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CORRESPONDENCE

Anesthesia for the first successful HeartMate II left ventricular assist device implantation in Taiwan

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HeartMate II is the new generation left ventricular assist device (LVAD) approved by the US Food and Drug Administration (FDA) for bridging to transplantation therapy in end-stage heart failure patients.[1] Here we report the first successful HeartMate II implantation in Taiwan.

A 37-year-old man, who suffered from advanced heart failure as a result of ischemic cardiomyopathy, underwent HeartMate II insertion because his heart function was deteriorating despite maximal medical treatment. Anesthesia was conducted as in patients with severe heart failure. A pulmonary artery catheter (PAC) was inserted, because right ventricle (RV) failure is common and it is a leading cause of morbidity and death after LVAD implantation.[2] The PAC was used for monitoring the pulmonary artery pressure, optimizing the use of pulmonary vasodilators and inodilators to decrease RV afterload while maintaining ventricular contractility.

Intra-operative transesophageal echocardiography (TEE) showed a hypokinetic heart with dilated left atrium and ventricle. Mild mitral regurgitation (MR) and tricuspid regurgitation (TR) were noted. There was pulmonary artery hypertension with a TR pressure gradient of about 44 mmHg. A mural apical thrombus (3 cm × 3 cm) was found in the left ventricle (LV).

The implantation steps were done under cardiopulmonary bypass. The apical thrombus was removed after apical coring. The alignment of mitral valve and inflow cannula was checked by TEE.

Before LVAD was activated, we gently shook the heart in a Trendelenburg position and needle punctured the LVAD outflow tract to assist in de-airing of the intracardiac air bubbles. Protamine was then administered slowly. Abrupt elevations of pulmonary artery pressure (PAP) and central venous pressure (CVP) and a plunge of blood pressure developed shortly after activation of the LVAD pump. Significant ST segment elevation was noted in lead II. TEE showed severe TR and flattening of the interventricular septum (IVS) (Fig. 1). Protamine-induced pulmonary vasoconstriction, high LVAD pump speed causing leftward IVS shift or right coronary artery (RCA) air embolism-related RV dysfunction were considered. Pump speed was decreased from 9600 rpm to 9000 rpm. Dobutamine, dopamine, and milirinone were titrated to optimize RCA perfusion pressure, increase RV contractility and decrease RV afterload. The patient condition was stabilized and transferred to the intensive care unit. The endotracheal tube was removed the next day. He was discharged to go home 1 month after surgery, and was assessed as New York Heart Association functional class II.

TEE is essential to enable surgeons and anesthesiologists to make prompt decisions during LVAD implantation. TEE is

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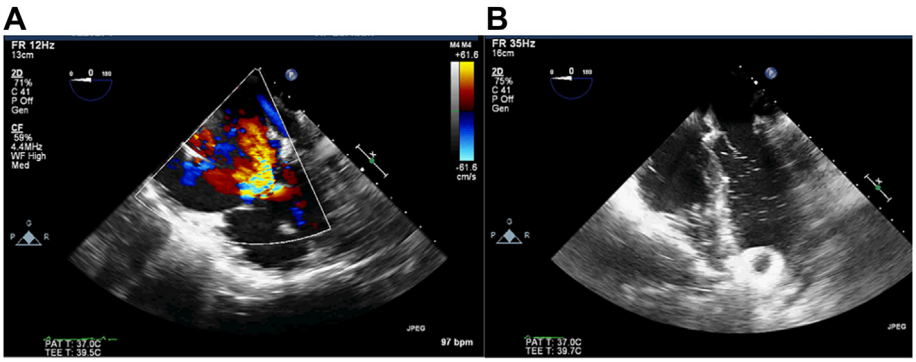

Figure 1 (A) Left panel: A midesophageal two chamber view, sowing severe tricuspid regurgitation and flattening of interventricular septum (IVS) shortly after initiation of HeartMate II pump. (B) Right panel: A transverse midesophageal four chamber view, showing IVS returned to a neutral position after reducing the pump speed.

necessary for detecting cardiac structural and functional abnormalities: ventricular dysfunction, valvular pathology, mural thrombi, and atrial septal defect or patent foramen ovale.[3,4] AI and MS which decrease LVAD output should be corrected if they are greater than a moderate degree.

There might be a transient RV dysfunction after LVAD initiation: intracardiac air migrating to coronary arteries, causing transient myocardial ischemia, high pump speed producing RV failure because of a leftward shift of the IVS and severe TR. Adjust the pump spin to produce a slight rightward shift of the IVS with decrease in the degree of TR under TEE.

Careful patient selection, meticulous surgical and anesthesia practice, use of inotropics and inodilators, with PAC and TEE monitoring are important for successful HeartMate II implantation.

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