

quality of the drug, method of storing, method and quantity in which they are administered, the state of the patient's health, the presence of intercurrent complications, the nature of preliminary preparation and premedication, the duration of operation, and the means employed for elimination of the drug. As regards the preliminary treatment, the patient should be made as fit as possible to undergo the anesthesia. . . . In a healthy patient who has been properly prepared and suitably premedicated, the administration of pure anesthetic drugs should not cause toxic effects provided that the minimum quantity of anesthetic compatible with satisfactory muscular relaxation is not exceeded. Overdose, even with the use of weak anesthetics like N_2O , is harmful. To prevent overdose of any one particular anesthetic agent, the method of synergistic anesthesia is recommended, i.e. a combination of several hypnotic drugs which, according to Burg's law, causes a summation of effects and so results in a greatly enhanced narcotic effect than the mere use of one anesthetic agent alone even in a large dose. . . . For premedication, morphia has several disadvantages as it sometimes causes complications, viz. respiratory depression, vomiting, troublesome constipation, abdominal distention, headache, and interference with kidney secretion. Hence, recently other drugs have replaced morphine for pre-medication. . . . The use of suitable premedication lessens the dose of inhalational anesthetic, and so anesthetic toxicity is decreased. . . .

"To save the patient from the toxic effects and complications of anesthetics, the planes of the different stages of anesthesia should be skilfully regulated by deepening or lightening the anesthesia as required. According to 'the law of diminished resistance' the vitality of the patient is decreased as the anesthesia progresses, and therefore the amount and percentage of an

anesthetic vapor must be also proportionately decreased, otherwise there may be great depression of the vasomotor and other centers with fall of blood-pressure. . . . To lessen toxicity of inhalational anesthetics, it is necessary that they should be quickly eliminated from the system. Pulmonary ventilation should therefore be carried out, as soon as the operation is over, by the interrupted administration of CO_2 gas for a few minutes. . . . To safeguard against the occurrence of pneumonia, the use of heated anesthetic vapors is recommended particularly on cold days. Shipway's apparatus is quite useful. Care should be taken that when the patient is removed from the heated theater to his room he does not catch a chill in the escalator or through the cold corridors. Tight bandaging of the abdomen and over the lower ribs, intercostal paralysis after high spinal analgesia, conditions in which deep breathing or coughing gives pain to the patient, are apt to cause pneumonia and should be remedied. . . . Proper selection of the anesthetic and the method of its administration greatly decrease the risk of anesthesia, whereas any fault or irregularity may become manifest by any one of the danger signs of anesthesia as regards breathing, pulse, pupils, color, etc. To prevent complications the anesthetist should never wait for all the classical signs of the fourth or toxic stage to be present, but should be able to understand the significance of any single abnormality that may arise during conduction of anesthesia."

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LIVINGSTONE, HUBERTA M., LIGHT GERALDINE A., HEIDRICK, A. FAUSTEENA, AND KABLE, VERA N.: *Further Experience with Divinyl Ether (Vinethene) Anesthesia; Report on 2,050 Administrations*. J. A. M. A. 115: 1353-1357 (Oct. 19) 1940.

"Since vinethene has, in our experience, become increasingly popular, a

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report is being made of our clinical results. This study covers a total of 2,050 consecutive administrations. It was the only anesthetic used in 325 instances and was used as an induction agent preceding ether in 1,703 instances; the remaining twenty-two administrations represent vinethene inhalations supplemental to nitrous oxide-oxygen, ethylene-oxygen, avertin with amylene hydrate, and spinal or intravenous evipal soluble anesthesia. . . . Since vinethene was the only anesthetic agent employed in 325 instances, we feel that an analysis of these administrations is of particular importance. The patients ranged from 10 months to 61 years of age. . . . Myringotomies, extractions and incision and drainage of abscesses are particularly frequent, although a rather wide variety of minor surgical procedures is included. The preoperative condition of these patients was . . . variable. . . . Many patients received no premedication. Eight received atropine, four morphine and atropine, three atropine, three pentobarbital sodium and one each soluble phenobarbital, and codeine and atropine. It was found to be particularly unnecessary and inadvisable to give premedication to those patients who were to be ambulatory immediately after anesthesia. Increased salivation seemed to be much less frequent than when we first employed the drug in 1936. Salivation occurred occasionally, but much less frequently than with ether. Selective premedication may be employed, if desired, when patients are to be hospitalized. It is of interest to note that the one instance of nausea preceding anesthesia occurred in an adult after morphine premedication. . . . Anesthesia was induced by the open drop technic, using two thicknesses of cotton stockinet on a wire frame mask. It was felt that the surface on which the vinethene was dropped should not come

in contact with the skin or mucous membranes in order to avoid a burn. The correct use of a wire ether mask of a type corresponding to the Schim-melbusch mask, obviated this hazard. The eyes were protected with a moist pad of cotton batting. The dropper tip was held close to the mask to prevent loss by evaporation in the air before the drops reached the vaporization surface. The rate of administration was slow, between those of chloroform and ether. Air was permitted free access under the mask during induction. The patient was usually advised to count aloud. Consciousness was rapidly lost and usually there were no manifestations of an excitement period. . . . The required amount of vinethene varied considerably, depending particularly on the length of time of anesthesia and the general resistance of the patient. . . . Maintenance was almost uniformly satisfactory. . . . Recovery . . . was rapid in every instance, consciousness usually being present almost immediately after cessation of administration. Recovery was particularly free from untoward symptoms. Many of the patients awakened smiling as if from a normal sleep. . . . In each instance in which nausea and vomiting occurred it was present immediately after the cessation of anesthesia, and in no case did it persist. . . .

"Vinethene as an induction agent before other anesthesia has been very satisfactory because of the simplicity of apparatus and administration and the smoothness and rapidity of anesthesia. . . . We have employed open drop vinethene induction preceding ether anesthesia for 1,703 patients, and this method has met with increasing popularity. . . . Premedication varied. . . . The combination of codeine and atropine was employed in 301 instances, atropine in 238 and no premedication in 974. . The remaining 190 patients received morphine-atropine

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premedication or one of the barbiturate derivatives, either alone or in combination. . . . During induction cyanosis was observed in four patients who had not received premedication and in two who had received codeine and atropine. Fifteen had cyanosis at intervals until large tonsils were removed and a better airway was established. This was true whether or not premedication had been given. One patient had apnea for one minute during induction, and another had slow respirations from codeine depression and required oxygen inhalations. Fifteen had cyanosis only after ether was administered. All of these received oxygen, usually by catheter or mask but in one instance by intratracheal intubation. Eight were depressed from overpremedication and one of these required intubation; two had laryngeal stridor; two had deep cyanosis after atropine and ether; one had hiccups; an acromegalic patient was cyanotic after atropine and a very small amount of ether, and one patient had an apnea following a lumbar puncture. Sixteen patients had marked mucous secretions only after ether was started.

"Muscular tremors or convulsive movements were observed during eight inductions with vinethene. Three of these patients also had deep cyanosis and one had hiccups. Four recovered spontaneously and four needed oxygen inhalations. One of the latter definitely had vinethene overdosage. Mucus and cyanosis were present, and there was abolition of intercostal activity followed by a short period of respiratory arrest. The patient recovered rapidly with manual artificial respiration combined with intermittent mask oxygen under moderate pressure. All of these anesthetics were satisfactory with ether maintenance. All but two of the eight patients had received premedication, the patient with vine-

thene overdosage having had atropine and the rest a combination of codeine and atropine or morphine and atropine. One patient having had codeine-atropine premedication had an uneventful vinethene induction but had muscular tremors toward the end of an ether maintenance anesthesia. . . . There were fourteen postoperative deaths in this series. Twelve were due to intracranial lesions and occurred from one day to two months after operation. One patient died twenty days postoperatively of an intestinal obstruction. All of these deaths were unrelated to the anesthesia. The other death may have been associated with the anesthesia, although this is questionable. . . . Thirty-four patients who had tonsillectomy-adenoidectomy procedure had postoperative hemorrhage, none necessitating return to the operating room. . . . Hemorrhage was controlled mostly by packing. A few patients needed intravenous fluids, and three received blood transfusions. Postoperative fever was observed in twenty-four patients. In twenty-two instances it was unrelated to anesthesia and in two instances it was very questionably related. . . . Vinethene makes an excellent general anesthetic agent for office and outpatient practice; however, as with all anesthetic agents, a suction device and a supply of oxygen and apparatus for its efficient employment should be available. Although no explosions or fires have thus far been reported, precautions must be taken as it is inflammable and explosive. The use of this rapidly acting agent should have its place in war surgery, particularly in areas free from the fire and explosion hazard. Short, painful procedures can be satisfactorily cared for under this agent, and the rapid return to complete consciousness will lessen the postoperative care."

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