



The osmolality of the more common spinal anesthetic solutions and diluents.

to prevent damage to the tissues adjacent to the initial site of anesthetic solution deposition. While this tissue damage is usually re-

versible, it should be remembered that this is not always true.

SUMMARY

An extensive survey of the osmotic pressures of commonly used commercial spinal anesthetic solutions was accomplished. It was found that most of the drug solutions studied had osmolalities which exceeded the usually accepted physiologic range of 257 to 305 milliosmoles per liter for cerebrospinal fluid.

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Brachial Plexus Infiltration with Dilute Phenol Solution in the Management of Upper Extremity Spasticity

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Injection of the brachial plexus with phenol has not been reported as an adjunct in the management of patients with spastic arms. In the course of our investigations of phenol blocks on peripheral nerves in spastic extremities,** we decided to attempt brachial plexus infiltration with 3 per cent phenol in water solutions.

Three patients were studied. Brachial plexus block was done to attempt to alleviate disabling spasticity and clonus and to increase muscle function. The supraclavicular approach was used twice and the axillary technique once. One patient had excellent relief

and increased function, the second showed increased function but no objective change in spasticity, and the third no changes at all. The first patient only will be presented here:

A 29 year old man was referred to us for evaluation and treatment of a spastic left arm. Two years previously the patient had developed subacute bacterial endocarditis with embolism to the right hemisphere and a resulting left sided hemiparesis. Functional return was gradual and at the time we first saw the patient he had a poor to fair return of motor power. His main problem was the persistence of spasticity and clonus in the left arm. Using a 0 to 4 plus scale, with 4 plus being intense spasticity, our initial evaluation of the patient was as follows: There was 2-3 plus spasticity in the abductors, abductors and rotators of the shoulder; 2-3 plus spasticity in the flexors and extensors of the elbow and wrist; the metacarpal-phalangeal joints had 2 plus spasticity and the interphalangeal joints were 3-4 plus.

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** Katz, J., Knott, L. W., and Feldman, D. J.: Peripheral nerve injections with phenol in the management of spastic patients, submitted to *Arch. Phys. Med.*

Clonus was marked whenever he tried to use his arm. All sensations were intact. A median and ulnar nerve block at the elbow was performed with 3 ml. of 3 per cent phenol in saline injected at each site. After this block the patient was able to grasp and raise to his lips a standard drinking glass filled with water. Clonus in the lower arm no longer presented a problem. His major difficulty now was upper arm spasticity and clonus of the biceps and triceps brachii both on rapid velocity and passive movement. One month later a left brachial plexus block by the suprascapular approach was done using 9 ml. of 3 per cent phenol. Immediately post block, spasticity went to 0 in the biceps. One week after block both biceps and triceps were 0-1 plus. Clonus was gone. Functional activity increased dramatically to the point where the patient was able to do two push ups. In the months which have followed the block there has been some return of spasticity but functionally the arm remains good. He is now on an active regime to improve coordination. Aside from some soft tissue swelling at the sites of injection, which disappeared without treatment in 48

hours, there have been no untoward sequelae. All sensations are the same as before the block.

DISCUSSION

The use of dilute phenol solutions for peripheral nerve injections appears to be a relatively benign procedure. There is occasionally mild but quite tolerable discomfort upon injection. One patient has had a persistent hypesthesia over the ulnar distribution after block. Aside from this there have been no permanent or serious sequelae in over 50 peripheral nerve blocks.

It is our current opinion that when spasticity does not respond to drug and rehabilitation regimes nerve block with dilute phenol should be considered. The advantages of decrease in spasticity and possible unmasking of motor function far outweigh the fact that at present the technique and drugs used are not successful in all cases. Since the nerves to the muscles of the upper arm are technically difficult to isolate for injection further investigation of brachial plexus phenol infiltrations is being pursued.

Further Experience with the Earlobe Algesimeter

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An earlobe algesimeter described by one of us¹ in 1954 has recently been modified and tested. The original apparatus consisted essentially of a standard inductorium connected to a 1½-volt dry cell battery with identically wired primary and secondary coils. Direct interrupted current was produced through the electromagnetic circuit breaker of the inductorium and adjusted to produce a faradic current of 60 pulses per second. The current was directed across the earlobe of the subject by means of an adjustable earpiece, the voltage increasing as the secondary coil was manually moved toward the primary coil. The end point (pain threshold) was distinguishable as a dis-

tinct pricking sensation which was preceded by a feeling of vibration in the earlobe.

The current source, type of current, and basic premise in the modified apparatus remain unchanged. The modifications include: (1) an electric motor which drives the secondary coil toward the primary coil at a constant fixed speed; (2) a variable resistance voltmeter which allows precise reading of pain threshold in volts; (3) a lock switch with release which makes it necessary for the subject to start and stop each pain threshold determination; (4) a test switch which registers the pain threshold voltage on the voltmeter while bypassing the earpiece. (This latter allows leisurely and accurate reading of the threshold after each determination.) The elec-

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