

## An Inexpensive and Satisfactory Method for Gas Sterilization of Anesthetic Equipment

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Sterilization of anesthetic equipment, particularly rubber goods and endotracheal tubes, has been unsatisfactory for many years. Steam sterilization—an excellent and effective method—has not been popular because of deterioration of the equipment by heat. Various cold sterilization methods—utilizing surface detergents, phenolic disinfectants or chlorine-type agents, either are not reliable or the agents are harmful to the patient. The advent of ethylene oxide made possible a method which fulfills all of the requirements. The gas is not harmful to the equipment or the patient and will completely sterilize when used properly. However, commercially available systems for gas sterilization, intended for central supply use, are very expensive to acquire and operate. In addition, most of them require moderate temperatures and pressures to shorten the time required for sterilization.

Schmidt and Hoepflich<sup>1</sup> have devised a method which operates at room temperature and ambient pressure. Repeated sterility checks have proved its reliability. The cost of the equipment and the initial tank of gas is very modest (approximately \$110).

The heart of the method is the Anero Jar, size 3 (approximately 4½ gallons capacity) (a) which was originally intended for anaerobic cultures. This jar is large enough to contain all the endotracheal catheters used in our department for 1 to 2 days. The catheters to be sterilized are scrubbed, dried and placed in plastic tubes (b) permeable to the gas. The ends of the tubes are sealed with autoclave tape and placed in the jar, which is then evacuated. The ethylene oxide mixture (c) is now admitted to the jar until the pressure returns to atmospheric. The time required to load the jar is only 5 to 8 minutes. Since the gas mixture is in liquid form in the tank, the addition of an expansion chamber warmed by a water bath, between the tank and the jar

facilitates the vaporization of the mixture. We utilized a suction jar for expansion and a plastic gallon container for the hot water. After the gas is admitted, the objects are left in the jar for 18 hours. The gas mixture is then evacuated and the objects aired for 24 hours to allow the ethylene oxide to diffuse from the wrappers. There is no fire hazard—the mixture is nonflammable. There is some hazard to the operator if ethylene oxide is allowed to come in contact with skin or eyes. This hazard, however, is obviated by the use of vacuum to remove the mixture from the jar. The remote possibility of an implosion of the jar during evacuation exists—a metal safety shield (Fig. 1, E) is supplied to protect the operator.

Repeated sterility checks in our institution utilizing spores of *Bacillus subtilis* (globigii) (d) have shown the reliability of this method. We have been impressed by the fact that the endotracheal tubes retain their original character, which is usually not the case after cold sterilization.

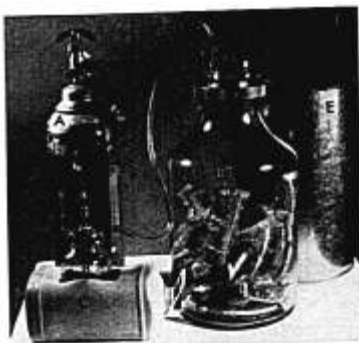


FIG. 1. A, ethylene oxide tank; B, expansion chamber; C, hot water bath; D, Anero jar; E, metal safety shield.

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The time required by the method described demands a larger supply of equipment. This additional expense is nominal compared to the cost of the units which sterilize in less time. The availability of gas sterilizing equipment in the department is an obvious advantage for contaminated cases. The jar is large enough to contain all the rubber goods, the endotracheal tubes, the blood pressure equipment, etc., from such a case.

## REFERENCE

- Schmidt, A. M., and Hoeprich, P. D.: Cold sterilization of cardiac catheterization equipment with ethylene oxide gas, *Circulation* 29: 892-894, June 1964. (a) Case Laboratories, Inc., 1407 N. Dayton St., Chicago, Ill. 60622. (b) Raptube, Duxe Products, P. O. Box 1192, Cincinnati 1, Ohio. (c) Ethylene Oxide 11%, Freon 11 54%, Freon 12 35%, The Matheson Co., P. O. Box 85, East Rutherford, New Jersey. (d) Spore-X strips, American Sterilizer Co., Erie, Pennsylvania.

## CASE REPORTS

### Unusual Complications from Placement of Catheters in Caudal Canal in Obstetrical Anesthesia

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Two case reports are presented because of complications resulting from placement of the catheters in the caudal canal to facilitate obstetric delivery. These complications must be relatively uncommon since they represent the sole comparable technical difficulties encountered during ten years at this institution in which this method of obstetric analgesia was been extensively employed.

*Case 1.* A 25 year old gravida 2 para 1 white woman was admitted for induction of labor. Five hours after induction, when she advanced to complete effacement of the cervix, caudal anesthesia was started. With the pa-

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FIG. 1.

tient in the lateral Sims position a skin wheal was raised with 1 ml. of 1 per cent procaine hydrochloride. A short 18-gauge needle was used in this case in substitution for the 17-gauge, 2½ inch needle normally employed as the latter was found to be defective. The sacral hiatus was entered with some difficulty. Thirty milliliters of mepivacaine hydrochloride were injected and the 25-gauge plastic catheter was then inserted through the needle. During withdrawal of the needle, the catheter seemed to catch. When the needle was completely removed, a frayed end of catheter was noted. About four inches of plastic tubing had been sheared off in the caudal canal. On close examination of the needle, the bevelled end had bent toward the lumen, forming a barb which apparently sheared through the catheter.

Delivery was completed uneventfully, the patient was taken back to her room and informed of the mishap. After some discussion neurosurgical consultation was obtained and it was decided to explore the sacral area for the fragment of catheter. At the sacral hiatus after the sacrococcygeal ligament was removed, the frayed end of the catheter was located and extracted without difficulty.