

1914 to 1918 and the recent Spanish Civil War, and it has been predicted that it will be used more than ever in the present war. . . . The advantages of spinal anesthesia over other methods are that the period of hospitalization is reduced and, less nursing attention is required, the period of convalescence is shorter, the laryngeal reflex is preserved, pulmonary disease is feared less, muscular relaxation is good and there is an economy of personnel, time and money. . . . The intravenous administration of anesthetic agents is not new in military surgery, as it was attempted with ether and with alcohol many years ago. Intravenous anesthesia, however, has been used on a large scale only since the introduction of barbiturates in relatively modern times and has not been given a test during a major war. . . . Intravenous administration of barbiturates seems to be adapted to war surgery because of the rapidity of the induction and the emergence from the anesthesia, simple equipment for use, ease of administration and their non-explosive qualities which allow use of cautery. . . . Moore listed some of the complications encountered during or after administration of a 5 per cent solution of pentothal sodium to men wounded in battle. These consisted of muscular twitching, persistent cough, laryngeal spasm, poor airway for patients who have had large doses on return to the ward, numbness of arm attributable to solution in extravascular tissues, restlessness of patients who have received less than 15 cc. of a 5 per cent solution and thrombosis in the vein used for injection. Some contraindications for this type of anesthesia in war surgery are poisoning by asphyxiant gases, shock, hepatic and renal damage, difficulty in venipuncture in some cases, previous operations on the upper portion of the abdomen, hyperpnea, hypopnea and

long operative procedures. . . . Rectal anesthesia by means of avertin with amylene hydrate would not seem feasible close to the battle lines but may be of use in hospitals, stations and base hospitals. Its use is especially indicated for patients who have been poisoned with a vesicant or suffocating gas. Colonic ether-oil anesthesia has been found satisfactory for operations about the face. . . . Cyclopropane probably will not prove to be practical in the field, owing to its explosiveness and the technical difficulty of administration. It may be useful, however, in base hospitals, where conditions approximate more closely those of civilian practice. . . . The administration of gaseous anesthetic agents by means of an intratracheal tube has proved to be exceptionally adaptable to military use, especially for intracranial, thoracic and facial operative procedures. Although ethylene and divinyl ether have been suggested as possessing properties suitable for use in war surgery, they both present the same disadvantages as cyclopropane, without the latter's potency and low toxicity. Hypnotism has been suggested as a means of anesthetizing soldiers but is not advised for major surgical procedures." 169 references.

J. C. M. C.

BOURNE, WESLEY: *Anaesthesia in War Circumstances*. *Canad. M. A. J.* **46**: 241-245 (Mar.) 1942.

"While it is evident that the general principles of anaesthesia are not affected by the circumstances of war, it is equally evident that it is our duty assiduously to seek those means in anaesthesia which are especially suited to the exigencies of battle. . . . Wherein there is little or no shock, the subject of lesser lesions will have received, promptly for his pain, an opiate, with which it is well to give scopolamine to enhance its action, dispel fear and

cause amnesia. . . . Usually, in this class of case, in which muscular relaxation is not particularly required, it will suffice to use local infiltrations or 'nerve-block' injections of drugs like procaine; inhalations of nitrous oxide, cyclopropane, vinyl ether or ethyl ether; or, intravenous administrations of one of the shorter-acting barbiturates, such as pentothal. The selection will be influenced by the number of cases to be done, the number of anaesthetists, and the extent of the surgical facilities. The time factor may be important. . . . Casualties manifesting shock are to be handled with the greatest circumspection and with the least possible surgical intervention until the state of the blood circulation is restored. . . . With an adequate personnel in a well equipped unit, it is not difficult to decide on what anaesthetic drugs to use and what procedures to employ. . . . In pre-operative medication, it is customary to use one or more of the sedatives; morphine, dilaudid, a barbiturate such as nembutal or pentothal, avertin, and scopolamine or atropine. Usually, it matters little how these are combined. . . .

"So long as preliminary sedation has been made complete, the local and block types of anaesthesia may be considered almost ideal for operations on the head, neck and extremities; and even in the abdomen as well as the thorax, on those rare occasions when spinal anaesthesia may not be carried out on account of the inadvisability of moving the patient. The advantages of spinal anaesthesia are very great, especially on account of the muscular relaxation and the excellent recovery. . . . At present I favour the use of percaïne for spinal anaesthesia. . . . It should be evident that the intravenous method is not advisable for other circumstances than those of minor surgery; for war conditions, the giving of such a drug as pentothal

intravenously for an operation of more than twenty minutes, or to administer it fractionally, might well be objected to on the ground of too much detail. With regard to inhalation anaesthesia, although ether still has a definite place in surgery, although it may be used with relative ease and safety by those who are not too well experienced, and although, when better equipment is not at hand, it is quite permissible to give ether by the 'open drop' method; yet nowadays all surgical centres will have an adequate number of anaesthetic machines from which nitrous oxide, cyclopropane or ether may be administered alone or with one another. . . . Here let me say that there is no reason why the quality of anaesthesia as well as the ability of the anaesthetists should not be just as high and as great for surgical units of war time as they may be under any other circumstances. The best is none too good for those who fight for us. Before the operation is started the intravenous administration of fluids ought to be begun and continued throughout at a rate suitable to the state of the blood pressure and character of the pulse. . . .

"After operation for a severe injury the patient should be moved with the greatest gentleness, particularly in regard to the horizontal plane, and any desired change in position ought to be made very gradually. This significance concerns the circulation chiefly. Intravenous supporting fluids are to be given as frequently as indicated and to these may be added anaesthetic drugs, or pain-relieving drugs as required. Oxygen therapy should be kept up as long as respiration and circulation are depressed; this implies that the upper respiratory passages must be perfectly patent and that the gas be made moist. To lessen the likelihood of postoperative pulmonary complications, there should be some

change made in the patient's position every hour, he should be encouraged to breathe forcefully every hour, and carbon dioxide may be added to the oxygen occasionally. In order that invaluable information be not lost, and for the sake of uniformity, each surgical unit should be obliged from headquarters to keep records of each case, along standard lines, of all that specially pertains to anaesthesia." 9 references.

J. C. M. C.

BUTLER, T. C.: *The Delay in Onset of Action of Intravenously Injected Anesthetics*. J. Pharmacol. & Exper. Therap. 74: 118-128 (Feb.) 1942.

"The delay that occurs between the intravenous introduction of certain narcotics and the full development of their action has attracted relatively little attention and has not been satisfactorily explained. The first narcotic found to show this lag was  $\alpha$ -D-glucochloralose. . . . The only drugs that I have found to have this property are chloraloses and 5, 5-disubstituted derivatives of barbituric acid and hydan-toin. The lags of a number of these drugs have been measured at doses designed to give comparable depths of anesthesia. Among the eighteen 5, 5-disubstituted barbituric acids studied, it has been demonstrated that anesthetic dose and lag are associated properties, the more active drugs tending to have more rapid onset of action. This association might be explained if it were assumed that the delay is the time required for the drug to penetrate into or through the cell membrane, the more rapid penetration of the more active drugs being due to their greater relative solubility in the lipoids of the membrane. This hypothesis is inadequate to explain the unequal rates of onset of the antipodal arabinochloraloses. No reason is ap-

parent for the fact that the property of slow onset of action is limited to those chemical classes named." 15 references.

J. C. M. C.

LONG, C. H., AND OCHSNER, ALTON: *Intravenous Pentothal Sodium Anesthesia: a Review of the Literature*. Surgery 11: 474-495 (Mar.) 1942.

"The successful use of pentothal sodium as an intravenous anesthetic by numerous groups, and its recommendation by some as 'one of the most valuable advances in the science of anesthesia that has been made in recent times,' make a thorough consideration of this agent mandatory upon progressive anesthetists and upon surgeons who assume part of the responsibility of directing the anesthetic control of their patients. This review is made in an attempt to evaluate this anesthetic agent. Since it is the opinion of many pharmacologists that there is slight hope of producing additional effective members of the barbiturate group, pentothal sodium may remain the barbiturate most acceptable for anesthesia. Various intravenous anesthetic agents had been used prior to the introduction of sodium pentothal. . . . The barbituric acid compounds were first introduced as intravenous anesthetic agents in 1929 when an attempt was made to utilize sodium amytal. . . . Although pentothal sodium had been developed earlier, by Tabern and Volwiler, it first was used clinically by Lundy at the Mayo Clinic during the latter six months of 1934. Since that time he and others have reported its use in 54,851 cases with almost universal praise of its anesthetic properties. . . .

"Pentothal sodium, or sodium ethyl (1 methylbutyl) thiobarbiturate, owes its success as an anesthetic agent to the fact that like evipal it belongs to the group of so-called 'light' or short-