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Preventing Barotrauma

To the Editor:—Drs. Rendell-Baker and Meyer have made an excellent proposal regarding an alarm-safety mechanism to prevent barotrauma and warn of accidental disconnection from the ventilator.[1] We agree about the need for incorporation of further protective equipment on the gas machine. We endorse completely the concept that any device designed to protect the patient must be activated automatically with the machine if it is to be effective. Frequently this increases complexity and limits versatility. In this light we would like to comment on an alternative approach to circuit pressure safety.

Analysis of cases of barotrauma under anesthesia shows the pressure source that usually causes the damage is not a ventilator but the anesthesia machine. All current machines will deliver pressures capable of rupturing lungs. Ventilators or their connections, where involved, are usually implicated as a source of outflow obstruction not as the source of pressure.

Several authors[2,3] have pointed out that the inclusion of a fixed pressure relief valve set for some value between 40–60 cm H_2O would effectively prevent barotrauma in current breathing systems. At least two such valves are available currently.[2,3] Inclusion into the system is easy, requiring nothing more than an appropriate T-connector. They are inexpensive. One of us (BL) is familiar with several English hospitals that use such valves routinely without difficulties.

Limiting the pressure in the system should be adequate to prevent most causes of alveolar rupture. It will not, however, prevent the effects of prolonged pressure application without ventilation. Such a situation would occur if the pop-off valve in a circle were closed and no heed paid to the ever-increasing size of the reservoir bag. The simple expedient of incorporating an alarm in the relief valve to signal a high pressure should bring rapid correction of this oversight.

The system proposed by Drs. Rendell-Baker and Meyer goes further than the simple relief valve-alarm. It reduces the pressure as well as provides ventilation. We agree that it is more advanced, albeit more complex. It is difficult to imagine such a system as a retrofit item easily attachable to the wide variety of current machines. We feel that, while the proposed design is excellent for the future, a circuit safety valve with alarm represents a more practical solution for present machines. At this time, manufacturers' attention might best be directed toward this simple solution.

GEORGE P. HERR, M.D.
Associate Professor

BERNARD LIBAN, F.F.A.R.C.S.
Visiting Lecturer
Department of Anesthesiology
UCLA School of Medicine
Los Angeles, California 90024

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Ventilator Malfunction—Another Cause

To the Editor:—Equipment failure in the anesthetic setting is a constant concern for the anesthesiologist. Numerous reports of such failures have appeared in the literature, often with tragic consequences for the patient.[1,2] Although causes of ventilator malfunction are diverse, a previously unreported cause is that of a ventilator malfunction in association with a Drager Volumeter.

A healthy male undergoing cholecystectomy was anesthetized uneventfully with the use of thiopental, 3–4 mg/kg, pancuronium, 0.1 mg/kg, and isoflurane with 70% N_2O in oxygen. Institution of mechanical ventilation at a tidal volume of 12 ml/kg resulted in incomplete emptying of the ventilator bellows, despite increasing the ventilator cycling pressure to 50 cmH_2O. This occurred despite the fact that manual ventilation was attained without difficulty. Disconnection of the ventilator hose revealed a substantial quantity of accumulated water in the internal structure of the bag/ventilator selector valve mechanism. Removal of the water by suctioning allowed mechanical ventilation to be reinstituted successfully at peak respiratory pressures below 20 cmH_2O.

The Drager Narkomed 11® anesthesia machine and ventilator with a semiclosed circle absorber system was used, with a Drager Volumeter in the expiratory limb of the circuit. The Drager Volumeter is known to be affected by water vapor and to be the site for the accumulation of condensate. This is especially true following prolonged use in a closed or semiclosed circle system. The position of the volumeter in the circuit above the level of the bag/ventilator valve assembly allowed accumulated condensate from the volumeter to gravitate toward and accumulate in the bag/ventilator valve assembly during periods of idleness with no gas flow. This accumulation over a period of hours resulted in the production of a static resistance to flow in the selector valve assembly, compromising the functioning of the ventilator. This occurred when initially activating the ventilator following a period of nonuse of the machine. This does not occur during use, because the machine and circuit are subjected to a continuous flow of gas that tends to ensure that significant water accumulation at the selector assembly does not occur due to continuous evaporation and mechanical displacement of water droplets.

In conclusion, we recommend that if the Drager Volumeter is to be used in circuit with the Narkomed 11® machine, it should be removed and dried as per manufacturer's recommendation at the end of each day and the bag/ventilator assembly valve inspected for moisture. Following such procedures should help minimize problems such as those reported here.

G. Y. Gaines III, M.D.
Associate Professor of Anesthesiology
University of Texas Southwestern Medical School
and Director, Anesthesiology Section (112A)
Veterans Administration Medical Center
4500 South Lancaster Road,
Dallas, Texas

D. Ian Rees, M.B., B.Ch.
Assistant Professor of Anesthesiology
University of Texas Southwestern Medical School
and Associate Anesthesiologist,
Parkland Memorial Hospital and Affiliated Institutions

Anesthesiology Section (112A)
Veterans Administration Medical Center
4500 South Lancaster Road
Dallas, Texas 75216

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Treating Peripheral Venospasm

Letter to the Editor:—It is with great interest I read the clinical report of peripheral venospasm by Cunningham and Korbon.[1] I have encountered this phenomenon and have successfully used a technique to counteract it that was not mentioned in their report, namely a small application (5 mm) of 2% nitroglycerin ointment spread thinly over the involved vein. A waiting period of 5–10 min is required for good venodilation and results in an improved flow rate, which persists for up to 2 h. Systemic side effects from this small transcutaneous dose (3 mg) are minimal. The authors mention intravenous nitroglycerin as a consideration in treating the venospasm.

The administration of the ointment also may be useful in lessening radial artery spasm during radial artery cannulation. The 2% nitroglycerin ointment is medically available from several different pharmaceutical companies under different trade names.

Walter P. Zmyslowski, M.D.
Assistant Clinical Professor of Anesthesiology
Boston University School of Medicine
and Staff Anesthesiologist
Boston City Hospital
818 Harrison Avenue
Boston, Massachusetts 02118

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