de-airing ventricular support systems. Dr. Denton Cooley, in an accompanying editorial comment, tended to dismiss the current need for carbon dioxide displacement. I disagree. It is a remarkably effective, very simple tool to lessen the chance of air embolism to both heart and brain. Others may find it similarly useful.

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Surgical glove perforation during cardiac operations

To the Editor:

Dr. Underwood and others¹ reported on glove perforations occurring during cardiac operations. They detected the perforations by filling the gloves with water and squeezing them to look for jets. I think they may have underestimated the number of surgical glove perforations by using this technique, which was described by Church and Sanderson.²

The size of the perforation is dependent on the degree of distention of the glove. As either water or air is injected into the glove, the palm distends more rapidly than the digital part of the glove. The tip of the finger, where the majority of the perforations are,³ distends least because the radius is least at the fingertip. This is an example of an important physical principle, the law of Laplace, which states that the distending pressure in a distensible hollow object is equal to twice the wall tension divided by the radius.

The accuracy of the test should be defined. Perforations should be made at various points on the glove with a needle of known size, and then either water or air should be injected into the glove to a known pressure, rather than volume, to detect these perforations. I evaluated the accuracy of the test described by Church and Sanderson² by perforating the tip of the index finger with a 2-0 gauge needle. I was not able to demonstrate a leak. This prompted me to modify the technique described by Ballbach, Beavin, and Walters.⁴ I set the accuracy of the test by, first, perforating the palm of the glove with a 7-0 gauge needle (diameter 220 μ m). The glove was sealed with a tie around the cuff and submerged under water. About 500 ml of air, corresponding to a pressure of about 0.29 kPa, was necessary before any streams of bubbles could be detected coming from the palm. Then 30 to 40 ml of air, corresponding to a pressure of about 0.74 kPa, had to be injected into each finger before any punctures in the fingertip could be detected. A control sample of 20 pairs

of gloves was tested with this method and they were all found to be leak proof. By modifying the technique originally described by Ballbach and associates,⁴ I have therefore devised a test that is standardized and reproducible and thereby minimizes both interoperator and intraoperator variation. Thirty-six pairs of surgical gloves were tested during six cardiac surgical procedures. Twenty sites of leakage were found, 19 in the fingers (eight in the tip) and one in the palm when the first part of the test was performed. However, an additional 29 sites of leakage were found during the second part of our test. Twenty-two of these were found in the fingertips. I used 10 pairs of unused gloves as controls, and they were all found to be intact during both parts of the test.

I suggest that the test originally described by Church and Sanderson² is inaccurate. In the future, the method of detecting glove perforations ought to be better defined.

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Classification of variant courses of the posterior descending artery

To the Editor:

I was interested in the anatomic study on the posterior descending artery performed by Arsiwala and Panday (*J THORAC CARDIOVASC SURG* 1993;105:952-3) and the surgical inferences drawn.

I was taught about this anatomic variation in the branching of the right coronary artery by John E. C. Wright of the London Chest Hospital. We subsequently did a small study to define the prevalence of different branching patterns (Adams and Treasure, *Thorax* 1985; 40:618-20). We studied angiograms ($n = 100$), the coronary anatomy as displayed at operation ($n = 100$), and postmortem dissections ($n = 22$). We classified them into three patterns (Fig. 1): bifurcation at the crux (*A*), at the acute margin (*B*), or in an intermediate position (*C*). The frequencies are given in Table I.