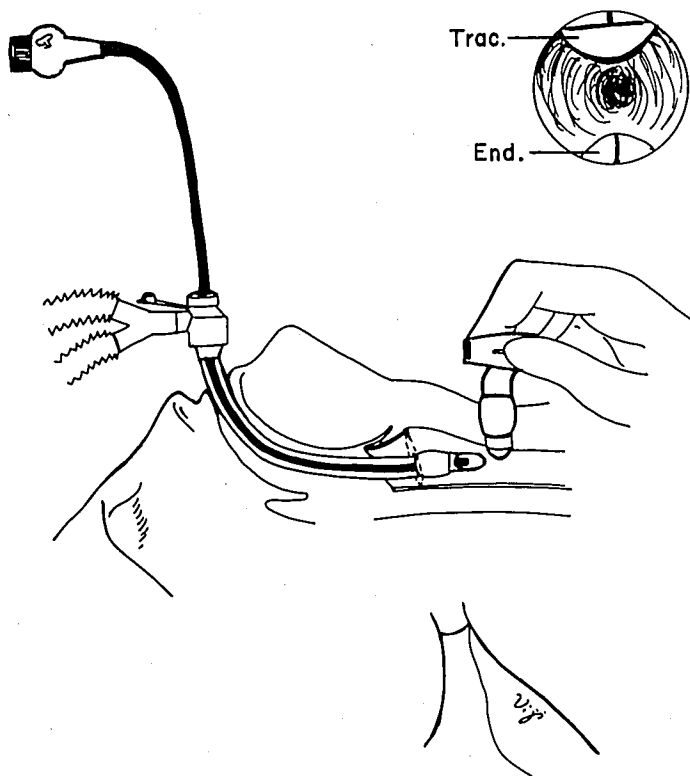


FIG. 1. Insert showing view through bronchoscope: tip of tracheostomy tube entering trachea and tip of endotracheal tube also visible. Vertical lines on tubes represent radiopaque markers of Portex® tubes.



malities. The anesthesiologist is also afforded the opportunity to gain facility with use of the bronchoscope.

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### Cordis Introducers: CVP Measurement with Fluid Infusion

*To the Editor:*—Cordis introducer catheters are presently utilized routinely for obtaining and maintaining central venous access.<sup>1</sup> The catheters are manufactured in 5 to 8-Fr sizes, the 8-Fr size being the most commonly available because of its compatibility with 7-Fr adult pulmonary artery catheters. Due to the convenience and relative safety of insertion by the Seldinger technique, these introducers are often used for central venous pressure monitoring in patients who do not require the added

risk of pulmonary artery monitoring. This has the additional benefit of permitting the rapid placement of a pulmonary artery catheter through the hemostatic valve of the introducer if the patient's condition deteriorates and such monitoring becomes indicated. The introducer also provides a large-caliber venous access for the rapid infusion of fluids. When using the introducer for such rapid infusions or for continuously infusing vasoactive drugs, the single sidearm port on the Cordis does not

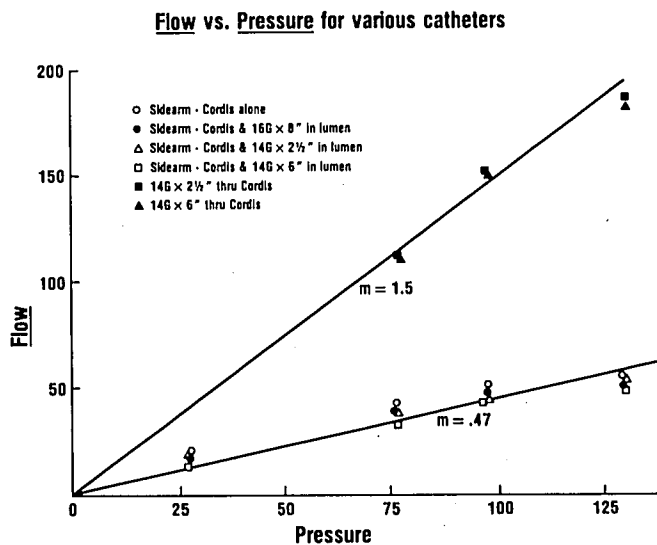


FIG. 1. Flow (ml/min) vs. Pressure (torr) for various catheters, with normal saline at 21° C, inclusive of resistance of iv tubing. Flow through a 14-gauge catheter in the Cordis lumen is approximately three times the flow through the Cordis sidearm at a given pressure.

allow for simultaneous pressure monitoring. The introduction of a 14-gauge, 15-cm (6") plastic catheter\* through the valve assembly of the Cordis will allow for concurrent pressure monitoring and fluid or drug administration. This 14-gauge catheter has the interesting property of increasing the rate of flow threefold at a given pressure compared to the flow through the Cordis sidearm port. Figure 1 shows the relationship between flow and pressure for the Cordis sidearm with various catheters placed into the Cordis lumen and the flow/pressure relationships for 14-gauge catheters within the introducer lumen. The presence of even a 14-gauge catheter in the lumen of the Cordis does not substantially alter the flow rate through the sidearm port. This seeming paradoxical flow characteristic is readily explained by examining the attachment of the sidearm port to the hub of the Cordis. The attachment orifice (visible with the valve assembly removed) is approximately 0.5 mm in diameter and offers such a high resistance to flow as to make the presence of a catheter within the Cordis lumen an inconsequential additional resistance. Based on this information, the insertion of a 14-gauge catheter through the valve should be routine if a Cordis introducer is to be used for resuscitation or high rates of fluid infusion, rather than using the sidearm port as is presently the practice. The sidearm port may be used for simultaneous central venous pressure monitoring when a 15-

\* Blitt CVP Monitoring Kit: Argon Medical Corporation, 2612 National Circle Drive, Garland, Texas 75041, No. 497601. Cordis Sheath Introducer System: Cordis Corporation, Miami, Florida 33137, 8F, Catalogue No. 501-608.

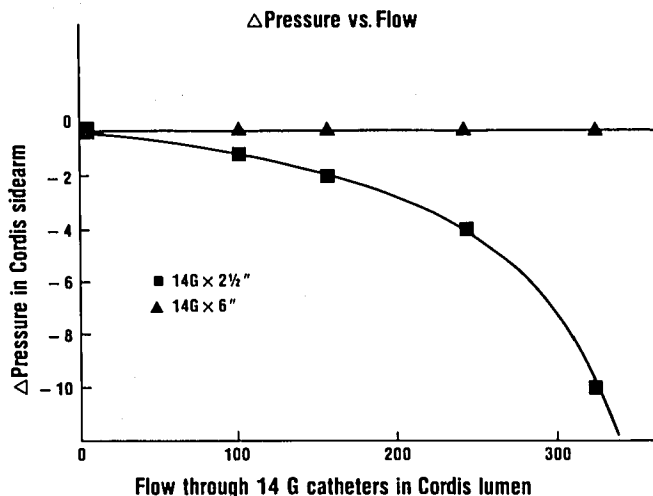


FIG. 2. Change in apparent sidearm pressure (torr) vs. flow (ml/min) through 14-gauge catheters within Cordis lumen. Six-inch catheters show no Venturi effect, 2.5-inch catheters show progressively decreasing pressures measured at sidearm.

cm (6 in) or longer 14-gauge catheter is used for volume infusion. If a 5-cm (2.5 in) 14-gauge catheter is utilized through the Cordis lumen, there will be an apparent decrease in the measured sidearm pressure due to the Venturi effect within the Cordis lumen (figure 2). In resuscitation situations requiring maximal rates of fluid infusion, fluid may be infused through both the sidearm and 14-gauge catheter, the total flow being four times the rate through the sidearm alone at any given pressure.

It should be noted that catheters smaller than 15-gauge (6-Fr) will tend to cause a leak around the diaphragm seal in the hub of a 8-Fr introducer. Catheters 12-gauge (8-Fr) or larger will not fit into the hub or will occlude the sidearm port. The 14-gauge, 15-cm catheter contained in the "Blitt CVP Monitoring Kit" external jugular catheterization package fits into the Cordis without leakage and provides adequate length to prevent alteration of sidearm pressure by the Venturi effect. Similar 14-gauge, 15-cm catheters are available from other manufacturers, but are not routinely available in many operating rooms, emergency rooms or intensive care settings.

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