

## A Practical Way of Using Heated Humidifiers with Pediatric T-piece Systems

*To the Editor:*—The use of a heated humidifier often is desirable when a “non-rebreathing” T-piece system is used for premature infants, mainly to minimize respiratory heat loss and help maintain normothermia during surgery.

When used with the usual pediatric T-piece system (Jackson-Rees or Bain type), the humidifier usually is placed between the fresh gas flow (FGF) outlet of the anesthesia machine and the FGF inlet to the system. There are two major disadvantages frequently encountered with this arrangement.

One is that the sensor for the thermostatic servo mechanism (which must be used to avoid excessive heat being delivered to the airway) is not easy to adapt. If it is positioned directly between the FGF tube and the T-piece, it tends to slip out or crack if the plastic adaptor is forced over the metal nipple of the T-piece, or otherwise it requires multiple adaptor connections, which result in a bulky, unwieldy T-piece. If the sensor is positioned between the T-piece and the endotracheal tube, it usually is stable, but results in a significant increase in dead space.

The second problem with this arrangement is the inevitable condensation or “rain-out” of water vapor as the gas mixture is cooled during its passage through the fresh gas delivery tube. Eventually excessive water condensation in the narrow (10-mm diameter) delivery tube can result in two undesirable and potentially hazardous situations: 1) Blockage of the FGF tube can result if condensed water accumulates in a dependent loop of the tube; and 2) a very loud bubbling noise usually occurs, which seriously interferes with the ability to use an esophageal or precordial stethoscope to monitor breath or heart sounds.

Attempts to reduce condensation have been reported.<sup>1</sup> This includes several combinations of insulating, or warming of the FGF tubing itself, or both. While this approach may be effective, it has the major disadvantage of making a basically simple system complex and bulky.

We found that using the large-diameter (22 mm) disposable adult anesthesia circuit tubes and “Y” piece, rearranged into a non-rebreathing T-configuration, can minimize the problems associated with condensation and sensor probe positioning, while still maintaining the advantages of a T-piece system. The following is a description of the current humidifier system at Children’s

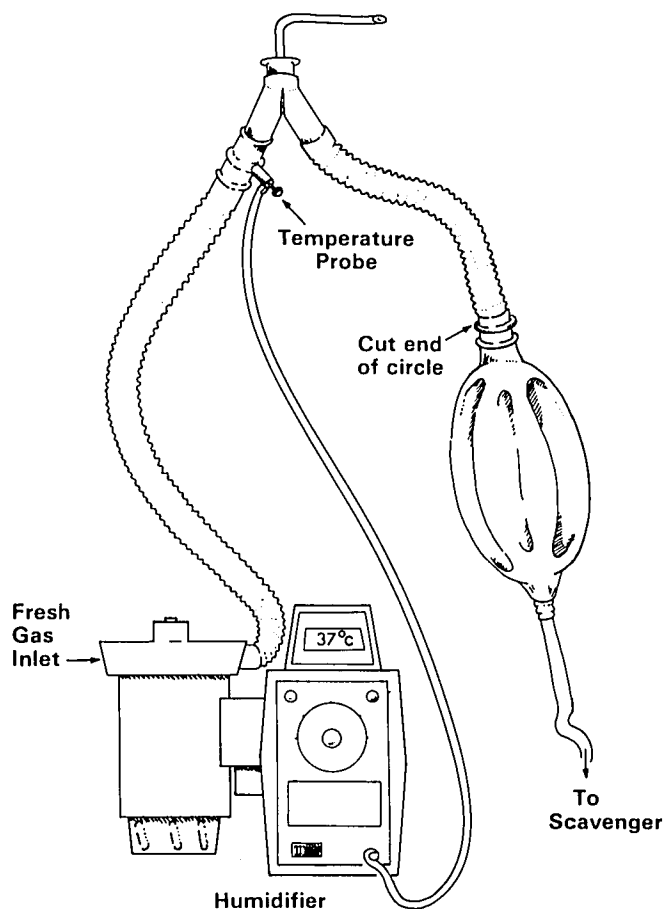


FIG. 1. Adult disposable breathing circle tubing rearranged into a non-rebreathing T-piece system used with a “Bird” humidifier.

Hospital National Medical Center (fig. 1): 1) A “Bird”<sup>\*</sup> heated humidifier with a ring sensor attachment is assembled. 2) One limb of a disposable adult breathing circle with a septate Y-connector<sup>†</sup> is attached to the humidifier outlet and functions as the fresh gas tube carrying the humidified gas mixture to the patient. The sensor probe ring is positioned between the end of the FGF tube and the Y-connector. 3) The Y-connector now functions as the T-piece of the system. Because of the built-in septum in the 15-mm port of the “Y,” the dead space is negligible. 4) The second limb of the circle tubing either is cut to the desired length (12–18 inches) and attached to a 1-l anesthesia bag or left intact and

\* Bird Corporation, Palm Springs, California 92263.

† American Hospital Supply Co., McGaw Park, Illinois 60085.

attached to an anesthesia ventilator. A plastic 22-mm outer diameter (OD) ring‡ is a perfect adaptor for that purpose.

The system described has the following advantages. 1) It is light weight, avoiding unnecessary drag on the endotracheal tube. 2) There is no increase in dead space over the standard T-piece system. 3) There is a secure attachment of a sensor probe along the fresh gas tube near the patient's airway. 4) Construction of components are available readily in any anesthesia department. 5) While water condensation will continue to occur, the wide-bore tubing used greatly will reduce the risk of blockage, and it definitely cuts down the bubbling noise, making it much easier to monitor breathing and heart sounds by auscultation.

There are two cautions that should be noted. One is that water collected in a loop of the FGF limb still can be inadvertently drained into the endotracheal tube. However, placement of the humidifier below the operating room table level and elimination of loops pro-

vide continuous drainage back into the humidifier reservoir. (When the FGF tube is of small bore, the velocity of the fresh gas tends to prevent drainage back to the reservoir). Another problem that must be kept in mind is that although dead space is not increased by using large-diameter hoses, the compression volume of the breathing circuit increases, and appropriate adjustments in ventilation must be made.

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‡ Bird® adaptor part #999 1233.

### In Defense of the Use of *d*-Tubocurarine prior to Succinylcholine in Obstetrics

*To The Editor:*—We are accepting Crawford's<sup>1</sup> challenge to "present a reasonable and compelling case" for the continuance of precurarization before administration of succinylcholine in obstetric anesthetic practice. "Postoperative muscle pain" has not been the reason for precurarization in pregnant women whose increased body water content serves to reduce muscle tension. There are, however, two other indications. First, as demonstrated by integrated electromyography,<sup>2</sup> succinylcholine-induced fasciculations increase intragastric pressure in a linear manner. Increased intragastric pressure, in turn, tends to increase the risk of regurgitation of gastric contents in the gravid woman whose stomach has shifted from a vertical to a horizontal position, whose intragastric pressure already is elevated, whose gastroesophageal junction tonus is decreased, and who often has developed a hiatus hernia.<sup>3-5</sup> Second, fasciculations are muscle contractions and, as such, utilize oxygen. In pregnant women, with their increased metabolism and reduced oxygen storage capacity, the arterial oxygen tension significantly falls more rapidly during apnea than in comparable nonpregnant women.<sup>6</sup> Prevention of succinylcholine-induced fasciculations before endotracheal intubation avoids this increased consumption of oxygen just before the period of apnea, thereby providing a greater margin of safety for mother and baby.

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