A Complication with Thermodilution Cardiac Outputs in Centrally-Placed Pulmonary Artery Catheters

To the Editor:

The use of side-arm percutaneous central venous pressure introducer sets for the insertion of balloon-tipped pulmonary artery catheters is becoming increasingly popular. In addition to expediting the subclavian or internal jugular insertion of the pulmonary artery catheter, they have the added feature of a side-arm fluid administration port.

Recently, we performed a thermodilution cardiac output study utilizing a 4-lumen Edwards thermodilution Swan-Ganz catheter inserted through a USCI “hemaquet” arterial/venous percutaneous catheter introducer sheath. Using the Edwards 9020A computer and 10 ml of iced injectate, cardiac output values of 24 L/min and 22 L/min were obtained. During the second injection, a retrograde surge of blood-tinted intravenous fluid was observed in the line infusing the side-port of the introducer sheath. Closing off the stopcock on this line before the next thermodilution injection resulted in cardiac outputs in the range of 9 L/min. These values were more consistent with the patient’s clinical picture.

The in vivo length of the pulmonary artery catheter measured at the hub of the introducer sheath was 42 cm. Since the proximal line exit port is at 30 cm, and the length of the introducer sheath and hub is 15 cm, we concluded that the proximal port was still well within the lumen of the sheath. During injection of the 10 ml iced bolus, a significant portion of this volume was being forced retrograde into the side-arm intravenous line. As a result, a smaller volume of the injectate was actually being added to the venous blood, thus causing erroneously high cardiac output values. Closing off the stopcock to the side-arm intravenous line corrected this problem.

Since pulmonary artery catheters placed either through the subclavian or internal jugular veins tend to have short in vivo catheter lengths, their placement within an introducer sheath increases the likelihood of the above problem occurring. Therefore, when performing thermodilution cardiac output studies through a pulmonary artery catheter utilizing an introducer sheath with a side-arm intravenous line, care must be taken to ensure that the proximal port is beyond the tip of the sheath. Otherwise, fluid infusion through the side-arm should be from an infusion pump or the side-arm intravenous line should be temporarily turned off.

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