EQUIPMENT

The cap on the gas-outlet port of the Bentley Oxygenator is removed aseptically and a sterile corrugated tube placed in the hole (U-mid/15 22 mm × 15 inch Bard-Parker Cat. #5012). A T connector (Hudson #1077), a 6-mm endotracheal tube connector, and a second corrugated tube 22 mm × 15 inches are placed on the other ports of the T connector. The 6-mm connector is attached to suction via 3/16 inch Tygon tubing; a small pinch clamp (VWR Cat. #21705-004) on the Tygon tubing controls the rate of flow. The absence of moisture beyond the T connector assures that adequate exhaust flows are present. These may be more accurately assessed using a vacuum flowmeter (Dwyer Instruments, VFA 25, Michigan City, Indiana). If the flowmeter is used continuously, vacuum flows should be approximately 25 l/min to prevent moisture build-up on the flowmeter. The T connector and two corrugated tubes may be gas-autoclaved for reuse or disposed of as required. The small ports of the oxygenator used for priming and addition of medication can be easily plugged with two three-way stopcocks or the caps initially present on these ports may be replaced, thus preventing any leakage of gas through these outlets.

Only a small reservoir tube is required because the exhaust from the oxygenator is a continuous flow. This system has been tested and does not produce either excessive positive or negative pressure at the exhaust port of the oxygenator. The danger of a defective T adaptor, as reported by Millar and Ketcham, must be guarded against.

REFERENCES


A Variation of the Intermittent Mandatory Ventilation Assembly

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Intermittent mandatory ventilation (IMV) is a relatively new technique that can be useful in weaning patients from ventilators and in synchronizing respiratory efforts with a ventilator. The benefits of positive end-expiratory pressure (PEEP) in certain patients are well recognized, and the IMV system may be instituted with or without PEEP. Certain physiologic benefits of IMV over the standard controlled ventilation have been described. The IMV assembly, given the proper equipment, is rather simple to attach to almost any volume ventilator. The assembly requires introduction of a T-piece anywhere on the inspiratory limb of the circuit, a one-way valve allowing flow toward the inspiratory limb, a reservoir, sources of compressed air and oxygen, a reliable oxygen-mixing device, a flowmeter, and a humidifier (fig. 1). The flowmeter is usually adjusted to keep the reservoir filled and the one-way valve just open. Numerous variations of the assembly have been described.
Fig. 1. The basic IMV assembly. A, inspiratory limb of circle; B, one-way valve with flow toward circle; C, reservoir; D, humidifier; E, flowmeter; F, oxygen blender; G, wall oxygen; H, wall compressed air.

Fig. 2. The basic alternate IMV assembly. A, inspiratory limb of circle; B, one-way valve with flow toward circle; C, reservoir open to ambient air; D, humidifier; E, flowmeter; F, wall oxygen.
In some hospitals, however, a source of compressed air is not readily available. One must use tanks of compressed air, which are expensive and require constant attention to ensure against exhaustion of their contents, or buy medical-grade air compressors.

We have successfully used the wall nebulizer as a source of oxygen for an IMV assembly. The nebulizer gives remarkably accurate oxygen concentrations at its settings and provides a source of humidification (fig. 2).

The use of this system necessarily must be limited to less critically ill patients, due to two requirements of the system. First, the oxygen concentration must not be critical, since the nebulizer works on a Venturi principle for oxygen dilution, and can be set on only one of three settings. However, it will deliver 40, 70, and 100 per cent oxygen with acceptable reliability. Second, the system must be open to ambient air proximal to the one-way valve, and flow rates should be high enough to prevent further air dilution at the open reservoir. This precludes its use with PEEP. If the system is used with PEEP and left open to ambient air, the patient must create a negative pressure relative to ambient pressure to open the valve. This is undesirable. If the system is used with PEEP and the reservoir is closed, allowing sufficient pressure to accumulate to keep the valve open, the efficiency of the Venturi is compromised and the percentage of oxygen will go up. We have measured FpO₂'s of 0.83 with a wall setting of 0.40 in such a system.

This method of IMV assembly is not recommended instead of the standard assembly where the proper equipment is available. However, in certain locations with limited facilities, it might benefit the less critically ill patient for short periods of ventilatory assistance.

REFERENCES