

this series. . . . There were 11 cases with pulmonary complications making an incidence of 1.1 per cent. One case had atelectasis, 8 cases had bronchopneumonia, one case had type III pneumonia, one case died of pulmonary emboli. . . . Seven of the cases in this series of 1,000 complained of backache post-operatively. This was relieved by the local application of heat. . . . There were 34 deaths among this series of 1,000 cases putting the gross mortality at 3.4 per cent. . . . In none of these deaths do we believe that the anesthetic was the direct causative factor. . . . We believe that this method of spinal anesthesia is safer and more controllable than the one dose method." 4 references.

J. C. M. C.

BIGELOW, NOLTON, AND HARRISON, IRVING: *General Analgesic Effects of Procaine*. J. Pharmacol. & Exper. Therap. 81: 368-373 (Aug.) 1944.

"During the course of an investigation on certain aspects of the local anesthesia induced by procaine, it was noted that this drug, like cocaine, may produce general analgesia, and this action is the subject of the present report. . . . Measurements of the cutaneous pain threshold were made under various conditions on 5 subjects. . . . Procaine has a general analgesic action in addition to its well-known local anesthetic properties. The maximum rise in the cutaneous pain threshold attributable to the general action of this drug after 100 to 800 mgm. injected subcutaneously is approximately equivalent to the ceiling rise observed after acetylsalicylic acid, namely, about 35 per cent of the normal threshold value. The duration of the procaine effect is, however, much shorter than the acetylsalicylic acid effect. The general analgesic action of procaine is usually more pronounced when other central effects of

the drug are also evident. The control injection of physiologic saline solution is also associated with a rise in the pain threshold, which, however, on the average is not as great as or prolonged as that observed after the smallest dose of procaine employed. The local anesthetic action of procaine after a perineural block outlasts the general analgesic action of this drug by about one hour. Variations are observed in the general analgesic effect of procaine on different occasions in the same subject independent of the dose." 9 references.

J. C. M. C.

YUDIN, S. S.: *Refrigeration Anesthesia for Amputations*. Am. Rev. Soviet Med. 2: 4-13 (Oct.) 1944.

"The author has had no experience with the use of refrigeration anesthesia at the front. The results reported below are based upon amputations performed in cases of serious railroad accidents, as well as upon a small series of thigh amputations performed from two to four months after injury. The patients were soldiers suffering from chronic septic wounds secondary to gunshot fractures. . . . From July to November 1943, 120 amputations of the extremities were performed on 106 patients at the Sklifosovski Institute. These patients may be divided into three separate groups. The largest group consisted of 92 patients injured in industrial and street car accidents. One hundred and six amputations were performed on them. . . . The anesthesia was completely effective in 81 cases and the patients did not complain during the operation. In 22 cases the anesthesia was satisfactory. The patients retained consciousness while the large nerves were being severed and the periosteum stripped. No supplementary anesthesia was needed, since the complaints were mild and were due to apprehension rather than

to actual pain. In the remaining three cases, refrigeration anesthesia failed. . . . The value of refrigeration anesthesia in aseptic healing of wounds may best be judged by comparing results of amputations performed at the Sklifosovski Institute prior to and after its use. . . . The difference in post-operative mortality rates following use of anesthesia is also striking. . . . It is routine practice in our hospital to administer 500-750 cc. of cadaver blood to patients admitted in a state of profound shock caused by severe trauma of both extremities. There is almost immediate improvement. Such transfusions have been given to patients since 1930 as a preoperative measure in cases of traumatic shock. Although their efficacy in preventing shock is undisputed, nevertheless cases of severe crushing injuries of the thigh were frequently fatal. . . . Seventeen of the 22 patients died from postoperative shock, despite repeated blood transfusions. Thus preoperative transfusion alone did not prevent post-operative shock. . . . Shock therapy must be directed at the majority of noxious factors producing shock, rather than at a single etiological factor, even if it be a major one. Refrigeration anesthesia satisfactorily treats four of these factors. First, refrigeration anesthesia is superior to all other anesthetics in that it does not introduce an additional toxic agent into the body. Second, the anesthesia is absolutely complete in that it eliminates the conduction of all painful, tactile, and other stimuli along the spinal and sympathetic nerve paths. This is of particular importance, since incomplete anesthesia is a major cause of operative shock. . . . Refrigeration anesthesia . . . gradually reduces nerve conductivity and probably causes it to disappear at a relatively high temperature of the surrounding tissue. Experiments now in progress indicate

that refrigeration anesthesia provides, so to speak, a reserve of superrefrigeration. This superrefrigeration of tissues cools off the deeper structures, such as the bony parts, and, as a result, the superficial layers are excessively cooled. The completeness of the anesthesia prevents operative shock. Third, it appears that the progressive warming of the stump after the operation not only gradually restores conductivity in the severed nerves but also provides a safety valve against excessive stimulation of the receptor centers in the brain, which inevitably occurs when the paralyzing influences of local or general anesthesia are suddenly removed. The gradual return of conductivity also depends on the fact that paralysis in all the excluded nerves is extensive. . . . This complete exclusion of the nerve elements can be accomplished only with refrigeration anesthesia and with infiltration or conduction anesthesia. The fourth useful factor in the prevention of shock is the retarded absorption of toxins from the stump. . . . This method of anesthesia is strongly recommended for use in military hospitals behind the front where later amputations of seriously infected extremities are common."

J. C. M. C.

WHITTERIDGE, D., AND BÜLBRING, E.: *Changes in Activity of Pulmonary Receptors in Anaesthesia and their Influence on Respiratory Behavior*. J. Pharmacol. & Exper. Therap. 81: 340-359 (Aug.) 1944.

"There is a number of conditions in which rapid and shallow breathing occurs in spite of the absence of any recognized change in the chemical stimulus to the respiratory centre. These include experimental starch embolism, perhaps cardiac dyspnoea, and blast injury to the lungs. During some work on these conditions, we encountered complaints of respiratory