Pulmonary Artery—Bronchial Fistula*
A New Complication of Swan-Ganz Catheterization

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A patient with a Swan-Ganz catheter developed massive hemoptysis. Injection of radiographic contrast media through the catheter revealed rapid filling of the tracheobronchial tree, consistent with direct pulmonary artery-bronchial communication. Development of hemoptysis in a patient with a Swan-Ganz catheter should alert the clinician to this possibility.

Since 1970, the Swan-Ganz catheter has been very beneficial in the care of critically ill patients. However, both minimal and serious complications are occasionally seen.1-10 Our patient developed massive hemoptysis, probably secondary to direct pulmonary artery-bronchial communication, which to our knowledge has not been previously reported.

Case Report

A 72-year-old man had been observed for several years for arteriosclerotic heart disease and an old inferolateral myocardial infarction. During a routine outpatient visit, he sustained a cardiac arrest. An electrocardiogram revealed ventricular fibrillation, and he was converted by electroshock and taken

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Figure 1. Position of Swan-Ganz catheter in left pulmonary artery prior to onset of hemoptysis.

to the coronary care unit. At that time, physical examination revealed blood pressure of 100/80 mm Hg, pulse rate of 80 beats per minute, and respirations, 16 per minute. An endotracheal tube was inserted; he was placed on a respirator, and other appropriate measures were taken. A Swan-Ganz catheter was placed with no difficulty; the pulmonary artery pressure was 38/20 mm Hg with a mean of 26 mm Hg, and the pulmonary capillary wedge pressure was 21 mm Hg. Pulmonary pressure was monitored continuously, and there was no evidence of persistent wedging of the Swan-Ganz catheter at any time during the hospital course, nor was the balloon left inflated.

Hospital Course

Serial ECGs revealed an evolving anterior myocardial infarction. The patient responded to treatment until the third day when he became restless and irritable. On the fourth day, the Swan-Ganz catheter was changed without difficulty (Fig 1). The pulmonary artery pressure was 31/14 mm Hg with a mean of 22 mm Hg, and the pulmonary capillary wedge pressure was 14 mm Hg. Later that day, a second

Figure 2. Communication between pulmonary artery and bronchus. Water soluble contrast media has been introduced through Swan-Ganz catheter.
episode of ventricular fibrillation also required electroschock for conversion.

On the sixth day, massive hemothymys occurred through the endotracheal tube. Bronchoscopy was not helpful and the surgery department was consulted. The senior surgery resident injected approximately 20 ml of radiographic contrast media through the Swan-Ganz catheter by slow hand injection over a period of approximately one minute. This revealed immediate filling of the tracheobronchial tree (Fig 2). Fifteen milliliters of venous blood was removed from the patient, protamine sulfate was added to reverse heparin effect, and approximately 10 ml of the resulting clot was introduced through the Swan-Ganz catheter. This procedure resulted in immediate cessation of the patient's hemothymys. The Swan-Ganz catheter was then removed and prior heparin therapy was reversed with protamine sulfate. Hemothymys during the entire hospital course was limited to this single episode.

The patient's condition improved for three days. He became alert and responsive. However, on the ninth day, he aspirated a tube feeding and developed pneumonia. On the tenth day, he was found in shock with blood pressure of 60/30 mm Hg, and he died later that day.

PATHOLOGY

Autopsy revealed recent massive pulmonary thromboembolic disease with infarction, thought to have occurred within 48 hours of death. Gastric contents were found in the lungs. Marked necrosis at the site of the Swan-Ganz perforation precluded visualization of a fistula. Old and recent myocardial infarcts as well as a mural thrombus were found.

DISCUSSION

Although much valuable information may be obtained through use of the Swan-Ganz catheter, complications are occasionally seen. Pulmonary infarction may result from persistent wedging of the catheter tip, from leaving the balloon inflated, or from thrombosis developing around the catheter.1-5 Cardiac arrhythmias,6 intracardiac trauma,4,5 knotted catheters,6 systemic venous thrombosis,7 and pulmonary artery perforation8-10 have also been reported.

Chun and Elledstål8 suspected pulmonary artery perforation when their patient felt a bubbly feeling in his windpipe and a sweet taste in his mouth during infusion of 5 percent dextrose in water through his catheter.

Lapin and Murray9 reported a patient with pulmonary hypertension who developed hemothymys shortly after placement of a Swan-Ganz catheter. They surmised that pulmonary artery rupture had occurred, possibly secondary to development of a pressure gradient across a small segment of pulmonary artery allowing the catheter tip to perforate the wall of the artery.

Golden et al10 reported an autopsy-documented fatal case of pulmonary hemorrhage secondary to rupture of a pulmonary artery by a Swan-Ganz catheter.

Although the Swan-Ganz catheter is certainly not designed for angiography, the development of massive hemothymys in this patient led to the installation of radiographic contrast media through the catheter with demonstration of the probable site of bleeding. The slow, low-pressure injection of the contrast media seems an unlikely cause of the fistula. The high viscosity of the contrast media and rapid filling of the bronchial tree suggest the presence of a direct arterial-bronchial fistula rather than filling of bronchi from flooded alveoli. Subsequent infiltrate developed, probably secondary to the water soluble contrast media in the lung, but previous roentgenograms had not shown infiltrates in this area. Embolization of clot via the catheter terminated the hemothymys, and the patient recovered, only to die four days later of other causes.

In conclusion, we wish to describe massive hemothymys probably due to perforation of a pulmonary artery by the catheter tip and subsequent erosion through a bronchial wall. This possibility should be considered when a patient with a Swan-Ganz catheter develops hemothymys so that appropriate therapeutic measures may be taken.

REFERENCES

3 Abernathy WS: Complete heart block caused by the Swan-Ganz catheter. Chest 65:349, 1974