oxygen, a special arrangement has been used for several years at the Mayo Clinic. The strainer nipple in the oxygen yoke of each gas machine has been enlarged, and the port in the valve of the oxygen cylinder, into which the strainer nipple is placed, has been correspondingly enlarged. The air-tight fit is accomplished by forcing the face of the valve up against the lead washer, which is held in place by the strainer nipple against the face of the yoke. This arrangement allows the oxygen cylinder to be used on any hanger yoke but, in the gas machines at the clinic, effectively precludes the placing of a cylinder of nitrous oxide or other anesthetic gas on the oxygen side of the machine with the possibility of resulting disaster. The cylinders for oxygen are built so that they are still adaptable to other types of oxygen yokes and can be used if they are sent to some institution that does not have this especially arranged yoke.

"The arrangement of the carbon dioxide yoke has been changed by removing the strainer nipple from the yoke and inserting it into the port in the valve of the cylinder of carbon dioxide. Just as there is a lead washer on the oxygen cylinder and yoke, so we have a lead washer to make an air-tight fit when the face of the valve is forced against the lead washer and yoke. This device makes it impossible to hang any cylinder in the carbon dioxide yoke except one in which the nipple is inserted into the face of its valve and also makes it impossible to hang a cylinder of carbon dioxide on any but the carbon dioxide yoke of the gas machine. . . .

"It is not our practice to keep the cylinders of gases that are used only occasionally in their yokes on the anesthetic gas machines. When a special agent, such as cyclopropane, is specifically indicated, the cylinder containing it is attached just before it is used."

J. C. M. C.

KENNEDY, F. J., AND BURFORD, G. E.: *Sudden Cardiac Arrest Under Anesthesia.* New York State J. Med. **40**: 1667–1669 (Nov. 15) 1940.

"A well-developed white man, aged 33, was admitted for right inguinal herniorrhaphy. . . . The patient was a severe chronic alcoholic. . . . He was apprehensive about an operation. Morphine sulfate grain ¼ and hyoscine hydrobromide grain $\frac{1}{150}$ were given one and one-half hours before the induction of anesthesia with satisfactory sedative effect, though he was still awake on coming to the operating room. Blood pressure taken then was 98/64. Anesthesia was started with nitrous oxide and ether at 10:25 a.m. and produced excitement immediately. This subsided shortly, but a prolonged second stage could not be avoided. The incision was made at 10:45 a.m. Up to within two minutes of that time the patient had moved his legs. One-half ounce of ether had been used. The color was good, but periods of cyanosis had previously occurred. . . . About two and one-half minutes after the incision was made, the pulse and respiration ceased almost simultaneously. The color, which had been satisfactory, changed to ashen gray in his face. A mottled cyanosis soon appeared, particularly on chest and arms. The cornea was dry and lusterless, with pupils three-quarters dilated. Artificial respiration with oxygen was

given continuously without difficulty. A pharyngeal airway was in place. Fifteen minims of 1/1000 epinephrine was given subcutaneously and 25 minims intracardially. No pulse was present or heart sounds audible during almost continuous observations. After five minutes, cardiac massage through an extra incision was considered, but held in abeyance. External cardiac massage was attempted without success. Fifteen minutes after the pulse beat had ceased, a left upper rectus incision was made and the heart was massaged. After compressing the heart four times, response suddenly occurred. A forceful heart beat and pulse returned, and the color changed to a bright pink. The pulse rate was 80; blood pressure was 64/40 on the first reading and 140/80 within a few seconds. No attempt to breathe was made. . . .

"The patient did not breathe spontaneously for sixty minutes. During the first forty minutes (including fifteen minutes before the heart resumed) artificial respiration with oxygen was carried out, with care taken to avoid hyperventilation. Five per cent. carbon dioxide in oxygen was then used for twenty minutes without effect. At the end of this time, 4½ cc. of coramine was injected slowly, intravenously. This produced a deep gasping inspiration which was followed by another in some thirty seconds. Thereafter, regular respiration continued but was abnormal. It was slow (about 10) but was very forceful and showed a flutter at the end of each deep inspiration. . . . The patient was returned to the ward and given oxygen continuously through an insufflation airway. Shortly afterward, slight convulsive movements of the extremities occurred. The abnormal type of respiration continued. A very faint corneal reflex was present at first; this disappeared after four hours. His blood pressure continued at 140/70 to 120/60 throughout the day, and his color remained good for about ten hours. Then his condition gradually became worse and death occurred twenty-two hours after onset, with a terminal temperature of 107 3/5 F. and a pulmonary edema. Autopsy showed severe cirrhosis of the liver and congestion of both lower lobes of the lungs. The heart appeared normal. . . .

"When the heart stops early in the operation and in light anesthesia, the diagnosis is fairly certain to be ventricular fibrillation. The other important cause of cardiac arrest under anesthesia is dilatation and failure from toxic overdosage of the anesthetic. Ventricular fibrillation, occurring in light anesthesia, is aided by a prolonged second stage of anesthesia such as often accompanies the induction of alcoholic patients. The vascular system is flooded with epinephrine of the individual's own manufacture as a result both of stimulation from excitement and from the effect of the ether. Further massive afferent stimulation, resulting from the incision, reflexly enhances the hyper-excitability of the cardiac muscle and sets the stage for ventricular fibrillation. . . . Following the sudden suspension of cardiac activity from any cause, epinephrine is almost universally used immediately. The value of this procedure in an anesthesia emergency occurring while the anesthesia is known to be light is seriously to be questioned. . . . On the other hand, the value of epinephrine when the heart has failed because of dilatation from toxic overdosage is well established. . . . When cardiac arrest occurs under anesthesia and an abdominal operation has not been planned, the responsibility of an important decision is placed squarely upon the surgeon and the anesthetist. . . . For those who saw this case, any future decision will be easier. Massage produced immediate resumption of the heart beat after fifteen minutes of si-

lence. . . . The time element is . . . all-important in making this decision. It should be done, certainly, within five minutes or will probably ultimately fail, whatever its temporary effect. . . . During respiratory arrest, the last thought and not the first should be the use of analeptics. . . . The effect for good of these drugs on the heart is seriously questioned in reported experimental and practical experience."

J. C. M. C.

DEPREE, J. F.: *Morphine-scopolamine Anesthesia—in First Aid Treatment of the Injured.* Indust. Med. **9**: 554–556 (Nov.) 1940.

"The use of morphine-scopolamine anesthesia has been described since 1904. It was popular in obstetric practice and was commonly referred to as 'twilight sleep.' In 1918 the use of this anesthesia was introduced at the Washington Boulevard Hospital by Dr. B. F. Lounsbury, former Chief Surgeon of the Milwaukee Railroad. It was found to be very satisfactory and was supplemented by nitrous oxide or ether when necessary; and it was used in almost all major and minor surgery including the emergency room in handling those traumatic cases which required general anesthesia. Its use has been continued up to the present time and covers approximately 16,000 cases. . . .

"Morphine-scopolamine has been given to patients of both sexes, and from the age of 12 years up. In the first aid room we are using it in treating those cases requiring an anesthetic such as fractures, dislocations, wounds requiring special care, and burns. When any person with such injuries is brought to the first aid room a careful examination is made to determine the extent of injury, identification for the record which is to be kept is made, and if the patient's general condition requires immediate treatment a hypodermic injection of morphine-scopolamine is given. The usual initial injection consists of morphine sulphate grain ¼, and scopolamine hydrobromide grain 1/150. In only the extremely young or aged is the dose smaller and then the dose is decreased to morphine grain ⅙ and scopolamine grain 1/100. During the subsequent thirty to forty minutes the patient is observed closely and if time is an important factor treatment is started using nitrous oxide and oxygen or ether or both. . . .

"In our experience most working men between the ages of 18 to 60 and weighing 150 to 200 pounds will require two injections of morphine grain ¼ and scopolamine grain 1/150 and a third of grain ⅙ and grain 1/100 respectively. Some men tolerate three large injections. Most women from 18 to 60 and weighing 120 to 150 pounds require one injection of morphine grain ¼ and scopolamine grain 1/150 and two injections of grain ⅙ and grain 1/100 respectively of each drug. Larger women require the same amounts as an average man. The injections are given 30 to 40 minutes apart and the patient is observed constantly during this time, a close watch being maintained on the pulse rate and the respiratory rate. The former is seldom affected, but there is usually a decreased respiratory rate and if it is down to 10 to 12 per minute no additional morphine-scopolamine is given. . . . In most cases no additional anesthetic is required, and the patient remains sufficiently narcotized for three to six hours to enable the surgeon to carry out the necessary procedures. Bibliography—4 references.

J. C. M. C.

SLAUGHTER, DONALD; PARSONS, J. C. and MUNAL, H. D.: *New Clinical Aspects of the Analgesic Action of Morphine.* J. A. M. A. **115**: 2058–2060 (Dec. 14) 1940.

"Morphine is considered the best pain-relieving drug which the clini-