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CO₂ Monitoring during Cardiopulmonary Bypass

To the Editor:—PaCO₂ may fluctuate widely during cardiopulmonary bypass. Variations in PaCO₂ reflect changes in production of CO₂ occurring secondary to changes in temperature. CO₂ removal is proportional to gas flow into the pump oxygenator. CO₂ is added as either a fixed or variable percentage of the gas flowing into the oxygenator. Variability in PaCO₂ can be reduced through frequent monitoring of arterial blood gases and subsequent adjustment of either total gas flow, per cent CO₂ in the gas flow or both. We have devised a simple method for rapid adjustment of PaCO₂ based upon use of a portable end-tidal CO₂ analyzer (Puritan-Bennett®, etc).

One end of the sampling port of the CO₂ analyzer is fitted to a 3-mm endotracheal tube adapter. The other

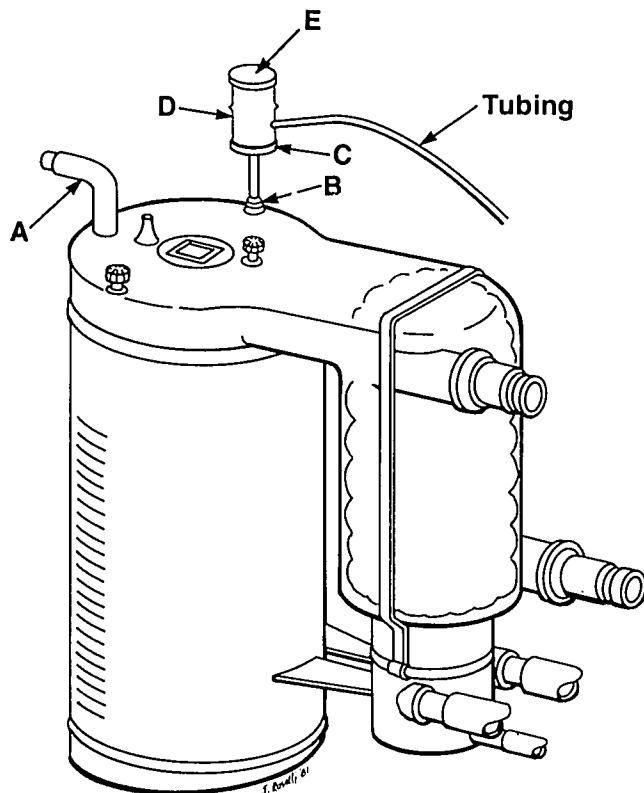


FIG. 1. Puritan-Bennett CO₂® Analyzer attached to Shiley S-100 A oxygenator. Gas exhaust port, A; quick prime port, B; 3-mm endotracheal adaptor, C; CO₂ sampling attachment, D; occlusive cap, E.

TABLE 1. Analysis of End-tidal CO₂ and Respective Blood PaCO₂

End-tidal CO ₂ (mmHg)	Blood PaCO ₂ (mmHg)	Error/mmHg
35.5	36.6	0.9
40.0	39.7	0.7
39.5	39.7	0.2
29.5	30.7	1.2
34.0	34.6	0.6
40.0	41.0	1.0
41.0	41.5	0.5
41.5	41.0	0.5
41.5	40.7	0.8
35.0	34.1	0.9
29.5	29.3	0.2
34.0	33.6	0.4
35.0	33.8	1.2
40.0	39.7	0.3
44.0	43.1	0.9
38.0	36.8	1.2
39.5	39.0	0.5
48.0	47.3	0.7
42.0	40.0	2.0
40.5	42.3	1.8
Mean	38.4	38.2
		0.8 (Range -1.8 to +2.0)

end is occluded to prevent sample contamination. The endotracheal tube adapter is then attached at the quick priming port of the oxygenator (Shiley S-100A) and gas is continuously sampled (See fig. 1).

We compared twenty temperature-corrected, arterial blood gas determinations (IL 813 Blood Gas Analyzer®) to comparably timed readings from the CO₂ analyzer. In no case did the two measurements differ by more than two mmHg (See table 1).

We present this as a simple method of monitoring PaCO₂ suitable for rapid adjustment of CO₂ addition or removal during cardiopulmonary bypass and as a means of reducing the necessary number of blood-gas determinations.

TODD B. JAFFE, M.D.
Fellow
Department of Anesthesia

JOHN BERNHART
Cardiovascular Perfusionist
North Carolina Baptist Hospital

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