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Erroneous Cardiac Output Determination Due to Pulmonary Artery Catheter Proximal Port Dysfunction

To the Editor:—We recently encountered a problem with the use of a pulmonary artery catheter due to the location of the proximal (VIP and CVP) ports in our patient, a 162-cm-tall woman having aortic valve replacement. We placed an introducer (USCI-8 French) in the right internal jugular vein using the anterior approach, inserted a pulmonary catheter (American Edwards with a venous infusion port [VIP]), and advanced it to the wedge position. This placed the catheter at the 40-cm mark at the hub of the introducer. When we injected solution into the VIP for a cardiac output, the CVP trace showed a rapid and sustained pressure elevation, and fluid backed up into the introducer port. We advanced the catheter 4 cm (at which point the pulmonary artery trace was still normal) and could then inject fluid into the VIP without disturbing the CVP trace or having fluid flow back into the introducer. The cardiac output value obtained with the catheter advanced was 2 l lower than the previous output, while other hemodynamic parameters were unchanged from the previous values. The cause of the above problem is that with the catheter tip inserted 40 cm, the proximal ports which are 30 cm from the tip were within the introducer sheath.

The initial CVP trace was normal but with injection through the catheter proximal port (VIP) pressure was transmitted to the CVP port, which was also within the introducer. The cardiac output was falsely elevated because the volume of injectate was less than anticipated from the computation constant used.

We now know that if the pulmonary artery catheter wedges at 43 cm or less at the hub, then the proximal ports may indeed be inside the introducer sheath. We are now attempting to find shorter introducers; meanwhile, if the problem occurs, the sheath can be withdrawn slightly to allow more usable length of catheter.

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Frozen Pulmonary Artery Catheter: A Complication Associated with Cryoablation of the Ventricle

To the Editor:—Pulmonary artery catheter monitoring during the period of cardiopulmonary bypass can be both potentially valuable and harmful during the course of open heart surgery.[1,2] Abnormal elevations of pulmonary artery pressure during bypass may result from inadequate venting of the left ventricle or forcible wedging of the catheter tip during manipulation of the heart.[1,2] Recently, during the course of cryoablation of an irritable ventricular focus, marked elevation of the pulmonary artery pressure was observed that was not due to inadequate venting or forcible wedging but the result of freezing a segment of the pulmonary artery catheter.

REPORT OF A CASE

The patient is a 69-yr-old white man with a 2-month history of recurrent ventricular tachycardia refractory to medical management, who was scheduled for endocardial mapping, ventricular resection, cryoablation of anomalous conduction pathways, and a coronary artery bypass grafting (CABG). A 14-g intravenous and a 20-g right radial artery catheter were inserted percutaneously. The right internal jugular vein was cannulated with a #7 French introducer (Arrow®) using the Seldinger technique, after confirmation of a venous waveform. A pulmonary artery catheter (Opticath®) was advanced without complications into the pulmonary artery and to a wedge position at a distance of 50 cm from the insertion site. A normal pulmonary artery pressure and waveform was present with the balloon deflated. Pulmonary artery, central venous pressure (CVP), and radial arterial lines were attached to a continuous high pressure (300 mmHg) flush system.

The patient was anesthetized with isoflurane, N_2O, and O_2 by mask. Pancuronium was given to facilitate tracheal intubation. Normothermic cardiopulmonary bypass was initiated, and epicardial mapping was performed. The right ventricle was opened in order to locate the irritable focus *via* endocardial mapping. A portion of myocardium was excised, and the adjoining myocardium was treated with a cryoprobe (Frigitronics® Cryosurgical System) to a temperature of −60° C. During this period it was noted that the pulmonary artery pressure was rising.

The connections to the pulmonary artery catheter were verified to be intact, and the transducer was re-zeroed to the reference point; the catheter was still at 50 cm. When the surgical field was inspected, it became apparent that the pulmonary artery catheter came into contact with the cryoprobe, and ice crystals could be seen on the catheter. We were unable to aspirate or inject through the catheter, and the pressures now went off the scale.

Cryoablation was completed, and the catheter was not adherent to the probe. The distal coronary anastomosis was performed under hypothermic bypass (28° C), and the patient was rewarmed while the proximal anastomosis was completed. During rewarming, the pulmonary artery pressures returned to normal values, and it was again possible to aspirate blood freely from the pulmonary artery catheter. The patient was successfully weaned from cardiopulmonary bypass. During this process, a typical pulmonary artery waveform appeared, and cardiac outputs were easily obtainable. The catheter continued to function without problems postoperatively, and it was uneventfully removed 36 h later.

Discussion

When abnormal pulmonary artery pressures are observed during cardiopulmonary bypass and thought to be due to forcible wedging, it is prudent to pull the catheter back to avoid possible perforation of the vessel. It is conceivable that had this been attempted, the frozen catheter might have fractured due to the extremely low temperature. Early partial withdrawal of the catheter to the right atrium before bypass would prevent this problem.[3] Alternatively, the catheter should be carefully retracted from the site during cryoablation, and the possibility of freezing should be considered if a rise in pulmonary artery pressure is temporarily related to the use of the cryoprobe. In this case, the freezing and subsequent thawing did not appear to result in catheter malfunction.

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References

1. Barash P, Nardi P, Hammond G, Walker-Smith G, Capuano D, Laks H, Kopriva CJ, Bave AE, Geha AS: Catheter-induced pulmonary artery perforation. J Thorac Cardiovasc Surg 82: 5–12, 1981
2. McDaniel DD, Stone JG, Faltas AN, Khambatta HJ, Thys DM, Antunes AM, Bregman D: Catheter-induced pulmonary artery hemorrhage. J Thorac Cardiovasc Surg 82:1–4, 1981
3. Stone JG, Khambatta HG, McDaniel DD: Catheter-induced pulmonary arterial trauma. Can it always be averted? J Thorac Cardiovasc Surg 86:146–155, 1983

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Anesthesia for Acute Epiglottitis

To the Editor:—The clinical report, "Two-stage Fiberoptic Nasotracheal Intubation in Infants: A New Approach to Difficult Pediatric Intubation,"[1] that discusses using ketamine sedation and topical anesthesia is of considerable interest. I have used a slightly different technique that may be useful in similar cases, including epiglottitis.

Case Report. A 2-yr-old, 12 kg boy with a provisional diagnosis of acute epiglottitis was brought to the operating room where all the emergency equipment had been prepared. Intramuscular ketamine 50 mg was given, an intravenous infusion was established, and the tongue and pharynx were topically anesthetized with lidocaine 2 mg/kg. A flexible fiberoptic bronchoscope (FFB) (Machida, OD 3.9 mm) was introduced orally through a 7-cm Airway Intubator®[2,3,*] into the pharynx, and the diagnosis was confirmed.

The FFB was removed, and nasotracheal intubation was accomplished using a rigid, straight-blade laryngoscope. In retrospect, much less trauma would have occurred to the already inflamed and edematous tissues if intubation could have been carried out by passing a nasotracheal tube into the pharynx and directing the tip of the endotracheal tube between the vocal cords by manipulating the tube at the proximal end while observing the vocal cords through the FFB. This technique has now been successfully used in adults, and there seems to be no reason why it would not be equally useful in infants and small children.

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References

1. Berthelson P, Prytz S, Jacobson E: Two-stage fiberoptic Nasotracheal intubation in infants: A new approach to difficult pediatric intubation. ANESTHESIOLOGY 63:457–458, 1985
2. Rogers SN, Benumof JL: New and easy techniques for fiberoptic endoscopy-aided tracheal intubation. ANESTHESIOLOGY 59: 569–572, 1983
3. Palazzo MGA, Soltice NJ: A new aid to fiberoptic bronchoscopy. Anaesth Intensive Care 2:388–389, 1983

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* Airway Intubator® sizes 7 cm and 8 cm will soon be available from 3M Medical–Surgical Division.