Correspondence

A Report on a Possible Hazard of Gas Cylinder Tanks

To the Editor:—This letter is written to report an occurrence demonstrating a possible hazard inherent in the valve assembly design of gas cylinder tanks which could have serious consequences to personnel.

A call was received from the Radiology Department for assistance in securing an airway in a patient who had experienced an adverse reaction to a radiographic dye substance. Two anesthetists answered the call, but when they reached the x-ray department the patient had recovered spontaneously and assistance was no longer needed. As they were leaving, however, they were asked for advice concerning an oxygen E-cylinder which could not be turned on. The radiologist said he had been turning a valve on top, but gas would not flow. The anesthetist placed the tank wrench on the valve seat and turned it approximately one half turn, counterclockwise. At this point, the entire valve stem and its retaining collar shot out of the top of the tank and hit the ceiling with a loud crash. Fortunately, the anesthetist was holding the tank in front of her; had she been bending over it she would have received the full impact.

In reconstructing the incident, we determined that the radiologist had used the a hexagonal wrench instead of the regular tank wrench on the valve-stem retaining ring, under the mistaken impression that this was the valve; he had unscrewed the valve almost out of the collar. The last half-turn on an already-loosened valve catapulted the whole valve-stem and ring under full tank pressure.

We present this incident for two reasons: first, to point out that this type of accident is possible and to call it to the attention of anesthesia personnel. The second reason is to suggest that cylinder manufacturers should consider changing the thread direction of the valve collar to a reverse thread so that attempts to loosen it by turning in the customary counterclockwise direction will result only in further tightening of the thread. It would be safer if the thread direction of the valve stem were different from that of the valve collar.

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The Improperly Calibrated Flowmeter—Another Hazard

To the Editor:—This letter describes an error in the repair of an anesthesia machine which could have led to a serious anesthetic accident.

Recently the 20–250 cc/min flowmeter to the Verni-trol of one of our Ohio anesthesia machines was broken. The repairman installed a replacement which included a new scale, tube and bobbin. He did not check the flow calibration. Several hours later a resident used the anesthesia machine to anesthetize a patient for emergency resection of a leaking aneurysm of the thoracic aorta. Halothane/nitrous oxide/oxygen anesthesia was planned. It was noted after initial setting of the flowmeters for induction that the odor of halothane coming from the system was unexpectedly strong. For this reason a portable halothane vaporizer was substituted.

Later, by measuring water displacement from

an inverted 500-cc bottle, we measured the flow of gas that actually came through the flowmeter. With the flowmeter set at 250 cc/min the measured flow was approximately 1,500 cc/min. This would have delivered roughly six times as much volatile anesthetic agent as the flowmeter indicated. Early recognition of the problem probably prevented serious anesthetic overdosage. Following subsequent repair we verified calibration of the new system with a bubble flowmeter, finding it accurate.

The anesthesiologist must continually be on guard for the situation in which an anesthesia machine does not do what it is supposed to be doing.

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Obstetrics and Pediatrics

NEWBORN O_2 CONSUMPTION Oxygen consumption ($\dot{V}_{O_2}$) was measured in 68 infants during the first ten to 35 days of life by recording changes in circulating gas volume in a metabolic chamber. In infants weighing more than 2.5 kg, when environmental temperature (T_E) was 35 to 38 C, $\dot{V}_{O_2}$ increased from five to seven ml O_2/kg/min during the first two days of life. Physical activity and $\dot{V}_{O_2}$ both increased when T_E decreased below 33 C. The increase in $\dot{V}_{O_2}$ appeared to be related linearly and inversely to T_E, but the increase in heat production was seldom enough to prevent a decrease in rectal temperature. In infants weighing 2.5 kg or more, mean increase in $\dot{V}_{O_2}$ was 0.56 ml O_2/kg/min for each 1 C decrease in T_E when the infants were four to 12 hours old and 1.27 ml O_2/kg/min when they were between four and 20 days old. The maximum $\dot{V}_{O_2}$ in infants over 2.5 kg at birth and over two days old was about two and a half times the minimum $\dot{V}_{O_2}$. In seven infants who were motionless and apparently asleep after sedation with chloral hydrate, increases in $\dot{V}_{O_2}$ at low T_E were reduced but still significant. The newborn responds to a cool environment with a considerable and immediate increase in heat production. Visible muscular activity appears to account for only part of this increase. (*Hey, E. N.: The Relation Between Environmental Temperature and Oxygen Consumption in the Newborn Baby, J. Physiol. 200: 589 (Feb.) 1969.*)

SHUNT IN RDS Respiratory distress syndrome (RDS) is associated with total venous admixture (shunt) of up to 80 per cent of the cardiac output. This occurs at three sites: 1) in unventilated but perfused alveoli, 2) through a patent foramen ovale, and 3) through a patent ductus arteriosus. The arterial O_2 content difference above and below the ductus was determined by right radial artery puncture and descending aortic catheterization in 33 newborns with RDS. Serial studies of 17 newborns were done. Calculated shunt across the ductus proved to be less than 10 per cent of cardiac output in 30 infants. The maximum shunt was 21 per cent. Serial studies showed decreasing ductal shunt with advancing age, and no correlation of ductal shunt with *p*H, radial artery Pa_{O_2}, or survival. The data indicate that the ductus is not a major site of venous admixture in RDS. (*Murdock, A. J., and Swyer, P. R.: The Contribution to Venous Admixture by Shunting Through the Ductus Arteriosus in Infants with Respiratory Distress Syndrome of the Newborn, Biol. Neonat. 13: 194 (No. 3–4) 1969.*)