Valve Simplifies Pressure Monitoring from Triple-lumen Pulmonary-artery Catheters

To the Editor:—The triple-lumen, flow-directed pulmonary-artery catheter permits the simultaneous monitoring of pressures in the right atrium and pulmonary artery (PA). In addition, by inflation of the balloon, the distal lumen can be used to measure pulmonary capillary wedge (PCW) pressure. However, it is often unnecessary or impractical to monitor the two pressures continuously with a transducer and its associated electronic amplification/processing/display system. If the PA/PCW pressure information is considered to be of greater significance than the central venous pressure (CVP), the distal lumen will normally be connected to the transducer with provisions for intermittently switching to the proximal lumen. The switching system usually consists of some stopcock or manifold arrangement that selects the pressure to be seen by the transducer and ensures that both lumens will be kept patent by the slow or intermittent flush of a suitable solution. The system must also provide for the withdrawal of blood samples and the venting of the transducer to atmosphere for zero or calibration adjustments.

Any arrangement comprised solely of conventional stopcocks, either individually or in a manifold, necessitates that several stopcock handles be turned in the correct direction to monitor a different lumen while insuring that the other is kept patent. Errors of omission or commission may result in mishaps such as inaccurate calibration, mistaken waveform identification, clot formation, air embolism, blood back-up, or sampling and flushing of an undesired lumen.

To decrease the probability of error, we have employed a special four-way valve that simplifies the process for selecting the lumen to be monitored. This valve, when combined with two Intraflo®-type flush-

---

Fig. 1. Fluid pathways of the special four-way valve in position to monitor PA/PCW pressure.

Fig. 2. CVP monitoring position requires only 90-degree rotation of the valve handle but assures patentcy of the distal lumen.

References

(As the valve is patent to atmosphere and zero the transducers, two connections may be used simultaneously without effort.)

* Sorenson Research Company, P.O. Box 15588, Salt Lake City, Utah 84115.
ing devices and a single pressure transducer, assures the continuous flushing of both lumens and permits the monitoring of either pressure by rotation of a single handle. In the PA position, the distal lumen is connected to the continuous flush with the transducer while the patency of the proximal lumen is maintained by the other continuous flush (fig. 1). Rotating the valve handle through 90 degrees essentially switches the proximal and distal connections so that the CVP is now presented to the transducer (fig. 2). Conventional three-way stopcocks may be inserted at the proximal and distal connections to facilitate calibration procedures and blood sampling.

We have constructed and are using a prototype assembly based on a commercially available chromatographic four-way valve with flow through any two adjacent ports† (fig. 3). The valve and fittings have been mounted on a piece of plastic that fits into a conventional manifold holder for convenient attachment and positioning. Because the chromatographic valve is designed to rotate through 360 degrees, mechanical stops that limit rotation and align the ports must be added. Utilization of a miniature pressure transducer is a desirable but unnecessary feature. Standard-sized transducers can be connected by a short length of appropriate tubing or can be mounted directly onto the valve assembly with only a slight alteration in the configuration.

GARY S. KOTTER, M.S.
Clinical Engineer
Department of Anesthesiology
Medical College of Wisconsin
Veterans Administration Medical Center
Wood, Wisconsin 53193
(Accepted for publication October 18, 1979.)

† Hamilton Company, P.O. Box 10050, Reno, Nevada 89510.

Hazard of Disposable Diaphragm Domes

To the Editor:—We read with interest and concern the paper reporting a hazard in using disposable diaphragm domes.¹ A tragedy was averted by the presence of mind of one of the anesthesiologists.

The actual pressure cannot reach the transducer when the dome is loose. Leakage will be obvious in the case of a non-diaphragm dome, but inaccuracy without visible leakage occurs when a diaphragm dome is loose.

The user is directed several times to tighten the dome very firmly: in an instruction sheet in the bag with every TA1009D (and other Gould Statham® disposable) dome, on an illustrated 8½ × 11-inch sheet packed in every box of 12 domes and in the instruction booklet accompanying all P23-series transducers. We emphasize the necessity of a firm installation torque.

The distance from fully tight to complete thread