During the period of this study only one intravenous injection of the procaine solution was given daily. The daily injections were continued until pain was markedly relieved. Usually no treatment was required after the third day.

"The results of treatment are as follows: A definite reduction of the 'sharp' pain occurred within three minutes after the first intravenous injection was started. The dull localized pain subsided shortly thereafter. Complete comfort persisted for five to ten hours after the twenty minutes method and for seven to twelve hours after the longer procedure. Partial relief for the remainder of the day followed with both methods. Some rectal discomfort was present the next morning, but on repetition of the treatment it abated in a similar manner. If pain then recurred, it did so with diminished fury. The procaine hydrochloride was usually needed through the third day; thereafter, many patients were comfortable and required no further medication. It was noted that ulceration, if present, frequently healed by the fifth day."

A. A.


"Among the many recent advances in anesthesiology, the development of synthetic analgesics holds a prominent place. . . . One of the outstanding recent advances in anesthesiology has been the application of curare to aid muscular relaxation. . . . The use of intravenous procaine constitutes another important advance. . . . Continuous caudal anesthesia for obstetrics was introduced by Hingson in 1942. . . . In 1939 Lemmon introduced continuous spinal anesthesia. . . . In 1947 Saklad and his co-workers reported a method of intraspinal segmental anesthesia. . . . Paravertebral lumbar sympathetic nerve block for the treatment of acute thrombopilebitis in the lower extremity is a well established procedure. . . . Smith and Rees have recently reported gratifying results with prolonged continuous spinal anesthesia in three patients with peripheral arterial embolism. . . . Stellate ganglion block by providing vasodilatation of the intracranial arteries has proved effective for the treatment of intracranial hemorrhage, embolism, thrombosis, and arterial spasm. . . . Inter-costal nerve block following upper abdominal surgery has been advocated to reduce postoperative discomfort and pulmonary complications. . . . Various vasopressor drugs have been added to spinal anesthetic solutions in order to prolong the effects and to reduce the amount of the anesthetic agent. Many conflicting reports have appeared in the literature on the results obtained with combinations of ephedrine, epinephrine, or neosynephrine with procaine, pontocaine, or nupercaine."

A. A.


"The postspinal headache is a serious objection to the use of spinal analgesia in obstetrics. Before we devoted extra attention to avoiding it, our obstetricians were reluctant to have their patients receive spinal analgesia. . . . The incidence of this complication in several reports of spinal anesthesia for vaginal delivery has varied from 20 per cent to zero. . . . We began this study in February, 1947. Out of many diverse and conflicting statements in more than one hundred articles, we formulated the following as a working
basis. The common type of postspinal headache is due to leakage of spinal fluid through the persisting opening in the dura with the consequent development of a subnormal volume and pressure of cerebrospinal fluid. This, in turn, leads to dilatation of intracranial veins and, in the upright position, to traction on the anchoring structures of the brain, the stimuli directly causative of headache. The subnormal volume of spinal fluid results from a situation in which the rate of loss through the dural puncture is greater than the rate of restoration by the choroid plexus. The rate of leakage depends chiefly on the size of the puncture and the time at which the patient assumes the upright position. The rate of re-formation of spinal fluid is dependent on the tonicity and volume of water in the blood and interstitial spaces. Water which is free to influence the formation and absorption of cerebrospinal fluid (which we term 'free water' for convenience) is water that is in excess of the prior demands for water made by the more vital functions of temperature regulation, maintenance of blood volume, urine formation and pulmonary respiration. Water that is hypotonic is more effective in increasing the volume of cerebrospinal fluid. A large percentage of postpartum patients do not have a volume of hypotonic water available in sufficient quantity to maintain the new formation of cerebrospinal fluid at a rate which can compensate for a relatively large loss by leakage. 'Free water' is probably markedly reduced in these patients by the less than normal intake of fluid and food during labor and the first few days of the puerperium coupled with the larger than normal losses of water during the same period. The fluid output is larger than normal because of the increased elimination of water with sodium salts that results from the hormonal changes of the puerperium and because of the considerable blood loss during the third stage of labor and the postpartum flow of lochia rubra. . . . These facts have justified the trial of two possible means of reducing the incidence of postspinal headache: 1. To decrease the rate of loss of cerebrospinal fluid by minimizing the size of the lumbar puncture wound. 2. To increase the rate of formation of cerebrospinal fluid by enlarging the volume of 'free water' in the postpartum patient. . . .

"A control series of 93 unselected patients who were punctured with a 22 gauge needle and received no increased hydration showed a headache incidence of 26 per cent. Another series of 120 unselected patients who received no increased hydration but were punctured with a 24 gauge needle had a headache incidence of 2.5 per cent, a statistically significant reduction from the control series. A third series of 108 unselected patients who were punctured with a 22 gauge needle but received increased hydration showed a statistically significant reduction of headache incidence to 10 per cent. . . . This controlled study of three series of spinal analgesia cases for vaginal delivery demonstrates the exceptional value of using the 24 gauge spinal needle and the principles of hydration to achieve a significant reduction in the incidence and severity of postspinal headache."

A. A.