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Crossover Study of Ethrane and Halothane in Volunteers

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Any new volatile anesthetic agent should be compared with the one most widely used in this country, *i.e.*, halothane. Ethrane,‡ CF_2H-O-CF_2-CClFH, Compound 347, is a new, nonflammable ether with promising anesthetic properties in animals and man.[1-4] Further investigation in man seemed indicated. This report deals with a comparison of halothane and Ethrane with special regard to induction and emergence, blood pressure, pulse rate, tidal volume and blood volume in normal volunteers.

METHODS

Seven healthy men varying in age from 22 to 26 years received no premedication and were without oral intake for at least ten hours prior to the experiment. The agents being compared were administered at one-week intervals in random fashion. Induction with the test drug was accomplished in a 4-l flow of 50 per cent nitrous oxide in oxygen. A Fluotec vaporizer was employed and concentrations of the volatile agents were increased rapidly to a maximum of 3 per cent with halothane and a reading of 4 per cent Ethrane (actual concentration about 3.5 per cent). Arterial blood pressure was monitored directly. Samples of arterial blood were drawn during surgical anesthesia and analyzed for *p*H, P_{CO_2} and P_{O_2}. Tidal volume was estimated at intervals employing a Wright respirometer. At appropriate intervals direct laryngoscopy was attempted, and the ease or difficulty of accomplishment in terms of jaw relaxation was noted. Induction was considered to be accomplished when the lid reflex was lost and eyeball movements ceased. Recovery was considered completed at the time the subject responded to his name. The duration of anesthesia was 25 minutes after induction.

RESULTS

There was no statistically significant difference in induction time between Ethrane (5.9 ± 0.9 min) and halothane (7.2 ± 2.0 min). Recovery times were somewhat shorter, but not significantly, for Ethrane (8.1 ± 1.7 min) compared with halothane (9.5 + 3.1 min).

At equivalent estimated clinical depths of anesthesia there was a consistent increase in tidal volume during Ethrane maintainance, while there was usually a decrease of about 20 per cent during halothane maintainance. There was no significant change of rate of respiration with either agent. All observations were made during unassisted spontaneous respiration. The average P_{CO_2} rose to 46 mm Hg (37 to 54) during Ethrane anesthesia and 53 mm Hg (43 to 64) during halothane anesthesia. At this time, the *p*H was 7.31 (7.24 to 7.39) with Ethrane and 7.27 (7.24 to 7.30) with halothane.

Relaxation of the jaw appeared adequate with both agents. Laryngoscopy was per-

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‡ Ethrane is the trademark of Air Reduction Company, Incorporated, for 1,1,2-trifluoro-2-chloroethyl difluoromethyl ether.

formed with ease and tracheal intubation could have been readily accomplished. Salivation occurred occasionally, but in no instance was it objectionable with either agent, despite the absence of a belladonna drug.

Summary

Ethrane appeared similar to halothane in this small crossover study. Both were readily accepted by volunteers. Induction and emergence were alike in duration. Muscular relaxation of the jaw was acceptable with both agents.

The principal difference was that spontaneous respiration was well maintained with Ethrane at levels where serious depression occurred with halothane.

Ethrane was supplied through the kindness of Mr. James Vitcha of Ohio Medical Products, Division of Air Reduction Company, Incorporated.

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A Safe Method for Discharging Anesthetic Gases

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Of increasing concern to every anesthetist is his daily exposure to potentially toxic vapors. Davis[1] discusses contamination of the operating room by effluent anesthetic gases, and Bruce *et al.*[2] point out the possible relationship of toxic vapors to the incidence of lymphoidal malignancy. A new method † has been developed to provide a way to vent excess gases from high-flow semiclosed or nonrebreathing anesthesia circuits into central hospital vacuum systems without exposing operating room personnel to the potential environmental hazards of these vapors.

Description

In this closed-discharge-into-vacuum-line system, a needle flow valve is attached in parallel with the conventional pop-off valve (fig. 1). The discharge side of the flow-reducing valve is connected to a central vacuum line. In most hospitals, the vacuum line is attached to a central pump and a roof vent. Figure 2 shows the Marrese "Safe-vent" adapter in place with a flexible suction hose attached; the pop-off is above.

Operation

When discharging into the vacuum system, the pop-off valve is closed. Gas flows around the primary anesthesia circle to the pressure-relief valve area, where the volume of discharge is regulated by the needle valve, which allows the vacuum line to remove from the circuit only that volume of gas which is in excess, while maintaining gas bag tension and pressure at the desired levels.

Results

This method of discharging gases was used without untoward incident in several hundred anesthetic administrations. Proper adjustment of the "Safe-vent" adapter was accomplished easily, and no patient was subjected to mea-

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† The method utilizes the Marrese "Safe-vent" adapter. Patent pending. This adapter is available from the Marosul Company, Post Office Box 216, River Forest, Illinois 60305.