Increased airway pressure caused by a ventilator

To the Editor:
We report a progressive increase in airway pressure caused by external pressure on the ventilator relief valve pilot line of the North American Dräger Narkomed 2C anesthesia machine during anesthesia. Previous check of the anesthesia machine was performed according to the FDA anesthesia apparatus checkout recommendations -1986.

Twenty minutes after instituting mechanical ventilation in an ASA I patient, the alarms warned of an increased breathing circuit pressure tracing with each ventilation cycle. Visual check showed that an electrical cable was pressing on the ventilator relief valve pilot line (Figure). The breathing circuit pressure pattern reverted to normal after its removal. The design of the same pilot line in the ventilator AV 2 + has been improved by the addition of an internal metal tube.

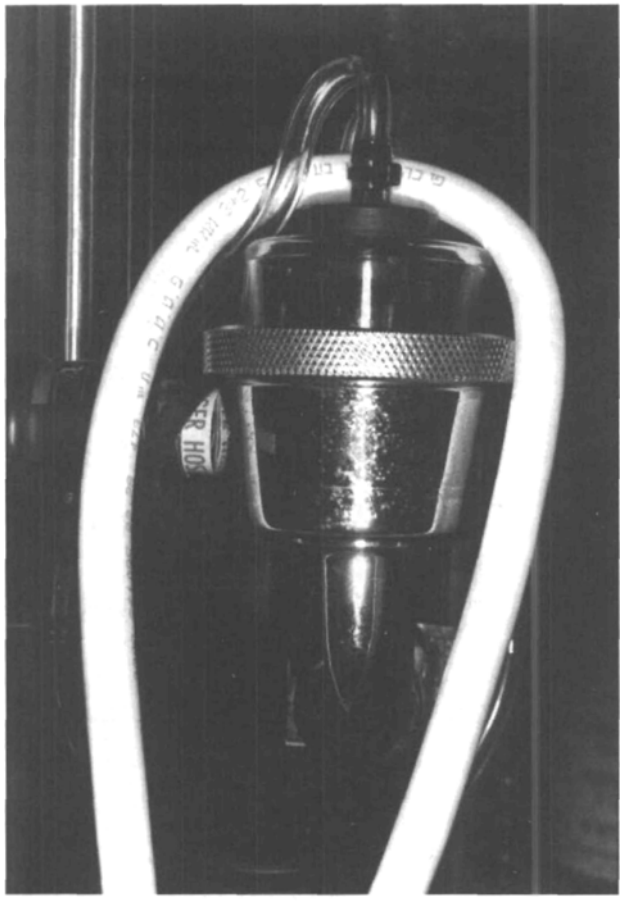

FIGURE Electrical cable lying on the ventilator relief valve pilot line

An iatrogenically induced valve malfunction that resulted in increases of the minimum and peak pressures in patient circuit has been described when the connecting tubing from the ventilator was occluded after repositioning the anesthesia machine.[1] In our case, it seems that an operating room staff' member put the cable on the valve in the middle of the procedure. During the inspiratory phase of ventilation when the pressure of the driving gas in the bellows housing was being transmitted via the pilot tubing to hold the ventilator pressure, the relief valve closed. Kinking of the tubing during this time kept the relief valve closed and prevented gas from leaving the circuit and caused progressive increase in airway pressure.

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REFERENCE

1 *Eisenkraft JB.* Potential for barotrauma or hypoventilation with the Drager AV-E ventilator. J Clin Anesth 1989; 1: 452B6.

Manual pump failure

To the Editor:
I wish to report an unusual failure of the manual pump of the Y-Type Blood/Solution Set with Pressure Pump, Baxter 2C7613 (Baxter Healthcare Corporation, Deerfield, IL).

An elderly lady presented for abdominal perineal resection. General anesthesia was induced without difficulty. A second large bore intravenous line was established after tracheal intubation and connected to a Hotline™ (Level I Technologies, Inc., Rockland, MA) to which the Y-Type Blood/Solution Set with Pressure Pump had been attached filled with normal saline as per the manufacturer's instructions. Two litres were infused with free flow and no leakage.

During pelvic dissection, there was an unexpected loss of 750 mL blood: blood pressure decreased to 90/60 mmHg with a heart rate of 110 bpm. The intravenous lines were opened wide. The manual pump of the Y-Type Blood/Solution Set was compressed to assist with fluid resuscitation. With the first compression, a jet of fluid squirted from the upper portion of the pressure pump assembly (Figure). The defective Y-Type Blood/Solution Set with Pressure Pump was removed and replaced.

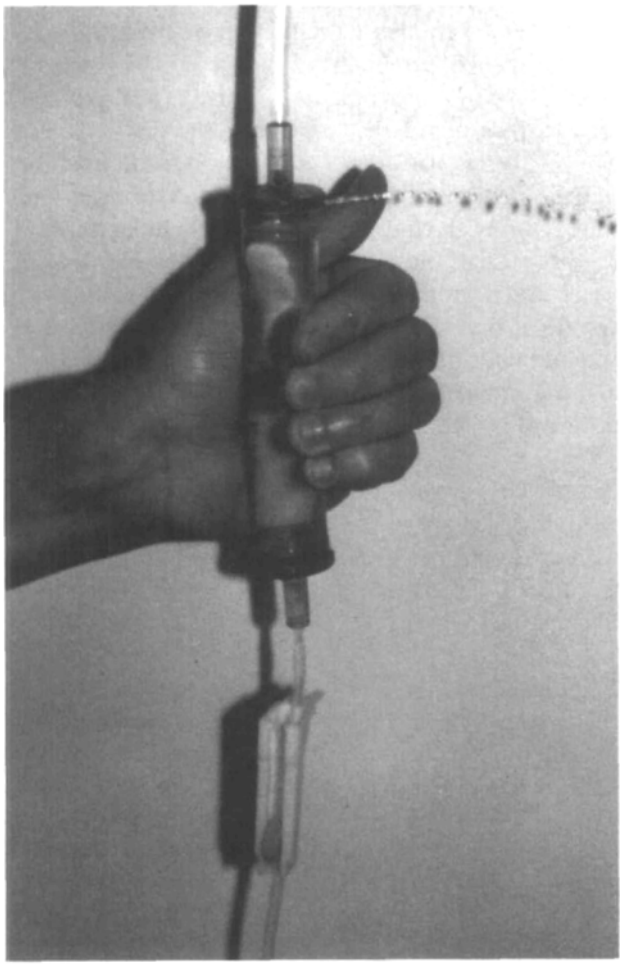

FIGURE Defective Baxter Y-Type Blood/Solution Set with Pressure Pump

Examination of the manual pressure pump revealed that the seal between the top portion and the pump cylinder was flawed. Despite following manufacturer's recommendation the defect was undetected. Only if the pressure pump was held vertically and compressed against the closed regulating clamp distal to the pump could the defect be demonstrated.

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REPLY:

We functionally qualify the hand pump to withstand internal pressure and typical manipulations that occur during compression of the hand pump. In addition, we conduct inspections of the pressure pump component and of the set.

The pressure that can be generated by the hand pump component is dependent on the stroke volume of the hand pump, the inner diameter of distal components, the tubing dimensions, and length/modulus of elasticity. It is also dependent on the usage of the blood hand pump in terms of compressions per min. Other contributing factors may include fluid viscosity, surface characteristics of the tubing and components that might add resistance. The blood hand pump on the 2C7613 has a stroke volume between 26 and 29.5 ml.

We retrieved 50 unused samples of the reported product code from our manufacturing facility, testing was conducted, and no failures occurred. Components downstream of the hand pump can cause restriction and increased pressure. Thus, our label copy states, "The pressure pump is not recommended for use with products that have pressure limiting labeling statements and are used downstream of the pressure pump."

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