

Accidents which occur during spinal anesthesia are usually: (1) undue fall in blood pressure, (2) respiratory arrest or embarrassment resulting from high anesthesia and, (3) cardiac depression. Methedrine (20-30 mg.) has been found to be an excellent drug in the treatment of sudden or severe drops in blood pressure during anesthesia. The hypotension which is associated with other signs of deterioration in the patient's condition requires the use of analeptics. Respiratory arrest which occurs following high spinal anesthesia causes anoxia. The staff should be notified when respiratory arrest occurs. The surgeon is asked to start rhythmical compression of the chest. The table is placed in Trendelenburg position unless a hyperbaric solution of pontocaine-glucose has been given within the past few minutes. Intravenous injection of normal saline is started and 8 minims of adrenaline is injected into the tubing. Manual compression on the breathing bag is started after an unobstructed airway is assured either by artificial airway or tracheal intubation. If cardiac arrest occurs, cardiac puncture, injection of adrenaline intracardially, or cardiac massage should be done.

Anoxia seems to be an important factor in ether convulsions. Convulsions may also occur from local anesthetics. Violent movements of convulsions should be controlled with 4 to 8 cc. of 2.5 per cent pentothal intravenously. Oxygenation should be insured immediately.

Depression caused by pentothal is usually promptly treated by giving coramine 5 cc. intravenously and oxygen. Intra-arterial injection of pentothal may cause persistent vasoconstriction. Amputation may be necessary. Stellate ganglion block on the affected side, using 30 cc. of 2 per cent novocaine, should be done. The sympathetic

axone reflex is broken and prolonged vasoconstriction prevented.

Few accidents have been reported following the use of curare. Precautions should be taken to prevent residual effects of curare. Oxygen should be used if respiratory embarrassment persists. Prostigmine, 5 mg., intramuscularly should be given. 9 references.

F. A. J.

RESTARSKI, J. S.: *Anesthesia Induced by Local Refrigeration of the Jaws*. J. Dent. Research. 25: 433-440 (Dec.) 1946.

Local refrigeration to alleviate pain in dental operations was tried as early as 1863. In a preliminary study at the Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md., preliminary studies disclosed that continuous cooling of localized areas in the jaws of dogs, at 1 to 2 C. for as long as two hours, did not produce pathological changes in the gingivae, teeth or related structures. It was decided to test the efficacy of refrigeration as a local anesthetic by drilling and filling the teeth of human subjects. Of 22 cavities prepared, 15 operations were completely painless. Seven patients experienced mild pain. Additional trials on human subjects were made to determine more completely the limitations, effectiveness, and practicability of this type of anesthesia. Improvements in the apparatus, particularly in the construction of gingival applicators, were also studied. Additional temperature and histologic studies were made on dogs.

Freon was used in the cooling system. This was an improvement over the ice-salt mixture used in a previous study. The refrigerant was circulated through applicators at 0 to 1 C. The lowest temperature attained in the

area of the inferior alveolar nerve was 11.5 C.; 7.5 C. between the bone and periosteum, and 2.8 C. at the surface of the mucous membrane. Histological studies of nerves from canine mandibles disclosed no evidence of injury. Of 52 cavities prepared for filling under local refrigeration in 33 persons, 34 instances (63 per cent) had complete anaesthesia; 13 (25 per cent) had mild to moderate pain and in 5 (10 per cent), there was little or no anaesthesia. 4 references.

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SCHILD, EVERT: *Low Spinal Cord Injuries Following Spinal Anesthesia*. Acta chir. Scandinav. 95: 101-131 (Jan. 20) 1947.

After the initial enthusiasm over spinal anesthesia it was found that the method carried with it marked risks and criticism and skepticism followed. From the beginning there have appeared reports in the literature of complications of the nervous system following the use of spinal anesthetics. The author, after having experienced a very serious damage to the nervous system following spinal anesthesia with percaine, decided to investigate the risks. The present report deals only with those complications involving the caudal portions of the central nervous system which can occur in connection with spinal anesthesia.

Cocaine is no longer used for spinal injection. Tropacocaine is not used to a great extent. Novocaine (procaine, ethocaine) has a toxicity which is only a fraction of that of cocaine. Novocaine is a part of many preparations such as allocaine, durocaine, gravocaine, neocaine, parocaine, planocaine, syneaine, seurocaine and spinocaine. Pantocaine (decicane) is close to novocaine but the action is less certain and of shorter duration. Tutocaine is similar to cocaine in some ways but is related to novocaine.

Stovaine and alypin, also related novocaine, are, however, harmful tissues and the injections are painful. Percaine, which is identical with nupercaine, is used extensively in Sweden. It has a very great affinity for nervous tissue.

A study of the literature covering low injuries of the spinal cord shows that in experimental studies tropacocaine, novocaine, alypin and stovaine cause, in some experimental animals, definite spinal cord lesions. The injuries are located in the cord and are most marked near the site of injection. Nerve roots and spinal ganglia are not as a rule, involved in the damage. In clinical studies, a review of the literature shows that mild, severe, and at times fatal injuries of the nervous system are seen following spinal anesthesia in which tropacocaine, novocaine preparations, pantocaine, tutocaine, stovaine or percaine are used. The relatively few cases in which autopsy was done showed that changes occur in the spinal cord or its membranes and that they are most marked near the site of injection. The reported changes vary both in extent and intensity. In the more severe cases they advance to necrosis.

To investigate the occurrence, degree and kind of spinal cord lesion following spinal anesthesia, the author sent questionnaires to surgical centers in Sweden. A total of 121 blanks were sent and most of them were answered. More than 23,000 spinal anesthetics per year were reported. An estimated 25,000 to 30,000 spinal anesthetics per year are given in Sweden. Novocaine, percaine, decicane and tropacocaine were the only drugs used. Percaine was used in 17,500 cases of the reported series. As a rule the injection was done at a safe distance below the conus terminalis.

Six cases of postanesthetic damage of the nervous system were reported in