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Pulmonary Artery Catheterization in the Anesthetized Patient

To the Editor:—Keusch, Winters, and Thys have shown that the head-up and right-lateral tilt position appears superior to Trendelenburg's position for passage of pulmonary artery (PA) catheter in the awake patient.[1] The present report investigated the incidence of cardiac arrhythmia and/or failure to achieve pulmonary artery catheterization when PA catheterization was attempted in the anesthetized patient.

The investigation was carried out in 15 patients undergoing coronary artery bypass grafting (CABG group), and nine patients undergoing mitral or aortic valve replacement (V group). The investigation was approved by the Institution Research Committee, and informed consent was obtained. Following induction of anesthesia and initiation of controlled ventilation, the patient was positioned in a 20-degree head-down tilt, and a flow-directed thermodilution 7-F PA catheter was inserted percutaneously *via* the right internal jugular vein using a sheath introducer. The catheter was advanced to the 20-cm mark. The balloon was then inflated with 1 ml of air and the tip of the catheter advanced through the right ventricle into the pulmonary artery and subsequently wedged in a peripheral pulmonary artery. All patients were continuously monitored by EKG (V_5). The incidence of cardiac arrhythmia was not significantly different between the CABG group (4/15) and the V group (3/9). However, PA catheterization succeeded in all patients of the CABG group, but failed in four patients of the V group. In the latter patients, the balloon was deflated and the catheter was withdrawn so that the tip was 20 cm from the skin; the patients were then positioned in a 20-degree head-up and right-lateral tilt position; systolic blood pressure decreased by about 10–20% following change of position; successful PA placement was achieved in three of the four patients (table 1). The right ventricular outflow tract originates at the upper position of the right ventricle and courses superiorly and to the left in most patients.[1] Thus, putting the patient in the head-up and right-lateral tilt position may facilitate floating of the balloon *via* the right ventricular outflow tract into the pulmonary artery. Also, when the right atrium is markedly dilated and/or fibrillating, the head-up position may decrease stagnation of the blood in the atrium and facilitate the passage of the catheter into the right ventricle.

In the fourth patient with severe mitral and tricuspid regurgitation, atrial fibrillation, and severe pulmonary hypertension, the catheter could not be passed from the right atrium into the right ventricle with the patient in either position (table 1). Tricuspid regurgitation creates a whirlpool type of blood flow in the right atrium denying entry of the air inflated balloon into the right ventricle.[2]

The report supports the previous findings in the awake patient[1] and suggests that the head-up and right-lateral tilt position may be also superior to Trendelenburg's position for PA catheterization in the anesthetized patient. This position may be particularly advantageous in patients with valvular disease and pulmonary hypertension.

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TABLE 1. Preoperative Diagnosis, Site of Coiling a Type of Arrhythmia in the Four Patients of the V Group with Failed PA Catheterization in the Trendelenburg Position. Influence of Recatheterization in the Head-Up and Right-Lateral Tilt Position

Preoperative Diagnosis	Trendelenburg's Position	Head-Up and Right-Lateral Tilt Position
Mitral regurgitation and stenosis	Atrial coiling	Successful pulmonary artery catheterization
Pulmonary hypertension	Atrial premature beats	No arrhythmia
Mitral stenosis tricuspid regurgitation	Ventricular coiling	Successful pulmonary artery catheterization
Left atrial enlargement	Ventricular premature beats	No arrhythmia
Pulmonary hypertension		
Severe aortic regurgitation	Ventricular coiling	Successful pulmonary artery catheterization
	Bigemini	Ventricular premature beats
Severe mitral and tricuspid regurgitation	Atrial coiling	Atrial coiling
Atrial fibrillation	Atrial fibrillation	Atrial fibrillation
Severe pulmonary hypertension		