The role of echocardiography in pulmonary embolectomy has traditionally included diagnosis and assessment of right heart function [4]. Our case adds the detection of mechanical venous obstruction to this echocardiographic menu. Although an inflow cannula for CPB may be obstructed by a heart structure such as an aneurysmal interatrial septum or a tricuspid valve leaflet, this was unlikely in this case [5]. The interatrial septum was bulging into the left atrium away from the right atrial cannula due to the severe acute pulmonary hypertension and associated right ventricular failure (Fig. 1). The tricuspid leaflets had limited excursion due to the severe dilation of the tricuspid annulus and right ventricle. As a result, they were tethered in the right ventricle, far away from a right atrial cannula.

In summary, the clinical observation from this case is that the complete loss of venous return during CPB for acute embolectomy may be due to thromboembolic occlusion of the venous cannula. This mechanical complication must be added to the intraoperative differential diagnosis of this scenario. Intraoperative transesophageal echocardiography can promptly diagnose the obstruction and guide its management, thus further expanding its utility in pulmonary embolectomy [6].

References


eComment: Surgical options in emergency pulmonary embolectomy

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We read with interest the article of Augoustides and co-workers. We congratulate the authors for the successful result of the treatment, which in these acute patients is not always easy to obtain [1].

The authors describe a case of mechanical obstruction of the cardiopulmonary bypass (CPB) venous cannula during pulmonary embolectomy. They describe a 43-year-old lady with respiratory distress syndrome and consecutive acute severe hypotension. The per-operative echocardiogram was consistent with massive acute pulmonary embolism, and it had showed already ‘serpentine thromboemboli in the right atrium’.

With the present e-comment we would like to discuss some surgical details. In particular the choice of right atrial cannulation at the start of CPB, and the choice of the aorta cross-clamping. Concerning the choice of
right atrium cannulation, the authors explain that this conduct of CPB was deliberately chosen to minimize the risk of thromboembolism, with a manoeuvre performed with a minimal touch technique. We suppose with the aim to decreasing the tension on the right heart, and changing to a bicaval cannulation afterward.

In our experience of pulmonary embolectomy in emergency, we usually perform a bicaval cannulation at the beginning, even with very unstable patients. We insert one metallic right angle tip cannula directly in the superior vena cava without touching the heart. The other cannula for the inferior vena cava is already connected to the venous line, but is clamped. In this way, it is already possible to start a partial cardiopulmonary bypass, and to decrease the tension on the right heart. Then, we proceed to cannulate the inferior vena cava, through a purse string suture done very near to the inferior vena cava, to reduce the manipulation and minimize the risk of embolism. Once cardiopulmonary bypass is fully established we snare both cavae, and we get access to the right atrium, the ventricle, and the pulmonary arteries. We usually do not cross-clamp the aorta, and we perform the procedure on the beating heart. We manage to obtain a clean surgical field using adequate suction and eventually some very short periods of reduced CPB flow. This, in order to avoid myocardial ischemia.

To minimize the risk of embolism another option in cases with thrombus inside the right atrium diagnosed by echocardiography is the venous drainage of the lower part of the body obtained via a femoral cannulation using a long cannula in the inferior vena cava, and cannulation of the superior vena cava through a direct approach or through jugular cannulation as we usually do in minimally invasive heart port technique.

Reference