

cases have left the impression that dose for dose the duration of procaine spinal anesthesia is prolonged when plasma rather than spinal fluid is the diluent. Predominantly, motor or sensory anesthesia can be obtained easily and as desired by appropriate adjustments of the position of the patient." 8 references.

J. C. M. C.

GREENE, B. A.: *Hazards of Fire and Explosion of Anesthetic Agents: IV. In the Presence of Suction and Vaporizing Machines.* Surg., Gynec. & Obst. **75**: 73-75 (July) 1942.

"In this report we devote our attention entirely to the hazard created by the operation of suction and vaporizing machines in the presence of a combustible anesthetic agent. This problem deserves special emphasis because these machines have set off more combustions than any other single type of igniting agent, exceeding by far static electricity, the cautery, or diathermy. . . . We have collected 58 cases ignited by an electrical spark produced by the use of a suction and vaporizing machine, either or both. . . . It is curious to note how complacently this type of anesthetic combustion has been accepted for very many years, in striking contrast to the hysteria usually aroused by the more publicized static explosions. . . .

"The descriptions of cases ignited by suction and vaporizing apparatus are monotonously alike and simple. Open drop or insufflation ether anesthesia is started or in progress when suddenly there is a flash, a trail of fire into the ether bottle and a burst of flaming ether all through the room. It is the pattern for most accidents of this type. Frequently the machine has been started or stopped just before the flash but just as often there has been no prior manipulation of the switch. In 57 of the 58 cases, the ig-

nited anesthetic mixture has been ether-air. The other incident involved cyclopropane-air. No one was injured in 47 of the cases (46 ether-air and 1 cyclopropane-air). In all 58 cases only 2 patients were affected, one was slightly and the second seriously burned about the head; 2 surgeons, 1 nurse, and 4 anesthetists were seriously burned, 1 anesthetist and 5 surgeons slightly injured. This record is a striking tribute, not to the safety of ether, but to the retarding influence of air (approximately 79 per cent nitrogen—21 per cent oxygen) on the force and propagation of the pressure and flame waves of ether combustions with air as compared with ether-oxygen and ether-nitrous oxide-oxygen mixtures. The long period of toleration of this hazard has been due largely to this factor of relative harmlessness which is associated with the combustion of any anesthetic mixed with air. . . .

"Modern design and construction of suction and vaporizing apparatus and of electrical fixtures for use in operating rooms have provided the sure protection from this source of ignition which anesthetists and surgeons must demand for themselves and their patients in the hazardous circumstance of an anesthetic-laden room unavoidably produced by insufflation anesthesia. The open arcing switches are replaced by mercury switches. . . . The motor is sealed so that no contact is possible between the internal parts of the motor and the external atmosphere. The metal shell or cabinet is freed of induced and static electricity by grounding. . . . Arcing at the wall socket plug contact is to be avoided during the danger period by making the connection before the anesthesia is started and by not breaking the connection until the room is ventilated free of the combustible vapors or gases. Furthermore, to prevent acci-

dental breaking of the plug socket contact during the danger period, the plug socket connection should be of the locking type. . . .

"There is another method of securing a completely safe suction and vaporization and that is by the use of wall outlets connected by pipe lines to a remote, centrally located source of suction and pressure. This arrangement is ideal in many respects; however, it is suitable only for installation in the process of construction or renovation. . . . We have reached the conclusion that this type of anesthetic fire and explosion is entirely preventable with the knowledge and apparatus available today." 6 references.

J. C. M. C.

TURNER, F. P., AND WILKINSON, F. A. H.: *Operating Room Deaths: a Study of Twenty-three Consecutive Cases in which Autopsies were Performed*. Am. J. Surg. 57: 242-252 (Aug.) 1942.

"Anesthetics per se have accounted for only a relatively small number of these deaths. In two of the twenty-three cases spinal anesthesia was held to be the cause of death, in one of them chloroform was held responsible and in the other ether was the predominant factor. . . . One patient who was operated upon on a very hot day in August, represents one of the so-called 'ether convulsions.' As is usually the case, the patient was very sick with evidence of toxemia. . . . In searching for some feature common to these cases of operating room deaths, it became immediately apparent that in all but a few of them asphyxia or oxygen deprivation of the tissues was a factor of the greatest importance. In these cases the progression of oxygen want or anoxia could be followed clinically, and at autopsy the effect of this anoxia could readily be seen. . . . The following seven subjects . . .

have bearing on the various causes of death in the different cases presented in the case reports. 1. Aortic stenosis. . . . 2. Carotid sinus reflex. . . . 3. 'Pleural shock.' . . . 4. Status thymicolymphaticus. . . . 5. Shock. Shock forms by far the largest group of post-operative deaths, and it also accounts for the largest number of operative deaths. It is the main problem which both the anesthetist and surgeon have to contend with. Its causes are many and complex and its management is an urgent one. Its primary effect is that of a stagnant anoxia, and the pathology of shock is basically similar to the pathology of anoxia, due to whatever cause. . . . 6. Air embolism. . . . 7. Anesthesia. In general we might say that anesthesia has had to take the blame for a greater number of operating room fatalities than in our opinion has been warranted. It is far too easy to dismiss a case as an anesthetic death without due consideration of the many physiological factors entering into the picture. However, it is true that anesthetic deaths are all too common and could perhaps be diminished in number by proper preoperative care, wise choice of the anesthetic agent, and consideration of the various secondary factors which might make the patient a definite risk. . . .

"Local anesthesia . . . we will dismiss with little more than mentioning an important experimental observation by Beecher that while 40 mg. per Kg. of novocaine when injected rapidly intravenously will kill a cat, when injected slowly 400 mg. per Kg. may have no harmful effect at all. That there are cases on record of sensitivity to novocaine is well known. This has been one of the suggested reasons for the so-called 'pleural shock.' However, we do not believe that this had any bearing on our own series of cases. . . . As for general inhalation anesthesia, there is a long list of available