

peculiar advantage is its remarkable penetrability, freely passing through polyethylene film, rubber, and other materials impervious to bacteria. Areas inaccessible to steam and soaking, such as under cuffs, and between tube and metal fittings are fully exposed to bacteriacidal action, making disassembly unnecessary during the sterilizing process. Objects packed in sealed polyethylene bags before sterilization are rendered sterile indefinitely until the seal is broken. Disadvantages observed were: (1) cost, much larger numbers of tubes and fittings required because of time interval between sterilizations, (2) frequent sterilizer breakdowns interrupting service, and (3) deterioration of latex cuffs (18-36 sterilizations) due to heat. Sterilizer operates at 135 F. Sanders tubes and other multiple dip "anode" tubes employing inclusion reinforcement windings are unsuitable for ethylene oxide sterilization due to bubble formation in the tube wall during decompression phase of sterilizer cycle. A serious hazard is created by unnoticed bubbles projecting into the lumen of such tubes. Evaluation of patient response to ethylene oxide sterilized tubes was made by comparing the incidence of postintubation sore throats with our previous experience, and with the incidence reported by others sterilizing by conventional methods. Absence of any significant difference was taken to indicate that mucosal irritation by retained ethylene oxide in endotracheal tubes from the sterilization process was negligible, and that sore throats that might be related to organisms introduced with "subtotally" sterilized tubes were not revealed. To determine if gas sterilization of endotracheal tubes could be related to the incidence of postsurgical infection in our hospital, the incidence of postoperative atelectasis and pneumonia was recorded for a 9-month period before, and a 9-month period after inauguration of gas sterilization. While a small overall reduction was found, a wide fluctuation from month to month persisted through the period of gas sterilization, suggesting that other factors than intubation were predominant. We conclude that "absolute" sterilization with ethylene oxide gas may have advantages over other methods for the treatment of endotracheal tubes from an esthetic, and a medicolegal point of view.

Histologic Changes in the Spinal Cord Following Subarachnoid Alcohol Block.

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During this same period, 16 spinal cords were obtained at autopsy from patients who had had subarachnoid alcohol at varying intervals prior to death. Each cord was grossly examined and its meninges removed. A segment 2 cm. long, including the site of injection as its midpoint, was removed and divided transversely into multiple blocks, each 1 to 2 mm. in thickness. Other specimens were taken above the site of injection at intervals of 1 to 2 cm. and below it at intervals of 2 to 4 cm. Each block was serially sectioned and stained with hematoxylin and eosin, Marchi myelin stain, and Bielschowsky's stain. The changes most frequently found were demyelination and degeneration of the posterior roots, either unilateral or bilateral, and chromatolysis of the nerve cells of the posterior root ganglion. Within the cord itself, the most frequently af-

affected areas were Lissauer's tract and the posterior funiculus. The latter was involved in all cases but one. The involvement of the posterior funiculus was usually a narrow demyelinated band in the fasciculus cuneatus at the level of the injection only. The changes in the dorsal funiculus are apparently the effect of the alcohol on touch pressure fibers. Degenerative changes in the lateral portion of the dorsal funiculus represent progressive degeneration while those of the medial part of the dorsal funiculus represent the direct effect of alcohol on the cord. Changes in nerve cell bodies and Clarke's Column occurred regularly below, at, and above the injection site. There is no apparent reason for this. Since Clarke's Column is a spinal cord center for visceral efferent fibers, the changes are probably unrelated to pain relief obtained. Another puzzling feature revealed in this series is that regeneration of nerve fibers has been found to occur in the cord itself, where according to classical neuropathology, none should occur. This may be nonfunctional regeneration. It is apparent that the presence of alcohol in the subarachnoid space may directly affect the cord itself. Usually this change is limited to the periphery of the cord near the site of injection and the structures adjacent to the dorsal median fissure, where presumably a high concentration of alcohol may have been present. This phenomenon is thought to account for the occasional focal demyelination seen in the dorsal spinocerebellar tract. Interruption of ascending tracts by this same mechanism is believed to be responsible through retrograde change for the degeneration observed in various nerve cells in the cord at levels below the site of injection. Accidental injury to the cord by direct intramedullary injection of alcohol occurred in two of the sixteen cords examined. Judging from the extent of damage, only small amounts of alcohol had been deposited in the cord, the balance entering the subarachnoid space as intended. There was very little clinical evidence of any neurological deficit as a result of this occurrence. Histopathologic evidence indicates that the posterior root is interrupted with all sensory modalities being involved. No patient who had a change in his pain pattern had any subjective sensory changes in the skin. There is apparently enough over-

lapping of contiguous dermatomes that the sensory loss to the patient is imperceptible. A more detailed report will be published elsewhere.

The Effects of THAM on Cerebrospinal Fluid Pressure During the Acute Carbon Dioxide Phase of Apneic Oxygenation. E. C. JORDON, M.D., H. C. SLOCUM, M.D., AND G. G. NAHAS, M.D. *Department of Anesthesiology, Walter Reed Army Hospital, Washington, D. C.* In another paper (Nahas, G. G., and Jordon, E. C.: *Effects of "CO₂ Buffer" on Hypercapnia of Apneic Oxygenation, to be published*) we have shown that a 0.33 molar intravenous infusion of nontoxic 2-amino-2 hydroxymethyl-1-3 propanediol (THAM) administered to dogs at the rate of 0.34 mM/kg./minute maintained cerebrospinal fluid pressure constant during a one hour period of apneic oxygenation. The present study demonstrates a possible clinical application of THAM to counteract or reverse the acute effects of hypercapnia on cerebrospinal fluid pressure. Using the preparation of apneic oxygenation, a total of 12 mongrel dogs were subjected to 30 minutes of apneic oxygenation induced with succinylcholine in a series of three experiments. Experiment one; 4 dogs were subjected to 30 minutes of apneic oxygenation without receiving THAM. Experiment two; 5 dogs were subjected to 30 minutes of apneic oxygenation while receiving a 0.33 molar intravenous infusion of THAM at a rate of 0.34 mM/kg./minute. Experiment three: 3 dogs were subjected to 15 minutes of apneic oxygenation without receiving THAM, followed by 15 minutes of apneic oxygenation during which time they received a 0.66 molar intravenous infusion of THAM at the rate of .66 mM/kg./minute. Just prior to apnea and at 15 minute intervals during apnea, arterial blood samples were withdrawn for determination of pH, P_{CO₂}, and hematocrit. Measurements were also made of mean arterial blood pressure, and cerebrospinal fluid pressure. Comparing the control value to those obtained after 30 minutes of apneic oxygenation in experiment one, there was a decrease in arterial pH from 7.54 to 6.64; P_{CO₂} increased from 25.1 mm. Hg to 247.7 mm. Hg; mean arterial blood pressure increased from 150 mm. Hg to 176 mm. Hg; and