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Tank Wrench Holder for Ohio Modulus® Anesthesia Machine

To the Editor:—The majority of anesthesia machines now being manufactured conform to "American National Standard Minimum Performance and Safety Requirements for Components and Systems for Continuous-Flow Anesthesia Machines for Human Use" (ANSI® Z 79.8—1979). Although this standard specifically addresses hanger yokes (Section 5) and general requirements (Section 4.1), there is no specified location for hanger yokes given. Ohio Medical Products has chosen to locate their hanger yokes on the rear of their ANSI standard Modulus anesthesia machine. Access to tanks in the yokes is through an open section of the anesthesia machine's front panel. The tank valve-stems are located 2.25 inches below the top surface and are not visible from the front of the machine. It is not an easy task to fit a tank wrench onto a valve-stem under these conditions.

We have constructed a simple holder for T-type tank wrenches which mounts on the back of the anesthesia machine (fig. 1). This holder acts as a guide for the wrench to engage the stem, or alternatively, as a convenient way to hold the wrench in position on the stem. The holder is made from hardened aluminum, one long bar $20.5 \times 0.5 \times 0.25$ inches, and four blocks $1.25 \times 0.5 \times 1$ inches. These blocks have 0.55-inch D holes drilled and tapered to 0.75 inch D at the top for ease of tank-wrench insertion. The blocks are screwed on to the bar by drilling and tapping for two 6-32 screws in each block, with corresponding #28 holes countersunk for flat-head screws in the bar. The position of the blocks on the bar is so that their holes are aligned directly above the four tanks' valve-stems when the holder is mounted on the anesthesia machine. The mounting

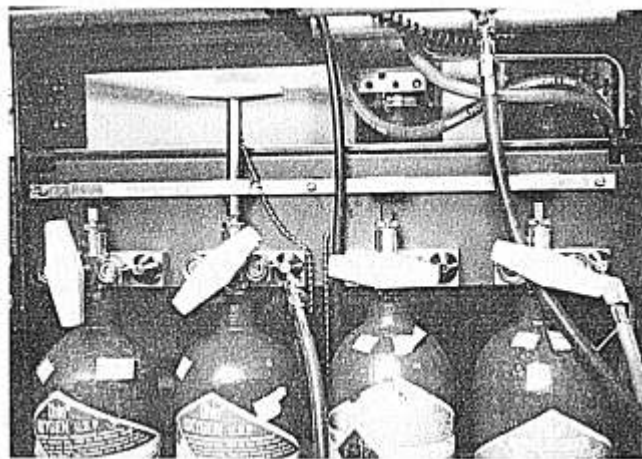


FIG. 1. Rear view of Ohio Modulus® anesthesia machine with tank wrench holder installed.

is done through three equi-spaced #3 holes in the bar and by drilling and tapping the back plate of the anesthesia machine for 10-32 screws. We have located the top of the holder 1.25 inches below the top surface of the anesthesia machine. The holder on a Modulus anesthesia machine is shown in the photograph.

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Heart Rate Response to Nociceptive Stimulation as an Index of Anesthetic Potency for Enflurane

To the Editor:—Roizen *et al.*¹ reported that while halothane blocks the cardiovascular responses (HR and BP) to incision in a dose-dependent fashion, enflurane does not. Therefore, they concluded that cardiovascular responses to incision do not reveal the depth of enflurane anesthesia. We have found that heart rate response to painful stimulation may be used to measure the depth of anesthesia induced by a number of intravenous and

inhaled anesthetics.^{2,3} Since enflurane was not among the agents investigated in the above studies, we compared enflurane dose-effect curves for purposeful movement (PM) response and heart rate (HR) response to a noxious stimuli in rats. The results presented in figure 1 show that enflurane blocks heart rate response to a noxious stimuli in a dose-dependent fashion. The discrepancy between our results and those by Roizen *et al.*

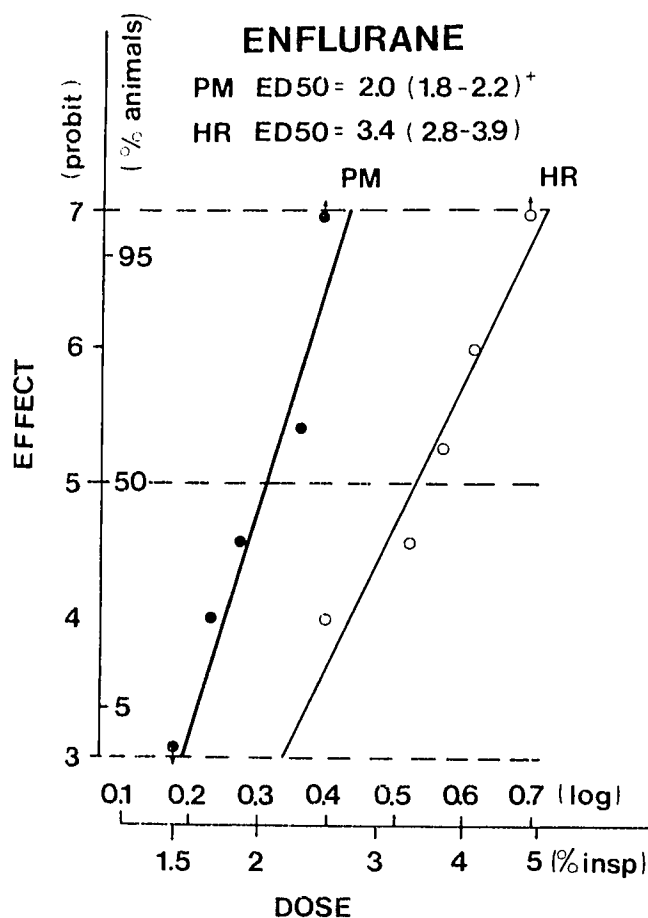


FIG. 1. Enflurane dose-effect curves for purposeful movement (PM) and heart rate (HR) response to a noxious stimuli. The vertical axis indicates the per cent of animals with lack of response to a noxious stimuli (4 kg/cm² on the middle of the tail for 60 s). The horizontal axis indicates per cent of inspired enflurane (each rat was exposed to only one predetermined concentration of enflurane in oxygen for 30 min). Each circle represents the incidence of the effect in a group of six animals at the indicated dosage. Closed circles = abolition of purposeful movement response. Open circles = abolition of the heart rate response (the heart rate was derived from an ECG). ⁺ %, inspired concentration. For heart rate and movement response experiments, different groups of animals were used. For calculation of dose-effect curves, we used the probit procedure in SAS on an IBM 370 computer. Details of the experimental procedure were the same as in a previous publication.³ Notice that enflurane blocks heart rate response to a noxious stimuli in a dose-dependent fashion and that HR ED₅₀ (3.4%, 95% fiducial limits: 2.8-3.9%) is 70% higher than PM ED₅₀ (2.0%; 95% fiducial limits: 1.8-2.2%).

may be due to the fact that the Roizen data were obtained in humans, while our experiments were in rats. Another possibility is that indicated by Roizen and associates: they measured the cardiovascular changes at 3 and 10 minutes after incision, and this may have been too late to detect some of the changes in cardiovascular responses. (In our experiments, the most significant increases in heart rate were either during the stimulation period or within one minute after stimulation.)

Although the results of Roizen *et al.* disagree with our data regarding blockade of heart rate response to painful stimulation, they are in excellent agreement with our values in another aspect. Roizen *et al.* have shown that ED₅₀ for blocking an increase in blood norepinephrine upon skin incision was 1.6 MAC for enflurane (with an addition of 60% nitrous oxide). The HR ED₅₀ to the PM ED₅₀ ratio in our experiments with enflurane was 1.7, which is similar to Roizen's results. This ratio suggests that tachycardia in response to painful stimulation may be suppressed by an anesthetic concentration that is 70% above the concentration depressing the movement response. Heart rate response to a noxious stimuli could possibly be used as an alternative index for the measurement of anesthetic potency of enflurane.

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