Clinical picture

Pulmonary artery catheter placement guided by echocardiography

A 60-year-old woman presented with 3 days history of fever, chills, shortness of breath and productive cough. On arrival to emergency department she was critically ill. Vitals were unstable with blood pressure of 67/30 mmHg, heart rate 122 bpm, respiratory rate 30/min and SPO₂ 78% on 6 l of O₂. Arterial blood gas was done and showed pH of 7.0, PaCO₂ 87 mmHg, PaO₂ 48 mmHg and HCO₃ 9 meq/l. Chest X-ray was done and confirmed right lower lobe consolidation which is consistent with pneumonia (Figure 1). She was intubated, and started on intravenous (IV) antibiotics. Blood pressure did not respond to IV fluid boluses and she was started on IV pressors. She was admitted to the medical intensive care unit with the diagnosis of septic shock and respiratory failure.

Past medical history was significant for liver cirrhosis secondary to hepatitis C and alcoholism, hepatic encephalopathy, gastrointestinal variceal bleeding, hypertension, type II diabetes and congestive heart failure.

In intensive care unit, echocardiogram was done at the bedside and showed dilated chambers with left ventricular ejection fraction on 20% (compared with 35%, 2 years prior). In an attempt to adequately manage her septic shock in the setting of acute decompensated heart failure and to wean her off mechanical ventilation, pulmonary artery catheter (PAC) was inserted to guide fluid management. The first attempt to insert the catheter was made using waveforms-guided technique. Chest X-rays to confirm the catheter position were done and showed that the catheter tip is coiled in the right ventricle (RV) (Figure 1, arrow). That catheter was withdrawn and second attempt was made but this time by two operators; one operator introducing the catheter and looking at the waveforms while the second operator is doing real-time bedside echocardiography. The echo was used to follow the catheter advancement across the right atrium (RA) into the RV (Figures 2 and 3) and finally into the right pulmonary artery (PA) trunk (Figure 4). Chest X-ray was done after this approach and showed the correct position of the PAC (Figure 5).

Discussion

PAC, also known as Swan-Ganz catheter, has been used less in critical care medicine. This is mainly
because of lack of benefit especially in patients admitted to critical care unit with septic shock. On the other hand, critical care echocardiography is a non-invasive and routinely used tool in the evaluation of critically ill patients with hemodynamic instability. Critical care specialists are becoming more experienced in the use and interpretation of bedside echocardiography. In our case, due to septic shock in the setting of acute decompensated systolic heart failure, PAC was indicated to guide the management using IV fluids, vasopressors and inotropics. The catheter was safely placed using bedside thoracic echocardiography.

This case demonstrates that bedside echocardiography is a useful tool to guide safe placement of PAC in critical care unit when clinically indicated.

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References