Stellate Ganglion Block Using Physiologic Saline Solution

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Differential neural blocks are recommended to
differentiate psychogenic-, sympathetic-, and somatic
sensory-mediated pain.1 Pain relieved by injection of
physiologic saline solution is regarded as psychogenic
in origin. Following injection of physiologic saline
solution into the stellate ganglion, we have observed two
cases of partial relief of pain accompanied by signs of
sympathetic blockade.

REPORT OF TWO CASES

Both cases had essentially the following characteristics. The
patients were women of approximately 60 years of age who had
fractured their wrists and had had them immobilized for as long as
three months. The hands, wrists and arms showed the following signs
of symptoms of altered sympathetic nervous system function: 1) 
increased sweating; 2) non-dermatomal burning pain; 3) slight pitting
edema, with markedly decreased range of motion. Sensation was
normal, and radial pulses and hand skin temperatures were equal
bilateral. The patients appeared nervous and depressed. To
confirm the diagnosis and possibly quantitate the psychological
component of the pain, both patients received a differential stellate
ganglion block using the anterior paratracheal approach.1
Approximately 5 min after the block with 10 ml of physiologic saline solution
without preservative, Horner's syndrome and nasal stuffiness
appeared, accompanied by 50 per cent subjective reduction of the
burning pain, in both patients. The skin temperatures of their hands
increased by 2 to 3 degrees F. Ten minutes later, the block was
repeated with 10 ml of 0.25 per cent bupivacaine. There were further
increases of the hand temperatures by 2 degrees F, with complete
disappearance of the residual burning pain. The patients' symptoms
responded to a series of stellate ganglion blocks (three to five) and
physical therapy.

DISCUSSION

Signs of successful sympathetic block include the
development of Horner's syndrome, anhydrosis, vaso-
dilatation of the hand and arm, and an injected
conjunctiva.2 In addition, there is blockade of the
psychogalvanic reflex, increased pulse amplitude by
digital plethysmography,3 and an increase in capillary
blood Po2 exceeding 8 torr.4 There is no direct correla-
tion of the signs of sympathetic block with the extent of
blockade. These signs have been found inconsist-
tently, and were not always evident when the psycho-
galvanic reflex was abolished.5 The two patients
described showed evidence of sympathetic blockade
following injection of saline solution.

Physiologic saline solution with 0.9 per cent benzyl
alcohol as a preservative has been shown to cause anal-
gesia of the skin, in contrast to plain physiologic saline
solution, which caused discomfort on injection without
producing such analgesia.6 Segmental hypesthesia to pin
scratch and cold stimuli, diminution of the psychogal-
vanic reflex, and partial relief of pain were con-
sequences of intrathecaly administered saline solution.
These effects were made more pronounced with sub-
sequent injection of 0.2 per cent procaine.5

It is possible that the block of the stellate ganglion
with physiologic saline solution was secondary to a
pressure phenomenon. Compression by a large
volume can be postulated, since the ganglion is em-
bedded in the pretracheal lamina of the cervical
fascia.7

It is necessary to have a placebo injection in the
evaluation of pain to rule out psychological complaints. Preservative-free physiologic saline solution has been
used for this purpose. However, we have observed that
saline solution can produce some of the signs of sympa-
thetic blockade accompanied by reduction of pain.
Anesthesiologists should be aware of this possible con-
sequence so as to prevent errors in diagnosis.

REFERENCES

blockade in pain syndromes of questionable etiology. Med

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Contamination of an Anesthesia System with Liquid Halothane

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Inhalation of a volatile anesthetic drug in the form of liquid or saturated vapor is a rare anesthetic catastrophe.1–3 Such incidents have occurred with both concentration-calibrated vaporizers (e.g., Fluotec®, Fluomatic®, etc.) and flowmeter-controlled devices (e.g., Vernitrol®, Copper Kettle®, etc.),2,3 and are related to faulty technique. We recently observed the introduction of liquid halothane into the fresh-gas delivery tubing of an anesthesia machine as the result of an error in technique combined with the use of inappropriate materials in the circuit.

REPORT OF INCIDENT

During a routine preanesthetic check of an anesthesia machine (Ohio Model 2000, Ohio Medical Products, Madison, Wisconsin), we found that the on–off valve of the sidearm Vernitrol vaporizer had been left open overnight, with a flow of 20 ml/min through the vaporizer, which contained 100 ml halothane. After the flowmeter was turned off, the valve closed, and a flow of 5 l/min oxygen through the main oxygen flowmeter begun, a strong odor of halothane was apparent from the system. We then noticed about 5–6 ml of clear liquid collected in the transparent polyvinylchloride (PVC) fresh-gas delivery tubing. When poured from the tubing into a gauze sponge, the liquid evaporated quickly, with the strong odor of halothane.

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ADDITIONAL STUDIES

A similar anesthesia machine was later set up with a clean 4-foot length of PVC tubing (Bentley IT-200, Bentley Laboratories, Inc., Irvine, California) connecting the common gas outlet to a Mapleson D-type patient circuit. The valve of the sidearm vaporizer was opened and a flow of 20 ml/min was directed through the vaporizer, which contained about 100 ml halothane. Room temperature varied between 18 and 20 °C. Within 30 min, droplets of liquid were seen condensing on the walls of the tubing. After two hours, more than 2 ml of liquid had accumulated. By four hours, 4–6 ml were present. Most of the liquid evaporated rapidly when an oxygen flow of 5 l/min was begun. The identity of the volatile component as halothane was confirmed by gas chromatography. The residue, an oily liquid, was identified by the technical branch of Bentley Laboratories, Inc., as dioctyl phthalate, a plasticizer, which had apparently dissolved in the liquid halothane.

Similar results were obtained using enflurane instead of halothane, with other Ohio machines with similar vaporizers (Vernitrols), and with a Model 300 Fortrend® machine equipped with a Copper Kettle #1 vaporizer (Foregger Company, Division of Air-Products and Chemicals, Inc., Smithtown, New York).

Halothane would also apparently accumulate if conductive rubber tubing were used in place of the PVC, but most of the halothane was absorbed, with swelling and distortion of the walls of the tubing, and could not be recovered as the liquid. However, liquid accumulation was not observed when a length of bent glass tubing was substituted for the PVC, or when a length of silicone rubber (Silastic®, Dow Corning Corp., Midland, Michigan) was used.

DISCUSSION

The absorption of volatile anesthetics by conductive rubber is well known.4 However, it is not immediately