PEEP for the Bain Breathing Circuit

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The Bain breathing circuit is a lightweight coaxial circuit. Predictable $P_{a\text{CO}_2}$ levels are obtained when the recommended fresh-gas flow is used. PEEP is a useful adjuvant in the treatment of certain pulmonary disorders in the intensive care unit and in the operating room. A device for administering PEEP has been available for some anesthetic systems, but until now, it has not been applicable to the Bain circuit. A device for adaptation of the Bain circuit for administration of PEEP has been constructed.

DESCRIPTION

The device (fig. 1) consists of a right-angle connector, leading from the bag attachment site. This connector joins to a T-piece positioned with one orifice directed vertically upward. The vertical orifice leads to a Boehringer® ball PEEP valve with flow directed vertically upwards. A right-angle connector directs flow in a horizontal direction through a Bird® unidirectional valve No. 5536. Another unidirectional Bird valve No. 5537 is attached to the horizontal orifice of the t-piece. Both unidirectional valves are joined by short pieces of clear plastic tubing to a Y-connector. The Y-connector is then attached to the ventilator hose (fig. 1).

DISCUSSION

Flow during the inspiratory cycle is directed through the lower limb of the device. No flow occurs in the upper limb because of the unidirectional valve (5536). During the exhalational cycle gas flow must pass through the PEEP valve because of the unidirectional valve (5537). The unidirectional valve (5536) in the upper limb of the device insures no forward flow and may be unnecessary with a properly seated PEEP valve. The pressure characteristics of

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Fig. 1. The device in use. Components shown upper right.
the Boehringer PEEP valves and the effect of back-pressure on anesthetic concentrations have been previously described. Initial pressure measurements for this device correspond to those described for other anesthetic systems with PEEP attached.

This device extends the range of usefulness of the Bain breathing circuits by allowing the application of PEEP intraoperatively. The use of readily available components that can be assembled and interchanged easily allows for cleaning and varying PEEP levels. Boehringer PEEP valves are the most expensive component of this device, and these are relatively inexpensive. These valves can also be adapted for use in other anesthetic systems.

Density Modulation—A Technique for the Display of Three-variable Data in Patient Monitoring

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The lack of compressed, readable displays is a major deficit in patient monitoring. Most strip-chart and oscilloscope channels are occupied with simple, function-vs-time displays: for example, the ECG or arterial pressure. Although these displays do provide considerable information, the limitation to two variables per channel has prevented the strip-chart recorder from achieving its full usefulness. For example, the EEG and vectorcardiogram are neglected because their display optimally requires more than two variables simultaneously. We present here a method that records three variables on one strip-chart channel and yet still allows the physician to recover the necessary information. This method described in this paper incorporates a second variable with the first and compares it with the first variable, while preserving a third variable—time—which runs parallel to the other strip-chart channels. The result is a voiceprint-like pattern that is easily read and interpreted.

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