HAEMOPTYSIS FOLLOWING INSERTION OF A SWAN–GANZ CATHETER

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SUMMARY

Haemoptysis occurred in a patient in whom a Swan–Ganz catheter was inserted for the induction of anaesthesia for hemicolectomy. It is suggested that acute pulmonary hypertension, superimposed on existing chronic pulmonary hypertension associated with mitral stenosis, was an important aetiological factor in the haemoptysis.

The introduction of the flow-directed balloon-tipped catheter by Swan and others (1970) has made possible the measurement of filling pressures in the left side of the heart. Before the introduction of the Swan–Ganz catheter, central venous pressure (c.v.p.) measurements were used to assess changes in intravascular volume and cardiac performance. However, even in the absence of cardiopulmonary disease, c.v.p. often does not correlate with pressures on the left side of the heart (Forrester et al., 1971).

Fortunately the complication rate associated with insertion of the Swan–Ganz catheter is low. However, complications do occur occasionally, with potentially fatal sequelae. Haemoptysis following insertion of a Swan–Ganz catheter is reported.

CASE REPORT

A 68-year-old white male presented with a 2-month history of dyspnoea on minimal effort, associated with progressive weakness. He was found to be in cardiac failure with an increased jugular venous pressure, hepatomegaly of 3 cm and ankle oedema. The heart rate was 110 beat min⁻¹ and regular, and systemic arterial pressure was 110/80 mm Hg. Fifteen months previously he had undergone open-heart surgery comprising insertion of mitral valve (Starr–Edwards) and aortic valve (porcine) prostheses for subacute bacterial endocarditis. Subsequently, he was maintained on therapy comprising digoxin 0.125 mg daily, frusenide 80 mg daily, potassium chloride 40 mmol t.i.d., spironolactone 25 mg b.d. and warfarin 7.5 mg daily.

On this admission he was found to have a haemoglobin concentration of 6 g dl⁻¹ with a haematocrit of 22% and evidence of a hypochromic and microcytic anaemia. The e.c.g. revealed an old anterior myocardial infarct and occasional unifocal ventricular premature beats. Chest x-ray showed cardiomegaly and bilateral pleural effusions. Blood-gas analysis before operation was as follows: pH 7.50 unit, PO₂ 9.33 kPa, Pco₂ 4.67 kPa.

A carcinoma of the colon was demonstrated by barium enema and the patient was submitted to hemocelectomy. Before operation one unit of packed red cells was given on alternate days and after 3 units the patient’s haematocrit was 30%. Warfarin was discontinued 3 days before operation and on the day before surgery the prothrombin time and partial thromboplastin time were both normal.

It was decided to insert a Swan–Ganz catheter before the induction of anaesthesia for the following reasons: (1) the patient had unstable cardiovascular function during his previous cardiac surgery and had developed total heart block requiring temporary pacing; (2) the patient was admitted to hospital in cardiac failure; (3) fluid balance problems in the peri-operative period were anticipated in view of the nature of the proposed operation and the patient’s poor cardiac reserve; (4) a central venous pressure catheter would probably not reflect accurately changes in the left side of the heart.

The right radial artery was cannulated and an initial pressure of 130/38 mm Hg recorded. The patient was placed in the Trendelenburg position and the right internal jugular vein cannulated using a 14-gauge needle and an 8 FG percutaneous catheter introducer set was inserted. A 7 FG Swan–Ganz...
catheter was advanced slowly into the right atrium. The patient was placed in a slightly head-up position. The balloon was then inflated with 1.0 ml of air and the catheter advanced further. A right ventricular pressure of 50/5 mm Hg was recorded and a pulmonary arterial pressure of 40/15 mm Hg. After the catheter had been inserted 51 cm a wedge pressure of 18 mm Hg was recorded. Following removal of the introducer, the Swan–Ganz catheter was noted to have advanced an additional 4 cm.

In addition, although the balloon was deflated, the oscilloscope tracing continued to reveal a "wedge pattern". The deflated catheter was withdrawn 1 cm at a time for a total of 5 cm, but the tracing continued to demonstrate a "wedge pattern". At this time, the patient began coughing and within 3 min coughed up bright red blood. He was immediately placed in the Trendelenburg position and the Swan–Ganz catheter removed. One hundred per cent oxygen was administered via a face mask and morphine 5 mg was administered i.v. A second peripheral i.v. cannula was inserted and 2 units of packed red cells given rapidly.

The patient coughed up a total of 250-300 ml of bright red blood over a 30-min period, but vital signs remained stable throughout and he was transferred to the intensive care unit. The patient continued to cough up small amounts of bright red blood for 7 days, but not exceeding 20 ml per day. Chest x-rays revealed a small infiltrate in the periphery of the right middle lobe.

Ten days after the initial episode the patient returned to the operating theatre. It was decided not to use a Swan–Ganz catheter, although a central venous line was placed. An uneventful hemicolectomy was performed.

**DISCUSSION**

Haemoptysis is an infrequent complication following the insertion of a Swan–Ganz catheter. Only five cases have been reported previously, in which haemoptysis was not attributed to pulmonary infarction (Chun and Ellestad, 1971; Lapin and Murray, 1972; German, Allyn and Bartlett, 1973; Golden et al., 1973; Page, Teres and Hartshorn, 1974). Haemoptysis (unassociated with pulmonary infarction) has been attributed in previous cases to perforation of a pulmonary vessel. In a fatal case of haemoptysis Golden and others (1973) found at autopsy a triangular tear in the distal bifurcation of the right pulmonary artery. Following removal of the intact left lung and pulmonary artery passage of a Swan–Ganz catheter to the same position as the right pulmonary artery tear produced a similar tear on the left after inflation of the balloon.

In our patient, perforation of a pulmonary vessel could have occurred when the catheter migrated 4 cm distally, after the wedge position was attained.

Lapin and Murray (1972) believed that the presence of a gradient between mean pulmonary arterial pressure and mean capillary wedge pressure may result in movement of a catheter distally, resulting in perforation of the vessel. Our patient had a small mean pulmonary artery to wedge pressure gradient of 5 mm Hg. Both Lapin and Murray (1972) and Page, Teres and Hartshorn (1974) reported the blood in the haemoptysis to be bright red as in our patient. If the cause were perforation of a pulmonary artery, one might expect the colour to have been dark (mixed venous blood). However, it is conceivable that blood may become oxygenated in the alveoli and airways before being coughed up.

Three of the five patients reported (Lapin and Murray, 1972; Golden et al., 1973; Page, Teres and Hartshorn, 1974) had mitral stenosis. Our patient also had pulmonary hypertension, which is a well-recognized cause of haemoptysis.

We suggest, therefore, that acute pulmonary hypertension (superimposed on existing chronic pulmonary hypertension) is an important aetiological factor in haemoptysis following insertion of a Swan–Ganz catheter.

The management of severe haemoptysis poses several problems including the control of bleeding, the maintenance of ventilation and maintenance of an adequate circulation. Fortunately, in our patient these problems were not severe. In the severe case the use of a double-lumen tube may be life-saving by permitting adequate ventilation of one lung.

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**REFERENCES**


**HEMOPTYSIS APRES INSERTION D'UN CATHETER DE SWAN-GANZ**

**RESUME**

Il s'est produit une hémoptysie chez un patient auquel on avait introduit un cathéter de Swan–Ganz pour induction de l'anesthésie, avant de procéder à une hemicolecotomie. On pense qu'une tension pulmonaire aigüe ajoutée à l'hypertension pulmonaire chronique existante associée à une sténose mitrale, ont été un important facteur étiologique de cette hémoptysie.

**HÄMOPTYSIS NACH EINFÜHRUNG EINES SWAN-GANZ-KATHETERS**

**ZUSAMMENFASSUNG**

Hämoptysis trat bei einem Patienten auf, dem zur Einleitung von Narkose für eine Hemikolektomie ein Swan-Ganz-Katheter eingeführt wurde. Es wird behauptet, dass eine akute pulmonare Hypertension, zusätzlich zu einer vorhandenen chronischen pulmonaren Hypertension im Zusammenhang mit Mitralstenose, ein wichtiger ätiologischer Faktor in der Hämoptysis ist.

**HEMOPTISIS SIGUIENDO LA INSERCION DE UNA SONDA SWAN-GANZ**

**SUMARIO**

Se produjo hemoptisis en un paciente a quien se le introdujo una sonda Swan–Ganz con el fin de inducir anestesia para hemicolecotomía. Se sugiere que la hipertensión pulmonar aguda, superpuesta a la hipertensión pulmonar crónica existente en asociación con estenosis mitral, fue un importante factor etiológico en la hemoptisis.