Reducing Air Embolism and Improving Accuracy During Pediatric Wedge Measurements

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Cardiac catheterization in congenital heart disease has developed in its range of indications and complexity over recent years. Despite this, it has become a minimal-risk procedure in the vast majority of clinical scenarios. To this end, the relative risk of any manipulation or procedural component needs to be very low and as such, incremental advances in reducing clinical risk are welcome.

One such manipulation occurs when exchanging a catheter over a wire when in a wedged position. This may be deep in a branch pulmonary artery, a small systemic artery, or an aorto-pulmonary collateral, but in any case there is a distinct possibility of entraining air during wire removal, often audible as a sucking sound as the wire is removed.

Although the volume of air entrained is likely to be very low; it could still be clinically significant if wedged in a small end arterial vessel, or in a situation where compromising a small subsegmental pulmonary vessel is important or where there is a possibility of pulmonary arterial-venous connections.

It is also likely to decrease the accuracy of wedge pressure readings, as the entrained air will dampen the measured pressure trace.

We have developed a simple technique to avoid entrainment of air in these situations. The method relies on withdrawing the exchanged wire under fluid and therefore entraining saline instead of air. It is described in Figure 1.

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It is our observation that depending on the gauge and length of the equipment being used, up to 1.5 mL of saline will be drawn from the syringe into the catheter, replacing what would otherwise be air entering the circulation. Filling a 2.5 cc syringe, therefore, consistently provides a sufficient amount of fluid to avoid air entrainment.

The technique is quick and simple to master and in our opinion, in a climate where the expectation is one of 0% mortality and ultra-low morbidity, is very worthwhile.

References